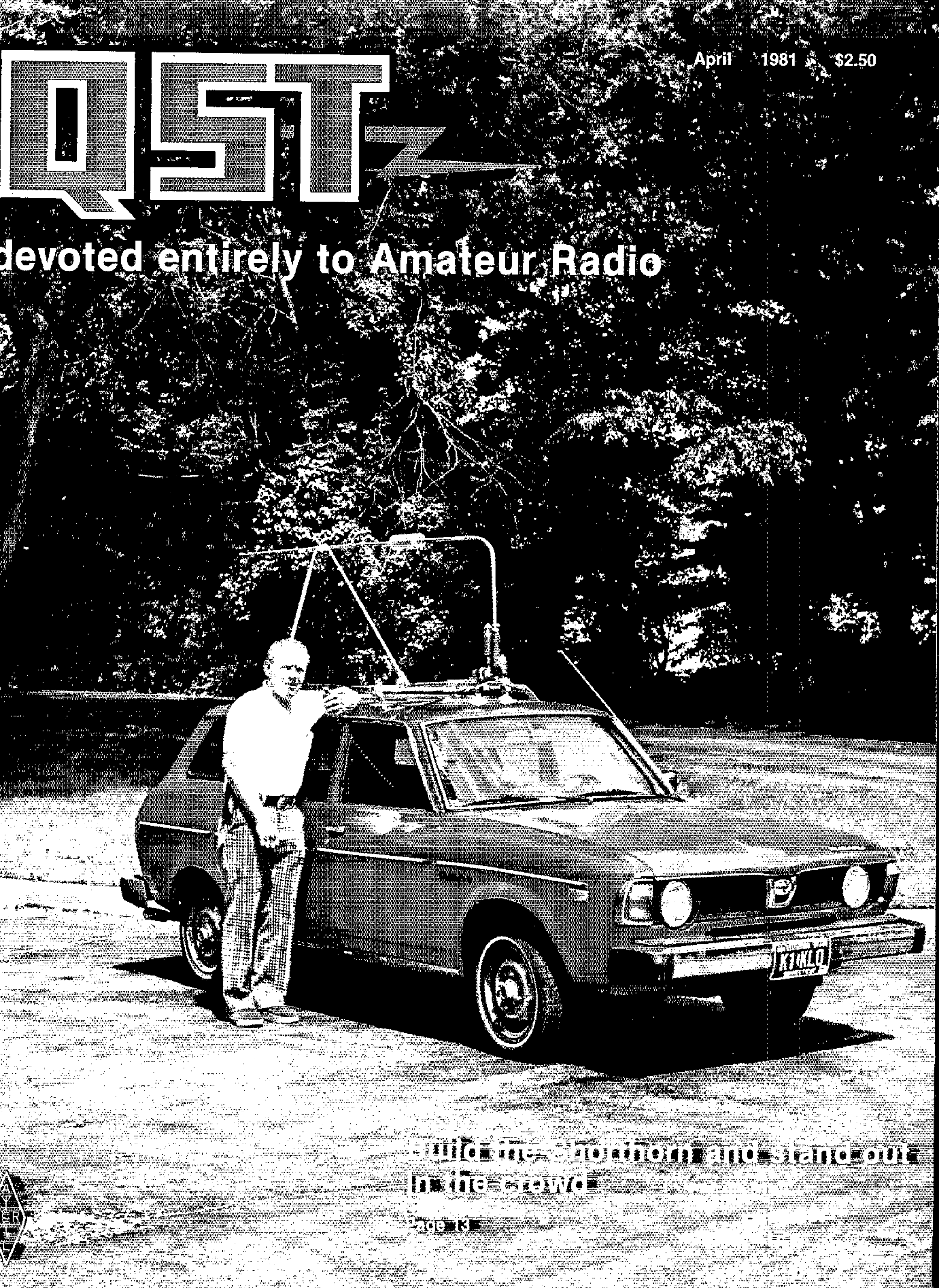
QST
April 1981 $2.50

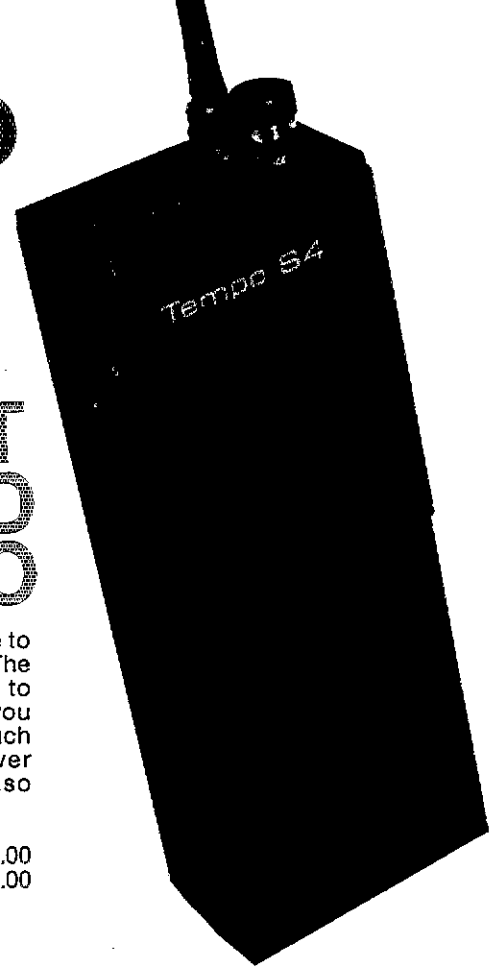
devoted entirely to Amateur Radio



Build the Shorthorn and stand out in the crowd

Page 13

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 model also available.

53 YEARS OF SERVICE

Henry Radio

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
931 N. Euclid, Anaheim, CA 92801 (714) 772-9200
Butler, Missouri 64730 (816) 679-3127

Please note, as of Dec. 1, 1980 we will occupy our new world headquarters building with a new Los Angeles address and phone number.

TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
Calif. residents please call collect on our regular numbers.
Prices subject to change without notice.

NEW FROM HAL

ELECTRONIC MAILBOX FOR RTTY

- DELETEF
- DIR
- ENDFILE
- EXIT
- FILEHELP
- HELP
- KY1ON
- KY1OFF
- KY2ON
- KY2OFF
- PRINTON
- PRINTOFF
- QBF
- READF
- RYS
- WRITEF

MSO-3100
Message Storage
Option for
DS3100 $595.00

DS3100ASR
$1995.00

The DS3100 Super Terminal is now even more versatile with the addition of the new MSO-3100.

The Message Storage Option (MSO) adds mass storage to the DS3100 so that relatively long messages may now be stored and replayed at will. For example, the MSO-3100 will provide more than 32,000 characters of additional storage—approximately 450 lines for messages. Messages are stored in variable length files with user-assigned file names and pass-words for file protection if desired.

The MSO feature may be accessed from either the DS3100 keyboard or by other users through the WRU feature of the ASR terminal. Thus, messages can be written, played, and relayed with either remote or local control.

Automatic TX/RX relay control, CW ID, and user help messages make the "electronic mailbox" easy for all to use. This factory installed option may also be used for brag-tape and net bulletin preparation and storage.

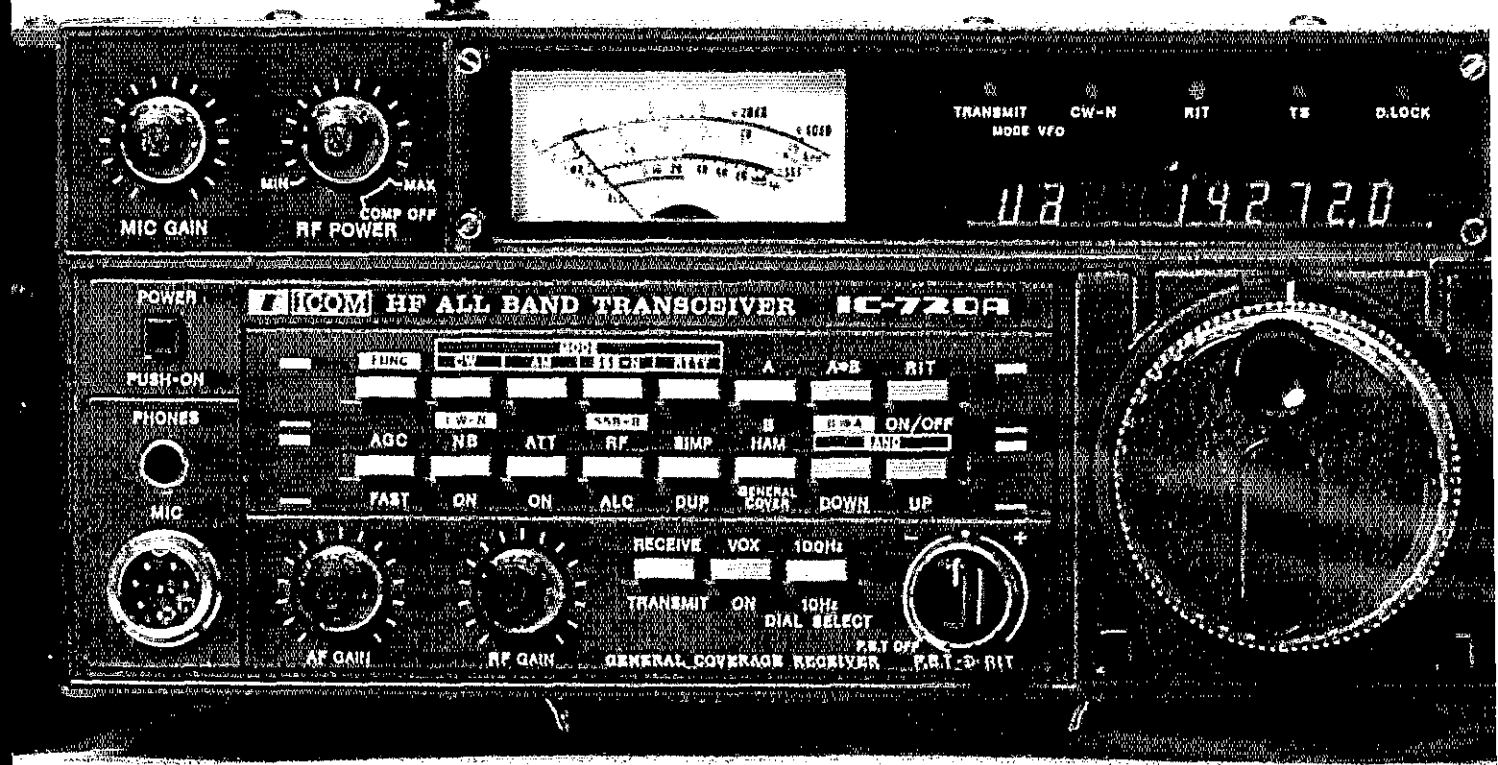
Write or call us for more details.

When our customers talk . . . we listen.

HAL COMMUNICATIONS CORP.
Urbana, Illinois 61801 Box 365 217-367-7373

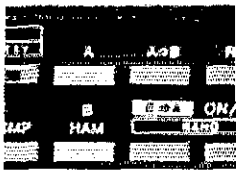
For our European customers, contact: Richter & Co. D 3000 Hannover 1 • Transradio SA, 6816 Bissone/Lugano • Radio Shack, Ltd., London NW6 3AY

ICOM IC-720A

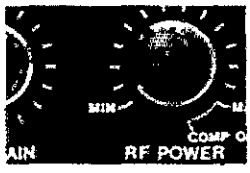


Multi mode operation includes CW/AM/SSB/RTTY — Normally used side band selected automatically.

Simple to use Dual VFO's standard Data transfer button for marking a frequency of interest and storing it in unused VFO.

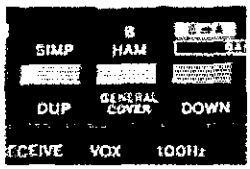


Continuously variable power from 10W to full power — speech processor — LDA channeling module included provides auto band changing capability when increasing your power using the IC-2KL broad banded solid state linear.

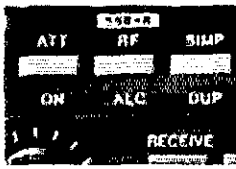


Broadbanded solid state transceiver operation on the 9 amateur HF bands — Readout of mode in use and VFO — Status LEDs for push button functions.

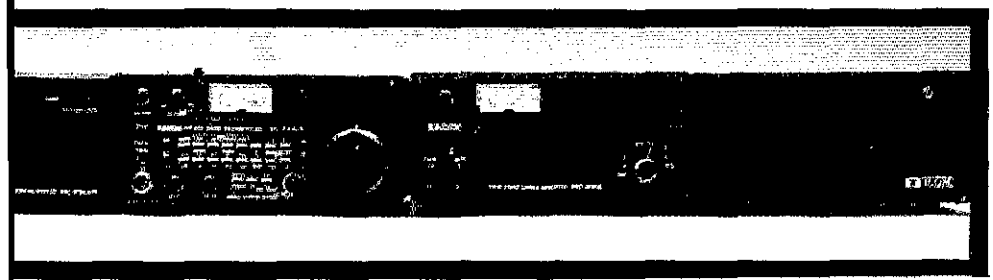
General coverage receiver from a 0.1KHz to 29.999.9MHz — Split VFO operation — Frequency memorized in standby VFO.



Use of RF/ALC switch in conjunction with the internal top hatch cover switches allows monitoring relative RF Out, SWR, collector current and ALC.



The ICOM HF System. We Have You Covered.



HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

ICOM

ICOM AMERICA, INCORPORATED

Sales Service Centers located at:

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Bellevue, WA 98004
Phone (206) 454-8155

3331 Towerwood Dr., Suite 30
Dallas, TX 75234
Phone (214) 620-2780

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THE COVER

If you're the type who prefers to blend into the crowd, you won't want any part of this multiband mobile antenna. On the other hand . . . See page 16.

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Technical

Basic Amateur Radio

General

Operating

Organizational and Regulatory

Departments

The best amplifier value just got better....

Clipperton–L, now with tuned input.

Clipp[illegible]
together [illegible]
ton. [illegible]

If you're like most of us [illegible] Clipperton Linear Amplifier from DenTron [illegible]

The Clipperton-L™ was inspired by the famous DXpedition [illegible] were used. We built the Clipperton-L with 4 rugged economical 572-B's [illegible] provide a full 2KW PEP on SSB and 1KW CW on 10 through 160 meters. With features like high power selector for equal efficiencies [illegible] 2 KW, a power transformer that is vacuum impregnated, wide spaced tuning and loading capacitors, built-in ALC and an improved whisper-quiet cooling system, the excitement of crashing a pile-up can be yours.

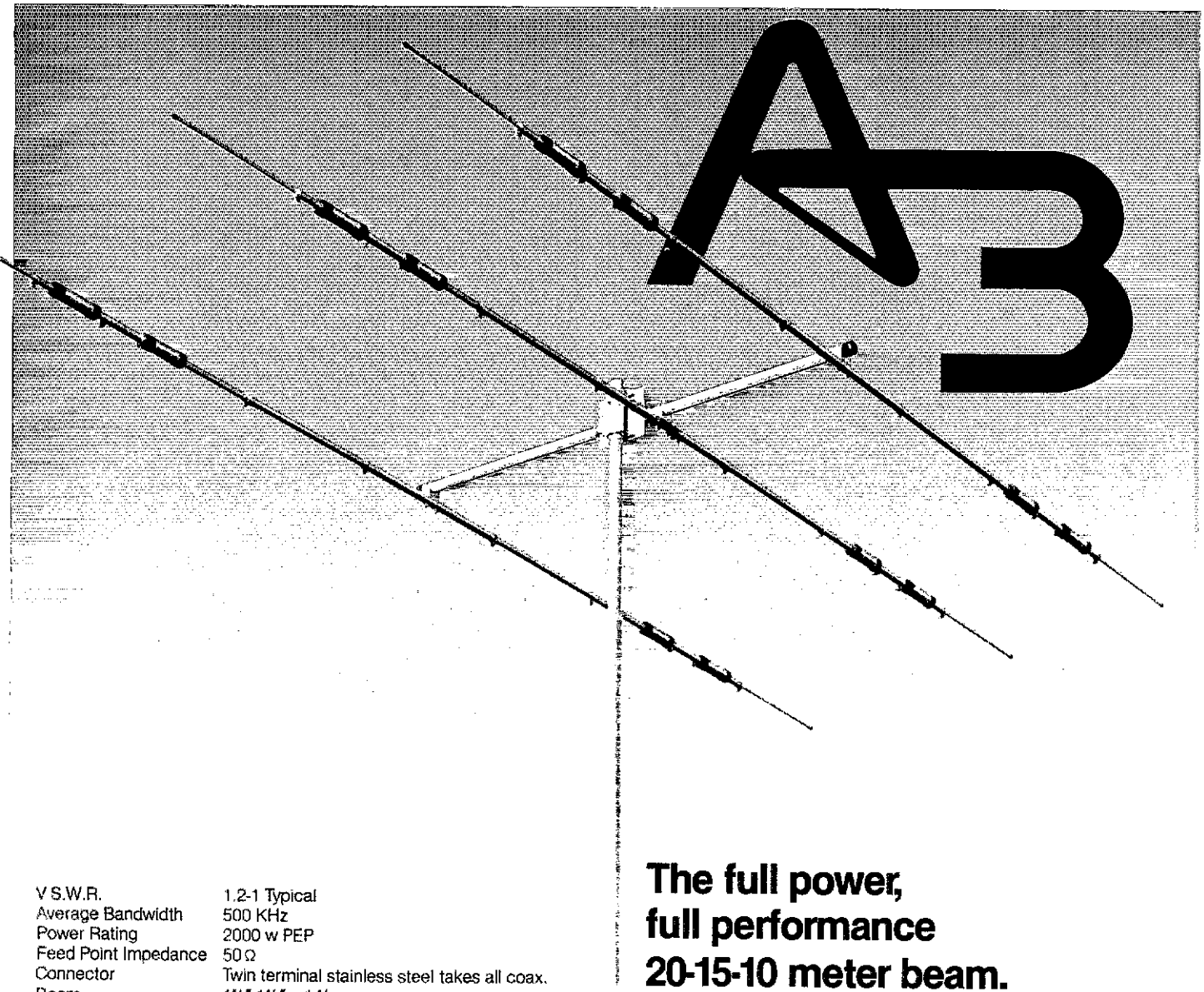
Clipperton-L suggested price $699.50.

FCC Type accepted.

DenTron

[illegible]

Dedicated to making amateur radio more fun.



V.S.W.R.	1.2-1 Typical
Average Bandwidth	500 KHz
Power Rating	2000 w PEP
Feed Point Impedance	50 Ω
Connector	Twin terminal stainless steel takes all coax.
Boom	1⅝"-1½" x 14'
Elements/Longest	1⅛"-½" x 27'9"
Wind Sfc. area	5.6 Feet²
Weight	35 Pounds
Turn Radius	15'6"
Mast Diameter	1¼" min. 2" max.
Material	6063-T832 Seamless aluminum
Fasteners	Zinc Plated Steel
Telescope Method	Taper tubing with full circle clamps

UPS Shippable

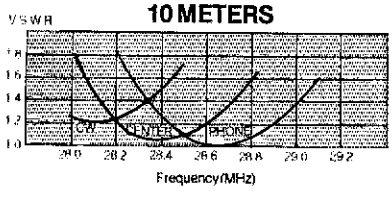
No balun required

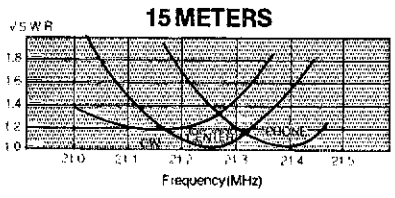
The full power, full performance 20-15-10 meter beam.

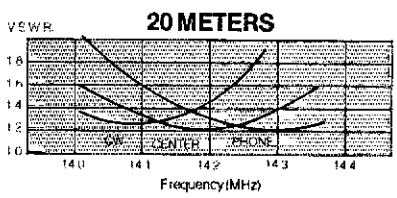
Enjoy the thrill of working rare DX with excellent A3 forward gain. Increase the pleasure of your daily contacts with A3 interference reducing front to back ratio. Use your linear amplifier with confidence in our new A3 high power traps.

Make friends of your neighbors with A3 compact dimensions, low profile, and small turn radius. Satisfy your budget with A3 economy pricing.

The Cushcraft engineering team has again created that unique combination of quality materials, easy assembly and high performance with A3, the three band beam for the eighties.







A LEADER FOR OVER 30 YEARS

cushcraft CORPORATION

The Antenna Company
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108

Top-Notch.

VBT, notch, IF shift, wide dynamic range

TS-830S

Now most Amateurs can afford a high-performance SSB/CW transceiver with every conceivable operating feature built in for 160 through 10 meters (including the three new bands). The TS-830S combines a high dynamic range with variable bandwidth tuning (VBT), IF shift, and an IF notch filter, as well as very sharp filters in the 455-kHz second IF. Its optional VFO-230 remote digital VFO provides five memories.

TS-830S FEATURES:

- **160-10 meters, including three new bands**
  Covers all Amateur bands from 1.8 to 29.7 MHz (LSB, USB, and CW), including the new 10, 18, and 24-MHz bands. Receives WWV on 10 MHz.
- **Wide receiver dynamic range**
  Junction FETs (with optimum IMD characteristics and low noise figure) in the balanced mixer, a MOSFET RF amplifier operating at low level for improved dynamic range (high amplification level not needed because of low noise in mixer), dual resonator for each band, and advanced overall receiver design result in excellent dynamic range.
- **Variable bandwidth tuning (VBT)**
  Continuously varies the IF filter passband width to reduce interference. VBT and IF shift can be controlled independently for optimum interference rejection in any condition.
- **IF notch filter**
  Tunable high-Q active circuit in 455-kHz second IF, for sharp, deep notch characteristics.
- **IF shift**
  Shifts IF passband toward higher or lower frequencies (away from interfering signals) while tuned receiver frequency remains unchanged.
- **6146B final with RF NFB**
  Two 6146B's in the final amplifier provide 220 W PEP (SSB)/180 W DC (CW) input on all bands. RF negative feedback provides optimum IMD characteristics for high-quality transmission.
- **Built-in digital display**
  Six-digit large fluorescent tube display, backed up by an analog dial. Reads actual receive and transmit frequency on all modes and all bands. Display Hold (DH) switch.
- **Adjustable noise-blanker level**
  Built-in noise blanker eliminates pulse-type (such as ignition) noise. Front-panel threshold level control.
- **Various IF filter options**
  Either a 500-Hz (YK-88C) or 270-Hz (YK-88CN) CW filter may be installed in the 8.83-MHz first IF, and a very sharp 500-Hz (YG-455C) or 250-Hz (YG-455CN) CW filter is available for the 455-kHz second IF.
- **More flexibility with optional digital VFO**
  VFO-230 operates in 20-Hz steps and includes five memories. Also allows split-frequency operation. Built-in digital display. Covers about 100 kHz above and below each 500-kHz band.
- **Built-in RF speech processor**
  For added audio punch and increased talk power in DX pileups.
- **RIT/XIT**
  Receiver incremental tuning (RIT) shifts only the receiver frequency, to tune in stations slightly off frequency. Transmitter incremental tuning (XIT) shifts only the transmitter frequency.
- **SSB monitor circuit**
  Monitors IF stage while transmitting, to determine audio quality and effect of speech processor.

More information on the TS-830S is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

Matching accessories for fixed-station operation:

- SP-230 external speaker with selectable audio filters
- VFO-230 external digital VFO with 20-Hz steps, five memories, digital display
- AT-230 antenna tuner/SWR and power meter
- MC-50 desk microphone

Other accessories not shown:

- TL-922A linear amplifier
- SM-220 Station Monitor
- PC-1 phone patch
- HC-10 digital world clock
- YG-455C (500-Hz) and YG-455CN (250-Hz) CW filters for 455-kHz IF
- YK-88C (500-Hz) and YK-88CN (270-Hz) CW filters for 8.83-MHz IF
- HS-5 and HS-4 headphones
- MC-30S and MC-35S noise-cancelling hand microphones

KENWOOD
...pacesetter in amateur radio

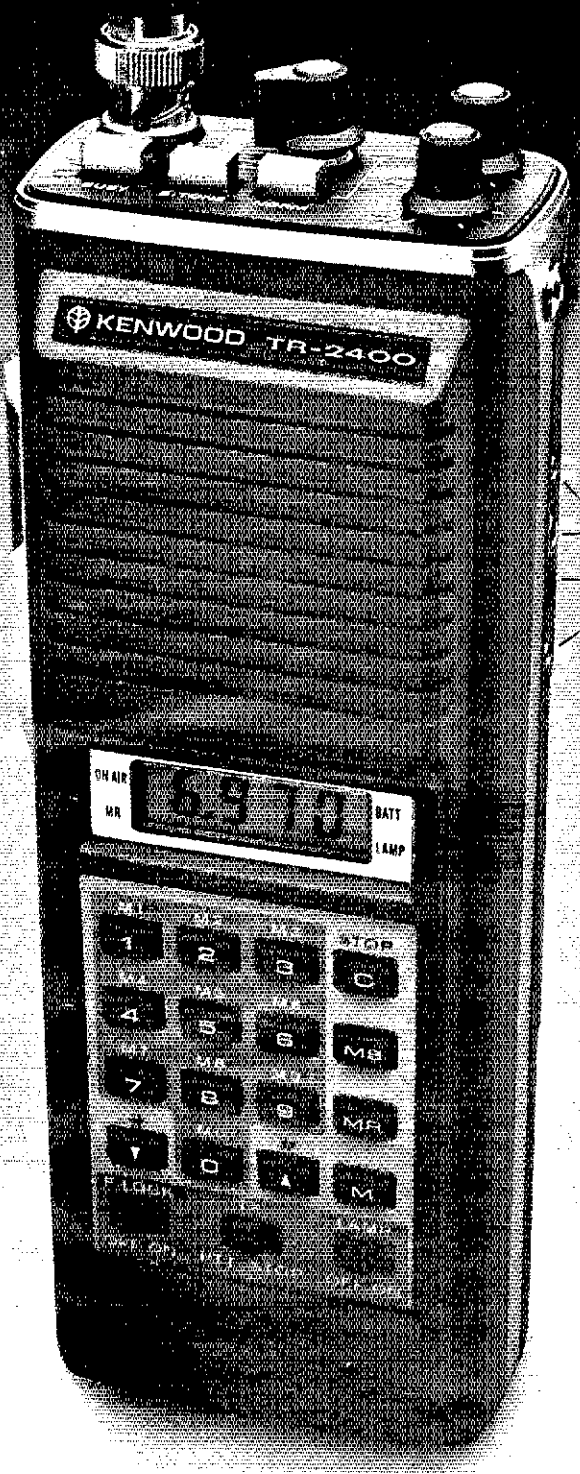
Specifications and prices are subject to change without notice or obligatio

Hand-shack.

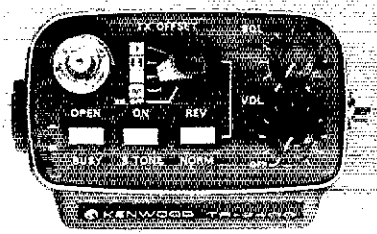
Big LCD, 10 memories, scanning, DTMF

TR-2400

Put a ham shack in your hand. The TR-2400 is the ideal hand-held for 2 meters FM. It features a large LCD readout that can be read in direct sunlight or in the dark, 5-kHz-step PLL synthesized operation, 10-channel memory, scanning, and 16-button autopatch DTMF encoder.



- **Large LCD digital readout**
  Readable in direct sunlight (better than LEDs). Readable in the dark (with lamp switch). Virtually no current drain (much less than LEDs) and display stays on. Rugged and dependable in hot or cold temperature ranges. Shows receive and transmit frequencies and memory channel.
- **5-kHz-step frequency selection**
  PLL synthesized keyboard channel selection system. No "5 up" switch needed. Selects from 144.000 to 147.995 MHz.



CONVENIENT TOP CONTROLS

- **UP/DOWN manual scan**
  Single or fast continuous 5-kHz steps from 143.900 to 148.495 MHz for Amateur and MARS or CAP simplex or repeater operation.
- **10 memories**
  Retained with battery backup (only 2.0 mA). "M0" memory may be used to shift the transmit frequency any desired amount to operate on repeaters with nonstandard split frequencies.
- **Built-in autopatch DTMF encoder**
  All 16 buttons of keyboard provide telephone dual-tones while transmitting.
- **Automatic memory scan**
  Checks all 10 memory channels. Programmable to lock automatically on either BUSY (signal present) or OPEN (no signal) channels.
- **Repeater or simplex operation**
  Convenient mode switch shifts transmit frequency +600 kHz or -600 kHz or to the frequency stored in "M0" memory.

- **Reverse operation**
  Push-button switch shifts receiver to transmit frequency and transmitter to receive frequency.
- **BNC antenna connector**
  Easy to connect external antenna.
- **LCD "arrow" indicators**
  Show "ON AIR", "MR" (memory recall), "BATT" (battery status), and "LAMP" switch on.
- **High-impact case and zinc die-cast frame**
  Extremely rugged with antenna counterpoise.
- **External PTT microphone and earphone connectors**
  Easily accessible on right side of transceiver.
- **Compact and lightweight**
  Only 2-13/16 inches wide, 7-9/16 inches high, and 1-7/8 inches deep. Weighs only 1.62 pounds (including antenna, battery, and hand strap).

Standard accessories included:

- Flexible rubberized antenna with BNC connector
- Heavy-duty (450-mAh) NiCd battery pack
- External-standby (PTT) plug
- External-microphone plug
- AC charger
- Hand strap
- Earphone

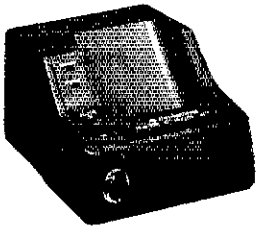
More information on the TR-2400 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

Optional accessories:

- ST-1 base stand (shown) which charges to 90% (to protect battery) in 1.5 hours, with 4-pin connector for dynamic microphone and SO-239 antenna connector
- BC-5 DC quick (90%) charger
- SMC-24 speaker/microphone
- LH-1 deluxe leather case (top-grain cowhide)
- PB-24 extra battery pack with charger adapter
- BH-1 belt hook

KENWOOD

...pacesetter in amateur radio



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Vice Director: Robert C. Smithwick, W6JZU, 516 Remington Dr., Sunnyvale, CA 94087 (408-736-8601 business)

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Vice Director: Marshall Quist, AGØX, 1624 Market St., Suite 200, Denver, CO 80202

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Vice Director: Mrs. Evelyn Gauzens, W4WYR, 2780 N.W. 3rd St., Miami, FL 33125 (305-642-4139)

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Vice Director: Peter F. Matthews, WB6UIA, 3403 S. Walker Ave., San Pedro, CA 90731 (213-547-5816)

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RAYMOND B. WANGLER, W5EDZ, 642 Beryl Dr., San Antonio, TX 78213 (512-733-9632 home, 512-684-5111 business)

Vice Director: Thomas W. Comstock, N5TC, 1700 Dominik, College Station, TX 77840 (713-693-1181)

*Members Executive Committee

Section Communications Managers of the ARRL

Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 73 administrative "sections," each headed by an elected Section Communications Manager. Your SCM welcomes reports of individual and club activity. ARRL Field Organization appointments are available covering a wide range of amateur radio operating interests. Whatever your license class, your SCM has an appointment available. Check with your SCM (below) for further information. Section boundaries are defined in the booklet *Operating an Amateur Radio Station*, free to members.

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British Columbia — H. E. Savage, VE7FB, 4553 West 12th Ave., Vancouver V6R 2R4 (604-224-5226)
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Eastern Pennsylvania — Karl W. Pfeil, W3VA, 211 Schuylkill Ave., Tamaqua 18252 (717-668-3533)
Maryland-D.C. — Karl R. Medrow, W3FA, 718 W. Central Ave., Davidsonville, MD 21035 (301-261-4008)
Southern New Jersey — William C. Luebkemann, Jr., WB2LCC, 116 Country Farms Rd., Marlton 08053 (609-983-8844)
Western New York — William Thompson, W2MTA, RD 1 Rock Rd., Newark Valley, 13811 (607-642-8930)
Western Pennsylvania — Otto Schuler, K3SMB, 3732 Colby St., Pittsburgh 15214 (412-231-6890)

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Indiana — Bruce Woodward, W9UMH, 6208 Bramshaw Rd., Indianapolis 46220 (317-251-5606)
Wisconsin — Roy Pedersen, K9FHI, 510 Park St., Juneau 53039

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North Dakota — Lois A. Jorgensen, WAØRWM, Box 55, Abercrombie 58001 (701-553-8724)
South Dakota — Erwin C. Heimbuck, Jr., KØOTZ, 3312 Parkview, Rapid City 57701 (605-348-5433)

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Nebraska — Shirley M. Rice, KAØBCB, 510 East 16th St., Scotts Bluff 69361 (308-632-4337)

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Santa Clara Valley — Jettie B. Hill, W6RFF, 22410 Janice Ave., Cupertino, CA 95014 (408-255-6714)

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West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

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Utah — Royce Henningson, K7QEQ, P. O. Box 1267, Moab 84532 (801-259-5018)
Wyoming — Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82001

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THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

A Bargain Awaits You!

When the Board of Directors of the League met on March 11, almost the first item of concern was the financial stability of the League, a concern which we addressed on this page last month. The directors listened to extensive oral reports from the president, the general manager, the treasurer, and the Management & Finance Committee. There was lengthy discussion, and every officer and director present had an opportunity to ask questions and to participate so that he would know exactly what was involved and so that all directors had the benefit of each other's thinking.

From these discussions a number of thoughts emerged. Inflation continues to plague us, and despite reductions in staff that have taken place over the past several years, the forecast is for difficult times for ARRL in 1981 and 1982 unless we find additional revenue. Advertising rates were increased both last spring and this spring, to a total of nearly 50%, and no additional revenue can be expected from that source at the present time. Some of the League's income is from the sale of various technical and operating manuals, but it does not appear likely that we can soon increase that source of money. Unlike many not-for-profit groups, such as universities and museums, we have not yet achieved a successful fund-development program which would solicit grants and gifts from corporations, foundations and well-to-do individuals.

The general manager was asked if he could not make substantial cuts in the various membership services offered by the League, whether we could not cut back in various areas of our operation. The answer is, of course, that we can indeed make further cuts in many areas, but only to the detriment of the goals of the League. You see, the basic problem confronting us is not whether the League could be operated at a lower level of achievement, but what we can do to continue the League's existing role in the face of a national economy that has some real difficulties. The League is the leader of Amateur Radio in Canada and the United States. The League does, in fact, play a key role in international Amateur Radio, a role that has been acknowledged worldwide. We will, now and forevermore, be challenged both at home and overseas by those who would like to make use of some of our precious frequency bands. The League must not, it cannot, abdicate its leadership role in Amateur Radio, either domestically or internationally.

The Board has recognized the need to maintain leadership, and thus voted at its March 11th meeting to increase annual dues in the ARRL to $25 yearly, effective July 1st, 1981. That would, because of the postal surcharges, be $30 in Canada and $33 elsewhere outside the U.S. In addition, in order to protect those who are retired and on fixed incomes the Board established a special dues rate, available upon request, for Full members over 65 years of age of $20 annually.

We know full well that this is going to be disturbing to some of our members, particularly those who are on a fixed income, or who work in industries where the income levels have not kept up with inflation. That's why the Board held off the effective date of the dues increase until July 1st, to give existing members and would-be members an opportunity to extend their present memberships for periods up to three years at the existing dues rate of $18. Others of you may find that this is an opportune time to become Life Members of the League. If you want to extend your present membership, or to sign up as a new member, for a term of up to three years, the cost in the U.S. is presently $18 for one year, $35 for two years, and $51 for three years. Elsewhere, including Canada, the cost is $26 for one year, $51 for two years, and $75 for three years, in U.S. funds. For Life Membership, the fee is currently $450 in the U.S. and $650 elsewhere, payable either in one lump sum or in eight quarterly payments over a two-year period, U.S. funds.

The decision to raise the basic dues structure of the League was not an easy decision for the Board to make, but it was made with the conviction that even at $25 annually League membership is a good value. Furthermore, that decision was made with the conviction that the League must remain financially strong in order to maintain its position of leadership and to ensure that Amateur Radio is adequately represented wherever and whenever necessary.

But, between now and July 1st, take advantage of an even greater bargain and renew at those lower rates we mentioned above. — *Richard L. Baldwin, W1RU*

The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, bonded for the promotion of interest in Amateur Radio communication and experimentation, for the relaying of messages by radio, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worthwhile amateur in the nation and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in Amateur Radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite, although full voting membership is granted only to licensed amateurs.

All general correspondence should be addressed to the administrative headquarters at Newington, Connecticut 06111.

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Canadian Counsel: S. Robert Benson, Q.C., VE2VW, 1010 St. Catherine St. West, Montreal, PQ H3B 3R5

*Executive Committee Member

League Lines...

AMSAT Deutschland invites interested parties to comment by April 15, 1981, on its selection of frequencies for the next AMSAT Phase 3B satellite. AMSAT-DL is prepared to change these frequencies if it anticipates serious problems. U-Transponder: uplink 435.300-435.150 MHz; downlink 145.820-145.970 MHz; general beacon 145.8125 MHz; and engineering beacon 145.990 MHz. L-Transponder: uplink 1269.950-1269.150 MHz; downlink 436.150-436.950 MHz; general beacon 436.040 MHz; and engineering beacon 436.020 MHz. Address your comments by April 15, 1981 to AMSAT Deutschland e. V., D-3550 Marburg-1, Holderstrauch 10, Federal Republic of Germany.

Canada now has a third party traffic agreement with Australia and a reciprocal operating agreement with Ireland.

The FCC has been receiving a large number of inquiries about the licensing of club, military recreation and RACES stations, so it has released a public notice to clarify the status of these stations. The Commission will no longer license new club, military recreation or RACES stations; however, it will continue to modify and/or renew presently-existing licenses for these types of stations. The FCC found that the desire for a new license most often arises in connection with Amateur Radio clubs. Clubs which do not already have a club station license may choose a licensed Amateur Radio operator as a trustee for the station and then use the trustee's primary call sign as the club's call sign. For more information, call the Consumer Assistance Staff at the FCC's Gettysburg, Pennsylvania facility: 717-334-9167.

House Bill 6235, the Connecticut legislation that proposed limiting that state's towns from over-regulating Amateur Radio antennas, died in committee. This information was received at Hq after the item in this month's "Happenings" was written. The bill had substantial support in committee, but when HB 6235 was considered in a package with other planning and zoning proposals, several legislators in favor of the bill were forced to vote against it. Representative David Thorp, KA1KC, sponsor of the bill, plans on introducing another bill in next year's legislative session avoiding HB 6235's problems, and Hq and he have already begun laying the groundwork.

When you inform Headquarters of an address change, renew or extend your ARRL membership, or write concerning your membership, it is extremely important that you indicate the information contained on the top line of your QST mailing label. What does all that gobbledygook mean? The first set of numbers with a check character at the end is your membership number. Next is the issue number, which is followed by the month of your membership expiration plus the first character of the name of the ARRL division where you vote. The last characters to appear are your callsign. If you have a label with the three vertical X's, that is a Zip code change indicator which tells the printer that your label is the first of your particular Zip code.

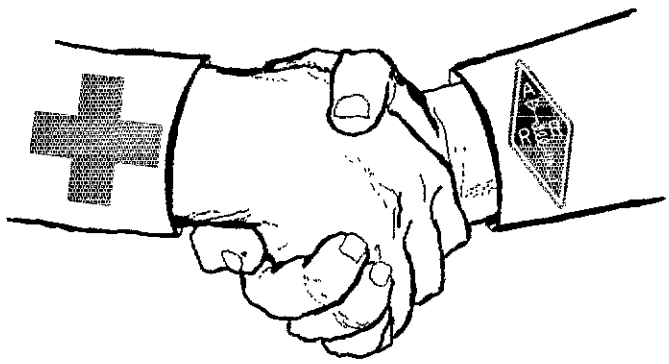
Volunteers would be permitted to assist the FCC in monitoring violations of Amateur and CB rules and in preparing and administering FCC examinations under a bill just introduced into the House by U.S. Representative William E. Dannemeyer, R-California. The bill, HR 2203, has been assigned to the Subcommittee on Telecommunications, Consumer Protection and Finance, Committee on Energy and Commerce. See "Happenings" in this issue for more details.

The CRRL has asked the Department of Communications to remove the restrictions on Canadian amateur operations on the 160-meter band. One problem is that Canada will continue to operate its east coast LORAN-A chain on 1950 kHz for two more years. The CRRL has proposed temporary restrictions on amateur operation between 1925 and 1975 kHz until this operation ceases.

A bill introduced into the Maryland House of Delegates, Bill 445, would have outlawed radar detectors in that state. Concerned about the bill's possible adverse affects on amateur microwave activities, ARRL Vice Director Hugh Turnbull, W3ABC, from the Atlantic Division, and Chris Imlay, N3AKD, from the League's General Counsel's Office in Washington, testified before the Judiciary Committee. The bill died in committee.

A U.S. Court of Appeals has issued an opinion in a case it decided against two Michigan individuals who were selling subscription TV (STV) decoders to the public. The court ruled that STV is not broadcasting; therefore, an STV company can use Section 605 of the Communications Act (secrecy of communications provisions) as the basis for bringing an action against any person who provides decoders to non-subscribers. Chartwell Communications Group v. Westbrook, ___ F.2d ___, (6th Cir. No. 80-1566, December 29, 1980).

Operation Red Cross Message Relay



To honor the 100th birthday of the Red Cross, the ARRL field organization is gearing up for an ambitious venture to coincide with the Red Cross National Convention in May.

By Robert Halprin,* K1XA

"Amateur Radio operators provided the Red Cross with communications between the various temporary shelters, helping to reunite separated families . . ."

"Hams assisted Red Cross personnel by conducting a street-damage survey . . ."

"In a disaster such as Hurricane Allen, thousands of health-and-welfare messages were sent out of the disaster area via ham radio operators stationed at Red Cross centers . . ."

"When two large propylene tanks exploded, hams assisted the Red Cross by manning evacuation shelters . . ."

"The American Red Cross chapter house was without telephone service as the twister passed less than a block north of them. Radio amateurs went to the chapter house and supplied communications with the emergency-operations center . . ."

"ARES responded promptly to our request to come to the district office of the American Red Cross and operate communications equipment — their performance was excellent. Without their support, it would have been most difficult for this office to carry out its mandated disaster responsibilities in an efficient manner."

These are a few glimpses of Red Cross/Amateur Radio hand-in-hand operations throughout the League world. The two organizations working together successfully is nothing new. To this effect, the American National Red Cross and the ARRL have maintained a formal cooperative agreement since 1940. The League, through our field organization, offers both emergency-communications planning in the pre-disaster phase and emergency-communications facilities in the emergency phase to Red Cross chapters from coast to coast.

A cordial relationship between ARRL Hq. and Red Cross officials at the national level has existed for many years, as has a joint effort to promote cooperation at the local level. And it has had productive results, as shown by the opening examples. To enhance further such cooperative efforts and to help the Red

THE AMERICAN RADIO RELAY LEAGUE

RADIOGRAM

VIA AMATEUR RADIO

NUMBER	PRECEDENCE	HX	STATION OF ORIGIN	CHECK	PLACE OF ORIGIN	TIME FILED	DATE
1	R		WA6YBT	30	LOS ANGELES CA		APRIL 5

To

AMERICAN RED CROSS CONVENTION
W4PAY
FAIRFAX VA

THIS RADIO MESSAGE WAS RECEIVED AT
AMATEUR STATION _____ PHONE _____
OWNER _____
STREET ADDRESS _____
CITY AND STATE _____

CONGRATULATIONS ON THE CENTENNIAL OF
THE NEXT CENTURY WILL PROVIDE
BETWEEN OUR CHAPTER AND THE
THE AMERICAN RED CROSS X
EVEN MORE OPPORTUNITIES FOR COOPERATION
RADIO AMATEURS OF THE ARRL

ERIC ROSE
EXECUTIVE DIRECTOR
WEST LOS ANGELES CHAPTER

SENDER'S ADDRESS AND PHONE NUMBER FOR REFERENCE

FROM	DATE	TIME	TO	DATE	TIME
REC'D			SENT		

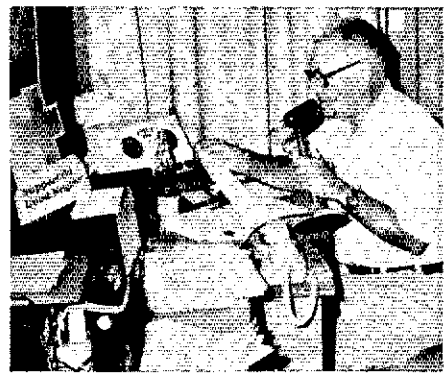
THIS MESSAGE WAS HANDLED FREE OF CHARGE BY A LICENSED AMATEUR RADIO OPERATOR. WHOSE ADDRESS IS SHOWN IN THE BOX AT RIGHT ABOVE. AS SUCH MESSAGES ARE HANDLED SOLELY FOR THE PLEASURE OF OPERATING, NO COMPENSATION, DIRECT OR INDIRECT, PAID OR PROMISED, CAN BE ACCEPTED BY A STATION OWNER, FOR THE SAME REASON, NEITHER EVENTUAL DELIVERY NOR ACCURACY OF COPY CAN BE GUARANTEED. ANY REPLY MAY BE FILED WITH THE STATION DELIVERING THIS MESSAGE TO YOU. FURTHER INFORMATION ON AMATEUR RADIO MAY BE OBTAINED FROM A.R.R.L. HEADQUARTERS, 225 MAIN STREET NEWINGTON, CONN 06111.

THE AMERICAN RADIO RELAY LEAGUE, INC., IS THE NATIONAL MEMBERSHIP SOCIETY OF LICENSED RADIO AMATEURS AND THE PUBLISHER OF QST MAGAZINE. ONE OF ITS FUNCTIONS IS PROMOTION OF PUBLIC SERVICE COMMUNICATIONS AMONG AMATEUR OPERATORS. TO THAT END, THE LEAGUE HAS ORGANIZED AN AMATEUR RADIO PUBLIC SERVICE CORPS (ARPSC), CONSISTING OF THE AMATEUR RADIO EMERGENCY CORPS (ARES) FOR WORK DURING EMERGENCIES, AND THE NATIONAL TRAFFIC SYSTEM (NTS) FOR DAILY NATION-WIDE MESSAGE HANDLING. THE TWO DIVISIONS SUPPLEMENT EACH OTHER IN DAILY OPERATION. MORE INFORMATION IS AVAILABLE FROM A.R.R.L. HEADQUARTERS. (LITHO.—U.S.A.)

Fig. 1 — All Red Cross chapters are encouraged to send this radiogram for the special message relay.

*Assistant Communications Manager, ARRL

WB8QGB checks out a 2-meter rig at the local Red Cross chapter disaster communications center.



Many Red Cross chapters have Amateur Radio stations right on their premises, enabling local clubs and ARES groups to enjoy those facilities. The Ardmore, Oklahoma, ARC station, W5JP, is permanently located at the Red Cross chapter house in Ardmore. Shown at the controls is Marty Green, K5OWK, who has served for the past four years as communications chairman for the Carter County chapter of the Red Cross. *(photo courtesy of W5BLW)*

Cross celebrate their centennial, ARRL will honor the Red Cross by implementing a special message relay to coincide with their National Convention, to be held in the Washington, DC area, May 17 to 21.

There are approximately 3000 Red Cross chapters across the United States, some having very strong ties to Amateur Radio, some needing improvement in this area. To better promote this local contact between radio amateurs (especially the League's Amateur Radio Emergency Service) and Red Cross personnel, a goal has been set for each Red Cross chapter to originate via the National Traffic System a congratulatory radiogram that will arrive prior to the convention.

All ARRL section communications managers (page 8, *QST*), section emergency coordinators and section traffic managers have received a package of information from ARRL Hq. outlining a plan of attack to assist in the implementation of the ARRL/Red Cross Message Relay in their section. Fig. 1 shows the standard radiogram that all Red Cross chapters will be encouraged to send. Please note that *all* congratulatory radiograms should be addressed to the central collecting point, W4PAY, as follows:

AMERICAN RED CROSS CONVENTION
W4PAY
FAIRFAX VA

By the time this article appears, the message-relay planning will be well underway in most ARRL sections. Contact your SCM for more details. [Note: The Canadian Red Cross is under a separate administration and, as such, is not celebrating a centennial. However, Canadian sections are encouraged to participate wherever possible.] ARRL district and local emergency coordinators will likely be in the forefront of making contact with chapters in their jurisdictions and eliciting the message originations. All radiograms should be originated no later than April 30. The traffic will be collected by the Red Cross Amateur Radio Club, W4PAY (under the leadership of John Manning, WB4MAE), and will be presented to high-ranking Red Cross officials at an appropriate ceremony during the convention. This presentation of a massive number of radiograms will be an impressive display of support from the Amateur Radio/ARRL community for the good work done by the Red Cross.

Service is Amateur Radio Tradition

Service to the public has been a traditional responsibility of the Amateur Radio Service. It is significant that Part 97 of the FCC's Rules and Regulations mentions, as the very first principle under "Basis and Purpose," the following:

"(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary non-commercial communication service, particularly with respect to providing emergency communications."

ARES and NTS exist as the League's implementation of this basic principle for the basis and purpose of our fraternity. Although many League members are familiar with the League's field organization and its role in the public-service scheme of things, many of us are unfamiliar with the mission of the Red Cross. This article is a convenient vehicle to sketch the Red Cross organization, for improved understanding on both sides.

The American National Red Cross, by virtue of a congressional charter, has long served as the nationwide agency through which the American people voluntarily extend assistance to individuals and families who are in need because of disasters. The chapter is the local unit of the Red Cross, and is responsible for all activities of the agency within its particular territory — subject to the policies and regulations of the national organization. Groups of chapters are organized into divisions which report to one of four area field offices. Since the chapter is essentially the focal point for Red Cross activities, it is at this level that the Amateur Radio interface is most important.

Each Red Cross chapter is responsible for developing a special disaster-preparedness and relief committee, composed of the best-qualified volunteers available. The committee studies the disaster hazards of the territory and surveys local resources for personnel, equipment and supplies, including transportation and emergency-communications facilities that are available for disaster relief. It also formulates cooperative plans and procedures with local government agencies and private organizations for carrying on relief operations in case of disaster.

When floods, hurricanes or other natural disasters threaten or actually occur, the Red Cross provides food, clothing, shelter, blood and blood products, and medical and nursing or hospital care on the basis of evident need.

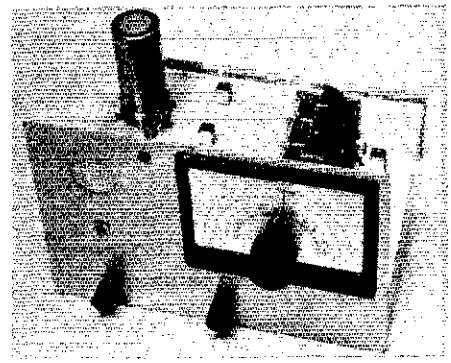
League's Assistance Welcomed

The Red Cross welcomes the cooperation and assistance of the League's traffic/emergency field organization. Red Cross chapters and divisions may further this cooperation by requesting an ARRL official (typically the DEC or EC) to serve on the disaster committee. In an emergency, the Red Cross often requests the assistance of ARES officials nearest the disaster scene. Through their nationwide system, the American National Red Cross Disaster Services coordinates the total resources of the organization for use wherever needed in large disasters. For more information, please refer to "Red Cross Division Communications," by Malcolm Mallette, WA9BVS, in October 1980 *QST*, page 50.

The ARRL/Red Cross Message Relay provides amateurs with a marvelous opportunity either to open the lines of communication with their counterparts in Red Cross chapters or to renew old acquaintances. The result will be an improved disaster response by both organizations, and everyone benefits.

Receiving with Plessey ICs

Four ICs and three bipolar transistors make possible this simple 75/80-meter receiver with high dynamic range. A subsystem chip is the heart of this circuit.



By Peter Chadwick,* G3RZP and Doug DeMaw,** W1FB

Have you worked with a subsystem IC? If not, the circuit approach discussed here should stimulate your interest in doing some design work with these multifunction chips. This is not a construction article, and for the present there is no pc-board pattern available. Our purpose is to illustrate a circuit and describe the performance characteristics it offers.[1]

Experienced builders should have no difficulty in developing a pc-board layout for the prototype discussed in this article. Others may wish to build their own version in a more compact format, and with circuit modifications of their choice. Some of the components are of British origin, while others are available from Radio Shack stores. We will specify inductance and turns-ratio values for the inductors and transformers for those who wish to construct equivalents to the British parts.

What is a Subsystem IC?

For the most part a subsystem is a type of LSI (large-scale integration) IC. That is, it has a large collection of individual circuits or stages formed on a single substrate (foundation). A number of semiconductor manufacturers offer subsystem chips, including RCA and National Semiconductor. Plessey has been in the subsystem business for quite some time, but their components were difficult, if not impossible, to obtain by small-quantity buyers in the USA. Thanks to the help of U.S. National Sales Manager Paul Cooper, K6PY, the situation has improved somewhat.[2] Information on securing Plessey semiconductors is available from the U.S. eastern office of Plessey.[3]

Fig. 1 shows the functional aspects of the Plessey SL6700 subsystem in block form. The actual circuit has thus far been unavailable from the manufacturer. The IC contains two i-f amplifiers, a doubly balanced modulator (or product detector), noise blanker, a-m detector and age generator. The general lineup suggests a number of interesting amateur applica-

*Applications engineer, Plessey Semiconductors, England
**Senior Technical Editor, ARRL

'Notes appear on page 15.

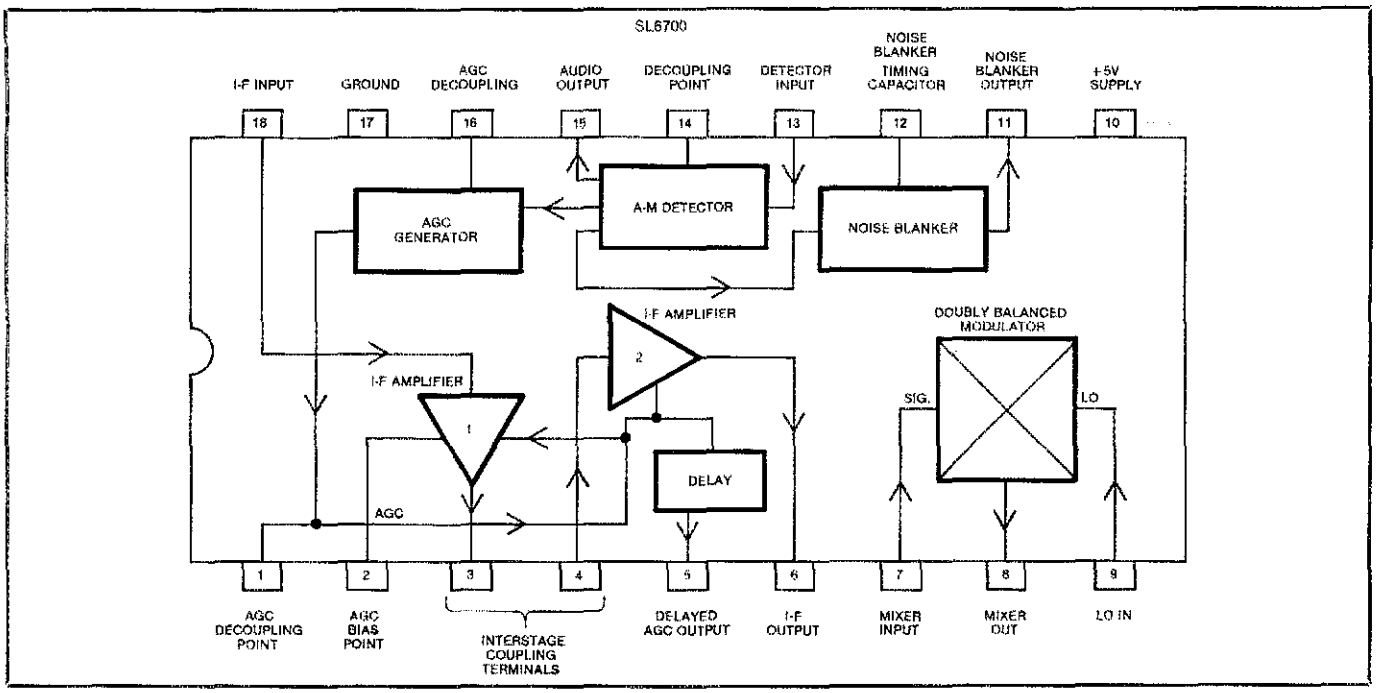


Fig. 1 — Block diagram of the inner workings of the SL6700 subsystem IC.

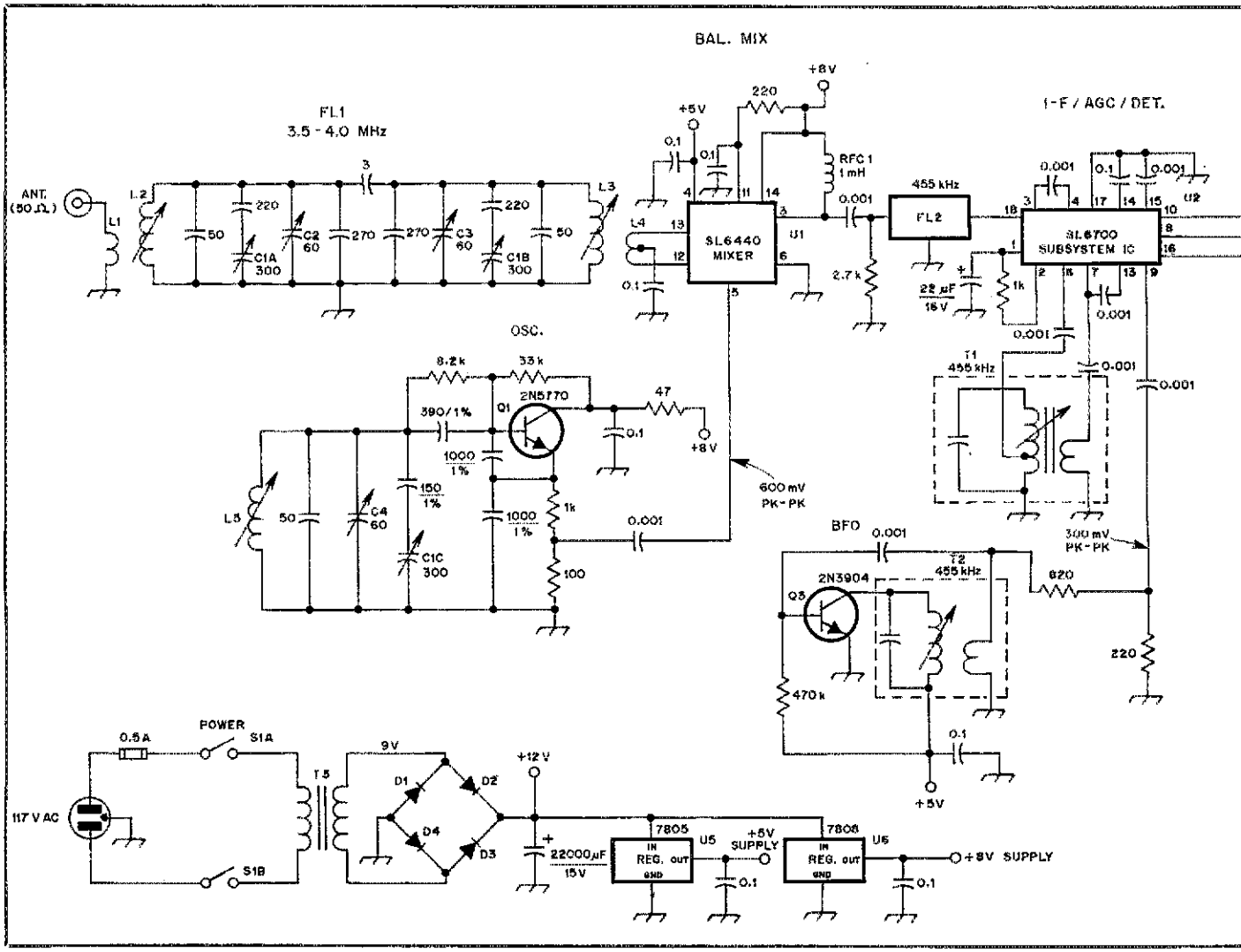


Fig. 2 — Schematic diagram of the G3RZP 80-meter receiver. Fixed-value capacitors are disc ceramic unless otherwise indicated, except for those in FL1, which are polystyrene. Fixed-value resistors are 1/4- and 1/2-watt composition types. Polarized capacitors are electrolytic.

C1 — Three-section variable, 300 pF per section (Jackson Bros., Ltd.).
C2, C3, C4 — Polystyrene trimmer, 60 pF max.
D1-D4, incl. — Silicon rectifier diode, 1 A, 50 PRV.
FL2 — Ceramic i-f filter, 2-kHz BW (Murata CFS-455J).
L1, L2 — Magnetic-core transformer. L2 = 4.3 µH, L1/L2 impedance ratio = 15:1.
L3, L4 — Magnetic-core transformer. L3 = 4.3 µH. L3/L4 impedance ratio = 10:1 + 1 (center-tapped L4 winding).
L5 — Variable inductor, 4.3 µH.
R1 — Linear-taper composition control, 10 kΩ.
R2 — Same as R1, but 250 kΩ.

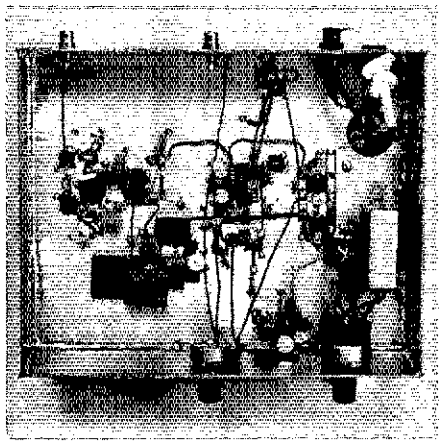


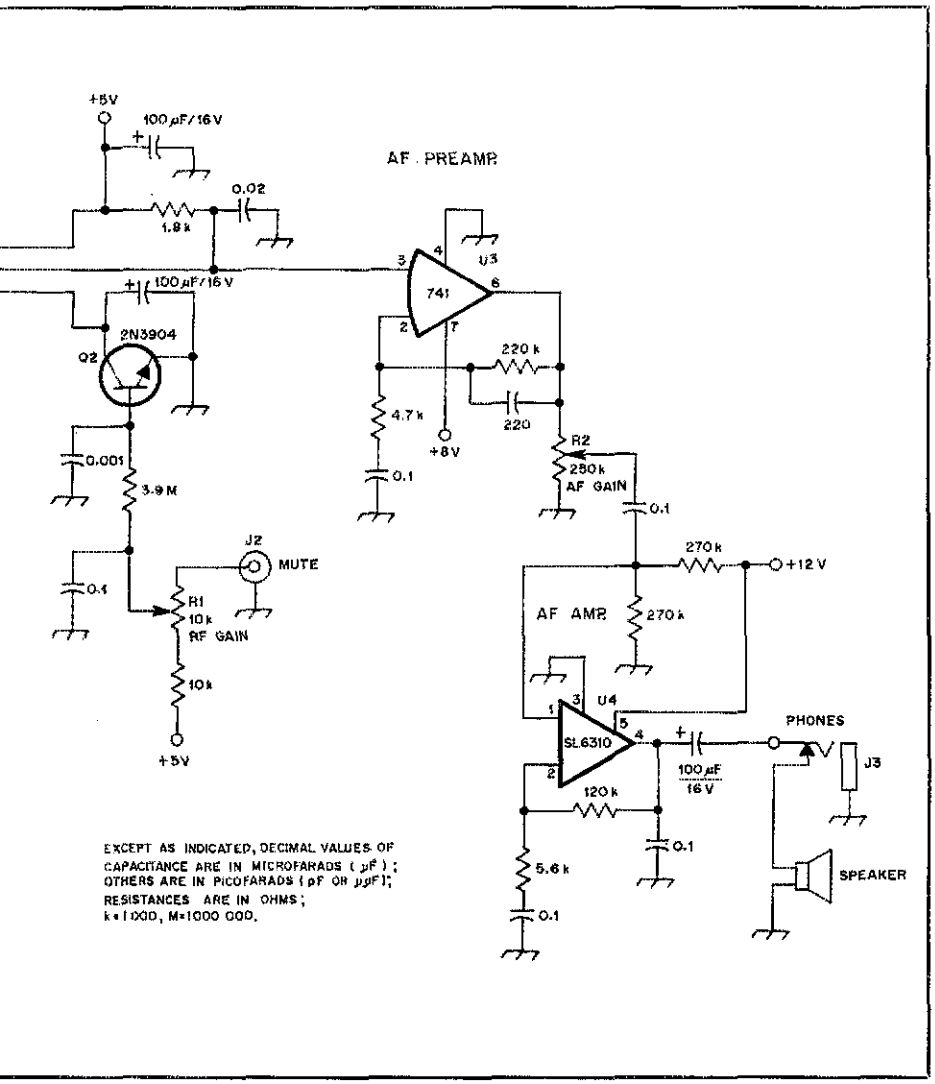
Fig. 3 — Bottom view of the receiver. Stick-on circuit strips were used to contain the ICs and other components. The chassis and panel are made from sections of double-sided pc board. The large rectangular capacitors on the lower left are Radio Shack 1% units that are used in the local oscillator.

tions for this chip. It is intended primarily for use with an i-f of 455 kHz. However, the manufacturer states that the IC is useful up to an i-f of approximately 12 MHz if careful layout is used.

The Composite Circuit

Fig. 2 contains the complete circuit of the 80-meter receiver, as designed by author Chadwick. The high-performance SL6440 doubly balanced mixer (U1) is supplied with signal energy from the antenna via tunable filter FL1. This filter is tracked with the local oscillator (Q1) by means of a three-section variable capacitor (C1). Optimum operating parameters for the SL6440 were given in an earlier *QST* paper.[4] Best dynamic range will occur when the LO injection level is approximately 0 dBm and with the conversion gain set for 0 dB or slightly less. U1 is a programmable mixer, in that the standing current can be varied by changing the voltage at pin 11. With the circuit shown in Fig. 2 the receiver MDS (minimum discernible signal) is −119 dBm. The IMD is 89 dB and the blocking level (excellent) is in excess of the ARRL measurement-equipment capability. These numbers equate to a receiver noise figure of approximately 20 dB, which, although high, is satisfactory for 80-meter operation most of the time. It appears that FL1 is fairly lossy, so the noise figure could be improved by decreasing the insertion loss of this front-end filter. An rf amplifier should not be necessary, and it would degrade the dynamic range if one were used.

FL2 is a Murata ceramic filter with a 2-kHz bandwidth. The characteristic impedance of the filter is 2000 ohms and the center frequency is 455 kHz. Insertion loss is between 6 and 8 dB. Unit cost in the USA is $35, according to three Murata distributors on the East Coast. A second-



RFC1 — Miniature 1-mH rf choke.
S1 — Dpdt switch (part of R2).
T1 — Miniature 455-kHz i-f transformer, tapped primary, 680 µH.
T2 — Miniature 455-kHz i-f transformer, 680 µH.
U1, U2, U4 — Plessey IC.
U5, U6 — Radio Shack three-terminal regulators, 7805 and 7808.

hand Collins mechanical filter might be a better choice in terms of cost and shape factor. Most Collins filters have a 2000-ohm impedance, but the insertion loss is a trifle higher — about 10 dB for the lower-cost models in the line. A simple post-mixer bipolar or FET amplifier could be used to compensate for the additional loss of a mechanical filter.

U2 contains the i-f (2 stages), agc and product detector portion of the circuit. T2 comprises the tuned circuit for the LC BFO. A miniature 455-kHz i-f transistor is suitable for use at T2. T1 is used as a 455-kHz coupling transformer between the two i-f amplifier stages in U2. It can be one of the tapped miniature 455-kHz i-f transistors found in pocket-size transistor radios.

Q2 is a dc amplifier that is used to control the i-f gain in combination with R1. Receiver muting is accomplished by shorting across J2.

Audio output from the balanced product detector in U2 is amplified by means of U3, a 741 op amp. Another Plessey IC (U4) increases the audio to speaker and headphone level.

Power Supply

Three operating voltages are required for this receiver (5, 8 and 12 volts dc). T3 supplies 9 volts ac to the bridge rectifier, and by virtue of a capacitor-input filter the dc voltage increases to 12. Regulators U5 and U6 drop the 12-volt bus to 5 and 8 volts, respectively.

The 12-volt branch of the dc is not well filtered. Because of this there will be a fairly strong 120-Hz hum in the headphones. The tiny speaker does not pass the 120-Hz component, and therefore is not heard. This can be resolved by using an 18-volt transformer at T3 and employing a 12-volt regulator after the rectifier diodes. U5 and U6 would remain attached to the 12-volt bus, as shown in Fig. 2, immediately after the 12-volt regulator.

Summary Remarks

Apart from the 120-Hz hum problem just mentioned, one minor anomaly was noted. The agc tends to lock up in the presence of very strong signals. This can be remedied easily by reducing the i-f gain slightly (R1). No attempt was made by author DeMaw to modify the circuit for the purpose of improving the agc action.

Real-life performance of the receiver is outstanding, based on evaluations by AK4L and N1FB of the ARRL technical staff. Both operated the receiver from their home stations and reported it to be "very strong" and "really clean." In terms of two-tone dynamic range it compares favorably with some $1000+ commercial receivers evaluated in the ARRL lab.

No doubt this circuit could be expanded to make it do a number of things that the basic circuit rules out. For example, a crystal-controlled BFO could be added to provide reception of upper as well as lower sideband. Also, a BFO crystal could be added to allow a 700-Hz note for cw reception. Down-converters can be added ahead of FL1 to permit reception of the 40-, 20-, 15- and 10-meter bands, as well as the three WARC-sanctioned amateur bands (10, 18 and 24 MHz).

The proof of the much-heralded "pudding" came when W1FB subjected the receiver to the relentless onslaught of W1AW's kilowatt signal on 80 meters (two city blocks away). When used in combination with a quarter-wave vertical, there was no aural evidence of receiver overloading. In fact, an RST 569 cw signal was copied perfectly only 5 kHz away from the W1AW operating frequency! Addition of an Autek QF1-A RC active audio filter made the receiver a stellar performer on cw. A 400-Hz cw filter at FL2 of Fig. 2 would do wonders during cw reception, and is an option worth considering.

Perhaps only portions of this circuit will be of interest to you, but in any event the Plessey ICs are interesting and useful. A wealth of IC-circuit information is contained in the Plessey book, *Radio Communications Handbook*, by Mr. James Bryant, Applications Manager of Plessey semiconductors. It is available from the U.S. offices at 1641 Kaiser Ave., Irvine, CA 92714.

Notes

[1]At the time this was being written, Circuit Board Specialists indicated that a kit version of the receiver, inclusive of a pc board, would be available at a future date.
[2]The Plessey ICs for this circuit are available from Circuit Board Specialists, Box 969, Pueblo, CO 81002.
[3]Mr. Patrick Redko, Eastern Sales Mgr., Plessey, 89 Marcus Blvd., Hauppauge, NY 11787.
[4]DeMaw and Collins, "Modern Receiver Mixers for High Dynamic Range," *QST*, Jan. 1981, p. 19. Also, see *Session 15 Preprint*, IEEE SOUTHCON/81, Atlanta, Georgia.

The Connecticut Shorthorn

Here's a mobile multiband antenna that will deliver a signal — it'll also help you locate your car in a parking lot!

By Andrew Pfeiffer,* K1KLO

If you've read the August 1967 issue of *QST*, it might be said you've now seen the long and the short of it. [Sorry! — Ed.] That particular issue described the Connecticut Longhorn, a horizontal, monoband mobile antenna which sprawled across the rather impressive rooftop of my 1964 Ford Country Squire. Unlike its predecessor, the multiband Connecticut Shorthorn is confined to the diminutive rooftop of my 1979 Subaru station wagon. Diminutive, too, is the size of the presently used Kenwood TS-120S transceiver when compared to that of the Heath HW-12A which was carried in the Ford. That's not where the differences end, either. The TS-120S has five bands of potential rf firepower to that of the HW-12A's single 3.5-MHz gun.

Design Concept

The difficulties encountered in designing and building a multiband mobile antenna (as opposed to a monobander) increase as the square of the bands involved; or, according to Murphy's Law no. 10: "The probability of an occurrence is in inverse ratio to its desirability." This presentation is meant to serve as a guide and stimulus for further experimentation by others and not necessarily for exact duplication.

As shown in Fig. 1, the basic antenna circuitry follows that of the original Connecticut Longhorn. Changes include a reduction in total radiator length (because of the obvious difference in car sizes); a shunt-feed inductance, L1, which is provided by three separate plug-in inductors (Fig. 2A) using a common adjustable ferrite slug; and the use of plug-in coils at L2 (Fig. 2B). Three separate inductors are used at L2 and, in conjunction with the remotely controlled ferrite slug (see Fig. 3), perform the function of a fine-tuning control. They cover the full frequency range of the transceiver along with L3 (Fig. 4), which is used only on the two lower bands. Fig. 5 shows the complete antenna assembly.

The control box for the Longhorn contained an SWR indicator and a dpdt switch with a neutral OFF position. This switch controlled the 12-volt dc motor which positioned the ferrite slug up or down inside L2 for obtaining exact operating frequency resonance.

The Connecticut Shorthorn control center shown in Fig. 6 is a bit more sophisticated. In addition to the original control complement, there's a digital up/down counter. A switch (S2) that is operated twice for each revolution of the motor shaft activates the counter. Rota-

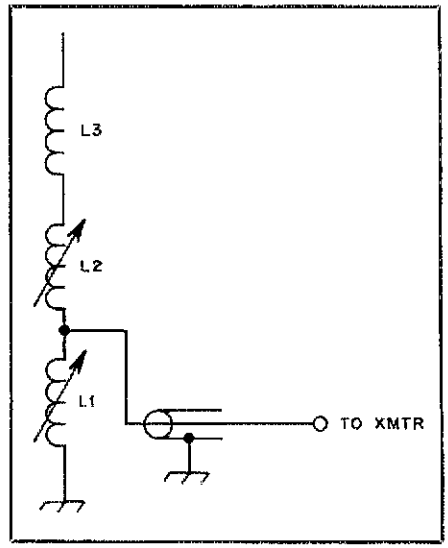
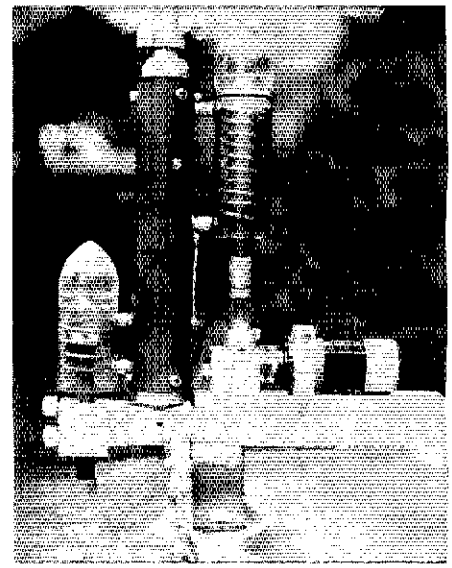
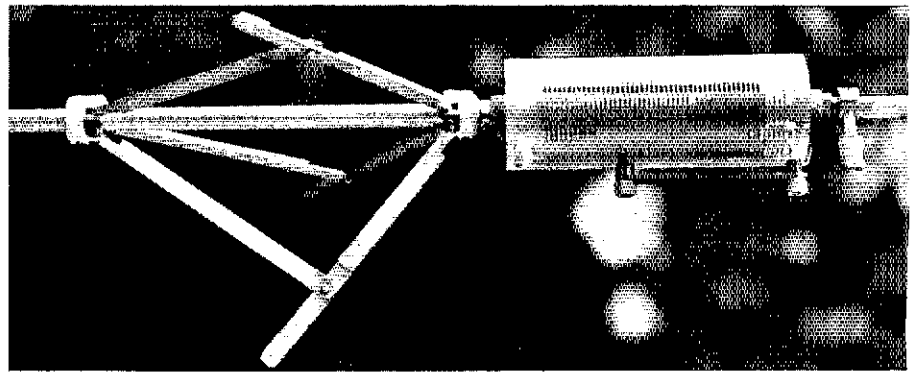


Fig. 1 — A schematic diagram of the Connecticut Shorthorn. L1 is the shunt-feed inductance and is used for impedance matching; L2 is employed for resonance adjustments; L3 is a loading coil used for 3.5 and 7 MHz operation.

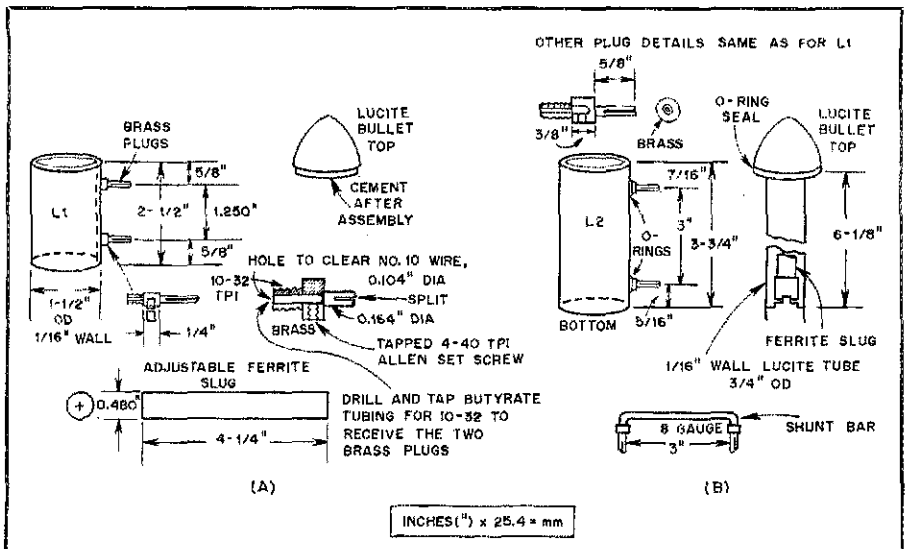


A close-up view of the plug-in coil assemblies; L1 is at the left and L2 at the right of the antenna base. The tuning motor is horizontally mounted to the right of L2.



The capacitive hat and loading coil L3, used on 80 and 40 meters, are shown here.

*132 Whippoorwill Rd., Old Lyme, CT 06371



L1 Inductances

Band (MHz)	No. of turns	Wire size	Turns' spacing
3.5	7	10	wire diameter
7.0	4	10	0.25 in. (6.4 mm)
14, 21, 28	3	10	0.375 in. (9.5 mm)

L2 Inductances

Band (MHz)	No. of turns	Wire size	Turns' spacing
3.5	24	12	0.040 in. (1 mm)
7	10	10	0.190 in. (4.8 mm)
14	10	10	0.190 in. (4.8 mm)
21	3	10	0.50 in. (12.7 mm)
28	shunt bar used		

Fig. 2 — At A, the mechanical assembly of L1 and table of coil winding information are shown. Construction of L2 and its coil data are shown at B. All inductors are wound on 1 inch (25.4 mm) diameter forms. The individual L1/L2 coils are enclosed in 1-1/2 in. (38 mm) diameter, 1/16 in. (1.6 mm) wall sections of Butyrate tubing to protect them from weathering. The O-ring seal and Lucite tube attached to the bullet top were added to weatherproof L2. Note that the slug must be lowered before L2 is unplugged or else breakage will occur.

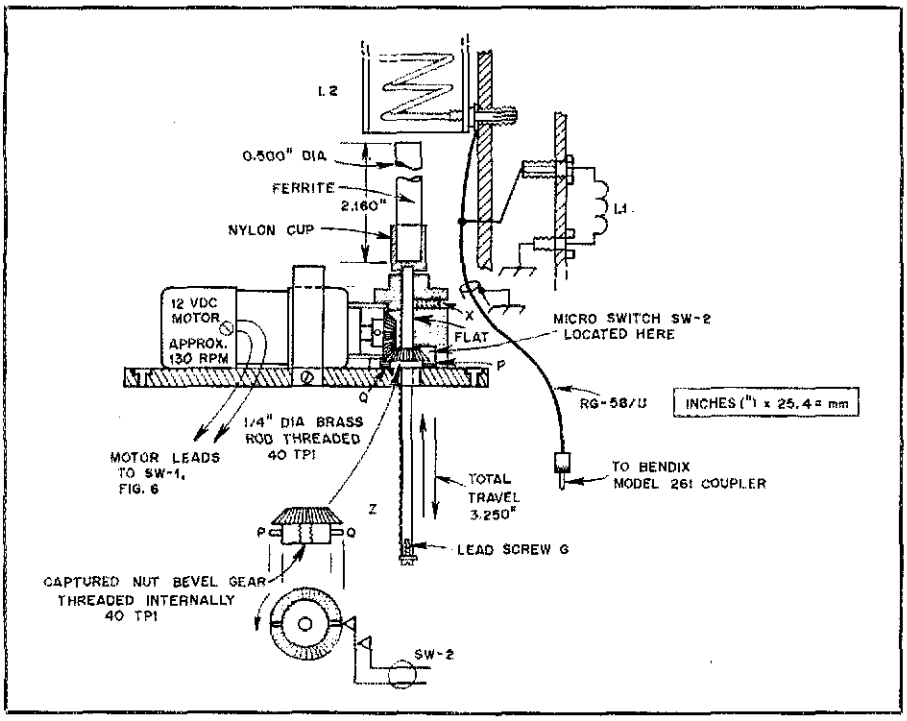


Fig. 3 — The remote variable-inductor drive assembly. Threaded drive rod G has a milled flat over its whole length; the rod is prevented from rotating by means of a set screw positioned against this flat at X. The hole in bevel gear Z is tapped for 1/4-40 threads per inch and mates with drive rod G. The motor-driven bevel gear drives the "captured nut" bevel gear Z, raising or lowering the ferrite rod inside L2. Projections P and Q on bevel gear Z activate switch S2 (see Fig. 6) twice per revolution. S2 will be activated for each 0.0125 in. (0.3 mm) of up or down travel of lead screw G. Two-conductor shielded cable is routed from S2 to the control center (see Fig. 6).

tion of the motor shaft is translated to a vertical travel of the ferrite slug in L2. The up/down counter display, visible to the operator at a glance, shows a relative number which is used to determine the position of the tuning slug in L2. Output from a free-running variable oscillator (U1) is controlled by S3 and programs the digital counter to any desired display independent of the action of S2. When a frequency change is made with the transceiver, it is important to know where the slug in L2 is located so that you can tell whether to move the resonance adjustment switch (S1) up or down in frequency.

Here's how the counter and its associated oscillator are used. The rig is set to operate at a particular frequency, say, of 7.200 MHz. The transmitter is keyed to produce a carrier and the resonance switch (S1) is activated until the resonance-indicating meter of the SWR bridge reads zero. The oscillator is then activated by S3 to display a readout of 7200. From then on, a comparison may be made between the transceiver frequency readout and that of the display counter to determine the correct direction, up or down, to move S1. The actual numbers can be logged for future reference.

Some Advice

A number of amateurs who are eager and willing to experiment with mobile, portable or fixed-station antenna systems find that, for whatever reason, the erection of a full-sized conventional dipole or vertical antenna is not feasible. Therefore, they turn to short radiators which must employ a loading coil. The following information is offered as an aid; hopefully, you can profit by my mistakes and not repeat them!

The wide-range pi-section output cir-

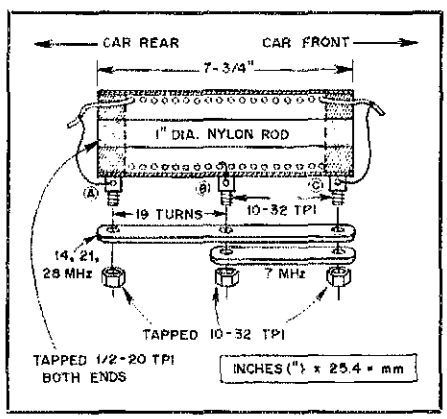


Fig. 4 — The main loading coil (L3) assembly. This coil is used on 3.5 and 7 MHz only. L3 consists of a total of 55 turns of no. 14 gauge wire wound on a 2-1/2-in. (63.5 mm) diameter form at 8 tpi. The inductor is enclosed in a 3 in. (76 mm) diameter, 1/8 in. (3 mm) wall Lucite tube. End discs are made of 1 in. (25.4 mm) thick Lucite. The brass shunt bar is placed across threaded studs at B and C, leaving a total of 19 turns of wire for 7 MHz operation; the entire coil is used on 3.5 MHz. Another bar, connected from A to C, shorts out all of L3 for 20-, 15- and 10-meter operation.

cuitry of the rigs of the past made it possible to correct for some antenna system mismatches. With modern broadbanded, no-tune rigs, we are obliged to correct any mismatch at the antenna itself. This is where corrective measures should be made in the first place — the broadbanded rigs keep us honest!

Many mobile hams I've contacted use so-called "antenna couplers" between the rig and the antenna coaxial feed line. The "coupler" will satisfy only the output impedance requirements of the transmitter and will do nothing to make the antenna resonant at the chosen operating frequency. This antenna resonance is a must if you are to realize maximum antenna efficiency.

In any and all antenna systems, two important conditions must be satisfied if we are to obtain the maximum potential output of any given transmitter. Simply, the output of the transmitter must like what it is looking into and, secondly, the antenna must be tuned to the operating frequency. In a physically shortened, loaded, quarter-wave antenna such as the Shorthorn, the Q is very high. Transmitter frequency excursions 10 kHz above or below the exact resonant frequency presented by the coil-loaded radiator adversely affect the rf output of the transmitter and attenuate the signal at the receiving point. I ran many tests that proved this. One 40-meter test, with Ole (N4ABM) in Reston, Virginia, indicated a six S-unit difference in signal strength between exact antenna resonance and frequencies 10 kHz above and below resonance during key-down cw conditions. S meters being what they are, the difference is relative, but significant. Results of similar tests at different times, bands and distances were much the same.

Shunt-feed inductance L1 and the adjustable ferrite slug used with the Shorthorn satisfy the first condition: The TS-120S is very pleased with what it is looking into. L2 and its remote-driven ferrite slug fulfill the second condition. Certainly there are other methods of accomplishing the same things — this is but one of them.

All the necessary specifications and dimensions for the construction of the Connecticut Shorthorn are given in the accompanying diagrams. Remember, however, that there are many variables. Slight changes in antenna height above the car roof (the counterpoise), physical placement of the various inductances in relation to each other and their relative position along the straight sections of the antenna system will change the resonance of the whole unit. The closer L3 is to the feed point, the lower the total inductance need be; the converse is also true.

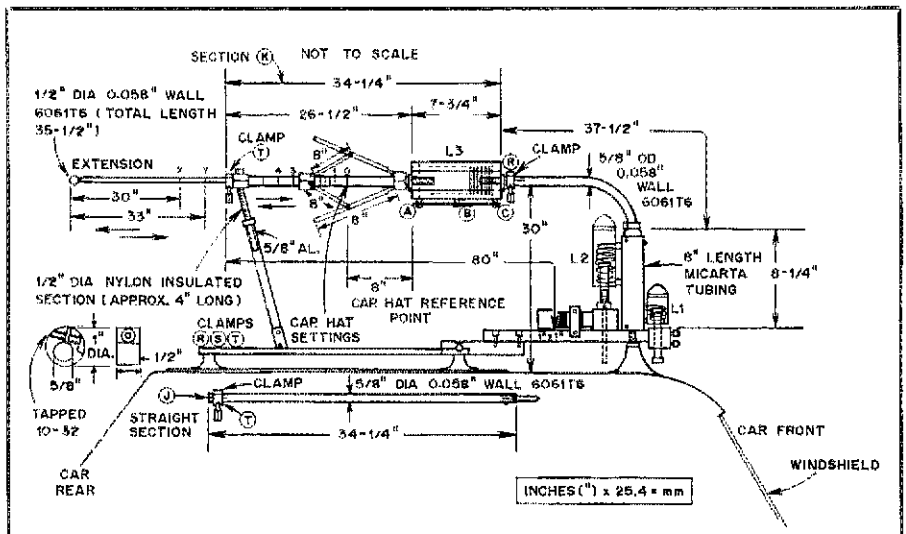
The various inductances may be calculated, but somewhere along the line you will definitely need to use a GDO. Be sure to loosely couple the GDO to the feed line; a one-turn coil of wire is sufficient. A word about GDOs: They will see and indicate everything within their tuning range — each and every resonant response along the particular length of coaxial cable used. Be ready (particularly on the higher frequencies of 14, 21 and 28 MHz) for more than one dip!

Winding the various inductances may require experimentation. Use the largest practical wire size. Coils, with the exception of L3 and L2 for 3.5 MHz, are wound with no. 10 copper wire; L3 is wound with no. 14 wire; and L2 for 3.5 MHz is wound with no. 12 wire.

Good grounding is a must! Inadequate grounding — particularly on 14, 21 and 28 MHz — may introduce you to a new experience, rf burns. Before I'd grounded the "beast" efficiently, the car's indicator lamps flashed on and off during operation on the higher frequencies!

On-the-air tests run with stateside and European stations have indicated that the system is omnidirectional. A half-hour test run with Jim, G4JPM, during which I drove the car in a large figure-eight pattern, showed there was little or no effect upon the signal level as received abroad. Similar tests with stateside stations had more or less the same results. I've more than "held my own" in local and other stateside contacts on all bands and in DX pile-ups. During one 21-MHz DX contest contact with a station in Germany (where nothing more than the usual 5/9s were given out), I received my final pat on the back. In a "semi-pile-up," the response to my call was: "K1KLO, your signal is exceptional — 20 over 9! Good luck in the contest!"

The 3-1/2 months invested in the construction of the Connecticut Shorthorn have been rewarded. It's finished, road-tested and ready to add to the QRM!



Freq. (MHz)	L1	L2	L3	Cap. Hat	Extension	Total Radiator Length
28	3 turns	shunt bar	J section replaces K section	0	1 in. high end 4 in. low end	84 in.
21	3 turns	3 turns	J section replaces K section	0	30 in. – X	110 in.
14	3 turns	10 turns	J section replaces K section	0	30 in. – X	110 in.
7	4 turns	10 turns	19 turns of L3*	3-3/4 in.	30 in. – X	110 in.
3.5	7 turns	24 turns	55 turns*	2-1/2 in.	30 in. – X	110 in.

*Section K with the adjustable capacitive hat and L3 are used on 3.5 and 7 MHz only.

Fig. 5 — The main antenna assembly. Details of the necessary antenna adjustments for each band are given in the table. Note: Section K with the adjustable capacitive hat and L3 are used on 3.5 and 7 MHz only.

Acknowledgments

I would like to recognize the following people who have helped with many aspects of this long and sometimes confusing project. My thanks to Ole, N4ABM, and Jim, G4JPM, for their time and patience in conducting the performance tests; to Chet, W1PE, Peter, N1AUT, and Mike Urban of the Veeder-Root Company, for their interest and help regarding the digital display counter and associated circuitry. And special thanks to my wife, Marianne. For three months she gave encouragement to an absent-minded husband who talked of nothing other than the inherent problems, goofs and glitches of this project. Marianne put up with all this, and with pride christened the finished product "The Connecticut Shorthorn"!

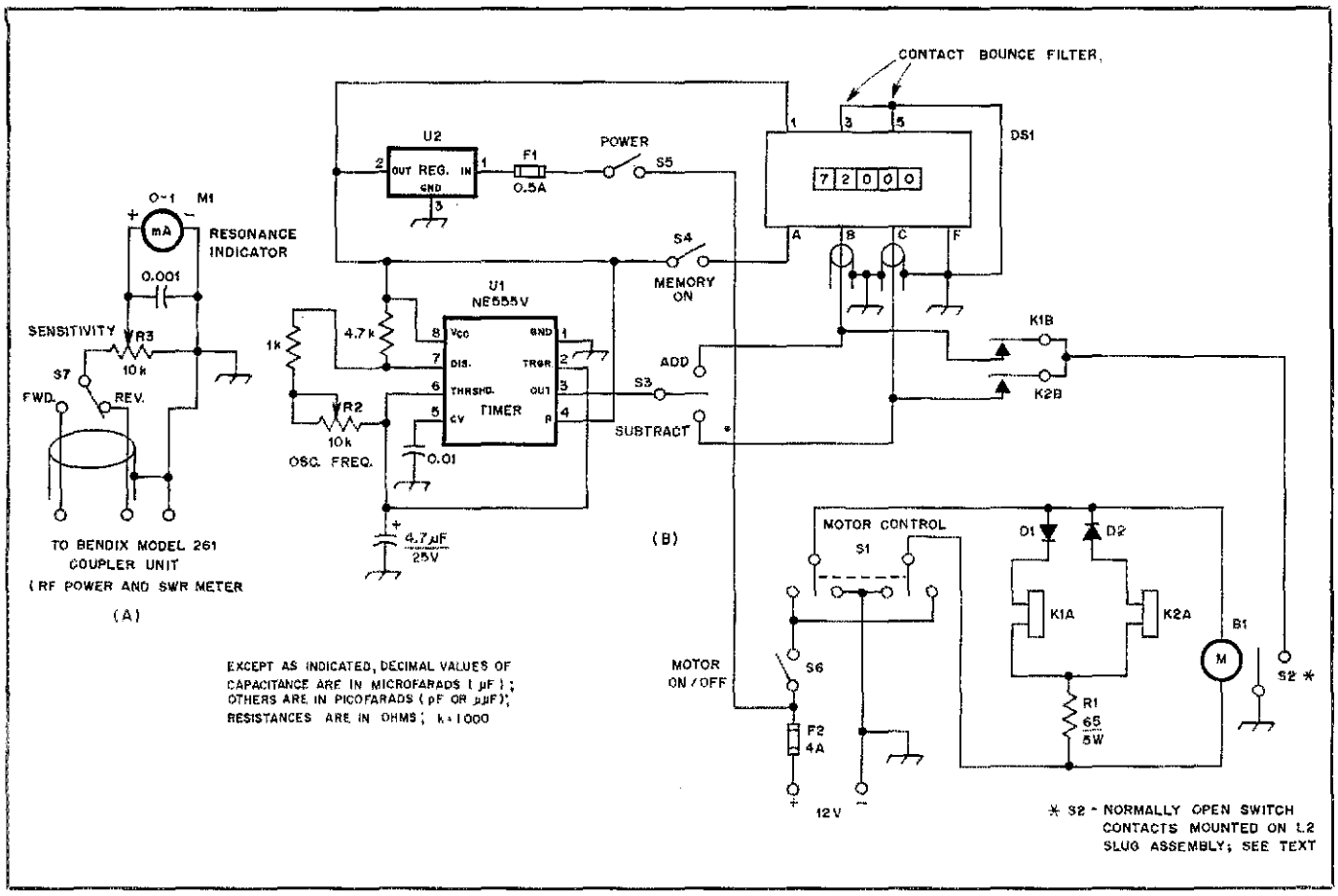


Fig. 6 — The control center diagram. Aluminum foil is used to enclose and shield the counter; the foil should be grounded to prevent receiver interference.

B1 — 12-volt dc motor, 130 rpm (surplus).

DS1 — Counter, Veeder-Root series 7996 mini-counter totalizer. (Veeder-Root, Digital Systems Division, Hartford, Connecticut 06102. Tel. 203-527-7201).

K1, K2 — Dpdt dip relay, 5-volt dc coil (Radio Shack 275-215 or equivalent).

S1 — Dpdt, center off, momentary-contact switch.

S2 — Normally open switch contacts mounted on L2 ferrite slug screw assembly.

S3 — Spdt, center off, momentary-contact switch.

U1 — NE-555 timer IC.

U2 — 12-volt regulator, LM-340-12 or equivalent.

Strays

GET IN ON THE FUN

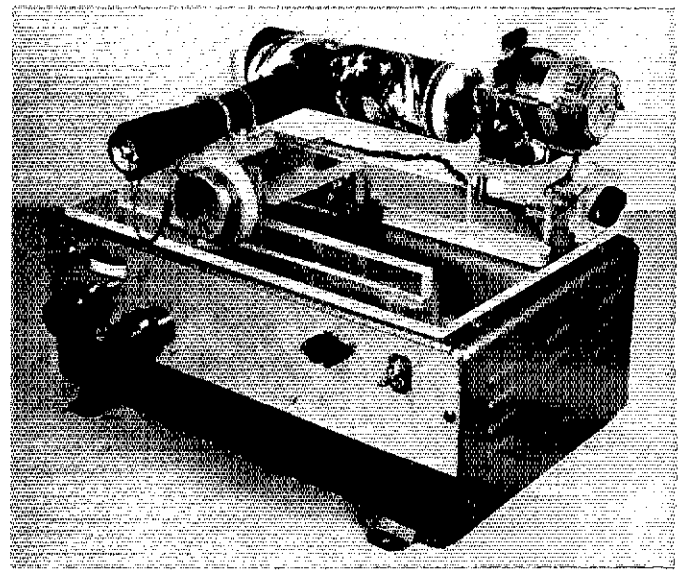
☐ All unlicensed members: have you ever considered obtaining an Amateur Radio license? As an ARRL member, you must have. Some of the 1980's on-the-air events included special operations from the Lake Placid Winter Olympics, Voyager I Flyby of Saturn and even the special QSL from Davy Crockett's birthplace in Morristown, Tennessee. If you missed out during 1980, be sure you're in on the fun in 1981. Be prepared for future activities of this kind by getting into Amateur Radio. Write to the Club and Training Department for additional information. We'll be happy to put you in touch with a club in your area. — *Maureen Thompson, KA1DYZ, Training Assistant*

QRP MOVEMENT GROWS

☐ Low-power fans may be interested to know that the G-QRP Club has just signed up its 1000th member. He is a former RSGB president (G3HCT). John still serves RSGB as a member of its various committees. The G-QRP Club has members from 32 countries and all continents. *Sprat*, the quarterly QRP journal, is sent to all members. The club offers awards and trophies to winners of its contests, and also operates an internal QSL bureau. Club membership is open to any amateur or SWL in the world with an interest in QRP (very low power). Membership/subscription to this RSGB affiliate club is 3.5 pounds or $9 U.S. Applications should be sent to Secretary George Dobbs, G3RJV, 17 Aspen Dr., Chelmsley Wood, Birmingham, B37 7QX England.

A U.S.-based QRP organization, QRP Amateur Radio Club International, Inc., has recently changed its rules for QRP awards to a specified maximum of 5 watts output. Previously, the term "QRP" was defined by the club as 100 watts, which was rather absurd in the eyes of many QRP enthusiasts. Members must agree to run no more than 50 watts on cw and 100 watts PEP for ssb work, except in time of public service and emergency. Membership is for the life of the applicant. Information concerning membership and club activities can be obtained from President Tom Davis, K8IF, 11729 Merriman, Livonia, MI 48150. Most cw QRP activity takes place on 1810, 3560, 7040, 7060, 14,060 21,060 and 28,060 kHz. The 7030 frequency has become loaded with QRM from the "speed merchants" with their keyboard keyers in the past two years, so for U.S. operations it is better to use the 7040- or 7060-kHz frequency for low-power QSOs. In Europe use 7030 kHz. — *Doug DeMaw, W1FB*

Printing Pictures from "Your" Weather Geostationary Satellite



Wherever on earth you're located, a rotating-drum facsimile unit like this will provide remarkably good weather pictures. Plan now to make one for your station!

By Guido Emiliani,* I4GU and Marciano Righini,** I4MY

In our previous article, "An S-Band Receiving System for Weather Satellites," (August 1980 *QST*, page 28[1]) we explained how to construct equipment for receiving weather pictures from satellites in space. As a sequel to that article, we now propose the use of a rotating-drum facsimile display including the related electronics for printing APT-WEFAX images on photographic paper.

Because the International Coordination Group of Geostationary Meteorological Satellites has standardized all aspects of the satellite communication system, the reproducing unit we shall describe can be operated readily by APT users all over the world. It takes advantage of the fact that all five spacecraft include a common downlink frequency of 1691.0 MHz. The format of the WEFAX data is identical for all satellites.

Video Modulation and WEFAX Image Format

From the characteristics of the APT modulation in Table 1, you can see that the 2400-Hz audio signal (subcarrier) is amplitude modulated by the video information. White corresponds to the maximum signal level, black to the minimum. The intermediate levels furnish the shades of gray. Notice that, even at minimum level, a small percentage (5%) of the subcarrier persists.

The line rate (horizontal scan) is 4 lines per second. As the picture is divided into 800 lines, vertical scan time is 200 seconds (image data only). The frame format is shown in Fig. 1. The scan is subdivided in the following manner:

1) Start signal for 3 seconds (12 lines) consisting of rectangular waves at 300 Hz.

2) Line synchronization code for 5 seconds (20 lines). Each of these lines begins with a black level of 12.5 ms (5% of the line); the rest of the line is at white level and has a duration of 237.5 ms (95% of the line). The 20 black levels print a black rectangle at the upper left of the frame.

3) A useful image consists of 800 lines (200 seconds). Each line begins with a white level of 11.9 ms corresponding to

Table 1

Modulation Characteristics of the APT-WEFAX Unit

Subcarrier frequency	2400 Hz
Subcarrier modulation	a-m
White level	maximum (80%)
Black level	minimum (5%)
Base-band video	1600 Hz
Line rate	4 Hz (240 lines/min)
Lines-per-image	800
Image time	200 seconds
Aspect ratio	1:1 (square)
Direction of horizontal scan	left to right
Direction of vertical scan	top to bottom
Index of cooperation	267.36

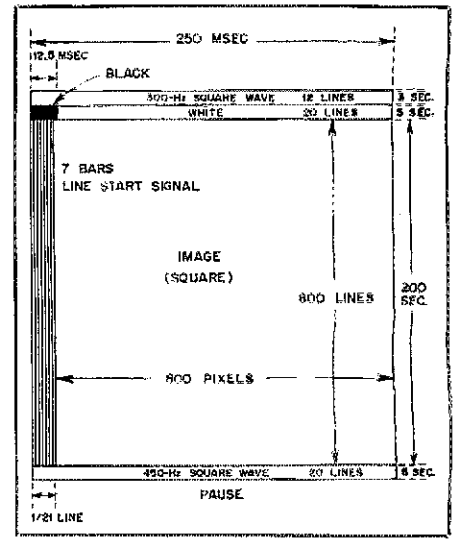


Fig. 1 — The APT-WEFAX format. Time indications are either in seconds (s) or milliseconds (ms). Pixels are the image elements of the transmitted signal.

*Via Fratelli Bandiera 18, 48018 Faenza, Italy
**Via Colombo Lolli 8, 48100 Ravenna, Italy

[1]This material was published in the Italian magazine *Radio Rivista*, March 1980.

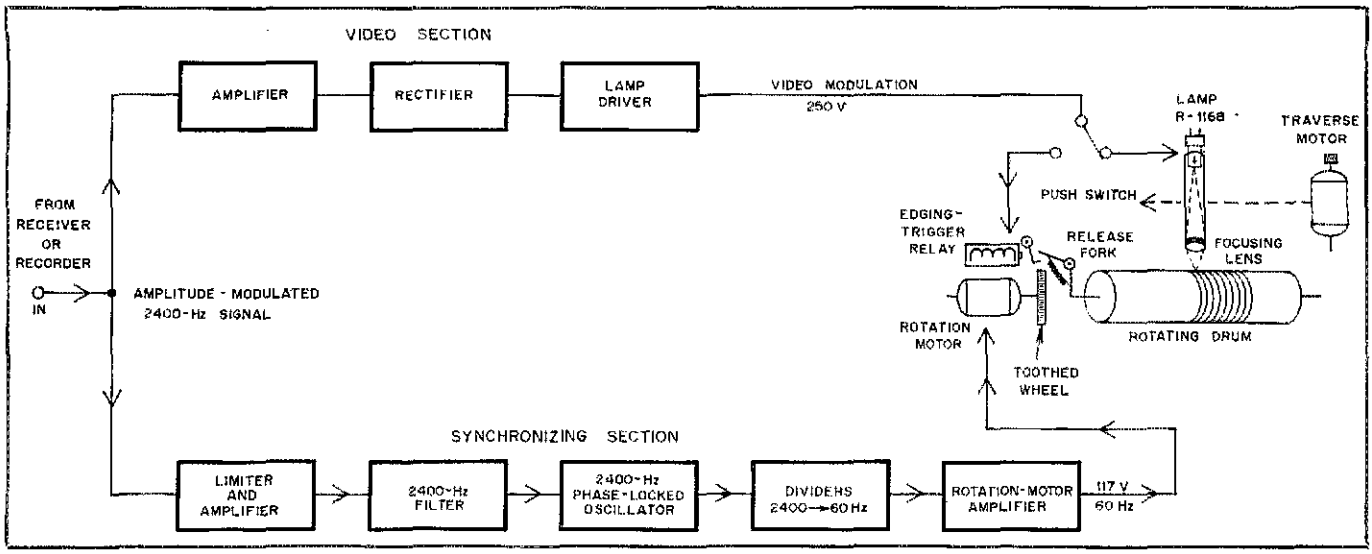


Fig. 2 — Block diagram of the facsimile reproducing unit.

1/21 of the line. This line start signal may contain a pattern of 2 white pixels followed by 2 black pixels modulated in a sequence of 7 cycles which simulates a frequency of 840 Hz in a rectangular waveform. The rest of the line containing the image data lasts 238.1 ms. The image is square.

4) Stop signal for 5 seconds (20 lines) consisting of rectangular waves at 450 Hz.

Picture Display

APT is a slow-scan TV system in which the image has to be fixed line after line on some support (photographic paper, for instance) so that, when the scan is over, one can get the cumulative view of the whole raster. This can be done in various ways. We will consider the two systems most widely used by radio amateurs — the *oscilloscope system* and the *rotating drum system*.

With the oscilloscope method, the raster (line structure into which the image is divided) takes shape on the face of a cathode ray tube and is fixed on the film of a camera situated in front of the CRT. This system is certainly the easiest of all because it does not involve moving parts. It is rather slow because of the double negative/positive passage and does not appear to be suitable for the APT frames of geostationary satellites. These frames must be set together to form a mosaic and therefore must be perfectly square.

The principle of the rotating drum system is that a spot of modulated light is focused on a sheet of photographic paper wrapped on a drum that rotates at the line rate of the video information, and, at the same time, traverses at the vertical scan speed. When the whole frame is exposed, the paper can be developed and the image seen in almost-real-time. This system, used by many commercial displays, gives geometrically perfect, high-definition, low-cost pictures. Moving parts are necessary, and the less mechanically talented amateur may require assistance to construct them.

Block Diagram

The system we use has a rotating drum

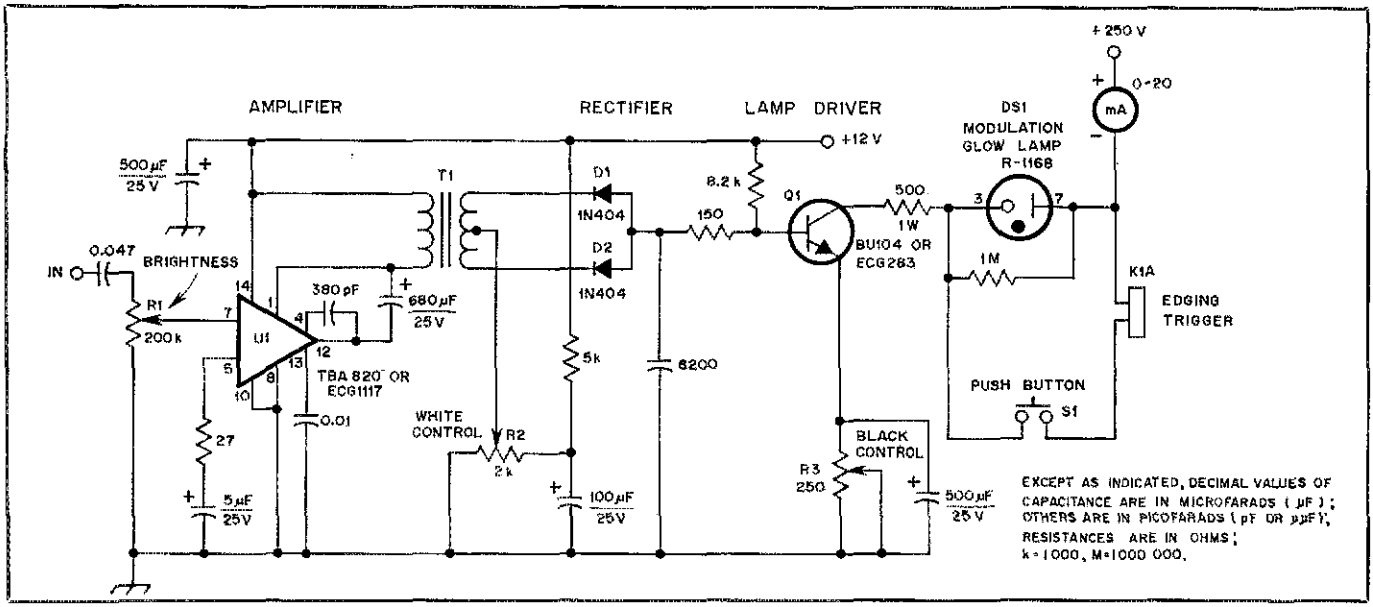


Fig. 3 — Video section of the reproducing unit. Resistors are 1/4 watt except as indicated.
D1, D2 — Silicon rectifier, 600 PRV, 1 A, 1N404.
DS1 — Sylvania modulation glow lamp R-1168 or equiv.
K1 — Modified relay, 3000 ohms, 15 mA. (See Fig. 9.)
S1 — Push-button spst.
T1 — Transistor type output transformer, 1 W, 8 Ω/200 Ω ct.
Q1 — Npn silicon HV high-current switcher, BU104, Sylvania ECG283 or equiv.
U1 — Audio amplifier, 2 W, TBA820, Sylvania ECG1117 or equiv.

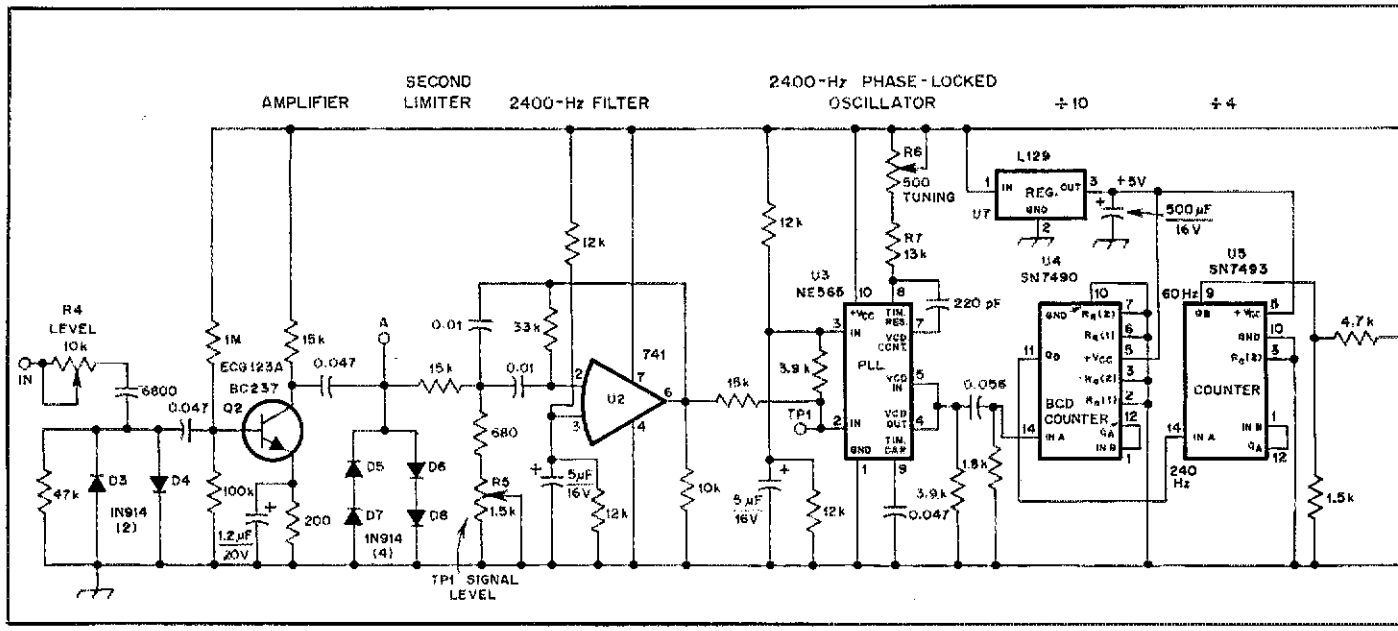


Fig. 4 — This is the circuit for the synchronization section of the facsimile reproducing unit. The subcarrier signal from the satellite is processed in this section for driving the rotation motor. Resistors are 1/4 watt except as noted.
C1-C3, incl. — See text.
D3-D8, incl. — Fast-switching silicon rectifier, 1N914.
Q2, Q3 — General-purpose silicon high-gain, low-power transistor, BC237, Sylvania ECG 123A or equiv.
Q4, Q5 — Npn silicon high-power, high-current

and prints the image on photographic paper. Fig. 2 shows the block diagram of the entire reproducing unit.

Incoming signals from the receiver are simultaneously applied to both the video and the synchronizing sections. Recording the signal and reproducing the picture later may be convenient and at times indispensable. In that case, you need a monaural (or stereophonic using one track) audio recorder.

In the video section, the modulated signal is rectified and amplified to drive the lamp, R-1168. This lamp provides the modulated light for printing the paper. The purpose of the synchronizing section is to divide the 2400-Hz signal down to 60 Hz in order to drive the rotation motor. A rotation rate of 4 turns per second must be maintained by the drum on which the photographic paper is wrapped. The function of the light gun is to carry the modulation glow lamp (R-1168) and the focusing lens. The light gun traverses parallel to the drum during the whole frame time. The edging relay aligns the image with the edge of the paper. Now, let's examine the various sections in detail.

Video Section

The strength of the modulated 2400-Hz signal is controlled by R1 (Fig. 3), which serves as a brightness control and should be accommodated on the front panel. It should be regulated to get the right light intensity. Developing time for the photographic paper should be two minutes at 20° C (68° F).

After the amplifying stage, U1, the signal is full-wave rectified by D1 and D2. These diodes are biased (1.5 V on their cathodes) by R2 which is the WHITE control. When the signal level is maximum, the lamp should be off and Q1 should not conduct. R2 and R3 should be accessible from the front panel. R3 is the BLACK control. It should be regulated for the maximum brightness of the lamp (therefore, maximum flow of current through lamp driver Q1) when the signal level is minimum.

The modulation glow lamp, R-1168, supplies the photographic paper with the proper amount of light. Characteristics of the lamp are shown in Table 2. It gives a peak of energy at 370 millimicrons, the frequency of violet. Also observe that the operating voltage should not exceed 150 V and that the average current may vary from 5 to 15 mA. To measure this current, a 20-mA (full-scale) meter has been put in series with the lamp. The average current value is to be found experimentally by regulating the strength of the signal with R1. The right amount of light depends on the kind of focusing lens used, on the distance between lamp and lens and on the grade of paper that is to be used. An average current of 7 mA should be sufficient for proper exposure. Too much current will shorten the life of the lamp.

Table 2

Modulation Glow Lamp R-1168 Characteristics

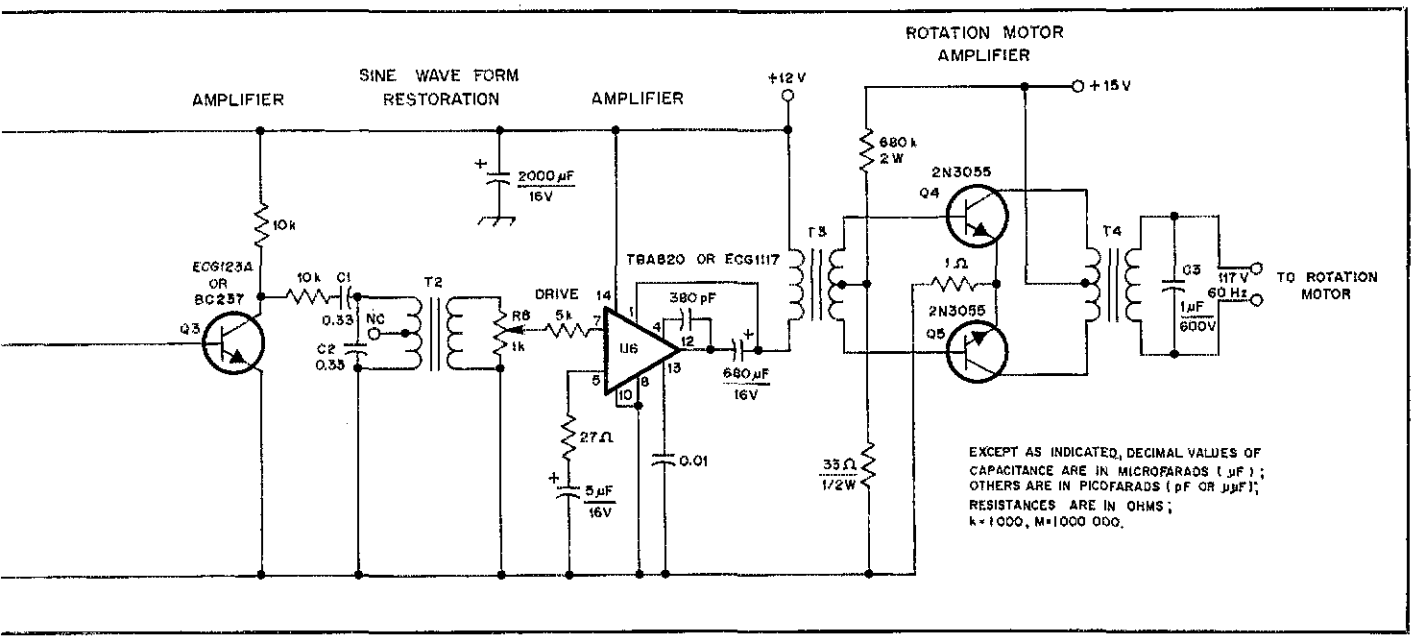
Operating voltage	150 V max.
Starting voltage	225 V min.
Current (avg.)	5 to 15 mA
Current (peak)	30 mA
Brightness	132 candles/sq. in. (0.2 candles/sq. mm)
Color of discharge	blue-violet
Glow aperture dia	0.015 inches (0.38 mm)
Rated avg. life	150 hours
Base type	intermediate shell octal
Lamp style	T9

The glow lamp with the smallest aperture (0.015 inches or 0.38 mm) is the R-1168. It is particularly suitable because a spot of light of the right size can be obtained with low demagnification. However, there are other glow lamps with larger openings. These are less expensive and give equally good results. Besides the R-1168, Sylvania makes the following: R-1130B (0.056 inches or 1.42 mm), R-1131C (0.095 inches or 2.41 mm) and R-1169 (0.075 inches or 1.91 mm). Other types we have used are the 1B59 and XL601. The edging relay and the push button functions will be dealt with later.

Synchronizing Section

Rotation of the drum must be at the same rate as the image (4 lines per second). To obtain this rate, we drive the rotation motor with the reference signal (subcarrier) transmitted by the satellite. In Table 1, you can notice that the 2400-Hz subcarrier is always present. In fact, even at black level, a small percentage (5%) of the audio signal persists. So you can use the 2400-Hz frequency as a synchronizing reference and drive the rotation motor with a submultiple of that frequency.

The signal applied to the synchronizing section (Fig. 4) is amplitude limited by D3 and D4, amplified by Q2, limited again by D5, D6, D7 and D8 and filtered by U2, a 2400-Hz band-pass filter. For the right



audio amplifier, 2N3055.
T2, T3 — Transistor output transformer, 1 W, 8 Ω/200 Ω ct.
T4 — Filament transformer, 24 V ct/117 V ac, 20 W.
U2 — General-purpose operational amplifier, 741 or equiv.
U3 — Linear PLL, NE565.
U4 — Decade counter, SN7490 or equiv.
U5 — Four-bit binary counter, SN7493 or equiv.
U6 — Audio amplifier, 2 W TBA820, Sylvania ECG1117 or equiv.

setting of the filter, apply a 2400-Hz signal to terminal A. R5 should be adjusted to get the maximum signal amplitude at TP1.

U3 is a 2400-Hz oscillator which is frequency and phase driven by the incoming signal. It should oscillate at 2400 Hz even when the incoming signal is not present. Its frequency is given by R6 and R7. The value of R7 may differ, but not very much, from the one indicated. R6 is the oscillator fine tuning and should be adjusted only once.

The signal from U3 is divided by 10 at U4 and by 4 at U5. A 60-Hz signal at pin 9 of U5 is amplified by Q3, and the waveform is made sinusoidal by the LC network consisting of T2, C1 and C2. The exact values of C1 and C2 are to be found experimentally in relation to the transformer (T2) that is installed. R8 should be adjusted so that the amplifier U6 drives the push-pull final amplifier (Q4 and Q5) properly.

At the secondary of T4, you will have 117 V, 60 Hz to feed the synchronous rotation motor. The value of C3 is to be determined experimentally in relation to the motor used.

Synchronous Rotation Motor

We have already said that the drum must rotate at 240 turns per minute. With a 60-Hz driving signal, this speed can be obtained directly at the shaft of a 30-pole synchronous motor. If the motor has a smaller number of poles, its speed will be higher and a reduction gear will be necessary.

The relationship between frequency, number of poles and the number of turns is shown by the following formula:

$$\text{turns per minute} = \frac{120 \times \text{frequency}}{\text{number of poles}}$$

In practice you should get a 10-W synchronous motor with a rotation speed, at the shaft of the reduction gear, of 240 turns per minute. With the arrangement of Fig. 7 the shaft should rotate clockwise.

The drum is made of expanded polystyrene foam of the type used for making containers. Therefore it is extremely light, ready to follow the possible speed fluctuations and quick to reach the full rotation speed. It turns on small ball bearings or self-lubricating bushings.

The circumference of the drum establishes the size of the picture. Experience has shown that the optimum size of the image is 7 × 7 inches (180 × 180

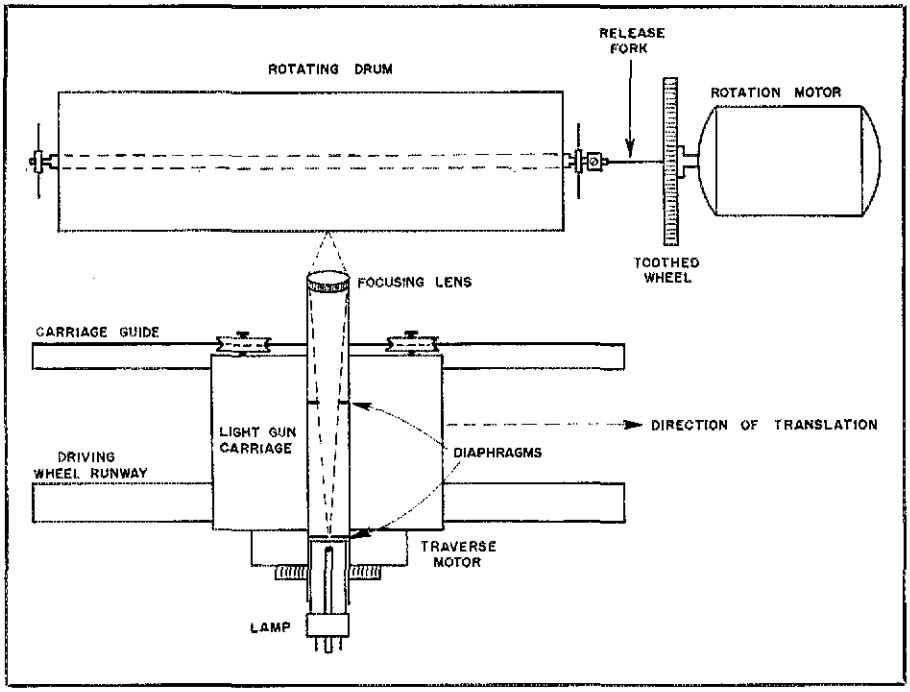


Fig. 5 — This drawing shows the physical arrangement of the facsimile display as seen from above.

mm). Photographic paper that is 7 × 9-1/2 inches (180 × 240 mm) is commercially available. If you choose this dimension, the diameter of the drum must be 2.2 inches (57 mm). The minimum length of the drum should be 7.9 inches (200 mm).

Edging Trigger

As may be seen in Figs. 8 and 9, the rotation motor and the drum are coaxial,

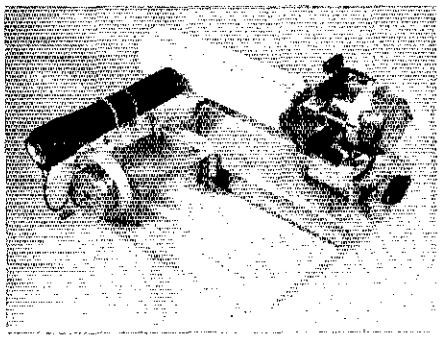


Fig. 6 — The carrying structure of the display is made of Plexiglas. Any other material from wood to metal is equally good. The alignment line and the two-faced adhesive tape can be seen on the drum, which is made from expanded polystyrene.

but they are not integral. They become integral (rotate together) only when the release fork engages one of the teeth in the wheel that is fastened to the rotation motor shaft. If the motor and the drum were integral all the time, we could not set the exact point where the scan line begins, and the image would be cut haphazardly. To align the image with the edge of the paper, we have taken advantage of the black level that is present at the beginning of the 20 lines of the synchronization code preceding the image (see Fig. 1).

In practice, we wrap the paper around the drum, then insert the tip of the release fork in the relay keeper so that the motor and drum are not integral. The 300-Hz note warns us that the frame is going to begin. Then the rotation motor is started while the drum remains still. After 3 seconds of the 300-Hz note, there are 20 lines (5 seconds) which are at black level for the first 12.5 ms each. These impulses get the maximum current to flow through the lamp.

During the five seconds when the 20 lines are transmitted, we press the push button shown in Fig. 3. In doing so, the relay coil and the lamp are paralleled. A current of 15 mA (the maximum for black) will activate the relay. The first black impulse, no matter which one of the 20 after the push button has been depressed, activates the relay. In turn, the relay keeper is attracted and the release fork (returned by a spring) engages a tooth of the cogwheel. This coupling makes the motor and the drum integral and, because the drum is light, it reaches full speed immediately. The cogwheel should not be too heavy. Neither the diameter nor the number of cogs on the wheel is important.

An essential step in the preparations is finding the place where all lines start. A longitudinal line should be drawn on the drum. The edges of the paper are to be aligned with it when the sheet is wrapped around the drum.

Translation

The light beam must traverse the paper while the drum rotates. These two combined motions result in the light beam developing a spiral on the paper consisting of the sequence of all the lines, one after another. There is a relationship between the two motions of rotation and translation. This relationship is given by the *Index of Cooperation*. The index number represents the product of the drum diameter and the number of lines scanned in the unit of measurement used.

Index = Dia in mm × number of lines scanned in one mm (in. = mm ÷ 25.4)

The Index of Cooperation of APT-WEFAX images is 267.36 and the diameter of our drum is 57 mm. Applying the above formula, we find that 4.69 lines should be scanned in 1 mm. As the line has a duration of 1/4 second, the spot will have to traverse 1 mm in 1.17 seconds, which means 171 mm in 200 seconds. The image will come out perfectly square, for it occupies only 20/21 of the line or 171 mm (see Fig. 1).

There are many ways to make the light beam traverse. The important point to keep in mind is that its movement must be extremely accurate so that the lines are separated by the same distance. The easiest way to obtain this condition is to put the light gun on a self-carrying carriage drawn by a synchronous motor (Figs. 5, 7 and 10). The carriage is guided parallel to the drum by a rail on which two grooved wheels roll. The driving wheel, located on the back of the carriage, is run by a small synchronous motor connected to the ac lines. It is a rubber wheel that operates on a runway.

As the carriage must traverse 171 mm in 200 seconds, we can calculate the circumference of the driving wheel. If we use a synchronous motor with 1 turn per minute at the reduction gear shaft, the circumference of the driving wheel will be 51.2 mm and the diameter will be 16.3

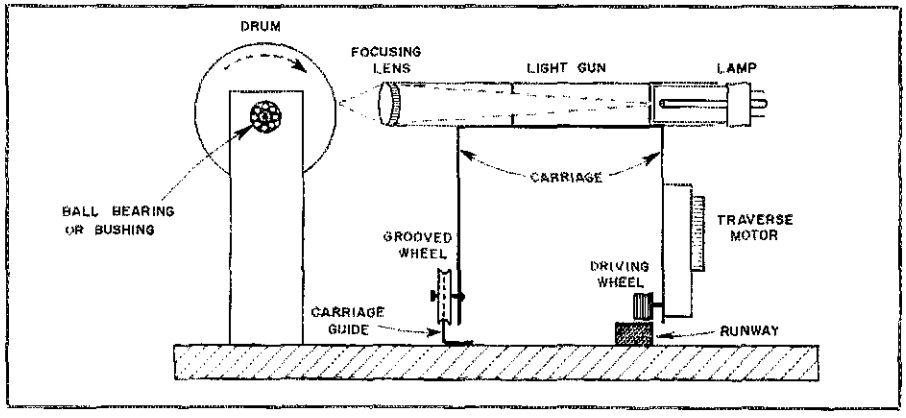


Fig. 7 — The facsimile display as seen from the left.

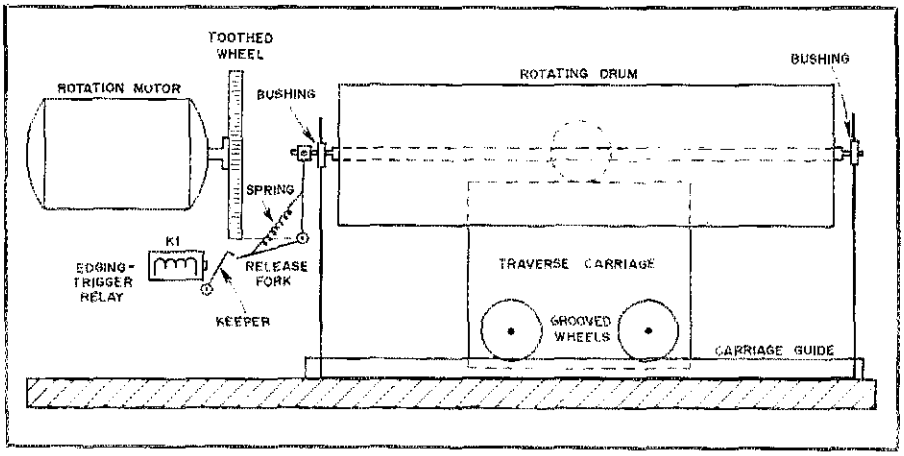


Fig. 8 — The facsimile display as seen from the rear.

mm. With the arrangement of Figs. 5 and 7, it should rotate counterclockwise.

Light Gun

The barrel holding the lamp and the focusing lens is shown in Figs 5 and 7. You should get a 10× eyepiece with a focal length of 15 or 20 mm (0.59 or 0.79 in.) and set it at one end of the light gun. Equip the eyepiece with a micrometer screw for fine-focus adjustment of the spot on the paper wrapped around the drum.

Set the lamp at the other end of the barrel at a distance from the lens that tentatively provides the best results as far as quantity of light, spot dimension and lack of halo are concerned. To reduce the halo, some diaphragms must be placed between the lamp and the lens. The first, with a 2 mm (0.78 in.) hole, is to be placed close to the flat head of the lamp — the other(s), at the distance that experience suggests. A black interior of the barrel is essential.

As the spot is projected on the paper, it may look very large, but you will notice that the outer regions of the spot are reddish, while the inner part is white. It is this bright small spot of actinic light which exposes the paper and which should be focused very carefully.

The dimension of the spot of light depends on the eyepiece and the lamp utilized in addition to the distance from the lamp to the lens. The spot should be neither too large (the lines would mix), nor too small (the lines would be too far apart). With patient attempts you will find the right size.

Photographic Paper

To apply the paper around the drum, use a strip of double-faced adhesive tape. This strip must be positioned on the longitudinal line drawn on the drum that serves to set the right edging of the image (Fig. 6). The edges of the paper are to be placed along this line and are to be pushed against the adhesive tape so that they adhere to it along the whole length.

As we said, the suggested size of the paper should be cut down to the appropriate size before wrapping it. We suggest glossy grade 3 paper. However, try other grades to find the one which makes the greatest possible number of details stand out. Development and fixing are carried out in the traditional way. If the exposure is proper, the paper should develop thoroughly in two minutes at 20° C. The whole process of printing and development must be carried out in red or yellow-green light.

Power Supply and Test Equipment

The reproducing unit requires four different voltages. For the video section (excluding the lamp) and the synchronizing section (excluding the final power amplifier), 12 V at 1 A regulated, must be furnished. The rotation-motor power amplifier (Q4 and Q5) requires 15 V at 1.5 A. Other voltages are 250 V at 30 mA for the glow modulation lamp and 117 V at 60 Hz ac for the translation motor.

When the main switch S1 is ON, the 12 V is always applied to the circuit. Only when the display is in operation are the 15 and 250 V applied. S2 serves as the stand-by switch.

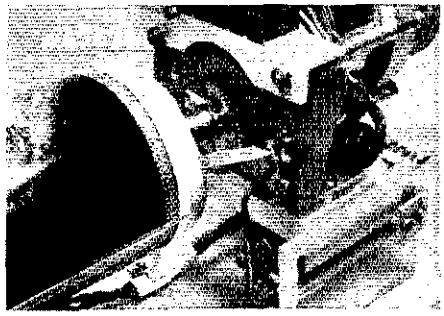


Fig. 9 — Detail of the alignment device. The release fork is inserted in the edging relay keeper. When the relay is activated, the release fork (returned by the spring) fits into a groove of the cogwheel fastened to the rotation motor shaft. In the display shown here, the drum shaft is inserted in a bushing connected to the motor shaft. The two shafts are independent of each other. Support for both the cogwheel and the drum shaft is provided by the motor shaft.

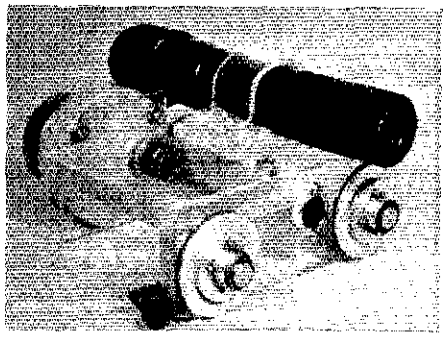


Fig. 10 — This photograph shows the traverse carriage with the light gun. You can see the two grooved wheels, a DIN socket for the voltages needed and a small wheel (bottom left) which, pressing against the guide rail, makes the traverse movement very smooth. On the back of the carriage you can see the traverse motor with the reduction gear and the small rubber driving wheel.

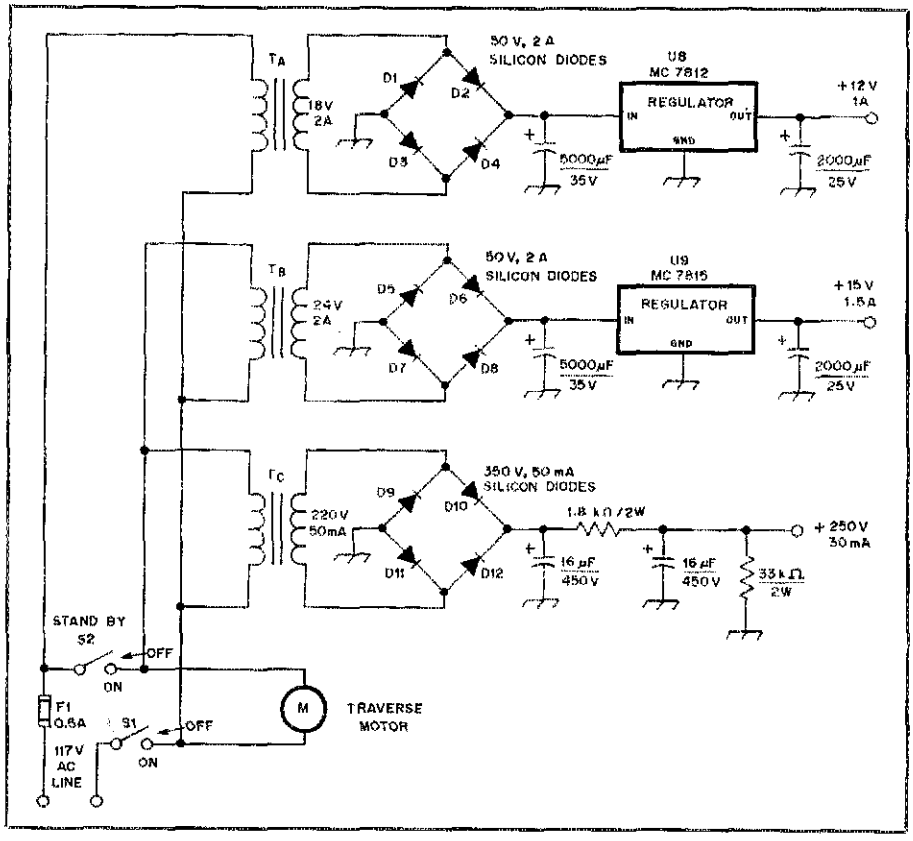


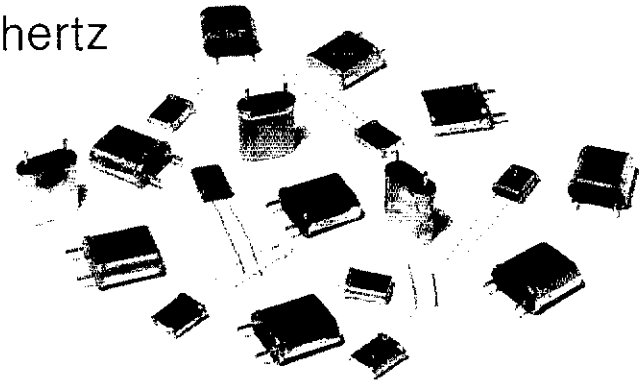
Fig. 11 — Power supply for the reproducing unit.
D1-D8, incl. — Silicon diodes, 50 V, 2 A.
D9-D12, incl. — Silicon diodes, 350 V, 50 mA.
F1 — 0.5 A fuse.
M — One-turn-per-minute synchronous motor, 5 W.
S1, S2 — Spst switch.
T_A — 117 V pri/18 V, 2 A sec.
T_B — 117 V pri/24 V, 2 A sec.
T_C — 117 V pri/220 V, 50 mA sec.

A possible layout of the power supply is shown in Fig. 11. Any other arrangement providing the above voltages and currents would be equally suited.

For the proper setup of the reproducing unit, an audio frequency generator and an oscilloscope are needed. A frequency counter may be useful but is not essential.

Do You Know Where Your Crystals Are?

Variations of only a few hundred hertz in the operating frequency of some of the crystals in your ssb rig can mean a big difference in the quality and intelligibility of your signal. Why?



By Joe Pettengill,* N2BC

Today's method of producing ssb signals involves an audio amplifier, an rf oscillator, a balanced modulator and a band-pass filter. Once the ssb signal is generated, the remaining processing is mostly heterodyning (adding or subtracting other frequencies to obtain the operating frequency) and amplifying the signal before coupling it to the antenna.

When the audio signal drives the balanced modulator, it modulates a crystal-controlled rf carrier and produces two sidebands — an upper and a lower sideband. During the modulation process, the carrier is almost balanced out and is present at a very low level at the output of the balanced modulator. This signal is then coupled to a band-pass filter, usually of the four-pole crystal type, which passes only one of the two sidebands and which provides further attenuation of the carrier.

Now, let's get back to that silly-sounding question. The operating frequency of the carrier oscillator crystal with respect to the filter will determine which sideband will be passed. Also, the exact relationship of the crystal frequency to the filter frequency will determine the quality of the signal that your ssb transmitter puts on the air.

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What happens to the filtered output signal with small changes in the crystal oscillator frequency? To answer this let's examine the output of the filter before it is heterodyned. We will look at the upper sideband only. (The processing of the lower sideband will be a mirror image of the upper.)

Where It Should Be

Fig. 1A shows a graph of the passband of a typical crystal filter, with the oscillator set for optimum operation of the circuit. The crystal oscillator frequency is close to 200 Hz below the 6-dB-down point of the lower frequency edge of the passband. This setting is optimum for two reasons. First, the carrier is attenuated by the filter. Second, and perhaps more important, the filter will pass the frequencies required for understandable human speech, 500 to 2500 Hz. Frequencies higher and lower will be rejected by the filter.

A number of studies have shown that loss of voice frequencies below 500 Hz and above 2500 Hz does not seriously affect understandability of speech in a communication medium. However, a loss of low-end frequencies above 500 Hz or a loss of high-end frequencies below 2500 Hz seriously affects the understandability of words spoken.

If the crystal frequency is only 1/100 of 1% low, it will be 500 Hz low and the resultant modulation products that should be passed by the filter will be 4999.8 kHz to 5003.5 kHz. Because the filter is fixed with a passband of 5000.3 kHz to 5003.0 kHz, the low-end speech frequencies corresponding to about 800 Hz audio will be rejected. Additional high-end frequencies will be allowed to pass causing interference to adjacent channels on the upper side of the signal (Fig. 1B). These factors combine to make understandability at the receiving end poor.

If we vary the frequency of the crystal oscillator upward from optimum by the same percentage factor, things again become bad. Not only do we affect the upper frequencies that will be passed by the filter, but we allow some of the lower sideband frequencies to be passed (Fig. 1C). Products corresponding from 0 Hz to 2200 Hz fall within the passband, which means that some of the significant high frequencies will be missing in the recovered audio at the receiving end. There is little appreciable attenuation of the vestigial carrier. The presence of lower-sideband frequencies will cause serious interference to other stations operating on the lower-side channels.

It's 11 P.M. Do you know where your crystals are?

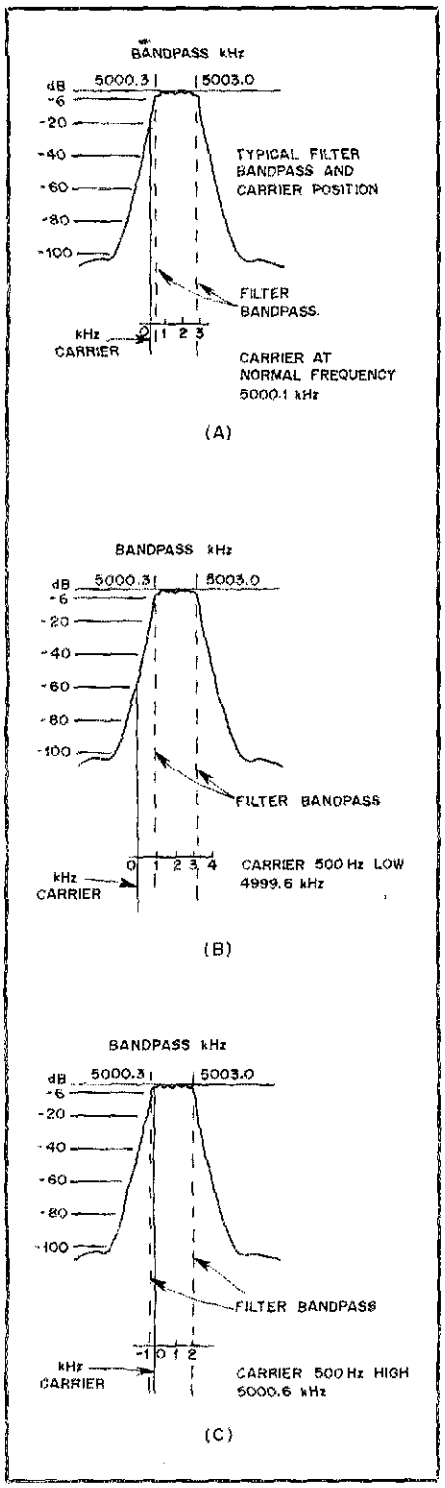


Fig. 1 — At A, the relative position of the carrier and the corresponding audio with respect to the passband of the filter. In addition to passing the desired audio products, the filter provides approximately 20 dB of attenuation of the vestigial carrier. If the carrier frequency is shifted 500 Hz low, the system has the characteristics depicted at B. The carrier is attenuated even more, but the products corresponding to low frequency audio are also greatly attenuated making it difficult for the receiving station to understand what is being said. At C, conditions that occur when the carrier frequency is shifted 500 Hz high are shown. The carrier is not attenuated by the filter and important audio products are lost. Additionally, portions of the lower sideband are passed through the filter. Again, the result is a poor signal.

First Packet Repeater Operational in U.S.

KA6M/R in San Francisco is the first U.S. all-digital, simplex packet radio repeater for use in the Amateur Radio Service. The repeater went into operation on December 10, 1980, and has been running both as a packet repeater and a beacon since. KA6M indicates that it has created a flurry of inquiries and that several amateurs are working on equipment that will bring them on line.

The primary function of a packet repeater is the same as that of the conventional repeater — to extend the geographic coverage of fixed or mobile stations. In terms of secondary functions, packet repeaters have the potential to far outstrip conventional repeaters with respect to flexibility and creative uses. A packet repeater or digital repeater ("digipeater" as the Canadians call it) is a machine which receives a message or block of data and, after verification, retransmits that message on the same frequency channel. Except for possible modifications of some address or control bytes, the message transmitted is the same as the message received. However, only a single simplex channel is required for operation. A conventional voice repeater requires two separate frequency channels.

KA6M/R is currently operating on 146.58 MHz, a simplex channel assigned in the San Francisco area for non-voice use. It transmits data at a speed of 1200 baud. The machine consists of a Z-80 microprocessor, a Bell 202 compatible modem and a solid-state transceiver (FT-202) utilizing PIN diode switching. Currently, the repeater is located in Menlo Park.

The framing format used for the packets is high-level data link control (HDLC), which is a new and internationally recognized standard in the communications industry. A frame consists of an opening flag byte, an address byte, a control byte, an information field, two bytes of CRC checking and a closing flag. The use of HDLC framing and control procedures guarantees highly reliable and nearly error-free communications. The Vancouver Digital Communications Group was the first amateur group to use HDLC framing.

As a beacon the machine transmits three packets every five minutes, immediately following its cw i-d. Each packet contains about 70 ASCII characters. Functioning as a repeater, it will retransmit any packet received which has the correct address and CRC checksum. The information field is currently limited to 256 bytes.

This repeater is one of the first steps in what is proposed to be a nationwide if not international network of interconnected computer systems. Several other groups, including the Amateur Radio Research and Development Corporation (AMRAD), are currently working on similar systems. Others are busily working on a slightly different approach that has been pioneered by a group from Ottawa, Ontario. Packet radio is a new frontier of Amateur Radio. The trailblazers and scouts are moving ahead. Can the swarm of immigrants be far behind? — *Hank Magnuski, KA6M, and Pete O'Dell, KB1N*

Strays

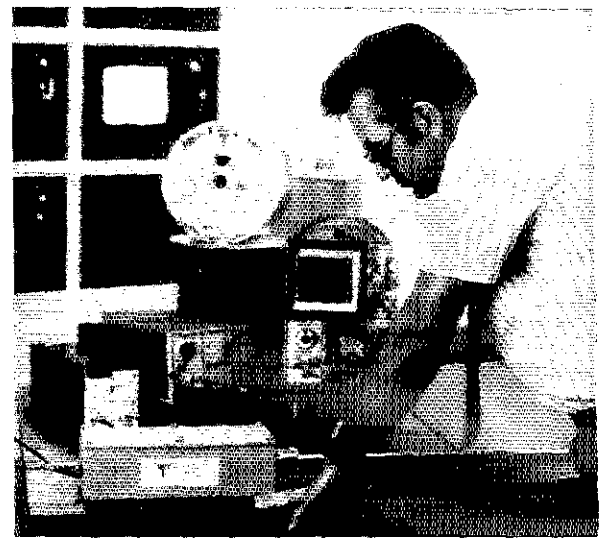
POSSIBLE ALUMINUM WIRING HAZARD?

☐ Do you have a 15- or 20-ampere aluminum wiring system in your home? If so, you may want to read, "Was Your Home Built After 1964? Do You Have An Electrical System With Aluminum Wiring?" This booklet may be obtained by calling the following toll-free numbers: in the continental United States call 800-638-8326; in Maryland call 800-492-8363; in Alaska, Hawaii, Puerto Rico or the Virgin Islands call 800-638-8333. — *"Fire Investigation Handbook" issued by the U.S. Department of Commerce, August 1980.*

CALL FOR PAPERS

☐ Papers are invited for the 1981 Annual VHF Conference sponsored by the Electrical Engineering Department of Western Michigan University at Kalamazoo. Principal emphasis will be on engineering developments applied to radio communication, design and construction on the frequencies of 30 to 1200 MHz. This conference will provide an opportunity for beginning or mature researchers to report their findings to their peers. We especially encourage the inexperienced inquirers to participate. Authors wishing to present papers should send by June 30, 1981, a synopsis describing the paper to: Dr. Glade Wilcox, W9UHF/9, Program Chairman, VHF Conference, Department of Electrical Engineering, Western Michigan University, Kalamazoo, MI 49008. — *Glade Wilcox, W9UHF/8*

Coaxial Cable — The Neglected Link



Is a better grade of coaxial cable worth the price difference? This analysis of the importance of shielding in coaxial lines explains why the answer is "Yes!"

By Charles Brainard,* WA1ZRS, and Ken Smith*

When energy is transmitted through a coaxial cable, some of this energy may escape. Conversely, the cable may be in a field of energy and some of that energy can penetrate into the cable. The transformation of the energy out of, or into, the cable is called radiation, and the associated transducer is termed an antenna. The cable is a transmitting antenna when the energy escapes (egressive signals) and a receiving antenna when energy penetrates into the cable (ingressive signals). This phenomenon has many names associated with it such as leakage, radiation, isolation, shielding, shielding effectiveness, screening and screening efficiency.

Energy must pass through the cable shield for either egressive or ingressive signals. Obviously, for the most common use of coaxial cable, high attenuation of the energy passing through the shield is essential. There are cables that are designed for controlled leakage, and they are used when a highly controlled radiation of signals is desired. The following discussion, however, will be directed toward shields that are designed to prevent this leakage.

In 1960, a development program was established to investigate methods of construction of flexible coaxial cable to reduce cost, decrease attenuation and to improve rf shielding. It was found that test methods used to measure the radiated energy were quite difficult and were not sufficiently repeatable to evaluate different cables. This method measured the energy external to the cable resulting from a known energy level within the cable. Hence, a new test method was developed which gave relative ratings for cables in decibels. This method was found to be useful for evaluation of different cables even though these ratings could not be directly interpreted in radiation. The repeatability of the test was in the neighborhood of 3 to 5 dB, and it was found that relative ratings varied from 20 to 100 dB for various cables.

The theoretical development of electromagnetic field coupling through the shields of coaxial cable began many years ago and the general theory was presented in an article by Schelkunoff in 1934.[1] He represented the coupling by a transfer impedance and developed formulas for calculating the characteristics of solid shields. He also analyzed multiple-layer shields. Since 1934, numerous people have analyzed the coupling mechanisms and methods of measuring coupling. In the photograph, coauthor Ken Smith stands beside the Radiometer, an instrument that uses the triaxial test method[2,3,4] for measurement of the electromagnetic field coupling through the shield. He developed this instrument for the Times Wire and Cable Co. in 1978.

The purpose of this article is to show the transfer impedance and capacitive coupling impedance and, therefore, shielding effectiveness of different types of coaxial cables. The theory of electromagnetic field coupling and method of measurement will be reviewed, as will the measurement data of different types of cables.

Measurement

The Radiometer measures the absolute value of the transfer impedance and capacitive coupling impedance of the coaxial shield. An artist's sketch of the test setup is given in Fig. 1 showing that the cable is coaxially supported by a dielectric in the test chamber, creating a triaxial transmission system. The inner coaxial-transmission system is inside the test specimen and the outer coaxial-transmission system center conductor is the shield of the specimen. Its outer conductor is the test chamber. The specimen is terminated in its characteristic impedance by load A and the combination of the sweep oscillator and preamplifier. Load B and the detector are connected to the outer system by coaxial terminals. The rectangular termination on the ends of the chamber have ferrite toroids surrounding the test sample. These toroids minimize current flow along the shield of the test

*Times Wire and Cable Co., 358 Hall Ave., Wallingford, CT 06492

†References appear on page 31.

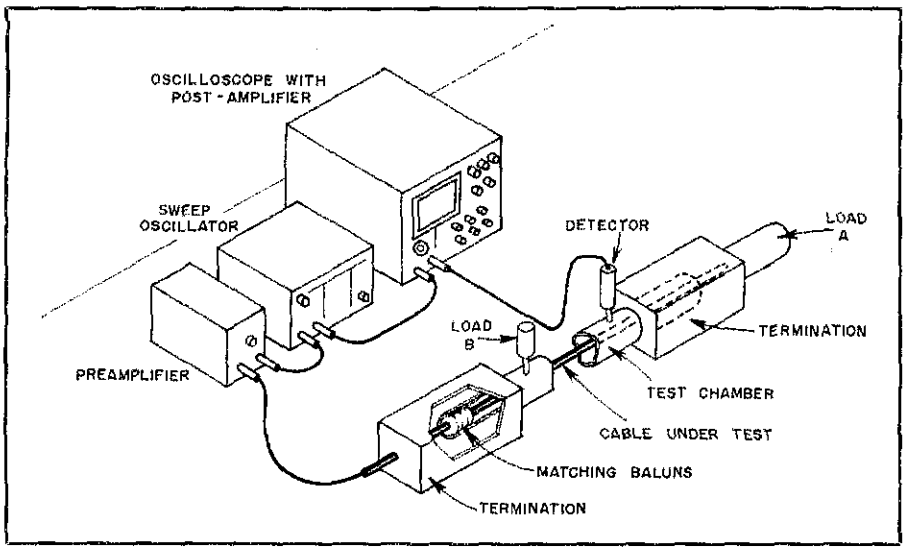


Fig. 1 — A setup for using a triaxial-test method for measuring the electromagnetic-field coupling through the shield.

specimen to the end of the rectangular termination where the shield of the specimen is grounded. These rectangular terminations form baluns creating a high impedance allowing load B and the detector to match the impedance of the chamber. Errors are not introduced by leaky conductors; the shield of the specimen is unbroken through the entire length of the fixture. The connectors on the sample are connected to the ends of the rectangular terminations and are not critical since the baluns isolate the connector leakage from the signal in the test chamber.

When the equipment is set up as shown in Fig. 1, an analysis (neglecting attenuation and assuming the cable shield is uniform) shows that the magnitude of the output voltage in the triaxial transmission system is:

$$\left|V_f\right| = \left|\frac{(Z_t - Z_f)\, V_i \sin\left[(B_s - B_c)\, L/2\right]}{Z_s\,(B_s - B_c)}\right| \qquad \text{(Eq. 1)}$$

where

V_f = the detector voltage with set up of Fig. 1.

V_i = the specimen input voltage.

Z_t = the transfer impedance in ohms per meter.

Z_f = the capacitive-coupling impedance in ohms per meter.

L = the distance between the coaxial terminals of the test chamber in meters.

Z_s = the specimen characteristic impedance in ohms.

B_s = the specimen phase constant in radians per meter.

B_c = the test-chamber phase constant in radians per meter.

An analysis of the output voltage with load B and detector exchanged shows:

$$VR = \left|\frac{(Z_t + Z_f)\, V_i \sin\left[(B_s + B_c)\, L/2\right]}{Z_s\,(B_s + B_c)}\right| \qquad \text{(Eq. 2)}$$

where

VR = The detector voltage with load B and detector swapped.

Z_t and Z_f may be calculated since ratios V_f/V_i, VR/V_i, B_s, B_c, L and Z_s can be measured. The test procedure provided with the Radiometer includes tables which can be used to convert the voltage ratios measured in dB to transfer impedance and capacitive-coupling impedance. The minimal specimen attenuation is neglected but the chamber attenuation is accounted for. The tables were obtained from the following equations:

$$Z_t = \frac{1}{L}\sqrt{Z_s Z_c}\left(\left|\frac{\phi}{\sin\phi}\right| e^{x} + \left|\frac{\theta}{\sin\theta}\right| e^{y}\right) \qquad \text{(Eq. 3)}$$

$$Z_f = \frac{1}{L}\sqrt{Z_s Z_c}\left(\left|\frac{\phi}{\sin\phi}\right| e^{x} - \left|\frac{\theta}{\sin\theta}\right| e^{y}\right) \qquad \text{(Eq. 4)}$$

where

Z_t = the transfer impedance in ohms per meter.

Z_f = capacitive coupling impedance in ohms per meter.

Z_s = the specimen characteristic impedance in ohms.

L = chamber length in meters.

$\phi = (B_s + B_c)\, L/2$ in radians.

$\theta = (B_s - B_c)\, L/2$ in radians.

Z_c = the chamber characteristic impedance in ohms.

B_s = specimen phase constant in radians per meter.

B_c = chamber phase constant in radians per meter.

$$x = \frac{DBR - \alpha_{c/2}}{8.68} = \text{Ln } VR/Vi \qquad \text{(Eq. 5)}$$

$$y = \frac{DBF - \alpha_{c/2}}{8.68} = \text{Ln } VF/Vi \qquad \text{(Eq. 6)}$$

α_c = chamber attenuation

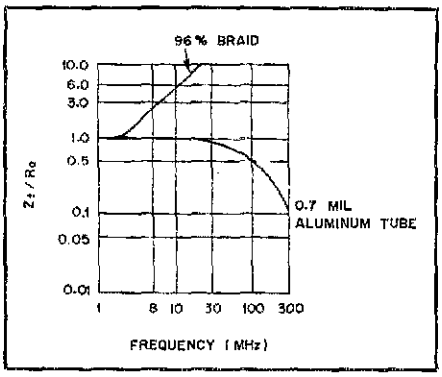


Fig. 2 — Coaxial-cable transfer impedances (Z_t) divided by the dc resistance of the shield (R_o) vs. frequency.

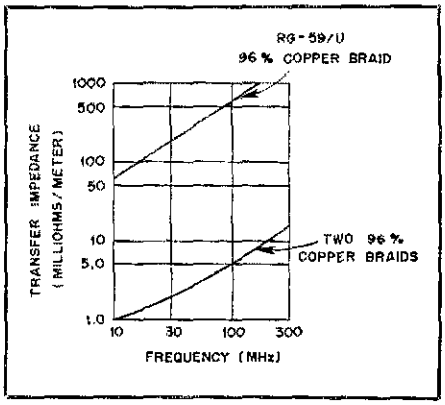


Fig. 3 — The relationship of transfer impedance vs. frequency for braided shields is shown by this graph.

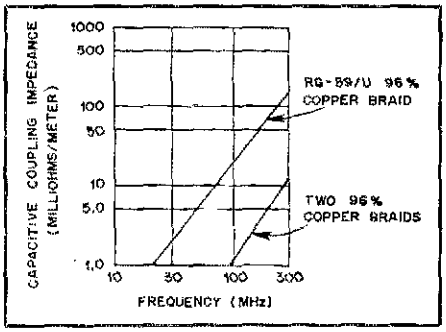


Fig. 4 — A graph representing capacitive coupling impedance vs. frequency for braided shields.

Note: X, Y, DBR, DBF and α_c are negative quantities.

Discussion and Analysis of Transfer-Impedance Test Results

Transfer impedance in an elementary length of coaxial cable is defined as the ratio of the potential gradient (voltage) in the disturbed circuit to the current flowing in the interfering circuit. When the cable is acting as a transmitting antenna (egressive signals) the disturbed circuit is the environment around the cable. When the cable is acting as a receiving antenna (ingressive signals) the disturbed circuit is

within the cable and the interfering circuit is the environment around the cable. A lower transfer impedance reduces the electromagnetic coupling (radiation).

The transfer impedance of a braided shield has two components — a diffusion component caused by current diffusing through the metal and a mutual-coupling component caused by penetration of the magnetic field through the openings in the braid. The mutual-coupling component can be represented by a mutual inductance. (Figs. 2, 3 and 4 are related to this discussion.)

The transfer impedance is the vector sum of these two complex quantities, and its magnitude is:

$$|Z_t| = \sqrt{(|Z_d|\cos\phi)^2 + (|Z_d|\sin\phi + |Zm|)^2} \quad \text{(Eq. 7)}$$

where

$\phi = 0.785 - \tan^{-1}(\cot d/\delta \tan d/\delta)$

Zd = the diffusion component of Z_t in ohms per meter.

Zm = the mutual-coupling component of Z_t in ohms per meter.

d = the diameter of braid wire in meters.

δ = the skin depth in meters.

The approximate diffusion component and mutual-coupling component for braided cable is obtained from an extension of Vance's equation[5] and Schelkunoff's.[1]

The diffusion component is:

$$|Z_d| = R_{dc} \frac{(\sqrt{2})\, d/\delta}{\sqrt{\sinh^2(d/\delta) + \sin^2(d/\delta)}} \quad \text{(Eq. 8)}$$

$$\delta = \sqrt{\frac{\rho}{\pi f \mu'}} \quad \text{(Eq. 9)}$$

The mutual-coupling is:

$$|Z_m| = \frac{\omega v \mu m}{\pi^2 D^2} \quad \text{(Eq. 10)}$$

where

ρ = the resistivity of the shield in ohms per meter.

f = the frequency in hertz.

μ' = the absolute magnetic permeability of the shield in henrys per meter.

d = the diameter of braid wire in meters.

R_{dc} = the dc resistance of the shield in ohms per meter.

ω = the angular frequency in radians per second = $2\pi f$.

v = the number of holes per meter in the braided shield.

μ = the absolute magnetic permeability of the insulation between the conductors in henrys per meter.

D = the mean inside diameter of the shield in meters.

m = the magnetic polarizability of the holes in the braid.[5]

Z_m = the mutual-coupling component in ohms per meter.

Z_d = diffusion component in ohms per meter.

δ = skin depth in meters.

Analysis of Capacitive-Coupling Impedance Test Results

The openings in the shield also allow the electric field to penetrate, creating electric coupling. This coupling can be represented by a capacitive coupling between the center conductor of the coaxial cable and the return path external to the cable.

The capacitive-coupling impedance is derived for the definition accepted by the International Electrotechnical Commission Working Group 1 (Screening Efficiency)' and Vance's equation for transfer admittance.[5]

$$Z_f = \frac{p}{m} Z_m \sqrt{\varepsilon r_e / \varepsilon r_i} \quad \text{(Eq. 11)}$$

where

Z_f = the capacitive coupling impedance in ohms per meter.

p = the electric polarizability of the holes in the braid.[5]

m = the magnetic polarizability of the holes in the braid.[5]

Z_m = the mutual-coupling component of Z_t in ohms per meter.

εr_e = the relative dielectric constant of the insulation in the external circuit.

εr_i = the relative dielectric constant of the insulation within the cable.

The capacitive-coupling impedance will be zero if there are no openings in the shield. If openings exist, then the capacitive-coupling impedance should vary directly with frequency. The test data plotted in Fig. 4 follows this characteristic reasonably well.

Conclusions

Measurements of the transfer impedance and capacitive-coupling impedance of coaxial shields can be made. Results agree with theoretical equations. Since the theory of transfer of energy through shields is known, an engineer can analyze and design coaxial cable theoretically. Because of the different types of coaxial cables in use today, the design engineer should be aware of the large variation in the coupling of electromagnetic fields through the shields.

The information in Table I gives an idea of the relative isolation of coaxial cable in accordance with percent and type of shielding. We have also indicated the losses in dB per 100 feet at 15 and 150 MHz (near two very popular Amateur-Radio bands) for each construction in the table. While Table I deals with RG-59/U cable, the isolation characteristics are applicable to any solid-dielectric cable while the losses in dB per 100 feet can be interpolated to other coaxial lines.

Down-line attenuation of cables is controlled by (1) the type and material of the center conductor; (2) the velocity of propagation and type of material of the center dielectric; and (3) the type and material of the outer conductor. An examination of the loss curves of Fig. 5 shows that RG-58 A/U exhibits loss characteristics from 11% to 12% more than that of RG-58/U. The only difference between these two cables is the nature of the center conductor. RG-58 A/U has a 19-strand tinned-copper center conductor. Both the stranding and tinning increase attenuation. Tinned copper is very popular with antenna manufacturers because it simplifies soldering. But, considering attenuation tinned-copper shields

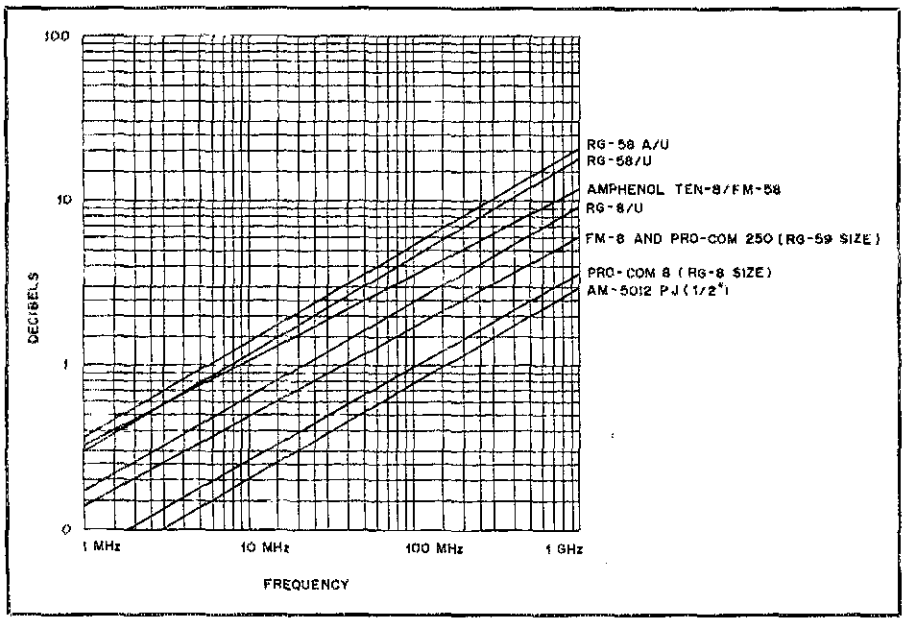


Fig. 5 — Nominal loss characteristics per 100 ft (30.48 m).

Table 1

Relative isolation characteristics of RG-59/U coaxial cable vs. percentage and type of braid coverage/shielding.

Shield	Relative Isolation (dB)	Ratio of Power Radiated from Cable	Losses in dB per 100 ft. (30.48 m) 15 MHz	150 MHz
40% bare copper	17	1:50	1.72	5.55
51% bare copper	18	1:63	1.72	5.55
59% bare copper	26	1:398	1.39	4.51
79% bare copper	34	1:2500	1.13	3.67
98% bare copper	52	1:160,000	0.98	3.20
96%/96% bare copper	83	$1:2 \times 10^8$	1.01	3.31
Solid sheath (alum.)	282	$1:17 \times 10^{28}$	0.89	2.91

Note: Isolation capabilities of coaxial cable at 20 meters is roughly 10 times as good as at 2 meters.

Table 2

Formulas Common to All Coaxial Cable

Capacitance (C) = $\frac{7.36E}{\text{Log (D/d)}}$ picofarads/ft

Inductance (L) = 0.140 Log (D/d) microhenrys/ft

Impedance (Z_o) = $10^3\sqrt{\frac{L}{C}} = \frac{138}{\sqrt{E}}$ Log (D/d) ohms

Velocity of propagation as % of speed of light = $\frac{100}{\sqrt{E}}$

Time delay = $1.016\sqrt{E}$ nanoseconds/ft

Cutoff frequency = $\frac{7.50}{\sqrt{E}(D+d)} = F_{co}$ (GHz)

Magnitude of Reflection Coefficient =

(1) = $\left[\frac{Z_r - Z_o}{Z_r + Z_o}\right] = \frac{\text{VSWR} - 1}{\text{VSWR} + 1}$

VSWR = $\frac{1 + \Gamma}{1 - \Gamma}$

Peak voltage = $\frac{1.15Sxd\ (\log D/d)}{K}$

$\alpha = \frac{0.435}{Z_o\ (D)}\left[\frac{D}{d}K_1 + K_2\right]\sqrt{F} + 2.78\sqrt{E}(P.F.)\ (F)$

where

- α = attenuation in db/100 ft
- d = outside diameter of inner conductor in inches
- D = inside diameter of outer conductor in inches
- S = maximum voltage gradient of the cable insulation in volts per mil
- E = relative dielectric constant of the insulation of cable
- Log = Logarithm to base 10
- K = safety factor
- K_1 = strand factor and material
- K_2 = braid factor and material
- F = frequency in MHz
- P.F. = power factor

Feet × 0.3048 = meters

Properties of Wire and Cable Insulating Materials

Material	Dielectric Constant	Power Factor	Volume Resistivity (ohms-cm)	Normal Operating Temperature Limits (°C)
TFE	2.1	0.0003	10^{19}	−75 + 250
Polyethylene	2.3	0.0003	10^{16}	−75 + 80
Cellular polyethylene	1.40-2.10	0.0003	10^{12}	−75 + 80
Polyvinylchloride	3.00-8.00	0.0700-0.1600	2×10^{12}	−55 + 105
Nylon	4.60-3.50	0.040-0.030	4×10^{14}	−60 + 120
Kel-F	2.37	0.0270-0.0053	1.2×10^{18}	−40 + 150
Silicone rubber	2.08-3.50	0.007-0.016	10^{13}	−70 + 250
Ethylene propylene	2.24	0.00046	10^{17}	−40 + 105
FEP	2.10	0.0003	10^{18}	−75 + 200
Perforated TFE	1.50	0.0002	10^{19}	−75 + 250
Cellular TFE	1.40	0.0002	10^{19}	−75 + 250
Cellular FEP	1.50	0.0002*	18^{18}	−75 + 200
Polyimide	3.00-3.50	0.002-0.003	10^{13}	−75 + 300

*Varies with frequency

generate seriously detrimental effects above 500 MHz.

Another example that can be drawn from Fig. 5 is loss differentials (approximately 33%) between RG-8/U and FM-8 (Flexifoam by Times Wire). RG-8/U utilizes a 7-strand bare-copper center conductor and a 66% velocity core dielectric as opposed to a solid bare-copper center conductor and 79% velocity center core. It should be noted that in order for the FM-8 to possess a 50-ohm characteristic, the center conductor must be enlarged to 0.102 inches (2.59 mm) or no. 10 gauge vs. 0.0808 inches (2.05 mm) or no. 12 gauge for the center conductor on RG-8/U. As the velocity of propagation of a coaxial cable is increased while maintaining the same inside diameter of the shield, the center conductor must be increased in size in order to maintain the same cable impedance.

Braided-shield coaxial cables are, to varying degrees, impacted by their environment. That is, mounting a poorly shielded cable directly to a tower leg, as is so common, can drastically alter the attenuation characteristics of the cable. This change in characteristics is often in excess of 10 times. Degradation increases with frequency.

Placing poor cables in any conducting environment such as when attached to a tower leg or even buried in the ground can cause adverse results.

From the formulas in this article, transfer impedance and capacitive-coupling impedances can be calculated. As these impedance values rise, the outer conductor (shield) has larger openings. Consequently, higher-impedance cable is more affected by environment.

There is much more to coaxial cable than meets the eye. Since the cost of coaxial transmission line is usually relatively small in proportion to other station costs, it's difficult to reason the use of poor grade cable. A properly shielded line should be a must for all installations. QST

References

[1]Shelkunoff, "The Electromagnetic Theory of Coaxial Transmission Lines and Cylindrical Shields," *Bell System Technical Journal*, Vol. 13, October 1934.

[2]Zorzy, "RF-Leakage Characteristics of Popular Coaxial Cables and Connectors, 500 Mc. to 7.5 Gc," *Microwave Journal*, November 1961.

[3]Bourseau and Sanjivy, "Mesure de L'impedance de Couplage et Application à L'étude des Ecrans," *Cables et Transmission*, 10 (1), January 1956, p. 11.

[4]Simons, "The Terminated Triaxial Test Fixture," IEC paper SC46A/WG1 (Simons) 2, October 1973.

[5]Vance, "Shielding Effectiveness of Braided Wire Shields," *IEEE Transactions of Electromagnetic Compatibility*, Vol. EMC-17, No. 2, May 1975.

[6]Cohn, "Determination of Aperture Parameters by Electrolytic-Tank Measurement, "*Proceedings of The Institute of Radio Engineers*, Vol. 39, November 1951.

[7]Fowler, "Observations on the Use of $Z_{t(c)}$ for Comparing the Breakthrough Capacitance of Cable Braids," IEC paper SC46A/WG1 (Fowler) 3, November 1973.

The ZS6U Minishack Special†

Like to experiment with simple antennas? Here are ideas for everyone from the antenna farmer to the apartment dweller.

By Colin Dickman,* ZS6U

The original article on the Minishack Special antenna appeared in *Radio ZS*, January 1973, and was reprinted there in metricated form in August 1977, entitled "The ZS6U Minishack Special — A Multiband End-fed Inverted-V Antenna System." The aim of this article is twofold: to provide a summary for the benefit of those who do not have access to the original article, and to expand on some of the original details.

Summary of the Original Article

1) By using a wire two wavelengths long at 10 meters, a very simple bandswitched L-network matching unit can be used to preselect 10, 15, 20, 40 and 80 meters quickly and reliably.

2) The system is preadjusted to provide a purely resistive load to the transmitter. Unlike other multiband systems, there is no reactance present to cause loading difficulties accompanied by rf in the shack and possible RFI.

3) There are no transmission-line losses. Consequently all of the rf from the transmitter is radiated by the antenna.

4) By using lobe alignment, the antenna yields useful directivity and gain over a dipole or vertical, especially at the higher frequencies.

5) On reception the antenna has a greater effective aperture at the higher frequencies than a dipole or vertical. In addition, the L network provides a degree of selectivity. The two together result in a stronger, cleaner signal.

6) The 2-wavelength version requires less than 14 meters (46 feet) of ground space. The length of the wire is obtained from the formula

$$L\ (\text{feet}) = \frac{984\ (N - 0.0125)}{f\ (\text{in MHz})}$$

where N is the number of wavelengths at the highest frequency. (To convert from feet to meters multiply by 0.3048.) For example, for two wavelengths at 28.6 MHz, L = 68.4 feet (20.8 m). This is the overall length of the wire right up to the antenna terminal of the L network.

The circuit diagrams for L networks for 2- and 4-wavelength antennas are shown in Figs. 1 and 2, respectively. The adjustment procedure is to insert an SWR bridge

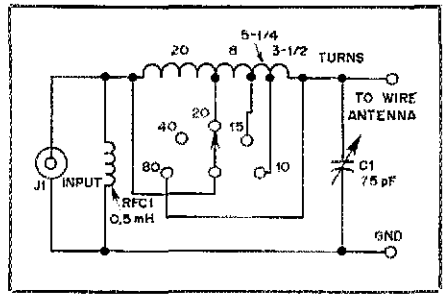


Fig. 1 — This simple, bandswitched L network is for use with the two-wavelength antennas of Figs. 3 and 5. Coil information is given in the text and Table 1.

Table 1

Coil Information for the Network of Fig. 1

Coil diameter (inches)	*Coil length (inches)*	*Largest usable AWG wire size*
1-3/8	1-1/2	18
1-1/2	1-7/8	17
1-5/8	2-3/16	15
1-3/4	2-5/8	14
1-7/8	3	13
2	3-1/2	11

Inches × 25.4 = mm

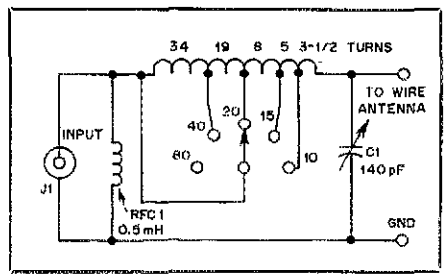


Fig. 2 — This L network is for use with the four-wavelength antenna of Fig. 4. See the text and Table 2 for coil information.

Table 2

Coil Information for the Network of Fig. 2

Coil diameter (inches)	*Coil length (inches)*	*Largest usable AWG wire size*
1-3/8	2-9/16	18
1-1/2	3-1/16	17
1-5/8	3-11/16	15
1-3/4	4-5/16	14
1-7/8	5	13
2	5-11/16	12

Inches × 25.4 = mm

*P. O. Box 46007, Orange Grove, Johannesburg, South Africa

†Adapted from an article in *Radio ZS*, January 1978, p. 8.

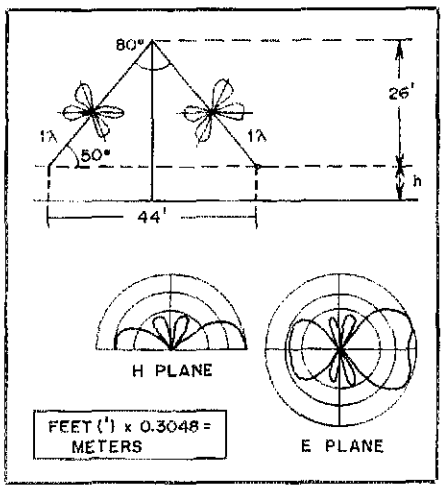


Fig. 3 — The standard ZS6U Minishack Special. H-plane and E-plane radiation patterns showing angle of radiation and directivity, respectively, are also shown.

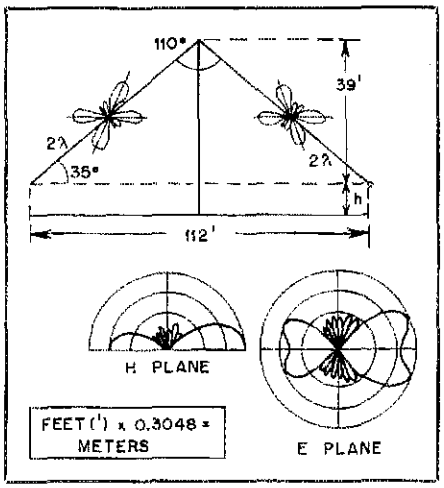


Fig. 4 — The full-size ZS6U Special has more gain than the standard version, especially on 80 meters.

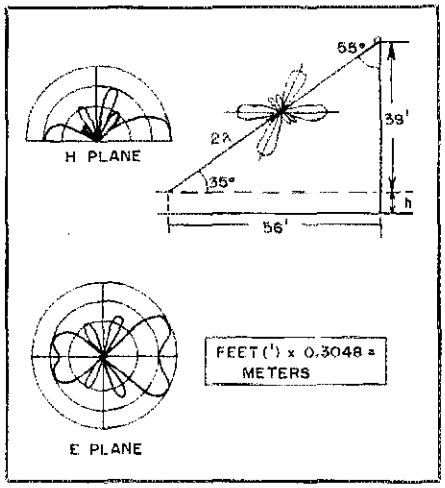


Fig. 5 — This version of the ZS6U special, which is two wavelengths long on 10 meters, may be just the solution to the antenna dilemma for many apartment dwellers.

between the rig and the L network, switch it to the reflected-power position and using sufficient carrier power on 40, 20, 15 and 10 meters in turn, adjust C1 for the lowest dip in the meter reading. With the two-wavelength system there is no tuning on 80 meters and C1 is merely set to minimum capacity. With the four-wavelength system the adjustment procedure for 80 is the same as for the other bands. Mark each band setting of C1 on its dial so that band changing merely involves switching the bandswitch and turning C1 to the calibrated mark for that band before tuning the rig.

The Wire Configurations

Having stretched and cut your measured piece of wire you will be looking for some way to string it up. The simplest way may be to use an L shape or you may need to take the wire in various directions to get it in the clear. Random shapes, however, do not do justice to the fine performance potential of this antenna. There are certain preferred configurations which will put the signal where it will do the most good. Be assured that the extra effort will be well worthwhile.

The principle of lobe alignment has been used in the three recommended configurations shown in geometric form in Figs. 3, 4 and 5 to achieve useful gain at low radiation angles. Using the formula and example given earlier, 2 wavelengths = 68.4 feet (20.8 m) and 4 wavelengths = 137 feet (41.8 m).

Fig. 3 depicts the standard ZS6U Minishack Special, which is 2 wavelengths long on 10 meters and 1/4 wavelength on 80. In this configuration, the change in direction of the wire at the apex splits the antenna into two 1-wavelength sections. Starting with the 50° lobe angle of a one-wavelength antenna in free space, the wire tilt, apex angle and height can be derived. The two pairs of horizontal lobes tend to reinforce each other to produce low-angle, bidirectional radiation along the plane of the wire. As with all end-fed antennas, the lobe amplitude in the free-end direction exceeds the reverse lobe because of progressive radiation loss along the wire. The gain of the 2-wavelength wire (about 2 dB) is added to the gain from lobe reinforcement (about 3 dB) to provide a total gain of about 4.5 dB. This gain is in a wide beam at a vertical angle of less than 10° in the direction of the open end of the wire. The theoretical patterns are shown in the accompanying vertical- and horizontal-plane diagrams for 10 meters. On the lower frequency bands the lobes become progressively misaligned, resulting in higher angles of radiation with less directivity and gain.

Fig. 4 is the full-size ZS6U Special. It is four wavelengths long on 10 meters and a half wavelength on 80. Here the tilt angle is 35°, resulting in a triangle having a height of 39 feet (12 m). If the dimension h, which represents the height at which the wire is connected to the L network, is taken to be 5 feet (1.5 m), then the pole height would be 39 + 5 = 44 feet (13.5 m), compared with 31 feet (9.5 m) in Fig. 3.

Because of the larger dimensions, the gain of the configuration in Fig. 4 is about 6 dB on 10 meters. It has a somewhat narrower beamwidth than the antenna of Fig. 3. As long as the full height is used, the performance on the five bands is better than the mini version by about 1.5 dB on each band. If the best possible performance is desired on 80 meters, this is the version to use. It requires the L network shown in Fig. 2.

The lobe-alignment principle for low radiation angles is also employed in the antenna of Fig. 5, which is half of the inverted V of Fig. 4. It has the same tilt angle and height but uses only two wavelengths of wire. As the polar diagrams indicate, this version is less desirable than the antennas of Figs. 3 and 4, but is preferable to a straight wire or a random shape. Apartment dwellers please note that this version may be used sloping downwards at the angle shown with good results. You will need to be on the fourth floor or higher.

Metal Obstructions

The near side of the wire is at high impedance on all bands and should therefore be insulated and kept as far as possible from metal window frames, gutters and cables. For example, it is not a good idea to close a metal-framed window with the wire clamped between the metal parts. Ideally, the near side of the wire should be secured to an anchor insulator and then should enter through a glass or plastic pane or a wooden window frame.

The support of the apex of the antenna should be a wooden pole guyed with nylon rope or metal wire broken by egg insulators. In certain cases where there are two suitable high points on either side of the antenna plane, they can be joined horizontally by nylon rope and the antenna wire can be thrown over the rope to form the apex.

If a metal pole is used it is best to shift it 7 to 10 feet (2 to 3 m) to one side so that it does not lie precisely in the vertical plane of the antenna. The resulting slight tilt in the plane will have little effect on performance.

All three configurations described show

decided gain in the direction of the free end of the wire and should therefore be erected pointing in the desired direction. If space allows, two antennas may be erected at right angles and switched to the L-network antenna terminal by means of a porcelain-insulated knife switch. Little is to be gained by joining two such antennas together, as the power in each would be halved. The impedance at the feed point would also be halved, upsetting the matching of the L network.

More About the L Network

Fig. 1 shows the network for two-wavelength antennas of the sort in Figs. 3 and 5. Fig. 2 shows the network that must be used with the antenna in Fig. 4. This network can also be used with lengths of 8, 12, 16 or 20 wavelengths.

One of the original problems facing builders of the original L network was that I used a piece of 1.4-inch (35-mm) OD polyethelene for the coil form and based my coil data on that. Here is a way for you to use the same number of turns and the same taps with a different diameter coil form. I derived the following formula, where L_1 and d_1 represent the given length of winding and diameter of coil, and L_2 and d_2 represent the new length and diameter:

$$L_2 = L_1 \left(\frac{d_2}{d_1}\right)^2 + \frac{d_2 - d_1}{2}$$

The formula is accurate over a 1.5:1 range. Tables 1 and 2 contain sets of values for each network. For example, if you use a coil diameter of 1.5 inches (38 mm) for the network of Fig. 1, you must spread the 20 turns evenly to occupy a winding length of 1.9 inches (47 mm). The maximum usable wire diameter given in the tables is derived from a spacing between turns equal to the wire diameter. An air-wound coil has the lowest losses, but if you use a coil form make sure it has a reasonably low power factor at 30 MHz. The switch is of the ordinary single-pole, five-position wafer variety, and the capacitor should have a spacing of at least 0.02 inch (0.5 mm) between the plates — otherwise arcing may occur. Enclose the unit in a plastic box. If a metal box is used, the coil should clear the metal by at least 1 inch (25 mm) on all sides.

I must emphasize that the L network must be looked upon as the equivalent of a quarter-wave transmission line and that resonance on each band (and therefore pure resistive load) is indicated by a dip in reflected power reading. If you leave your SWR bridge permanently in the line, here are a few words of advice. As hams are inveterate experimenters, it will not take you long to discover that if you fiddle with the L-network capacitor while tuning (contrary to instructions) you may find a setting other than the marked point on the dial which gives a higher reading on the "forward power" scale of the SWR bridge. You are about to fall into the trap of believing that you have discovered a way to radiate more power. But, alas, in reality the higher reading is caused by undesired reactive voltage being added to the desired resistive voltage. The moral is to interpret SWR-meter forward readings with caution.[1]

More About the Two-Wavelength Antenna on 80 Meters

Some constructors have had difficulty tuning the network on 80 meters. On this band the antenna is a quarter wave long — an earth ground is essential for its operation. As with any quarter-wave antenna, every foot of ground lead adds to the overall length of the antenna system.

If your ground system is so unsuitable that the antenna will not take power on 80 meters, there are three ways to handle the problem:

1) If the ground lead is about 15 feet (5 m) long or less, use a variable capacitor of about 300 pF in series with your antenna wire to cancel out the inductive reactance and electrically shorten the antenna. Set the capacitor for a minimum reflected power reading on the SWR bridge. This capacitor should be shorted out during operation on the other bands.

2) Use can be made of the property of a half wavelength of wire to repeat at its near end the conditions that exist at its far end. Choose a ground point sufficiently far away to accommodate a half-wavelength of ground wire at 80 meters. Use insulated wire because the middle of the wire will be at rf potential above ground. By varying the length of this wire, the antenna can be brought into exact resonance.

3) Use can be made of the property of a quarter wavelength of wire to act as an inverting transformer. Connect one end to the ground terminal of the L network and leave the far end free. The excess wire can be stapled around the skirting of the shack, hung out of the window or trailed along the ground, but must not be grounded. As in par. 2 above, its length can be trimmed to provide exact resonance. It should be noted that with this method an additional electrical ground must be provided to the rig for lightning and shock protection. If this protective ground upsets the antenna resonance, connect an rf choke in series with it consisting of a close-wound single layer of wire on a 1/2-inch (13 mm) OD ferrite rod. In any case, it is a good idea to use such a choke, especially when the ac-line ground is used, to reduce RFI with your neighbors.

Here's wishing you an outstanding signal. QST

[1]See "What Your Wattmeter Really Reads," by J. T. Kroenert, in February 1981 *QST*.

Strays

TA PROFILES

☐ Where would we be today without the knowledge of professionals in the area of safety and health? Probably in deep trouble! We are grateful to have on our TA roster an expert in this field, ARRL Technical Advisor John J. Champa, K8OCL.

First licensed in 1959 as KN8OCL, John presently holds an Advanced class license. His primary interest in Amateur Radio is satellite communications. He is a life member of the ARRL and AMSAT, a member of the Columbus Amateur Radio Association, Central Ohio Amateur Radio Emergency Service, plus numerous other societies.

John received his BA degree in Sociology/Psychology from Ohio State University, his MA in Management and Supervision from Central Michigan University and his DBA in Organizational Behavior from Western Colorado University. He is employed at Cooper Energy Services as Manager, Safety and Workers' Compensation. He resides in Columbus, Ohio, and enjoys gardening, music, reading and weight lifting. — *Marian Anderson, WB1FSB*

TA John J. Champa, K8OCL.

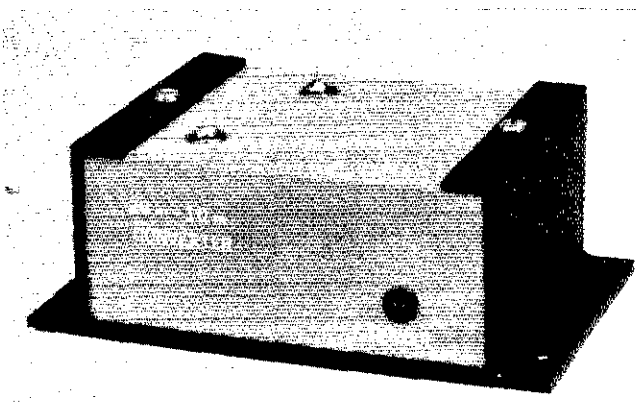
I would like to get in touch with . . .

☐ anyone interested in forming a scientist's net for radio amateurs. Ben Hawkins, KAØDVL, 6879 South Elizabeth Circle, Littleton, CO 80122.

☐ anyone building, flying or otherwise dealing with ultralight aircraft. Dominic A. Burlone, WD4IFY, Rte. 2, Stagecoach Dr., Anderson, SC 29621.

A QRP Transmitting Converter

Double up and have some fun as you chase 10-meter DX. Converting from 14 to 28 MHz is a simple technique that may be used at other frequencies as well.



By Jim Pitts,* KE4Y

Low atmospheric noise levels make the 10-meter band an excellent choice for QRP operation. Unfortunately, many QRP circuit designs cover only the 160- to 20-meter bands. This is primarily because of stability problems encountered when constructing simple VFOs for operation above 14 MHz. Also, it is difficult to build direct-conversion receivers with sufficient sensitivity and stability for use at higher frequencies. The 20- to 10-meter transmitting converter described here was designed for use with low-power transmitters or transceivers. At my station, the converter is used in conjunction with the Heath HW-8 transceiver and a separate ham-band receiver.

Circuit Description

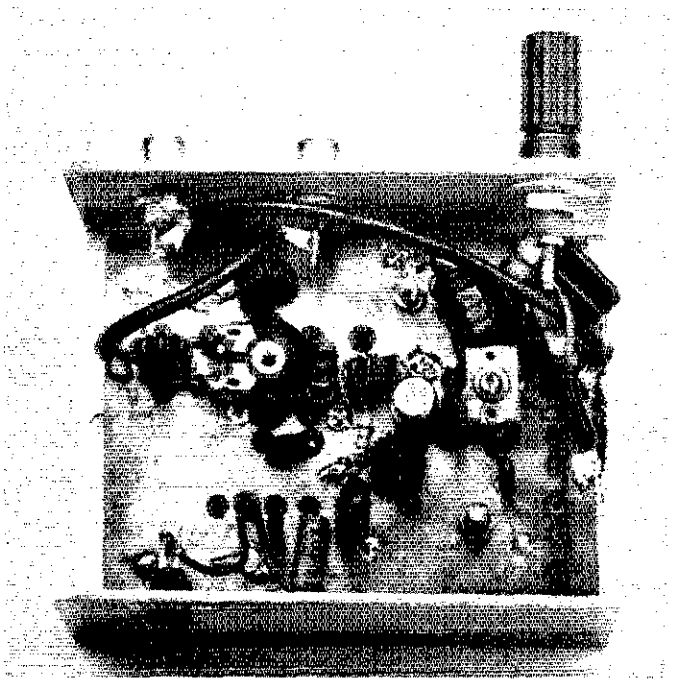
The design of the converter shown in Fig. 1 is based on principles outlined in *Solid State Design for the Radio Amateur*.[1] Many different circuits, some involving several stages, were tried before this simple circuit was chosen. It features simplicity, low cost and flexibility for adaptation to other bands.

The "heart" of the converter is the frequency-doubling stage. The 14-MHz input signal is transformed into a 28-MHz output signal by the action of D1, D2 and T1. You may recognize this configuration as being similar to that found in a full-wave power-supply rectifier circuit. R1 is used to compensate for differences in the characteristics of the diodes and secondary windings of T1. Asymmetry in these components would produce a nonsinusoidal waveform which would result in strong 14-MHz fundamental feedthrough. According to DeMaw and Hayward, diode doublers can suppress fundamental feedthrough by more than 40 dB.

C1 couples the 28-MHz signal to T2 and T3, which form a broadband impedance-matching network. The 16:1 matching network feeds the base of the transistor, Q1, through a ferrite bead. This bead and R2 help stabilize Q1, which is prone to oscillation because of its high f_T. The transistor is an easily obtainable 2N3866. This is an npn silicon vhf transistor with an f_T of 800 MHz and a maximum collector dissipation of 5 watts.

The output pi network provides some protection against the radiation of harmonics of the 28-MHz signal. However, ARRL lab tests showed that the addition of a low-pass filter was required to ensure spectral purity. Pads have been provided on the pc board for the installation of the required filter components. With the addition of these components, the second harmonic is suppressed approximately 64 dB below peak power output.

The simplicity of the QRP transmitting converter may be seen here. Low-pass filter components are grouped at one corner of the pc board beneath the binding post used as the dc input connector.



Construction

The prototype of the frequency doubler was constructed on single-sided pc board using a method similar to that of the ARRL breadboard described in *QST*.[2] This method is fine for construction of small, noncritical circuits and allows circuit changes to be made with a minimum of effort. A slightly more rugged and aesthetically pleasing version may be built using double-sided pc board, and this is the method used in the model shown here. (See Figs. 2 and 3.)

The board is mounted in a small enclosure that I purchased at a hamfest. A dull-black and fawn-gray paint job adds a professional appearance to the completed unit. J1 and J2 are phono jacks, but other types of connectors may be substituted.

*1764 West Creek Way, Louisville, KY 40222

Notes appear on page 37.

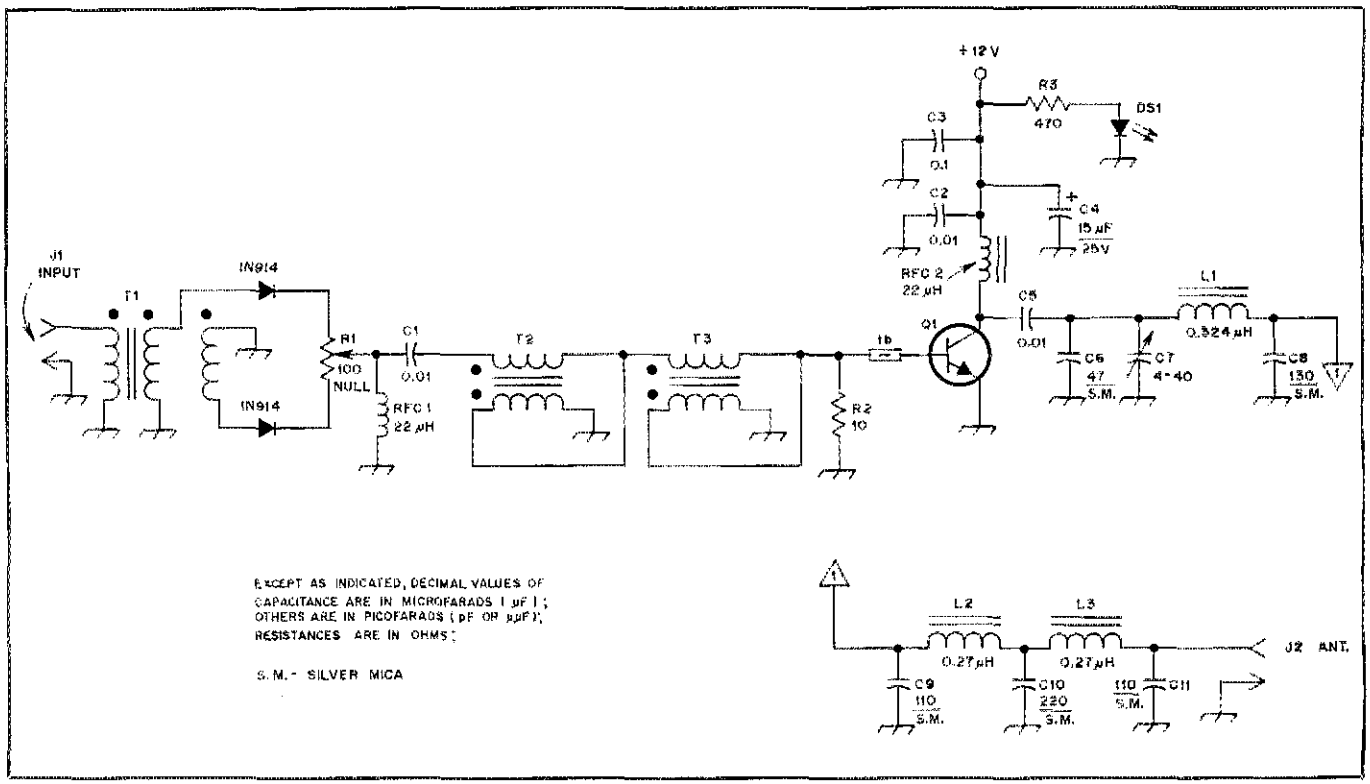


Fig. 1 — Schematic diagram of the transmitting converter. R1 is used to null the 14-MHz signal feedthrough. The low-pass filter consisting of C9, C10, C11, L2 and L3 is required to reduce the harmonic content in the output signal.

C1, C2, C5 — 0.01 µF, 100 V disc ceramic.
C3 — 0.1 µF, 100 V disc ceramic.
C6 — 47 pF silver mica or polystyrene, 100 V.
C7 — 4-40 pF trimmer (Arco 403 or equiv.).
C8 — 130 pF silver mica or polystyrene, 100 V.
C9, C11 — 100 pF silver mica or polystyrene, 100 V.
C10 — 220 pF silver mica or polystyrene, 100 V.
D1, D2 — Silicon, fast switching, 100 V; 1N914 or equiv.
DS1 — 3-V, 50-mA (max.). Radio Shack T1 mini LED (276-026) or equiv.
FB1 — Ferrite bead.
J1, J2 — Phono jacks.
L1 — 9 turns no. 23 enameled wire on T-50-6 core (0.324 µH).
L2, L3 — 5 turns no. 24 enameled wire on T-50-6 core (0.27 µH).
Q1 — Silicon npn vhf transistor (see text).
R1 — 100-Ω, pc-mount potentiometer.
R2 — 10 Ω, 1/2 watt.
R3 — 470 Ω, 1/2 watt.
RFC1, RFC2 — 20 turns no. 28 enameled wire on FT-37-61 core (0.324 µH).
T1 — 8 twisted trifilar turns no. 28 enameled wire on FT-37-61 core.

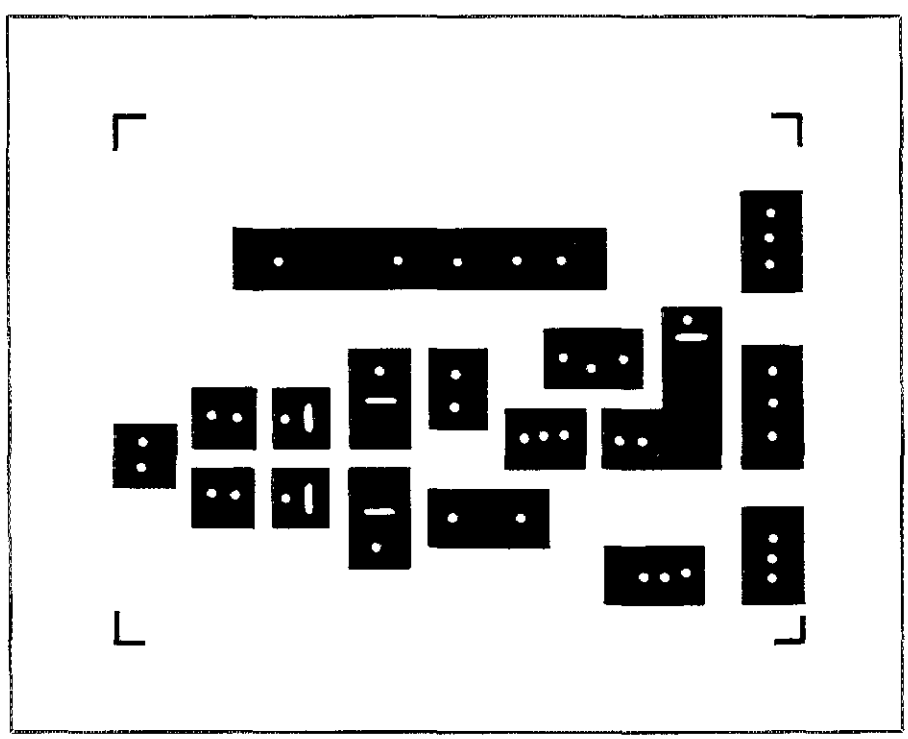


Fig. 2 — Actual size circuit-board etching pattern. Black areas represent copper. A double-sided board is used; only one side is etched. Clearance holes are drilled at the appropriate locations on the ground-plane side of the board to pass the component leads.

Connections from the board to the jacks are made with RG-174/U coaxial cable. An LED is used as a power-on indicator. A dpdt switch might be added to allow switching the doubler in and out of the line.

Alignment

The tune-up procedure is simple, but care must be taken to ensure stability. With no dc voltage applied to the converter, feed a 1-watt, 14-MHz signal into J1. While listening to the 14-MHz signal feedthrough with a receiver, carefully adjust R1 for a deep null in the signal strength. Next, attach a dummy load (a 52-ohm, 2-watt resistor will do) and power-indicating device such as a VSWR meter to J2. Apply 12 to 13.5 V dc to the converter and once again inject the 14-MHz signal at J1. Listen for the 28-MHz signal with the station receiver and adjust C7 for a peak in the signal strength; the SWR reading should be low. The converter may now be placed in the line and a careful check made for spurious emissions in the 10- and 20-meter bands. Hashy noise anywhere indicates parasitic oscillation problems. If such oscillations exist, try reducing the 14-MHz signal drive

level and readjusting C7. Ensure you have the shortest possible emitter lead length on Q1. The output of the doubler should be approximately 1 watt. If more output is desired, you may try using higher values for R2, but stability is likely to be harder to achieve.

Additional Notes

The lack of tuned circuits in the doubler design is deliberate. As such, a simple change in the output-network component values makes it useful on other frequencies. Provisions could be made for switching the output networks as desired.

As with any similar multiplying scheme, VFO bandspread will be sacrificed. A 50-kHz transmitter frequency change results in a 100-kHz change at the doubler output. On the other hand, 500 kHz of the 10-meter band can be covered with a transmitter tuning range of only 250 kHz. Several 1000-mile (1600-km) contacts have been made using this transmitting doubler with a simple dipole antenna. Under proper ionospheric conditions, you too can expect similar results. (QST)

Notes

[1]Available from the ARRL, $7.
[2]Leslie, "Breadboard Revisited," February 1974 *QST*, p. 30.

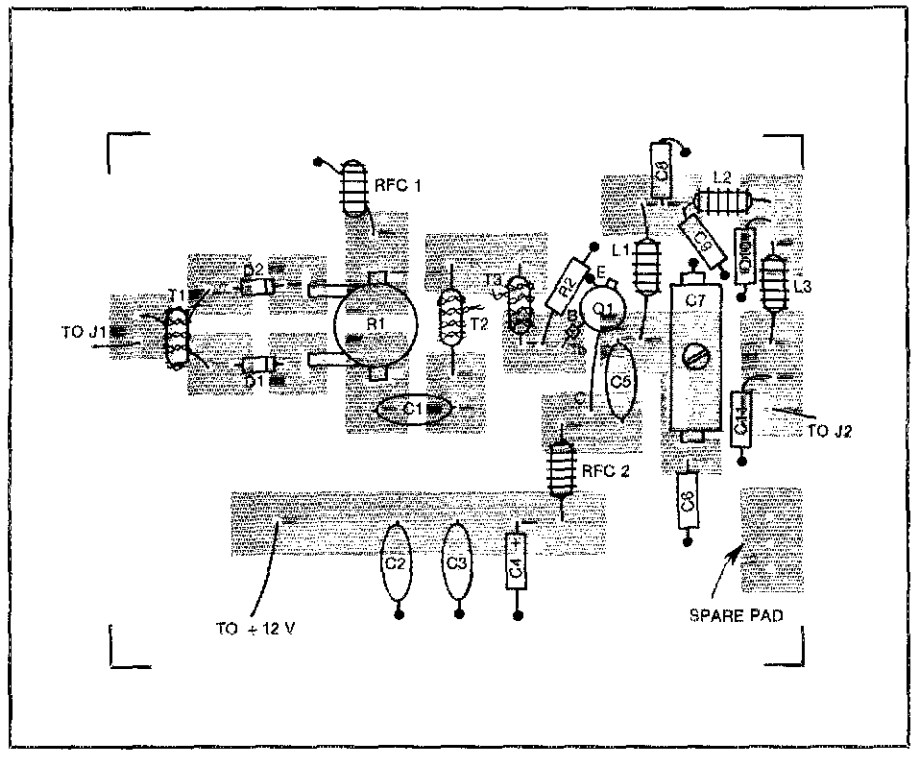


Fig. 3 — Parts-placement guide for the transmitting converter. A double-sided board is used with the components being placed on the ground-plane side of the board; the shaded areas represent an X-ray view of the etched side of the board.

Strays

John Walker, WD4HSF, and his wife, Lynn, stand before their yacht, *Gusto*, docked at Whangarie, New Zealand. The Walkers crossed the Pacific Ocean from the U.S. East Coast via the Panama Canal, and plan to resume their around-the-world voyage this spring. Look for John on 15 and 20 meters. *(photo courtesy of Paul M. Wilson, W4HHK)*

HIGH SPEED CLUB OF GERMANY

☐ The High Speed Club (HSC) is an international organization of cw operators, with headquarters in West Germany. HSC administers a number of awards and their club station is DLØHSC. For further information contact Edgar Schnell, DL6MK, or Kurt R. Schmeisser, W8LZV, 20114 Houghton Ave., Detroit, MI 48219, Tel. 313-534-4456.

WESTLINK TRUST FUND

☐ Rather than succumb to a less-frequent broadcast schedule, the weekly Westlink Amateur Radio News has set up a trust fund and is turning to the amateur community for support. If you would like to contribute, make your check payable to the Westlink Radio Network, c/o Dr. Norm Chalfin, K6PGX, P. O. Box 463, Pasadena, CA 91102.

QST congratulates . . .

☐ Gerry Wood, WB4ZQN, who was recently named Editor-in-Chief of the international music industry trade publication, *Billboard*.

ROANOKE DIVISION MEETING

☐ The Roanoke Division will hold a League Planning Meeting on May 9 and 10, 1981, at the Ramada Inn at Tyson's Corners, Falls Church, Virginia. All League members in the division are invited to attend, and each affiliated club in the division is urged to send at least one representative. All inquiries should be forwarded to: Northern Virginia Amateur Radio Council, P. O. Box 682, McLean, VA 22101. Reservations for rooms should be made directly with the Ramada Inn at 800-228-2828. Expressly request a reservation receipt. — *Gay Milius, W4UG*

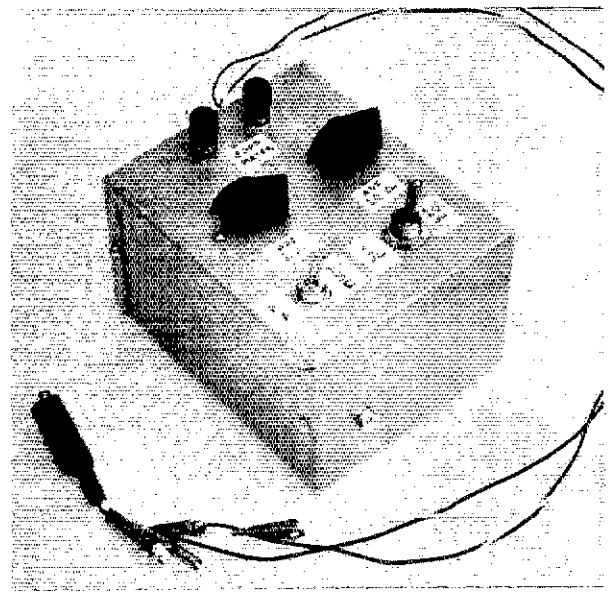
I would like to get in touch with . . .

☐ anyone knowing about the disposition of equipment of the late Dr. James Hard, XE1GE, deceased circa 1941. John Nagle, K4KJ, 12330 Lawyers Rd., Herndon, VA 22071.

☐ active members of Toastmasters International. Al Markwardt, W5PXH, 826 Sherbrook Dr., Richardson, TX 75080.

☐ those in need of KH6 contacts to meet daily on 15 meters. Contact Warren O. Smith, KH6AQ, 525 Pauka St., Kailua, Oahu, HI 96734.

Paying OHMage to Low Resistance — The Lohmeter



This project shouldn't be impeded by cost — it's low, too!

By Robert M. Forster,* W2DVG

Do you ever make meter shunts, check for ground connections, or estimate the copper losses in the secondary windings of a high-amperage transformer for that new regulated power supply you're building? If so, the low-ohms measuring meter described here is a simple and practical instrument that will make your job easy.

The Basics

This approach is by no means new, but it has had little attention in amateur publications. It's based on the principle of measuring voltage drops across a series chain of resistors carrying a uniform current. The instrument has the advantages that the readout scale is linear and that lead resistance from it to the unknown resistance is irrelevant.

Refer to Fig. 1. R1 is a current-adjustment resistor used to set the pointer of voltmeter M1 to full-scale deflection (FSD). R2 is the "standard" resistor — a resistor of known value. R3 and R4 represent the resistances of the leads from the instrument to the unknown resistance to be measured, RX. M1 and M2, identical voltmeters, measure the voltage drops across the standard resistance and at the *terminals* of RX. The absolute voltages across R2 and RX are of no importance. It is only necessary to know the *ratio* of V2 to V1. Since the current through the resistance chain is uniform, the voltages measured by M1 and M2 are proportional to the resistances of R2 and RX. Thus, if the FSD of M1 (as set by R1) is 100 and M2 registers 25, RX will have a resistance of 25/100ths of R2. For instance, with a 1-ohm standard, if M2 registers 87, RX is 0.87 ohms.

You can select a range to suit your needs: A 0.1-ohm standard provides a range from zero to 0.1 ohm, a 5-ohm standard sets the range from zero to 5 ohms, and so on. In a practical system, two separate voltmeters are neither necessary (a single unit can be switched) nor desirable (if they are not identical, the results will be erroneous). However, the single meter used should be a high-impedance type, 20 kΩ/volt or more.

A Practical Instrument

One example of this type of ohmmeter is shown in Fig. 2. The voltmeter is not built in. An instrument of this kind is not so frequently used that a good meter need be tied up permanently. Instead, a Simpson Model 260 VOM (or equivalent), using the 50-μA current-measuring position, is connected when making measurements. A 1-kΩ multiplier resistor (R1) is built into the case to permit it to be used as a voltmeter. Two resistors, R4 and R5, are used for the standard to provide ranges of measurement from 0 to 1 and 0 to 10 ohms.

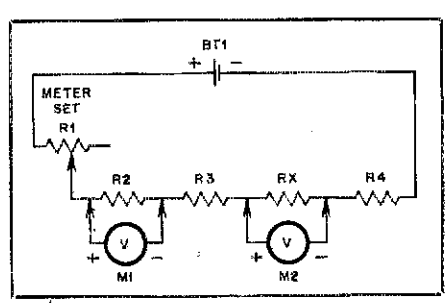
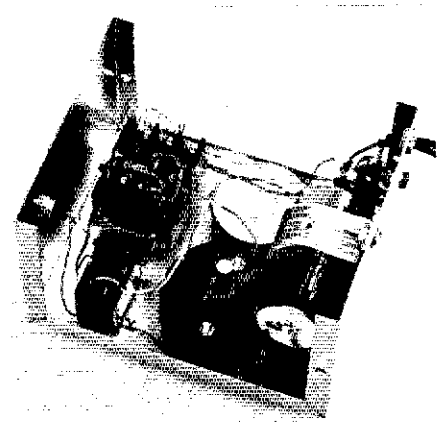


Fig. 1 — The basic circuit of the instrument. R1 is used to set the pointer of M1 at full-scale deflection.

Construction

Except for the 5 × 4 × 3-inch (127 × 102 × 76-mm) enclosure, all the parts used in my unit came from the ubiquitous "junk box." The 1-ohm standard was made using wire from a broken heater element; the 10-ohm unit is a combination of composition resistors. Access to a Leeds and Northrup bridge made accurate measurement of these resistors possible, but 5%-tolerance resistors will suffice.

S1 is a 3pdt heavy-duty switch. As may



The "standard" resistors are shown bridged across S1. An insulated standoff is used to support one end of R1. The binding posts are beneath the battery and not visible in this photo.

*130 Steelman Rd., Southern Pines, NC 28387

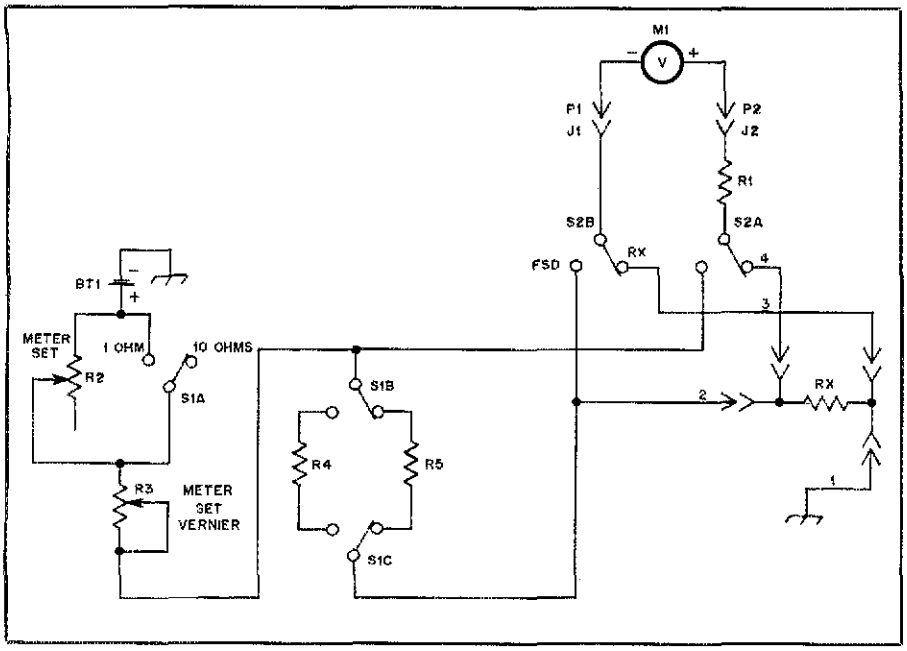


Fig. 2 — Schematic diagram of a practical instrument for measuring low ohmic values. A functional description is given in the text.

BT1 — 1.5-volt battery.
J1, J2 — Suitable connectors to mate with meter test leads.
M1 — 0-50 μA meter, may be part of a VOM (see text).
P1, P2 — Part of meter test leads.
R1 — 1-kΩ, 1/2 watt.
R2 — 50-Ω potentiometer, Mallory C50R or equivalent.
R3 — 6-Ω potentiometer, Mallory C6R or equivalent.
R4 — 1-Ω "standard," 5%, see text.
R5 — 10-Ω "standard," 5%, see text.
S1 — 3pdt switch, Cutler-Hammer 7615K2 or equivalent.
S2 — Dpdt switch.
Misc. — Alligator clips, enclosure.

be seen in the photograph, the outside lugs support the two standards. One switch section is used to short out R2 in the 1-ohm measuring position as shown in Fig. 2.

A word about the R2-R3-S1A network. A resistance range of 50 ohms is needed for FSD with all possible measurements. However, a vernier adjustment is desirable when setting the FSD for low values of RX. By combining R2 and R3, that vernier adjustment is available when needed.

The four leads to RX can be of any length required to suit the convenience of the constructor. Caution should be exercised when making the interconnections to prevent the possibility that the voltmeter pointer will be deflected in opposite directions when S2 is switched between FSD and RX. Leads 1 and 3 should be prepared using wire of one color, and leads 2 and 4 of another color. Then the matching colored wires are connected to each side of the RX terminals. An insulated boot should be placed over the alligator clip on lead 2 because when leads 1 and 2 are connected, current is drawn from the battery. If these leads accidentally touch while the unit is in storage, the battery will be under continuous discharge.

Setup

To prepare for use, leads 1 and 2 are connected across RX, the unknown resistance. The leads need not be very short. S2 is placed in the FSD position and R2 (or R3) adjusted until full-scale deflection is reached on the meter. Then leads 3 and 4 are connected across the unknown resistance with the clips directly applied to the terminals of RX. S2 is then switched to the RX position. The ratio of the RX voltage to the FSD voltage indicates the ratio of the ohmic value of RX to that of the "standard" resistor. It is convenient to use a meter scale on the VOM of 0-100 when a 1-ohm or 10-ohm standard is employed.

Application and Results

This meter has many uses: the making of meter shunts and current sensing resistors, distinguishing dead shorts from low-resistance paths, measuring resistances between "grounds," and determining the resistance of high-current power transformer windings. Many other possibilities exist, as well.

The accuracy of the measurements obtained will depend upon: the precision of the resistors used as standards, the ability to set the pointer of the meter to full-scale deflection, the linearity of the meter itself and how accurately the meter is read. With reasonable care, no difficulty should be encountered in achieving results commensurate with amateur practice.

Strays

ARRL PRESENTS ITS 13TH IEEE PROFESSIONAL PROGRAM

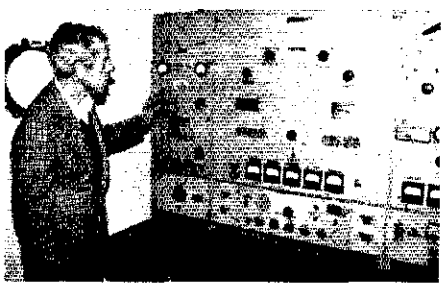
☐ The League presented its 13th Technical Symposium for the IEEE (Institute of Electrical and Electronics Engineers) this year on January 14 at IEEE SOUTHCON in Atlanta, Georgia. The Symposium, Session 15, was entitled, "Modern Solid-State Devices, Techniques and Applications for High-Performance RF Communications Equipment."

Two of the committed speakers ARRL TA Rick Olsen, N6NR, and ARRL TA Ed Oxner, KB6QJ, had to cancel their appearances at the last minute. They were replaced by backup speakers Bill Allen of Lockheed (Georgia) and Tom Hayes of the Boston Siliconix office.

The session organizer was Doug DeMaw, W1FB. The organization of the program was aided by Marian Anderson, WB1FSB, who served also as session chairperson. A paper was presented by W1FB. The fourth speaker on the program was Dr. Ulrich Rohde, DJ2LR.

A show of hands indicated that approximately 75 percent of the attendees were radio amateurs as well as engineers. This has been typical during the eight years of ARRL involvement in IEEE technical sessions.

This was the first year for SOUTHCON. It will be held yearly and will alternate between Atlanta, Georgia, and Orlando, Florida. Amateurs are invited to attend the ARRL-organized sessions at IEEE ELECTRO, MIDCON and SOUTHCON Conventions. It's a good opportunity also to see the latest in components and test equipment. ELECTRO-81 will be held this year in New York City from April 7-9. The League's session is No. 30. It will be held at 12:30 p.m. on April 9, and the subject is antennas. See you there! — *Doug DeMaw, W1FB*



Thomas Stand, N6UG, inspects the autoalarm in the restored radio room of the *SS Jeremiah O'Brien*, the last unchanged World War II Liberty Ship. Members of the San Francisco Radio Club volunteered their time and efforts to complete this restoration. The ship is now permanently moored at Fort Mason in the Golden Gate National Recreation Area. *(Photo by John Wheaton, WA6MXS)*

From Cigar Lighter to 9.6 Volts

Mobiling with a hand-held transceiver? Here's a weekend project that won't drain your pocketbook or the transceiver batteries.

By Raymond Charland,* WA1IKJ

I own a Kenwood TR-2400 2-meter fm hand-held transceiver. A desire to eliminate using the internal batteries of the transceiver while mobiling led to the development of the circuit shown in Fig. 1.

Description

This adapter reduces the voltage available at the vehicle cigar-lighter socket to the 9.6 volts required by the transceiver. It maintains regulation over a current range of 30 mA during receive to approximately 600 mA during transmit and includes fail-safe protection by employing a 1-A fuse and a Triac "crowbar." R1 is used to adjust the output voltage to 9.6 volts and the combination of D3, Q1, R3 and R4 are part of the protection circuitry which will open the 1-A fuse should the regulator fail and more than 11.5 volts appears on the output line.

R5 and DS1 were late additions to the circuit and are used to indicate actual power availability. Their inclusion is the result of a few weeks of operating with the adapter in vehicles equipped with cigar-lighter receptacles having varying degrees of contact cleanliness. The TR-2400 memory contents would be erased unknowingly if an instantaneous loss of supply voltage occurred — most aggravating. Now, the LED will indicate any such loss of voltage.

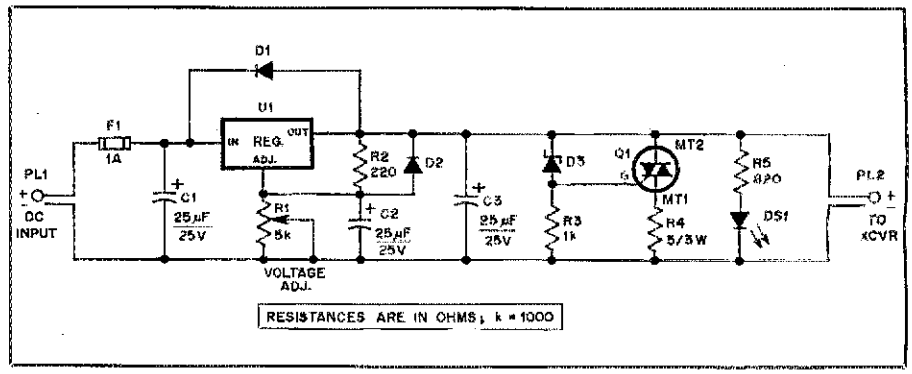


Fig. 1 — Schematic diagram of the adapter. Construction of the unit is described in the text. F1 is mounted in an in-line fuse holder. Resistors are 1/2-W types unless otherwise specified.
D1, D2 — Silicon, 1-A, 50-PIV, 1N4001 or equivalent.
D3 — 11.5-V, 1-W Zener.
DS1 — Miniature red LED.
F1 — 1-A fuse.
PL1 — Cigar-lighter plug.
PL2 — Miniature plug to mate with transceiver jack.
Q1 — 200-V, 6-A Triac (Radio Shack 276-1001 or equivalent).
R1 — 5-kΩ linear-taper potentiometer.
U1 — Adjustable 3-terminal 1.5 A positive voltage regulator, LM317K or equivalent.

Construction

The adapter I built is wired point-to-point in a 1-1/8 × 2-1/8 × 3-1/4-inch (28.6 × 54 × 82.6-mm) plastic box with an aluminum cover (Radio Shack 270-230). The voltage regulator, U1, is mounted on the aluminum cover. With a continuous current drain of 800 mA, the regulator and cover get warm, but not excessively. All parts attached to the box cover are in the 9.6-volt positive lead, but should the cover be grounded accidentally to the car, F1 will open.

Input and output leads are fed into the box from opposite ends through rubber grommets. The input lead is fitted with a cigar-lighter plug and includes an in-line fuse holder for F1. I fitted the output lead with a plug to mate with the charger input jack on the TR-2400.

In order to switch between the transceiver internal battery pack and the adapter, I installed a small, single-pole, two-position switch in the battery pack cover. The charger jack is used for the adapter input as well as its original purpose.

I'm sure you'll find the construction of this adapter well worth the small expenditure of time and effort. It's especially handy when you encounter extended operating periods in an environment which provides a readily available source of + 12 volts.

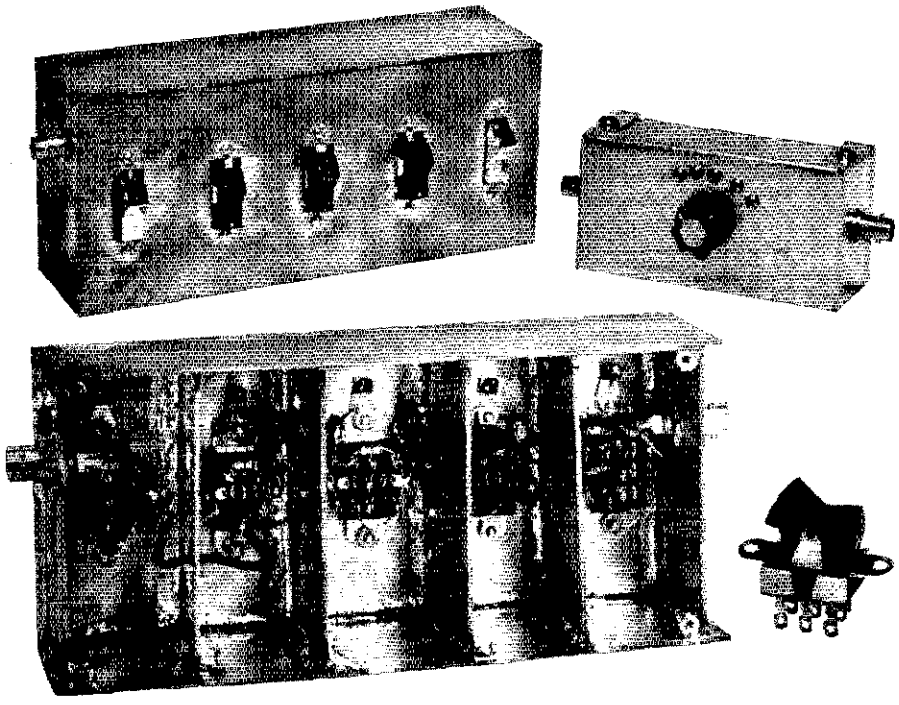
*Summit Rd., Prospect, CT 06712

• *Basic Amateur Radio*

Knock-It-Down and Lock-It-Out Boxes for DF

Direction finders know that the real trick is pinpointing the signal when you are within a few hundred feet of the source. Here are a couple of devices that will keep the nearby signal from "blowing away" your receiver front end.

By Peter O'Dell,* KB1N



Two approaches to building the attenuator. Rotary switch model (upper right) is smaller, lighter and less effective. Lower photo: inside view of rocker-arm switch version of the attenuator. During construction slight variations in the positioning of the resistors were tried for improved isolation between ports. Test data revealed no significant difference. RG-174/U routed through small holes in the walls connects one stage to the next. Copious amounts of solder are used to bond the walls to ensure minimal leakage from one compartment to another. Size of box (and compartments) is not critical.

A few years back I was in the ARRL lab when a manufacturer came in with a new transceiver. He proudly announced that this receiver had an "uncrunchable" front end. Doug DeMaw, Senior Technical Editor, looked at him, smiled and said, "Nothing has an uncrunchable front end when you are next door to W1AW. We've put an rf voltmeter between an antenna terminal and ground here when W1AW is on the air and measured in excess of 15 V rf." The manufacturer paled somewhat, but went ahead with his tests and demonstration. As I recall the receiver did have a good front end, but it didn't quite stand up to W1AW.

When you are in the presence of strong rf fields, it is necessary to alter your procedures when making measurements involving rf. One of the simpler devices for assisting in this problem is an attenuator. An attenuator does what its name implies; it attenuates or reduces the level of a signal. A good commercial attenuator will cost upwards of $100. Another device that can be useful in strong rf fields is a screen room. The ARRL lab, along with most major radio manufacturers, has a screen room available for testing equipment. A screen room is an enclosure usually big enough for at least one person and several pieces of equipment. The room is completely surrounded by a good conductor such as copper. Rf on the outside stays on the outside, and rf on the inside stays on the inside. A screen room will cost thousands of dollars and is usually not very portable. This month we have a couple of cheap imitations that will substitute very nicely for these "high-priced spreads."

Knock It Down

My initial investigations of the antenna described last month[1] (see Feedback in this issue for an update on phasing harness construction) indicated that, for my receiver to be able to discern a null in the signal level, it needed up to 60 dB of attenuation in front of it. In other words, the signal level at the output of the attenuator should be 1/1,000,000 of the power at the input. In fact the 60-dB figure seemed to be a bare minimum with 70 or 80 dB being even better. That is not as difficult as it may sound. I said earlier that a good commercial attenuator will cost upwards of $100, so you are probably sitting there mumbling that this turkey in Newington is going to tell me to go out and plop down $100 for something I will use once a month or less for bunny hunts. Well, for less than $10 in parts and three or four hours of your time, you can have an attenuator that will work very well up to 250 MHz. After you have it built and have learned to use it, you will probably find lots of other uses for it and will wonder how you ever got along without it.

Fig. 1 shows two different types of attenuator pads that consist of three

*Basic Radio Editor

[1]Notes appear on page 44.

resistors each. Resistors aren't that expensive, even 5% tolerance variety. The pad at A is a T network (if you straightened out the bends in the schematic diagram, the pad would look like a letter T). The pad at B is a pi circuit (you guessed it; it looks like the Greek letter pi). Notice that each circuit is symmetrical; i.e., its input looks just like its output. The input and the output of each can be used interchangeably. The circuits are designed to present a nominal impedance of 50 Ω and an attenuation of 12 dB, but notice the difference in resistance values. The choice of which circuit arrangement to use is normally a matter of which is the most convenient for mechanically arranging the resistors. More on this later. Also, one type of circuit for a given attenuation value may call for oddball values of resistors that are not commonly available, while the other network for the same attenuation may call for values near standard.

Thus, you see, one pad in and of itself is simple. The problem is to isolate the input from the output. This can be done by keeping the input physically separated from the output and by judicious use of shielding. If you wanted a 100-dB attenuator, you could build a box from circuit board material with five compartments in it and put in five 20-dB pads in series. This would be fine if the only value of attenuation you ever needed would be 100 dB. Such is not the case.

Fig. 2 shows a simple solution to this problem. We have added a double-pole double-throw switch to each of our compartments. With the switch in one position, the attenuator pad is in the circuit; in the other position, the pad is out of the circuit. Ah, much more versatile! Unfortunately, the fundamental rule of economics (and everything else in the

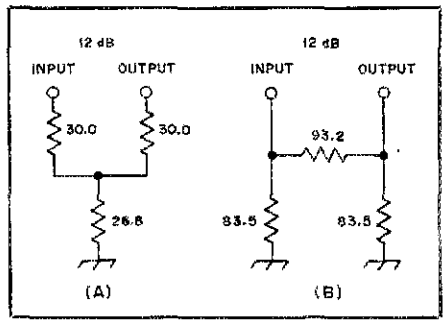


Fig. 1 — Schematic diagrams for two attenuator pads. At A, an attenuator in a T configuration; at B, a pi configuration. Both pads have nominal input and output impedances of 50 Ω. Both are symmetrical.

universe) is "there *ain't* no such thing as a free lunch." The price to be paid here is primarily that the sets of switch contacts will look somewhat like a capacitor. Depending on the style of switch, this "phantom" capacitor may bypass the signal around the pad and send it on to the next stage at almost the same level that it arrived. This is one of the reasons that commercial attenuators cost so much. They are constructed to avoid this problem.

We can avoid this pitfall by carefully choosing our switches. Ordinary toggle switches are probably the worst possible choice. Slide switches or rocker-arm switches are the best bet of the types commonly available. I used rocker-arm switches that I obtained from a surplus dealer for a very reasonable price. Fig. 2 shows each section having a 20-dB pi-network pad. The pi network is convenient for use with dpdt switches. You may find it useful to replace one of the 20-dB pads with a 12-dB pad. This will give your attenuator increased versatility with little effect on total attenuation.

An Alternative to Our Alternative

Fig. 3 shows a somewhat easier-to-build version of the attenuator. S1 is a single-pole, six-position rotary switch. The enclosure is an ordinary aluminum box. Five 12-dB pads are wired in series; S1 permits us to select up to 60 dB of attenuation (theoretically, anyway). An aluminum box is certainly easier to work with than one made of circuit-board material. It is much simpler to drill a hole for the shaft of one rotary switch than it is to use a nibbling tool or file to make five rectangular holes for switches. No individual compartments are used in this construction. I used the T-circuit arrangement to avoid long ground leads, thinking this would provide better isolation between attenuator sections.

But again we run into the "no free lunch" rule. The single-switch circuit is easier to build, but it has some minor differences in operation. First let me mention that the arrangement of five switches and five compartments provides a constant 50 Ω system impedance. No matter how much attenuation is switched in or out between the antenna and the hand-held receiver, the terminating impedance in either direction is 50 Ω. (This assumes the hand-held receiver has a 50 Ω antenna input, although it may be something entirely different.) Not true with the single-switch attenuator circuit. The receiver and the bank of resistors are combined as a load for the feed line coming from the antenna, and this load changes with different switch positions. Similarly the load seen by the receiver, looking back toward the antenna, changes with different attenuation levels. These drawbacks are insignificant if our sole intent is to knock down

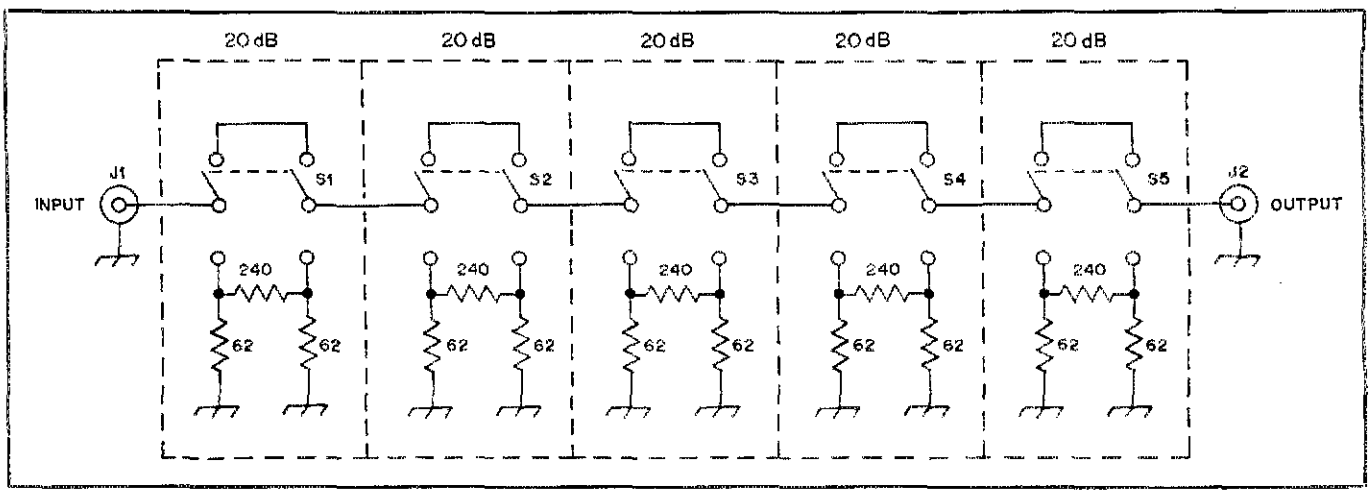


Fig. 2 — Schematic diagram of 100-dB attenuator. Resistance values are in ohms. Resistors are 1/4-watt, carbon-composition types, 5% tolerance. Broken lines indicate walls of circuit-board material enclosure. A small hole is drilled through each wall to route RG-174/U shielded hook-up cable. Leads are kept short. Enclosure dimensions are 7-1/2 × 3-1/2 × 2-1/4 in. (190 × 90 × 57 mm). See photo.
J1, J2 — Female BNC connectors.
S1-S5, incl. — Dpdt rocker-arm switches. Suggested source: Diamondback Electronics Company, P. O. Box 12095, Sarasota, FL 33578, Tel. 813-953-2829.

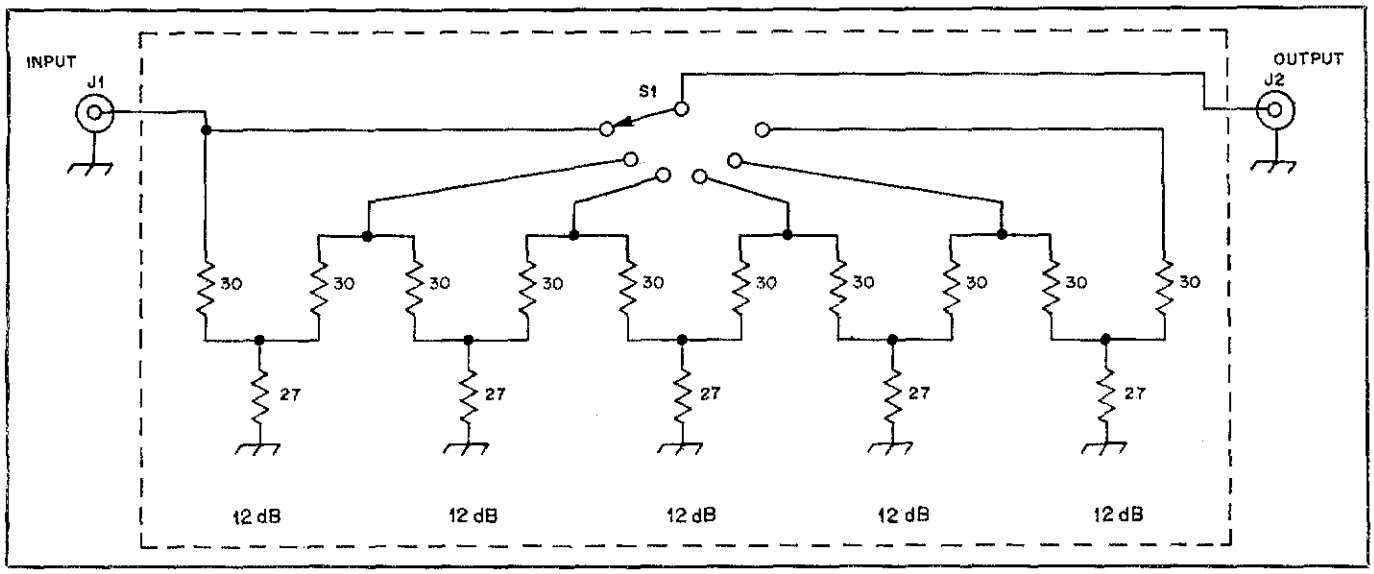


Fig. 3 — Schematic diagram for alternative-style construction. Resistances are in ohms. Resistors are 1/4-watt, carbon composition types, 5% tolerance. Broken lines indicate aluminum box housing. S1 is connected to the jacks with RG-174/U cable. Five solder lugs are mounted to the box around the switch to provide ground connections.
J1, J2 — Female BNC connectors. S1 — Single pole or double-pole, six-position rotary switch (Radio Shack 275-1386).

the level of an incoming signal. But for more precise work with attenuators you may want to devote some extra effort and use the five-switch arrangement.

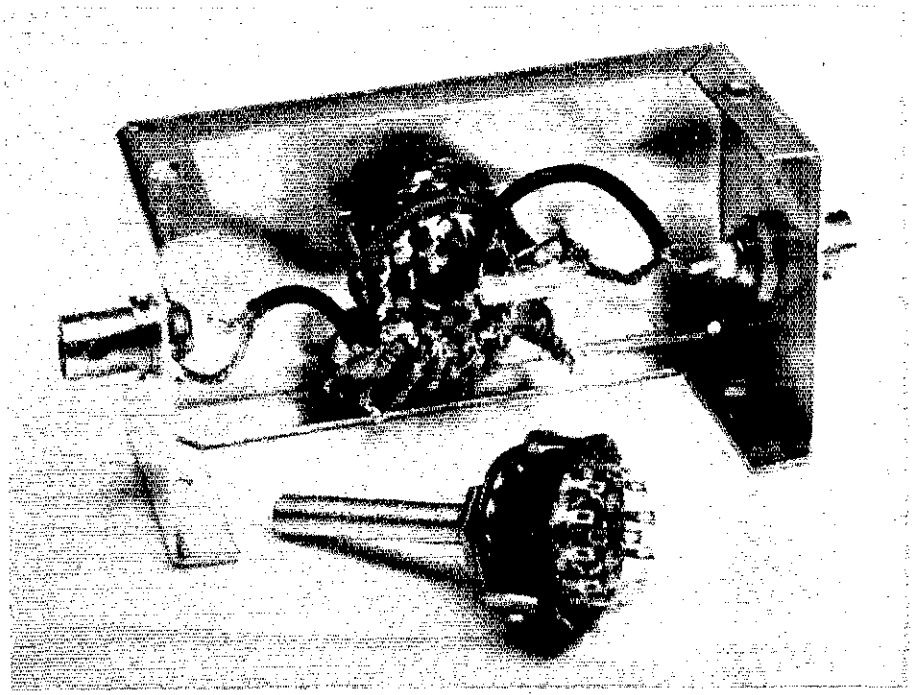
Is the extra effort worth it? For proof, we turn to the spectrum analyzer. An earlier article in *QST* gave a detailed description of the use of the spectrum analyzer.[2] Suffice it here to say that the spectral display shows a range of frequencies along the horizontal axis of a CRT. The vertical position indicates the amplitude (strength) of the signal at the corresponding frequency. Fig. 4 shows two traces on the CRT. The top trace depicts a sweep generator fed directly into the spectrum analyzer. The lower trace shows the rocker-arm switch attenuator added to the circuit and set to pass the signal straight through. The vertical divisions are 2 dB per major division, so the attenuator has an insertion loss of about 0.8 dB.

Fig. 5 shows four traces on the spectral display. The top trace was made with the attenuator connected and all switches in the "out" (pass through) position. The three traces below the top one display the results when switching in three of the 20-dB pads, one at a time. Hence, the attenuation actually obtained is very near the design value at these frequencies (150-MHz center frequency, 5 MHz per horizontal division and 10 dB per vertical division). Ultimate attenuation for the five sections of 20-dB pads was found to be 95 dB — just 5 dB short of the design value!

Fig. 6 depicts the results of the rotary-switch version of the attenuator. In this case the sweep generator was set to 0 dB (top of the CRT display). The attenuator was then added to the circuit and the top trace was made. Here we have an insertion loss of about 5 dB as a result of the impedance mismatches mentioned earlier. The second trace down is with the first section switched in. It is a nominal 12-dB pad and does produce approximately that amount of attenuation. Adding a 20-dB pad gives us another 16 dB. Now things start to get interesting! Add one more 20-dB pad and get a whopping 9 dB. The fourth section is a 12-dB pad and in reality nets us about 4 dB. What appears to be a thick trace at the bottom is actually two traces. That's right — the final 20-dB pad results in only 2 or 3 dB of actual attenuation, because the signal leaks around the networks!

From this analysis, we can conclude that taking the time to build a circuit-board box and using rocker-arm switches is worth it. If you don't want to take the time to do it right, then a rotary switch in an aluminum box will probably produce around 45 dB of attenuation. You might as well use 12-dB T pads throughout this one since they are easier to build in this

Rotary switch version. Although considerably easier to construct, this model does not perform as well as the rocker-arm switch type.



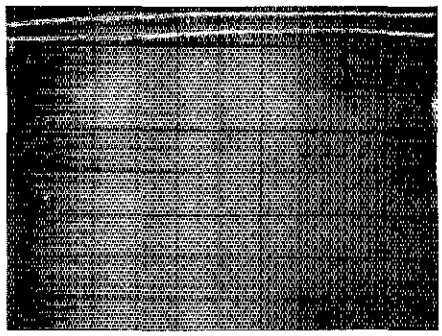


Fig. 4 — Spectral display depicting the insertion loss of the rocker-arm switch attenuator. (See text). Reticle graduations are 2 dB per vertical division, 5 MHz per horizontal division, 150-MHz center frequency.

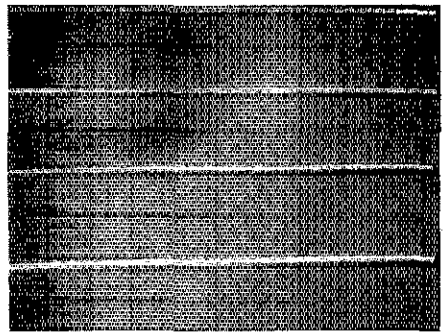


Fig. 5 — Spectral display showing the cumulative effect of adding 20-dB attenuator sections to the circuit. 10 dB per vertical division, 5 MHz per horizontal division, 150-MHz center frequency. See text for discussion.

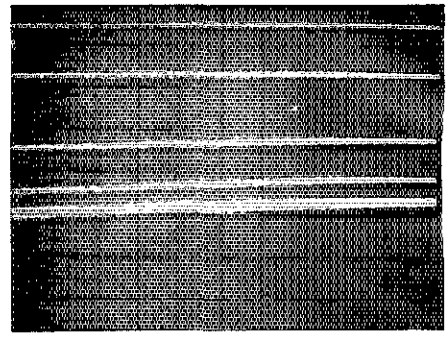


Fig. 6 — Spectral display depicting insertion loss and cumulative attenuation of rotary switch attenuator; 10 dB per vertical division, 5 MHz per horizontal division, 150-MHz center frequency. See text for discussion.

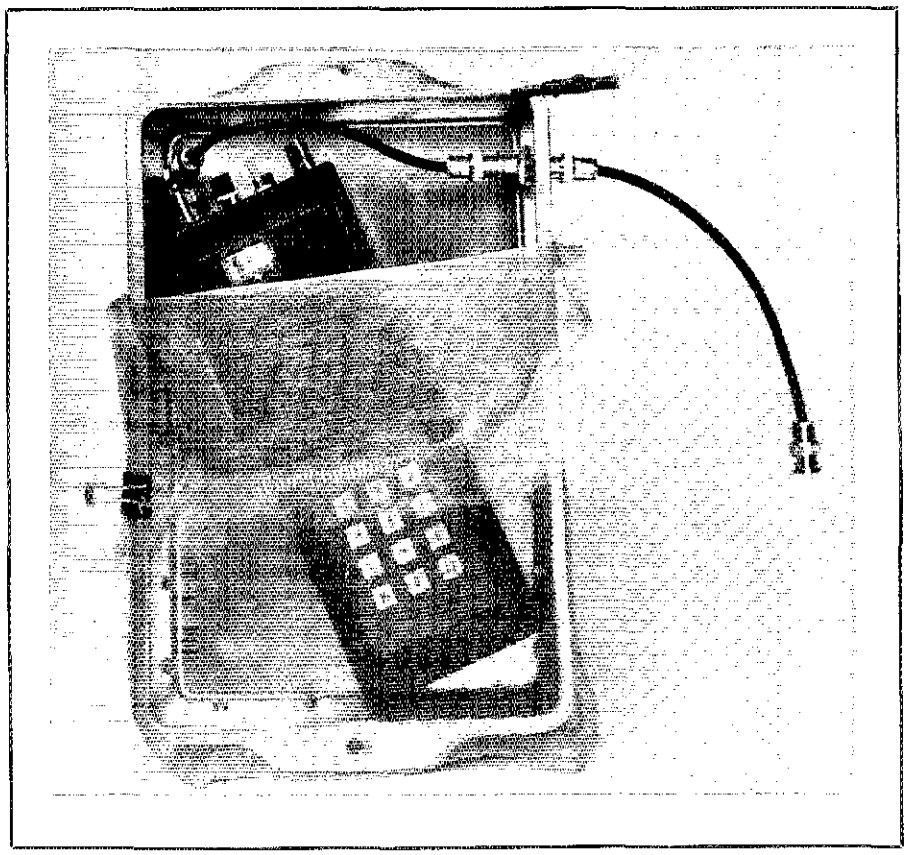
format than the pi sections of any value. You can probably get over 70 dB of attenuation by bolting two aluminum boxes together and building two identical attenuators in series. Other values of attenuator pads can be constructed from common resistors. If you would like to know more about these circuits, consult the *ARRL Electronics Data Book* or Chapter 16 in the *1981 Radio Amateur's Handbook*.

The Portable RF Coffin

Most modern, portable 2-meter fm rigs have plastic cases which are durable and help keep the cost of the equipment down. Unfortunately, rf passes right through the plastic. When you get within a few hundred feet of a 1-watt signal source you will probably find that more rf is going through the case than is coming through your antenna and attenuator. So what do you do? Put your radio in a screen room!

It would be foolish to suggest that you construct a full-fledged screen room and tote it about. You can, however, put the radio inside the equivalent and provide some means for being able to observe the meter movement from outside the enclosure. Because my radio already had the S meter mounted in its case, I chose to use screen wire for part of my enclosure. Thus, I could see the meter through it. The rest of this "portable rf coffin," as my co-workers dubbed it, consists of a breadpan that I paid $1.29 for in a local discount store. I used a BNC double-female bulkhead connector to route the rf into the enclosure. The screen is bolted to the pan for about 2/3 of the length of the pan. Once the radio is installed inside, large alligator clips or spring paper clips are used to keep the screen tightly meshed around the lip of the pan. If you have performed the S-meter modification presented in last month's article, you might consider mounting the meter to the lid of an aluminum box instead of using the breadpan and the screen wire.

The "rf coffin" or portable screen room. The screen wire is bolted to the lower 2/3 of the pan. The radio is connected to the external antenna through the coaxial cables and the double-female bulkhead connector. Several large spring paper clips or alligator clips are used to secure the screen flap once the radio is installed and adjusted.



I conducted some experiments in my backyard with the attenuators, rf coffin and cardioid antenna. I was able to get enough of a null to pinpoint a 1-1/2 watt transmitter from about 50 ft (16 m). Once I was closer than that, enough rf got inside the coffin to pin the S meter regardless of the direction of the antenna. Without the coffin, the S meter was pinned from a considerably greater distance. As DeMaw indicated, if you are close to a "big" signal, you will have to contend with front ends that go *crunch*.

These articles are intended to give you a few tips on the equipment that you will need for vhf fm direction finding. The projects are inexpensive, easy to duplicate with ordinary parts and easy to use. Your group can make up for a lack of sophisticated equipment with sheer numbers. Build the necessary equipment, get organized and go hunt a few tame little bunnies. That way you will be ready for the next wild turkey that comes along. QST

Notes

[1]O'Dell, "Simple Antenna and S-Meter Modification for 2-Meter FM Direction Finding," *QST*, March 1981, p. 43.

[2]Rusgrove, "Spectrum Analysis — One Picture's Worth a ..." *QST*, August 1979, p. 15.

Product Review

Conducted By Paul K. Pagel,* N1FB

Yaesu FT-107M HF Transceiver

The FT-107M is a full-featured, completely solid-state transceiver offering the radio amateur a high degree of versatility which is further enhanced by a variety of available options. Standard equipment includes all the features we have become accustomed to in an advanced transceiver; smooth VOX operation, an effective noise blanker, semi-break-in cw and a good rf speech processor, to name a few. Band coverage is complete, 160 through 10 meters, including the three new WARC bands.[1]

The all-solid-state PA is rated at 240 watts input on cw and ssb, and 80 watts input on a-m and fsk. Being solid-state, the PA is somewhat more sensitive to SWR than rigs using vacuum tube finals. Built-in protection circuitry automatically reduces input power in the event of high SWR, thus preventing damage to the output transistors. The power reduction is gradual, rather than the abrupt shut-off found on some rigs. Operating into a 2:1 SWR will result in approximately a 25% reduction in output power. The heat sink for the finals is fitted with a thermostatically controlled fan to cool the unit during long transmissions.

Other features of the FT-107M include a 20-dB attenuator, offset tuning on receive and/or transmit, and digital and analog frequency readout. Some of the more unusual features found on the '107 are an af peak/notch filter, SWR meter, 170-Hz fsk circuitry and variable i-f bandwidth. The af filter can be tuned from 300 Hz to 1.4 kHz in either the peak or the notch mode. Tuning in both modes is very sharp, and some care is required in adjusting the frequency for maximum effectiveness. The peak mode is useful on cw, even when the optional 600-Hz i-f filter is used. The variable bandwidth control is like that found on the FT-101ZD.[2] It allows the i-f bandwidth to be adjusted from 2.4 kHz to 300 Hz. This can be very helpful when operating ssb under crowded band conditions.

Power requirements for the FT-107M are 13.6 V at 20 A dc. For operation from the 117 V ac line, two power supply options are available. The FP-107E is an external supply with built-in speaker, while the FP-107 supply can be installed in the transceiver cabinet for compactness.

Digital Memory and DMS

Perhaps the most unusual option available for the '107M is its digital memory system. The DMS system provides a synthesized VFO (the main VFO is a conventional LC tuned oscillator) and 12 memories, each of which can be used to control transmit or receive frequency, or both. In addition, memory fine tuning and the normal offset tuning can be applied to the memory frequency. This allows considerable flexibility in frequency control. But wait — there's more! The DMS (Digital memory Shift) control enables the operator to shift a memory channel, in 100-Hz steps, to either the upper or lower band limit. This is done by means of an optically encoded, detented control. When combined with the optional YM-35 hand-held scanning microphone, the operator can tune to any frequency in the band with just one hand. Three buttons, on top of the mike, control the direction and speed of scanning. As pointed out in the owners manual, a slight chirp may be heard when using the DMS. The chirp is very brief and not objectionable. It is caused by the relatively long

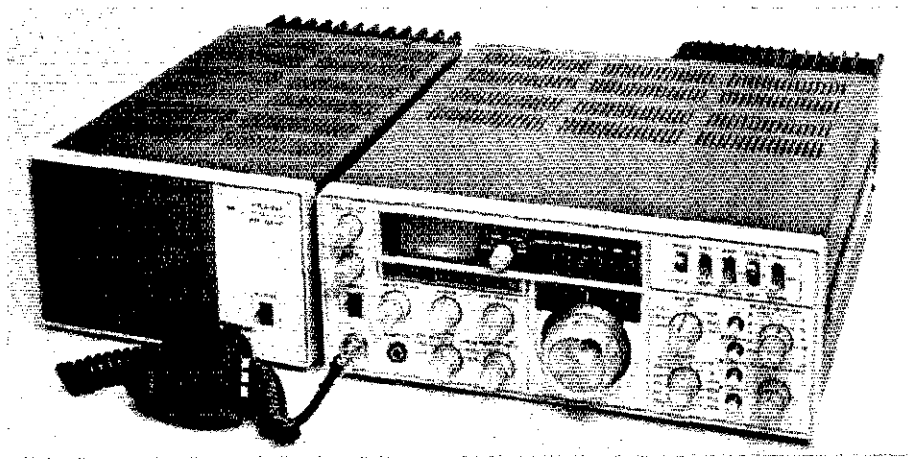


Fig. 1 — Yaesu's FT-107M and matching external ac-operated supply. The optional YM-35 microphone shown may be used for frequency control of the transceiver.

Yaesu FT-107M Serial No. 9N030626

Manufacturer's Claimed Specifications	*ARRL Lab Measurements*
Frequency coverage, (MHz)	As specified plus 40 kHz beyond each band edge.
1.8 - 2.0 3.5 - 4.0 7.0 - 7.5 10.0 - 10.5 14.0 - 14.5 18.0 - 18.5 21.0 - 21.5 24.5 - 25.0 28.0 - 29.9	
Power input (dc): 240 watts (ssb, cw), 80 watts (a-m, fsk).	
Output power: Not specified.	Greater than 125 watts on 160, 80, 40 and 20. Greater than 110 watts on 15 and 10 meters.
Carrier suppression: Better than 40 dB, (at 14 MHz).	51 dB (at 14 MHz)
Unwanted sideband suppression: Better than 50 dB, (at 14 MHz, 1 kHz tone).	Better than 60 dB (at 14 MHz, 1 kHz tone).
Spurious output: Better than 50 dB down.	47 dB down from carrier (1.8 MHz)
Transmitter third-order IMD: Better than 31 dB down.	32 dB down from PEP.
Receiver sensitivity: 0.25 μV for 10 dB S/N.	0.16 μV for 10 dB S/N (at 14 MHz).
Rf attenuator: 20 dB ±3 dB.	21 dB.
APF, notch frequency range: 300 Hz to 1.4 kHz.	260 Hz to 1.7 kHz.
Notch filter depth: Not specified.	35 dB.
Audio output power: 3 watts at 10% THD (into 4 ohm load).	Greater than 3 watts at less than 10% THD.
Receiver MDS: Not specified.	– 133 dBm on 80 meters, – 133 dBm on 20 meters.
Receiver two-tone, third-order IMD dynamic range: Not specified.	82 dB on 80 meters, 90 dB on 20 meters.
Receiver blocking dynamic range: Not specified.	Could not be measured because of receiver noise.

*Assistant Technical Editor

[1]The 10-, 18-, and 24-MHz bands are not yet open to U.S. amateur occupancy. See Baldwin and Sumner, "The Geneva Story," *QST*, February 1980, p. 53.

[2]Product Review, *QST*, December 1979, p. 52.

lock-up time of the synthesizer, which also ensures that the LO signal is clean, thus not compromising the receiver performance. ARRL laboratory tests confirm this; receiver measurements made using both the synthesized and the conventional VFO produced the same results.

Circuit Highlights

Each major functional unit of the transceiver is contained on a separate, plug-in circuit board. Extensive use of diode switching permits band and mode changes to be made by switching only dc control voltages to the various boards. The only point at which diodes are not used for rf switching is at the output of the PA; each of the output low-pass filters has a relay at each end.

During receive, the incoming signal is preselected by a single-tuned circuit and applied to a dual-gate MOSFET (a 3SK51-03) amplifier. The amplified signal passes through a two-pole band-pass filter before being fed to the doubly balanced diode ring mixer. Following the first mixer, the signal is band-pass filtered, buffered and then applied to the crystal filter. The i-f amplifier uses two dual-gate MOSFETs, while a doubly balanced diode ring is used as the product detector. The overall performance of the receiver is very satisfactory with the exception of poor cw filter performance. The skirt selectivity of the 600-Hz filter, while adequate for most operating, was far from outstanding. Also, the two-tone, third-order IMD dynamic range measured on 80 meters was less than expected, 82 dB compared to 90 dB measured on 20 meters. To determine if the unit received for review had a problem, a second FT-107M was solicited and the measurements were repeated. Nearly the same results were obtained with the second unit.

The transmitter section of the '107M is of conventional design. The local oscillator is a premix type using a 5-MHz VFO frequency which is mixed with the output of a crystal oscillator. A separate crystal oscillator is used for each band, and the crystal frequencies are such that the LO signal is always above the signal frequency.

Low-power a-m operation is provided by modulating the 8988.3 kHz carrier signal. Fsk is generated in a similar manner: the carrier oscillator frequency is shifted the required 170 Hz. During a-m and fsk operation, the rated input power of 80 watts produces an output power of 10 watts.

Figs. 2 through 4 show cw keying waveforms obtained when operating the FT-107M under differing conditions. Fig. 2 shows the waveform when the DRIVE control is adjusted for maximum input power. It was noted during testing that the first dot transmitted has a different waveform, as shown in Fig. 3. This photo was taken by closing the manual transmit switch and then keying a single dot. This waveform variation is likely caused by the time constant of the alc circuit. The waveform shown in Fig. 4 was produced by adjusting the DRIVE control to the point at which the alc meter just begins to show an indication; the output power at this point was 100 watts. While the keying waveforms shown in Figs. 3 and 4 depart from the ideal 5 ms rise and fall times, on the air tests showed only the slightest "click" to the signal.

The spectral photograph in Fig. 5 shows the transmitter two-tone, third-order IMD performance to be reasonably good. Suppression of spurious emissions easily meets current FCC requirements (see Fig. 6). The maximum output power obtainable from the '107M tested was typically 126 watts, dropping to 112 watts on some bands. Other pertinent specifications and test results are listed in the table.

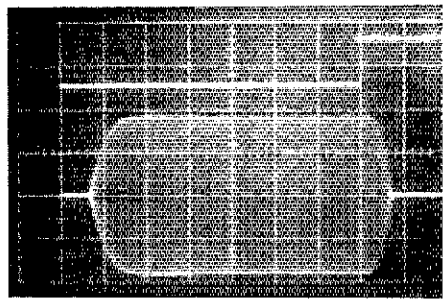


Fig. 2 — Cw keying waveform of the FT-107M with DRIVE control adjusted for maximum input power. Upper trace is the actual key closure; lower trace is the rf envelope. Each horizontal division is 5 ms.

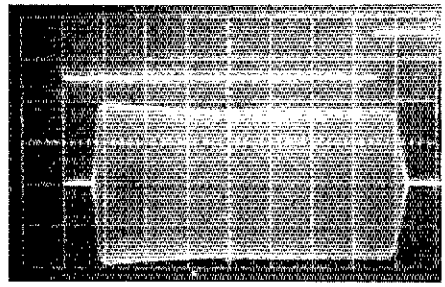


Fig. 3 — Cw keying waveform of the first dot in string. All operating conditions are the same as those used for Fig. 2.

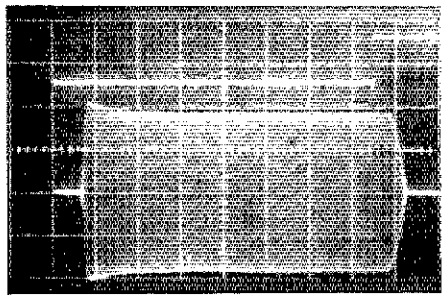


Fig. 4 — Cw keying waveform with the DRIVE control adjusted to the point at which the alc indication just begins. All other operating conditions are the same as those used for Fig. 2. Note that under these conditions the rise time is reduced to about 1 ms and fall time to about 2 ms.

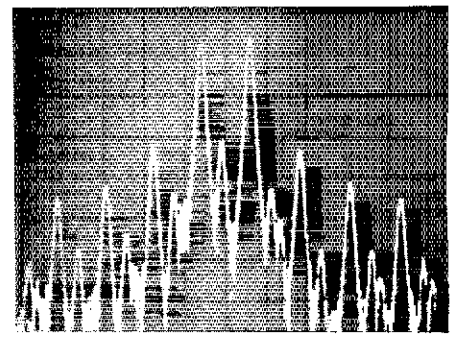


Fig. 5 — Spectral display of the FT-107M output during two-tone IMD test. Third-order products are 32 dB below PEP and fifth-order products are 41 dB down. Vertical divisions are 10 dB; horizontal divisions are 1 kHz. Transceiver was being operated at rated input power on the 20-meter band.

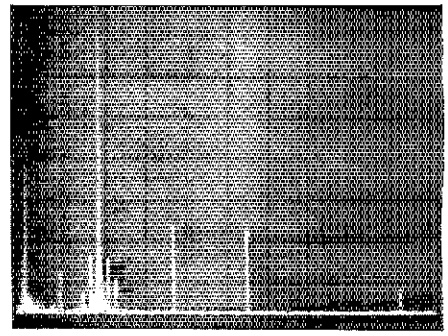


Fig. 6 — Spectral display of the FT-107M output operated at rated input power on the 160-meter band. Output power is approximately 125 watts. All spurious emissions are better than 40 dB below the carrier. Vertical divisions are 10 dB; horizontal divisions are 1 MHz. The FT-107M complies with current FCC specifications for spectral purity.

On-the-Air Operation

Using the FT-107M on the air was, for the most part, a pleasure. The broadband design allows quick, no-tune-up band changes — provided the antenna system used shows a reasonably low SWR on all bands. Both received and transmitted audio quality is excellent and the cw keying drew no unfavorable comments. Receiver sensitivity was more than adequate even when using small antennas.

A minor problem with the S-meter calibration was noted during on-the-air tests: The S-meter readings seemed rather high compared to those obtained with the station receiver normally used. Tests with a calibated signal generator showed that an S-9 meter reading required only a 1.5 μV signal! Following the S-meter calibration procedure given in the owner's manual resulted in a 52 μV signal producing an S-9 reading. The number of decibels per S unit averaged 3.5 across the meter scale, which is somewhat less than the 5 or 6 dB per unit normally found.

Station accessories available include the FC-107 antenna tuner, FTV-107R vhf/uhf transverter, FV-107 external VFO and the SP-107P speaker/phone patch. All of the above accessories match the FT-107M in color and styling. Price class: FT-107M with DMS, $1170; FP-107E, $145. Manufacturer: Yaesu Electronics Corp., 6851 Walthall Way, Paramount, CA 90723. — *George Collins, AD0W*

KENWOOD TR-2400 2-METER FM TRANSCEIVER

☐ Need a durable, convenient-to-use rig that should handle just about any 2-meter I'm situation you're likely to encounter? Kenwood's Model TR-2400 synthesized hand-held is that kind of rig.

The TR-2400 is built around a sturdy aluminum frame, partially encased front and back with dark-gray high-impact plastic covers. The physical layout is well planned,

with the VOLUME, SQUELCH, TRANSMIT OFFSET, special purpose (OPEN/BUSY, SUBTONE, REVERSE/NORMAL) switches and a quick-disconnect BNC antenna jack on the top surface. The LCD readout, multifunction 16-key pad and special (FREQUENCY LOCK, TRANSMIT LOCKOUT, LAMP) switches are located on the lower front panel, with jacks for the earphone, battery charger and microphone on the right-hand side. The PTT thumb switch is well placed on the left-hand side and the 8-ohm internal speaker and condenser microphone are located at the top of the front panel.

Power is supplied by a 9.6-volt NiCad battery pack which drops into a bottom rear compartment accessible through a slide-out panel removable with a coin. Accessories supplied with the standard unit include the rubber stub antenna, NiCad battery pack, ac wall charger, earphone, plugs for microphone and standby inputs and instruction manual. (The manual contains thorough operating instructions, a block diagram and schematic, but no maintenance information.)

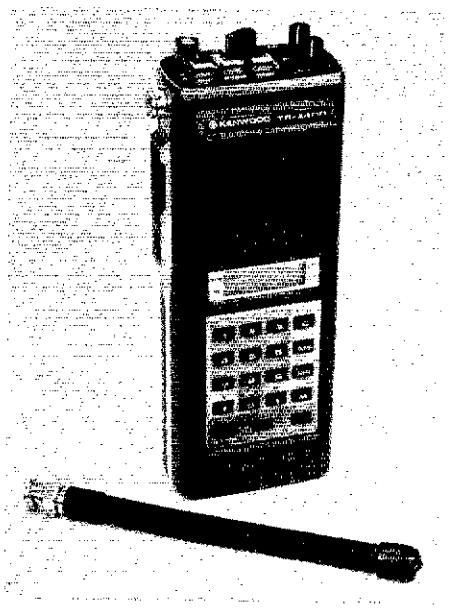


Fig. 7 — The Kenwood TR-2400 2-meter fm transceiver. The BNC antenna connector is a thoughtful feature.

Frequency Synthesis

Synthesized hand-helds are becoming more the rule than the exception today, thanks to comparatively recent developments in electronic technology. The convenience and versatility of the "800 channel" rigs are hard to dispute. The Kenwood approach was "digital control of a phase-locked voltage controlled oscillator," or placing the frequency output of a VCO under microprocessor control. At its simplest, you tell the microprocessor by means of the keypad and function switches what you want, and it controls the electronics within. Thus, when you want to operate a 146.28 MHz/146.88 MHz repeater, for example, you enter the exact receive frequency using the keypad: punch the four digits 6,8,8 and ∅ (the 1 and 4 are assumed and the decimal point automatically "set" by definition). Assuming all the other controls are set properly (−600 kHz offset, etc.), you'll be operating right where you want!

Operating frequency range is controlled by the microprocessor according to the "operational rulebook" preprogrammed at manufacture. Under microprocessor control, the TR-2400 covers the entire 2-meter amateur band plus those frequencies down to 143.900 MHz and up to 148.495 MHz. You cannot *directly* enter any frequencies above 147.995 MHz or below 144.000 MHz, but you can scan manually beyond these limits. By pressing continuously the up or down "arrow" keys, corresponding to the keypad's "#" and "*" respectively, you'll reach the upper and lower extreme limits mentioned above. When you reach 148.495 MHz scanning up in frequency, the synthesizer "jumps down" to 143.900 MHz and continues scanning up from there in 5-kHz steps. The reverse is true when scanning down beyond 143.900 MHz. To change frequency by 5 kHz only, depress the appropriate arrow only momentarily. To change from one frequency (within the 2-meter band) to another, enter the last four digits of the desired new frequency as described above: the last digit to the left of the decimal point (MHz units-place) and the three digits to the right of the decimal point. The last digit will always be a ∅ or a 5, as the synthesizer generates frequencies in minimum 5-kHz increments. If you enter a 5, 6, 7, 8 or 9, the last digit will be a 5; if you enter a ∅, 1, 2, 3 or 4, the last digit will be ∅. The last four digits of the frequency currently being generated may be viewed in the LCD readout.

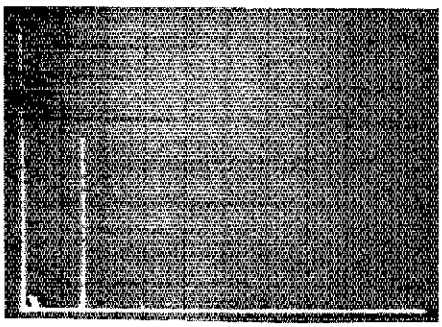


Fig. 8 — Spectral display of the TR-2400. Vertical divisions are 10 dB; horizontal divisions 100 MHz. The fundamental has been reduced in amplitude approximately 34 dB by means of notch cavities; this prevents analyzer overload. Power output is 2 watts at a frequency of 147.88 MHz. The second harmonic is just barely visible approximately 74 dB below peak fundamental output. Tests were performed in the ARRL lab. The TR-2400 complies with current FCC specifications for spectral purity.

Memory

The TR-2400 incorporates 10 memory channels to program with your most-used local frequencies. With several of the channels programmed, changing frequency becomes a simple matter. Pressing the key labeled MR (memory recall), followed by the number of the memory channel holding the frequency you want, will do it.

With your local repeaters' frequencies programmed into the memory channels, you'll also be able to scan all ten of them automatically. Pressing the MS (memory scan) key will return the rig to the frequency stored in M1 where it will pause for one second, change to the frequency stored in M2, pause, and so on. From M∅ it recycles back to M1 and continues scanning. Though this scan rate seems fairly slow, if you care to monitor only two repeaters, for example, you can speed up the apparent scanning rate (see "Hints and Kinks," December 1980, p. 53). The same can be done with three repeaters or more, or you can set up a "priority channel" by programming a priority frequency in every odd-numbered memory channel with five other frequencies entered in the even-numbered memories.

When scanning, you have the option to pause on either open channels or busy channels using the OPEN/BUSY push-button switch on the top panel. Scanning will resume when the status again changes. To stop the rig manually from scanning, press the keypad button labeled STOP. This button serves double duty as the C or CLEAR key when you've made entry errors using the keypad. As the keys are exposed and susceptible to unintentional entries during everyday use, provision has been made to prevent errors by locking in the displayed frequency. When you slide the F.LOCK switch on, you will not be able to change the frequency manually. If the radio is scanning *before* this switch is activated, it will continue to scan the 10 memories and will not stop until you've turned the F.LOCK off and hit STOP.

Receiver/Transmitter

The receiver performs well and exhibits no overloading problems unless operated immediately next to another 2-meter rig. The internal speaker provides surprisingly good audio, though in a noisy environment, such as the inside of an automobile, you'll need to turn the volume up near its limit. The transmitter yields a minimum of 1.5 watts with the batteries charged. At full charge, you'll typically get over 2 watts out from the rig. A spectral display of the output is shown in Fig. 8.

One quirk that we noticed is the way the transmitter "sweeps hot" from the receive frequency to the transmit frequency. Whatever the split, whether the standard ±600 kHz or the broadest possible split (143.900 MHz to 148.495 MHz using the nonstandard split capability), when you key the PTT switch the TR-2400 begins transmitting instantaneously at the receive frequency; very quickly (less than a second) the transmitted carrier sweeps up or down to the appropriate transmit frequency. As the thought of an rf pulse traversing the entire band raised a few questions in our minds (hmmm . . . wonder if we'd key up all the repeaters for miles around?), we took a long, hard look. The fact is that at any given frequency, the transmitted pulse "looks" like a very low power transient that does not break squelch. It certainly did not key up any of the local repeaters, many of which are near ARRL Hq., and the pulse could barely be detected above the noise as a very low audio "bip" in a second receiver a few feet away. Though quick, it *was* present as a full-powered pip racing up the display of the spectrum analyzer.

Early models of the TR-2400 (those characterized by a spring-return (no-click) REV/NORM push button on the top panel — later models have a locked-detent button that remains halfway "down" when in REV position) were electronically gated to prevent transmitting. Though the synthesizer did sweep from the receive to the transmit frequency, the transmitter was disabled for a few hundred milliseconds and nothing was transmitted *until* after the transmit frequency was reached. Several owners of earlier models have com-

mented about the delay on transmit, wondering why their first syllable was often "chopped" off. This is the answer. Later models, those with a detent or "cocked" position in REV operation are not gated: When you key the transmitter, you are transmitting immediately, but the listener may still miss the first syllable.

Within the amateur allocations, this really poses little problem, as we demonstrated with our test. When considering MARS or CAP operation, however, where reception is often below 144 MHz and transmission above 148 MHz, the newer TR-2400s *do* transmit while sweeping across frequencies that are not authorized for use. The operator should be aware of this feature.

Transmitted audio quality is excellent. The tiny internal condenser microphone seems to do the job quite well, as reports were good whether through repeaters or operating simplex. Though most listeners could tell that the rig was a hand-held, the tonal qualities of the operator's voice were reproduced well enough that he was easily recognized.

Power Consumption

The 9.6-volt battery pack consists of eight standard 1.2-volt AA NiCad cells wired in series and held together in a shrink-wrap sleeve. With the wall charger, Kenwood states that full recharge (from complete discharge) should take about 15 hours; this seemed to be a pretty fair estimate under a variety of operating conditions over the test period of several months. The normal claimed operating time of the TR-2400 is 2-1/2 hours at a 1:3 transmit/receive ratio. I found this estimate to be a good rule of thumb, though I did not sit down for a 2-1/2 hour stint with a stopwatch! Good 2-meter fm operators normally do much more listening than talking (the proverbial elephants — all ears and little mouth), and will find their operating time greatly extended beyond the 2-1/2 hours claimed. On the other hand, our alligator friends (all mouth and no ears) should carry an extra battery pack, as their operating time will be less per charge (poetic justice!). An informative chart of battery voltage versus operating time is included in the operating manual.

With the power switch turned off, the memory backup circuitry that keeps the 10 memories "loaded" draws about 0.8 mA. Though this is normally insignificant during active periods, Kenwood has included the option of eliminating even this drain over long periods of non-use: Turn the TX OFFSET to BU.OFF (back up off). I found that putting the TR-2400 aside for over a week with the memories saved would reduce later operating time before a charge was needed; reprogramming the memories is so simple a task that turning this off for extended "down times" should be standard procedure!

Another way Kenwood chose to prolong the usefulness of a full charge was to use a liquid crystal display (LCD). The TR-2400 display is non-defeatable and must be left on whenever the power is turned on; but the power consumed is truly insignificant. One complaint often heard about LCDs is that they are difficult to read. Though the TR-2400's LCD digits don't "jump out" at you like their bright-red LED counterparts, they posed no problem whatsoever even in dim lighting conditions. And, for viewing the display in total darkness, you need only throw the LAMP switch and a small bulb illuminates the entire display. As the bulb does consume a good deal of power, it should not be left on indiscriminately — but there are a few instances where you'd need more than several seconds to check your frequency.

While we're looking at the display, it would be a good time to note four LCD "pointers" that convey additional information to the operator. One, the MR indicator, tells you that the operating frequency in the display has been "called" from one of the 10 memories. The LAMP indicator lets you know that the lamp has been left on; in bright light the lamp is not noticeable and this warns you to turn it off before the batteries have unnecessarily been drawn down. A third indicator, labeled BATT, warns that your batteries are close to full discharge. When this comes on you have only enough power left for one or two *short* transmissions. The fourth indicator, ON AIR, tells you that the radio is presently transmitting; that is, it is keyed. These latter three indicators proved indispensable in saving the battery charge on several occasions.

Kenwood recommends recharging the battery pack for about 10 hours after unpacking the rig, even though the batteries are fully charged at the factory. We did this but still experienced a bit of a problem for the first few weeks of operating as the batteries would not hold a full charge for very long. Leaving the rig off for as little as two days after a full charge would leave the battery pack on the verge of "going south." After a few weeks, however, the problem seemed to cure itself, though I suspect several cycles of deep discharge and complete recharge — "exercising" the batteries — may have helped. Kenwood cautions against operating while recharging the batteries with the wall charger and recommends not leaving the rig plugged into the charger after the 15 hours required for full charge. When both cautions were inadvertently violated, the rig suffered no apparent damage, though I suspect that the potential for doing harm does exist.

Other Features

Several other features are worth mentioning. With the TX OFFSET switch you can select ±600 kHz offsets or simplex operation as with most new rigs, but one can also program so-called "oddball" splits directly. Enter the last four digits of the repeater input frequency into memory 0 (MO), enter the repeater output frequency into the display and turn the TX OFFSET switch to the M position. With this setup, you will listen on the displayed frequency and transmit on the frequency stored in MO, regardless of the size of the split. The receive frequency is displayed during receive and the transmit frequency displayed during transmit.

The remaining two push-button switches on the top of the radio control two equally useful functions. The button marked S.TONE enables a subaudible tone generator (not supplied with radio and not available from Kenwood). The instruction manual describes clearly how to install one of these generators, which are readily available from several sources for those needing tone-access capability. The NORM/REV switch allows you to "flip" your transmit and receive frequencies and "play repeater." With the button depressed, you'll receive on the repeater input and transmit on the repeater output: a quick way to check if you're close enough to someone to work them simplex, freeing the repeater for others, or for working others should the repeater be down unexpectedly for a short time.

The BNC "quick disconnect" antenna jack is one of the more useful features of the TR-2400, though few people think of it in those terms. It readily accommodates the supplied stub antenna and most any other 2-meter antenna that can be adapted to BNC. Many TR-2400 users use magnetically mounted 5/8 λ whip antennas on their cars, inserting an easy-to-find SO-239 to male BNC adaptor between the commercial antenna's PL-259 plug and the rig. A quick twist and the radio is ready to go.

The TX-PTT/STOP or transmit lockout prevents transmission when in the STOP position. This is handy when swapping between antennas or when the radio is sitting on the car seat beside you, situations where transmitting accidentally could cause you or others problems.

And for the autopatch user, the multifunction keypad does more than just "talk to the microprocessor." Twelve of the 16 keys function as a Touch-Tone generator during transmit (digits 0-9, * and #). Operation is standard, though the radio must be keyed with the PTT switch; because of the other keypad functions, the rig cannot be automatically keyed when a button is depressed.

Its multiple features, versatility and ease of operation make Kenwood's newest entry in 2-meter fm hand-helds a joy to operate.

Kenwood TR-2400 2-Meter FM Transceiver Serial No. 0121277

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 144.000 to 147.999 MHz with direct programming	143.900 to 148.495 MHz manual scan
Rf output power (50 Ω load): 1.5 W	2 W
Spurious emissions: 60 dB below fundamental	>60 dB below fundamental
Power requirements: 9.6-volt dc battery pack.	
Dc current drain:	
Approx. 28 mA receive/no input signal.	
Approx. 500 mA transmit.	
Approx. 0.8 mA memory backup.	
Receiver type: Double conversion;	
first i-f — 10.7 MHz;	
second i-f — 455 kHz.	
Sensitivity: <1 μV for 30 dB S/N.	0.31 μV for 20 dB quieting.
Audio power output, 8-ohm load: >200 mW (10% distortion).	180 mW (undistorted).
Size (HWD): 7-9/16 × 2-13/16 × 1-7/8 in. (192 × 71 × 47 mm).	
Weight: 1.62 lbs (0.74 kg)	
Color: Brushed aluminum, charcoal gray and black.	
Price class: $400.	
Manufacturer: Trio-Kenwood Communications, Inc., 1111 West Walnut, Compton, CA 90220.	

Whatever the application, autopatching, monitoring a number of local 2-meter repeaters, searching for accessible machines in unfamiliar territory or joining in a friendly roundtable, the TR-2400 will find a place in many active 2-meter fm shacks. — *Steve Place, WB1EYI*

GARGLER, INC. MICROPHONES

☐ At last! A phone operator's microphone that has all the features required by the amateur or CBer! Gargler, Inc. has developed a group of space-age microphones that will satisfy the needs of contesters, DXers and ragchewers. The manufacturer offers vanity accessories for those who wish to be "big frogs in little ponds," plus some assorted functional accessories.

The problem with past and present microphones has been a lack of variation in design. That is, most mikes have not been designed for the application, at least with respect to hams and CB operators. Furthermore, existing microphones dictate the voice reproduction quality by virtue of the bandpass constrictions of the microphone element. It dates back to the days of "burnt-lip" modulation (loop modulation), wherein one was inclined to shout into a megaphone to avoid rf burns that could result from coming into physical contact with the mike. We've progressed well beyond that primitive stage of voice operation, graduating to carbon mikes, condenser mikes, ribbon mikes, dynamic mikes, crystal mikes, electret mikes and — finally — ceramic mikes. But, all suffer the same shortcomings: no significant "bells and whistles," to use the vernacular. Transceivers have become endowed with countless unnecessary frills and goodies. Why not the same for microphones? After all, the cw operator's needs have been addressed nicely with electronic keyers, keyboard keyers, CMOS keyers and memory keyers. Why has the phone operator been ignored? We may never know the answer, but we can rejoice in the knowledge that *finally* the shy or "leather-lunged" voice enthusiast can stand proudly with his or her cw counterparts. Gargler, Inc. has answered the ssb/a-m/fm person's need!

Microphone Features

The basic microphone mainframe is their model Profundo 10X, illustrated in Fig. 9. It becomes apparent that panoramic speech was a fundamental design objective when we observe the width of the microphone head (1 ft./305 mm). The height of the head is 3 in. (76 mm). This portion of the mike is available in a plane format or with a 180-degree curvature. The latter is for those operators who move their heads and wave their arms during the heat of phone-contest operating. The curved format permits a uniform dyne level on the mike element over a 180-degree range. This prevents "voice QSB" within a 1-dB level range, which can be vital during weak-signal work.

Perhaps of equal value is the luster-chrome back shield (splatter plate). It serves three important functions: (1) It prevents saliva droplets from reaching the station equipment beyond the mike, thereby eliminating the need to periodically clean and polish the panels of the transceiver and linear amplifier. (2) It provides 30 to 35 dB of background noise (blower fans, etc.) suppression. (3) It allows the operator to see his or her own image clearly during operating periods (important to some on-the-air personalities). The reviewer wants to caution the buyer that this part of the 10X must be cleaned and polished frequently, especially if the operator is in the habit of snacking while operating.

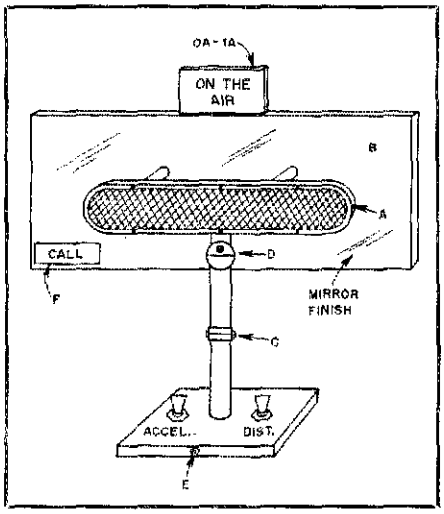


Fig. 9 — Line drawing of the Profundo 10X Magnum with connection points indicated for accessories. The mike element is 12 in. (305 mm) long and 3 in. (76 mm) high. A splatter shield is situated behind the microphone (see text).

Areas C and D in Fig. 9 are jointed. Section C permits forward and reverse tilting, while point D contains a ball joint. This makes the mike adaptable to persons of assorted heights. It also accommodates operating tables of various heights. Those with large paunches may find it convenient to lean back and place the Profundo 10X directly on the flat part of the stomach. This technique has been proved desirable for ragchewing sessions.

Other Features

Let's now discuss those space-age features of the 10X. This brings us to the Contester Model 4X Magnum. It contains battery-operated CMOS circuitry in the base of the mainframe. One circuit is called a "speech accelerator." It contains a memory and word processor that permits transmitting the human voice at four times the spoken rate. This can be equated generally to the function of a keyboard keyer with a buffer circuit. We may ask, "Of what value is this feature?" Well, if you've ever listened to the phone bands during a contest, you've no doubt heard many operators trying to talk so fast that they nearly choked! This is because some humans lack the necessary speech articulation to talk clearly while speaking rapidly. Slow talkers, and those with regional accents, will be able to match operating advantages with the best of them when using the model 4X! This circuit is invaluable in DX pile-ups for "tailending" on voice. You can almost always beat the other guy when dropping in your call at accelerated rate. *Caution:* The reviewer has learned that this feature is unacceptable for certain operators who normally are regarded as "fast talkers." The transmitted voice energy may be too fast for intelligibility, especially when QSOing with foreign amateurs who aren't adept at the English language.

For those who do not own speech processors or can't afford to buy one, take heart! The Contester 4X has a built-in circuit that can introduce just enough distortion to make one's voice sound like it has been routed through a speech processor. By actuating the DISTORTION switch on the mike base you can sound like most of those who use processing regularly, but Gargler's circuit has a "distortion limiter" that prevents excessive signal bandwidth. This enables the operator to identify with his or her peers, while not causing splatter on the phone bands, such as is commonly heard with misused conventional processors. The manufacturer plans to introduce a model Contester 10^8X in a few months. It will have "limitless distortion," which will be controlled by means of a 10-turn Helipot.

Fig. 9 shows a jack at point E. This is for use with the Gargler TI-10A outboard 10-minute automatic timer. If the operator forgets to identify his or her station each 10 minutes, the TI-10A disables the output from the mike element and inserts a voice-simulator i-d, such as, "This is KN1FE." Then the mike is reinstated for continued communications. The operator is never aware that the i-d is being sent, so the function does not interfere with the flow of speech or thought. The i-d is inserted in the buffered speech so no information is lost. Neat, we say!

Some operators insist on having an on-the-air indicator in the shack. Well, Gargler has thought of that feature too. The OA-1A plug-in display attaches to the top of the splatter shield of the Profundo, as shown in Fig. 9. This display is voice-actuated, and has an audio age circuit that prevents the light from flashing on and off in sync with the spoken words. The original model (LQ-1) used a liquid-crystal readout. Owners complained because visitors to the shack were unable to see the on-the-air sign light up. So, Gargler now uses bright red 1/2-in. (13 mm) LED blocks.

Finally, owners can have the microphone personalized at no extra cost. The call letters are embossed at the lower left of the splatter plate in 1-in. (25 mm) high gothic letters. Some of the newer U.S. calls are too long to fit on the left. In this situation half of the call is embossed on the left, and the remainder (suffix) is impressed at the lower right of the splatter shield.

We feel that this line of microphones is ideal for today's dedicated voice operator. Those seeking Ragchewers Certificates will be delighted with this apparatus. You may want to try one of the Gargler products during the phone Sweepstakes contest, or just for bursting DX pile-ups on 20 meters. Whatever your operating preference, Gargler offers you the modern approach to voice communications. Dealer inquiries are invited. — *Lypp Survis, YØWL*

Gargler Profundo 10X Microphone

Manufacturer's Specifications

Height: 2 ft (610 mm).
Weight: 5 lb (2.2 kg).
Color: Gold or chrome (buyer's choice).
Power requirements: 9-volt transistor-radio battery.
Frequency response: dc to 50 kHz.
Output voltage: 10 volts (50,000 ohms).
Price class: $495 (Contester 4X).
Manufacturer: Gargler, Inc., 70 Braeburn Rd., Bristol, CT 06010.

Technical Correspondence

Conducted by
Jerry Hall,* K1TD

The publishers of QST assume no responsibility for statements made herein by correspondents.

AVERAGE OR RMS POWER?

☐ Articles about power amplifiers, whether audio or radio frequency, often contain statements about power ratings. Many times these ratings are confusing, with terms such as *peak music power, average power, rms power* and others appearing with no clear explanation of what the terms mean. In particular, *rms power* and *average power* are seen most frequently.

Instantaneous power to or from a device is the product of the voltage across the device times the current into or out of it at a particular instant. If conventional current is flowing into the positive terminal of the device, then the device is accepting power. Otherwise it is giving up power.

The time average of the instantaneous power is what a wattmeter would indicate, and is known as the average power. For a purely resistive circuit with a fixed ac or dc voltage, this is equal to the effective (rms) voltage times the effective (rms) current. If these values remain unchanged, the average power remains constant at $V_{rms} \times I_{rms}$. Note that this should be referred to as average power or just plain power. It is not proper to refer to this as rms power.

The rms value of anything, whether it be voltage, current or some other quantity, is defined as the square root of the mean of the squares of the quantity — hence the name root-mean-square. In mathematical form this is given for voltage in the equation

$$V_{rms} = \sqrt{\frac{1}{T}\int_0^T v(t)^2\,dt}$$

As examples, the rms value of a sine wave of voltage is 0.707 times its peak value, while the rms value of a triangular wave is 0.577 times its peak value. The rms value of a dc (constant) voltage is equal to its dc value. Therefore the rms value of a constant and unvarying power reading is the same as its average value, but the rms value of a power that varies with time in some fashion is *not* the same as its average value. Actually, for any nonconstant value of a quantity, the rms value is always greater than the average value.

If a sine wave of voltage is applied to a resistance, the average power is $(V_{rms})^2/R$. The power fluctuates, however, from $(V_{max})^2/R$ to zero. This is shown in Fig. 1. In this instance the rms power, using the strict and correct definition of rms, is *not* the same as the average power. Note that the average power is half the peak power, but the rms power is (by calculation) 1.225 P_{av}. A wattmeter would indicate P_{av} and not P_{rms}. The true heating power and the power useful in producing sound or rf output for the above case is P_{av}, and *not* P_{rms}.

Of course, in more complicated situations the relationship between P_{av} and P_{rms} must be determined for each case, but P_{av} is less than P_{rms} in every instance except when the power does not vary with time.

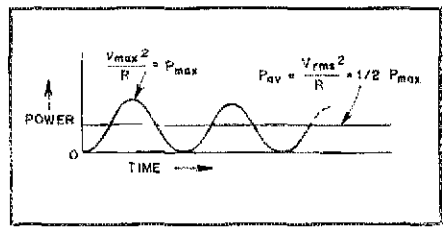


Fig. 1 — The instantaneous power for a voltage sine wave varies from zero to P_{max}. As may be seen here, the average power is 1/2 P_{max}. This is not the same as P_{rms}.

In many instances the term *rms power* is used loosely to mean average power. This practice should be discouraged, since the two terms are clearly not the same in most cases. — *James N. Thurston, W4PPB, 322 Woodland Way, Clemson, SC 29631*

I-F CAN MYSTERY SOLVED

☐ I think I can enlighten your readers about the nature of the long i-f cans which you describe as possibly being fm discriminators in your article on chokes and coils in the Radio Shack $1.98 bargain assortment.[1] I, too, bought one of these packs, sorted through the obvious stuff, then came upon The Mystery Item.

After some diligent efforts with my crude homemade test equipment and some pliers, I was able to determine that the item is really two i-f coils separated by a ceramic filter. By wiring it as shown in Fig. 2, I was able to get the following bandwidth characteristics: 454.4-452.4 kHz at −6 dB and 449.6-457.9 kHz at −24 dB. So these little items should make up a nice i-f strip. I've wired strips using transistors and 3028 ICs, per the *Handbook* receiver section. — *James G. Ruggiero, 208 Graves Ave., Blacksburg, VA 24060*

[1]DeMaw, "A Radio Parts Eldorado!" August 1980 *QST*, p. 20.

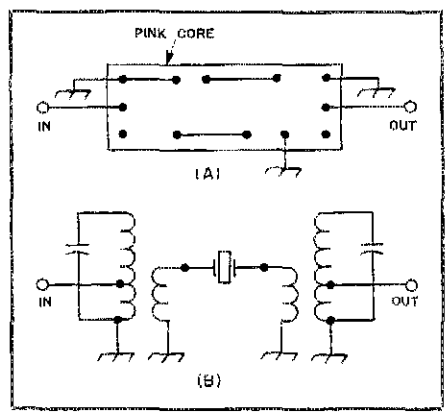


Fig. 2 — Mystery i-f can unveiled. The connections shown at A result in the circuit shown at B. See text for bandwidth characteristics.

TIPS FOR SOLAR CELL USERS

☐ After reading those two interesting articles on solar power in August 1980 *QST*,[2,3] I thought I would pass along a few things I've learned since going solar in August 1979. First of all I'm using a Gel Cell-type storage battery instead of a lead-acid car battery. The Gel Cell has two main advantages. First of all it is completely sealed and could be permanently installed upside down. Second, it can withstand over 400 complete charge-discharge cycles. Under normal operation it is unlikely you would completely discharge it even one time, which means it should provide you with reliable power for many years. Its disadvantage is the dollar cost per ampere hour of storage capacity. The unit I'm using is the Globe Union model U-128, which is rated at 28 ampere hours. This forces you into the QRP category unless you want to spend a lot of money on batteries. My equipment consists of three transceivers at 5, 15 and 25 watts.

The next item is the blocking diode which is used to prevent the battery from discharging back into the solar panel when the sun goes down. This diode should be the Schottky type which has a 0.3 volt drop across it. This is compared to the silicon type which has a 0.8 volt drop. However, Schottky diodes with a higher current rating also have higher leakage current in the reverse-bias direction. The one I'm using was hand picked and the leakage current is less than 10 μA at 14 V.

Last is the question of whether or not you

[2]Halliday, "Solar Powering a Ham Station," August 1980 *QST*, p. 11.
[3]Blakeslee, "An Electronic Switch for a Solar Panel," August 1980 *QST*, p. 12.

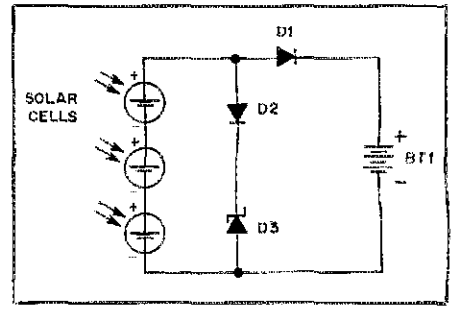


Fig. 3 — The shunt regulator used with solar cells at W8AC. See text for information on the solar cells and battery. D1 and D2 are Schottky diodes rated to handle the maximum current the solar panels will deliver. D3 is a 14-V, 50-W Zener diode.

*Technical Editor, *QST*

need a voltage regulator. The problem arises because Ciel Cell and car batteries require a charging voltage around 14 volts, but solar panels designed for a 12-volt system can supply more than 17 volts with direct sunlight. I operated my system for over 10 months without any regulator. If you use the system enough the battery will always be in some state of discharge, and it in turn will load down the solar panel below 14 volts. If you let the battery completely charge, however, the terminal voltage could increase as high as 17 volts and reduce the life of the battery.

At the present time I am using a simple shunt regulator, Fig. 3. D1 and D2 are both Schottky diodes. The type you would use will depend on the maximum current your panel could generate. The only purpose of D2 is to compensate for the 0.3 volt which is dropped across D1, the blocking diode. D3 is a 14-volt Zener diode rated at 50 watts, more than enough to handle the 1-1/2 ampere panel I'm using.

Shunt regulators have never been very popular because of their high power consumption. In this case, however, where the source of energy is as free as sunshine, that is no longer a factor. One additional advantage to this type of regulator is that it requires no power from the battery for operation. — *Jim Martin, W8AC, 24455 Lakeshore no. 1804, Euclid, OH 44123*

USING BALUNS IN TRANSMATCHES WITH HIGH-IMPEDANCE LINES

☐ The article by DeMaw, W1FB, "Ultimate Transmatch Improved" (July 1980 *QST*, page 39), contained comments on the use of baluns in Transmatches and the disastrous results that can be suffered when attempting to use high power and feed high-impedance balanced loads. The high voltages that are developed cause arcing between turns of the balun, upsetting its function and likely destroying it.

The Ultimate Transmatch is such an exceptionally broad-range matching device it seemed a shame it was limited to only low-impedance *balanced* loads when using high power. I had been working on the problem and had solved it shortly before Doug's article appeared. After reading his suggestion that the user limit high-power operation to impedances of 300 Ω or less, I realized I had the solution to one of the few remaining limitations of this most effective device.

While trying to find a solution, I wound several varieties of baluns, including an air-wound version. All conventional baluns failed by arcing between turns whenever the load was more than a few hundred ohms, as DeMaw predicted. Ultimately the solution was found in the method of winding the balun. It was wound on two T-200 Amidon cores according to instructions in *The Radio Amateur's Handbook*, but with three major differences. First, the coil was wound with the turns well separated and equally spaced (Fig. 4A) instead of with the turns close together (Fig. 4B). Second, 10 bifilar turns were used (instead of the 15 indicated in the *Handbook*) to limit the amount of wire on the form and to permit maximum spacing of the turns. (Amidon instructions indicate 10 turns is adequate for 3.5- to 30-MHz operation.) And third, additional insulation was obtained by dipping the assembly in polyurethane varnish.

The photos show the completed balun. Construction is as follows:

1) Use two Amidon T-200 cores. (The *Handbook* suggests three cores for 2 kW, but two proved adequate for my particular 2-kW final.)

2) Insulate each core by winding with two layers of no. 27 glass-cloth insulating tape.

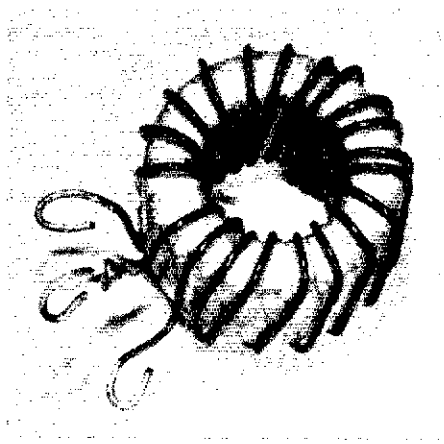
3) Stack the two cores and wind another layer of tape around the two.

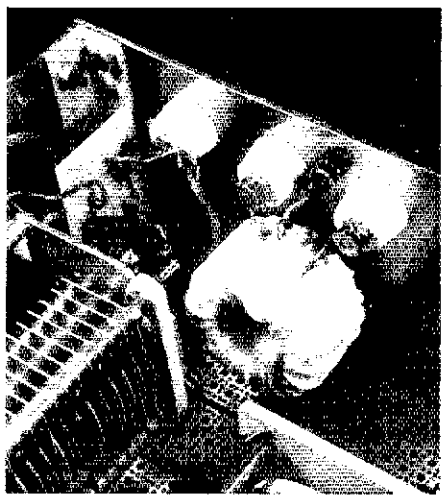
4) Wind 10 bifilar turns of no. 14 Teflon covered wire spaced equally one wire from the other, as shown. Be careful to keep all turns separated as far as possible. *Do not let any turns touch each other.*

5) Dip the assembled balun in clear polyurethane varnish (I used Behr no. 603 clear gloss) while holding the balun by one of the wires. Keep the wire ends clear of the varnish, or be sure they are scraped clean before making connections. Suspend the assembly and let it dry for 24 hours.

6) Wind a final layer of tape around the turns to be sure they are held in place.

7) When mounting the balun, be sure to keep it as far away from the housing and other components as possible to avoid rf flashover.





The upper photo shows the balun wound and ready for immersion in polyurethane varnish. After drying, the balun is wrapped with a final layer of glass-cloth insulating tape and installed away from other components, lower photo.

Performance is highly satisfactory. When put into operation, the balun functioned perfectly with no problems. Voltage between legs of the open-wire transmission line appeared to be well balanced, as indicated by a neon lamp. Core saturation did not occur even when running 2 kW ssb. With the key down for one minute at 1 kW input (on an unused frequency, of course) there was only a slight rise in balun temperature. This test was made on 40 meters with a transmission line length that presented a high impedance at the feed point.

It is now possible to run the full legal input to my 4-1000A final with all lengths of transmission line I have tried, 10 through 80 meters, without breakdown using my 80-meter open-wire center-fed antenna and homemade Transmatch. This modification has made it a more truly universal matching device and has enhanced its versatility considerably. — *William E. Fanckboner, W9INN, 811 Cathy La., Mount Prospect, IL 60056*

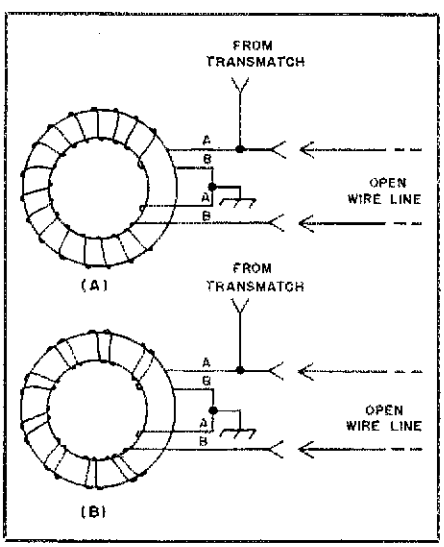


Fig. 4 — Fanckboner recommends winding toroidal baluns with the bifilar turns equally spaced, as shown at A, rather than in the conventional method shown at B. This helps to avoid arcing between turns at high power when lines with high input impedances are being fed.

SOMETIMES BALUNS ARE BALONEY

☐ A *QST* article by Bruce Eggers, WA9NEW, presents several interesting and, I believe, valid conclusions about when baluns are or are not needed.[4] However, it is somewhat misleading to draw conclusions about 80-meter dipoles from the results obtained from the 1.6-GHz half-wave dipole used in the author's tests. From the photographs it appears that his test dipoles were fed with RG-8/U coax. Scaled to 80 meters, this would represent a coax feeder having a diameter of 14 feet or 4.3 meters — clearly *not* a typical 80-meter dipole! Unfortunately it is impossible to construct a true scale model of an 80-meter antenna at 1.6 GHz — to accurately scale RG-8/U would require a feed line of less than 0.001 inch (0.03 mm) diameter.

Fortunately for those of us who operate on the lower frequencies with dipoles and wonder about the need for baluns, a report by the Stanford Research Institute contains the answers.[5] The radiation patterns of full-size hf antennas, including dipoles with and without baluns,

[4] Eggers, "An Analysis of the Balun," April 1980 *QST*, p. 19.

[5] Ray, "Full-Scale Pattern Measurements of Simple HF Field Antennas," *Special Technical Report 10*, Stanford Research Institute, Menlo Park, CA. Available from National Technical Information Service, Springfield, VA 22161, as number AD487494.

were measured. The patterns were obtained by flying a fully instrumented helicopter around the antennas. The conclusions are in basic agreement with Eggers, and can be restated quite simply. A wire dipole being operated at or near resonance does not require a balun in order to have a symmetrical pattern. (Of course, as Eggers points out, metallic objects in the vicinity of the antenna may distort the pattern, but this would be the case with or without a balun.) Also, as has often been stated, the coax should be brought straight down at right angles to the antenna for at least a quarter wavelength if possible.[6]

The Stanford report also reveals that when a wire dipole without a balun is operated at a frequency far off resonance, the pattern will be severely distorted. An example might be operating a coax-fed 80-meter dipole on 40 meters. Even though the pattern may be distorted, however, I would advise *not* using a balun. The reason is simply that the termination that the dipole feed point presents to a 1:1 or a 1:4 ferrite-core balun is highly mismatched when the dipole is far off resonance. In such a case, the amount of power transferred through the balun is highly problematical. One might well conclude that not only is there no real need for a balun when feeding hf wire dipoles, but that a balun may in some cases introduce more problems than it supposedly cures. — *Jacob Z. Schanker, W2STM, 65 Crandon Way, Rochester, NY 14618*

[6]*The ARRL Antenna Book*, any edition.

TVI FROM SWR INDICATORS AND POWER METERS

☐ I wish to bring your attention to something you may or may not already know about. It concerns the Daiwa CN-720 and similar SWR indicators/power meters causing TVI on channel 2 when used on the hf bands, especially 10 meters. I discovered this almost by accident after battling a TVI problem for almost a year.

I use an ICOM 701. The transmitted signal passes through a low-pass filter mounted close to the output of the rig, through the CN-720, into a small tuner and out to a quad antenna which is up 35 feet (11 meters). I use RG-8X coax. Everything is installed properly, and bonded and soldered according to good installation techniques. There are grounding jumpers to all the above equipment, connected to a driven ground 8 feet (2.4 meters) deep and approximately 6 feet (1.8 meters) from the rig, using no. 4 stranded copper wire. During transmission my "hash" caused a completely negative picture on TV sets within a one-block radius of my QTH.

Using the techniques described in *The Radio Amateur's Handbook* and the ARRL *Radio Frequency Interference* booklet, I got nowhere until I removed the CN-720 completely from the circuit. No more TVI! I took the CN-720 to a test facility that had a spectrum analyzer and they confirmed it was the source of my problem. I tried a smaller version, the CN-520, and the same problem recurred.

I contacted J. W. Miller and returned my CN-720. Miller confirmed my suspicions that the problem was caused by the LEDs that indicate the power range being used. They disconnected the LEDs and returned my unit. With the LED bridge disconnected, my station is free of TVI. A look at the circuit shows the take-off point between a 3.9-kΩ and a 5.1-kΩ resistor through a 1N60 diode in parallel with a 0.01-μF capacitor to ground through LEDs with a switchable common ground. Wow, what a harmonic generator!

After reading the Product Review of the CN-720 (January 1979 *QST*, page 47), I agree 100%. No one usually tests an SWR/power meter for harmonics, but from now on maybe they should. I felt obligated to write so other hams might be made aware of a potentially serious TVI problem. — *Jack Tobias, N6BBR, 2345 Newport Blvd. no. 36, Costa Mesa, CA 92627*

[Editor's Note: In addition to the problem Tobias describes, we have also found switching diodes and diodes remaining in the signal path in power amplifiers when the amplifiers are *off* to sometimes be a source of TVI. The use of diodes (including LEDs), as well as other solid-state devices that may be behaving as rectifiers in the transmission line path, may require remedial measures when a TVI problem exists. Items received for advertising approval and Product Review are now being examined for this possibility in ARRL lab tests.]

HARMONIC RADIATION FROM A TRANSMITTER CHASSIS

☐ One transmitter TVI problem seems to occur quite often, namely harmonic interference on a TV channel despite the use of a low-pass filter at the output of the transmitter. Such a problem is described in Hints and Kinks, June 1979 *QST*, page 41. The writer of that information described a successful modification of a commercially designed transmitter which reduced the harmonic radiation from the transmitter by 17 or 18 dB. There is another approach to such a TVI problem which may complement transmitter modification, or in some cases may provide a solution when successful modification of the transmitter is not possible.

Use of a low-pass filter alone does not make any provision for *dissipation* of the unwanted harmonic energy produced by the transmitter. Since there is a high degree of impedance mismatch between the coax cable and the input of the low-pass filter at frequencies above the cutoff frequency, there is a high VSWR on the feed cable between the transmitter and the filter at harmonic frequencies. Also, since there is usually no provision for external dissipation of this energy and since harmonic energy is continually being produced, dissipation occurs only in the final amplifier stage and in the cable. Consequently there is a likelihood of harmonic energy radiation from the transmitter itself, as well as possible harmonic energy radiation from the cable because of leakage, faulty connectors and so forth.

An obvious solution is to use a high-pass filter having a 50-Ω resistive load connected in shunt with the feed cable, e.g. by means of a coaxial T connector. Such a high-pass filter should be designed to have the same cutoff frequency as the low-pass filter, to have a 50-Ω input and output impedance, and to have series M-derived end sections so that its input impedance at frequencies below cutoff will be high.

The result will be that harmonic energy is dissipated in the 50-Ω load connected to the output terminals of the high-pass filter. The shunt effect of the high-pass filter will be negligible at low frequencies because of the high input impedance of this filter below cutoff. There will be no high currents and voltages at harmonic frequencies since the SWR at the harmonic frequencies will be close to unity. Harmonic energy will be dissipated outside of the transmitter chassis, and not all in the final amplifier, so the final stage will run a bit cooler. Of course, all this leads to less TVI. This concept of complementary filters has been used for many years in hi-fi installations for separation of high and low frequencies. — *Ken Miller, W2KF, 309 Cherry Hill Blvd., Cherry Hill, NJ 08002*

[Editor's Note: Information on the construction of a low-pass/high-pass absorptive filter is contained in *The Radio Amateur's Handbook*, 1979 through 1981 editions, page 15-8.]

ON REWINDING POWER TRANSFORMERS

☐ I was delighted to find the Basic Amateur Radio article by O'Dell and Shriner, "Rewinding Transformers," in the October 1980 issue of *QST*. Although transformers are readily available in my area, the prices have skyrocketed in the last few years so now they are a luxury item. However, I found an old filament transformer in my junk box with a 2.5-V, 5-A secondary which seemed ideal for rewinding.

The instructions were clear and I had no difficulty rewinding the secondary to get 18 volts. The only trouble was, when reassembled, the new secondary windings vibrated, causing the transformer to hum loudly. I assumed that this was occurring because the new secondary winding was not as secure as the original secondary.

The transformer was perfect except for the noise, so I wanted to find a way to fix it without taking it apart again (once was enough). I remembered that the original secondary winding had been secured with some kind of compound, possibly varnish. So I got a can of varnish and soaked the entire transformer in it for an hour. After letting the transformer drain off and dry out for a day, I tried it again and was delighted to find it completely quiet.

As a result of this experience, I would recommend that the rewound coil of the transformer be soaked in varnish before reassembly. This should avoid the problem of noisy windings which I experienced. — *Jack Botner, VE3LNY, 35 Wynford Hts. Cr. no. 1708, Toronto, ON M3C 1L1.*

FEEDBACK ON DIRECTION-FINDING ANTENNA

☐ In the construction of the phasing harness for the direction-finding antenna in my article, "Simple Antenna and S-Meter Modification for 2-Meter FM Direction Finding," March 1981 *QST*, I inadvertently multiplied the velocity factor by the length of a real resonant antenna, as opposed to a theoretical (free space) antenna. Since the real antenna is shorter than the theoretical, the calculated length of the half-wave phasing harness is off slightly. The formula that should be used is

$$\text{length (in.)} = \frac{5902 \times \text{velocity factor}}{f\ (\text{MHz})}$$

The correct lengths for the phasing lines for operation at 146 MHz are 26.7 in. for the half wavelength, and 13.35 in. for the quarter wavelength (678 mm and 339 mm, respectively). When the error was discovered, a new set of phasing lines was constructed with the correct dimensions; as the computer program had predicted, the notch was deeper. If care is taken in disassembly, the same BNC connectors can be used for the new lines. It is probably worth the effort. — *Peter O'Dell, KB1N, ARRL Hq.*

Feedback

☐ In the article by May, "Antenna Modeling Program for the TRS-80," February 1981 *QST*, the program listing on page 16 has no known errors. There is an unnecessary statement in line 70, however. *A(N,4) = A(N,4);* may be removed from the listing. For clarification, line 390 has no zeros except in 400. Following the 2 should be the word *OR*. If you're successfully using this program, K1TD at Hq. would like to hear from you.

☐ The correct identification of the Heath HX-1681 which appeared in the March 1981 *QST* Product Review column is *transmitter*, not transceiver.

☐ Fig. 2 in Ridpath's "T-R Switching With PIN Diodes," March 1981 *QST*, omitted the added quarter-wave line and diode. The correct figure is shown here. Further, the etching pattern is *not* actual size. A full-size pattern appears in Fig. 2.

In the third column on page 20 the numbers in the calculation of power reaching the receiver were slightly garbled. It was shown that the reflected resistance was 3.333 kΩ. The amount of rf current flowing in this branch is only 50/3333 times the antenna current:

$50/3333 \times \sqrt{23/50} = 10$ mA.

The power delivered to the receiver is thus $0.01^2 \times 0.75$ or 75 μW, and the isolation is

$$10 \log \frac{23}{0.000075} = 55 \text{ dB}$$

☐ Dexter R. Wheeler, W1TUM, points out that the "Considerate Operator's Frequency Guide," January 1981 *QST*, page 47, should list the satellite downlink frequencies as 29.30-29.50 MHz.

☐ In addition to the plaques listed in February 1981 *QST*, page 73, the Long Island DX Association is sponsoring a DXpedition (phone) plaque in memory of Howard Geberth, W2NUT/1, for the 1981 ARRL International DX Contest. QST

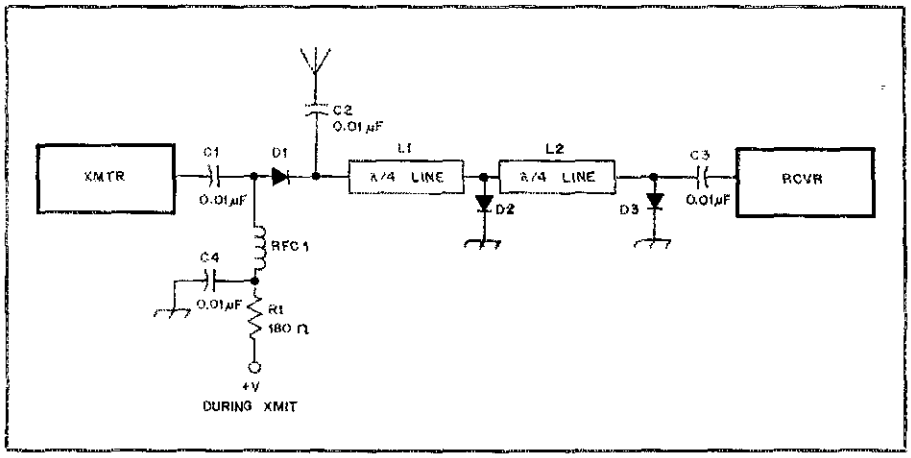


Fig. 1 — The correct Fig. 2 diagram for "T-R Switching With PIN Diodes," March 1981 *QST*, page 20.

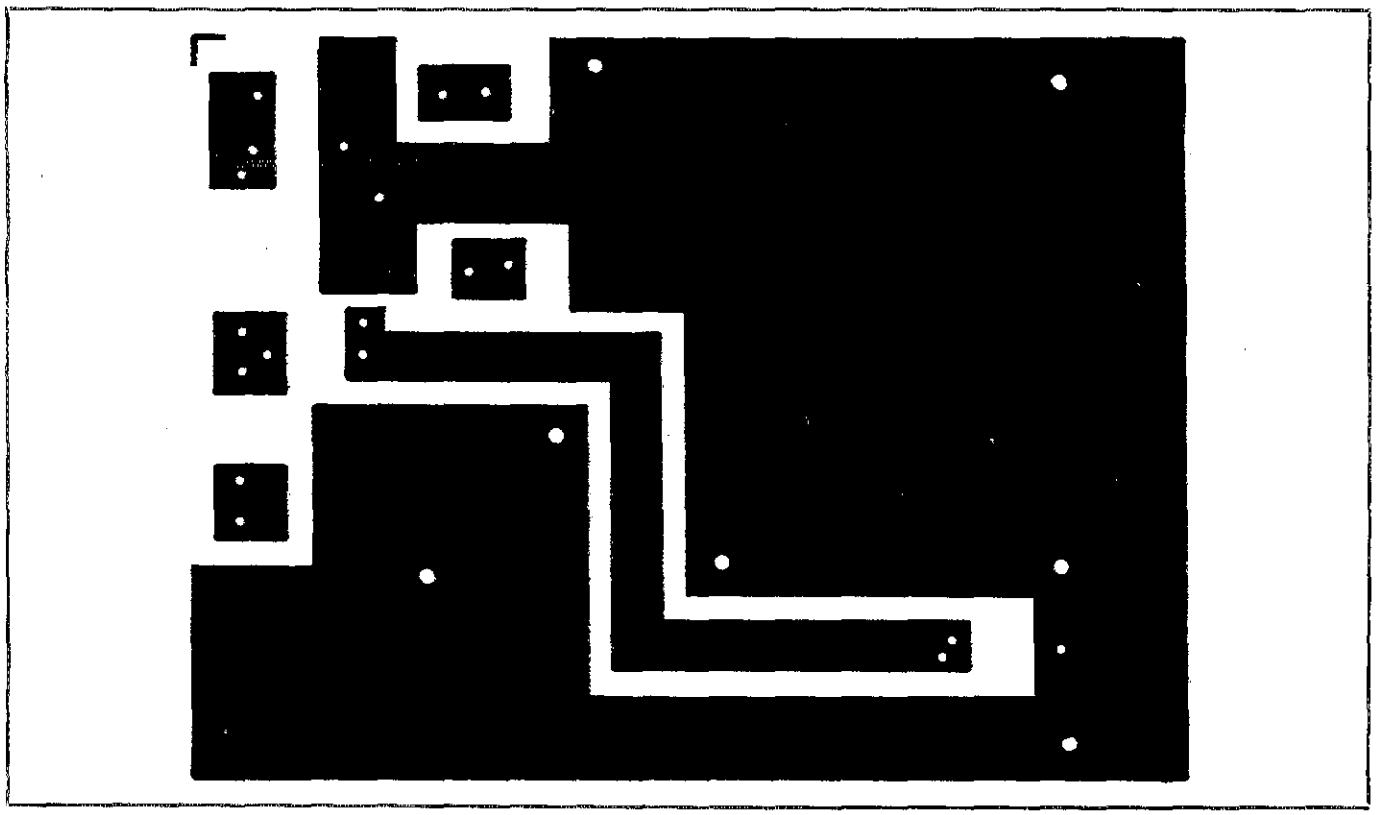


Fig. 2 — The etching pattern for Ridpath's "T-R Switching With PIN Diodes." Black represents copper.

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

DEMAW'S ANTENNA SOLVES 2-METER COVERAGE PROBLEM

☐ My liaison work between the Macomb County Amateur Radio Emergency Service 2-meter net and the National Traffic System required a more effective antenna at my station than the quarter-wave radiator I had been using. Doug DeMaw's article, "Build Your Own 5/8-Wave Antenna for 146 MHz" (June 1979 *QST*), induced me to construct such an antenna. By operating this antenna as a ground plane, mounted on my chimney, the signal coverage from my station became county-wide with considerable gain over the quarter-wave unit.

Construction of the antenna is shown in Fig. 1. The mounting base is cut from flat-plate aluminum and formed over a 3/8 inch (10 mm) drill held in a vise. All 45° bends in the ground-plane radials can be formed in the same vise *after the holes are drilled. I mounted the whole* thing on a 12 foot (3.6 m) length of 1-1/2 inch (38 mm) tubing. It is secured to the tubing by two stainless-steel hose clamps. The coaxial cable is extended through the tubing for a neater appearance. A plastic pill bottle, having been drilled for a 3/16 inch (4.5 mm) hole in the bottom, is slipped over the antenna to protect the coil from the weather.

So far the antenna has given satisfactory performance with my Tempo S-1. I guess this letter is my way of saying thanks for an article that solved a problem that arose when our repeater was taken off the air during net operations. It saved me money, the cost being around one-tenth of a commercial antenna. *The project gave me the pleasure and satisfaction* of making something that worked. — *Harry G. Bellows, KB8MX, ex-KA8EZM, Mt. Clemens, Michigan*

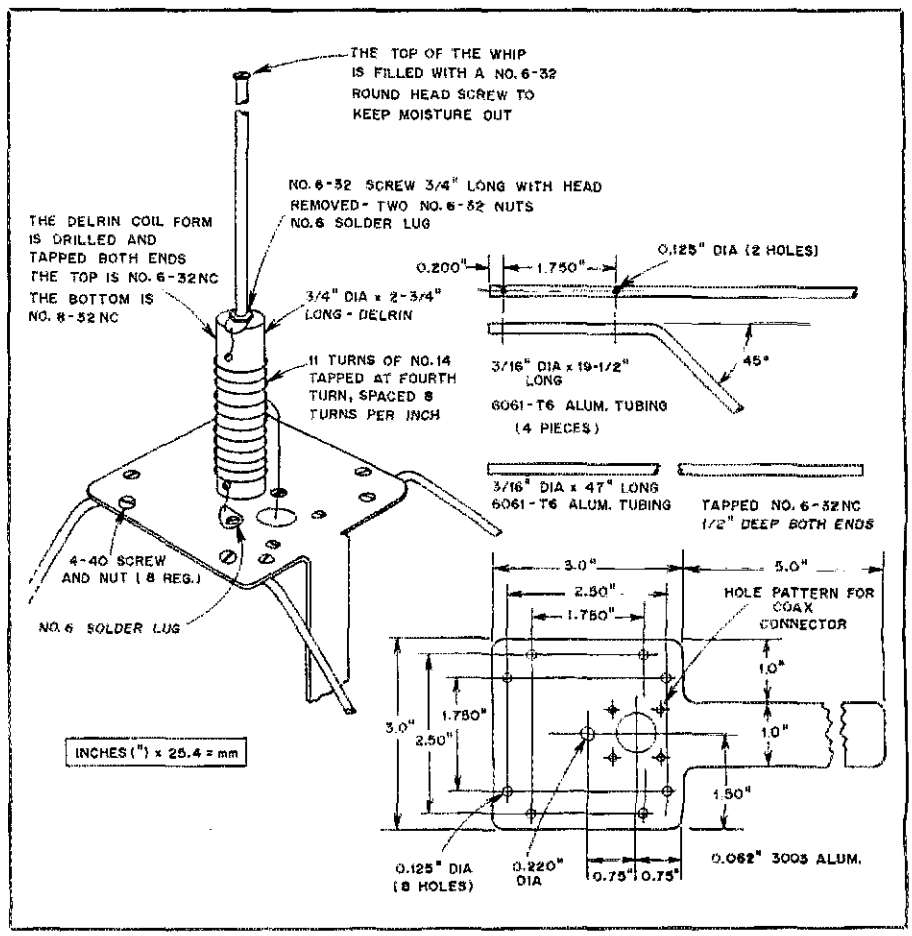


Fig. 1 — Details of the KB8MX version of Doug DeMaw's 5/8-wave 2-meter antenna. Signals from KB8MX now cover Michigan's Macomb County for the Macomb County Amateur Radio Emergency Service 2-meter network. This antenna did the trick.

THE COAXIAL-CABLE BALUN

☐ The two main advantages of coreless baluns over the ferrite-core type is that they are not *subject to core saturation and possible power* loss known to affect ferrite-core baluns under some conditions. Furthermore, coreless baluns present low SWR readings over a broad band of frequencies. I have a Collins-type coaxial-cable balun (Figs. 2 and 3) in my antenna system, put there originally because I did not wish to string up a footwarmer for the birds nor did I wish to waste costly energy.

A coaxial-cable balun is easy to build and inexpensive, and does not require the help of an rf lab, computer or calculator. To form the coil, the cable may be wrapped around a plastic bottle in the manner shown in Fig. 2. For mechanical stability the turns are closely spaced. An odd number of turns allows the *center feed point and the output leads to ap*pear on opposite sides of the coil.

Some liberty can be taken in the amount of cable used for the balun since it is a broadband device. "Cut and try" construction works well. The approach, therefore, is to have the balun become self resonant for the band to be used for the *middle band* where a triband antenna is to be installed). Since my triander covers 10, 15 and 20 meters, I made the balun resonate in the 15-meter band. Keep in mind that a balun is not a matching device like the L-match, pi-network or Transmatch. It is simply a transformer that, in this case, has a 1:1 ratio and connects an unbalanced line to a balanced

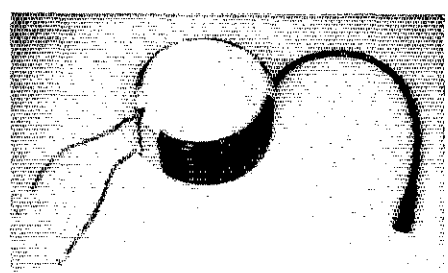


Fig. 2 — A coreless balun formed around a section of a plastic bottle. It contains an odd number of closely spaced turns of coaxial cable so that the terminating ends and the feed point are on opposite sides of the coil, offering an advantage for installation.

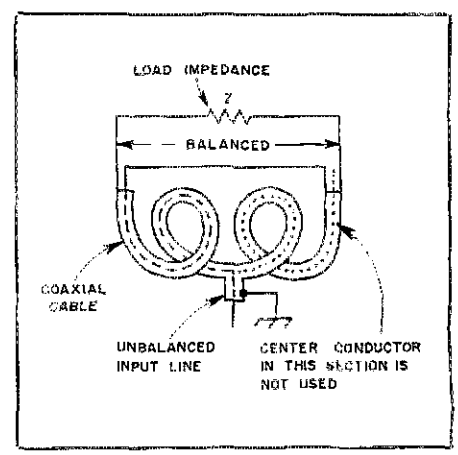


Fig. 3 — This illustrates the general configuration of the Collins type coreless balun as explained in the publication *Fundamentals of Single Side Band*, published by the Collins Radio Co., in 1959. In the accompanying text, Wayne Cooper, AG4R, explains the construction of a balun suitable for use with a 10-, 15- and 20-meter tribander antenna.

*Assistant Technical Editor

load. The resonant frequency of a coreless balun is easily checked with a dip oscillator (see page 21-3 of the 1981 *Handbook* for related information). Obtaining resonance is mainly a matter of adjusting the turns or varying the coil diameter.

A practical way to eliminate cable fittings or splices would be to cut the coil at the center tap point. Then use one of the half lengths to measure down the transmission line from the antenna. Connect the outer shields together at this point and rewind the balun coil as part of the transmission line. All exposed connections should be made weatherproof.

My balun is constructed with RG-8/U. A predetermined 5 foot, 5 inch (1.65 m) length of cable provided with an additional 6 inches (152 mm) for connecting leads, is soldered to the shield as explained above. The two ends are wound into a 7-turn coil having a 5-1/2 inch (140 mm) ID. Before I connected the output ends, I rechecked the coil at 21 MHz with my dip meter. An SWR bridge at the transmitter end of the line showed that the completed balun had a 1:1 ratio at 28 MHz and 1:1.3 at 3.5 MHz. I placed a 50-ohm dummy load across the balun output for this test. Total loss was 1 dB, an increase of 0.2 dB from the original line measurement.

An experimental balun I constructed consists of a 10 foot, 1 inch (3 m) length of RG-8/X cable plus connecting leads. This is wound into a coil of 9 turns having a 4-3/8 inch (111 mm) ID with a resonant frequency in the 21-MHz band. Checking it with an rf bridge and a 50-ohm load, I found that the balun displayed these impedance readings at the frequencies indicated: 3.5 MHz — 65 ohms; 7 MHz — 60 ohms; 14 MHz — 55 ohms; 21 MHz — 55 ohms and 28 MHz — 50 ohms. It can be seen that this balun configuration will also give a low SWR as a transformer connected to a 50-ohm antenna load. — *Wayne Cooper, AG4R, Miami Shores, Florida*

[Editor's Note: Attention is called to the following *Ham Radio* articles: Badger, "A New Class of Coaxial-Line Transformers," February 1980, pp. 12-18, and Nagle, "The Half-Wave Balun: Theory and Application," September 1980, pp. 32-35.]

HALF-SLOPER HARDWARE

☐ The quarter-wave or "half-sloper" wire antenna is being used by a great many amateurs on 40, 80 and 160 meters. This interesting and sometimes perplexing antenna generally gives a fairly good account of itself for local and DX QSOs, but many have written to Hq. and asked, "How do I attach the half-sloper to my tower?" Certainly, there are many practical ways to make the attachment point, but each has its weaknesses. I have found the method illustrated in Fig. 4 to be satisfactory for my needs. Perhaps it could be used as successfully at other locations.

Dimension "A" of Fig. 4A should be slightly smaller than the diameter of the legs of your tower. This will permit effecting a tight compression of the homemade clamp when the two no. 8 bolts are screwed into the mating nuts. My clamp/bracket is made of no. 16-gauge aluminum stock. It was formed around a piece of tubing that was slightly smaller in diameter than the legs of my Rohn 25 tower. The lips of the clamp were compressed in a vise until the aluminum sheeting was drawn to the approximate shape of the tubing.

The shortcoming of this attachment method is oxidation and electrolysis between the dissimilar metals. A good electrical contact is needed between the tower and the bracket to ensure that the shield braid of the 50-ohm coax is making a finite-resistance contact to the tower leg. I've found that a coating of silicone grease inside the clamp and on that part of the tower leg helps to slow down oxidation. Cleaning the mating surfaces and applying fresh grease every six months (in salt-air environments), or once a year (inland locations) should prevent problems.

Once the antenna wire is soldered to the coax connector, I suggest that a generous application of noncorrosive sealant be applied to the rear of the coax connector and around the heads of the mounting bolts.

A ceramic standoff insulator is mounted on the bracket just below the coax fitting. A long solder lug is affixed to the top of the insulator. This permits clamping the antenna lead to the insulator, as shown in Fig. 4B, for the purpose of reducing stress at the coax connector. Earlier installations of mine lacked this feature, and the lead wire eventually broke loose at the connector.

The main antenna insulator is supported from the lower part of the clamp bracket by means of a short loop of no. 14 solid-copper wire, as shown in Fig. 4B. This short guy section will remain durable even though the sloper moves about in the wind. Make sure that the loop of antenna wire from the standoff insulator to the lower part of the main insulator is large enough to permit ample play as the sloper wire is blown to and fro in the wind. — *Doug DeMaw, W1FB*

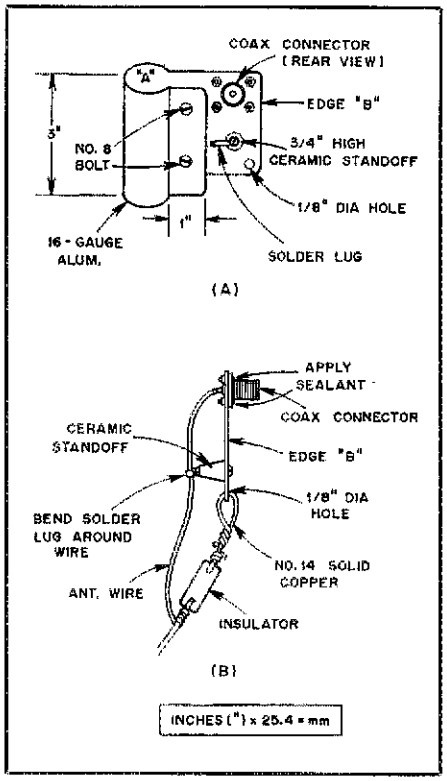


Fig. 4 — Details of the homemade clamp/bracket used for the W1FB half-sloper antenna (A). An edgewise view of the assembly is shown at B to illustrate how the standoff insulator is mounted. The coax connector should be coated with sealant to prevent oxidation between it and the aluminum bracket. Inches × 25.4 = mm.

ANTITORQUE DEVICE FOR WHIPLASHED BEAM ANTENNAS

☐ How many of you have had the gears torn out of your rotator motor as a result of high winds or sudden braking stops of your antenna? Recent QSOs led me to believe that the problem is a common one.

When I decided to invest in a tower and multiband beam antenna, the problem was uppermost in my mind. My good friend Gerald Smith, W9JGB, offered a suggestion on how to avoid such damage.

The simple device consists of a heavy spiral spring welded to two pieces of pipe, one inside the other (Fig. 5). The top of the spring is welded to the top pipe and the bottom is welded to the lower pipe. Any size pipe can be used but the two pipes must be capable of telescoping. Furthermore, the spring must fit fairly snugly over the larger of the two. In my case, I have a 1-1/2 inch (38 mm) upper pipe and a 2 inch (51 mm) lower pipe. The spring is just 2 inches in diameter and 10 inches (254 mm) long. It is formed from 1/4 inch (6 mm) spring steel. The heavier and stronger the spring, the better it is, for it takes up only the greatest of shock to your rotator gears. It should not be so weak that every little breeze will swing your antenna one way or the other.

Construction is not difficult. I simply telescoped the two pipes to the desired length, slipped the spring over the pipes and made sure to center the spring at the point where the smaller pipe extends from the larger pipe. A welding bead was then placed around the top spiral of the spring, firmly attaching it to the smaller pipe. A similar bead was then placed around the bottom spiral of the spring to hold it firmly to the larger pipe.

Before telescoping the two pipes, I smeared heavy lubricating grease on the smaller pipe. When the assembly was completed, I smeared additional grease on the coils of the spring.

Obtaining the proper spring may present a problem for amateurs living in some areas. Fortunately for me, the good people at the Superior Spring Manufacturing Co. in Kokomo furnished me with a one having the correct size.

Since I installed this device, my Mosley TA-33 on top of a 40-foot tower has withstood some very heavy winds, and the gears in my CDE rotator remain intact. I think this is an excellent investment. — *Russ Rennaker, W9CRC, Kokomo, Indiana*

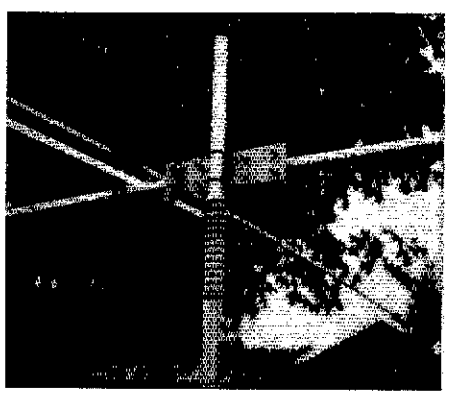


Fig. 5 — A shock absorber type spring and telescoping pieces of pipe prevent heavy winds from wrenching the beam antenna atop W9CRC's tower. This safety measure avoids possible damage to the rotator gears.

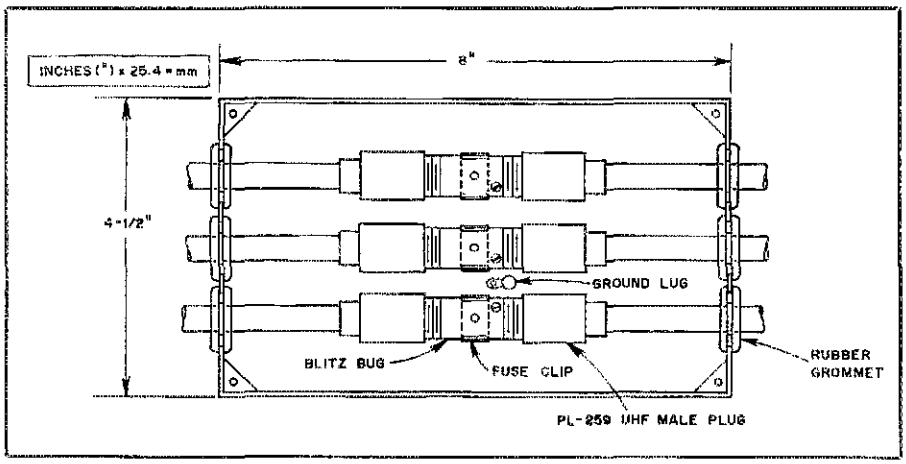


Fig. 6.— An enclosure for coaxial feed line lightning protectors. The housing is a Bud P/N AC-1407 aluminum chassis with bottom plate P/N BPA-1507. Buss P/N 5592-33 fuse clips hold the arrestors. Grommets at each end of the enclosure provide snug protection against weather.

ANTENNA FEED-LINE ENCLOSURE FOR COAXIAL LIGHTNING PROTECTORS

Permanent yet inexpensive in-line lightning protection for antenna transmission lines is provided through the use of the Blitz Bug, manufactured by Cushcraft. Each of my three coaxial lines now has this protection.

To ensure weatherproofing, ease of maintenance and component accessibility, and to provide a static drain to ground, I designed the enclosure shown in Fig. 6. The housing is a 4-1/2 × 8 × 1-1/2 in. (114 × 203 × 38 mm) chassis equipped with three fuse clips suitable for mounting 9/16 in. (14.3 mm) OD fuses. These clips firmly hold the Blitz Bugs. The protectors are model LAC-2 (uhf female ends). If necessary, the lightning protectors can be snapped out easily.

In order to pass the coaxial feed lines in and out of the enclosure, three holes are made on each side of the chassis. Each of these 13/16 in. (20.6 mm) holes is fitted with a 3/4 in. (19 mm) grommet. These grommets have an ID wide enough for RG-213/U or RG-8/U transmission line while providing a snug fit. When the grommet is pushed out of the mounting hold, there is sufficient clearance for the PL-259 coaxial male plug to pass through.

A ground post may be installed at a convenient point on the enclosure and a ground clamp placed on the outside of the box. Heavy wire (no. 8) should connect the static drain screws on the lightning protector to the ground post.

Once the cables are connected (the grommets should be placed on the cable ends before installing the PL-259 connectors) and the Blitz Bugs are snapped into the clips, the enclosure is ready for mounting. I mounted mine under the house eave near my tower. Added weather protection is afforded by the use of a chassis cover plate. The ground lead from the exterior of the box to an adjacent ground rod consists of heavy braided wire. [Editor's Note: Copperweld electrician's ground rods are well suited for grounding antenna systems.]

The arrangement of Fig. 6 can be adapted to other antenna system requirements. In any case be sure to ground your tower! — *Edward A. Whitman, K2MFY, Plainview, New York*

LIGHTNING PROTECTION FOR THE HAM-M CONTROL BOX

After the destruction of one meter movement and several diodes in my Ham-M control box because of lightning surges within the vicinity of my tower, I decided that it would be advantageous to isolate the box whenever serious weather threatened. At first this seemed an easy task, but it involved disconnecting eight control wires from the terminal strip located on the rear panel of the box. To get around this time-consuming method, I installed Molex male and female connectors directly in the control line. Readily available and reasonably priced, they are easy to disengage and save me from the feeling of anxiety during the thunderstorm season. — *James E. Mackey, K3FN, West Chester, Pennsylvania*

A 2-METER FOX-HUNT ANTENNA

To be successful at hunting a transmitter or tracking down a jammer, you need a directional antenna that will enable you to take bearings quickly without getting out of your car. An inexpensive stowable mast, mounted on a car door as shown in the accompanying photographs (Fig. 7), provides a simple way of supporting a rotatable mobile antenna. Each car model, of course, will require some variation from this particular arrangement.

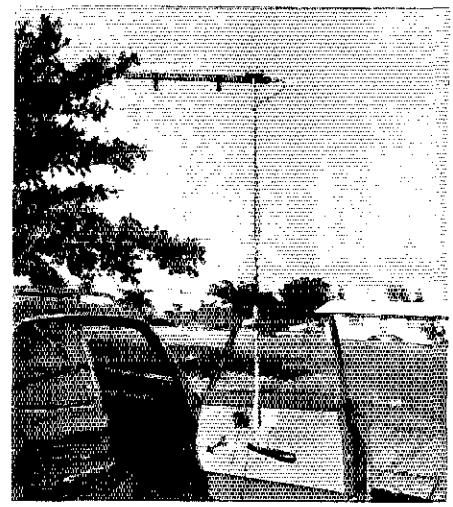
The mast is made from a 5 foot (1.5 m) length of 1/2 inch (13 mm) electrical conduit. Other materials required include a 1 foot (305 mm) length of pipe with an inner diameter large enough to accept the 1/2 inch conduit. You will also need a 12 × 3 inch (305 × 76 mm) piece of aluminum to make a bracket, 12 inches (305 mm) of rubber from an old tire inner tube and a scrap of wood to be fastened to the bottom of the 12 inch length of pipe as shown in the photograph. Two bolts from your junk box will be adequate for fastening the wood to the pipe. A sheet metal screw is the only other item on the materials list.

Wrap the rubber around the top of the door at a point adjacent to where the mast will project upward past the window frame. Bend the aluminum around the rubber so that the piece of aluminum can serve as a bracket for the mast. See the photos. Drill a 5/8 inch (16 mm) hole through the bracket to accommodate the mast. To avoid getting cut or scratched by the bracket, the edges of the aluminum should be filed. Make a small hole for the sheet metal screw which serves to draw the ends of the bracket together once it is placed on the door.

Cut the piece of wood to fit in the hole of your door handle (arm rest). The wood should extend 6 inches (152 mm) above the handle. Bolt the 12 inch length of pipe to the wood, being sure to countersink the bolts on the back of the wood to prevent scratching the car.

Once you slide the mast through the bracket and into the larger pipe attached to the wood, your installation is finished. To make storage easier, you may wish to cut the mast into two sections that can be joined with a fitting. To prevent the mast from turning while driving, drill a hole through the 12 inch pipe and the mast. Then insert a nail. Use of a handlebar grip facilitates turning the antenna.

The folding log-periodic antenna I have used contributed to winning a share of the fox hunts and led to the QTH of a jammer who was caught. I can furnish information on this antenna for anyone who wishes to send me an s.a.s.e. — *Bob White, WB4TNV, Coral Springs, Florida*



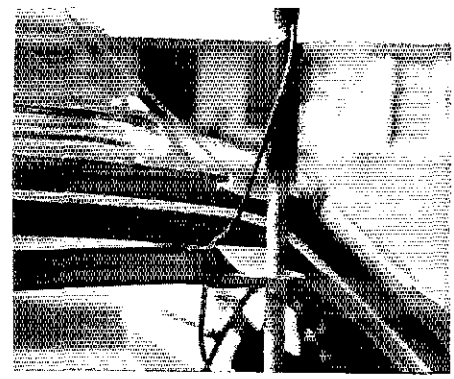


Fig. 7 — This rotatable mobile antenna, used for transmitter hunting, is the work of Bob White, WB4TNV. The 5 foot (1.5 m) electrical conduit mast slips into a piece of pipe bolted to a wooden tee that fits in the door handle. The lower photo shows the aluminum bracket that supports the mast. A handlebar grip, shown above the bracket, facilitates turning the antenna. It takes Bob only three minutes to put the antenna in operation.

Your Place in Your League

Part 2: In February, Part 1 explained how the League's early history influenced its organizational structure. Now we continue our look at the important roles played by ARRL member-volunteers.

By David Sumner,* K1ZZ

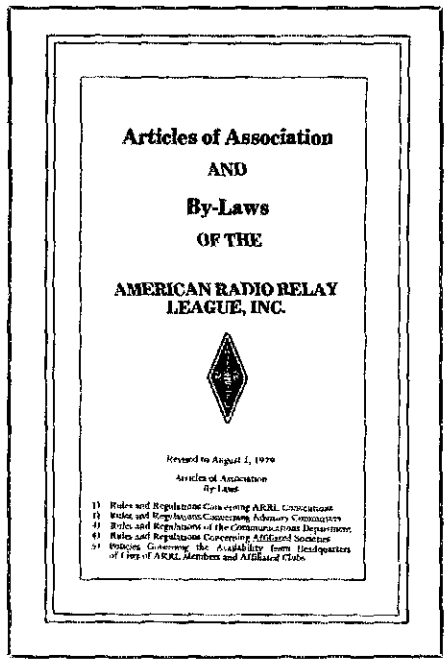
Two months ago, we began a series of articles to explain the inner workings of the American Radio Relay League. This is the second of three installments in that series. The ARRL is a complex organization; even if you are an active member, you may not fully appreciate the scope of its activities. In particular, you may not be aware of the opportunities for membership involvement which exist within the League's structure. In Part 1 we outlined the early history of the ARRL, to provide an understanding of how the organization has evolved. Then we explained that the members have the ultimate authority and responsibility for determining League policies. This authority is exercised through the election of Directors on a regional basis to represent the members. The Directors choose the League's officers and determine the overall policies of the organization at twice-annual meetings. Finally, we explained the roles of the Vice Director, Assistant Directors, Public Information Assistants and Advisory Committees in assisting the Board and the individual Directors in their work.

As we warned you at the end of Part 1, this is just the beginning. In Part 2 we will discuss the remaining volunteers that are responsible directly to the ARRL Board: the directors and officers of the ARRL Foundation. Then we will examine a number of programs administered by three departments of ARRL Headquarters which use large chunks of volunteer time and talent: the Membership Services, Club and Training and Technical Departments. Finally, later this year, in Part 3 we will look at the largest group of volunteers in the ARRL structure: the Communications Department.

The ARRL Foundation

The ARRL Foundation was created in 1973 to raise funds in support of amateur satellite programs and other innovative programs related to the purposes of the League. The Foundation has nine Directors, a majority of whom are also Directors of the ARRL. The ARRL Board chooses the Foundation Directors, who in turn elect its officers. In this way it is guaranteed that the objectives of the Foundation will align with those of the League.

Since its creation, the ARRL Foundation has raised and distributed more than $120,000 in support of amateur satellites, the League's WARC-79 efforts and other programs. Most of the donations came from League members, particularly Life Members. Like the ARRL itself, the Foundation is tax-exempt under the provisions of Section 501(c)(3) of the Internal Revenue code. This means that contributions to the Foundation (or to the League, but not including membership dues) are tax deductible.


Articles of Association
AND
By-Laws
OF THE
AMERICAN RADIO RELAY LEAGUE, INC.

Copies of this booklet are available free from Headquarters. Just send a stamped, self-addressed envelope.

Because the Foundation Board has no direct influence on the policies of the League, there is no need for eligibility provisions that are designed to avoid conflicts of interest as in the case of the ARRL Directors. The list of past and present officers and Directors of the Foundation includes a number of amateurs who have distinguished themselves in the business world as well as in their Amateur Radio activities. The League membership is fortunate that they have been willing to volunteer their time and talents in this way.

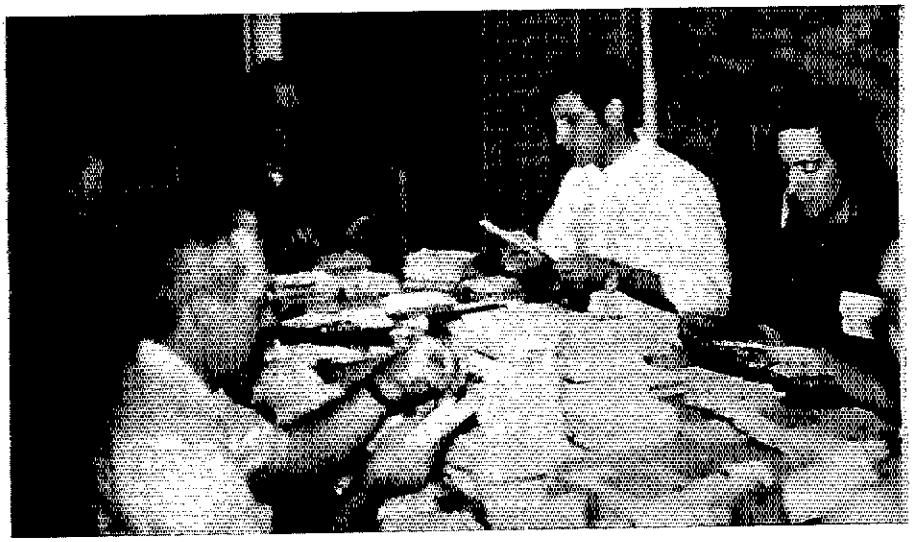
The ARRL DX QSL Bureau System

Just as in their two-way radio communication, in exchanging QSL cards to confirm contacts amateurs must use both a "transmitter" and a "receiver." For U.S. and Canadian amateurs, the most convenient way of sending cards to foreign stations is to use the ARRL-Membership Overseas QSL Service. For $1 per pound (or portion thereof) of cards, members (and *only* members) may send their cards to Headquarters for forwarding to bureaus overseas. Details on how to use this service are printed periodically in the "QSL Corner" column of *QST*, or are available from Headquarters. The "outgoing" QSL service was instituted in 1976 and is now forwarding cards at the rate of four million per year.

The handling of "incoming" cards, destined for amateurs in the U.S. and Canada from amateurs in other countries,

*Assistant General Manager, ARRL

is performed by a far-flung network of more than 400 hard-working volunteers. They are organized into call-area "QSL bureaus," responsibility for which is usually assumed by an affiliated club. Each volunteer spends an average of about 10 hours per month sorting cards, stuffing and mailing envelopes, and handling correspondence. Out-of-pocket expenses for the operation of the bureau system are borne by the League, but the key to the system is the willingness of the bureau workers to contribute their time to what is often a thankless task. Cards are handled for members and non-members alike. If you want to know more about the Incoming QSL Bureaus, read the article by Atlantic Division Director Jesse Bieberman, W3KT, in November 1980 *QST*, page 54. Jesse knows what he's talking about — he operated the Third Call Area QSL Bureau for 33 years before retiring in 1979! Both the outgoing and the incoming QSL bureaus are administered by the Membership Services Department at Headquarters.



More than 400 volunteers throughout the U.S. and Canada keep the incoming QSL cards from overseas flowing to the deserving recipients.

The Intruder Watch

Another group of volunteers that helps the Membership Services Department accomplish its objectives is the Intruder Watch (IW). When the IW was established in 1967, it had two main goals: to reduce the number of nonamateur stations in our exclusive bands, and to document the interference from intruders suffered by amateurs so it would be a matter of record at the next ITU World Administrative Radio Conference, which eventually occurred in 1979. The second goal is now history, but the first remains important. At present approximately 200 volunteer monitors, most of them highly skilled and many possessing special equipment, are active participants in the Intruder Watch. Their job is to document persistent intrusions by nonamateur stations into our bands, and to provide the FCC with information so the Commission can document the case and file a complaint with the responsible administration. It is frustrating work, because many intruders operate with the full knowledge and consent of their governments and are not about to move. The IW has plenty of successes to its credit, however, particularly in cases where the interference is caused by a spurious or otherwise unintentional emission.

Affiliated Clubs

ARRL affiliated clubs probably deserve an article all their own. There are approximately 2100 clubs affiliated with the League. What does "affiliated" mean? It means that the club has expressed ". . . sympathy with and allegiance to the aims and policies of the League . . ."[1] It also means, except for local school or youth group Amateur Radio clubs, that 51% of the voting members of the club are members of the League and 51% of the voting members are licensed amateurs.

There are three categories of affiliated clubs. Category 1 is for local clubs that meet the 51% requirements described above; there are almost 1800 of them in the ARRL organization. Nearly all of them are in the U.S. and Canada, although on occasion a club in another country will request affiliation and the request will be granted if it is endorsed by the member-society of the country concerned. This occurs most frequently in the case of clubs on U.S. military bases overseas. Category 2 is for regional and national Amateur Radio groups. Category 3 is for local school or youth groups, where the 51% requirements are waived and a much easier requirement is substituted, namely that the club president, sponsor, trustee or faculty advisor is an ARRL member and licensed amateur. Normally, clubs having fewer than five members are not affiliated. Councils (or federations) of clubs are categorized separately.

When Part 1 of this series was being prepared, there was some question as to how the relationship of the affiliated clubs to the rest of the ARRL organization ought to be depicted in Fig. 1.[2] Many active affiliated clubs maintain close liaison with their Section Communications Manager and their Division Director, usually through a club member who serves as Assistant Director. However, this relationship is not recognized formally within the League's structure, and there are not enough Assistant Directorships for each club to have one. Aside from this, the communications channel used most frequently between the League and its affiliated clubs is the Club and Training Department at Headquarters. C&TD receives hundreds of club bulletins and newsletters each month, all of which are carefully read and items highlighted for the information of the League's officers and staff. The bulletins and newsletters are also the source of considerable material for *Radio Club News*, which is issued quarterly to all active affiliates. (You say you're a member of an affiliated club, and you've never seen a copy? Get after your club secretary or president!) Because communications from Headquarters are intended to help a club represent Amateur Radio at the local level more effectively, we finally decided to solve our problem in the February article by showing C&TD as "advisory" to the affiliated-club officers.

Maintaining one's status as an active affiliate is easy: All you have to do is file annual reports on a form provided by C&TD, and, of course, to continue to meet the membership requirements. As an additional incentive to promote League membership, a club is allowed to deduct a commission of $1.50 for each regular ARRL membership application or renewal its treasurer forwards to Headquarters. Other benefits of affiliation include eligibility to participate in ARRL-sponsored contests in one of three club-aggregate-score categories, receipt of the ARRL *Annual Report* free on request, receipt of timely information on FCC rulemaking proceedings and how the club may participate, and the occasional receipt of a new ARRL publication for use as a door prize at a club meeting or as an addition to the club library. Clubs also may obtain a complete set of League publications at half price if it is to be donated to a local library.

To this point we have not talked about the responsibilities of affiliated clubs: what they are supposed to accomplish for Amateur Radio in return for affiliated status. There are no specific rules or

[1]Notes appear on page 60.

guidelines clubs are expected to follow, but most affiliated clubs recognize their responsibilities in the following areas:

- Training new amateurs, providing classes for members who want to upgrade, and providing "continuing education" for members through occasional technical programs at meetings.
- Resolving local TVI/RFI and antenna/zoning problems in ways that enhance the image of the radio amateur in the local community.
- Other public relations activities, including the placing of favorable publicity in the local media; organizing exhibits at public places; countering unfavorable publicity when it appears; and passing news about outstanding amateur contributions in their area to Headquarters for national dissemination.
- Support for emergency-communications preparedness, either through sponsorship of an Amateur Radio Emergency Service group or through close cooperation with the local RACES/ARES organizations.
- Routine liaison with local officials and community leaders.

Clubs are involved in many other activities, of course, but these are the key responsibilities that *every* club should be addressing in one way or another. Headquarters is here to help, of course, and can supply assistance in a variety of ways. *But the responsibility for solving Amateur Radio's problems at the local level rests at the local level.* You can't simply pay your dues, either in the League or in your local club, and expect someone else to solve all the problems. You have to *get involved!* And there's no better place to start than your local, League-affiliated club.

Instructor Corps

Radio amateurs have been helping prospective hams study for the Federal license examinations since the first amateur exams were given in 1912. The League has been supplying study material almost as long. It was not until 1976, however, that Amateur Radio instructors were formally recognized as a part of the League's "family" of volunteers. Today, some 6000 individuals are registered in the Instructor Corps and have been provided with material from Headquarters to make their job easier and more effective. Some receive a modest honorarium for teaching at, for example, an adult education program at a community center, but most teach simply because they enjoy sharing their knowledge and experience with newcomers. None receives compensation from the League. Many, but by no means all, licensing classes are sponsored by affiliated clubs because clubs recognize this as the best source of new members.

The Satellite Program

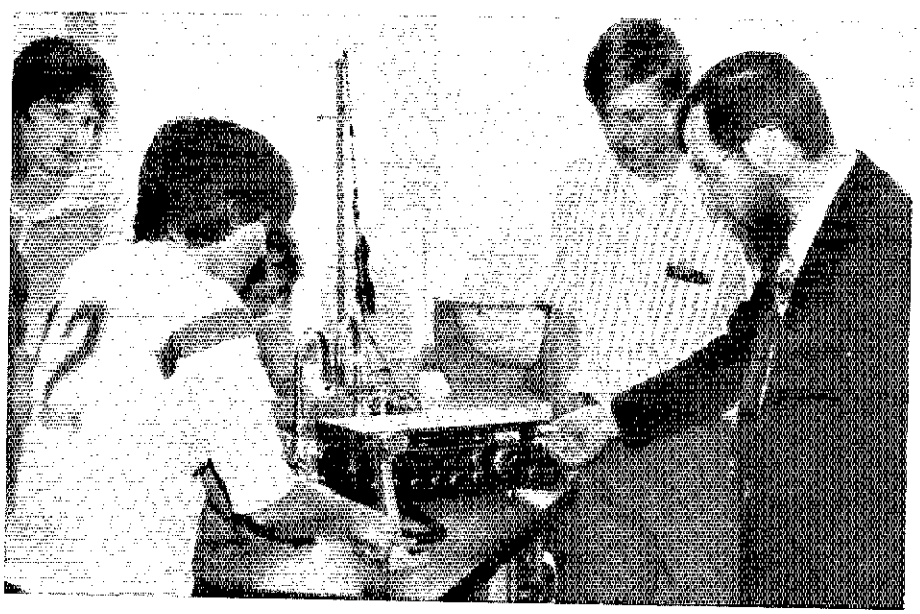
The group primarily responsible for the amateur satellite program is the Radio Amateur Satellite Corporation, or AMSAT, which itself relies mainly on "volunteer power" to get things done. AMSAT is affiliated with the League, and the two organizations have a long history of cooperation. The League has provided considerable funding to AMSAT over the years, in recognition of the fact that AMSAT is in a better position than the League to design and build satellites and arrange for their launch, but that Amateur Radio as a whole stands to benefit from the satellite program.

While the League has not become involved with the construction of satellite "hardware," it has assumed an active role in satellite operations. Responsibility for the operation of OSCAR 8, launched on March 5, 1978 and still going strong, rests with the League to permit AMSAT to concentrate on future satellites. A worldwide network of command stations under the supervision of the OSCAR 8 Operations Manager keeps the satellite under control.

The largest group of ARRL volunteers in the satellite field is in the OSCAR Education Program. This program encourages teachers to use amateur satellites as classroom tools, giving their students hands-on experience with such concepts as Doppler shift and orbital mechanics. As teachers do not always have the necessary equipment or experience to take advantage of this opportunity, volunteers in the amateur satellite community have been asked to step forward to bridge the gap — and approximately 240 have done so. Of course, this also provides an excellent opportunity for improving community relations and introducing youth to Amateur Radio.

Soon after OSCAR 8 was launched, it became apparent that one of the satellite's transponders was being under-utilized. The "Mode J" transponder uses uplink frequencies near 146 MHz and downlink frequencies near 435 MHz, and while many stations were equipped to transmit through the satellite relatively few had gone to the trouble of equipping themselves to receive it. OSCAR 8 was the first satellite to use the 435-438 MHz allocation to the Amateur-Satellite Service for anything but a beacon, so it was important to encourage people to use this feature of the satellite.

Into the breach stepped Larry Roberts, W9MXC. Larry was particularly enthusiastic about the potential of Mode J, and was willing to invest some time and energy in its popularization. With encouragement and a few dollars of "seed money" from Headquarters, Larry founded the "Mode J Club" to encourage Mode J activity. Thanks to Larry's efforts the club has grown to 170 members in 20 countries, each of whom has made at least eight contacts via Mode J, and the use of the transponder has increased steadily. Larry is a perfect example of volunteerism in action. He didn't say, "*They* ought to do something to encourage Mode J activity." He said "We" instead of "They," and went ahead and *did* something!



OSCAR Education Program volunteers like Herb Lapp, N2GQ, shown here demonstrating satellite communication to a high school physics class, bring the sounds of space science right into the classroom.

***QST* Authors**

You probably think of *QST* as a magazine, and it certainly meets the dic-

tionary definition of one. But *QST* is more than that. It is a membership journal; a chronicle of the interests and activities of the association's members and, as a result, of Amateur Radio itself. Unlike a commercial publication, the *raison d'etre* of *QST* is not to generate a profit from the sale of advertising and subscriptions. It is to keep members informed about operating activities and about technical and regulatory developments; to nurture their interest in Amateur Radio by giving them new projects to undertake; to provide a channel of communication to and between the radio amateurs of North America and the world. It is to give League members the desire and the means to expand their horizons through Amateur Radio.

QST is unparalleled as a medium for sharing one's ideas and achievements with the Amateur Radio community. Members have access to the pages of *QST* in several ways. They can report their operating activities monthly to their Section Communications Manager, who uses these reports in preparing a monthly "Section Activities" column. They can write a letter for publication in "Correspondence" (although many more letters are received than there is room to print, so there is no guarantee that one's letter will be used). They can send news to the conductor of one of the monthly columns or for use in "Strays." Or, they can become a *QST* author.

A glance at the Table of Contents will show that the majority of articles in *QST* are not written by members of the ARRL staff. Rather, they are written by members just like you. More articles are submitted for consideration than can be used, especially on nontechnical subjects, so the staff must choose the ones that will be of the most interest to *QST*'s readers. The process of selecting and publishing *QST* articles is described in "Speak Up, We Can't Hear You!" in January 1977 *QST*, page 46.

Most of the articles contributed by members deal with technical subjects, so in our chart in Part 1 we showed *QST* authors as reporting to the Senior Technical Editor. In practice, the Technical Editor of *QST* provides the interface with technical authors, while the Assistant Managing Editor does so with nontechnical authors. We use the word "contributed" because the League does not "buy" articles; an author's work is a contribution to the work of the League, just as is the work of thousands of other volunteers within the organization. *QST* is typical of membership journals in this regard.

Why would someone give an article to *QST* when he can sell it to a commercial magazine? The answer varies with each individual, but it is for much the same reason that all of the League's volunteers donate their time and talent to the organization: They see a job that needs to be done, and they enjoy doing it. Additionally, *QST* has by far the largest audience and the greatest prestige of any Amateur Radio publication, the League has several awards programs to recognize outstanding contributions to its membership journal, and the *QST* staff is in a position to do an especially thorough job of editing, and often can improve upon the original manuscript before publication.

Technical Advisors

At its meeting in July 1976, the ARRL Board of Directors adopted the following motion:

Moved, that an appointment for the Technical Department be instituted and known as a Technical Advisor. ARRL members wishing to serve the ARRL Technical Department in this voluntary position shall first secure an acceptable recommendation from this department in order to be presented to the appropriate division director for approval and recommendation to the president for appointment. The term of the appointment shall be for one year and be renewed upon recommendation of the Technical Department. A suitable certificate of appointment shall be provided.

Today there are only about three dozen TA's, a small number compared to the number of volunteers holding other League appointments, but as a group they are held to a very high standard. You have met several of them through "TA Profiles," which appears occasionally in *QST*, and you may meet some in person at ARRL conventions because they are sometimes asked to represent the League by giving technical talks at these events.

The goal of the Technical Advisor program is to provide the Technical Department and the Board with access to a wide range of specialized technical knowledge in the fields that are applicable to Amateur Radio. The list of TA's includes experts on antennas, industrial safety, RTTY, SSTV, propagation, filters, digital communications, rf design, RFI, microwaves and a number of other fields. TA's are asked to comment on the merits of articles submitted to *QST*, to critique other League publications, to provide material in their area of expertise, and to serve as "expert witnesses" in court cases involving Amateur Radio. Periodic newsletters from Headquarters keep them apprised of technical developments in Amateur Radio, and the same medium often is used to solicit their suggestions.

Next: The Communications Department

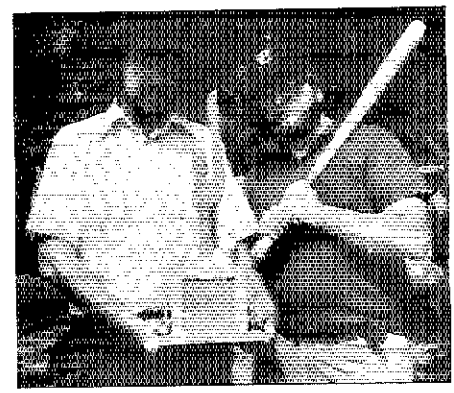
Any of the thousands of appointees in the Communications Department Field Organization will tell you that we have saved the best for last! Part 3 will describe the oldest, largest and probably the most thoroughly organized cadre of volunteers in the ARRL structure. Stay tuned! (ost)

Notes

[1]From "Rules and Regulations Concerning Affiliated Societies," which is contained in the same booklet as the League's Articles of Association and By-Laws.

[2]See February 1981 *QST*, p. 54.

Strays



When the Livonia (Michigan) Amateur Radio Club challenged the Oak Park ARC to a baseball game, there was more at stake than the usual post-game refreshments. The purple Wouff Hong trophy was bestowed upon the winning Livonia team. Umpire Jack Rummelsburg, WD8IKY (left), awarded the coveted symbol to Jim Hebert, K8SS. *(photo courtesy W8RYH)*

SUMMER CAMPS FILE

☐ Every so often, we at ARRL Hq. receive a request for a list of summer camps offering Amateur Radio classes. Since we do not presently have this information on hand, we are asking any Amateur Radio operator who will be doing this sort of thing or who has information on this subject to forward it to Maureen Thompson, KA1DYZ, ARRL Training Assistant.

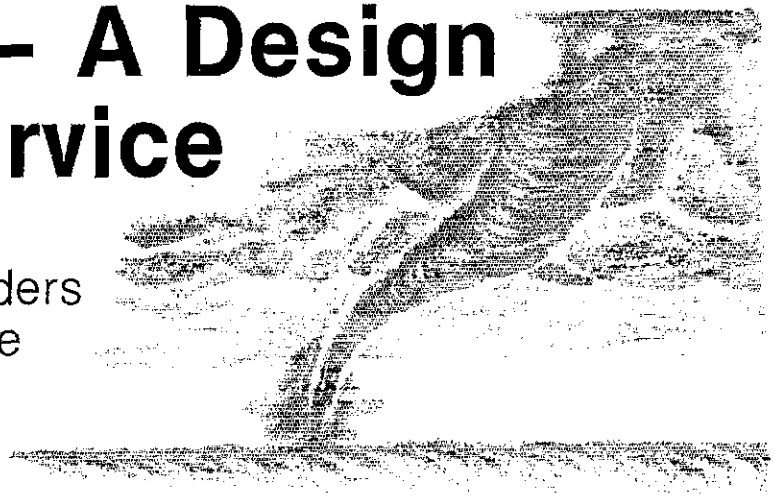
A file is in the making which will help us develop a list of summer camps that offer Amateur Radio classes. This list will eventually be shared with your fellow ARRL members. Who knows — the next request might be from your new student!

QST congratulates . . .

☐ the following recently elected fellows of the Radio Club of America, Inc.: William H. Chriss, W2FRD, Monte Cohen, AA4MC, Gene S. Goebel, W9ESG, Al Gross, W8PAL, Richard C. Kirby, WØLCT, John B. Knight, W6YY, Leo I. Meyerson, WØGFQ, Kenneth M. Miller, K6IR, and Louise Ramsey Moreau, W3WRE. In addition, AA4MC was awarded the Sarnoff Citation for "exceptional service to the radio industry during the past half century."

☐ Creed Russell, W8KM, of Glen Morgan, West Virginia, who at the age of 64 graduated *magna cum laude* with a Board of Regents Bachelor of Arts Degree from West Virginia State College. "Russ," a member of the Society of Wireless Association, is currently working on his master of arts degree in humanities.

SKYWARN — A Design for Public Service



When severe weather thunders down "Tornado Alley" these amateurs are prepared.

By R. B. Shreve,* W8GRG

Tornado Alley runs from Oklahoma and Texas to the Great Lakes. Here in Cleveland, at the northeast end of this belt, severe storms are a normal part of spring and early summer. Like many other groups, the amateurs of northeast Ohio have developed SKYWARN operations as an important part of their communities' disaster-preparedness programs.

The Lake Erie Amateur Radio Association's SKYWARN station at Cleveland's National Weather Service (NWS) office was designed and constructed specifically for its job. In contrast, the Amateur Radio SKYWARN Net, of which the station is a part, wasn't designed — it just grew.

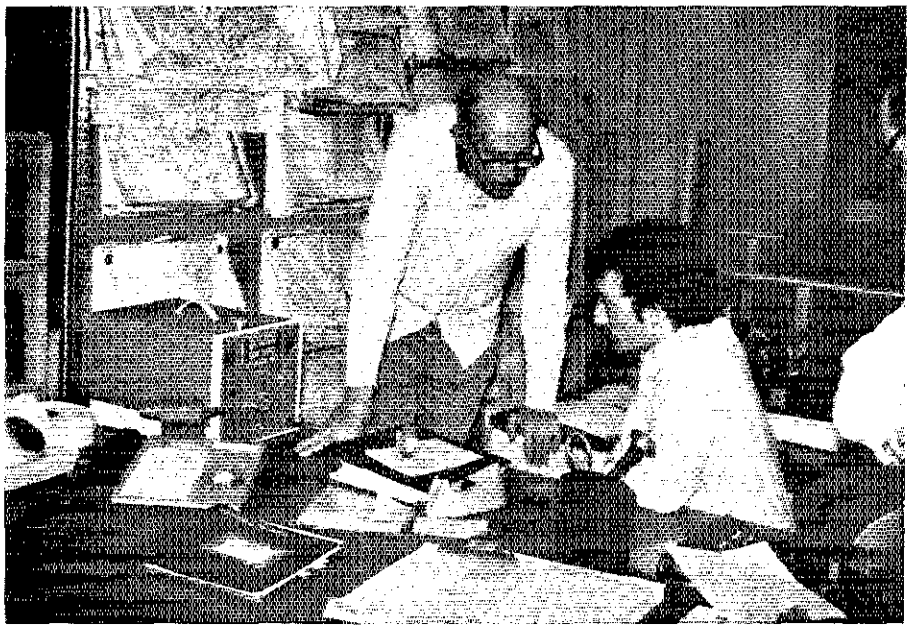
The severe-weather warning program began as the Thunderhead Net on 6-meter a-m. At that time, it was supported by a small group of AREC regulars. With the growth of 2-meter fm and repeaters, participation and coverage of the net have expanded. Today, from 75 to 100 amateurs may take part in an eight-hour alert. Initially, repeater activity was a simple exchange of reports on the development and progress of a storm for the hams' own information. We few amateurs who participated in the NWS observer program phoned in items we thought might be of interest.

The Meteorologist-in-Charge at the Cleveland NWS office recognized that our loosely constructed net had great potential value as a source for on-the-spot reports to supplement their radar data. NWS officials instructed the hams in the net about the types of information NWS would need during an emergency. The Lake Erie ARA (LEARA) was asked to coordinate collecting and relaying observations to NWS.

Now, whenever a tornado watch or severe-thunderstorm warning is issued, the LEARA 16/76 repeater goes on SKYWARN alert. Procedure still is informal, but discipline is good. Three amateurs normally share the responsibilities of control operator — one runs the net, a second collates reports and relays pertinent material to the NWS, while a third organizes liaison with the other area repeaters, whose members' reports are invaluable to the success of an early storm-warning effort. The control operators use a 220-MHz repeater as an intercom.

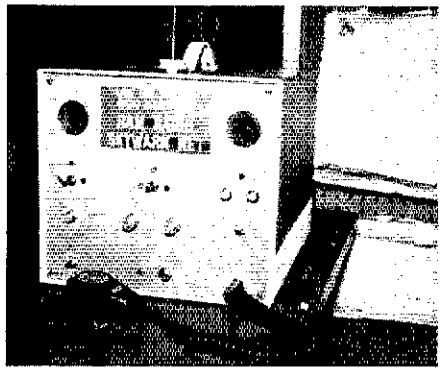
Telephone Tie-Up

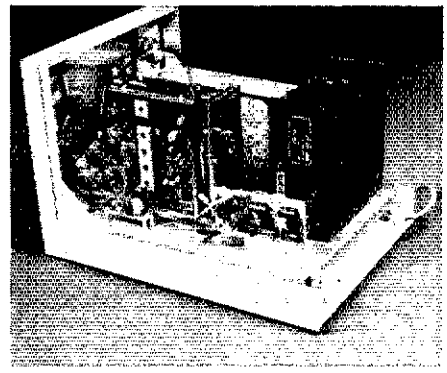
In addition to the amateurs, NWS has a network of several hundred spotters who report by telephone. The weather service also receives calls from police, sheriffs and the Highway Patrol. Because of this, it is sometimes difficult to get through to NWS on the telephone. We decided to install amateur equipment at the weather



Pat Shreve, W8GRG (left), explains operation of the SKYWARN station to Pete DiFranco, a National Weather Service official at Cleveland's Hopkins Airport. The SKYWARN station is one of two LEARA operations specially designed to serve the public. The other, at the headquarters of Cleveland's Medical Emergency Dispatch, serves as a control point for support of the Academy of Medicine Disaster Teams. *(WB8JYR photo)*

*2842 Winthrop Rd., Shaker Heights, OH 44120





Two views of the unique LEARA station. The photograph on the left shows the attractive cover which only allows access to those controls essential to the SKYWARN function. In the inside view, the tone-alert receiver can be seen to the rear, the transceiver is located in the left front and the power supply and IC-ow keyer on the right. The CTCS encoder is in the left foreground. *(W8GRG photo)*

Be Prepared with Proper Equipment

SKYWARN operations take more than dedication to function successfully — lots of equipment is also required. Preparation is the key word. The "SKYWARN Kit" for the Garland (Texas) Amateur Radio Club advises its members to have the following equipment for use during a weather alert: (1) for a fixed or base station — antenna in a place least likely to be struck by lightning, accurate clock, tape recorder, weather instruments, detailed city maps and an independent power supply; (2) for a portable or mobile station — working radio, full tank of gas, detailed city maps, rain gear, flashlight, watch or clock, clipboard with paper and pencil, first-aid kit, binoculars, compass, ARRL message forms, spare magnetic-mount antenna, basic tools, small amount of cash, camera, i-d card, hard hat and a valid amateur license. — *Bob Jones, W5TGA*

service office so its staff could monitor the net and we could operate from there during a serious emergency.

The first installation at the NWS office was a two-frequency tone-alert monitor converted to receive 146.76 and 146.88 MHz, the primary and backup SKYWARN repeaters. We thought the tone-alert feature would permit SKYWARN control to activate the receiver and eliminate the need for continuous monitoring by NWS officials. Too often, however, the receiver was turned off or its volume was turned down instead of resetting the tone-alert trigger. Even when it was used as intended, the tone alert provided us with no way of knowing if our reports had been received. It still was necessary to confirm important items on the telephone.

To make two-way communication possible, a 10-watt transceiver was added to the NWS installation. However, its receiver was too complicated for use by people with limited radio experience. In addition, NWS officials had enough to think about during an alert besides monitoring an Amateur Radio repeater! Also, the appearance of the station failed to improve a casual observer's opinion of (or excite his or her interest in) Amateur Radio. We decided to build a station at the NWS office that was specifically designed for its job.

Severe-weather Reporting Tips

"The Fort Worth and Tarrant County Civil Defense RACES SKYWARN Roster" suggests that mobile, trained spotters with one or more SKYWARN classes in the last two years are the most useful to good severe-weather reporting. Reports from windowless ham shacks are virtually useless. Concise reports, *what, where* and *when*, should be given in no more than eight or 10 words. When severe-weather reports are requested, do not report anything except emergencies. Also, go mobile whenever possible; reports from the field are needed. Report your location by grid coordinates and major features, making transmissions short and giving just the facts. Do be careful of what you say and how you say it — lots of visitors are listening. Don't give "sunshine" reports when severe weather is present, and don't leave the frequency without telling net control. When you have something to report, give only your call, not "break" and not someone's name. — *Ben F. Myers, WB5HFH*

Making the System Work

Our objective was to design in a single package a complete station that would be reliable, simple to use and attractive enough to stimulate conversation about Amateur Radio. The final product incorporates the tone-alert receiver, a 2-meter transceiver and power supply, a CTCS generator to access the repeaters when they are in guard and an automatic cw keyer. Only those controls essential to the SKYWARN function are accessible when the cover is in place. A quarter-wave antenna for the tone-alert receiver is mounted on the cabinet, while the transceiver uses an outside antenna.

The tone-alert monitor is activated by the main power switch. A green LED labeled ALERT glows when it is on. One of two other LEDs, green for the primary frequency and red for the secondary, shows to which repeater the monitor is tuned. The only external controls are the frequency switch and the reset button. No external volume control is needed because the audio output is either on at high level or muted. In this way, attention is guaranteed when a control station triggers the tone during an alert.

To monitor one of the repeaters, the operator turns on the MON switch, which powers the transceiver. A green monitor LED and one of the second pair of frequency LEDs light up. Volume and squelch are controlled by the operator. Jacks permit the use of headphones or a miniature earphone. A microphone normally is not plugged in unless a licensed amateur is present.

In an emergency, the station is manned by one of the amateurs who work at or live near Hopkins Airport, the location of the weather station. For alerts that are not emergencies, a LEARA member employed by an agency at the airport is responsible for the station's operation.

A major problem with the station's design[1] was determining how to permit the person in charge of the severe-weather desk to acknowledge reports while the licensed operator was busy. The solution was the installation of an automatic cw keyer similar to a repeater identifier but "smarter." Transmitter power is turned on, either at the site or by remote control, by the responsible amateur when the severe-weather watch begins. Keying is inhibited, however, until net control transmits the alert tone that enables the identifier to key the transmitter, indicating the tone alert was received.

The identifier does not key the transmitter after a tone alert is received until the repeater carrier drops at the end of the net control operator's transmission. During this delay the individual who is monitoring net traffic at the severe-weather desk has the option of acknowledging the transmission by pressing the COPIED OK button, which substitutes R...R for the call sign of the identifier, or the REPEAT button, which replaces the call sign with IMI. A short time after one of these transmissions, keying is again inhibited until the next tone-alert signal is issued by a control operator.

The author was instrumental in organizing and establishing SKYWARN in the Cleveland area. As a result of his efforts, he was given the 1979 National Weather Association Award for the non-meteorologist who made an outstanding contribution to meteorological operations. QST

[1]Space does not permit us to reproduce the circuit diagram provided by the author, but photocopies are available from ARRL Hq. Send a stamped, self-addressed, business-sized envelope to SKYWARN, ARRL, Newington, CT 06111. — Ed.

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

The publishers of QST assume no responsibility for statements made herein by correspondents.

1981 RESOLUTIONS

The January *QST*, "It Seems To Us . . ." sets a high standard. The questions that were raised are important. Also, the proposed solutions give us all plenty of food for thought. I think you could solicit additional ideas, such as ultra narrow-band fm, additional spectrum-saving methods, and improved services to the public. Keep up the good work. — *Wayne Reed, K9NE, Linton, Indiana*

INDOOR ANTENNA FARMS

Many thanks to Peter O'Dell, KB1N, for his excellent article entitled, "Antennas and Grounds For Apartments," which appeared in December 1980 *QST*. I had been off the air for the last three years due to lack of an effective antenna system. But armed with Pete's article and five dollars' worth of materials, I quickly worked 18 states. Indoor antennas *can* be effective! — *Tom Milton, WB4PNE, Memphis, Tennessee*

44

I would like to receive opinions on my idea for a new cw abbreviation similar to "73" or "88." The new number could be "44," signifying "Freedom." It would be a memorial to the 444 days our people were kept prisoners in a foreign land. — *Ernest L. Dawson, W2DTF, Java Village, New York*

TIMELESS HUMOR

John G. Troster's "King of the Hill" story in December *QST* proves once again that a person who gets the Amateur Radio bug is hooked for all time. A Troster story in December 1970 *QST* gave me a big laugh back then and has continued to over the years. May he write many more articles in the future that will make us laugh. — *Paul S. Crimmens, K4HNF, North Port, Florida*

[Editor's Note: The 1970 Troster article to which Mr. Crimmens refers is: "Oh, He's Making A List . . .," December 1970 *QST*, page 70.]

CLIMBING THE LADDER

I was so disturbed by the letter from WØXI in the January 1981 Correspondence column that I felt an opposing view must be expressed.

I am certain that most amateurs certainly do not feel as WØXI does about study aids which closely resemble FCC exams. I expect that most are very grateful for the help in directing their study to the areas of knowledge which, out of the vast field of radio electronics, are expected of Amateur Radio operators. Using both the ARRL and other study guides, I have helped new amateurs who were struggling to master the basics of Novice radio theory, and have seen the delight of the older ham who has overcome a lack of technical education to achieve his Extra Class ticket. I am extremely grateful on their behalf for the availability of these guides.

Regarding WØXI's comments on the manner in which exams are made up and administered, it is my belief that the intent of the FCC is *not* to make professional-grade electronics engineers out of each amateur. Rather, I feel the primary purpose of any level amateur exam is to insure that the amateur has a certain *minimum* level of training, plus the vocabulary, with which to pursue the hobby. I cannot sympathize with WØXI's call for "rougher and tougher" exams. What would be the purpose? I suspect that one of WØXI's purposes would be to reduce the number of amateurs who receive licenses, thus leaving more bandwidth available to him. If he wants the rough-tough challenge, I suggest he contact the nearest university and start work right away toward a PhD in electrical engineering. — *Harry A. Cole, Jr., W5UXN, Starkville, Mississippi*

As one who has been licensed for over 25 years, I feel that Amateur Radio has seen its better days. I strongly urge the Federal Communications Commission to make it harder to get a license and keep one. Hopefully, the Reagan Administration will insist on a more conservative FCC. Too many poor operators, who shouldn't be licensed, are joining our ranks. I blame CB for harming a truly great hobby, Amateur Radio. — *Bob Christensen, WØZPM, Humboldt, Iowa*

WORKED ALL STATES

When I became aware of the new Worked All States Program with emphasis on specialized communications techniques, I anxiously awaited receipt of each issue of *QST*.

As each new *QST* arrived, I would quickly thumb through it for that new award program or at least the OSCAR WAS listing. I promised myself that if it were not in the January issue I would write seeking information. Then, there it was in the January issue. Wow! A whole new Worked All States program. I was a little disappointed when I saw that only the first 10 of each class were listed (my number 18 just missed your listing, Hi).

Anyhow, the real purpose of this letter is to express to you the joy I had when I opened that large ARRL envelope and saw that beautiful new WAS OSCAR Certificate. The program should certainly stimulate new interest in specialized modes (in addition to OSCAR, I specialize in SSTV and RTTY).

Thank you again for a beautiful certificate and a terrific new awards program. — *Dan Babin, K5KQG, Sherman, Texas*

CATCH 22 CAUGHT

Ending-sign misuse, as illustrated by W5XW's "Chapter 22, Not Catch 22" (January 1981 *QST*, page 62), can be blamed, in part, on the ARRL itself.

If you examine the referenced listing you'll find a confusing presentation that's impossible to memorize as given. It's out of order, much too wordy and too jumbled to use in a hurry. Continuous exposure and making mistakes in the process is the learning method — not the textbook.

The answer is obvious: resequence the listing as used in a QSO, simplify the presentation for easy memorization and make the entries brief enough to be referred to in case they're forgotten. Thus:

Ending Signs
(in order of use)

After CQ	= K	Any station welcome for a QSO.
Answering CQ	= $\overline{AR}$	Awaiting your Reply.
Over	= K	Your turn, including any "breaker."
Over, specific	= KN	Your turn, and no breakers, please.
Over, quickly	= BK	(Sent without IDing).
End of QSO	= $\overline{SK}$	(Sent before ID's).
Closing station	= CL	(Sent after ID's).

Will it work better? It sure does! The Northrop Radio Club used this list for four years on its Code Practice Card, and students and members now understand readily, memorize quickly, use them correctly and thereafter are never confused about which sign is appropriate for the situation.

Ending-sign misuse will remain a problem as long as that puzzling table continues to be published. We suggest the ARRL adopt a better presentation, like ours. — *W. A. Monahan, K6KH, Manhattan Beach, California*

THE ULTIMATE SACRIFICE

I have read with interest and have been saddened by the deaths of Mr. Jerry Martin, W6TQF and Mr. Reid Blackburn, KA7AMF, who lost their lives while providing public service communications during the eruption of Mount St. Helens. I suggest a Court of Honor be established at W1AW wherein a small brass plate be installed showing their names and call signs.

When an amateur is selected for the Court of Honor, the next of kin should receive some type of plaque, and a memorial article should be written for *QST*. I don't know what else we could do to show our appreciation for those who have paid the ultimate sacrifice to the Amateur Radio Service. — *Thomas L. Markley, WA6IKH, Fontana, California*

*Membership Services Assistant, ARRL

Moved and Seconded

MINUTES OF EXECUTIVE COMMITTEE MEETING
No. 385
February 21, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 9:01 A.M. EST February 21, 1981, at the Headquarters' offices of the League in Newington, Connecticut. Present were Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Clar Anderson, KØGA, William J. Stevens, W6ZM, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Also present as observers were Vice President Larry E. Price, W4RA, Director John C. Sullivan, W1HHR, and Chris Imlay, N3AKD, of the General Counsel's office.

On motion of Mr. Zak, the Committee recognized the names of 339 members who had recently been elected to the Membership, and directed the General Manager to list their names in *QST*.

On motion of Mr. Anderson, the affiliation of the following clubs was approved: Albuquerque DX Association, Albuquerque, New Mexico; Amateur Radio Outreach Club, Oral Roberts University, Tulsa, Oklahoma; Callaway Amateur Radio League, Fulton, Missouri; Central Arkansas DX Club, No. Little Rock, Arkansas; Crittenden Amateur Radio Assn., West Memphis, Arkansas; Eastern New Mexico ARC, Clovis, New Mexico; I.S. 206B Amateur Radio Club, Bronx, New York; Kansas City Technical Education Center ARC, Kansas City, Missouri; Lakes Area Amateur Club, Delavan, Wisconsin; Longview Amateur Radio Club, Longview, Texas; Markem Amateur Radio Club, Keene, New Hampshire; Marquardt Amateur Radio Club, Van Nuys, California; Old Hickory Amateur Radio Club, Hermitage, Missouri; Ottawa County ARC, Port Clinton, Ohio; Palestine/Anderson County ARC, Palestine, Texas; Paul Bunyan Wireless Association, Merrifield, Minnesota; Philadelphia ARC, Philadelphia, Pennsylvania; Pratt & Whitney Aircraft Club, Inc. Amateur Radio Group, East Hartford, Connecticut; Quarter Century Wireless Assn., Central Ohio Chapter, Columbus, Ohio; Seaside School ARC (PS 225Q), Rockaway Park, New York; Sioux ARC of the Univ. of North Dakota, Grand Forks, North Dakota; Soweia Amateur Radio Club, Lake Charles, Louisiana; Tumbleweed Amateur Radio Club, Vernon, Texas; Virginia Amateur Communications Assn., Newport News, Virginia; West Jersey DX Group, Sergeantsville, New Jersey. (With this action, the League now has 1936 Category I affiliated clubs, 9 Category II clubs and 359 Category III clubs.)

On motion of Mr. Anderson, approval was granted for the holding of the following ARRL conventions: Michigan State, April 3-4, 1981, Muskegon, Michigan; Ohio State, June 12-13, 1981, Cincinnati, Ohio; West Virginia State, July 4-5, 1981, Weston, West Virginia; Indiana State, July 12, 1981, Indianapolis, Indiana; N. Florida Section, August 1-2, 1981, Jacksonville, Florida; Illinois State, September 6, 1981, Rockford, Illinois; Dakota Division, September 18-20, 1981, Rochester, Minnesota; Roanoke Division, September 26-27, 1981, Virginia Beach, Virginia; S. Florida Section, October 2-4, 1981, Clearwater, Florida; Southeastern Division, June 12-13, 1982, Atlanta, Georgia; New England Division, October 2-3, 1982, Boxboro, Massachusetts; Pacific Division, October 8-10, 1982, Santa Cruz, California.

The Committee noted that in the above list, as at other times, there are a number of conventions being held on the same dates in various parts of the country, which often results in possible attendees, equipment displayers and officers/directors/staff having to make a choice between one or another. After discussion, the General Manager was instructed that henceforth, whenever there is a conflict in such dates, he is to send a suitable notification of such conflict to the convention group which has been most recently approved, with carbon copies of the notification to those who have been previously approved for that same date. Such letter is simply to be a notification, without editorial comment.

Director Sullivan reported to the Committee that the New England Division convention, originally scheduled for the weekend of September 19 and 20, has been cancelled because of the inability of the convention committee to obtain suitable space.

The Committee noted that the dates of the second 1981 Board meeting had been previously established to match the dates of the now-cancelled New England Division convention, and decided to refer any possible change in the Board meeting dates to the meeting of the full Board in March.

The Committee reviewed the limited amount of National Convention program material which was available, and directed the president to place a phone call to the chairman of the National Convention to obtain additional information. At 9:44 A.M., Mr. Dannals and Mr. Price left the meeting in order to place that call. At this point Mr. Smith took the Chair.

Director Sullivan reported to the Committee on the actions taken by the Membership Affairs Committee with respect to the ARRL Hall of Fame. After extended discussion, on motion of Mr. Anderson, the Committee VOTED to accept the report of the Membership Affairs Committee and recommended that the name of Clarence D. Tuska, co-founder of ARRL, be presented to the Board at its March meeting for consideration for election to the ARRL Hall of Fame. (At 10:12 A.M., during the course of the above discussion, Mr. Dannals and Mr. Price returned to the meeting.)

Mr. Dannals reviewed his telephone call with the chairman of the National Convention, who reported advance registrations double those of the previous convention. In addition, there are 116 commercial displayers, and 300 flea market tables. The Executive Committee was appreciative of this information, as well as the verbal report on the program, but expressed concern of the nonreceipt of adequate advance program information.

Mr. Dannals resumed the Chair at 10:30 A.M.

The Committee then proceeded to review various matters of litigation involving the League and Amateur Radio. There was extended discussion of the so-called Karagozian case in California, together with matters of funding thereto, and decided to take no action with respect to further funding at this time. The General Counsel's office was directed to obtain a clarification of the funding request and the accounting of monies previously advanced to Attorney Lawson in this and other cases involving amateurs in California.

Mr. Imlay provided an extensive review of the New Jersey case involving Donald Jellinek, K2AHL, and the lack of cooperation from Mr. Jellinek. Mr. Imlay will provide a detailed chronology of our attempts to assist in this case, for the benefit of directors and others who may receive questions about the case.

Mr. Imlay reviewed the funding being provided the Personal Communications Foundation and the actions that the funding was underwriting.

On motion of Mr. Stevens, an additional 1980 appropriation of $750.88 was approved for the Roanoke Division.

On motion of Mr. Stevens, the Committee approved a 1980 transfer of $1000 from the NTS Officials account to the SEC account, and a transfer of $700 from the STM account to the SCM account.

On motion of Mr. Zak, approval was granted for the holding of an ARRL Technical Symposium at the National Conference of IEEE Vehicular Technology meeting of April 6, 1981.

Mr. Dannals reviewed the Legislative Package which had been previously approved by the Board and the plans for its implementation with the new Washington Administration.

The General Manager reviewed a draft of a filing for Extra Class phone at 7075-7100 kHz, in accordance with Minute 26 of the July Board meeting, and put forward the staff proposal that phone in that segment be limited to inter-regional contacts. The Committee, after discussion, agreed informally to refer this consideration to the March meeting of the Board.

After discussion, on motion of Mr. Anderson, the Committee approved the proposal of the General Manager that the League adopt the position of not sanctioning requests by amateurs for Special Temporary Authority to operate on the proposed 18- and 24-MHz bands in advance of their being opened for general amateur use in the course of the regular implementation of the provisions of WARC-79.

In accordance with the Board Standing Order, the General Manager reviewed progress on various items of action required of him and adopted at the July 1980 Board meeting, supplementing his September 13 and November 19 reports to the Executive Committee. Action on Board minutes 27, 33, 43, 47, 48, 51, 65, 75, 81 and 89 has either been completed or is underway to the extent that no further report is necessary. Minute 26 is complete except for the portion relative to phone on 7 MHz. Action on Minutes 70 and 88 will be considered complete with the next printing of the AABL booklet. (It may be worthy to note that Standing Order 59 is not being fully complied with at the present time, in that the Executive Committee is not satisfying itself as to the status of action items of officers and committees.)

The Committee received reports from the Interference Task Force and the Ad Hoc Committee on Ethics.

There being no further business, the meeting was adjourned at 12:15 P.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

LIFE MEMBER APPLICANTS
February 21, 1981

Donald J. Adams, WBØLQW; Jerry L. Adams, WB7TUT; Kenneth L. Adams, NØCP; Phillip V. Akers, NØAOK; Daryl R. Allen, WD9JDP; James T. Anderson, W4CUJ; Dorothy N. Andrews, VE3MKB; Grant R. Ayers, Jr., KN4K; Rodney A. Baden, K5YKC; Gary Bader, WB6RXW; George Bailey, WAØDTM; David F. Balko, W8GUR; Richard L. Ball, KA3BNW; Ronny D. Barr, NØOF; Donald L. Bartnik, WA4DSW; Steve Bauer, WB6FZU; Olin L. Beall, II, WA7YXY; Roger L. Beamon, W3BFM; Dan M. Bechtol, WB4GNP; Ira Bell, N4IB; Jon E. Benner, KØSTI; Dennis Bennorth, WD6BIP; Norman P. Bernstein, K2KLV; Conrad Berthold, W1GPT; Philip Keith Bess, WB9PGV; Harold Bettle, K9JZB; Faith E. Bierbaum, WA4WOU; David E. Bierbaum, K4RBJ; Daniel A. Bisbee, K9ZME; Howard H. Blonder, K2OIX; Gary Boatright, WB5KNR; Richard Boltrus, K1ECC; David A. Borchard, WBØIKS; Frederick W. Braithwood, KA2BBW; Michael R. Bratcher, N5ALP; William H. Brewer, Jr., WB4TIY; Henry F. Briese, WA4RLV; Norman R. Brines, WB5TZJ; Dallas L. Brown, WD6CHA; Marion R. Brown, WD6CGZ; Herman K. Brown, N3AWF; Larry L. Brucker, K7MQF; Ernest W. Buck, Jr., W1YNT; T. Graf Buckenmaier, Jr., KG4U; Lloyd Bundy, KA6EMS; Ronald Burns, N7APR; Charles K. Bussell, Jr., K9AH; Thomas Camb, WA2SIK; Kenneth D. Cameron; Armand Canestraro, WA2EQW; Gordon D. Canney, WB7OKG; Ernest Cardone, WA2CIO; Alan H. Carp, K1HLZ; Jackie M. Carter, K4WRM; Ian L. S. Cassell, WA1KMR; Victor P. Chester, Jr., K2YJ; John E. Chism, ND4N; Edward P. Chromczak, AJ2C; Thomas H. Clark, K4SHY; William F. Clarke, A17N; Roy G. Clay, Jr., KB5IG; William R. Claypool, WBØCSG; Robert Cleret, F6AVF; Christopher F. Codella, W2PA; Fred E. Coe, Jr., WAØRIO; Raymond Cole, Jr., K4GAA; Richard H. Coleman, K5RI; James A. Collins, W7RVD; Keith L. Collins, WB1GGJ; Charles J. Cook, WD5ABG; Peter Olds Cooper, WB3BTU; Charles W. Craft, N3MW; Randall M. Craft, K9ZOD; Warren Tom Cramer, WB8VCR; Bartlett Cranford, KA4BNK; John G. Crosby, Jr., WD4IBR; William W. Cross, KA9EBM; John D. Daniels, WAØUQK; J. C. Darden, K4GAC; Ronald R. David, WA6YRW; Kenneth G. Deahl, N1ACJ; Henry W. Des Black; R. Gary Dixon, Jr., KA4HVI; Thomas Donohue, W3UEQ; Dennis W. Downer, AB6H; Billie W. Dunn, Jr., WD5IRR; James R. Dunn, KB6EX; Daniel S. Durgin, KA1AFJ; Vernon A. Dyer, WA5RUQ; Gerald C. Elder, WA6PDT; Richard W. Eller, N4RE; Alan R. Erickson, WBØOAV; Ernest R. Evans, N4AVE; Jerome B. Fanucci, K8JF; Christian Fazi, KB3BF; George M. Fazio, WB3IGR; Eugene J. Finch, KW4D; Peter J. Finnegan, W3WC; Ronald E. Fish, KD6IT; A. C. Fisher, II, WB8LEQ; Pete Fisher, KA5CRT; Richard G. Fisher, WA7JJL; Joseph B. FitzHarris, KH6DH; Joe M. Flake, N4BGQ; James W. Forrester, WA4LHL; Harold L. Foshee, N4ASP; Robert D. Fox, WB2EWR; Bradley J. France-Kelly, WA4YBD; Albert A. Fritz, KA6CUX; Robert G. Fuss, W4OWY; Gary L. Gammon, KJ4C; Eugene Garcia, WA5KNC; Melvin L. Gin, WA6VNO; Dean A. Glace, WA4MMO; Robert J. Gobrick, WA6ERB; James Goehrs, W7YMX; Ed Goldberg, WA1ZZO; Richard A. Golden, K8LOS; John J. Gonzalez, KP4W; Eldon Graham, W7TIR; Lee Graves, WA7OBH; H. Howard Green, N8AYS; R. Peter Griffith, WA6VAQ; Floyd Grossochme, WB9UIP; Richard A. Grover, WA2MNR; George M. Grunert, KD6V; Donald Haenichen, WA2QIP; Thomas S.

Hall, VP9IB; Russell S. Hamilton, K3RH; Connie R. Hamlin, WB4COM; Barry Hampton, WB2KLE; William A. Hanlon, N1ADY; Walter Clark Harbert, WB7WBG; Gary W. Hartley, K4HTV; James K. Hartley, WA4UKV; Donald I. Hartsfield, Jr., KA4DBZ; Edward R. Hartwick, WB0FAQ; Thomas L. Hatch; Patrick W. Haug, KA5P; James M. Healzer, WB6PCQ; Ronald F. Herber; Walter F. Herold; James R. Hicks, WB4GAW; Maynard E. Hicks, WA4FSC; Lee Hiers, AA4GA; Robert J. Hill, Jr., W1ARR; W. H. Hill, WB4SYK; Michael R. Hogan, K9VZJ; Roger Hoffman, N4RR; Ron M. Hoffman, WA2EYC; Edwin J. Holdsworth, N2EH; G. Scott Hull, KA9ASH; Eugene Robert Hysner; Joel G. Iacono, WA9DJP; H. E. Gene Ingram, Jr., WD5FZM; Timothy J. Jellison, W3YQ; James L. Jensen, W6KVA; Karl P. Jesness, KØMGG; Carl W. Johnson, WDØEPH; Harold W. Johnson, Jr., W4MUK; Philip J. Johnson, W2SQ; Rand N. Johnson, WA7RLT; Russell L. Johnson, Jr., K3PI; William S. Johnston, WB6EAU; Robert T. Jones, WA4MMK; Michael R. Kaczynski, W1OD; Loren S. Katz, WB2UAN; Nat Kawakita, KB2IO; Shawn C. Kelley, WB1AEL; Peter W. Kemp, KA1KD; William Patrick Kennedy, KA9AND; James A. Kesterson, KØGU; Donald Kirby, KA3EDW; Elliot B. Kleiman, WA4YDK; Leonard I. Klisz, W8SEP; Howard L. Knickerbocker, Jr., K1DCS; John S. Knight, WA7ZXD; Joshua L. Koslov, WB2CWQ; Gary Kotler, WA1UUO; John B. Kreer, WA8ZTQ; Louis N. Laderman, KBØCJ; Amrum Lakritz, KB9DD; Walter F. Lange, W1YDS; James A. Larkin, KA2FFP; Gary W. Laska, WB3KFO; Michael J. Lavelle, KA2EVG; William Leal, VE3IHB; Raymond Leivo, VE3AQJ; Michael Levie, W2IQO; John S. Lewis, Jr.; Joseph Michael Lewis, KA4CAS; Scott A. Lieberman, N1EE; Nathan A. Lilienthal, WA6PQN; James C. Little, Jr., K4JUO; Joseph A. Livingston, WA5IGD; James E. Lockhart, KAØAFT; Russell H. Loverude, WA9MAQ; Fred E. Lux, WD8ITZ; James E. Mackey, K3FN; Erich Majer, DL9BM; Jerald R. Malin, WB2LEI; Sergio Marino, WA1VWQ; Tom L. Markley, WA6IKH; Joseph R. Massi, KB2JG; Michael W. Mayer, III, W5ZPA; Kevin T. A. McCarthy, K1VGF/WA1VCE; Rich McCracken, KA2CVN; James E. McDaniel, N6IR; Joseph H. McDowell, II, AA4T; Douglas A. McDuff, WB4MAI; Richard H. McGuire, KI8C; Gary D. McIlnay, WB3LPN; Randy McMillen, WD8IZG; Rollin K. McKean, WD5FUN; Tom McKee, VE3KO; Wilson N. McKeithan, KS4S; James D. McMechan, WØPFP; Joseph R. Mignogna, Jr., WA3QKA; Daniel J. Mincinski, WA7PTZ; Ronald Miotke, WD8MNX; Maynard Miller, WA8VEK; Mark Meester, KAØCAS; Charles A. Miller, Jr., AD3X; John S. Mitby, WØCJ; Richard G. Moldt, K4LV; John B. Mollan, AE7P; Gerald A. Moravec, WD5AAM; Ed Morris, K4XM; Jeffrey L. Myrick, K5FZJ; Walter Nellis, WB2JAB; Conrad Nelson, N1AHI; Arthur G. Nevins, WA4NTP; Norman E. Newman, WAØBSN; Carl H. Nord, WA1KPD; Sally O'Dell, KBIO; Cynthia H. O'Donohue, WD4EUV; Robert W. Oiler, KB8AV; John R. Oliver, WA3KDR; Howard T. Olson, WA9KEK; Thomas Ostrowski, WA3UMU; William P. Overstreet, K4KIG; Benson J. Owens, K5KV; Alden T. Oyer, AG5S; Douglas E. Pabst, KA4CRV; Jack C. Parker, KCØW; Theresa G. Parris, N4AFY; Joseph M. Perge, WB8HWF; James H. Perkins, W5DRG; Gerald E. Peters, WA7ADK; Pamela E. Phelps, WA4YSC; David A. Phillips, W7GZ; Pete Philpott, WA6KFQ; John J. Pich, K3AKR; Daryl G. Popowitch, N8AID; Lester Prehm, WA6ZAV; John G. Rahic, WB8OJG; Christopher B. Ramsay, N4YE; G. Lee Ranger, KM4Y; Thomas G. Reitenheiser, KA2ICV; John Resanowitch, WA4USU; Tim Richardson, WB4HZT; Steve Richert, WB5ANA; William N. Richmond, WD4CPQ; Dale Ristrom, WD9ESZ; Tim W. Ritter, WB4GOY; John B. Robinson, K3GLX; Bernard C. Rodenhizer, KM4F; Harold W. Roesler, WBØSCX; Robert A. Rollins, WB7DPA; Greg Roupe, KA1AIE; Jay Ryno, AD8C; Douglas Sanders, K4QO; Larry A. Schlosser, WA3JUO; Albert C. Schook, WA8AEE; Benedict T. Schwar, Jr., WB9RFP; Clarence E. Schwartz, KB9PD; John Paul Schwartz, WB5YFG; David B. Sears, KA7ECQ; Jose P. Setka, KB6LP; John W. Shean, N9TV; Adrienne J. Sherwood, WA6YEO; Daniel A. Sherwood, WA6PZK; M. P. Siebert, K3PNL; Dennis A. Silage, WB2LGJ; Glen A. Skarbakka, KØSK; Billy Smith, Jr., W4HMV; Danny R. Smith, WB9LUK; Gregory B. Soltys, N3AIZ; Donald R. Sorensen, KB8HS; Joseph Speroni, AHØA; Paul T. Staupe, WBØBQA; Stuart P. Stephens, K8SJ; John W. Stevens, Jr., K5JS/K5KYU; Jimmy L. Stewart, WD9FHY; Tyler G. Stewart, WA3UXU; Robert W. Stielau, N2XN; James J. Stimeck, WA3JCJ; Daniel E. Street, KITO; Bruce A. Stucky, WBØCUY; Timothy J. Sugrue, WB2CMK; Louis Tanney, WB3HKU; Tom Taylor, KØINR; George Herbert Testerman, WB3KVT; Don G. Thode, N4AWK; F. Cameron Thomas, VE3CTQ; David O. Thorp, KA1KC; Theodore C. Trostle, WB2LOU; John R. Todd, Sr., WD4ODS; Michael Tortorella, W2IY; Jack R. Travis, WD8PGN; Stephen B. Trout, WB7OPB; Larry S. Tucker, W7FHH; Sam W. van der Weide, W5KRH; Lloyd E. Vancil, AI7I; M. Herbert Varn, WA4ZMS; Grayson A. Varner, WB2PJY; Raymond Verbrugge, ON4VW; Bonnie A. Vernor, WB5FTG; William H. Vernor, Jr., WB5FTH; Daniel L. Viens, WB1CSV; Robert C. Walworth, AK5B; Mark Wayne, W8UBS; Joel H. Weiner, VE6WQ; Steven Weinerman, WA2IMS; Duane E. Wenzel; William Whitaker, WD4JKM; Terry Wiley, WA4QLQ; J. T. Williams, W4VCF; C. D. Williamson, WBØZLH; Thomas J. Wilmarth, WA1ZPG; Norman A. Wilson, N6JV; Robert W. Wilson, K9RBW; Kevin C. Wise, AI4X; Douglas W. Wismer, VE3EHC; Vaughn W. Worth, WB3GCG; Dean Wrasse, KB8MG; Dennis A. Yao, N3ER; Lee Roy Young, Jr., WB5UYV; Scott R. Zucker, WAØAVL.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

W1APN, Eliot A. Hayward, Fairhaven, MA
WB1BPG, Ray H. Dumas, Athol, MA
WB1BXO, Richard E. Miller, West Hartford, CT
W1DGY, Frank M. Housman, Lincoln, MA
W1FE/ex-W1ALJ, Corliss B. Gardner, Peacedale, RI
WA1FSM, Medford W. Latchum, Norwich, CT
W1IUI, Lloyd M. Currier, South Hampton, NH
W1OA, John H. Kenney, Adams, MA
W1SH, Albert Lane, Dedham, MA
W1TSC, Willis C. Dyer, Brookline, NH
AB1V, George F. Ives, Glastonbury, CT
WA1VCV, Ralph E. Summerton, Milo, ME
W2CCT, Howard E. Maine, Ithaca, NY
WB2JDA, Mel B. Poses, Syracuse, NY
W2JDG, Samuel J. Grossman, New York, NY
W2LKM, William G. Kay, Paterson, NJ
W2LPJ, Albert F. Emrich, Miller Place, NY
WB2QGL, Lyle C. Adams, Rochester, NY
W2TST, Edwin C. Wigton, Batavia, NY
WA3ANO, Roy G. Bartges, McKeesport, PA
K3RCM, Robert D. Baker, Milton, PA
W3RWQ, Peter G. Gardner, Pittsburgh, PA
WA3TER, Carlos E. Dobson, Denton, MD
W3ZJ, Edward J. Meehan, Jr., Philadelphia, PA
WA4EGA, J. D. Pyle, South Pittsburg, TN
KA4KVK, Karl E. Voelker, Jacksonville, FL
W4LFF, Wesley N. Simmons, Chattanooga, TN
WA5CHD, Clinton E. "Ted" Shuler, Enid, OK
W4DPX, Lt. Col. Joseph C. Brewer, Millbrook, AL
WB4IBN, Mitchell H. Burns, Birmingham, AL
W4IOI, Bert A. Berthelsen, Ormond Beach, FL
WA4PQM, Ben Demby, Miami, FL
WA4RHH, William Phillips, New Port Richey, FL
W5TFN, Lee Pullen, Waurika, OK
KB5XA, James W. Young, Shreveport, LA
N5AB, Hurley O. Saxon, El Paso, TX
W5ANP, Ferdinand A. Pecoul, Gulfport, MS
W5BDG, Lewis E. Lear, San Antonio, TX
W5BTO, Sam H. Crawford, Palestine, TX
N5ET, Frederick Walworth, Dallas, TX
WB5LBS, Harold D. Morse, New Orleans, LA
W5OHH, Leland E. "Buzzy" Brooks, Midwest City, OK
K5RS/ex-WØDD, Franklin K. Matejka, Kerrville, TX
WA5SDU, Jerry D. Girty, Enid, OK
WA6CJV, Alphonso Romero, Jr., Lompoc, CA
WA6DCX, Thomas W. Watson, Santa Ana, CA
KH6ECT, David S. "Stu" Judd, Honolulu, HI
KH6ECX, Edward W. Smith, Honolulu, HI
KA6GVW, Larry Paul, Newport Beach, CA
K6LOP, Glenn T. Camp, Long Beach, CA
K6LQX, Frank Hendricks, Trinidad, CA
WB6NZZ, Lester V. Myrah, Orangevale, CA
N6OV, Dr. James G. Terry, Pleasanton, CA
W6SLX, Edward R. Kirkwood, Eureka, CA
KA7BJM, Francis B. Marcoe, Puyallup, WA
WB7DVZ, Charles T. Viner, Boise, ID
W7ECG, Donald C. Hawkins, Spokane, WA
K7MHD, Gordon L. Jermann, Portland, OR
W7TPE, Richard Gerberding, Wolf Point, MT
WB7QFC, Frank C. Berkley, Cheyenne, WY
K8BPB, Czar K. Kesler, Dayton, OH
W8BPK, Paul J. Henry, Toronto, OH
WA8CPR, J. E. Morgan, Sr., Van Wert, OH
W8CRO, Hal B. McNichols, Columbus, OH
W8CTC, James A. Maentz, Byron Center, MI
W8CVI, Maurice E. Druley, Wilmington, OH
WD8CZQ, Stephen B. Cowdery, East Grand Rapids, MI
K8GXK, Arnold J. Barnett, Lyndhurst, OH
W8HTO, Joseph S. Wojcik, Mansfield, OH
W8JDX, Grover E. Hall, Sr., Shadyside, OH
W8KTJ, Willis L. Barlow, Muskegon, MI
W8NQT, Raymond T. Westfall, Akron, OH
K8POT, Stanton F. Ferguson, Port Huron, MI
K8RNP, Gilbert Curtin, Detroit, MI
W8RPV, Hugh E. Leech, Warren, OH
W8RQK, Martin H. Hunker, Canton, OH
W8TIX, John A. Daugherty, Lancaster, OH
W8UEJ, Clarence A. Vandervelde, Muskegon, MI
W8WSA, Guy L. Pattison, Detroit, MI
K9CBQ, Kenneth R. Kempf, South Bend, IN
WA9CSB, Harry L. Ward, New Albany, IN
K9DMR, Forrest L. Robb, Milan, IL
W9DZC, Howard E. Grubbs, Greenfield, IN
KA9IZW, Mack T. Lawrence, Fort Wayne, IN
W9KZN, Earl J. Green, Evansville, IN
W9LTW, Don R. Burke, Anderson, IN
W9LY, Willis K. Lindeman, Michigan City, IN
K9RYV, Lymann E. Thomas, Marion, IN
KØAY, David D. Bridges, Hannibal, MO
KAØBBR, Owen F. Graves, St. Peters, MO
WØDXI, Willard C. Kamberg, Prairie Village, KS
WØJEC, Lester W. Perkins, Corpus Christi, TX
WØJXJ, Fay Carrington, Kansas City, MO
KØKJN, Francis P. Phelps, Boulder, CO
WØLJ, Gerald R. Sutton, Atlantic, IA
KØPKS, Mabern B. Gaskill, Kansas City, MO
WØTYW, Myron D. Piersol, Maplewood, MO
WØTZX, Clyde H. Schindler, Perryville, MO
WAØYMT, Douglas D. Nielsen, Lynch, NE
VE1AQM, Charles E. Peterson, Saint John, NB
VE4LA, Lester A. Brown, Lenore, MB
TI2LA, Luis D. Arce, San Jose, Costa Rica

Note: All Silent Key reports sent to Hq. must include the name, address and call sign 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*.

Happenings

Conducted By W. Dale Clift,* WA3NLO

Implementation of WARC-79

The World Administrative Radio Conference (WARC) held in Geneva, Switzerland, in 1979 established world frequency allocations generally; however, the Federal Communications Commission has the task of making more specific domestic frequency allocations within the general WARC guidelines. The FCC's decisions will have an impact on amateur allocations into the 21st Century, so the importance of the FCC's proceeding, General Docket 80-739, cannot be overemphasized.

The American Radio Relay League, Inc., has submitted its comments on behalf of its members in response to the FCC's First Notice of Inquiry into the implementation of the Final Acts of WARC-79, which deals with frequencies below 28 MHz. Further Notices of Inquiry will deal with the higher frequencies. The FCC hopes that necessary revisions to the Commission's rules can be made as soon as possible after the U.S. Senate ratifies the Final Acts. What follows is a summary of the League's comments. Members desiring a complete copy of ARRL's comments to the First NOI in 80-739 should send their request with an s.a.s.e. to ARRL Hq., Newington, CT 06111.

The 160-Meter Band

The League has made it clear that it is dissatisfied with the FCC's proposals for the 160-meter band. The 1979 Conference added the Radiolocation Service as a coequal sharing partner in the band 1850-2000 kHz, which is already shared with a number of other services, and made the band 1800-1850 kHz available exclusively to the Amateur Service. Now, the FCC proposes the following domestic allocations:

1800-1900 kHz AMATEUR (exclusive)
1900-2000 kHz RADIOLOCATION (exclusive)

The League contends that 1800-1900 kHz is insufficient to meet radio amateurs' needs, and that if FCC departs from its pre-Conference position and prohibits its Amateur Service from operating in the 1900-2000 kHz segment, it would constitute a serious breach of faith with its 382,000 amateur licensees. ARRL urges that the Commission adopt the following domestic allocations:

1800-1900 kHz AMATEUR (exclusive)
1900-2000 kHz AMATEUR (primary) and Radiolocation (secondary)

In paragraph 21 of its proposal, the FCC states that it does not want to reopen a general discussion of allocation issues treated during WARC preparation, nor does it want to open new allocation issues. Yet, as ARRL points out, this is precisely what the FCC has done by suggesting that the Radiolocation Service be given an exclusive allocation at the expense of the total spectrum available to amateurs on 160 meters. At no time in the four years leading up to WARC did those responsible for the U.S. position consider any proposal as onerous to the Amateur Service at 160 meters. Furthermore, at no point during WARC preparation did the Commission even suggest the possibility of an exclusive allocation for Radiolocation at these frequencies. In fact, all U.S. proposals for WARC-79 called for Radiolocation to be *secondary* to the Amateur and other services at 1900-2000 kHz. That the Conference adopted the allocation on a primary basis does not change the fact that the domestic requirement, developed during the more than four years of preparations, was for secondary status for Radiolocation.

The League emphasized that to be consistent with the U.S. WARC proposals, the Commission must accommodate the Radiolocation Service at 1900-2000 kHz on a secondary basis. Any higher status, or exclusion of the present occupants from that segment, runs counter to the proposals developed during four years of painstaking give and take involving all the services. Disregard of the culmination of these four years of preparations would constitute a violation of the very ground rules the Commission established for General Docket 80-739.

Canadian Broadcasting at 3950-4000 kHz

The 1979 Conference accommodated Canadian Broadcasting by footnote 3502 which reads as follows:

Additional allocation: in Canada, the band 3950-4000 kHz is also allocated to the broadcasting service on a primary basis. The power of the broadcasting stations operating in this band shall not exceed that necessary for a national service within the frontier of this country and shall not cause harmful interference to other services operating in accordance with the Table.

ARRL's comments pointed out the Commission's responsibility to act promptly should broadcasting stations in Canada operating in this segment cause harmful interference to the Amateur Service. The League also said that it would file strong complaints with the FCC should this interference occur and requested that its position be communicated to Canada in advance so there is no misunderstanding.

7 MHz

At WARC-79 the Amateur Radio service in Region 2 came very close to losing its access to the 7100-7300 kHz segment, but the leadership of the United States delegation saved the band. The League is intimately familiar with the problem of broadcasting at 7 MHz, and since 1938 the Amateur Service has been fighting an uphill battle against incursions into the band by the Broadcasting Service. The U.S. has been a staunch defender of the Amateur Service throughout this period, a posture greatly appreciated by the amateur community.

Broadcasting was very fortunate at WARC-79 to have obtained new allocations in the vicinity of 9, 12, 13, 15, 17 and 21 MHz. These new bands, together with the existing ones, give broadcasters an extensive family of frequencies to cope with varying propagation conditions. However, the simultaneous transmission of the same program on a number of frequencies, plus a number of other unsound practices, is a terrible waste of spectrum. Some of the bands are so similar in their propagation characteristics that for planning purposes they should be treated as *one band*.

The 7-MHz band, available for hf broadcasting in Regions 1 and 3, should not be used for the slight advantage a broadcaster might gain while transmitting the same program simultaneously at 6 MHz. Therefore, as the U.S. prepares its proposals for the 1983-84 HF Broadcasting WARC the League will propose that these two bands be treated as a *single* band for planning purposes. Unless the U.S. assumes a leadership role in solving this problem, the present chaos of out-of-band broadcasting will continue, and the Amateur Radio Service will continue to be a victim of this serious interference.

10 MHz

The League also addressed the new 10.1-10.15 MHz band. Unfortunately, because of the perceived needs of the other services in this part of the spectrum, the 1979 Conference decided that amateurs would be allocated 50 kHz on a *secondary* basis and not 100 kHz on an exclusive, worldwide basis as proposed by the U.S. Nevertheless, the FCC proposes to make the 50-kHz segment available in the U.S. and possessions exclusively to amateur stations. A proposed footnote concerning this policy, USYY 14, is consistent with international regulations, and is supported by the League with minor editorial revision.

18 and 24 MHz

ARRL expressed the hope that early access to 18.068-18.168 MHz and 24.89-24.99 MHz may still be possible, since amateurs are quite anxious to use these new allocations. Once more is known about the interim Fixed-Service requirements, perhaps early access to one or both bands by amateurs could be had on a limited basis until these fixed stations are reaccommodated in other allocations. The League hopes the Commission will be willing to entertain a request for early access as more information becomes available.

420-450 MHz POWER RESTRICTIONS EASED FOR SATELLITE COMMUNICATION

The Federal Communications Commission has made changes in the power restrictions that apply in certain parts of the United States with respect to the 420- to 450-MHz band. Amateurs in Florida, Arizona, parts of Texas, New Mexico, California and Nevada, and areas within a 200-mile circle of Cape Kennedy, Florida, and Eglin Air Force Base, Florida, continue to be restricted to 50 watts input in the 420- to 450-MHz band for terrestrial communications. Two new areas will come under the same restriction: a 50-mile radius of Beale Air Force Base, California; and a 50-mile radius of Otis Air Force Base, Cape Cod, Massachusetts. However, there will be an automatic exemption for amateurs attempting satellite communications only, on frequencies between 435 and 438 MHz, to facilitate future

*Deputy Manager, Membership Services, ARRL

satellite communications. Amateurs operating from the restricted areas may, for satellite communications, use 1000 watts effective isotropic radiated power *provided* that the half-power point in the amateur station's radiation pattern remains at or above 10 degrees higher than the horizon.

The new rules go into effect April 8, 1981. Waivers with respect to terrestrial limitations continue to be available after coordination with the FCC District Engineer-in-Charge and the Military Area Frequency Coordinator. See Section 97.61 of the Amateur Rules for more information about these power limitations and a description of the areas affected.

14 MHz PETITION TO EXPAND 20-METER PHONE BAND — ARRL

Hoping to relieve the severe overcrowding in the telephone portion of the 14-MHz band, the American Radio Relay League, on behalf of its members, has petitioned the Federal Communications Commission to expand the 20-meter telephony band from its present limits of 14.200-14.350 MHz to 14.150-14.350 MHz. The League further requests that the frequency privileges be subdivided according to the class of operator license as follows:

14.150-14.175 MHz — Amateur Extra only
14.175-14.225 MHz — Amateur Extra and Advanced
14.225-14.350 MHz — Amateur Extra, Advanced and General.

In support of its petition, the League noted that the last adjustment to the 20-meter phone band was made in 1960, when there were just 200,000 U.S. amateurs. Today, there are over 382,000 amateurs, and though some relief from overcrowding has occurred from the voluntary phasing-out of a-m in favor of single-sideband, suppressed-carrier emission, this was already occurring in 1960 and has been more than offset by the growth in numbers. In 1971 the FCC again considered 20-meter phone band expansion but drew back on its proposal. Staff changes at the FCC appeared to be the primary cause of the Commission's change of heart.

The League admits that the proposal would have some impact on amateurs outside the U.S.; however, it does not support extension of the phone band all the way down to 14,100 MHz, as has been suggested by some persons. Also, the League has taken steps to minimize the impact on foreign amateurs by making the segment 14.150-14.175 MHz available only to Amateur Extra Class licensees, of which there are presently fewer than 17,000. The segment 14.175-14.225 MHz would be available only to Amateur Extra and Advanced class licensees, who together comprise approximately 30% of the U.S. Amateur population, or 114,000 licensees.

ARRL proposes a 50-kHz expansion of the General class segment, 14.275-14.350 MHz to 14.225-14.350 MHz. The present General class phone segment is occupied heavily by organized networks of amateur stations, many of whom perform life-saving public service functions. However, their presence exacerbates the congestion problem for General class amateurs who are not interested in network operation, and for amateurs overseas who wish to communicate with General class licensees.

[Editor's Note: This is a brief summary of the League's petition. Members may request a complete copy of the 14-MHz proposal by writing to ARRL Hq., 225 Main St., Newington, CT 06111. Please enclose a business-sized, self-addressed, stamped envelope.]

ARRL PROPOSES 10-MHz BAND PRIVILEGES

The American Radio Relay League, Inc., has formally proposed amendment of Part 97 by FCC to define the extent of amateur operating privileges in the new 10-MHz band. The 50-kHz segment, made available to the Amateur Service on a secondary (noninterference) basis by the Final Acts of the World Administrative Radio Conference, may be implemented by FCC soon after U.S. Senate ratification. Amateurs would be required to ensure that their signals not interfere with stations in the Fixed Service.

Specifically, ARRL proposed that *General, Advanced and Amateur Extra Class licensees should have equal access to the band.* This "bridge," the League said, should be made available to all licensees who also have access to both the 7- and 14-MHz bands. Because of the shared nature of the band, ARRL felt it unwise to make it available to Novice and Technician operators, who are relatively inexperienced with hf radiocommunications. The League further stated that because of the narrowness of the band, the flexibility of amateur operation should not be further reduced by the imposition of subbands based on license class.

Secondly, the League proposes an *input limitation of 250 watts.* Such a limitation, the League feels, will reduce the possibility of harmful interference to stations operating in the Fixed Service. The League "believes that a very high level of compliance with the 250-watt limit can be achieved (because few hf rigs have a higher power capability without the addition of an external power amplifier), both demonstrating the good faith of the Amateur Radio Service in avoiding interference to the Fixed Service and reducing the likelihood of interference complaints."

Finally, ARRL proposed limiting the modes of emission to Type A1 and Type F1 to permit the greatest number of amateurs to use the new band. Since the new band is narrow and shared, the League feels that narrow-band emissions will make it possible for the maximum number of stations to operate without mutual interference. However, "because the new band is needed primarily to provide greater reliability in emergency communications," ARRL said, "some provision should be made for telephony operation in emergencies."

ARRL's proposal was the result of the report filed by the Board-established Ad Hoc Committee for the study of the 10-MHz band. The committee's report was based on the input of several hundred ARRL members. The recommendations of this committee formed the basis for the ARRL proposal, which was adopted unanimously by the Board.

In its petition, ARRL pointed out that "if the necessary administrative procedures can be completed in time, the Commission can make the 10-MHz band available to its amateur licensees as early as January 1, 1982, or as soon as the Senate ratifies the WARC-79 Final Acts, whichever is later." ARRL requested early action in this matter by recommending adoption of a Notice of Proposed Rulemaking (NPRM) based upon its petition. Comments on the League's petition should be sent to the FCC Secretary, Washington, DC 20554, with a copy to the petitioner: ARRL, 225 Main St., Newington, CT 06111. — *Richard Palm, KICE*

[Editor's Note: This is a brief summary of the League's petition. Members may request a complete copy of the 10-MHz petition by writing to ARRL Hq. Please enclose a business-sized, self-addressed, stamped envelope.]

Eugene Hastings, W1VRK, of the Federation of Eastern Massachusetts Amateur Radio Associations, presents ARRL Foundation Vice President and New England Division Director John Sullivan, W1HHR, with a check for $507 to be applied on the ARRL Matching Fund basis in support of the OSCAR Phase III-B project. The contribution represents the donations of over 500 attendees of the ARRL New England Division Convention in Boxboro, Massachusetts, October 4-5, 1980. The check was matched by the Convention management.

IMPROPERLY FILLED-OUT 610 FORMS CAUSING DELAYS

Because many Amateur Radio operators are not filling out the new 610 form properly when applying for, renewing or modifying an amateur license, the FCC has released a Public Notice to clear up some of the difficulties. First, it reminded amateurs that old 610 forms are obsolete. It will automatically return any application made on a 610 form dated earlier than August 1980.

The greatest difficulty centers around items 2A through 2I. The Public Notice specifically mentioned the following: *2A* — check this box to apply for renewal of your license with *no other changes.* The renewal, if approved, will be for a five-year term with no changes. *2G* — check this box is you wish to change your name on your license. Your previous name must be shown in the space provided. (For example, a change to or from Jr. or Sr. is considered a name change.) If this information is not provided, your application will be returned. *2H and 2I* — if you have a change of mailing address and/or station location, you must check 2H and/or 2I. *Do not check 2A* (this indicates no change). If you have changes and do not check blocks 2H and/or 2I it will result in one of two actions: (1) the return of your application for clarification of items 7 and 8 (current mailing address and current station location) that differ from your current license or, (2) a license renewal with no changes, which would be issued but returned to the FCC as undeliverable because of your change of address (box 2H not checked). It is important that changes from your current license are noted and the proper boxes checked.

For more information on the proper way to fill out the new 610 form, see "Washington Mailbox," February 1981 *QST*, page 60.

LOW-POWER TV PROPOSAL DRAWS LEAGUE CONCERN

ARRL has filed comments in the Federal Communication Commission's proposal to license low-powered television stations and to permit so-called television "translators" to originate broadcasts. The proposal, made under BC

Docket 78-253, would create a new TV broadcast service of 10- or 100-watt vhf stations, and 100- or 1000-watt uhf stations, depending on the frequency used.

The League's comments expressed concern over the possibility of "television receiver interception of or susceptibility to unwanted rf energy" in the context of relatively weak TV signals. It pointed out that radio amateurs have become quite proficient in techniques to suppress television interference resulting from the operation of their licensed amateur stations, even though the problem stems almost exclusively from defects in the basic design of television receivers. Amateurs have also found that the problem of television interference and the degree to which undesired radiation in the TV receiver must be suppressed depends in large measure to the strength of the TV signal. If the TV signal is very weak, it is far more difficult to suppress interference.

Should the Commission decide to allow this new type of TV broadcast service, the League has asked that it concurrently examine the design of television receivers with a view toward improvement of existing rejection techniques. Furthermore, it asked that the public be cautioned that signals from these new stations can not be expected to have the same effective range as regular TV stations. In other words, the public should be told at the outset that reception in normal TV "fringe areas" may be difficult or impossible in some cases.

FRANKLIN K. MATEJKA, K5RS

Franklin K. Matejka, K5RS, former director from the League's Rocky Mountain Division, joined Silent Keys on January 22, 1981. Frank was a construction engineer of top-level qualifications. For years he was involved with the Colorado-Big-Thompson project of the Bureau of Reclamation. Drilling of a huge conduit would commence simultaneously on each side of a mountain three miles wide; if the channel was off alignment more than a few inches when the drillers met, Frank said, "We'd have to fill 'er up and start all over again." His skill was such that he was chosen manager of the huge Sariyar water project in Turkey, which required resigning the directorship in the midst of a fourth term. That engineering feat accomplished, he joined the executive team for the St. Lawrence Seaway project. More recently, he retired to Texas.

His director tenure, 1947-53, witnessed considerable upheaval in amateur affairs — the first postwar WARC (Atlantic City, 1947) which greatly revamped the amateur frequency spectrum; FCC Docket 9295, the first and most intensive battle over incentive licensing; and the first appearance of serious TVI, threatening the very existence of hf Amateur Radio. Frank's extensive background (licensed in 1921) served him well in the League post: The division endorsed his performance by nominating no one else for three successive elections. He held calls 5RS, W5CKS, W5DAH, W9ZNN, WØZNN, WØDD, W2BB, W1MT and finally K5RS.

LEAGUE REQUEST BRINGS BUILDING-CODE MODIFICATION

The BOCA Basic Building Code, established by the Building Officials and Code Administrators International, Inc., has been adopted in hundreds of communities throughout the United States, as well as by several states. The 1978 edition of this nationally recognized model code provided in Section 427 for "antennae structures for private radio or television reception not more than 12 feet in height . . ." that might be erected on a roof without a building permit. The same section provided that "The installation shall not be erected nearer to the lot line than the total height of the antennae structure."

Unfortunately, many building inspectors and officials construed this to mean that no ground-mounted tower or antenna mast might be erected to a height above ground exceeding the distance from the base of the tower to the owner's nearest property line. This so-called "fall-safe" concept effectively barred many radio amateurs living on small urban lots from erecting a tower of reasonable height above surrounding trees and power lines.

In 1978, ARRL proposed to BOCA that language be added to Section 427 limiting its application to *roof-mounted* structures. Radio amateurs in communities governed by the BOCA Basic Building Code will be pleased to know that BOCA adopted the League's proposals exactly as presented. The revised Section 427 reads:

427.1 *Permits not required:* Antennae structures for private radio or television reception not more than twelve (12) feet in height may be erected and maintained on the roof of any building without a building permit. Such a structure, however, shall not be erected so as to injure the roof covering and when removed from the roof, the roof covering shall be repaired to maintain weather and water tightness. The installation of any antennae structure mounted on the roof of a building shall not be erected nearer to the lot line than the total height of the antennae structure above the roof, nor shall such structure be erected near electric power lines or encroach upon any street or other public space.

427.2 *Permits required:* The approval of the building official shall be secured for all roof-mounted antennae structures more than twelve (12) feet in height above the roof. The application shall be accompanied by detailed drawings of the structure and methods of anchorage. All connections to the roof structure must be properly flashed to maintain water tightness. The design and materials of construction shall comply with the requirements of Section 426.3 for character, quality and minimum dimension.

If your community is governed by the BOCA Code, and you are refused a permit to erect a tower because of a strained and erroneous construction of Section 427 as it existed before the revision, be sure to call attention to Code Change No. B90-79, 1978 edition, or Section 626 of the 1981 edition, BOCA Basic Code. — *George Goldstone, W8AP*

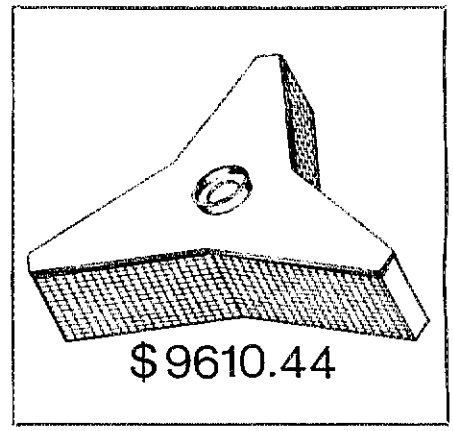
SCHOLARSHIPS

The Foundation for Amateur Radio, Inc., (FAR) a nonprofit organization with its headquarters in Washington, DC, plans to award eight scholarships for the academic year 1981-82. All amateurs holding a license of at least the FCC General class or equivalent can compete for one or more of the awards if they plan to pursue a full-time course of studies beyond high school and are enrolled or have been accepted for enrollment in an accredited university, college or technical school. The scholarship awards range from $300 to $900, with preference given in some of them to residents of various areas.

Additional information and an application form can be requested by a letter or postcard, postmarked prior to May 31, 1981, from FAR Scholarships, 8101 Hampden La., Bethesda, MD 20014. The Foundation is devoted exclusively to promoting the interests of Amateur Radio and to scientific, literary and educational pursuits that advance the purposes of Amateur Radio — *Foundation For Amateur Radio, Inc.*

TWENTIETH-ANNIVERSARY AMATEUR SATELLITE FUND DRIVE

Your Help is Needed was the proclamation in "It Seems to Us . . ." February 1981 *QST* for the ARRL Foundation's Satellite Fund. And thanks to many contributors, help for the future of amateur satellites is on the way. Contributors of $100 or more, as this is being written, include: The Fox River Radio League, Inc., W9CEQ; George J. Freund, W5QMI; William A. Meissner, W1GOY; W. P. Gearhiser, W5EPW; SEANARC 1980 ARRL National Convention Committee; Kenneth M. Miller, K6IR; Jerry Johnson, K7WVZ and William G. Brown, K9LF.



We have a long way to go to fulfill our goals in the successful completion of this phase of the satellite program. Won't you become a part of tomorrow's communications world by sending your contribution today to the ARRL Foundation, Inc., 225 Main St., Newington, CT 06111? — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

INLAND WATERWAYS GETS 216-220 MHz — REMEMBER THE CONFUSION?

The FCC has allocated the frequencies 216-220 MHz to the Mississippi River Maritime Communications System by a Report and Order in General Docket 80-1. Early last year, radio amateurs became alarmed when the FCC proposed the rulemaking to allocate spectrum for an automated inland-waterways communications system (IWCS) along the Mississippi River and connecting waterways. The Notice of Proposed Rulemaking (NPRM) addressed allocating the 216-220 MHz segment to IWCS; however, a phrase in paragraph 26 of the proposal said that FCC was considering the "216-225 MHz" band. This would have included the amateur 220-MHz band.

League officials quickly pointed out the error to the Commission, urging that amateur 220-MHz enthusiasts be reassured that the Commission was not proposing to take amateur frequencies. On March 10, 1980, FCC released a "Third Errata" in Docket 80-1 which changed the phrase "216-225 MHz" to "216-220 MHz." While some amateurs may still not be aware of the errata, this latest action by the Commission should put to final rest the fears that the amateur 220-MHz band is about

to become part of the Maritime Mobile Radio Services.

STAFF NOTES

Carol L. Colvin, AJ2I, has come on board the good ship ARRL as Editorial Assistant and Copyeditor in the Editorial/Production Department. Her duties will include the editing of Strays, *QST* general-interest feature articles and monthly *QST* columns. Moving to Connecticut from Kingston, New York, Carol was born and raised in Lima, Ohio (the home of the Lima bean). A 1973 graduate of Ohio State University (B.A. Political Science), she is an active ham indeed. Carol was first licensed in 1977 as WB2KLU and received the Extra Class call AJ2I in 1979. She enjoys operating both phone and Morse in the 40-, 15- and 10-meter bands, and keeping in touch with friends by radio. Besides ham radio, Carol enjoys watching old movies, refinishing antique furniture and playing with her two daughters, Tara and Charisse. Carol is also an avid fan of the Ohio State Buckeyes. Welcome, Carol! — *Richard Palm, K1CE*

CABLE TV COMPANY DRAWS ARRL FIRE

Concerned with the escalating incidence of CATV interference to amateur operations, ARRL has formally opposed a petition filed with FCC by Teleprompter Cable Communications Corporation (TPT). In its petition, TPT requested Commission approval of a channel arrangement using harmonic-related carrier frequencies rather than standard frequencies. The League cited the work of Washington state amateurs whose tests have shown that TPT's present cable system in Richland and Benton Counties, Washington, leaks rf energy, causing interference to amateur operation in the 144-148 MHz band. Although TPT's proposed channel configuration should cause no problems for Amateur Radio, cable leakage from its present operations appears to be excessive. Amateurs have measured signals emanating from the cable system with levels varying from 0.2 μV to over 100 μV, far in excess of the 20 μV level permitted by Commission rules.[1] ARRL pointed out that cable leakage may cause similar interference problems to other services as well — ground-to-air, police, fire and other public-safety communications. The League requested FCC to withhold approval of TPT's petition until the leakage from its present system is cleaned up. Granting TPT's request at this time would not be in the public interest. — *Richard Palm, K1CE*

[1]Section 76.605(a)(12) limits radiation from a community unit to 20 μV/m at 10 feet on frequencies of 54 to 216 MHz.

EARTHQUAKE PREDICTION RESEARCH TO INVOLVE RADIO AMATEURS

Amateur Radio operators are needed to help gather data for a research project that could lead to scientists being able to predict when earthquakes will occur.

The Earth Science Department of the University of Alabama, in conjunction with other research groups, has begun to study geomagnetic disturbances and how they relate to movements in the Earth's continental plates. In recent years certain information has been gathered which suggests that by measuring beacon-type radio station signals a correlation can be drawn between changes in radio signals and shifts in the earth. It is believed that hours before an earthquake occurs certain characteristics of transmitted radio signals improve. With the exception of some studies done by Soviet scientists, no other known research has been done in this area.

Volunteers are needed across the U.S., as well as around the world, to gather information on changes in band conditions, particularly unusual or unpredicted hf band openings, and to report their observations to researchers. Scientists hope to use the information obtained from this long-range test to help them detect earthquakes before they occur.

For more information on how you can get involved in this research project, send an s.a.s.e. to Scott Thompson, KB6CC, 4024 W. Monte Vista Ave., Visalia, CA 93277.

STATEWIDE RELIEF FROM ANTENNA RESTRICTIONS SOUGHT FOR CONNECTICUT

Connecticut State Representative David Thorp, KA1KC, has proposed House Bill 6235, seeking to place some restrictions on how towns regulate Amateur Radio antennas. At a hearing held at the State Capitol February 17, Representative Thorp expressed concern that if Connecticut towns continue their trend in adopting overly restrictive ordinances affecting antennas, the emergency communications capabilities of the state's amateurs will be seriously impaired. HB 6235 would amend Section 8-2 of the Connecticut General Statutes to provide that "no zoning regulation shall limit the height of any federally licensed Amateur Radio antenna."

Representative Thorp testified that the tone of the bill may be a bit too strong, but he would offer some substitute language which would accomplish the same goals while having a lesser effect on towns' rights. W. Dale Clift, WA3NLO/1, testified as a citizen of Connecticut and as a representative of the American Radio Relay League. After running a 2-minute video recording of a Connecticut mayor commending hams for their public service in the aftermath of a tornado, Clift pointed out some examples of towns' unreasonableness in applying zoning ordinances to radio amateurs. He mentioned in particular the case of W1TUW/R, which was forced off the air because a zoning board required the height of its antenna to be lowered to a point where it was no longer effective, and the case of K1EAT, who has spent over $1600 in surveyor's and attorney's fees in an unsuccessful attempt to receive approval for his 70-foot antenna.

ARRL Hq. has sent information about the bill to all ARRL-affiliated clubs in the state in the hopes that their members will write to legislators in support of the measure. At press time, HB 6235 was being held in committee.

VOLUNTEERS FOR FCC — H.R. 2203

A bill has been introduced into the 97th Congress which would allow the FCC to use volunteers in the preparation and administration of amateur license examinations. It would also allow amateurs to assist the FCC in monitoring violations of rules in the amateur bands; similarly, CBers could assist in monitoring violations occurring in the CB band. The bill, H.R. 2203, was introduced by Representative William E. Danemeyer, R-39th District of California (Fullerton, Orange, Placentia, part of Anaheim and so forth).

The legislation proposes to amend Section 4(f) of the Communications Act of 1934 by adding at the end thereof the following new paragraph:

"(4)(A) For purposes of monitoring any violation of any provision of this Act, and of any regulation made by the Commission pursuant to this Act, relating to amateur station transmissions, the Commission, without regard to part III of title 5, United States Code, may (i) recruit and train any individual licensed by the Commission to operate an amateur station; and (ii) accept and employ voluntary and uncompensated services of such individual. For purposes of recruiting and training such individual, the Commission, without regard to part III of title 5, United States Code, may accept and employ voluntary and uncompensated services of any amateur operator organization." A similar section, 4(f)(4)(B), deals in like manner with the CB radio service.

The administration of Novice license examinations by those holding higher tickets would be placed into statutory law by these words:

"(C) For purposes of administering any examination for the least-privileged class of amateur operator license established under section 303 (l) of this Act, the Commission, without regard to part III of title 5, United States Code, may accept and employ voluntary and uncompensated services of any individual who is licensed by the Commission to operate an amateur station and whose license is not of such class."

The problems which have come up (e.g., in the Reston Freedom of Information case) concerning amateur and CB transmissions under the secrecy provisions (Section 605) of the Act, are handled by this proposed amendment:

"Section 605 of the Communications Act of 1934 (47 USC 605) is amended by adding at the end thereof the following new sentence: 'This section shall not apply to any receipt, divulgence, publication or utilization of the contents of any Amateur Radio or CB transmission by any individual in the course of providing voluntary and uncompensated monitoring services to the Commission under sections 4(f)(4)(A) and (B) of this Act.' "

H.R. 2203 has been referred to the Committee on Energy and Commerce, Subcommittee on Telecommunications, Consumer Protection and Finance. ARRL members who are interested in supporting the Bill (and who reside in the districts of the following Representatives) should write them as soon as possible. Hq. would appreciate a copy of your letter.

Timothy E. Wirth, D-CO, Chairman
Ronald M. Mottl, D-OH
James H. Scheuer, D-NY
Edward J. Markey, D-MA
Thomas A. Luken, D-OH
Al Swift, D-WA
Henry A. Waxman, D-CA
Cardiss Collins, D-IL
W. J. Billy Tauzin, D-LA
John D. Dingell, D-MI, *ex officio*
James M. Collins, R-TX
Matthew J. Rinaldo, R-NJ
Carlos J. Moorhead, R-CA
Marc L. Marks, R-PA
Thomas J. Tauke, R-IA
Thomas J. Bliley, Jr., R-VA
James T. Broyhill, R-NC, *ex officio*

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

Malicious Interference

A malignancy by a minority, malicious interference continues to plague the amateur bands. Although the problem has always existed to some degree, it has become a crisis in recent times. Amateurs have faced crises before such as the RFI problem of the 1950's — but unlike RFI, the crisis of malicious interference has been generated from within our own ranks. And like the problem itself, the solution will be generated from within. The amateur community, after all, is still one of the best self-policed services under FCC jurisdiction.

Q. What are the rules concerning malicious interference?

A. The specific rule prohibiting interference is §97.125: "*No licensed radio amateur shall willfully or maliciously interfere with or cause interference to any radiocommunication or signal.*" In many cases of intentional interference, more rules are often involved. §97.115 prohibits the transmission of music by amateur stations. Sometimes obscenity, profanity and indecency are involved and prohibited under §97.119. False signals are often involved — §97.121: "*No licensed radio operator shall transmit false or deceptive signals or communications by radio, or any call letter or signal which has not been assigned by proper authority to the radio station he is operating.*" Stations causing malicious interference seldom give their proper station i-d — §97.123 prohibits unidentified communications. Perhaps the most comprehensive rule concerning amateur operation is §97.78 which states, "*In all respects not specifically covered by these regulations each amateur station shall be operated in accordance with good engineering and good amateur practice.*" This rule allows the Commission greater flexibility in enforcement because of its all-encompassing nature.

When malicious interference is involved in a rules violation, it is seldom that only *one* rule is violated.

Q. Rules are one thing, but how can I fight malicious interference at an individual level?

A. When experiencing malicious interference, use the most effective means of combatting it at your disposal — *ignore it* on the air. Call an FCC Monitoring Station and alert it to the situation (Table 1). (This step is not practical in the case of vhf interference.) Simply give the facts — frequency and stations involved. Follow through with a brief written letter to the facility, noting dates, times, frequencies and call signs (Table 2). Encourage others to do the same. Don't bother with tape recordings — they're of little value to the Commission after the fact.

Above all, keep your on-the-air operation strictly above board. Don't make the Commission's job more difficult by engaging interfering stations in their own game. And, by ignoring the offending stations, you deprive them of their one need — attention.

Table 1

FCC Monitoring Stations

Allegan Monitoring Station — P. O. Box 89, Allegan, MI 49010 Phone: 616-673-2063 616-673-3055
Anchorage Monitoring Station — P. O. Box 2955, Anchorage, AK 99510 Phone: 907-243-2153
Belfast Monitoring Station — P. O. Box 470, Belfast, ME 04915 Phone: 207-338-4088
Douglas Monitoring Station — P.O. Box 6, Douglas, AZ 85607 Phone: 602-364-2133
Ferndale Monitoring Station — P. O Box 1125, Ferndale, WA 98248 Phone: 206-354-4892
Fort Lauderdale Monitoring Station — P. O. Box 16027, Fort Lauderdale, FL 33318 Phone: 305-473-9845 305-472-5511 (recorded information)
Grand Island Monitoring Station — P. O. Box 1588, Grand Island, NE 68801 Phone: 308-382-4296
Kingsville Monitoring Station — P. O. Box 632, Kingsville, TX 78363 Phone: 512-592-2531
Laurel Monitoring Station — P. O. Box 250, Columbia, MD 21045 Phone: 301-725-3474
Livermore Monitoring Station — P. O. Box 311, Livermore, CA 94550 Phone: 415-447-3614
Powder Springs Monitoring Station — P. O. Box 85, Powder Springs, GA 30073 Phone: 404-943-5420
Sabana Seca Monitoring Station — P. O. Box FCC, Sabana Seca, PR 00749 Phone: 809-784-3772
Waipahu Monitoring Station — P. O. Box 1035, Waipahu, HI 96797 Phone: 808-677-3954

Q. Our net is often inundated with malicious interference. What can we do to suppress it?

A. Nets are often singled out for abuse because of their "ownership" of a particular frequency. Of course, no one has any special privilege to any part of a band. Keeping this in mind, use extra caution when choosing a frequency to engage your net. If you experience difficulties with interference, have net members contact a monitoring station and, as mentioned earlier, keep operation legal and follow up with written documentation (lengthy dissertations are not necessary — just the facts).

Apply peer pressure. If a known bad apple tries to check into your net — ignore him or her; chances are, the offender will go away.

Q. What is the role of the Federal Communications Commission?

A. The Commission's role in *our* fight against malicious interference will be to enforce its rules. There are severe penalties for violations of federal rules: If the FCC finds that you have violated the Communications Act, FCC rules or 18 U.S.C. 1464 (which prohibits the transmission of obscene, indecent or profane language), you may have to pay as much as $2000 in fines. If FCC finds that you have willfully or repeatedly violated the Communications Act or FCC rules, it may revoke or suspend your license. Violations of FCC rules are *serious*. Many repeat offenders have already been dealt with harshly.

Q. What can the amateur community do collectively to combat malicious interference?

A. Education is a large part of the solution — amateur clubs and organizations should spread the word about proper operating standards among their members. Point out effective means of dealing with interference. The exertion of peer pressure through club committees is helpful.

Q. What is ARRL doing about the problem?

A. By a directive of its Board, ARRL has established the Interference Task Force for the purpose of initiating an ongoing program of assistance to local interference committees, clubs and individuals. The ITF will coordinate an educational program, provide reference manuals and guidelines for interference committee operating procedures and provide liaison at the national level for those cases to be referred to FCC for action. The Task Force's goal is for the local interference committees to be able to resolve the majority of interference cases, which is consistent with amateurs' self-regulatory posture. Hard-core cases, having been reviewed by local committee, will be referred to FCC for their handling. Watch "Happenings" in *QST* for developments — the "FCC Censure-y Club" section reports FCC actions against amateurs involved in malicious interference cases. QST

Table 2

Suggested FCC Monitoring Station Report Form

Malicious Interference Report *Amateur Radio Service*

Date of occurrence:_____ Frequency:_____
Time of occurrence:_____ Complaint:_____
Call signs:_____
This report was phoned in on_____
(date)
Name:_____ Call:_____ Date:_____

*Assistant Manager, Membership Services, ARRL

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

CRRL Officers and Directors

President: A. Mitch Powell, VE3OT
Honorary Vice President: Noel B. Eaton, VE3CJ

Secretary: Frederick H. Towner, VE6XX
Directors: Thomas B. J. Atkins, VE3CDM
Albert G. Daemen, VE2IJ

A. George Spencer, VE6AW
Counsel: B. Robert Benson, Q.C., VE2VW

The WAVE and WACAN Awards

Nortown Amateur Radio Club (Ontario) is the sponsor of two long-established and internationally respected awards: WAVE, Worked All VE, and WACAN, Worked All Canada.

To qualify for the WAVE Award, an amateur must produce confirmation of QSOs with two different stations, on two different bands, for each of the following sections: Prince Edward Island VE1 or Nova Scotia VE1 or New Brunswick VE1 (two contacts only), Quebec VE2, Ontario VE3, Manitoba VE4, Saskatchewan VE5, Alberta VE6, British Columbia VE7 and Yukon or Northwest Territories VY1 or VE8. All contacts must have been made from an area within a radius of 200 km (approximately 125 miles) of one point, and after January 1, 1939. Applicants submit proof of the 16 contacts with one dollar or five IRCs.

To qualify for the WACAN Award, an amateur must produce confirmation of QSOs with two different stations, on two different bands, for each of the following sections: Prince Edward Island VE1, Nova Scotia VE1, New Brunswick VE1, Quebec VE2, Ontario VE3, Manitoba VE4, Saskatchewan VE5, Alberta VE6, British Columbia VE7, Yukon or Northwest Territories VY1 or VE8, Newfoundland VO1 and Labrador VO2. Again, all contacts must have been made from an area within 200 km of one point, and after January 1, 1939. VO contacts must have been made after March 31, 1949. Applicants submit proof of the 24 contacts with one dollar or five IRCs.

The WAVE (Worked All VE) Award was established by the Canadian Amateur Radio Operators' Association back in 1939. This award and the WACAN (Worked All Canada) Award are now sponsored by Nortown ARC.

Confirmation of QSOs for the WACAN Award will be automatically applied to a WAVE Award, which can then be obtained for an extra dollar or five IRCs. Holders of the WAVE Award can upgrade to the WACAN Award by producing confirmation of QSOs with two stations, on two different bands, in the extra four sections: Newfoundland VO1, Labrador VO2 and the two VE1 provinces not submitted for the WAVE Award. Again, submit proof of the eight contacts with one dollar or five IRCs.

Applications for WAVE and WACAN Awards should be sent to Nortown Amateur Radio Club, Box 146, Station A, Willowdale, ON M2N 5S8. Under no circumstances should actual QSL cards be sent. A sworn affidavit, certified by the president or vice president of a legitimate Amateur Radio organization or by a commissioner for taking affidavits, should be sent instead of cards. Photocopies of QSL cards are also acceptable. Specific questions about the WAVE and WACAN Awards may be directed to Nortown ARC's awards chairman, Wayne Hodges, VE3IMI, 902 - 60 Clipper Rd., North York, ON M2J 4E2.

WITH THE DOC

DOC has informed CRRL of new agreements for third-party traffic with Australia and reciprocal licencing with the Republic of Ireland.

Representatives of both CRRL and CARF attended a meeting, called by DOC in Ottawa on January 24, to prepare a major revision of TRC-24, the syllabus for all amateur examinations. President Mitch Powell, VE3OT, headed the CRRL team. President Bill Wilson, VE3NR, headed the CARF team. The meeting was friendly and constructive. Recommendations were well received by DOC. If adopted, DOC would (1) reintroduce code-sending tests, (2) permit up to three errors in code-sending and receiving tests, (3) ask both multiple-choice and essay-type questions on technical portions of exams and (4) make a clear distinction between levels of difficulty of Amateur and Advanced Amateur exams. The Amateur exams would require only a conceptual and practical knowledge of material, the Advanced Amateur a more-detailed knowledge. Syllabus content was discussed, and both CRRL and CARF were asked to provide more-detailed outlines within three weeks. The CRRL outline has now been submitted. It was prepared by CRRL President Powell, an experienced technical instructor, and listed not only content, but also performance objectives for items in the list. Target dates for the revised TRC-24 are publication by September 1981, and implementation by January 1982.

U.S. Coast Guard Loran-A has ceased operation on the 160-meter band. CRRL has asked DOC to remove all restrictions on amateur operation on this band. One problem is that Canada will continue to operate its East Coast Loran-A chain on 1950 kHz for two more years. CRRL has proposed temporary restrictions on amateur operation between 1925 and 1975 kHz to protect this chain until it, too, ceases operation.

As a result of WARC '79, the amateur service will be receiving new bands at 10, 18 and 24 MHz. The 10-MHz band will be Amateur on a secondary basis, while 18 and 24 MHz will be Amateur on a primary basis. The 18- and 24-MHz bands were not expected to become available until the late 1980's. CRRL has, however, submitted a petition to DOC requesting that on January 1982, 10 MHz become available for amateur use, and 18 and 24 MHz also become available, but on a secondary basis, until such time that they become Amateur on a primary basis.

CRRL NEWS

☐ The CRRL *Advanced Amateur Licencing Manual* is now available. As with the CRRL *Amateur Licencing Manual*, format is loose-leaf, suitable for three-ring binders. The 98 pages are divided into 10 chapters which closely follow the DOC syllabus. Author Ralph Zbarsky, VE7BTG, gives straightforward explanations, clear diagrams and humour, which make for enjoyable reading and easy understanding. Ralph is an ARRL-CRRL assistant director, and is looking after sale and distribution of both the Amateur and Advanced Amateur manuals. Cost of the Amateur manual is $13.50 ppd. Cost of the Advanced Amateur manual is $9 ppd. Order directly from Ralph at 3275 West 22nd St., Vancouver, BC V6L 1N1, or write to CRRL in London, Ontario. Incidentally, the CRRL *Amateur Licencing Manual* continues to sell well — it's now in its fifth printing. Over 2000 copies have been sold in little over a year. Users say it's the best Canadian licencing manual on the market.

☐ CRRL did contact Canadian postal authorities about the late delivery of December and January *QST*, and postal authorities are trying to determine the cause. The problem seems centered on Ontario. Most western amateurs, for instance, received *QST* without delay.

☐ *QST* in French? Well, not quite! But CRRL has helped RAQI, Radio Amateur du/of Quebec, obtain permission to translate *QST* technical articles into French for publication in their *RAQI Journal*. This should help many amateurs who speak only French to keep up with the state of the art in Amateur Radio.

☐ A CRRL Cross-Canada Net has begun below 14,130 kHz at 2130Z on Sunday afternoons. CRRL members are invited to check in and exchange ideas with CRRL representatives and workers.

☐ Contest forms and log sheets for all League contests are now available from CRRL. Just send your request and an s.a.s.e. to CRRL, Box 7009, Station E, London, ON N5Y 4J9. CRRL is also beginning a service through which blind amateurs may receive *QST* on cassette tape. Details will be announced shortly.

☐ The CRRL official bulletin station (OBS) system has been in operation since January, and seems to be working smoothly. Bulletins are generated in London, Ontario, and contain information about regulatory developments affecting Amateur Radio, representations made to DOC and other regulatory bodies by CRRL, upcoming events, and any other happenings that are of interest to Canadian radio amateurs. Bulletins are read on local and regional nets by the operators of VE1QST, VE2QST and so on. In addition, VE7QST provides bulletin service on Sundays at 1730Z on the 14,140 kHz Trans-Canada Net. W1AW also transmits CRRL bulletins on its regular schedule.

Canadian amateurs have been named to all League Advisory Committees. They are: Henry Thel, VE7WJ, Contests; Harold Parsons, VE3QA, DX; Mike Goldstein, VE3GFN, Emergency Communications; Tom Atkins, VE3CDM, Public Relations; Ron MacKay, VE1AIC, Repeaters and Les Weir, VE3AIB, VHF-UHF. QST

*163 Meridene Cr. W., London, ON N5X 1G3

YL News and Views

Conducted By Jean Peacor,* K1IJV

More Than Gold in "Them Thar Hills"

While some were out looking for gold in "them thar hills," there were others — pioneers of radio — in the same hills looking for rocks. Rocks that would be used as crystals for cat-whisker detectors. These were not galena crystals; more often they were iron pyrites.

At the age of 10, Harriet Kat (now Harriet Amborn, N6HA) was an expert at finding the best of these rocks. Her two older brothers, who were interested in radio, always took her along when they would hike into the Oakland Hills. What Harriet would find always produced the cleanest code signal — far superior to what could then be bought in radio stores. She also spent hours winding and shellacking a large number of coils for her brothers. So many coils, that she began to wonder if they were selling them to their friends. Some were used for their home-built receiver which was used for cw and music reception. Harriet rarely listened to the radio because the noise produced was just too much for her.

Harriet Amborn, N6HA.

Taking the Big Step

There were three girls in the Kat family. In 1927, Mary was being coached by a ship's radio officer for the Department of Commerce's Amateur Radio exams. Another sister, Babe, came home from school one day and announced that she had enrolled in a new evening radio class starting at Roosevelt High School in Oakland, California. She encouraged Harriet to join her, "because your math is so good." On May 19, 1928, a San Francisco newspaper headlined an article "Three Sisters Given U.S. Licenses as Radio Amateurs." The Federal Radio Supervisor for California's Department of Commerce stated in the article that he believed this to be the only time three girls in one family had been awarded radio licenses.

It was through ham radio that Harriet met her future OM, Phil, W6PA. In her words: "I often say, he chased me all over the airwaves until I caught him." They were married in 1930. Try as they might, no way could they put up a workable antenna in their apartment. Hamming took a back seat for a while.

With the Depression years upon them, both working and Phil also studying at the university, there was no time in their lives for radio for a few years. Harriet's license lapsed in 1935, Phil's in 1939. Both sisters had dropped out around 1930.

In 1965, both Harriet and Phil worked together to again become radio amateurs. They passed their General exams. They both continued to study and passed the Extra Class exam. They still had the apartment antenna problem, but this time it was solved.

Harriet is ex-W6DOY. "It took me a year longer than my OM to get my license back, eight years longer to make Extra Class and 50 years longer to get my initials for my call letters."

There is no need for Harriet to hike into the hills for iron pyrites for her radio equipment today. Yet, in her words, "The good old days of Amateur Radio are still good days."

A CAPITAL YL

Our nation's capital is also the QTH of a capital YL. She is Elizabeth Zandonini, W3CDQ, known to some as Liz, to others as "Emzie." If you are cw operator, chances are you've talked with her. During a Voice of America interview in 1963, Liz commented on her operating habits, "I may have been on phone once in my life."

Elizabeth Zandonini, W3CDQ.

Liz first became licensed as a radio amateur in 1922 as 3CDQ. She has been active ever since. Her interest in radio began in 1917 when she obtained a commercial ticket while still in high school. This knowledge was put to excellent use during WW I in the Women's Radio Corps. She also taught radio for rehabilitation in Army hospitals at Camp Meade and Fort McHenry. In 1921, she became a radio aide at the National Bureau of Standards where she helped with the establishment of WWV.

Liz has been active in so many things it would be impossible to list them all here. Some of the highlights well deserve mentioning. She is a 50-year member of ARRL and has been an Assistant Director in the Atlantic Division for many years. She is an OBS, A1 Op and a member of RCC. She was President of YLRL in 1949, has held every office in the Washington, DC Radio Club, has been Secretary of the Washington Chapter of QCWA for the past 15 years and a Trustee in the Washington, DC, Foundation for Amateur Radio for over 20 years. She is a member of OOTC, AWA and QCWW. In October 1979, she was honored by the Antique Wireless Association as the Member of the Year, the first YL to receive such recognition from AWA. A steadfast straight-key cw operator, Liz received a cup for the top YL cw copy at the National ARRL Convention in Seattle in 1951.

Liz has made a host of friends on the air over the years and has visited many in her extensive travels. She is fluent in several languages and frequently serves as guide and interpreter to visiting foreign amateurs.

W3CDQ's first transmitter was the typical VT-2 with "slop jar" rectifiers and a "cage" antenna. Her present shack boasts a Ten-Tec 540 and a Drake TR-4. Her favorite antenna is a dipole in the attic.

After 43 years with the Bureau of Standards, Liz retired in 1965, and you can find her on the air practically every day now — usually on the low end of 40 or 20 meters. She's working toward WAS/YL and is, therefore, hunting YLs from all states. Listen for this capital Young Lady. You are guaranteed a memorable QSO. Liz is truly one of the great ladies of Amateur Radio.

*Country Club Drive, Monson, MA 01057

RESULTS, YLAP

CW — Gold Cup, N1YL
SSB — Gold Cup, DJ2YL
CW/SSB Combined — DX Worldwide Hager Award, DF2SL
CW/SSB Combined — NA, Central America Hager Award, HP1XIE
Corcoran Award — N1YL

SSB (top ten) — DJ2YL, 18,034; N1YL, 17,020; WD4NKP, 16,235*; WB3GRT, 13,791*; W2GLB/5, 12,144; K6KCI, 10,599*; DJ1TE, 10,395*; LX1TL, 10,058*; N7YL, 9,576; DL1MS, 8,820*. CW (top ten) — N1YL, 1050; K4AOH, 880*; WB4PRM, 814*; K1IJV, 638*; WA8FSX/7, 525*; VE3KTX, 446*; DK6FM, 438*; AG5C, 360*; VK3KS, 285*; I5UNA 261*.

*Low power multiplier.

Iris Colvin, W6QL (left) visiting the station of Shirley Larsen, SVØBC, on the Island of Crete. Iris and her OM Lloyd, of the YASME DXpedition, operated W6KG/SV9 for two weeks during October, making 9500 QSOs in 142 countries, both ssb and cw.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Microwave Matching Techniques

Impedance matching is necessary for optimum transfer of power from a generator to a load. In practical terms that means that if the output of your power amplifier is not matched to your transmission line, or if your transmission line is not matched to your antenna, then you will be losing power. If a power amplifier is mismatched, the lost power may take the form of heat dissipated in the tubes, causing reduced tube life and increasing amplifier thermal-tuning drift problems (which are quite common in high-power amplifiers using 7289 type tubes at 1296 and 2304 MHz).

At lower frequencies impedance-matching transformers are often constructed in coaxial lines using "Q sections" or $\lambda/4$ transformers, and open-wire feeders are often matched using short-circuited tuning stubs. These techniques can also be used at microwave frequencies, perhaps with greater ease since the physical dimensions of the hardware involved get smaller as the wavelength involved gets shorter. For example, a two-slug tuner (described later in this column) for 1296 MHz is about 1 foot long. An equivalent device for 144 MHz would be 9 feet long, a bit bigger than is convenient for use in most ham shacks!

Two-Stub Tuner

The two-stub tuner is shown schematically in Fig. 1. It is analogous to stub tuners used on open-wire feeders. I don't want to go into any great detail of the theory of operation of this tuner, except to say that as the lengths of the shorted stubs are changed, different values of capacitive or inductive susceptance are added to the 50-ohm line section. The addition of these susceptances combined with the spacing of the stubs can cancel out standing waves present on the 50-ohm line. The range over which standing waves can be cancelled depends on the number and spacing of the stubs. Theoretically a three-stub tuner with $\lambda/4$ spacing between the stubs can cancel out standing waves of any magnitude and phase. However, such a tuner is very difficult and sensitive to adjust, and is seldom used. The most commonly used arrangement is that shown in Fig. 1 with two stubs (which must be capable of adjustment over a half wavelength in length) spaced $3/8\lambda$ apart. The adjustment of such a tuner is easy, though its matching range is reduced. The tuning procedure is to set the shorted stubs at $\lambda/4$ initially (in this position they do not affect the 50-ohm line). One of the stubs is then adjusted to minimize the SWR on the line. When a minimum is reached, the other stub is then adjusted for more improvement. The first stub may then be further trimmed and so on until no more improvement is seen. This tuner can match out any SWR up to 2:1 and can often match out much higher SWRs depending on their phase.

The greatest potential problem in the construction of such a tuner is the construction of the sliding shorts. The contact points of the short are high-current points and any resistance can cause power losses and erratic tuning. A $\lambda/4$ finger-type short as shown in Fig. 2 moves the contact point to a low-current position and can give more reliable results. Those interested in the construction of a two-stub tuner are referred to an article by George Hatherell, K6LK, in December 1978 *Ham Radio*, page 72.

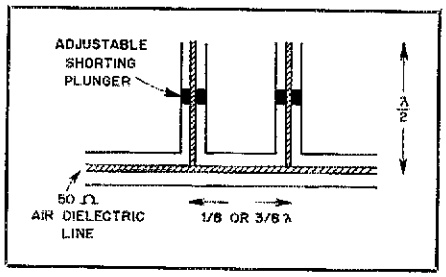


Fig. 1 — Two-stub tuner.

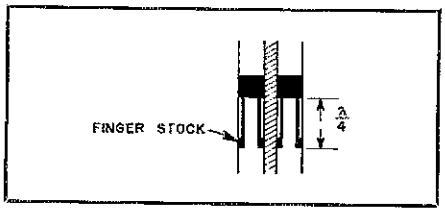


Fig. 2 — Improved $\lambda/4$ shorting plunger.

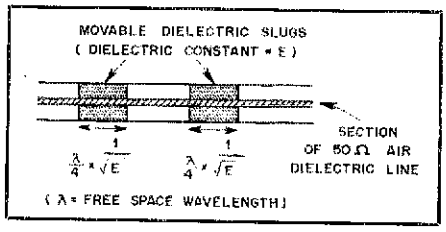


Fig. 3 — Two-slug tuner.

Two-Slug Tuner

A two-slug tuner is shown schematically in Fig. 3. The principle of operation of this tuner is that of the "Q section" or $\lambda/4$ matching transformer. It is well known that a $\lambda/4$ section of transmission line of characteristic impedance Z_m will match together two impedances, Z_{in} and Z_{out}, when connected between them and when the impedance values are related by the formula

$$Z_m^2 = (Z_{in} \times Z_{out})^{1/2}$$

It is also well known that the insertion of a $\lambda/2$ section of any impedance transmission line into a second transmission line will not affect the impedance of that second line.

Bearing the above in mind the tuner in Fig. 3 can be analyzed. It consists of a length of 50-ohm air-dielectric transmission line into which two movable $\lambda/4$ dielectric slugs are introduced. For use at frequencies above 1 GHz, Teflon is probably the only suitable material for these slugs. The presence of these slugs modifies the impedance of the line by a factor of $1/(\varepsilon)^{1/2}$ where ε is the dielectric constant of the slug material (ε is 2.1 for Teflon). Thus using Teflon, the dielectric slugs constitute two movable $\lambda/4$ sections of 34.5-ohm line. Note that the presence of the dielectric modifies the length of the slug. The length of a $\lambda/4$ section with the Teflon dielectric is $1/(\varepsilon)^{1/2}$, that of a $\lambda/4$ section of air dielectric line (e.g. at 1296 MHz $\lambda/4$ in air is 5.79 cm, while $\lambda/4$ in Teflon is 3.99 cm).

When the two Teflon slugs are moved so that they are touching they constitute a $\lambda/2$ section of 34.5-ohm line and, as a $\lambda/2$ section, they do not affect the impedance of the 50-ohm line section as sensed by any devices connected to it. When the slugs are moved apart, however, they act as $\lambda/4$ impedance transformers. Depending on their spacing and position in the line, the tuner can match out standing waves of up to ε^2 (4.4 in the case of Teflon slugs) of any phase, provided they can move over a sufficient length of air line (more than $3\lambda/4$).

The slug tuner is somewhat easier to construct than the stub tuner, principally because there are no current-carrying sliding contacts to make. The only difficult part of the construction is the cutting of a long slot (about 10 in.) in the outer of the 50-ohm air line section, to permit the movement of the dielectric slugs. (Unfortunately space does not permit details of the construction of a two-slug tuner at this time, but I hope to have such details in print in the near future.)

After building a tuner as described above, it occurred to me that since it consists of a section of slotted coaxial line, it is in principle quite easy to put a pair of small coupling loops into the line and thereby construct a device which is not only a tuner but which will give information on forward and reflected power as well! Initial tests on such a system indicate that it does indeed work quite well. One further point to note is the possibility of some rf radiation from the slot in a two-slug tuner. Although such radiation is expected to be at a low level, it is nevertheless advisable to be aware of it and perhaps incorporate shielding if high-power operation is anticipated.

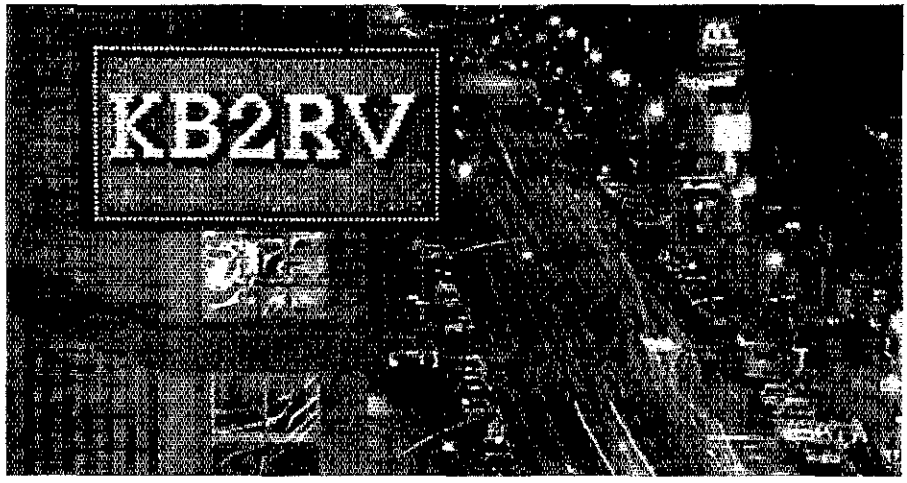
COMING EVENT

The 7th annual Eastern VHF/UHF Conference will be held on May 16 and 17 this year at the Sheraton, Boxboro, Massachusetts, (the same location as last year). Among the subjects planned for presentation on Saturday are antennas and arrays, narrow-band and microwave techniques (10 GHz ssb) and equipment for use on 1296 MHz. On Sunday it is hoped to have noise-figure measuring on the bands through 2304 MHz and antenna-gain measuring on 432 and 1296 MHz.

Watch for more detailed announcements soon.

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

Strays



Times Square in New York City is the setting for Jan Bridge's 4000-light, time-lapse QSL card photo of what may be the world's largest call sign. Listen for KB2RV as an HS, VS6, 4S7 or VQ9 *this summer working, you guessed it, QRP.*

LIGHTS, CAMERAS, ACTION! DIRECTORS HAVE PROMOTIONAL FILM

The ARRL Hq. film library does not distribute copies of *The World of Amateur Radio*, a promotional film designed to educate and inform the public about Amateur Radio. Because of the high demand for the film, it was necessary for us to send copies to each of our Directors. If you are interested in booking it, please contact your Director (listed in *QST*, page 8) to see if it is available. In the Atlantic and Southwestern Divisions, please contact your Vice Director. Modern Talking Picture Service also has many copies, and can be reached at tel. 813-541-6661. — *Joyce Martin, Audio Visual Branch, ARRL*

I would like to get in touch with . . .

U.S. high school or junior high Amateur Radio club stations for a net on 10- and 15-meter ssb. Mats Pettersson, SM6LRR, Gudmundsgatan 24, 441 Alingsas, Sweden.

anyone who served with the U.S. Marine Radio Detachment aboard the U.S.S. *Eldorado A.G.C. II* between 1954-56. R. T. Clark, WD8OOZ, 1520 County Line Rd., Hopewell, OH 43746.

firefighters interested in joining a firefighters' net on 10 meters. Send s.a.s.e. with four first class stamps to Claude Fant, Jr., KA8HBU, 328 Harrison Ave., Hamilton, OH 45013.

SPACE SHUTTLE OPERATION

The Antelope Valley ARC will hold a special-event operation at Edwards Air Force Base during the flight of the space shuttle, now scheduled for between April 1 and 15. The shuttle will land at Edwards. Operations, using the call K6OX, will last about 60 hours (the flight is to last 54 hours), and will be on or near 3.935, 7.260, 14.275, 21.310 and 28.650 MHz. — *Gary Barr, WA6TWT*

AMATEUR RADIO ON TELEVISION

KIDSWORLD, a nationally syndicated children's television show will air a segment on Amateur Radio entitled, "American Radio Relay League." To find out when the program will be aired in your area, call your local television station carrying the series and ask about the "American Radio Relay League" segment, episode number 175. A videotape cassette of this program can be purchased for $44 from Video Tape Associates, Inc., 2351 S.W. 34th St., Fort Lauderdale, FL 33312. Refer to the title and episode number when ordering.

QST congratulates . . .

Philip Keast, W6DD, who received the 1980 Award for Outstanding Citizenship from the Grass Valley, California, Chamber of Commerce. Mr. Keast, who has held his call for over 60 years, was cited for spreading "goodwill about Grass Valley" around the world through his Amateur Radio transmissions.

AMATEURS AID GRAVITY RACING CHAMPIONSHIPS

Most hams have never heard of Soap Box Rally racing, but a group of Chattanooga, Tennessee, amateurs were right in the middle of the action at the 1980 National Derby Rally Championship.

This past year's Nationals brought over 300 families to Chattanooga to pit their little gravity-powered racers against each other in a week-long series of eliminations. The Chattanooga ARC and the Chattanooga Tri-State FM Association volunteered manpower and equipment to assist.

An hf station was set up in a room at the headquarters motel to handle traffic for the many families in attendance. Numerous pieces of traffic were handled via National Traffic System (NTS) as families kept in touch with the folks in California, Michigan, Oregon and dozens of other states. Many youngsters, exposed to Amateur Radio for the first time, expressed a keen interest.

Another phase of amateur participation was direct assistance to the operation of the race and activities. Hams with handheld rigs furnished backup communications at the track, supplementing the telephone hookup between the pits, starting line and finish line. The amateur communications net became primary several times as the 100° heat caused some participants to require emergency medical aid. It was found that the amateurs were, in the words of Mike Reed, NDR chairman, "always there when you need them." A vhf link, set up between the track site and the headquarters motel, was used heavily during the week, coordinating the many activities of the championship week.

If you or your club would like to assist at a rally in your area, or if you have children in the 9- to 17-year-old age group and would like to find out more about NDR racing, please contact the author. As Amateur Radio/NDR liaison, I will be happy to put you in touch with a local racing group or send information on NDR racing. An s.a.s.e. would be appreciated. — *Jim Forrester, WA4LHL/5, Rte. 1, Box 559B, Meridian, MS 39301*

QST congratulates . . .

Ambrose McKenzie, W3BHE, of Cumberland, Maryland, who recently celebrated his 50th year in Amateur Radio and remains as active now as he was then. — *Ron Barb, K3OMN*

How's DX?

Conducted By Ellen White,* W1YL/4

DX Portrait

Last month we described early symptoms common to the DX virus. This peculiar malady is very long-lived, recurring even after long periods of remission. Its uniqueness is evident in that large numbers of those afflicted never really get cured!

How those long affected (and newly *in*fected) survive and prosper will be a persistent theme of this column in the months ahead.

Jock White, ZL2GX

This hardy New Zealander is approaching his 50th year in Amateur Radio, with the last 35 of those to his credit as Contest and Awards Manager for NZART, the New Zealand Association of Radio Amateurs. Jock's lifetime of DXing goes hand in hand with many other Amateur Radio activities, peripheral hobbies and a well-balanced productive lifestyle. Other avocations include coin and stamp collecting, an Amateur Radio museum, New Zealand art, etc. In fact, Jock's current collecting "fad" has him looking for the first 50 copies of the over 200 issues published of the popular Don Chesser "DX Bulletin" of some years ago.

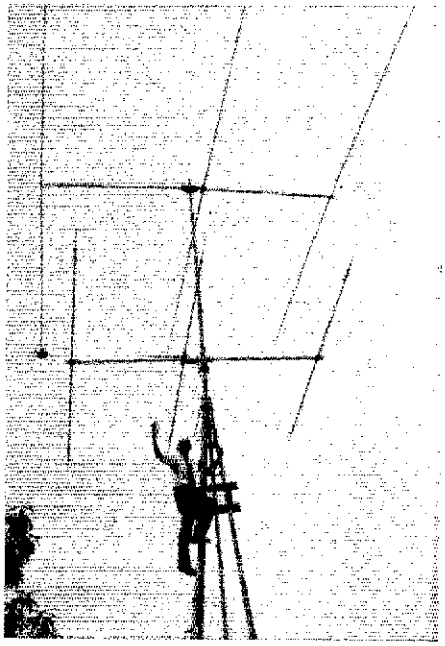
Now retired after 42 years in education (17 as principal of Gisborne Intermediate School), he still finds discretionary time to serve as Regional civil defense officer for the East Cape United Council (serving eastern New Zealand).

For some years ZL2GX has been QSL manager for numerous stations in Oceania, Africa and Asia. In fact, for a while he managed QSLs for one of the rarest of DX prefixes, 9N3 — for Peter Mulgrew, 9N3PW, recently killed in an Air New Zealand aircraft disaster in the Antarctic.

During his half century of hamming there have been numerous high points. Jock singles out three as his greatest moments in Amateur Radio: being elected an honorary member of the NZART (in 1960); making the world's first DXCC 300 (June, that same year); and meeting Charlie Meilen, W1FH, highly regarded by Jock and many others in the world as the *epitome* of the top DXer.

He admits to finding some operating practices irritating: the excessive use of emcees by DX stations (often self-appointed and a nuisance), and the desire by some for a clear channel (often an impossibility since sharing is the name of the game).

A hearty *kia ora* (Maori for GL!) both to and from ZL2GX — a DX'er worth emulating.



ZL2GX, our portrait candidate this month, is a "Collins believer," as evident in the photo. With two KWM2's (separate PTO units), an S-3 Line, KWM-1 plus an Argonaut with ancillary equipment, Jock's signal from down under radiates from a 20-meter monobander, 10/15 duobander, and drooping dipoles for 80 and 40. (*ZL2BFP photos*)

THE COST OF QSL'ING

Last month's "League Lines" made note of the fact that old-style IRCs are no longer redeemable for postage in the United States, as of January 1, 1981. New-style IRCs should prove more flexible in the years ahead, principally because they are *not* imprinted with the name of the selling country. Old-style ones issued in the United States may be exchanged for postage at a U.S. Post Office. Hopefully in the near future ARRL Hq. will have compiled a listing of those countries which do accept IRCs at their post offices. AS

Durable W4RHZ reminds us that the new postal rates bear some looking into. For instance, Joe points out that aerogramme lightweight envelopes for both the outgoing envelope and for the return card can save postage. (Aerogrammes now cost 30 cents each vs. 40 cents for one-half ounce of air mail.)

DEGREE OF DIFFICULTY

Last month we itemized prefixes of those countries with moderately large populations, an indicator of the likelihood of frequent QSOs. More selectively now, we approach what Honor Roll DX'er W1NG terms "Group 3." Contacts with stations in the following countries are sure to cause at least a mild adrenaline surge in neophyte DX'ers: 3B8 3D6 3V 5B 5H 5N 5U 5W 7P 7X 8Z4 9G 9K2 9M2 9N 9Q 9V A2 A4X A9X AP C3 C5 CEØA CT3 D4 DU EA6 FO(Polynesia) FR(Reunion) FS HBØ HKØ(San Andres) HM HS HZ/7Z J2 JT JY KC4 KG4 KG6/KH2 KG6/KHØ KS6/KH8 KX OD OHØ OY PJ(Sint Maarten) S7 TF TG TJ TU UA2 UA9-Ø UD6 UF6 UL7 UM8 UO5 VK9(Norfolk Is.) VP1 VP2A VP2K VK2K VP2S VP2V VP5 VP8(Faulkland Is.) VR1/T3(Gilbert & Ocean Is.) VR3/T3 VR8/T2 VW6 VU YB YJ YK ZB ZD8 ZK1(Southern Cook Is.) ZS3. Still find the going easy? Just wait till next month!

TIMELY TIPS

☐ *VE2ATD* will soon be active from Indonesia with a YB8 call and is looking for a QSL Manager. Contact Yves Dussault, VE2ATD, c/o Bina Marga, Box 291, Ujung Pandang, Sulawesi, Indonesia

☐ This is the last year the PZK will sponsor two modes in the same year for their annual contest. Starting in 1982, cw and phone will appear in alternate years. However, 1500Z April 4 to 2400Z April 5 will

*19620 SW 234 St., Homestead, FL 33031

Some DX'ers feel as strongly about contests as they do about DX. However, the French seem to have gone several steps further! On the left, all roads appear to lead to Saint Contest, named after a sixth-century Normandy bishop. On the right, F2WW's daughter Ingrid stands by a signpost near the Normandy village of Moon. Now, if that isn't quite enough, in the very same district several churches are named after another fifth-century Bishop — Saint Amateur. *Vive la France!* — (*F2WW photos*)

see the running of the 1981 cw event; phone, same times two weeks later on 80 through 10 meters with the usual categories. Details appear in March *QST*, page 82.

UA3AJ, an avid cw operator, is looking for counties in both North and South Dakota.

The Arkansas DX Association has a cute wrinkle in their club-member-only DX Contest. There will be two divisions for each mode; a 200-and-under division for those who have fewer than 200 countries worked at the beginning of the contest, for "big guns" and old timers, as well as previous contest winners, the ADXA has an Open Division. Good tip for your DX Club.

8Q7AQ was QRV on cw from December 19, 1980 to January 28, 1981. QSL to his home call, DL7FM. [QST]

QSL Corner

Administered By Joan Becker

ARRL-Membership Outgoing QSL Service

Send outgoing cards to this address: American Radio Relay League, 225 Main St., Newington, CT USA 06111.

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at a minimum of cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just $1 per pound or portion thereof (155 QSL cards average a pound).

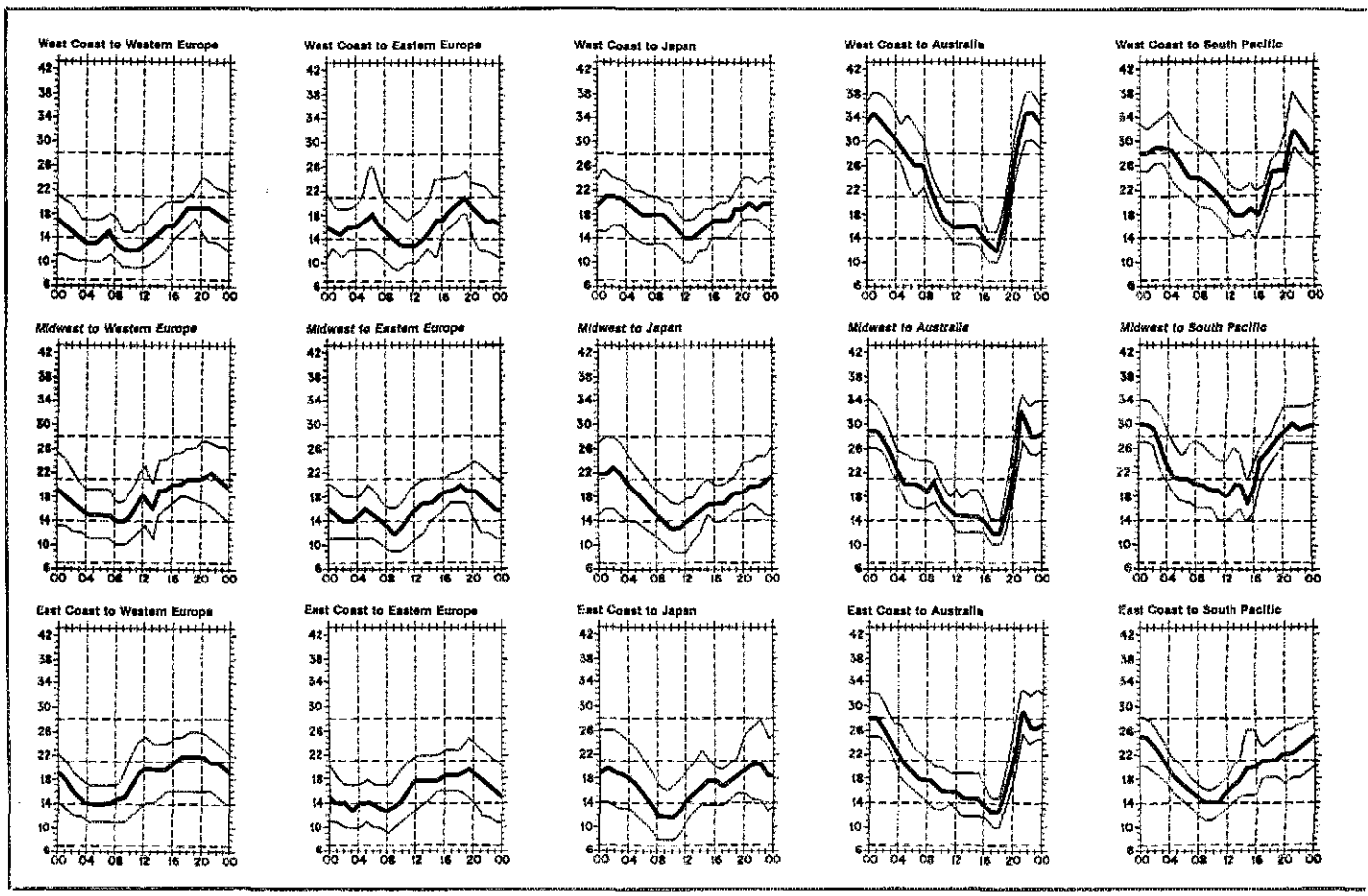
The ARRL-Membership Outgoing QSL Service operates *only* in an "outgoing" capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System," published every other month on this page.

U.S. amateurs may send SWL reports to foreign short-wave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: write for details.

Requirements

1) Presort your DX QSLs alphabetically by call sign prefix (A3, AP, C6, CE, F, FG, G, GI, GM, JA, 3A2, etc.).

2) Enclose the address label from the brown wrapper of your current copy of *QST*. This information shows that you are a current ARRL member. Family members may also use the service by enclosing their QSLs with those of the primary member. Include the



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

appropriate fee with each individual's cards and indicate "family membership."

Sightless members who do not receive *QST* should indicate that the QSLs are from a "sightless member."

ARRL affiliated club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that membership is current.

3) Enclose payment in the form of a check, money order or cash. Sending large amounts of cash through the mail is not suggested. Please do not send stamps.

Here is some 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 accurate. The call sign in parentheses is the QSL manager. Our thanks to AA4MI, W2QI and AK9Z for the helpful information.

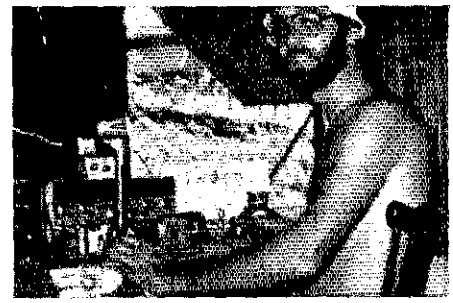
QTH information — G8YVN, Tom McCrimmon, 6 York, Albany, Walmer, Deal, Kent Close, United Kingdom

QSL requests for N2BA/HI8 — current address is: Brooke Allen, 132 E. 19 St., Apt. 6F, New York, NY, 10003. This address will be good only through the end of May 1981.

QSL MANAGER VOLUNTEERS

WD4GDZ WB3AKI
N2BZK K5QPT
K5MHZ K4KKQ
N2BJX

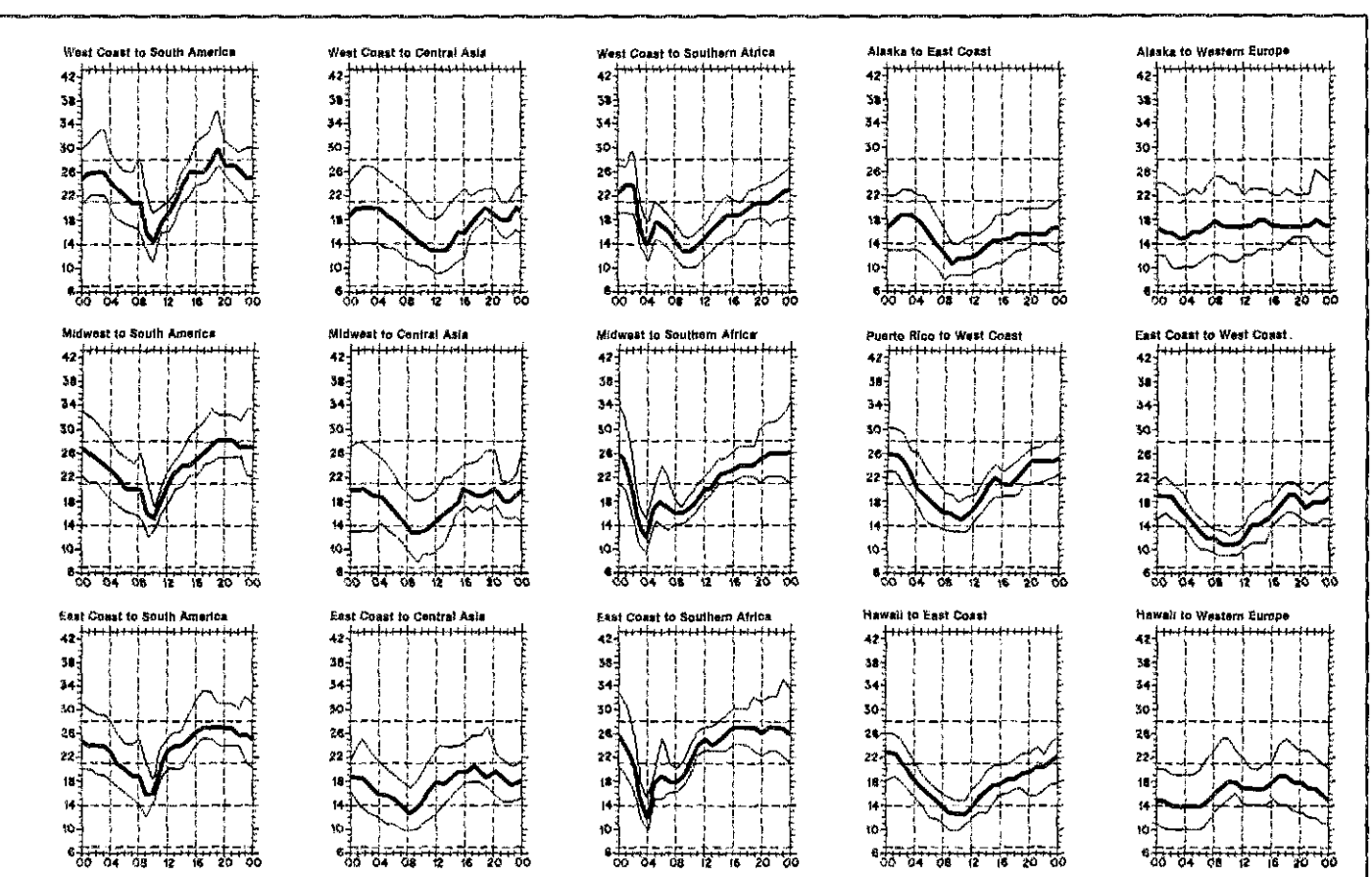
(W7PHO) not manager for XV5AC
CP6U (WB4LFM)
CX7BU (CX3AN)
CSACO (W2TK)
EA9HG Box 513, Ceuta and Melilla
EA9JL Box 518, Ceuta and Melilla
EC9AQ (EA9GN)
FG7ODY/FS (W3HNK)
FPGAQ (K8CJQ)
FG0BL/FS7 (K8BPX)
FG0GCT (F6ARL)



ZL1BCG is always traveling to some exotic DX port. Last June Ian operated as FW0DD and 5W1CR. Over the last five years he has made over 15,000 QSOs on his various expeditions.

FM7BZ Box 645, Fort De France, Martinique
FM0FTD (W2GHK)
GJ5DPX (PA0KHS)
G3KTR/5N9 (RSGB)
HC5EE/HC4 (K8LJG)
HH2PR (WB4OSN)
HK0BKX (WB4QFH)
HL9UJ (K5UJ) period from Nov. 25, 1977 through Nov. 2, 1978, also Jan. 7, 1980 through Sept. 30, 1980.
KC6MW (JR1AJB)
KZ2EV/M/TU2 Box 206, Vratza, Bulgaria
N4TO/KP4 (WB4OSN)
OA4AW (VE2AQS)
OX3NB (W7EDA)
PY0CW (PY7CW)
PY0ZZ (PY7ZZ)
ST0AS (DK2OC)
SU1AL (AF2M)
TF3DC (WA8AEE)
TR8IG P. O. Box 749, Libreville, Gabon
TR8WR (F6ERG)
VP2KJ (WB2TSL)
VP2VGF (NP2AF)
VP2SS (K1CC)
VP5HP (WB4OSN)
VP5GCM (NP2AF)
VP5ONX (WB4OSN)
WB6NZZ (K6URI) USA contacts only.
WP2ABZ (NP2AF)
XE2XW/1 (W5XW)
ZF2AF (W0GT)
ZF2DV (WB4OSN)
ZF2DX (K0GVB)
ZP7BM P. O. Box 54, Villaria, Paraguay
ZS6BSZ Box 395, Pretoria, South Africa
ZS6FU (WB4FHM)
ZS6YK (VE2EWO)
5H3KS P. O. Box 250 Dar es Salaam, Tanzania
5T5DX (W2TK)
6Y5MJ (K8ZBY)
8P6OR (K5MHZ)

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.

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 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from January 1 through January 21, 1981. 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

G31MKJ/106	HA8CH/150	OH2XA/230	K2SCU/101	W3DGK/108	KC4OR/127	WA5BDU/105	K7OKA/108	WB8WFS/108
DF6TC/107	HB9AIJT/136	OP9CAV/205	KF2G/101	W3NJL/100	N4TG/100	WA5GOT/102	KA7DBS/155	K9RHY/212
DK6ZN/102	HC1NS/115	TF5DC/110	KF2U/104	WB3EFQ/134	WA4BVX/103	WB5PBA/250	KD7JI/150	KA9FRV/100
DKØKO/119	JA2BGO/262	VE6OA/134	W2HLD/159	WB3KAB/116	WA4EAV/110	WD5COV/102	W7JSP/100	N9ANP/105
DL3CT/153	JA5XPD/100	ZS2MI/110	WA2BXT/131	WB3KAC/118	WA4JZS/104	WD5IAF/102	AC8Y/108	WB9VOA/103
DL3RC/130	JE6GC/116	AK1L/103	WB2RKD/261	AA4EH/100	WA4NXQ/101	AK6T/127	K8ES/225	WD9JBK/102
DL6HN/104	JH6LLR/138	KA1GEI/112	WB2RME/104	AD4X/101	WB4SXN/103	KB6QZ/257	K8IA/102	AIØO/147
DL7ZB/100	JR6LKG/108	KA1CFC/101	WU2ALA/100	KA4BYS/104	WB4YFZ/104	N6WJ/103	N8AVK/100	KØDH/106
EA3WZ/118	JA7WKG/110	WA1YLN/164	N3AKD/103	KA4EWX/107	WD4FIG/122	W6TEX/226	W8CY/293	WDØAKS/110
G4OTF/101	LA6KU/153	WB1FVO/109	NN3SI/101	KA4LXZ/139	AE5M/117	WA6GWH/103	W8GWC/110	WDØHDT/101
GI3ZGK/104	LJ2Z/135	AI2G/100	W3ADS/105	KC4FW/108	K5XI/115	K7PMI/206		

Radiotelephone

CX4BW/110	HB9BRC/110	LA9MW/114	9H3BA/142	WA2BXT/113	K4AWI/100	KE5M/117	WD6BZN/109	K9RX/234
DJ7AX/105	I3DUB/100	LJ2Z/127	K1CKD/110	WA2WDJ/112	K4ZIN/116	N5AW/111	AE7F/108	NØADI/102
DK4VC/105	I5IGO/112	SM5HPB/278	KA1DS/149	WB2RKD/220	KC4FW/107	N5BES/114	K7PM/141	NØALG/104
DK7DE/105	I8XTX/254	VE3BTO/W4/120	N1AVL/107	WB2TOJ/109	N4AY/100	W5EU/266	KD7J/117	KAØBUO/110
DK7ET/107	JR1ZIX/130	VE6OA/103	WA1FRC/101	WB2YMW/104	WA4NXQ/101	KB6QZ/257	N7AB/207	KBØQQ/115
EA2IA/309	JA2BGO/201	VE7AZV/127	WA1VHK/100	AF3M/105	WB4RFZ/277	KK6X/108	KB8RT/112	WØOIZ/117
F9IS/16?	JR3CVJ/131	VP2MBA/102	WB1DQP/105	AJ3H/119	WB4SXN/101	N6WJ/102	N8BBK/101	WBØOMY/102
FL2C/101	JE6EGC/113	VS6FH/107	K2PLF/236	N3AKD/103	WD4FHD/107	WA5GWH/103	W8GDA/139	WBØWGN/179
G4GED/102	JA7XZZ/121	Y54VA/104	KF2U/104	WB3KAB/106	K5XI/115	WA5GWS/109	W8RWFS/105	WDØFIF/108
HB9AUT/129	KG4DI/103	ZS2MI/110	N2DZ/104	WB3KAC/113	KA5ELC/107	WB6SHL/188	K9QXM/130	

Cw

DF3SV/207	DL9YG/152	SM7BXV/112	KA1CEI/101	N3CP/101	K9IA/121	WA5BDU/105	WB7FCQ/102	K9ARZ/100
DF9RW/132	I3YEG/140	SP9CAV/160	KA1DS/107	K4RS/116	KE5C/100	N6LK/116	WB8OZX/102	WB9VJN/100
DJ5VO/107	JA2BGO/215	YU2WG/100	K2PLF/143	WA4NEU/106	KM5R/106	W6TEX/151	WD8KKF/102	WB9WZN/108
DK4CU/135	ON6FX/105	ZL1AMO/117	KA2EAO/109	AB5P/152	W5XJ/130	K7PMI/101	K9AB/248	AIØO/116

RTTY

IØAOF

5BDXCC

W6KUT	JA1BWA	W3UJ	AA4R	YU2EZA	KØZZ	YU2CDL	N4GG	W8CY
LZ2JF	PY7ZZ	K6OZL	N2RT	K5OR	W3YY	OE1BFW	EA4DO	YV3AZC
SM7ASN	SP9CAV	N3ED						

Endorsements

Mixed

DJ5VO/328	JA5ELM/200	YU3TFA/257	K2SBJ/326	W3IVG/151	N4UU/312	W5VFJ/187	W7AO/350	K9IL/305
DK5PR/319	JA7HZ/315	YV1TO/213	KA2FRW/175	WA3LJP/275	NA4D/250	W5XJ/322	W7FR/301	K9RX/282
DL6OW/280	JA8MS/325	4S7DA/217	KB2EN/277	WA3SXH/300	W4AXR/347	K6ANP/263	W7FY/243	K9VFA/150
DL8AK/155	JA8ZO/334	AD1S/260	KB2HZ/202	AA4BA/279	W4OO/348	K6CBL/306	W7GUR/281	N9AZR/200
DL8VN/226	JA9DDM/206	K1JO/323	N2BIM/208	AA4NA/278	W4PNY/175	K6HHD/256	W7OK/299	W9CAJ/225
EA2IA/315	KL7JAI/196	K1MEM/311	N2JA/238	AJ4X/168	WA4GFG/140	K6PZ/321	W7OM/327	W9GXR/152
EA8LK/120	LA2GV/237	K1TN/306	W2CKR/250	K4HHM/249	WA4JXI/203	N6PV/202	W7RVQ/140	W9HZ/340
F6AZT/150	LA9CE/330	K1WJ/299	W2MZV/337	K4ITV/192	WA4TYJ/203	N6WK/237	WB7QXK/240	W9VNE/325
F6CXJ/172	LA9OI/200	KA1DS/208	W2QXA/285	K4TXJ/250	WA4WYN/300	W6AN/272	WB7RBA/124	W9WNB/337
G3DOG/292	OE1FTJ/346	KA1GC/149	W2SEC/147	K4UEE/311	WB4HOK/300	W6MJP/305	AJ8J/206	WB9LEE/205
G3IOR/339	OH2VB/328	KA1HQ/130	WA2EAN/315	K4ZIN/166	WB4PRU/275	W6MND/231	K8AC/199	WB9HIP/284
G3JAG/331	OH3KZ/294	N1AKX/215	WA2IZN/290	KA4OHX/127	WB4UBD/265	W6NPY/294	K8CMO/303	WB9KJT/144
GI3OOR/339	OH4NS/339	N1AO/296	WA2VCM/–50	KA4PI/203	WN4KKN/144	W6PLK/319	K8MPF/268	WB9RGA/280
HB9BLQ/199	ON7WW/251	W1AOQ/146	WB2NYM/315	KB4BU/280	AB5P/283	W6SG/329	W8ELE/305	WB9TTY/249
HB9HT/280	OZ9PP/305	W1FTX/337	WB2YJQ/202	KB4QB/291	AK5B/227	W6TC/313	W8GE/281	WD9CJG/124
HKØBKX/306	SM6BXV/242	W1FX/277	WB2YQH/327	KC4CT/250	K5BDX/174	W6TPJ/330	W8GIO/294	WD9GGY/151
HZ1AB/214	SM7FYK/154	W1ODY/309	WB2ZEL/151	KC4LP/149	K5EOA/277	W6YB/340	W8NJC/270	AGØA/178
I5EFO/271	SMØFKD/230	WA1TQP/126	AJ3H/233	KD4M/271	K5KV/273	W6YX/234	W8PR/341	KØJGH/238
IT9QDS/235	VE3BHZ/280	WB1ACI/133	K3AER/175	N4AXT/218	K5RSG/252	WB6SHL/243	WA8MQA/285	KØSVW/282
JA1ADN/344	VE3FEA/165	WB1BVQ/181	N3ARV/177	N4BCN/126	N5AW/264	WD6DJK/174	WB8LDH/295	KØSW/127
JA1CZI/220	VE3MZ/260	AA2Z/227	N3LD/322	N4EZ/150	N5AX/291	K7CQ/279	WB8UIA/272	KNØQJY/186
JA1ELY/318	VEJXM/158	AF2O/211	W3BBL/202	N4HB/267	W5CPI/304	K7LJQ/160	WD8KKF/270	WØJIE/160
JA1VNI/300	VE6GY/250	AJ2P/129	W3FAE/200	N4IB/252	W5GEL/335	K7SFN/283	K9ARZ/257	WBØYRN/216
JI1WRM/300	VK6HD/325	K2CG/146	W3DDG/119	N4SU/349	W5RFA/266	N7AYK/151	K9BLY/156	WDØBNC/270
JA3DSZ/287	YU1GMN/260	K2QE/177	W3DO/240	N4UH/324	W5RKT/150	N7MW/284		

Radiotelephone

DJ3AR/278	JA1ELY/315	VK6HD/281	KA2ELW/158	K3XG/294	WA4BRO/176	KB6BW/177	W7GYG/180	K9ARZ/242
DJ4PT/323	KI1WRM/285	VK6LK/318	KB2HZ/201	KA4P/197	WA4MMO/306	N6PV/154	W7GUR/277	K9UAA/280
DJ5VO/298	JA3CSZ/238	XF1MD/150	N2BIM/201	KB4PX/176	WB4SWI/250	W6MFC/270	W7OM/310	N9AUV/233
DJØXJ/137	JA7HZ/315	YV1TO/207	W2CKR/233	KB4QB/271	WB4UBD/265	W6ORD/290	WA7TM/260	W9CAJ/171
DL9VS/309	JA8ZO/323	ZS1BP/279	WA2EAN/313	KC4CT/250	WB4VNZ/174	W6QWJ/124	WA7ZWG/270	W9HZ/334
EA1QF/279	JA9DDM/201	ZL2AFT/276	WA2IZN/287	KD4M/270	K5RSG/248	W6YB/331	WB7CEH/173	WA9HRN/238
EA3JK/252	KH6OR/341	4S7DA/185	WA2JTX/159	KT4G/286	KA5ASD/249	W6YX/201	WB7CLU/260	WB9GHN/132
EA3KW/275	KL7JAI/187	AD1S/257	WA2VCM/148	N4AXT/208	KA5AZT/202	WA6BHP/220	WB7RUN/152	WB9HIP/282
F5OK/298	LA7ZO/279	K1JO/298	WB2CVL/263	N4BLX/230	W5TJQ/225	WA6LFN/254	K8CMO/300	KRØBB/201
F9MD/335	LA9GV/291	K1MEM/298	WB2NYM/326	N4BVP/155	W5UJO/151	WB6POP/312	K8MG/250	KBØU/260
G3DOG/270	LU1BARIW3/313	K1WJ/262	WB2YJQ/199	N4CSF/150	W5VFJ/179	K7BCX/315	W8CY/291	KNØQJY/182
G4FHL/127	LU8CW/269	KA1GC/145	WB2ZEL/132	N4HB/239	WB5PBA/247	K7CQI/242	W8GIO/292	WØKU/277
HB9BLQ/181	OH2XA/229	KA1HQ/130	N3ADI/216	N4IB/223	WB5TXP/150	K7LJQ/160	W8NK/153	WØPXM/200
I1LNU/261	SM5DQC/318	KA1JV/157	N3ED/301	N4UU/274	K6BKU/160	KA7BDS/151	W8TWA/271	WØRTB/157
I5EFO/271	SV1JG/234	N1AO/272	W3FAE/184	W4AXR/326	K6HHD/250	N7AKQ/202	WA8MQA/269	WØZRA/202
I5PAC/309	VE1AYE/173	N1AKX/187	W3JPT/160	W4FOD/277	K6PZ/308	W7EEF/258	WB8KLC/205	WBØPPR/129
I6MRD/168	VE1SH/136	WA1TQP/125	AA4NA/185	W4PNY/153	KB6AR/154	W7FR/255	WB8LDH/284	WAØPDA/122
JA1ADN/336	VE3FEA/151	WB1BVQ/180	K4HHM/239	W4WMO/200				

Cw

DF9FM/135	JI1WRM/241	AI1S/200	N2JA/225	W3AP/248	KB4BU/153	WA4WYN/199	W6IC/278	W9KNI/311
DJ5PA/138	JA3CSZ/241	K1MEM/275	W2SEC/140	W3GRS/291	N4IB/150	K5BDX/161	WB6SHL/204	WB9TIY/141
DK5PR/160	JA8ZO/282	N1AO/279	W2SSC/180	AA4NA/164	N4JJ/234	K5EOA/212	N7MW/251	AGØA/159
DL7AA/260	ON7WW/143	W1IHN/250	AJ3H/181	K4ITV/190	N4UU/208	K5KV/210	AJ8J/159	NØRR/290
HB9HT/256	SM6BZE/178	W1JR/270	N3ED/240	K4UEE/220	WA4DAN/250	N5RF/200	K8ZH/270	NØZA/150
JA1CZI/182	VE1BLX/176	WA1FCN/161						

DXCC Notes Honor Roll Corrections: Mixed, K9JF 311/325, Phone, W5SJ 309/327

Club Corner

Conducted By Sally O'Dell, *KB1O

"WILL YOUR CLUB BE ABLE TO COPE WHEN THE BIG ONE HITS?"

Unfortunately, the season is coming! No one likes to say it, but tornadoes do seem to have both a season and a favorite route — spring in the midwest. If you were in the path of a tornado, you'd want to know what to do about it, wouldn't you? If you wait until you see a tornado coming, it may be a little late to try learning what to do. Let's explore this now, in the safety of calm weather.

Are you a member of a club? Does your club actively participate in a SKYWARN program? Then you are already involved. How do clubs (and individuals) around the country respond during this season?

Many clubs and ARES groups begin by sponsoring a SKYWARN program in conjunction with the National Weather Service (NWS). When weather conditions suggest a tornado could be on its way, SKYWARN leaders activate their nets.

When the net control station is ready, he or she calls up the net, and weather reports start coming in. The NCS is in constant touch with the *local* branch of the Weather Service. The club has been well trained in net organization and operation; each participant knows his/her assigned responsibilities and can handle them. Each knows where the net will be operating and will pass only pertinent information.

What goes on behind the scene, before and after the net? To find out, read "SKYWARN — A Design for Public Service," elsewhere in this issue. This article explains how one club handles its repeater and net. In addition, refer to April 1979 *QST* page 52, and August 1979 *QST*, page 53, for additional information.

Alan Moller, meteorologist at the Southern Regional branch of the National Weather Service in Forth Worth, Texas, provided extensive information on SKYWARN activities in his area. NWS personnel are trying to be very aggressive and contact local Amateur Radio operators. Alan, who is studying for his license, thinks it would be great if local clubs would contact NWS themselves rather than waiting to be contacted. He advises: Let it be known that you and your club are available and want to participate. Those in the NWS who are aware of Amateur Radio are trying to publicize (within the Weather Service) just how beneficial Amateur Radio operators can be as storm spotters.

Contact? One problem clubs might have is locating a local NWS branch. In some larger cities NWS is listed in the phone book (see U.S. Department of Commerce listing). If it is not, contact your local Civil Defense or the nearest law enforcement office. NWS is in touch with almost all of these agencies. In some of the large cities in North Texas and other areas of the country, local amateurs are organized under RACES (Radio Amateur Civil Emergency Service) through Civil Defense. This usually occurs where there is a strong Civil Defense office.

Training? The NWS has developed a training program which runs a minimum of three hours. It gives amateurs as much technical information as possible about thunderstorm spotting, which NWS has advanced from an art to a science in the last year. They know where tornadoes develop in a thunderstorm and what kinds of clouds precede the development of the tornado itself. They also know the more common thunderstorm features that are often mistaken by the public for tornadoes. This is some of the data the NWS passes along to the interested amateur community. Moller says it works very well because many of the amateurs are technically minded anyway and are quick to grasp the information.

Moller sells Amateur Radio to others in NWS by telling them excellent reasons for using Amateur Radio operators for spotters: Amateurs have superior communications, are very public service oriented and, being technically minded, grasp the training so easily.

The NWS has developed a nationwide program, but it has been highly refined only in the last few years. Extremely successful since 1975, this program has worked very well for both the NWS and the hams. The training is just gaining national status. Alan has been working with this program — trying to "get it to go" nationally. Involved in a research program at the University of Oklahoma, Alan is mainly interested in chasing and photographing severe thunderstorms and tornadoes. The University sends people out into the field to take photographic histories of storms — the source of a lot of the information that people are now being trained with.

How Many Hams are Needed? NWS will operate with as many bodies as it can get. In some areas, however, there is only one amateur per town. One way they have handled such a situation is to use CBers who contact the one amateur. He or she, in turn, notifies the NWS in any way possible.

The NWS states that: (1) all communities need a spotter network (it is absolutely true in those parts of the country where thunderstorms and tornadoes are a recurrent problem) and (2) Amateur Radio operators within the community should be used more than any other group. This advice is given communities in helping them develop a severe-storm preparedness plan. Spotting isn't only for tornadoes, but for any severe storm. Spotters also report flash floods, winter weather and road conditions; really any imminent adverse weather.

How do you alert the amateurs? Usually by telephone. Alan said, "Here in our county we have a hotline to the Civil Defense headquarters. Minutes after contacting them, hams are on the air with 20 to 40 units in the field." Your group might also consider the tone-alert system described in January 1981 *QST*.

Do you want people out and moving around? It is hard to stay at home and see everything. Spotters in the field are usually stationed at major intersections, positioned to recognize an approaching tornado. They are told to drive to the east or southeast if the tornado is approaching, but *not* to try to outrun it. If the car can't get you out of the way quickly enough, find a reinforced shelter or ditch. NWS is very careful to train spotters on how to spot tornadoes but still get out of their way.

Jim Weaver, K8JE, Hamilton County (Ohio) emergency coordinator, mentioned another approach: an excellent siren warning system. Approximately 150 Civil Defense and/or fire sirens are tied into the local Civil Defense system. These sirens are tested once each week and can quickly alert local hams to an emergency.

If you are interested in beginning a SKYWARN program in your community, here are the simple steps to follow: (1) Discuss the problem at your next club meeting, (2) contact the NWS, (3) form a task force, (4) appoint a program director — someone in your club familiar with emergency communications, (5) conduct training sessions on and off the air (after becoming familiar with the SKYWARN program), and (6) coordinate all this planning with your section emergency coordinator.

Remember that your club could be instrumental in saving lives in your community. SKYWARN programs are organized with Amateur Radio in mind. Alan's last statement was, "We can't give enough credit to the Amateur Radio population." Let's keep it that way. QST

*Club Program Manager, ARRL

50 Years Ago

April 1931

In his editorial, K. B. Warner points out that the out-of-band operation by a few irresponsible hams has been causing trouble to other services. The Grand Island station of the Radio Division, Department of Commerce, is now in operation and has been instructed to monitor the ham bands and proceed against amateurs who are out-of-band. K.B. adds, "It seems too bad that this situation should prevail but for a long time government action has appeared inevitable."

Asst. Communications Manager Ev Battey takes 12 pages to report the " 'Phone-Vs.-C.W. Transcon Relay Results," a competition held on three Sundays back in January. Ev thought the 'phone men did quite well with their 50-kc. segment of the 80-meter band, since their c.w. competition could spread out over the remaining 450 kc. Elsewhere in the issue 9 pages are devoted to descriptions and photos of outstanding participants in this major event.

"The Crew at LaSalle Road" gives Associate Editor Ross Hull an opportunity to describe the new League Headquarters "digs" and provide thumbnail sketches of the 28 employees. The real estate consists of a second floor and a "penthouse" in a small building.

Technical Editor Jim Lamb offers antenna and transmitter suggestions in "Moving Into the 1750-Kc. Band." He points out that the band is attractive because the entire 250 kc. is available for 'phone, providing five times the spectrum space available for voice on 80 meters.

25 Years Ago

April 1956

The editorial decries the current trend to play down or ignore home construction and technical knowledge by radio amateurs. The outburst is inspired by a new (non-ARRL) book about getting into ham radio that has *no* elementary theory and not one schematic symbol. The editorial concludes, "Many of today's leaders in the communications field began their careers through an early interest in amateur radio — an attraction which, we'll wager, was primed largely by technical interest. We cannot subscribe to an amateur radio that, ten or twenty years hence, will depend on its contribution to the art from amateurs raised in the belief that what goes on inside the crackle-and-chrome boxes is wholly unimportant."

Carl Ericson, W2PPJ, describes the "Club-project 2-Meter Portable" of the KBT Club of Buffalo. The battery-powered hand-held design uses a crystal-controlled a.m. transmitter and a super-regen-plus-r.f.-stage receiver, with a common audio section. It was found that a 25-inch antenna works better than the more common 19-inch radiator — this was attributed to the very small ground plane, the 8 × 12 × 3-inch metal case.

Lew McCoy, W1ICP, lends a hand to "Understanding Television Interference" by the novice (and other) operators. It is mentioned in a *Soap* that Phil Rand's booklet, "Television Interference," is now out of print. This compilation by W1DBM was printed through the courtesy of Remington Rand and distributed by mail and at hamfests and conventions. It ran through three printings and 75,000 copies.

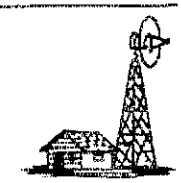
H. T. Orr, WØWET, in the "Beer-Can Antenna, Minnesota Style," gives an amusing account of the problems encountered at sub-freezing temperatures. However, he and his helpers seemed satisfied with the results.

Howard Lorenzen, W3BLC, finds you can "Pep Up Your Old Receiver" (a BC-348 and an old HRO) by substituting a 6AC7 for the first r.f. amplifier stage.

Hidden 10-meter transmitter hunts are popular in many parts of the country, and the "Directional Antenna for the Transmitter Hunter" of Harold Braschwitz, W8YPT, shows how to make the loop antenna unidirectional by adding a "sense" antenna.

"A Radical Approach to VFO Design," by famed Larson E. Rapp, takes a fresh look at a common problem: oscillator instability. His solution utilizes several well-known but overlooked principles, and it is just as sound in 1981 as it was when first published. — *Byron Goodman, W1DX* QST

The World Above 50 MHz



Conducted By William A. Tynan,* W3XO

A VHF/UHF Primer — Equipment

Last month, I began a series aimed at those who have an interest in the world above 50 MHz but who know very little about what to expect from this fascinating part of Amateur Radio. In that column, I discussed the bands and their propagation characteristics. This month's space will be devoted to the kinds of equipment available for the various bands. I will limit coverage to equipment appropriate for "weak signal" work, e.g. ssb and cw. There are many additional pieces of gear on the market designed strictly for fm. However, many of the ssb/cw transceivers available include fm. These, the so-called multimode rigs, make a good choice if one wishes to try the world of vhf ssb/cw but still keep in touch with the gang on the local repeaters.

6 and 2 Meters — These two most popular vhf bands will be treated together because the equipment is essentially the same for both. Often, similar versions of the same basic transceiver are available for either band, although, unfortunately none are produced in combination 6- and 2-meter units. Currently, ICOM, Kenwood and Yaesu offer multimode transceivers for both 6 and 2 meters. Most put out about 10 watts. For 2 meters, numerous commercially made solid-state amplifiers are available to boost this power to 100 watts or more, but for 6 meters the situation is quite different. At the same time the FCC came out with its famous 10-meter amplifier ban, it also announced that henceforth all commercial amplifiers for use below 144 MHz must be "type accepted." For an amplifier to obtain type acceptance, it must not include rf switching from transmit to receive and it must have a gain requiring drive power of more than 50 watts for rated output. This may not be the exact wording of the rule, but it suffices for purposes of explanation. Obviously, the intent of this rule is to prevent amplifiers from being used in conjunction with 5-watt CB rigs. Thus for 6, you can't go out and plunk down your shekels for a store-bought amplifier to give your 10-watt box greater punch. One obvious solution is to build an amplifier, which is perfectly legal because home-built units are not covered by the rule. Fortunately, 6-meter amplifiers are relatively easy to construct. The 1981 *Radio Amateur's Handbook* describes two. One is in the 500-watt class, while the other will run the legal limit. Both are designed for use with 10-watt exciters. Another potential solution to somewhat more soup on 6 meters is available in the form of higher-powered transceivers. The Yaesu 625RD puts out 25 watts, which will give a good account of itself. In addition, the big brother to the ICOM IC-551 10-watt unit, the IC-551D, boasts about 100 watts out. That's as much power as the majority of 6-meter operators ever run.

Since the FCC puts no restrictions on amplifiers for 144 MHz and above, the situation with respect to shoes for 2-meter rigs is quite different. Many manufacturers offer the so-called "bricks," solid-state amplifiers which require from 3 to 10 watts of drive to produce somewhere on the order of 100 watts or more. These are very popular and offer a simple approach. Many include rf sensing for automatic send/receive switching. So, you merely connect them in the line between the rig and the antenna. In selecting such an amplifier to go with your ssb box, be sure that the one you choose is linear and can properly handle sideband signals. Almost all amplifiers are called "linears" these days, but many actually operate in Class C and are by no means linear. Use of a nonlinear amplifier to boost ssb signals can lead to a very distorted and broad signal. Construction of amplifiers for 2 meters is more tricky than those for 6 meters; nevertheless, the home-built route should be considered especially by those adept at building rf equipment. Several high-power tube-type 2-meter amplifiers are available, including one offered, either in kit form or fully assembled and checked out, by Arcos Electronics, East Greenbush, New York.

In addition to transceivers, another approach to generating ssb and cw vhf is the transverter. This is a box used with an hf rig to convert the hf transmitted signal to the vhf band, and the received vhf signals to hf so that the low-band rig can detect them. A number of articles in *QST* and other amateur magazines over the years have described construction of such units. A very popular commercial transverter for 2 meters is manufactured by Microwave Modules of England and is available in the U.S. from Spectrum International, Concord, Massachusetts. Lunar Electronics, of San Diego, California also produces a set of modules that can be used to assemble transverters for any band from 50 to 432 MHz. Both Kenwood and Yaesu have 6- and 2-meter transverters designed to go with their hf equipment. In addition, Hamtronics of Hilton, New York, offers a line of transverter kits.

The question of whether to go the transceiver or transverter route is not answered easily. Like so many things, it depends on your interests and circumstances. If you are serious about gaining the best vhf capability primarily for home station operation and have a good hf rig — especially one with a really good receiver with several filter options and excellent dynamic-range capability — then your best bet is a good transverter. If, on the other hand, you are a more casual operator and particularly wish to try portable and mobile vhf operation — especially if you have no hf equipment at all or it is only fair in its performance — then one of the transceivers is probably for you. One very interesting type of transceiver is offered by ICOM. It is the small hand-carried portable unit with self-contained batteries and is capable of about 3 watts of ssb or cw output. The 6-meter version is called the IC-502, while its 2-meter cousin carries the designation IC-202. The IC-202 is especially popular in Europe for mountaintopping. For their size and cost, both of these rigs give good accounts of themselves. But don't expect them to be every bit as good as a first-class home-station setup in terms of performance or convenience of operation. Nevertheless, I have received from time to time reports of people using the IC-202 with high-power low-drive tube amplifiers for meteor scatter and extended tropospheric work. And I have heard many S-9 signals on 6 meters coming from a thousand miles or more away produced by barefoot IC-502s usually feeding beams mounted at 30 feet or so. I know of at least one station, KØSFH, that has collected WAS on 6 meters with just such a setup.

1-1/4 Meters — Because of the lack of an amateur allocation in this portion of the spectrum in many parts of the world, there is little in the way of commercial ssb/cw gear available for the 220-MHz band. There are no complete transceivers, so the transverter route is almost mandatory for someone wanting to try this band. This makes 220 a good place for the do-it-yourselfer. I know of two sources of commercial transverters, however. As already mentioned, one involves the use of the modules produced by Lunar. The other is an adaption of the 2-meter Microwave Modules transverter offered by VE3CRU, Box 6286, Station A, Toronto, ON M5W 1P3. In amplifiers, Arcos has available a 1-1/4 version of the unit offered for other bands. For the builder, a design for a high-power amplifier can be found in *The Radio Amateur's Handbook*.

70 cm — More commercial equipment is available for this band than for 1-1/4 meters, mostly because it is an internationally assigned amateur band. This frequency range is especially popular among European vhfers. Many of the names already mentioned are applicable here also. Lunar and Microwave Modules, along with another British company, Sota, offer transverters. ICOM has a 70-cm version of the IC-502/202 called the IC-402. That company has also just introduced a transceiver for this band similar to their IC-551 and 251. It is designated the IC-451A. On the used market, one can sometimes find the Echo-70 transceiver sold by KLM a few years ago. In the amplifier line, a few companies including KLM and Lunar offer solid-state bricks, while Arcos sells the kit or built-up version based on the well-known R1W parallel-kilowatt design using 4CX250Bs or other similar higher-powered tubes. It is this design that Arcos has used to derive its amplifiers for the lower vhf bands. Here again, *The Radio Amateur's Handbook* is a good place to find construction information on equipment for this part of the spectrum.

23 Cm and Down — This is almost exclusively the territory of the advanced builder, although

*Send reports to Bill Tynan, W3XO, P. O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

Microwave Modules and Sota do offer transverters for use on 1296 MHz, and Microwave Associates makes the 10-GHz Gunnplexer units sold by Advanced Receiver Research, Burlington, Connecticut.

This has been a very brief survey of ssb/cw equipment suitable for the bands above 50 MHz. Certainly some fine units have not been mentioned. Inclusion of those that were should by no means be taken to imply that they are necessarily best and the ones omitted are somehow inferior. Available space simply does not permit an exhaustive description of every piece of equipment available from all manufacturers.

The next column in this series, to appear in a forthcoming issue, will be devoted to vhf and uhf antenna systems.

THOSE STANDINGS BOXES

Many may have noticed that, in their last appearances, the Standings Boxes were somewhat skimpier than before. This reflects a policy announced in April 1979. That policy, briefly restated, is to keep in the boxes those who are active or expect to become active again, and drop those who have not been on the bands for a long time. During the six years that I have been conducting "The World Above 50 MHz," many have written urging adoption of such a policy. It became mandatory, in the case of the 2-meter box, when that listing grew to the point that it occupied more than half a page of valuable column space. In order to implement the policy, I announced that those who do not submit some kind of report over a two-year period will be dropped. Note that this does not mean that one must increase his total in order to stay in a standings box. It does not even mean that he or she need be currently active. A simple report expressing a desire to remain listed and an intention to resume activity will take care of maintaining a position on the list for another two years. Note, however, the guideline of 25 per call area instituted to prevent the 2-meter box from taking over the entire column.

Once again I ask that Standings Box, EME Annals and 6-Meter DX reports be made on the forms I have prepared. They will be supplied for an s.a.s.e. Of course, I will continue to process reports made in letters and little scraps of paper, the backs of QSL cards, etc. However, I am sure that my error rate is higher with such inputs. Also for the state box forms, please list one call for each state, Canadian Province, DX country, etc. For the EME Annals list all stations worked via moonbounce, not QSOs but different stations. If I have the complete list, I can determine the number of call areas worked, etc. Remember that, for the state boxes, call areas are all the U.S. call areas, plus KH6 and KL7, plus all VE and XE call areas, plus all other DX countries not located within the U.S., Canada or Mexico (e.g., the UN Building does not count here). My feeling is that it would be unfair to those who don't live within 100 miles of New York City if 4U1UN were counted, even though it is an official DXCC country. The reason that the change in definition of call areas was made is that many have achieved WAS on 2 meters and it seemed nonproductive to freeze them at 12 call areas. Now there is something else to strive for. However, many WAS holders have not reported since working their 50th state and they continue to be listed with their old call area totals, usually 12. Incidentally, WAS holders will not be dropped from the box whether or not they report every two years.

I plan to run the EME Annals soon, so please total up your moonbounce stations worked and get your report in the mail as soon as possible. If you don't have forms, drop me an s.a.s.e. and I'll send you some.

After I received a number of requests to indicate in the state boxes which stations have worked some of their states via EME, I am now doing this by adding a symbol behind the call. Some cases I know, but for many I need some help. Please inform me if some of your states are via EME and I have not noted this behind your call in the Standings Boxes for 2 meters, 1-1/4 meters, 70 cm or 23 cm. The intent is to keep the boxes meaningful and up-to-date but that requires help from all active vhfers.

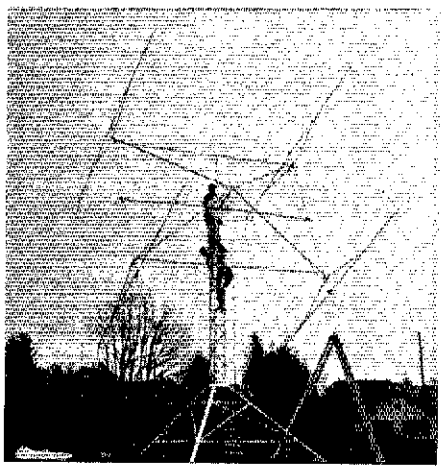
CONFERENCE SEASON COMING UP

It's hard to believe, but another season of vhf conferences is fast approaching. These get-togethers represent one of the best opportunities available for fellow vhfers to exchange ideas. Those seriously interested in this phase of our hobby will benefit from attending one or more of these affairs at least once every few years. The West Coast Conference is first on the docket. It is scheduled for May 1 through 3 in Sunnyvale, California. For details, send an s.a.s.e. to W6XN. The Seventh Annual Eastern VHF/UHF Conference will be held in Boxboro, Massachusetts, May 15 through 17. An s.a.s.e. to W1GXT will bring necessary information. The Central States VHF Conference is scheduled this year for Sioux Falls, South Dakota, from July 31 through August 2. That's two weeks earlier than in previous years. A large s.a.s.e. with 2 ounces of postage to W4FJ will bring a kit containing the program as well as transportation and hotel particulars. I hope to make one or more of these fine gatherings and look forward to seeing many vhfers from around the country.

ON THE BANDS

6 Meters — Not unexpectedly, F2 conditions were down in January from their December levels. But just as many thought that we were in for another repeat of the disappointing results of early 1980, things picked up markedly toward the end of January and early February. As the 10.7-cm solar flux climbed from the 160s during the final week of January to 216 on the 31st, the muf topped the 50-MHz mark. On the morning of the 31st, signals began to appear at this QTH, and many others in the eastern and central parts of the country. Strong fm was heard at about 50.020 and the DL3ZM/YV5 beacon on 50.043 was in, although only 229 here. The only station this conductor worked that day was W1QXX/KP4, but many to the west and north had better luck. For a number of 6-meter operators, 8P6KX was a new and welcome catch. John told me later on 10 meters that he worked a total of 120 stations in the 2nd, 3rd, 4th, 8th, 9th and Ø as well as VE3 call areas. For those wishing a card, his QSL manager is WB2WSV.

February 1, the following day, did not produce much in the way of F2, but a fine Es opening to the north-central part of the country took place. The band was relatively quiet over the next few days but opened again the morning of the 5th; however, because it was a workday, few were on to take advantage of it. I don't have many details, but it is understood that 8P6KX, TI2NA and TI2HL were coming through. Later in the day KH6IAA worked into Texas, New Mexico and Arizona. On the next day, Friday the 6th, good backscatter signals were heard here from K1FJM/4 in south Florida, and from Texas stations W5VY and W5UWB. KH6IAA reported working several stations in Minnesota and Iowa. That evening, a strong aurora developed and this conductor just knew that north-south conditions would be good the next day. Sure enough, Saturday morning, February 7, brought S-9 plus signals from TI2NA, who W3XO managed to work through a monumental pileup, along with several hundred others. The HK fm signals were also very strong. Backscatter signals from U.S. and Canadian stations were about as strong as I have ever heard them. However, that usual bellwether of north-south propagation, the FY7THF beacon, was not heard at this location; surprising! On the other hand, 6-meter F2 being what it is, many stations that were very strong even in nearby areas were heard weakly or not at all here. K3ZMS described February 7 as one of the best openings he has ever heard. The Number One SM1RK said that between 1415 and 1630Z DL3ZM/YV5, 8P6KX, NP2AE, PJ2DW, W1QXX/KP4, HI8PPV and VP2MAE, along with numerous backscatter stations, were all putting in good signals at his San Antonio QTH. KB7Q in Bozeman, Montana, notes making the grade with NP2AE, KP4EIT, W1QXX/KP4, PJ2DW, PJ2DEW and TI2NA between 1722 and 1838Z. These reports are certainly borne out by NP2AE who notes working 250 stations from his location on St. Croix in the U.S. Virgin Islands. As if this were not enough, the East and West Coasts were treated to the best transcontinental F2 opening in over a month. Many westerners had the opportunity to work VP9WB, quite a rare catch for them. Sandwiched in between the north-south and transcontinental openings, there was a very respectable Es session to the Gulf Coast from here in the mid-Atlantic States. The following day, Sunday the 8th, things were not quite so wild; nevertheless, FY7AZ, HK4EB and HC1FM were among those reported worked. Monday the 9th brought similar conditions with most of us back at work, but W7KMA Phoenix took advantage of a rare day off to snag HK4EB, VP2MEA, W1HOY/KP4, W1QXX/KP4, K1COW/KP2, 8P6KX and KP4EOR beginning about 1615Z. Then, just after 2200Z, Tom worked ZL2KT for his first ZL2 as well as ZL1MS. It was also reported that a nearby station, WA7JTM, heard a C21 during the time the ZLs were in. On Tuesday the 10th, VE1AVX reports working EI6AS two-way and several Gs crossband. These represent the first transatlantic QSOs in several weeks for Bob.



The 2-meter EME array consisting of four 16-element Yagis used by the HB9AYX group. Seen working on the antenna are HB9AYX and HB9BOI. HB9BLF and HB9MBP also contribute to the activity.

2 and 1-1/4 Meters — W2PGC reports an interesting, though not yet successful, EME test with W2HJA/5 in Dallas, Texas, whose station runs a non-elevatable array consisting of just two Boomers, while Sam has four of the same type antennas. No completed QSO resulted, but they have heard each other. A four-Yagi to two-Yagi moonbounce contact, if they can make it, will constitute something of a record. The only successful work that I know of by stations using two Yagis has been with super stations like WA6LET and K1WHS. Even four-Yagi to four-Yagi hookups are considered quite an accomplishment. Speaking of K1WHS, Dave reports what he believes to be the first contact on bands above 50 MHz between the U.S. and the USSR not involving a satellite. The station on the other end was UT5DL who it is understood, was running about 600 watts output to a single Yagi. Other single-Yagi stations worked by K1WHS, using his array of 24 Junior Boomers, include DK1TG, DK5MS, OZ1OF, G4CMV, G4KDR and G5CSZ. Dave notes that he has had more requests for skeds from foreign stations than from those in the U.S.

W2PGC has a 1-1/4 meter preamp using a 3SK-97 which he says produces a noise figure of about 1.0 dB. Sam will send a copy of the circuit for an s.a.s.e. to 47 Therin Dr., Hamburg, NY 14075.

K2UYH notes, in his monthly "432 and Above EME Newsletter," that 70 cm moonbounce was not as productive in January as in other months. He attributes this to bad weather in many parts of the world and a backlog of mail preventing the sked list, which accompanies the Newsletter, from arriving in time. That sked list has been prepared for many years by VE7BBG. Unfortunately, because of the press of work, Cor must give up that assignment. K2UYH notes the fine job that has been done on this not-so-simple task. This conductor wishes to add a thank you, on behalf of the 70- and 23-cm EMErs, to VE7BBG for his efforts over the years.

Al also reminds everyone of the approaching EME Contest. This year's dates are April 11-12 and May 9-10. See March *QST*, page 76, for full rules.

The 23-cm EME operation from SK2GJ in northern Sweden (see February column) went much better in late November than the previous month. Their moon-tracking program was working and output power had been increased to 150 watts. Contacts were completed with ZL2AKW, ZL1BQ, VK5MC, OK1KIR/P, SM6CKU (10 watts out), DJ8QL, K2UYH, LX1DB, K4QIF, SMØDFP, SMØFFS, I9FT, VE7BBG, G3WDG (once on cw and once on ssb with 5×3 signals), G4KGC, G4CVN, G3YGF, G3LTF, SM6FHZ and PAØSSB. Generally, signals ranged from 339 to 559. N6CA was able to receive SK2GJ on an array of four 44-element loop Yagis with 0.7 dB of line loss using a 0.4 dB preamp. Chip reports that he is working on a 15-foot (4.6 meter) dish and a kW amplifier and expects to be on 23-cm EME soon. He also reports consistently working AA6S in Visalia 200 miles to the north and over a 5000-foot mountain range. Signals run 20 to 35 dB out of the noise. The January contest netted 14 contacts in six sections, which Chip says is a new West Coast 23-cm record. VE4MA is also experimenting with loop Yagis for EME. Barry managed to detect moonbounce signals from W6YFK using a single 45-element job. Nevertheless, he feels that dishes are closer to optimum for this band.

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.]

***California:** The annual West Coast UHF Conference, sponsored by the West Coast UHF Society and Project OSCAR, Inc., will be held at the Sunnyvale Hilton, 1250 Lakeside Dr., Sunnyvale, CA 94086, on May 1-3. Conference begins Friday night with registration and no-host social. Saturday, registration 8:15 A.M., orientation 8:45 A.M., technical sessions 9:15 A.M. to 10 P.M. Commercial manufacturers, prizes, food. Preregistration $5, at door $8. Cook-out luncheon will be extra. Detailed information and preregistration, send s.a.s.e. to: West Coast UHF Conference, P. O. Box 5283, San Mateo, CA 94402. Room reservations, Hilton Reservation Service 800-652-1094 or direct to Sunnyvale Hilton at 408-738-4988.

Connecticut: The Fourth Annual PVRA Flea Market will be held on Sunday, May 3 at a new location — the George Penney High School, Forbes St., East Hartford. Tables $8.50, admission donation $2. 10 A.M. to 4 P.M. For advance table or info, contact Arnie, K1NFE, P. O. Drawer M, Plainville, CT 06062.

***Illinois:** Rock River ARC's 15th annual hamfest is on April 26, at the Lee County 4-H Center near Amboy, 1 mile east of junction of Rtes. 52 and 30. Camping space available at nominal charge. Tables available (6 ft) at $5. Come on Saturday and visit hometown of President Reagan; guided tours available. Talk-in on 37/97 and 52. Advance tickets $2, $2.50 at gate. Details from Charles Randall, W9LDU, 1414 Ann Ave., Dixon, IL 61021, tel. 815-284-6380.

Illinois: The 20th annual Moultrie ARK hamfest will be held May 3, at the Moultrie County 4-H Center Fairgrounds. Heated indoor and large, covered outdoor flea market. No charge to vendors. Space available on first-come-first-served basis. Talk-in on 146.94 and 146.055/655. Write M.A.R.K., P. O. Box 327, Mattoon, IL 61938.

Massachusetts: The South Shore Repeater Assn. of Weymouth announces its fifth annual ham auction to be held April 11 at Central Junior High School, Broad St., Weymouth. Check-in begins at 8 A.M., auction begins at 12 noon (15% minimum bids *are* allowed). Prizes. Talk-in on 147.90/30. For info contact SSRA Auction Committee, Town Hall Annex, 402 Essex St., Weymouth, MA 02188.

Massachusetts: The Framingham ARA will hold its annual spring flea market on Sunday, April 12, at the Framingham (MA) Police Station drill shed. Doors open at 9 A.M. Admission is $1, sellers $7 per table ($8 at door). Talk-in on 75/15 and 52. For more information or to register (sellers advised to preregister), contact Ron Egalka, K1YHM, 3 Driscoll Dr., Framingham, MA 01701, Tel. 817-877-4520.

Massachusetts: The Wellesley ARS is conducting its annual auction on Saturday, April 18, beginning at 11 A.M. at the Wellesley High School cafeteria on Rice Street, Wellesley. Talk-in on 63/03, 04/64 and 52. Doors open at 10 A.M. Contact: Kevin P. Kelley, WA1YHV, 7 Lawnwood Pl., Charlestown, MA 02129.

Massachusetts: The Middlesex ARC will hold its first annual indoor flea market on Sunday, April 26, at the Wayland High School Commons building, from 10 to 4. Admission at door, $1. Ample parking. Advance table reservations $6 from Irving Geller, WA1CDW. Tables at door on first-come-first-served basis, $7.50. Doors open at 9 A.M. for table set up. Talk-in on 147.96/36 and 52.

Massachusetts: The Hampden County Radio Assn. will hold its annual flea market on May 1 at the Feeding Hills Congregational Church, Rtes. 57 and 187, Feeding Hills. Doors open at 7 A.M. Admission is free; sellers' tables $3 each. Talk-in on 146.52 MHz. For more information call Andre Bouchard, WB1BZW at 413-786-9735.

***Nebraska:** The Ak-Sar-Ben ARC annual auction will be held May 3 at the Millard American Legion Hall, 135 & L Sts., Omaha, from 9 to 6. Auction rules available at door. Food, beverages available. Talk-in on 34/94. For further info write Jim Sanford, NØAIH, 4764 Meredith Ave., Omaha, NE 68104, Tel. 402-451-1443.

New Jersey: The sixth Trenton Computer Festival will be held at Trenton State College, Trenton, on Saturday and Sunday, April 25-26, from 10 to 5. This show is oriented toward computers and would be primarily of interest to hams who have an interest in this field. Commercial exhibits, electronics flea market, technical sessions and free short courses on Sunday. Admission $5 ($2 students). For further information, write TCF-81, Trenton State College, Hillwood Lakes, P. O. Box 940, Trenton, NJ 08625 or call 609-771-2487.

New Jersey: The DeVry Technical Institute WA2MDT ARC will hold its fifth annual Amateur Radio and computer flea market on May 2, at DeVry Technical Institute, 479 Green St., Woodbridge. Doors open at 8 A.M., flea market opens at 9 A.M. $3 charge to set up tables. Talk-in on 146.52 MHz. For further information call Frank Koempel, WB2JKU, at 634-3460 or Steve Hajducek, KA2IFX, at 727-5962.

New Jersey: The Tri-County Radio Association will hold its annual indoor hamfest/flea market on Sunday, May 3, at the Passaic Township Youth Center, Valley Rd., Stirling, from 9 to 4. Donation is $2, tables are $5. Hot food available. Many prizes. Talk-in on 147.855/255 and 146.52. For table reservations or information, write TCRA, Box 412, Scotch Plains, NJ 07076 or call Herb Klawunn, W2CHA, at 201-647-3461.

***New York:** May 2 is the date of the 22nd Southern Tier Amateur Radio Clubs Hamfest at the Owego Treadway Inn and Motel, Rte. 17C, east of Owego. Flea market, vendors, talks, women's program. Buffet and admission $10; admission $2. Reservations by April 15 advisable. Mixer on Friday night in New Bedford Room. Talk-in 16/76 and 52. Info from D. R. Vasilow, W2EWO, Star Rte. 1, Box 35, Owego, NY 13827, tel. 607-687-1515. Hotel rooms from Debbie Chambers, Owego Treadway, tel. 607-687-4500. Camping nearby at the Hickories.

***North Carolina:** The ninth annual Raleigh ARS Hamfest will be held Sunday, April 12, at Crabtree Valley Mall, U.S. 70 West, Raleigh. Activities begin at 8 A.M. Admission $3.50. Prizes, covered flea market and meetings. Motels and restaurants nearby. Talk-in on WR4ACF on 146.04/64 and WR4AOE on 146.28/88. For info, details or reservations write RARS Hamfest, P. O. Box 17124, Raleigh, NC 27619.

Ohio: The 12th annual B*A*S*H sponsored by the Miami Valley F.M. Association will be held on the Friday night of the Dayton Hamvention, April 24, at the Convention Center, Main and Fifth Sts. Parking in adjacent city garage. Free admission. Refreshments, live entertainment, prizes. For info contact the Miami Valley F.M. Association, P. O. Box 263, Dayton, OH 45401.

Ohio: The 30th Dayton Hamvention is April 24-26 at the Hara Arena, Dayton. Program brochures mailed about Feb. 5 to those registered. For accommodations write Dayton HAMVENTION, 1980 Winters Towers, Dayton, OH 45423. No reservations accepted by telephone.

Pennsylvania: The 7th annual Northwestern Pennsylvania Hamfest sponsored by the Crawford ARS will be held May 2 at the Crawford County Fairgrounds, Meadville. Gates open at 8 A.M. Bring your own tables; $5 per table to display inside, $2 per car space outside. Admission $3, children under 12 free. Refreshments. Commercial displays welcome. Talk-in 04/64, 81/21, 63/03. Details from CARS, P. O. Box 653, Meadville, PA 16335, Attn: Hamfest Committee.

Pennsylvania: The Penn-Central Hamfest will be held May 3 at the Woodward Twp. Firehall, Rte. 220 South, Williamsport. Vendors set up at 6 A.M. Public admitted at 8 A.M. Advance tickets $2.50, at gate $3. Talk-in on 13/73 and 52. Send s.a.s.e. for info and tickets to Richard Sheasley, K3QDA, Rte. 1, Linden, PA 17744.

***Pennsylvania:** The Warminster ARC seventh annual Ham-Mart will be held Sunday, May 3, from 9 to 4, rain or shine, at the Middletown Grange Fair Grounds, Penns Park Rd., Penns Park. Prizes, refreshments, flea market, free fm clinic, auction, outdoor and indoor selling (tables available). Registration $3, YLs and children under 14 free; sellers' (tailgaters) space $3, tables available. For additional information write WARC, P. O. Box 113, Warminster, PA 18974, or call Mark Hinkel, WA3QVU, at 215-657-7295. Talk-in on 146.52 or 147.69/09.

***South Carolina:** The Blue Ridge ARS hamfest will be held at the American Legion Fair Grounds, Hwy. 25 By-pass, Greenville, on May 2-3. Doors open 8 to 5 Saturday and 8 to 3 on Sunday. Admission $3. Dealers, flea market, refreshments, prizes. Earth satellite station on display. Outside tailgating, small fee. FCC exams Saturday at Greenville Tech, 10 A.M. to 3 P.M. (walk-in). Talk-in on 01/61, 22/82 and 34/94. Rooms available at Rodeway Inns, tel. 800-228-2000. For further info write Dave Slice, K4JNT, P. O. Box 9, Piedmont, SC 29673.

***Tennessee:** The first annual Tri-Cities Hamfest is being held on May 2-3 at the Appalachian Fairgrounds, north of Johnson City off Hwy. 137. Sponsors are the Bristol ARC, Johnson City ARA and Kingsport ARC. Doors open 9 to 5 Saturday, 8 to 4 Sunday. Flea market $3; general admission — advance $2, at door $3. Talk-in on 01/61, 37/97 and 223.34/224.94. For information and reservations write Mary S. Biggs, KA4EXP, P. O. Box 3682 CRS, Johnson City, TN 37602, tel. 615-928-1818.

Texas: The Mt. Pleasant High School ARC is sponsoring a swapfest April 25 at the Mt. Pleasant High School Campus. Doors open 7 to 3. Free admission; table space $3. Prizes. Talk-in on 34/94. For further information write Scott Redfearn, N5BQG, Box 105, Mt. Pleasant, TX 75455.

***Washington:** The Skagit ARC Hamfest is April 18 at the Grange Hall in Bryant. Vendor exhibits, tours, technical program, prizes. Cost of $8 includes program and banquet. Contact Norman G. Ray, W7LFA, 14005 132 Ave., Kirkland, WA 98033, or call 206-821-2985.

Washington: The Inland Empire VHF club is sponsoring "Swap Fest 81" on April 25, at the Spokane Interstate Fairgrounds. Commercial and noncommercial display booths and sales tables. Auctions, swap tables, snack bar, prizes, displays, contests and a professional Dixieland band. Write Swap Fest 81, Jan Thiemann, Chairman, 7803 E. Mission, Spokane, WA 99206, tel. 509-928-1778.

Wisconsin: The Ozaukee Radio Club will hold its annual indoor swapfest on Saturday, May 9, at the Cedarburg Community Center Gym on Washington Ave., Cedarburg. Doors will be open at 8 A.M. for general public; 7 A.M. for table set up. Admission $2 in advance; $3 at door. Tables (per 6 ft) $3, advance purchases recommended. Prizes, food and parking. Talk-in on 37/97 and 52. For more info or advance tickets, send s.a.s.e. to Ozaukee Radio Club, P. O. Box 13, Port Washington, WI 53074.

Wisconsin: The Milwaukee Radio Amateurs Club annual auction of equipment and parts is Thursday, May 14, at 7:30 P.M. at the club meeting hall, 7500 West State St., Wauwatosa. Open to all hams and proteges. Free admission; no sales charges. No flea market dealers. Please tag all gear to be sold with seller's name and minimum opening bid. For further info write Milwaukee RAC, N50 W16328 Pin Oak Ct., Menomonee Falls, WI 53051.

*ARRL Hamfest

Coming Conventions

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 12-13
Ohio State, Cincinnati

June 20-21
Georgia State, Atlanta

July 4-5
West Virginia State, Weston (Jackson's Mill)

July 12
Indiana State, Indianapolis

July 24-26
West Gulf Division, Oklahoma City

August 1-2
N. Florida Section, Jacksonville

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

MISSISSIPPI STATE CONVENTION

April 25-26, 1981, Jackson

The Jackson Amateur Radio Club will host the ARRL Mississippi State Convention from 12 to 5 P.M., April 25 and from 8 A.M. to 2 P.M. April 26, at the Raymond Road National Guard Armory, off Interstate 20, in Jackson.

Activities include dealers, forums, flea market and prizes. Admission is free. Swap tables will be $5 each day. Talk-in on 146.16/76, 146.52 and 3987.5. Food will be available at site both days. A banquet will be held Saturday night at the Holiday Inn-Southwest.

Please make reservations for both the swap tables and the banquet in advance. For more information contact Nita Stone, N5AGV, Rte. 1, Box 157, Brandon, MS 39042, tel. 601-825-2060.

PACIFIC DIVISION CONVENTION

May 15-17, 1981, Fresno, California

Amateur Radio operators will gather at the Hacienda Inn in Fresno on May 15-17, 1981, for the ARRL Pacific Division Convention and 39th Fresno Hamfest sponsored by the Fresno Amateur Radio Club.

Activities begin with the annual golf tournament Friday afternoon and wine tasting in the evening.

Saturday will feature technical sessions on computers, antennas and ARRL matters. The CD appointees' meeting will feature emergency communications. The Public Information Workshop will be of interest to all amateurs. MARS members will have their meetings to attend. Sharpen your cw for the QLF contest (left-foot sending) and your hunting skills for the transmitter hunt on 146.52 MHz. The latest in amateur equipment will be on display, and the Mermaid Patio will be loaded with goodies on the swap tables. The ladies' program will include a luncheon and entertainment.

The Saturday evening banquet will feature Roy Neal, K6DUE, as the keynote speaker. The Wouff Hong initiation will be held at midnight.

Come and meet ARRL First Vice President Carl Smith, WØBWJ; ARRL Hq. staffers Hal Steinman, K1FHN, manager, membership services; Doug DeMaw, W1FB, manager of the technical department; and Director Bill Stevens, W6ZM.

Tickets are $18 per person for all activities including the banquet, if purchased before May 8, and $20 after. For those desiring to participate only in technical sessions, commercial exhibits and swap tables, the price is $5 per person. Ladies' program tickets are $7 per person. Reservations may be made by writing Fresno Hamfest, P. O. Box 783, Fresno, CA 93712.

Be sure to mention the ARRL Convention for special rates is $5 per person. Ladies' program tickets are $7 per person. Reservations may be made by writing Fresno Hamfest, P. O. Box 783, Fresno, CA 93712.

Be sure to mention the ARRL Convention for special rates at the Hacienda Inn. Reservations should be made directly with the Hacienda Inn, 2550 W. Clinton, Fresno, CA 93705.

A talk-in station, W6TO/R on 146.34/94, will be available to help those arriving from out of town. The Hacienda Inn is at Clinton and Highway 99. From either direction take the Clinton off ramp on Highway 99.

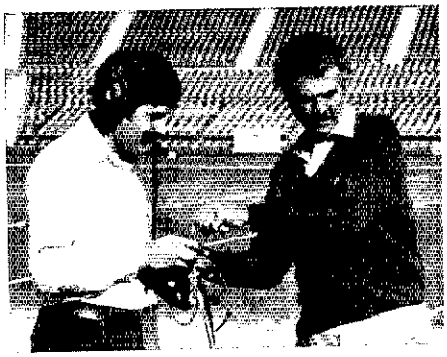
Strays

From left to right, VE3EUI, a City of Saginaw official, VE3FGT and WD8JEK, at communications central of the 1980 Friendship Games, an annual goodwill athletic contest between the sister cities of Sault Ste. Marie, Ontario, where the games were held last year, and Saginaw, Michigan. The events were assisted by the efforts of the Algoma Amateur Radio Club and the Saginaw Valley Amateur Radio Club. This cooperative effort served the needs of nearly 1800 contestants and many more spectators by providing continuous communications between the two cities during the three-day event.

Efficiency and cooperation were keys to the success of this venture!

W3JSM, in the foreground, and (from left to right) W3JGK, W4FS, N3ALU and KB3K unpack one of the 16 different microwave units installed to provide video and audio communications at the recent inauguration of President Reagan. Approximately 150 video circuits and 900 audio and radio circuits were required. *(information courtesy Frank Spurr, WB4YRB)*

Strays



Bob Melucci, KD6BP (left), and Birt Slater, coaching assistant for the San Diego Chargers, check out the hard-wire communications system at San Diego Stadium. According to stories in the *Los Angeles Times* and the *Escondido (California) Times Advocate*, during an NFL game between San Diego and the Philadelphia Eagles, Melucci overheard on his 2-meter radio vital strategy discussions by Chargers' coaches. He then made repeated efforts to inform them of this breach of security. Philadelphia lost 22-21, and there was no evidence that they had picked up the amateur-band transmissions. Bob, however, offered his services to rework the Chargers' communications system.

PONY EXPRESS DAYS

☐ The Missouri Valley Amateur Radio Club of St. Joseph, Missouri, will hold its third annual Pony Express Days on April 4 and 5, 1981. Operating time will be from 1000 CST to 1900 CST both days on the General portions (voice only) of the bands. A certificate stamped with the original seal of the Pony Express will be sent to anyone making contact with the club station and sending a legal-size s.a.s.e. along with their personal QSL card to: Missouri Valley Amateur Radio Club, 410 North 12th St., St. Joseph, MO 64501. — *John Winkler, WB0VRA*

HAMS HELP RECOVER STOLEN VAN

☐ Last Thanksgiving in Tampa, Florida, the van of William Edge was stolen while he made a quick shopping trip. He let his friends know about it, and asked them to look out for his vehicle. Five days later Clark Evans, WA4DLL, spotted the abandoned van parked on a side street. He immediately got on a Tampa repeater and asked Butch Howard, WB4EKP, to call the police, and also asked Dexter Willis, WD4MYS, to keep a watchful eye on the vehicle until help came. In the fashion of true happy endings, the van was recovered, and a grateful Mr. Edge gained not only his van, but also the friendship of three helpful hams. — *Clark J. Evans, WA4DLL*

STRAY HINTS

☐ "Strays" are those interesting fillers used when space allows in *QST*. Think you have an item with Stray potential? Here are some hints to help your submission become one. (1) Be sure the information will be of interest to most readers of *QST*. (2) Submit your material before deadline — the 8th of the second month preceding desired publication (i.e. arrive at Hq. before May 8 for July *QST*). (3) Any photographs you send should be good quality, black-and-white glossy prints. Color prints, slides and instant photos do not usually reproduce well.

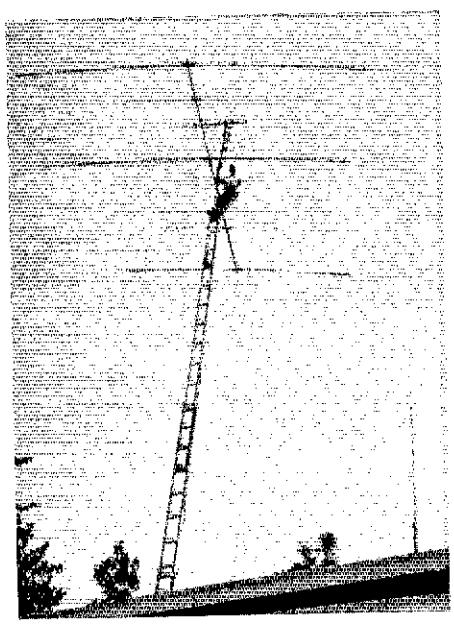
Items submitted are normally acknowledged, but that doesn't necessarily mean that your Stray will be appearing in *QST*. If you want your material returned, please include a statement to that effect and an s.a.s.e.

Follow the above hints and maybe your Stray will find a home in *QST*. — *Carol L. Colvin, AJ2I*

QST congratulates . . .

☐ Judge Lou Giovanini, W7LBR, who was recently appointed district judge in Washington County, Oregon.

☐ Dr. Philip D. Smith, Jr., W3DZR, professor of languages and linguistics at West Chester (Pennsylvania) State College, who received an Exceptional Academic Service Award from the Pennsylvania Department of Education.



Eighty-two-year-old Oscar Tupancy, W6BIH, checks out antenna conditions on his 50-ft tower in Vista, California.

"HAMFEST CALENDAR" RULES AND REGS

☐ *QST* will list your hamfest in its monthly "Hamfest Calendar," free of charge. There are certain guidelines, however.

Hamfests will be listed only once. Sponsors may specify the issue in which the announcement should appear. Normally, if the event will occur before the 10th of the month, we recommend listing it in the previous month's issue. The deadline for *receipt* of hamfest information is the 15th of the second month preceding publication. In other words, if an event is August 5, the announcement should be in Newington by the 15th of May at the very latest. For an August 19 event, the sponsor could choose either the July issue with the May 15 deadline, or the August issue with a June 15 deadline.

We will acknowledge all information received at Hq. for "Hamfest Calendar" with a postcard stating the date of publication. If you do not receive on acknowledgment within two weeks, your letter may not have reached us, so send a duplicate copy.

Oh, yes. "Hamfest Calendar" is separate from the hamfest section of Ham Ads. See the first page of the Ham Ads section in this issue for more information. — *Marge Tenney, WB1FSN*

Performing their original hit, "The Ballad of OSCAR 9," the Hamtones (l to r — K1CE, W1MJ and K1BA) are shown at the Eastern Massachusetts and Rhode Island Traffic Handlers Picnic this past summer. *(photo courtesy K. Scribner)*

TANKERS' NET

☐ Former "tankers" meet on the U.S. Armored Force Net on 14,343 kHz Thursdays from 0000Z to 0200Z. — *Ed Bedat, N4BSY, Fort Myers, Florida*

I would like to get in touch with . . .

☐ anyone interested in starting a net for the purpose of providing information for blind amateurs and for those people helping blind amateurs. Rick Hayner, K9RH, 5904 North Kenmore, Apt. 1 North, Chicago, IL 60660.

Results — 1980 Simulated Emergency Test

NTS and ARES enjoy their annual public service fling — but first the case-history of one Larry Lunchbucket.

By Robert Halprin,* K1XA and Mike Kaczynski,** W1OD

From the confidential files of Dr._____

The subject was apprehended by police on October 19, 3 A.M., for public dypsomania and disturbing the peace. He was reported shouting, "I am an official traffic station, not an official relay station" at passersby, alternately delivering blows to them with his handheld transceiver when they did not respond. As a specialist in Amateur Radio disorders, I was considered an authority on these cases. Thus, he was turned over to me for treatment.

The patient (we shall call him Larry Lunchbucket) suffered two back-to-back traumas [see June 1979 *QST* and April 1980 *QST* — Ed.] from which he has yet to fully recuperate. The public exhibition over the ORS/OTS modification was, of course, only a symptom of a more serious problem, which I hoped to solve. I welcomed the challenge to help him; furthermore I was planning a vacation trip to the Caribbean on the proceeds of the treatment he would be billed for.

Lunchbucket's story begins with the usual personality dysfunction prompting him, naturally, to gravitate towards Amateur Radio in adolescence as his outlet for interpersonal relationships. His life improved markedly when he secured a position on the reporting staff of the *Daily Times* of the city of _____, shortly after finishing college. As fate would have it, however, his situation deteriorated drastically when he was unceremoniously released by the editor (who had extreme authoritarian tendencies) for accidentally confusing the dates of the ARRL Simulated Emergency Test. Making matters worse, obviously, was that this should have been his area of expertise. This unfortunate incident, which contributed no small amount to his negative self-image (June 1979 *QST*, page 77), was the first trauma.

Shortly thereafter he received a mysterious phone call (trauma number two), the origin of which is still unknown. The caller alleged that the Simulated Emergency Test was being purposely scuttled by a conspiratorial group, who had, in turn, caused real emergencies to interfere with the then-January SET (later changed by popular demand to October), and had also caused, among other things, the generation of the revised list of numbered radiograms.

According to Lunchbucket, before this caller could reveal the identities of those responsible for such a Machiavellian plot, he was cut off, perhaps by force. Lunchbucket had been haunted by this incident ever since. Whether this call was a crank or a hallucination is immaterial to my work with Lunchbucket. I will leave the investigation into the validity of this theory to others.

Our sessions were held at 2:30 in the afternoon. At first it was difficult for him to talk freely in the face-to-face mode, not unusual for ham radio types. Eventually I got him to open up — it took my passing reference to handling instructions to make it happen. From then on, the conversation came out in a torrent — one only had to listen for a few minutes to his rage over traffic handlers ignoring handling instructions to recognize an inherent persecution complex. Tedious as it was, we were making progress — and so was my bank account!

Then there was a new roadblock. The NTS area net that Lunchbucket was active in started meeting at 2:30, in direct conflict with his weekly visits to my office. He was overwrought and upset, even though I was willing to modify my counseling schedule to accommodate him. This was a small matter indeed, although I don't mind saying that my appointment calen-

*Assistant Communications Manager, ARRL
**Communications Assistant, ARRL

Why Is There a SET?

For the uninitiated, the purpose of SET is

1) To test the capability of the local amateur communications organizations (primarily ARES and RACES) under emergency conditions.

2) To test the ability of nets (primarily NTS) to function under overload conditions.

3) To demonstrate to served agencies (Red Cross, c.d., Salvation Army, etc.), to the public and to the media, Amateur Radio's value as an emergency communications service.

4) To provide operator training and experience in emergency communications practices.

Charlie Drake, WDØHDN, of the Northland ARC, is shown inside the "Life Flight Helicopter," coordinating ground/air activities via 2 fm during the 1980 SET. The helicopter is based at St. Joseph's Hospital in Kansas City, Missouri, and answers all extreme emergency calls in western Missouri and eastern Kansas. *(KØRWL photo)*

1980 SET ARES/Local Activity

	1980	*1979*
Reports submitted	316	260
Number of ARRL Sections reported active	58	58
Total reported amateurs participating	5888	6150
Emergency-powered stations	3749	3730
Emergency-powered repeaters used	234	267
Total number of points	60,425	62,730

Total scores of participating groups are based on the sum of the following: two points for each amateur participating in SET activities; one point for each message originated or delivered on behalf of served agencies; five points for each station on emergency power; five points for each agency for whom messages were handled; ten points for each community in which agencies were contacted; and 10 points for submitting a press release to the news media. Last year's score is listed in parentheses.

The Amateur Radio club of the Citadel (the Military College of South Carolina) was in full operation in support of the South Carolina section SET. Shown left to right are: WB3LHW, WB2MFJ, WD4DHC and WDØBOF. Not shown is WB4FEU, the club advisor and EC for the city of Charleston. *(Tim Ryder photo)*

dar is always fully booked. He attributed the net situation, as with ORS, to that so-called conspiracy. Eventually, I prevailed. Appointments were switched (I rescheduled an EC who was experiencing extreme anxiety over the ARRL/Red Cross message relay), and Lunchbucket and I continued where we left off. He was surprised to find that his visits were just as productive as previously, even at a new time. He was also able to continue his area net participation which, in my educated opinion, was a very healthy and constructive outlet for his energy.

That Lunchbucket could maintain his regular appointment proved crucial, as not long after we made a major breakthrough — it had to do with an incident from his past. Once, at the formative stages of his Amateur Radio career, he was humiliated on a cw traffic net by an authoritarian net control, who deemed his code speed not adequate. Subconsciously, he had been tortured by this event ever since. In my view, this was the root cause of the problems he encountered in later life, including his unsuccessful dealings with that newspaper editor. But by discussing this incident, out in the open and in detail, we lessened its impact, and were on the way to expunging it from his soul permanently.

From this point onward there was a marked change in Lunchbucket. He became more positive about society and his place in it. Although he was still intrigued by that phone call, it no longer dominated his life. He began to realize that this plot to overthrow the SET or to tamper with his full enjoyment of Amateur Radio was hardly likely. For example, we reviewed some aspects of the 1980 SET, including the four-cycle NTS sequence, and found that it worked quite admirably. In fact, he even talked enthusiastically about participating in the 1981 SET — October 17 and 18. He no longer considered a modification of an aspect of Amateur Radio that he was interested in as a personal affront, but more as a global progression. Furthermore, his loss of perceived status, owing to unemployment, was offset by his new job — proofreading amateur license study guides for a fledgling publisher, a position he was marvelously suited for.

Frankly, I preferred to continue seeing Lunchbucket, for the sake of my vacation plans. But I had to admit that he had reached a state where he could safely rejoin society. So we parted, on a very happy and successful note, even though I was forced to cancel my flight and hotel reservations.

I didn't see or hear from him for a long time, although I heard through the grapevine that he had passed his Extra, as a byproduct of his professional duties. I was pleased with the news — here was a good example of his renewed commitment to Amateur Radio.

This was all behind me when I became absorbed in a new and fascinating case — a radio amateur who feared that people were listening to him when he was on the air — when the phone rang. I was slightly perturbed, as I had left instructions that my research was not to be interrupted. My secretary said it was Mr. Lunchbucket, so I told her to put him right through.

Even now, the level of cheerfulness in his voice still amazes me. No one would have believed that this was the same morose individual who had initially been escorted into my office in handcuffs and leg irons.

The reason for the call was peculiar, but under the circumstances, understandable. He wanted to tell me that he was in the process of filling out the appropriate forms whereby he was transferring his two-letter call from secondary to primary station status. Before I treated him, he admitted, he would have been afraid to file the forms, with the notion that the "conspiracy" would manipulate things so that he would lose his hard-earned Extra Class call sign. Now, he said, he was free of all irrational fears, and knew that there would be no problem in preserving his one-by-two. Thanks to me, he said, he trusted the FCC.

My palms started sweating. I concluded the conversation as gracefully, but quickly, as possible. I then notified authorities. Next I told my secretary to set up a new series of appointments for Lunchbucket, *after* she made plane reservations to Aruba.

How to Get Involved

SET is the one annual event that involves thousands of amateurs in what they do best — providing public service. Any interested amateur can participate in this or any of a number of activities that will benefit your community in times of emergency or disaster.

A good way to get involved is to procure an application form for the Amateur Radio Emergency Service (ARES) from the ARRL. Ask for form CD-98. After it is filled out and returned, it finds its way to your local emergency coordinator. The EC, who is probably active on the local repeaters, can show you how to help provide communications during the next drill, walk-a-thon or real emergency.

If your community doesn't have an EC, contact your section communications manager (SCM) listed on page 8 of each month's *QST*. Perhaps you might be the one for this challenging job. The Radio Amateur Civil Emergency Service (RACES), which operates under the direction of state or local government officials, is also active in many communities. Contact your local civil defense director for details.

Free literature on the various public service programs is available from Headquarters; a 9 × 12 self-addressed envelope with postage for seven ounces will get you a complete Public Service Package by return mail. The latest Net Directory will be included, but can be ordered separately for a large return envelope with postage for 3 ounces.

This happy ARES group participated in the 1980 SET from McLean County, Illinois. *(K9ORP photo)*

1980 SET NTS/Net Activity	*1980*	*1979*
Nets reporting	231	194
States/provinces active	38	33
NTS liaison or affiliation	173	128
Number of messages handled	18,764	14,164
Total reported amateurs participating	4503	6286
Emergency-powered stations	2502	1817
Total number of points	49,409	40,226

Net scores are based on the sum of the following: one point for each message handled; two points for each different station participating; three points for each station checking in on emergency power; five points for each different net control station; and five points for each different station performing NTS liaison. Last year's score is listed in parentheses.

SOAPBOX

Best SET in history of Kings County — officials were very pleased and impressed with ARES. Before SET, the county would not let us in central command. After the test, the county requested ARES to install antennas on the command building and offered to let us set up inside for better coordination (WB6TTP). This was my first SET as Net Manager; looking forward to next year (WA4GPY). This was our net's first SET. What an eye-opener!! (WB4ABY). SET 1980 went well this year, combining public service activity with traffic handling. We had good participation and a lot of good practice (WB9PXT). The SET seems to be turning into an annual ho-hum event (WØFT). All agencies participating were enthusiastic and impressed with the operation (WA4YPQ). More Generals and higher-class licensees should come up to the Novice nets (WB1DHW). Good turnout considering these were the first days of deer hunting (W7OCX). The Alexandria ARES was asked to provide local communications for this simulated tornado exercise, and to send a lengthy report by radio to the office of emergency and energy services in Richmond (K4BAV). We had close to 100% representation and it could be seen that everyone was inspired (NP4D). RTTY is a natural for handling large volumes of traffic. It is too bad that NTS does not take advantage of this capability (W1YNE). Everything went smoothly; generally good representation. All four sessions were held on 80 meters (K2KIR). Four cycles works! (W2MTA). I believe the use of the present time of the year for the SET is a good one, and I hope it continues to be used in the future. For our point of view, the time is ideal (VE3DVE). We are trying to establish a traffic net to serve this district on vhf. This drill went a long way toward seeing that net a reality (KA3DZD). The state emergency preparedness agency was pleased to cooperate with the Amateur Radio community during the 1980 SET (WD4BUB). This was the first county-wide exercise ever held in Broward (WB4KKG). This exercise, I believe, may have aroused the curiosity of a number of our members in the traffic nets (WB8BZF). Via Touch-Tone pad, our repeater can go to emergency power. The repeater will operate for approximately 36 hours with reduced output (K8JDI). Our three local TV stations gave excellent news coverage. The entire community was aware of our program (W9MJI). Since we have had local problems with repeater interference, we decided to conduct a transmitter hunt net on WRØAEV while a predetermined "jammer" transmitted on a second frequency at varying intervals and for varying durations. The exercise was successful as it acquainted some new members with the principles of direction finding, as well as a net control with data-handling techniques (KØGND).

Local Activity

Jurisdiction	Reported By	Total Points
VE		
Alberta	(—)	16
Edmonton	VE6ABC	16
Ontario	(463)	69
St. Catharines	VE3DVE	69
1		
Connecticut	(6491)	348
Northern CT ARES	WA1EMI	78
Wallingford	WA1CCR	135
Waterbury ARES	N1ADE	135
2. Massachusetts	(268)	1042
Bellingham	W1XA	84
Cambridge	WA1VSY	103
Danvers	W1ZMU	56
Greater Lowell	WB1DFV	195
Newton	WA1BJA	33
Rockland	KA1CGP	562
Shirley	W1IPZ	15
Whitman	K1PJ	50
Maine	(1269)	846
Aroostook Co	WA1YNZ	312
Hancock Co.	AK1W	34
Rhode Island	(170)	309
Kent Co.	W1YNE	156
Newport Co.	W1JFF	153
W. Massachusetts	(182)	605
Berkshire Co.	WB1HIH	451
Franklin Co	W1YI	35
Hampden Co.	WA1YYW	203
Hampshire Co	W1QAJ	23
Northern Worcester Co.	K1VHC	93
2		
E. New York	(371)	478
Albany Co	WB2ZQM	252
Dutchess Co.	N2ADJ	205
Orange Co.	WB2BSN	274
Rensselaer	WB2IJE	148
N.Y.C.-L.I.	(256)	—
American Red Cross	N2AUK	—
N. New Jersey	(502)	501
Bayonne	W2KB	93
Englewood	W2CC	47
Hunterdon Co.	W5DTR	79
Monmouth	WA7DPK	135
Union Co	WB2RMJ	147
S. New Jersey	(465)	1361
Atlantic Co	W2KP	339
Burlington Co	K2DM	230
Augusta Co	WA4EGW	69
First Colony	WB4UHC	275
Harrisburg/Rockingham Co.	KA4ETG	61
Montgomery Co.	AB9I	6
North Piedmont District	N4AAW	21
Northern Shenandoah Dist.	WA4STO	116
Rockbridge Co.	WA4AJI	138
Smyth Co.	KM4X	91
Southern Tidewater	WB4ZNB	27
Southside District	WA4YIU	32
West Indies	(169)	1246
Arecibo	KP4AET	120
Zone 1 (Caguas)	KP4E	50
Zone 2 (Bayamon)	KP4BG	233
Humacao	KP4DQS	198
Ponce	KP4BO	288
San Cristobal	KP4ID	285
San Patricio	KP4ID	94
5		
Arkansas	(50)	714
Collin Co	K5MWC	309
Grayson Co.	WB5SBO	97
McLennan/Bosque/Hill Co	W5TAH	262
Union City	N5AHH	46
Louisiana	(343)	576
Troop G-Caddo/Bossier	WB5USS	160
Vernon Parish	WB5JZP	96
Webster Parish	K5WOD	100
N. Texas	(2013)	—
Grayson Co.	WB5SBO	—
Oklahoma	(483)	382
Carter Co	W5BLW	116
Comanche Co	K5BYF	121
Payne Co.	WAZTN	58
Pottawatomie Co	WB5ZBA	85
S. Texas	(—)	1107
Bexar Co	WA5RNV	194
Harris Co	W5CKC	551
Southern Brazoria Co	WD5AAH	362
6		
E. Bay	(209)	195
Contra Costa Co.	WB6JGV	195
Orange	(749)	1338
Barstow	WD8BNG	1
District 2-Corona	WD6DGI	51
District 3	W6LKN	76
District 6	N6BKY	239
District 7	N6ANL	154
District 9	W6PZO	155
North Orange Co	W6KHI	391
Crawford Co.	WD8LWE	20
Cuyhoga Co.	AB8P	541
Darke Co.	WA8KZR	237
Erie/Huron Co.	WB8VZK	78
Fairfield Co	WD8OEX	—
Greater Cincinnati	KB8BV	—
Hamilton Co.	K8JE	506
Hardin Co.	W8OQL	233
Highland Co.	K8CKY	48
Jefferson Co.	WD8SAB	178
Knox Co.	WB8AYM	127
Lorain Co.	WB8KRF	309
Lucas Co.	WB8TTQ	244
Marion/Wyandot Co	WD8NEE	315
Medina Co.	W8GSR	189
Miami Co	WB8MYE	100
Monroe Co.	KA8CRV	8
Morgan Co	K8RYW	42
Morrow Co	WB8TED	(16)
Muskingum Co.	WA8CZS	263
Ottawa Co.	WA8HGH	119
Preble Co	WD8DJR	9
Richland Co.	WB8GCR	185
Washington Co.	WB8UHP	96
West Virginia	(665)	1059
Brooke Co.	Wb8MJE	77
Hancock Co.	KB8DEW	101
Marshall Co.	KB8XM	486
Monongalia Co.	WA8GYU	178
Raleigh Co.	KD8X	129
9		
Illinois	(895)	1415
Champaign Co.	KB9BB	186
Cook Co.	W9HPG	250
De Kalb Co	WB9NPC	102
Dupage Co.	WA9WXC	156
Green/Jersey Co.	W9IFA	102
Jackson Co.	W9CJX	161
Logan Co.	WB9IPX	57
Mc Lean Co.	K9ORP	203
Vermilion Co	WB9YJF	148
Wabash Co.	ARH	40
Indiana	(2340)	3826
Cass Co	K9EQT	78
Clark Co.	K9TE	229
Clinton Co	WB9WWB	83
Crawford Co.	WB9ZHL	49
De Kalb Co	W9GWI	183
Delaware Co.	K9UJK	77
Dubois Co.	N9AHP	898
Floyd Co.	KA9FDP	167
Fountain Co.	K9VKX	40
Hendricks Co.	W9TIZ	32
Huntington Co	K9DMH	142
[illegible]	[illegible]	[illegible]
Third Region, W3NEM	178	143
Fourth Region, W4SHJ	337	166
Fifth Region, N4MD	422	—
Sixth Region, WA6UAZ*		211
Seventh Region, W7VSE	270	56
Eighth Region, W8PMJ	178	209
Ninth Region, W9FC	231	235
Tenth Region, W0SS	231	282
Eleventh Region, VE1WF*		106
Twelfth Region, W7LYA	312	253
Total	9008	8167

*Did not file report

Section/Local Nets

State/Province	Reported By	Total Points
Ontario	(2224)	708
OBN-D	VE3KK	109
OPN	VE3GNW	302
OSN	VE3ISW	77
Alabama	(164)	531
Alabama Emergency "T"	WB4SRG	62
Alabama Emergency "X"	WA4RNP	276
Alabama Emergency "Z"	WA4RNX	117
Walker Emergency	WB4VZU	76
Alaska	(—)	332
Seasaw	KL7JFT	332
Arkansas	(166)	129
Southwest CW Traffic	KG5L	129
California	(468)	1019
BARC 2-Meter	KA4FDX	52
Mendocino Co.	WA6QMV	109
Riverside Co.	W6LKN	45
Santa Barbara ARES	K6DZT	184
Southern Cal. VHF	WA6QCA	378
Western S.J. FM	WB6TTP	251
Colorado/Wyoming	(182)	743
Boulder/Gilpin Co. ARES	WBØNF	297
Colorado-Wyoming	WDØAIT	446
Connecticut	(779)	580
Conn. CW	K1EIR	128
Conn. Phone	K1EIC	250
Western Conn	WB2PJU	182
Delaware/Maryland/DC	(1166)	454
Delaware Emergency Phone	K3JL	93
Delaware Traffic	WA3WIY	76
Maryland/Delaware/DC	W3PQ	73
Tri-State 2-Meter	W3DFW	210
[illegible]	[illegible]	[illegible]
Michigan	(4794)	4838
Alpena Co. ARES	KBQBZ	163
Branch Co. ARES	N8BJD	110
Calhoun Co. ARES	WB8FBJ	120
Copper Country ARES	KB8W	69
Delta Co. 2M Emergency	WA8DHB	343
Genessee Co. ARES	AH8V	168
Holland Emergency	WB8BZF	107
Lapeer ARC	KB8PX	154
Macomb Co. ARES	WB8ZJL	136
Michelson GARA	WB8SYA	61
Michigan AR Comm s System	KA2JU	749
Michigan State ARES	W8VWY	78
Michigan Thumb	WD8UIZ/ WB8IIH	47
Michigan Traffic	WD8LRT	638
Ogemaw Co. ARES	WB8UIB	35
Portland ARES	WB8LCU	42
QMN	WA8PIM	394
St. Clair Co. ARES	KA8PE	489
Two-Meter Repeater Assn	WA8CKY	9
Upper Peninsula	WA8DHB	719
Van Buren Co. ARES	WB8BNN	78
Wayne Co. ARPSC	WB8ZIY	64
Minnesota	(44)	88
Rochester ARES	KØTS	88
Missouri	(503)	984
Adair Co. Emergency	WØOTF	44
Central Missouri Emerg.	KAØE	194
Cole Co. ARES	WBØNIE	87
Northeast Missouri Emerg.	KØHKN	138
Northland ARA	NØAJI	135
SWMARC	WBØTNX	66
Montana	(61)	148
Early Morning Montana	WB7UTJ	79
Montana Traffic	KB7BI	69
Nevada	(—)	50
Nevada Sagebrush	W7BS	79
New Hampshire	(95)	262
Granite State FM	AK1E	227
New Hampshire	N1NH	35
New Jersey	(1310)	1601
Bayonne ARES RACES and 2M emergency	W2KB	63
Burlington Co. Emergency	K2QIJ	134
New Jersey (cw)	W2UEZ	242
New Jersey Phone	N2CR	355
New Jersey VHF	W2TCA	517
Old Bridge EAT	K2CNM	436

Results, Eleventh Annual ARRL 160-Meter Contest

By Bill Jennings,* K1WJ and Tom Frenaye,** K1KI

The statistics obtained from the entries received for the December 5-7, 1980 11th Annual ARRL 160-Meter Contest are probably more indicative of the nature of Top Band and Top Band operators than of the nature of the contest itself. Can this statement be made about any other Amateur Radio contest? We think not.

In the 393 entries received after the contest, there were easily five times that number of different call signs found as contest QSOs in the logs. In the K3LR log alone, there were over 800 different calls worked during the contest, better than twice the number of official entries. It appears that the 160-meter "regulars" are more than willing to lend a hand to the contesters by providing contest QSOs. Would you expect less from the operators on the "Gentleman's Band"?

In view of the type of operators usually found on Top Band and the characteristics of the band itself, one comes to realize how easily a newcomer can succumb to the casual and friendly operating conditions and become a 160-meter "regular." Thus to the 160-meter ops the 42-hour incursion by contesters to Top Band is seen not as a nuisance to be endured, but rather as a way to introduce some "first-timers" to the lure of 160 meters.

The 1980 contest saw a slight (3%) increase in entries from the 1979 total of 382. The average score of the top-ten single-operator stations showed a corresponding 8.2% increase to 109,572 points per entry — higher than the same group in the 1979 contest. Multioperator stations (top five) did not fare so well, with a drop to an average 99,557 points per entry compared to a 1979 average of 108,122 points per entry. Pause for a short recognition of perennial top scorers. Again in the Top Ten are single-operator stations W9ZR, KØRF (WØUA), WØAIH and K4FU, all of whom held slots on both the 1979 and 1980 Top Ten list. Multioperator stations W8LT and W8JI are "repeaters to the Top Five" for multiops, while W8LRL, who was the top single operator in the 1979 contest, grabbed K3EST for a partner and turned in the top multioperator score in the 1980 contest.

The biggest (*only*) complaint — USA/VE types transmitting in the "DX Window" (1825 to 1830 kHz). True, things are looking better for more allocation and elimination of certain power restrictions on 160; the whole complexion of the band might change including the "window." But even though the "DX Window" is not a hard-and-fast rule or regulation, let's try to abide by this traditional "gentleman's agreement" just to keep in step with those sharing the band. We don't need the bickering and ill will caused by intrusion into the "window."

A quick note on calculating your score. There are two points awarded for QSOs with stations in an ARRL Section. Any station on US/VE territory (most stations with W/N/A/K/VE prefixes) is included within an ARRL Section. For example, KV4 is in the West Indies Section and is a two-point QSO not a five-point DX QSO. KH2 stations are in the Pacific Section, and are also two- (not five) point QSOs. OK? Multipliers are ARRL sections (plus VE8/VY1) and DXCC countries. Maritime mobile stations do not meet DXCC criteria and thus cannot be counted as an additional country multiplier. Score adjustments based on the above points were made in more than a few logs, and those adjusted scores are reflected in the score listings.

Top Ten

Single Operator		*Multioperator*	
K3LR	127,296	W8LRL	122,320
K5GO	124,278	W8LT	97,966
W9ZR	122,928	W8JI	95,706
KØRF (WØUA)	110,250	KB8AC	93,365
W1ZM	107,200	WBØCMM	88,430
WØAIH/9	104,489		
W9RE	103,575		
K2IGW	99,864		
K4FU	98,800		
N5AN	97,040		

Virginia's own WB4URW, first in his section and top single-operator score in the Roanoke Division.

Division Leaders

Single Op	*Division*	*Multiop*
K3LR	Atlantic	K3WW
W9ZR	Central	K9ZUH
WØJX	Dakota	KØTG
K5GO	Delta	—
K4FU	Great Lakes	W8LT
W2VC	Hudson	—
NØDX	Midwest	—
W1ZM	New England	W1FC
W6RR/7	Northwestern	W7WA
N6RO	Pacific	—
WB4URW	Roanoke	W8LRL
KØRF	Rocky Mountain	WBØCMM
AI8H/4	Southeastern	—
K6SE	Southwestern	K6DDO
K5RC	West Gulf	KK5I
VE3ABG	Canadian	—
C6AEP	DX	JH1YDT

SOAPBOX

It was like Field Day in December, only better. The generator and rig didn't overheat, no mosquitoes, no sunburn and drinks stayed cold. The only drawback was that it was kind of difficult using the key with our mittens on (W1QP/K1DT). Never operated on 160 before. I was really impressed with the level of activity and the courtesy displayed by the operators (K8AQM). Have been in each and every ARRL 160 Meter Contest. Conditions spotty here — only two W6s heard and very few Europeans heard as well (W3AJS). A lot of people have asked for information on the weird antenna that I use on 80 and 160. It is a Collins Radio 237W-1X Discage. It carries a pricetag of $33,000 — so everyone should have one. Of course, it takes over an acre of land for the antenna and radial system. By the way, I bought it surplus for $48. In fact, I bought six of them. No, I am not interested in selling any of them! (N7DF) . . . my body cannot handle the nocturnal hours needed to participate in this contest (WØVB). Since the 1978 contest I have used a 45 foot high A-frame mast with 9 foot long fiberglass pole extension to support the vertical section of my twin lead Marconi antenna. The mast was made of 2 × 3 stock and there was a definite lack of wind survival at this location. In fact, since 1978, five such masts have failed to survive the first windstorm after erection. The latest mast was built one week before the contest out of 2 × 4 stock and it has since survived a five-day wind storm which brought gust of 81 mph . . . The single-turn outdoor loop, the 4T-ES loop indoors and the W1FB "Quickie" preamp proved to be an effective receiving combination for almost all situations; the indoor loop proved its worth during periods of strong local noise that rendered the outdoor loop ineffective. Despite the success of this receiving system, two QSLs were received after the contest from stations *not* worked, indicating that improvement of the system is needed (W7XZ). It's not fair to some of the Pacific DX stations to be classified the same as KH6 in the Pacific Section. Ditto for countries in the West Indies Section (VE5XU). Would it be feasible to move the DX window to 1975 to 2000 kHz? Too many W/VE types pay no heed to the window (W4NVN).

FEEDBACK

Please refer to pages 88 to 91 in April 1980 *QST* for the following corrections to the 1979 160-Meter Contest.

K2IGW should have been listed as the multioperator winner from the Atlantic Division. In the East Bay Section, WA6EUZ (2nd place) listed as a single-operator station, was in reality a multiop effort at the same score. The second operator was WB6OVV. This would make WA6EUZ the multioperator Pacific Division Leader. In Ohio at 9292 points is AJ8J. Walt's score should be adjusted upward to 18,696 points and an 11th-place finish in Ohio.

*Communications Assistant, ARRL
**Assistant Communications Manager, ARRL

Scores

Score listings indicate call sign, score, QSOs, multipliers, hours. Example: CO2KK 140-10-7-3 indicates 10 QSOs and seven multipliers for 140 points during three hours of operation.

DX

Bahamas

C6AEP(W@CP,opr) 32,184-298-54-14

Federal Republic of Germany

DJ4AX 216- 12- 9- 1

Republic of Ireland

EI9J 8- 2- 2- 1

France

F6BWO 8- 2- 2- 1

Haiti

HH2VP 13,464-153-44-

Panama

HP1XAT 180- 10- 9- 1

Japan

JA3ONB 2646- 63-21-
JE1SPY 484- 22-11-
JH1YDT(+JA@VSH,JE1QMV, JF1s DMQ EAL,JH1GNU, JK1CQG) 1512- 42-18- 6
JA7YAA(JH7LIS,JR7s OMD SEI,oprs) 324- 18- 9-

Czechoslovakia

OK1DIJ 264- 12-11- 1
OK3CXF 216- 12- 9- 3
OK1JDX 98- 7- 7- 1

Hq, United Nations

4U1UN(N2KW,opr) 14,432-176-41- 8

Dominica

J73D 240- 12-10- 1

Region 2

K3SXA/MM 8888-101-44-10

W/VE

1

Connecticut

W1ZM 107,200-631-80-37
AA1K 73,010-502-70-34
W1WEF 44,820-369-60-20
W1BIH 34,664-305-56-11
WB1GCM 29,680-277-53-30
N1JW 23,226-237-49-10
K1DW 11,442-159-36- 8
K1LGM 10,620-146-35- 8
WA1CCR 10,185-144-35- 5
AK1B 6138- 99-31- 6
N1CC 3402- 60-27- 3
AA2Z/1 3304- 59-28- 1
W1QV 2116- 46-23- 3
WB1EYI 1380- 33-20- 3
WA1HYN 672- 24-14- 2

Eastern Massachusetts

WA1UZH 33,046-256-62-
W1AQE 12,246-157-39-
W1JR 9694-128-37- 6
K1VV 7350-105-35- 4
K1MEM 5928- 69-38- 3
W1AXA 2592- 54-24- 5
K1EWF 1121- 28-19- 3
W1BB 112- 8- 7- 2
W1FC(+N1RC,AD8V) 55,744-401-67-29
AB1A(+K8UR) 19,800-222-44-14

Maine

K2QE/1 19,228-203-46-19
K1NBN 11,991-160-37-13
WB1GEE(+N1ADX) 570- 19-15- 3

New Hampshire

WA1TZV 27,768-261-52-
W1FZ 9720-135-36-

Rhode Island

N1R1(+N1XW,W1OH,KA1s AIR BBY EHR,WB1s DEZ DXQ EHQ) 52,130-383-65-29
W1OP(K1s DT GOS,W1GS, WA1NZR,WB1CVV,oprs) 49,476-390-62-22

Vermont

WB1GQR 52,980-434-60-26
K1IK 38,304-333-57-11

Western Massachusetts

WB1HIH 34,202-346-49-24
K1KNQ 3024- 56-27- 2
W1UPH 750- 25-15- 8

2

Eastern New York

K2GBH 32,383-301-53-10
W2IB 10,360-128-40- 3
K5NA/2 8050-115-35- 3
K2MN 7178- 97-37- 6
W2DW 6435- 78-39- 3
WB2PUH 3024- 56-27- 6

New York - Long Island

W2KTU 12,636-179-35-22
N6AA/2 7310-106-34- 5
W2GP 4374- 81-27-
WB2DLA 1088- 32-17- 5

Northern New Jersey

W2VC 32,916-312-52-
W2RQ 22,137-231-47- 8
WA2GEZ 20,930-226-46-13
W1GD 8330-121-34-
K2JT 8820-121-36- 6
W2SQ 1045- 26-19- 1
N2IN 324- 18- 9- 2

Southern New Jersey

W2EHN 21,900-216-50-13
K2BWR 16,907-155-53-
W2ZQ(WB2IQV,N3BDD,oprs) 2530- 55-23- 5

Western New York

K2IGW 99,864-686-72-20
KB2I 18,400-200-46-14
WA2IKO 16,032-164-48-13
WA2RXB 13,760-172-40-11
WA2QKF 11,248-152-37-18
WB2FBP 4408- 76-29-10
WA2EYA 2730- 51-26- 5

3

Delaware

N3ND 54,250-433-62-30
N8NA/3 736- 23-16- 1

Eastern Pennsylvania

K3UEI 67,947-465-71-
W3BUR 48,620-439-55-23
W3AJS 24,941-253-49-24
K3QOF 20,724-234-44-
W3TS 16,748-155-53- 5
WB3FAA 16,497-210-39-17
WB3AKI 10,296-143-36-14
WA3YON 6656-104-32-
W3ADE 5452- 94-29- 9
WB3KXP 4266- 79-27- 7
W3AP 2704- 52-26- 2
K3YW 1909- 40-23- 2
K3SWZ 330- 15-11- 1
K3WW(+KB3GJ) 78,256-512-73-

Maryland - D.C.

W3GN 74,444-495-74-
W3YOZ 60,116-361-68-
K3ZZ 27,642-268-51- 8
W3FA 25,806-250-51-10
N3CO 25,792-245-52-22
WB3AVN 25,272-240-52-11
K3HPG 15,826-190-41- 8
N4NW/3 9799-118-41-
WA3NQJ 3750- 61-30- 4

Western Pennsylvania

K3LR 127,296-801-78-31
W3BZN 16,967-176-47-11
LA4LN/W3 10,080-140-36-10
K3UA 8382-127-33-
W3IW 7854-119-33- 6
WA3FWA 4752- 88-27- 7
W3HOH 1452- 33-22- 1
K3CR(KA3GNF,N3BAO, oprs) 1476- 41-18- 9

4

Alabama

N4KG 34,385-260-65-11
K4ZGB 15,170-185-41-
K4TWJ 6156- 84-36-

Georgia

AI8H/4 55,656-379-72-36
K4UEE 46,296-314-72-18
N4UZ 10,320-129-40-
WD4NAE 1617- 37-21-
N4PB 512- 16-16- 2
K4BAI 180- 10- 9- 1

Kentucky

K4FU 98,800-641-76-27
W4YOK 29,588-283-52-11
WB4ASW(+WB4HNH) 66,365-509-65-30

North Carolina

K4UWH 30,141-291-51-17
N4NC 8132-104-38-
AA4NC 7600- 89-40-
W4OMW 5984- 85-34-
K4JO 1776- 37-24-
W4AMC(W4OMW,opr) 928- 26-16- 2

Northern Florida

N4WW 48,096-325-72-11
W4VQ 6688- 85-38- 4

South Carolina

K4CNW 55,616-427-64-24
N4TJ 49,436-356-67-26

Southern Florida

N4IN 60,724-380-76-25
W4PZV 13,287-150-43-
WB4OSN 11,891-122-47-
W4MLA 6405- 87-35-12

Tennessee

K4PJ 29,583-258-57-10
NF4F 16,254-189-43-20
W4ZJY 11,176-124-44-
K4ON 9956-131-38-

Virginia

WB4URW 83,398-559-74-28
K4PQL 73,168-520-68-24
N4UU 36,993-309-59-
W4DHZ 33,360-272-60-23
W4NVN 26,624-256-52-30
W4XD 22,644-219-51- 9
KX4V 18,616-176-52-
W4DM 14,400-157-45- 8
W4YE 14,241-150-47- 4
AA4M 12,986-148-43- 4
K4QD 12,954-124-51- 9
N4MM 12,150-117-50- 3
KG4W 10,472-116-44-
K4VHH 9360-114-40-
N4RA 9324-126-37- 4
W4KFC 7714-100-38-
W4ZC 7400-100-37-
W4WWQ 4557- 72-31-13
WD4GCE 1764- 49-18- 4
K4JSI 1664- 32-26- 4

5

Arkansas

K5GO 124,278-798-77-28
W5KL 8712-121-36- 3

Louisiana

N5AN 97,040-595-80-22
K5KLA 27,931-259-53-
KC5G 3120- 60-26-

Mississippi

WA@DXZ/5 23,406-246-47-
N5XA 20,142-182-54-13
AE5H 7881-105-37- 7
W5GWD 2688- 56-24-20

New Mexico

K5TA 17,850-172-51- 4
WA5YTX 13,260-127-51- 4
W5DO 5010- 73-30- 4

Northern Texas

K5IU 66,357-444-73-24
N5JB 60,902-404-74-26
K5NW 43,494-325-66-14
K5NU 43,456-335-64- 7
WB5AZI 24,644-199-61-19
AA5C 17,400-174-50-
W5QF 14,805-156-47-12
W5FIX 11,655-128-45-16
W5SOD 7955-106-37-13
K5IS 3540- 59-30- 4
N5ZR 20- 5- 2- 1

Oklahoma

KM5H 37,115-281-65-15
NI@N/5 7828-103-38- 3
KK5I(+K5JZN,N5s CG MF, W5KI) 73,438-494-73 31

Southern Texas

K5RC(K5GN,opr) 69,160-437-76-
K5MA 24,136-211-56- 8
N5DU 21,850-217-50-
N5IJ 11,139-117-47- 7
W5NTJ(+WA5IEX) 25,172-214-58-
N5EM(+WA4EWV,K5s HGB ZC WD5BDX) 18,847-199-47-
K5DL(+WN5TEN) 12,936-154-42-22
W5AC(WB5WOH,WD5BIK, oprs) 5400- 75-36-

6

East Bay

N6RO 74,479-484-71-
K6HIH 34,810-286-59-
AD6D 14,628-156-46-18
WB6ZEP 2546- 67-19- 8

Los Angeles

K6SE 88,038-519-73-25
WB6RZH 4060- 69-30-
N6NW 2684- 61-22-
K6DDO(+W6RW) 60,434-415-67-

Orange

N6PE 22,360-209-52-11
WD6EWG 7006-113-31-

Santa Barbara

N6TR 27,552-237-56-10
AG6K 18,290-155-59-
W6JTA 10,865-131-41- 5
W6SWM 6336- 88-36-16
K6MXO 5888- 32- -
W6TYR 2080- 52-20-11
WA6RKE(W6s HDQ WJ WYQ, WA6WMO,oprs) 5040- 84-30-11

Santa Clara Valley

WA6PGB 27,940-251-55-24
K6RU 20,332-212-46-20
W6OKK 9141-134-33-10
W6SZN 936- 36-13- 4

San Diego

N6ND 41,800-353-55-
W6AMD 19,200-183-50-18
K6XT 16,426-176-43-
K6QM 2208- 46-24-
W6UQF 1656- 46-18-
AA6EE 1444- 38-19- 2
WA6UFY 108- 9- 6- 1

San Francisco

KF6I 5800-100-29-

San Joaquin Valley

K6MO/6 25,056-208-54-17
K6UJG 14,584-161-44-
KK6C 10,988-134-41-
W6MUV 2000- 50-20- 9

Sacramento Valley

AI6V 67,464-443-72-29
WA6BRV 1800- 50-18- 4
WA9WAC/6 1536- 48-16-
W6SX 24- 4- 3- 1

Pacific

KH6CC 44,138-317-69-
KH6ND 8106- 89-42-16

7

Arizona

WB7FDQ 40,572-313-63-
AA7A 36,113-259-67-12

Idaho

N7SU 26,042-223-58-25
KA7BTQ 24,528-219-56-22
KB7N 11,890-145-41-20
W7IWU 3752- 67-28- 7

Montana

K@PP/7 52,080-369-70-26
W7HAH 18,200-175-51-23
W7BMI 3900- 78-25-

Nevada

W7XZ 46,995-342-65-31
W7ABX 2300- 50-23- 4

Oregon

K5MM/7 55,744-377-67-18
W7NCO 42,212-337-61-
W7ULC 26,320-226-56-
W7CCB 20,139-204-49-11
AI7B 14,448-168-43- 4
W7TC 6136-118-26-19
W7LT 2660- 70-19-11

Utah

N7DF 77,688-538-72-28

Washington

W6RR/7 79,236-510-71-19
N7AM 45,474-310-66-29
WA7GCI 39,065-269-65-30
WA7OFH 29,480-205-67-19
W7BYK 7359-110-33-15
W4DBG 6840- 92-36-
W7ERH 4266- 79-27- 9
K7XX 4088- 73-28- 5
K7IDX 2912- 44-32-
WB7RMQ 1862- 49-19- 7
AA7W 1170- 39-15- 5
W7DRA 256- 16- 8- 1
W7WA(+KC7I) 43,745-323-65-20

Alaska

KL7HBK 11,696-130-43-17
KL7GIH 3266- 71-23- 7
WB4WXE/KL7(+WB4YLR) 24- 4- 3- 1

8

Michigan

W8EP/8 89,150-596-74-
W8TU 34,556-323-53-
K8AQM 28,420-242-58-15
WD8DNG 13,884-178-39-
N8AXH 12,960-162-40-
KC8P 7590-115-33- 5
K8CV 6420-107-30- 7
K8LJG 5208- 84-31- 4
K8LX(+N8EA) 88,111-596-73-

Ohio

K8CCV 94,248-600-77-30
AD8I 79,488-570-69-21
W8DB 47,255-359-65-18
W8FN 39,072-290-66-14
AD8P 38,545-295-65-10
K8MR 33,872-289-58- 7
WA8TNO 20,600-203-50-12
KB8WL 15,288-182-42-17
W8OK 13,824-141-48- 4
K8IQG 13,608-162-42-
W8IM 11,352-126-44- 7
WB8IBY 8400-104-35- 4
WA8WCU 8128-127-32-14
K8HF 4544- 71-32- 4
K8BL 4150- 83-25- 4
N8AXA 736- 23-16- 4
W8LT(K1LT, K8s EM LT ND, W8ERO,WB8s PAF PHI, WD8ALS,oprs) 97,966-662-73-42
W8JI(+K8KAS,KA8BVM) 95,706-600-78-23
KB8AC(+KA8HFO,W8BTW, WA8EUK,WB8YJF,WD8LLR) 93,365-650-71-26

West Virginia

K8OQL 48,298-382-62-21
K8UC 32,205-281-57- 9
W8JWX 8066-109-37- 6
W8LRL(+K3EST) 122,320-742-80-42

9

Illinois

WA9PFB 85,162-544-77-28
K9BGL 70,522-460-76-30
K9BG 45,824-352-64-17
K9AB 41,472-321-64-13
K9JU 40,524-307-66-17
W9OA 31,906-301-53- 6
W9CH 31,552-269-58-12
WD9DCL 29,184-253-57-12
K9LUI 19,200-200-48- 7
WD9IIX 15,729-154-49-10
WD9GGY 9768-132-37-
AK9N 4590- 85-27-10
K9MDO 4266- 79-27-
W9REC 3640- 65-28-
W9ESD 2- 1- 1- 1
WD9CSA)+AK9F,K9s IFO NR, KB9N,N9RR) 52,920-414-63-
K9XI(+KA9COZ,W9s JXT NEC, WA9YZR) 49,111-365-67-25
WB9YTT(+KA9ALC,WD9FNB) 26,125-236-55-32-

Indiana

W9RE 103,575-686-75-28
K9CLO 54,604-397-68-29
N9GT 48,100-364-65-17
WB9JKO 38,019-332-57-16
W9JOO 35,728-305-58-
W9VP 33,475-253-65-11
WB9WQV 5280- 80-33-13
AG9S 5082- 77-33- 8
W9LT 4719- 70-33- 2
N9KB 1960- 49-20- 5
K9ZUH(+WB9PXR) 58,370-443-65-23

Wisconsin

W9ZR 122,928-779-78-
W@AIH/9 104,489-668-77-18
W9WQ 22,589-229-49-15
N9AUG 19,822-187-53-18
W9UP 6665- 76-43-12
N9KS 300- 15-10- 2
K9GDF 80- 8- 5- 1
N9AW(+WA9TZE,WD9GUR) 40,858-328-62-26
K9ODK(K9s EN ZZ,KA9s EYJ GNY, N9BPN,W@DWE, oprs) 38,346-289-65-15

Ø

Colorado

K@RF(W@UA,opr) 110,250-687-75-32
K@ZK 45,695-344-65-24
K@RZ 19,080-180-53-15
N@ZA 9492-113-42-
AB@G 2800- 50-28- 5
WB@CMM(+KC@D,WB@SSL) 88,430-575-74-
K@CL(+W@KEA) 73,002-502-69-26

Iowa

WD@AWM(KB8N,opr) 70,883-484-71-
K@GVB 69,930-466-74-28
W@EJ 65,552-479-68-13

Kansas

WA@TKJ 68,046-511-66-29
WA@QMU 37,260-309-60-18
WB@ISW 9990-135-37- 9
W@ODT 3834- 71-27-10

Minnesota

W@JX 64,824-435-74-
K@PK 60,130-425-70-25
W@HW 22,516-215-52- 8
W@VB 19,936-178-56-12
W@TIV 9266-113-41- 6
W@BF 4480- 70-32- 4
AI@Y 3848- 74-26-
K@TG(+K@FVF,N@BG, WA@RBW) 71,029-485-73-33
K@JUS(+AE@N,KA@JVB) 54,239-370-73-36

Missouri

N@DX 74,314-503-73-16
N@TT 61,200-444-68-
WA@FBQ 36,540-312-58-14
W@HMA 16,752-173-48-
N@RJ 6534- 99-33- 5
K@RWL 2100- 60-21- 4

Nebraska

N@BNY 1938- 57-17- 3

North Dakota

W@ZTL 23,976-222-54-10

VE

Maritime - Newfoundland

VE1AXT 28,956-230-57-17
VE1ASJ 15,498-180-42-
VO1HP 2574- 48-26-

Quebec

VE2FOU 21,195-234-45-
VE2MJ 12,580-185-34-17
VE2WA 4368- 78-28- 5

Ontario

VE3ABG 54,145-412-65-
VE3INQ 27,987-244-57-28
VE3DAP 22,660-256-44-18
VE3BFK 14,022-171-41-10

Manitoba

VE4AED 952- 28-17- 3

Saskatchewan

VE5RA 38,284-280-68-19
VE5XU 35,700-296-60-21

Alberta

VE6QU 40,068-315-63-14

British Columbia

VE7CRU 25,088-224-56-
VE7SL 7805-110-36-
WI7Z/VE7 4760- 68-35- 6

NWT

VE8XO 238- 17- 7- 4

Check Logs

K1GQ,N5AIL,W6XM,OL8CIR

Straight Key Night

By Bill Jennings,* K1WJ

There are always a couple of comments received with the Straight Key Night (SKN) reports that suggest that New Year's Eve/Day is just too hectic a time of the year to hold SKN. "What with all the parties, entertainment, and hustle and bustle, it's really hard to sandwich some SKN operating time into the busy schedule," they say. But that's the point, the whole flavor, if you will, of SKN. It's a chance to *make* time, to put on the brakes and to engage in a leisurely QSO or two and, in the light of a dawning new year, to reflect a bit on times gone by and times to come.

In years gone by while in my prime
I used to do it all the time
At crack of dawn or late at night
The urge was there to do it right.
Now, once a year I like to do
The good ole things I used to do.
We venture forth without a feur —
My straight key, me and yesteryear.

— George, W5JOV

New Year's Eve Is the Time for SKN.

There were 106 reports received for the 1981 edition of SKN, and in those logs were QSOs with 610 different stations. All United States and Canadian call areas were represented as well as stations whose prefixes are DK, FG, G, HS, JA and YV.

W4YE and W0OX wound up sharing top honors in the balloting for the "Best Fist" award. Each received four votes. Tied at three votes apiece in second place were KB2Z and W2LYH. Two "Best Fist" nods earned the following stations a third-place showing: N1CC, W1ATX, WB1HJF, W4KFC, W4UA, W6FU, W8TP, WB8ZVI, W9PCF and W0UA.

"Most Interesting QSO" honors were shared by four stations who each received two votes. They are W2LYH, KZ4P, W7BMI and W0HNM. (It is interesting to note that W2LYH is the only one to get multiple votes in both categories.)

We have a little "old business" to discuss. In the Key Clix section of the last SKN report (see page 87, April 1980 *QST*), WB7VLC wondered about world records for sending cw with a straight key. In answer, Charley Darner from Orlando, Florida, quoting a letter by W0KXP/9 which appeared in December 1979 *73 Magazine*, page 226, says that Harry Turner is the holder of the world's record for sending cw on a straight key — at 35 wpm. At the other end of the circuit, Thomas, WB6LPN, told us that the world's record for copying cw (word for word by pen and ink) is held by two chaps, professional telegraphers, who copied 55 wpm at the Paris Exposition in 1855. Thanks for the feedback.

That's about it for SKN '81. CU on New Year's Eve for SKN '82.

"Ode to the Code from a Winter Abode"

The winter winds were howling hard,
They whipped the dipole above the yard.
Such a storm, what a fright,
I pulled in close for straight key night
And warmed my hands above finals bright.

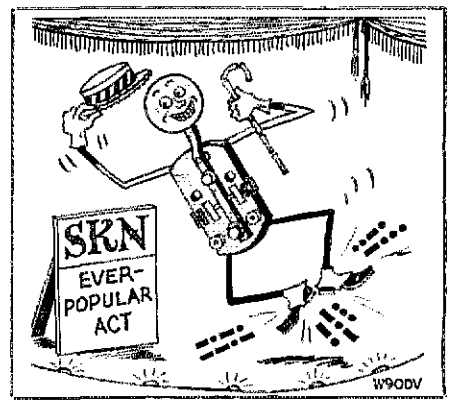
The key was clattering like my teeth
With a 549 for a chap named Keith.
Then someone called me far beneath
The clicks and chirps and idle splatter
Of foreign broadcast, but it did not matter.

I had to pull him from the noise,
For I knew it must be one of our boys,
Fighting hard with QRP
Against this stormy, noisy sea,
I listened hard and pulled him through,
With a tone of nine he was five by two.
And yet, the report he gave to me
Was just a lousy two by three.

This was more than I could bear,
I began to shout and tear my hair.
I ran to the window and threw up the sash,
Then my teeth began to gnash.
There on the breast of the snow I found,
My frozen dipole on the ground.

— Hunt, KØHT

de Joe, W9ODV



The straight key is still delightfully "hamming it up!"

KEY CLIX

After 18 years on the air using only my straight key, I finally broke down and bought my first keyer in Sept. 1980. It was sure good to dig out my old friend for SKN. I was surprised how quickly it forgave my transgression (WA7NXL). I don't like those hit-and-run contacts with an operator who can't talk or sends like hell and then can't copy 15 wpm. More SKNs (K8ANV). A great way to end a holiday season and start a new year (W3CEI). No multipliers, no prizes, no keyboards, no hotshots; just communicating — brasspounders and ragchewers — all first rate (WB2MLX). Seemed to be a dearth of two-by-three calls active; don't tell me all the newcomers lack straight keys! (W4KFC). SKN reminds me of when I was a boy of 19 years in 1934. Got on the air with a home-made three-tube rcvr and a type-47 xtal oscillator driving a type-210 tube on 40 meters. Only had one xtal and had to tune the whole band to find an answer to my CQ. Still have hundreds of QSLs from those days (W4RHZ). For the sake of the faint-hearted, W7QE at 81 can really handle a straight key! (W2VGO). I worked my "Elmer" who now lives in Mississippi. He said that I had a good fist. I hadn't seen Bill in a couple of years and it was really great to meet him again (AB4Y). As usual I had a ball on New Year's Eve. Got on at the beginning, went QRT at midnight and toasted the New Year with my wife, who allowed me to spend the evening on SKN. The rationale, "Better than being on the highway with all the drunks!" I took a bottle of Chenin Blanc out to the shack with a large hunk of fruitcake and by midnight, the wine and the cake were gone, and I returned to the house for the toast (W6FU). My vote for "Best Fist" was WD0BHQ, Dave, in St. Louis. This humble OM said that he was using a straight key because his keyer didn't know how to spell. Dave can really make the old "Charley Whiskey" sing with his old hand pump (WB1CSS). . . . there was George, K2IVG, calling CQ SKN on 40 meters. No one responded and he repeated, CQ SKN LAST CHANCE DE K2IVG. Well, I was not really ready but I could not let that go. I quickly sent AS on my keyer to let George know that it was not the end. I hurriedly dug out the old straight key and plugged it in. Lo and behold, the system still worked — K2IVG DE VE3MJC KN, and there was George just raring to go on the "last chance" QSO (VE3MJC). I had not used a straight key since I taught code to the Boy Scouts when our son was a member, and he is now 31 years old — HI! (W8RJI). Although I was sick with the flu, I was determined to make a few SKN contacts (W4MRD). I really enjoy operating in the SKN since it emphasizes what I like to do best: ragchew. I was on pins and needles for the whole SKN period but not because I had forgotten how to use the trusty old hand key. It was because my wife was due to give birth to our second child at any moment. Next year I plan to be on with my Jerry Gross three-tube regen receiver and a 210 TNT (W2SN). I believe that SKN has a bit of an emergency aspect to it also. In the event of a possible communications emergency, we may be restricted to battery power and all those nice electronic keyers and keyboards just may not be available (W2AEF). Please keep SKN because it makes us older types stay on our creaky toes with the fundamentals: the straight key (W3QYL). The best cure for a hangover is a whole afternoon of SKN. Your arm aches so badly that you forget about your head! (WA9ZBW). Harder to find SKN QSOs. Guess with all the low-cost keyers around that the straight key will die out (WB3KJT). I am into building replicas of equipment used in the 1930's. For example, I now have in the works the RK-20 single-tube transmitter shown in the April 1935 issue of *QST*. Getting genuine parts is a real challenge (N6TO). It would be interesting to know who was the youngest and who was the oldest operator in this SKN (W9ODV). [Best I can tell, Joe, KA4LKE at 15 years of age, and W7QE, 81 years young, fill those slots. — Ed.] Once again, SKN has been great fun and an escape from the winter doldrums. P.S. Do you know anyone who does elbow transplants? (K3NCO). QST

*Communications Assistant, ARRL

Public Service

Conducted By Robert J. Halprin,* K1XA

Hip Packet

Paul Rinaldo, W4RI, and other amateurs affiliated with the Amateur Radio Research and Development Corporation (AMRAD), have proposed the creation of an Amateur Radio digital communications network in the U.S. and Canada. Under the acronym AMNET, this network can augment our present National Traffic System with high-speed message-handling capabilities. Traffic could be relayed from one end of North America to the other, in a matter of minutes rather than hours, through a linkup of packet repeaters. Instantaneous communication (or lack thereof) has always been a concern to those on different ends of the NTS spectrum, so to speak, and packet radio enthusiasts suggest that this rapid-fire data transfer is well within our reach *now*.

Writing in the AMRAD newsletter, Dave Borden, K8MMO, made the following observations: "It takes a 'long' time to get a message through the National Traffic System. I want to originate a message here in northern Virginia and have it arrive in Redondo Beach, California, several minutes later. A network of smart repeaters can do this job. To quote a time-honored, trite phrase, 'we have the technology.' Canadian amateurs are already well into packet radio." Even those of us from the technically underprivileged segment of the amateur populace see the ramifications of this technology — a nationwide network of interconnected computer systems, drastically improving the response to high-volume message-handling needs, particularly in times of emergency.

WA1LOU, *FM/RPT*'s conductor, discussed one kind of system in a recent column called "Why ASCII?" The key to his system would be region ASCII-traffic repeaters. Such repeaters would need good coverage and would have to be tied to a microprocessor with a good-size memory. These repeaters would accept ASCII-encoded traffic 24 hours a day. As each message was received, it would be sorted by the microprocessor, according to its destination, and stored in the memory for future relay. Local traffic would eventually be relayed to other stations checking into the repeater that could handle the traffic. Messages destined for adjacent regions could be relayed to the ASCII-traffic repeaters in those regions. The inter-regional relays would be accomplished by linking the repeaters on a regular schedule, perhaps similar to our present NTS area nets. During each link, traffic destined to the other region could be relayed to the other repeater, where it would be stored for local distribution. Traffic destined to go beyond adjacent regions could be relayed to an amateur serving as liaison to an hf ASCII net, or to transcontinental schedules (NTS gateway stations) or by means of future Amateur Radio satellites (AMSAT has plans for making significant use of packet). Eventually, when the U.S. and Canada are completely covered with ASCII-traffic repeaters, the hf liaison could be eliminated, and traffic could be relayed automatically from repeater to repeater right across the continent.

The planning that W4RI and AMRAD have undertaken may differ in detail from the above. It is not the intent of this column to get involved with details, especially at this embryonic stage. The intent is, however, to get the reader to start thinking about the advantage, desirability and practicality of high-speed data communication. As the planning progresses, it will be important to establish one kind of message protocol as a standard: That certainly will be the subject of later inquiries.

A final thought for the time being — garbling and distortion of messages, so common in NTS these days, will become a quaint bit of nostalgia after the implementation of packet radio. Many of us want to be around to see that.

CALLING ALL AMATEURS WHO ARE REACT MEMBERS

REACT (the Radio Emergency Associated Citizens Teams) now has a net for hams who happen to be members of REACT or who are interested in learning more about the REACT organization. The net meets every Wednesday at 0230 UTC and every Sunday at 2100 UTC, on 21,380 kHz. Net controls are N4BAQ (Knoxville, Tennessee), WD4CPF (Huntsville, Alabama) and WA6NQF (Canoga Park, California). The purpose of the net is to improve the possibilities of cooperative efforts between amateurs and REACT members for public service communications.

To determine interest and potential participation in this movement, REACT has requested that those concerned fill out and return the form at the right to REACT headquarters (REACT International, Inc., 75 East Wacker Dr., Chicago, IL 60601) so that they may have a survey of amateurs who are REACT members. *(Information courtesy of THE REACTER, January/February 1981)*

PUBLIC SERVICE DIARY

☐ Mayes County, Oklahoma — January 18, 1981. Mayes County RACES operators were called upon to assist in the search for two missing youngsters who had strayed from home. After a six-hour search, the children were found unharmed. (WB5AXH)

☐ Siskiyou County, California — January 22, 1981. When a courier plane crashed into Mount Shasta, amateurs assisted the Siskiyou County sheriff. Using 2 meters, hams provided communications between air and ground search teams. (N6ADS)

☐ East Sandisfield, Massachusetts — February 7, 1981. Hams from the Hartford, Connecticut, area were on hand to provide communications assistance to

REACT Amateur Net Information Request

Call Sign_____ Class_____

Name _____

Address _____

City _____

State _____

Zip _____

REACT team name _____

Bands you can operate (Fixed) 160 80 40 20 15 10 6 2 1 1/4 other

Bands you can operate (Mobile) 160 80 40 20 15 10 6 2 1 1/4 other

Phone patch capability Yes_____ No_____

GMRS capability Personal Yes_____ No_____

Team Yes_____ No_____

Emergency Power Yes_____ No_____

Any repeaters or nets you normally work or monitor_____

*Assistant Communications Manager, ARRL

Vera AC8T, is active with the Flint, Michigan, Amateur Radio Emergency Service.

Nutmeg District Boy Scout officials during the annual Klondike Derby. Reports on patrol whereabouts within a designated wilderness area were relayed via 2 meters. (K1CE)

AMATEUR RADIO EMERGENCY SERVICE REPORTS

☐ Syracuse, New York — October 16, 1980. A 36-inch water main erupted, spewing 3 million gallons of water per hour into the street. Members of the Onondaga County Radio Emergency Corps supplied Red Cross personnel with communications both at the scene and at evacuation shelters. (WA2PUU, EC Onondaga County)

☐ Monroe, Michigan — December 5-6, 1980. When a tanker truck carrying butane overturned on an entrance ramp to Interstate 75, Monroe County ARES members were prepared. Using 2 meters, the hams provided one evacuation shelter with its only means of communications until the truck was uprighted 12 hours later. (WB8TKL, EC Monroe County)

☐ Montgomery, Alabama — December 27, 1980. When a deer hunter became lost in the woods, KA4ITU, WA4OOK (a deputy sheriff) and other ARES members conducted a search. Seventeen hours after the search began, the lost hunter was found. (W4IBU, SEC Alabama)

☐ Saratoga, California — January 12, 1981. A toxic chemical fire necessitated the evacuation of over 125 residents and the Silicon Valley Communications Group was asked to help. Using 2 meters, hams relayed information between the evacuation shelter and Red Cross chapter headquarters. (W6PLT, DEC Santa Clara Valley)

☐ Waynesboro, Virginia — January 17, 1981. When three Boy Scouts failed to return from an orienteering exercise, members of the Augusta County ARES became involved. Using W4PNT/R, amateurs conducted communications for area rescue squads, fire departments, police personnel and sheriff's offices. After 16 hours of searching in sub-zero temperatures, the Scouts were found. (WA4EGW, EC Augusta County)

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For January, 32 SEC reports were received, denoting a total ARES membership of 16,531. Sections reporting were: Ala, Alta, Ariz, Ark, Colo, Conn, ENY, EMass, Ill, Ind, Iowa, La, Mich, Minn, Nev, NLI, NFla, NNJ, NTex, Ohio, Oreg, SV, SDgo, SJV, SBar, SCV, SC, SFla, Wash, WVa, WMass and WNY.

COUNTING TELEPHONE NUMBERS IN RADIOGRAM TEXTS

Jim Hatherly, WA1TBY, section traffic manager for Eastern Massachusetts, questioned us recently about the proper way to count telephone numbers that are contained in the text of a formal radiogram. Actually, an ARRL-recommended procedure pertaining to phone numbers appearing in texts was established by W1NJM some years ago, but a specific reference to it has accidentally slipped from our various publications.

Be that as it may, our recommended procedure is to count the phone number as separate groups; that is, if an area code is included, 203 666 1541, it would count as three groups. If only the phone number is included, 666 1541, it would count as two groups. This, of course, is the way the message should be sent on the air. Separating the phone number into these groups is a good way to minimize garbling.

Here is a sample message, in proper form:

HAVE JUST BEEN EVICTED X
MY NEW TELEPHONE NUMBER IS
203 666 1541 X LOVE

This radiogram has a check of 15.

HOT INFO — THIS ISSUE!

Two features of interest to the public-service minded radio amateur appear in this issue of *QST*: results of the 1980 Simulated Emergency Test and an overview of the ARRL/Red Cross message relay. These articles contain information about the latest happenings of the field organization — good reading for those involved in traffic/emergency affairs as well as those just passing through.

THIRD-PARTY TRAFFIC AGREEMENTS

The United States has made special arrangements to permit U.S. amateurs to exchange third-party traffic *only* with amateurs licensed by these countries:

North America:	Canada Costa Rica Cuba Dominican Republic El Salvador Guatemala Haiti Honduras Jamaica Mexico Nicaragua Panama
South America:	Argentina Bolivia Brazil Chile Colombia Ecuador Guyana Paraguay Peru Trinidad and Tobago Uruguay Venezuela
Europe:	4U1ITU
Asia:	Israel Jordan
Africa:	Ghana Liberia
Oceania:	None

Canada has made special arrangements to permit Canadian amateurs to exchange third-party traffic *only* with amateurs licensed by these countries:

North America:	Costa Rica Dominican Republic El Salvador Guatemala Honduras Jamaica Mexico Nicaragua United States
South America:	Bolivia Chile Colombia Guyana Paraguay Peru Trinidad and Tobago, Uruguay Venezuela
Europe:	none
Asia:	Israel
Africa:	none
Oceania:	Australia

REPEATER LOG

According to reports received between January 21 and February 21, 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
K1FFK	1			3				1			5
K1FPK				3				2			5
WR1AHV							1				1
WR1AID				1							1
WR1AIW							1				1
W2ALS	1							4			5
W2VL	1		4	10	3						18
WB2NQV			3	1			1				5
WR2ADJ				3	1						4
WR2AIS				2							2
K3JSZ								4			4
N3AIA				2	1			3			6
W3CWC				1				4			5
W3UER			2	3	2						7
WA3AVX	1										1
WA3ZXG	4			3				7			14
WR3AEE	1										1
WR3AKM	1										1
WR3AKO	1										1
WR3AIZ	1										1
WR3AVX	1										1
K4EAJ						1					1
WB4QES	1	1	3	23		1		4			33
WB4TON				2			1	4			7
WR4ASY								1			1
VE5CI					1						1
W5GIX				15	1						16
WB5RDD				1							1
K6TZ			1	12							13
W6ESI		1									1
W6HIR				3							3
W6IYY		1		3	1		1	4	1		11
W6PVR		1		2				4			7
WA6EUZ			1	19	1						21
WA6WTT				1					2		3
WR6AEN				27			2				29
K7CC			1	20							21
W7IXF	1						2				3
W7LQT				1							1
WR7ACE				1							1
K8RO							1				1
W8BI				1							1
WB8UIN			2	2	2		2				8
WR8ABT								1			1
WR8ACC	2						3				5
WR8ADY								1			1
WR8AES								3			3
WR8AJL				1							1
WR8ARB				4	1						5
K9ORP				1							1
N9AHP									1		1
WR9ACJ				4							4
WRØAEV							1				1
WRØAMX	49										49
Simplex							4				4
Total	66		4	17	175	14	2	20	47	4	349

NATIONAL TRAFFIC SYSTEM

"The leadership displayed by Gary Carter, KP4FEY/NP4D, in organizing section traffic activities and providing liaison with the Fourth Region net is commendable and appreciated throughout the Eastern Area. NP4D, assisted by KP4U and others, has placed the West Indies section firmly on the NTS map. Systematic traffic flow to/from the section is now a reality. This is the first time in the over 30-year history of NTS that the West Indies section has had consistent reliable liaison with the rest of the system. The results of this liaison were clearly visible during the 1980 SET [details this issue — *Ed.*], during which many simulated emergency messages were passed to and from the section. A very sincere well-done to NP4D and others responsible for this excellent public-service work. Fourth Region net certificates have been forwarded to NP4D and KP4U." — *W4SHJ, manager 4RN/c4*

Other certificate issuances: 8RN/c4 — WAØTAQ/8, 2RN/c4 — W2IQK, N2BXB, KA2CLY and AA2Y, all first annuals. WA7GYQ new manager of TWN/c4; our thanks to former manager W7LYA for his excellent stewardship.

January Reports

1	2	3	4	5	6	7
Cycle Two						
Area Nets						
EAN	31	973	31.4	.792	97.8	
CAN	31	498	16.1	.390	100.0	
PAN	53	443	8.4	.331	82.3	
Region Nets						
1RN	61	330	5.4	.336	86.2	96.8
2RN	59	331	5.6	.330	88.1	100.0

3RN	31	193	6.2	.283	94.4	100.0
4RN	62	580	9.4	.374	79.7	100.0
RN5	31	289	9.3	.334	97.6	100.0
RN6	85	387	4 6	.231	75.9	82.3
RN7	62	402	6.5	.509	100.0	79.0
8RN						100.0
9RN	59	248	4.2	.227	91.5	100.0
TEN	31	106	3.4	.120	78.0	100.0
ECN						90.3
TWN	58	167	2.9	.230	61.3	85.5
TCC						
TCC Eastern	115[1]	575				
TCC Central	86[1]	343				
TCC Pacific	100[1]	261				
Cycle Four						
Area Nets						
EAN	31	1953	63.0	1.640	95.2	
CAN	31	900	29.0	.971	100.0	
PAN	31	1127	36.4	1.078	98.4	
Region Nets						
1RN	62	809	13.0	.560	97.7	96.8
2RN	93	686	7 4	.920	98.1	96.8
3RN						80.6
4RN	62	811	13.1	.558	94.5	96.8
RN5	62	545	8.8	.458	95.4	100.0
RN6	60	684	11.4	.334	81.9	100.0
RN7	62	577	9.3	.764	99 8	98.4
8RN	62	550	8.9	.475	97.0	100.0
9RN	62	458	7.4	.359	95.0	100.0
TEN	62	370	5.9	.400	92.1	100.0
ECN	62	281	4.5	.468	89 2	100.0
TWN	62	504	8.1	.414	97.1	96.8
TCC						
TCC Eastern	115[1]	530				
TCC Central	86[1]	355				
TCC Pacific	119[1]	777				
Sections[2]	6105	26,897	4.4			
Summary	7563	44,940	5.9			
Record	7468	50,754	19.1			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (176): APSN ATN (AB), ABN ACN AMB ASN ASEN (AK), AENB AEND AENI AENJ AENK AENM AENR AENS (AL), ARN MBIRD OZK SCARC (AR), ATEN HARC (AZ), BCEN (BC), NCN NCTN (CA), DEN FAST FMSN FMTN FPON FPTN (FL), I75MN ICN ITEN TLCN (IA), CD FARM IMN MTN (ID/MT), ILN (IL), ICN ITN OIN (IN), KPN KSBN (KS), KYN (KY), LAN LRN LSN (LA), BCE2MN EM2MN EMRI EMRIPN ERMISS HHTN NEEPN RIEM2MN WMN WMPN WMTN (MA/RI), MMN MTN WRIN (MB), AEN MPSN MSN OXRACES PTN SGN SPSN (ME), MACS MITN MNN QMN SEMTN UPN (MI), ACE NEMOE (MO), CMN GN GNCTN CNN JFK M2MEN NCSSBN PCTN RARS THEN TRN (NC), 160WXN CCTMN NCHN NE40MN NSN PVTN WNN (NE), GSFM NHN (NH), NJN NJPN NJVN NWNJVN OBTTN UCETN (NJ), NMRRN SWN Y2MN (NM), NSN (NV), CDN CNYTN EPN HVN NLIPN NYPON NYS OCTEN SCRN SDN STAR WDN (NY), BARF BN BRTN COARES OSN TSRAC (OH), OPON OLZ ONON OPEN OTWN (OK), LN OLN OPN OSN (ON), BSN JCARES OREARES OSN PDXARES PTTN WCN (OR), EPA EPAEPTN NWPATMTN WPA WPAPTN WPATMTN (PA), QSN WQV/UHFN (PQ), BR2MN LC2MN SCNTN SCSSBN (SC), PWXN RARA SATN SPN (SK), TNCWNS TNPNS TVHFNS (TN), DFW TEX TSN TTN (TX), BUN (UT), VLN VN VNTN VSBN VSN (VA), VTN (VT), PSTS WSN (WA), WINC WINS (WE/IN), BEN BWN NWTN WIN WNN WSBN (WI), WVFN WVN WVNN (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

Certificates: TCC-Pacific/c4 (years in parentheses) — W6VZT (17), N6GW (14), W7GHT (11), W5KH (6), W6OA (5), N5NG (3), K7HLR (3), N6PZ (2), W6SX (2) and WB6AMP (1).

1	2	3	4	5
Cycle Two				
TCC Eastern	124	92.7	1153	575
TCC Central	93	94.6	537	343
TCC Pacific	124	80.6	524	261
Summary	341	89.3	2214	1179
Cycle Four				
TCC Eastern	126	91.3	1563	530
TCC Central	93	92.5	695	355
TCC Pacific	124	95.9	1549	777
Summary	343	93.2	3807	1662

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (January) *Cycle Two* — Eastern Area (N2YL, Director) — K1XA, N1BHH, W1s QYY XX, N2YL, K2PL, W2s CQB RQ XD ZOJ, K3JSZ, WB3GZU, W4s JK SOQ, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8YDZ, VE3s ATU CWA GOL. Central Area (W9JUJ, Director) — W4OGG, WD4HIF, K4VM, W5KLV, WB5s NKC TAY YDD, K5s BNH KJN PE, W9s JUJ NXG, WB9WGD, WBØCID. Pacific Area (WØHXB, Acting Director) — W5JOV, KA5DDW, N5SJ, WB6s EIG MLB PVH, K6OE, KM6I, KT6A, W7s AK DZX GHT TGU VSE, WØs EJD HXB LQ RE, WAØOYI, WBØs FFV LFR MTA, WDØAIT, KØDJ, KDØM, NØBDE. *Cycle Four* — Eastern Area (W4SQQ, Director) — W1s KX NJM, K1s BA EIR GN SSH XA, WA1ZAZ, W2s CS FR GKZ MTA RQ, K2NY, WA2s IGB SPL, W3s FAF PQ, K3KW, WB3GZU, W4s JK MEE SOQ UQ, K4s BKX KNP, KB4N, WB4PNY, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, KC8C, VE3s ATU CWA GOL SB. Central Area (W5GHP, Director) — W4ZJY, W5s RB SBE, N5s BB BT RB TC, K5TL, W9s CXY DND NXG, WB9UYU, WØs AM HI, KØs CW EVH EZ. Pacific Area (KØDJ, Director) — K5MAT, N5NG, W5KH, N6s GW PZ, W6s EOT 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 (January 1981)

1	2	3	4
Amateur Radio Telegraph Society	31	1163	323
Central Gulf Coast Hurricane	31	92	2004
Clearing House	30	173	446
Early Bird	31	833	402
Hit and Bounce	31	296	586
Hit and Bounce Slow	31	126	327
IMRA	49	750	1569
Mid-West RTTY	31	63	185
Mission Trail	31	174	1594
New England Novice	31	70	118
North American SSB Traffic	23	27	179
Piconet All Day Watch	169	185	3317
Southwest Traffic	30	80	1449
20-Meter ISSB	27	326	471
75-Meter ISSB	31	356	1076
7290 Traffic	47	547	2980

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll January 1981

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.

880
KA9CPA

203
WB1DHW

161
WA4CRI

156
WD8LRT

151
WB2HDU

148
WA4PFK

147
WD4COL

145
WB3GZU

142
KA1CMR
W7VSE

141
NG4J

139
W7LRB

125
WB4FVV

122
WA5RVT
W7LNE

119
W4NFK

118
KZ4K
WB5YDD

117
W4ANK
WD4AWN
W2ZOJ

115
K4SCL

114
N4ET
AF8V

113
W1TN
KA1FE
WØOYH

112
WA1TBY
W4GPL
WA3PXA
KB3DT
W1EOF
WB1CPF

111
WB2TQC
WA7MEL
KB8MX

110
KK5B
WB2MCO

109
WD4HIF

108
W1RWG
AF2L
KA1BJY
KY4K
KT6A
WB2PJU

107
WB7WOW

106
WA4JDH
W2MTA
N9AUG
K9PNG
WA2SPL

105
W5DTR
W5JOV
KA4ASZ

KB5TC
W9YVC
AA2H

104
WA3EHD
WB1HIH
W9JUJ
WB2IQJ
WB2ZCM

103
KU4W
W4NWM

102
WD6CSL
WD8NYN
WA3WIY
WD5JYI
WA3NAZ

101
K3JL
WA4STO
AJ3R
WB4WYG
WD9IUX

100
AK1W
AD7G
N6AWH
K3JSZ
WD9BCM
N9AKX

99
KA1DZV

98
W6NTN
WA4SRD
KA2CRY
AK1E
K8AAZ
N2APB

97
N1NH
W2GLH

KE8X

96
KB2HM
VE3DPO
W4OGG
WB7DZX
W5HMR
KA4GFU
WA4CCK
WB8JGW
WDØBQG
KA2GSL
VE1WF

95
K7GXZ
VE3GT
KB5NX
WB8MTD
WB2EAG

94
WA4UTC
VE5HG
N2BNB
W2UEZ
K2GCE
AA4FG
WD9AJA

93
K2VX
WB3CAI

92
KA4LNA
WA2KOJ
W7GHT
KC4MM
WB7OEX

91
KN6C
WB7TQF
WAØTNM
WD4ALY
K1JHC
WA2ZJP

90
W2AHV
W4CKS
W5KLV

89
W7FJZ
KA2CYZ
N3AKC
KB5UL
K8OZ
WØFT

88
N8CW
NP4D
WA4EIC
KB4OW
KA8CPS
WB1ESJ

87
W2BIW

86
VE5AE
AG2R
W2XD
KA2CNN
KB1A
KC4MW
WB5LAT
KB4OZ
W4JK
KA8DJZ
WA5RKU
N5TC

85
WA3DUM
N5BT
KI2D
W2AET
WB8SYA
WB8YDZ
WA7LGN
K9BVE

84
W5VMP
N4AZI
WB4AID

83
AA5J
KF8J

82
WA2MVQ
N5RB
W9DM

81
WA4PIZ
KØPIZ
K4JST
N3BFL

N6GW
KB7JW
W2YJR
KØEZ

80
WD5EUE
N4AXN
N4BZH
N9AEI

79
WD4CNR
KA2CTU
K7JV
WA7IHS

78
WD4CNQ
VE3HTL
N5CEK
K5DY
WDØCID
WA4EYU

77
AFØO
W9QLW
WB9WGD

76
N3AZT

75
AF1L
W5CTZ
KB5EK
AG9G
KB2KW

74
VE3BVG
K4ZN
WD8BHE
K4EV

73
WD4JJK
K5TL
W5TI
KC3B
K6YD
KG5L
WB2AZW
WD6RNQ
AA4EI

72
N4PL
W6RNL
W9NXG

71
KA4FDX
VE3KK

70
AI6I
WB6QBZ

N6ANL
WØKJZ
W1TM
WD5DQR
WD8IBY

69
KA6A
WA3WQP
W6OA

68
WØOTF
WA1YNZ
KA5CFP
W8EK
WD8KBW
KA9HPQ
W9JIJ
WA2CUW

67
K4VHT
KG2S
KB6FC
WD8DTG
KA2GHM
KØDJ
WB9JSR

66
W1BJ
WA5QFD
AJ5F
W4LXB
N2BDW

65
VE5WM
VE3DUK
WA6LVO
W8GGX
N4UF
WB2PKG
KA1KP

64
KØSI
VE3LNN
K4DZM
KA4BBA
WD5GKH
WB5MMI
WB2IXR

63
KAØE
W5VMY
WAØTFC
W4ZJY
W7EP
KB8TA
KB3LF
WB3HTW
WD8KFN

KB2GT
W9IEM
WA2EQW

62
WA7DPK
VE3JLL
W3DKX
KCØT
KBØMB
WA1VRL
WB3GZV
KB6OT
WD8DYW
WB2MVC
N8BJD
K8DTG
WA8PIM
W8UE

61
W4FMN
WØOUD
WB5YYK
WB3JYZ
WA8GMT
WD8QMP
WB5NKD
AK3X
WA8DHB
WD8RHU
WB4RUJ
WA2GIN
WA7WBE
WA2HEB

60
WA3VIL
N2BLX
KA3T
KF4U
W7TC

55
WB2RMJ/T

51
KA5IWF/T

50
KA1CGP/T

48
KA7CSP/T

47
WP4BCV/T

45
KA4IKH/N

42
KA4ODX/N
KA4AUR/N
KA8DEZ/N

41
KA2HNQ/T

Brass Pounders League January 1981

BPL Medallion (see April 1979 *QST*, page 77) has been awarded to the following amateur since last month's listing: WD4AWN.

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.

1	2	3	4	5	6
W3CUL	743	956	1534	61	3294
NØBQP	34	1447	268	805	2554
WØWYX	57	956	382	577	1972
KA9CPA	32	967	141	821	1961
WA4JDH	1	567	537	5	1110
WAØHJZ	30	445	24	342	841
W3VR	267	149	358	10	784
W7SQT	2	484	4	266	776
W9JUJ	1	369	390	3	763
KØONK	1	614	127	12	754
WB1DHW	0	276	356	102	734
W7DZX	35	329	319	4	687
WB3GZU	62	254	287	44	647
WØZWL	0	299	0	324	623
W7VSE	10	273	219	47	549
W4JK	0	245	265	2	512
WB4PNY	2	263	230	6	501
W2ZQ(Dec.)	755	170	768	146	1839
WB2IQJ(Dec.)	337	288	389	192	1206
W6NL(Dec.)	63	286	322	12	683
W8PMJ(Dec.)	4	326	307	0	633
WB8DMF(Dec.)	8	262	269	0	545

BPL for 100 or more originations plus deliveries:

KA8CPS	189	WD4GOL	108
WD8LRT	168	WA4EQW/m	102
WA4CRI	145	WB7TQF	101
WØFQB	136	WA4EQW/m(Nov.)	101
W4EAT	111		
K4TH	110		

Multioperator station:
WD4IIO 218

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

ARRL Joins NVOAD

Radio amateurs possess the capability of providing a very much-sought-after commodity, namely, the ability to provide disaster communications. We do this in serious response to Part 97.1(a), "providing emergency communications." Unfortunately, we do not always make our extraordinary abilities sufficiently well known.

Amateurs have traditionally been held in high regard by the American Red Cross and the Salvation Army. In fact, ARRL has had national agreements with both these fine organizations for many years. But that doesn't do much good unless recognition can be effectively translated into field results. Sad to say, too often such local cognizance does not occur because those who need us in time of disaster know nothing of Amateur Radio.

Many an enthusiastic Emergency Coordinator has closed this educational gap by digging deep into his sales satchel of paraphernalia from handouts to hand-helds. Each "sale" to a prospective served agency is hard work that, multiplied by the number of EC's making the same pitch, reveals much duplication of effort. How much better it would be for the agencies we serve to hear about Amateur Radio *first from within their own organization*. With the welcome mat in place prior to the arrival of the Amateur Radio retailer, the job of effecting communications would stand a better chance of success. It would make the job of the EC far easier, for he would be received by folks who already had at least a rudimentary knowledge of our communications' capabilities.

How do we accomplish this? One way is for the ARRL to coordinate more closely with served agencies by active membership in National Volunteer Organizations Active in Disaster (NVOAD and pronounced NoVad). In December 1980, ARRL applied for membership in this 22-member coordinating alliance and in January, the ARRL was accepted into full voting membership. ARRL's Communications Manager attended NVOAD's annual meeting held in Washington to accept this honored membership and to participate in deliberations. ARRL's participation was most enthusiastically received by the family of volunteer disaster-related organizations. An enhanced recognition of ARRL and radio amateurs has resulted. This autonomous group includes not only the Red Cross and the Salvation Army, with whom we already have formal memoranda, but every other highly visible relief agency, mostly church sponsored. These are the very people who are always on the disaster scene and almost always in need of disciplined radio communications. Enter stage left, radio amateurs!

The purpose of NVOAD is outlined in its charter.

"To bring together national volunteer organizations active in disaster service to foster more effective service to people affected by disaster through: *Cooperation* — to create a climate for cooperation at the grassroots and all levels and to provide information; *Coordination* — to coordinate policy among member organizations and to serve as a liaison, advocate and national voice; *Education* — to provide training and to increase awareness and preparedness in each organization."

Members must be national in scope and purpose with voluntary membership and a nonprofit structure committed to meeting, without discriminating, the needs of people affected by disaster.

With the various volunteer organizations providing such equipment as transportation, clothing, shelter, food and counseling service the most glaring void is communications. Who better to provide that than radio amateurs? ARRL's participation will certainly enhance the League's liaison with disaster-relief efforts. Hopefully, this will translate into far better awareness at the local level of what we as radio amateurs can do. ARRL membership in NVOAD will play an important part in recognition of the important role that amateurs play in disaster response.

In addition to the national coordination effort already begun, several educational workshops are being scheduled throughout the country. The first of these will be attended by ARRL section officials in Wisconsin and Texas in early April. This will afford an opportunity to demonstrate Amateur Radio to the many NVOAD participants — hands-on experience at the local level to effect better disaster communications. As other workshops develop, affected League officials will be notified so that they too can profit from learning how to better meet the needs of NVOAD members in their respective areas.

It's people talking to people. But, then again, isn't that what we're all about?

*Communications Manager, ARRL

W1AW Schedule

April 26-October 25, 1981 MTWThFSSn = Days of Week Dy = Daily

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300 2300; TThSSn: 2000; S: 0200
	Fast Code Practice	MWF: 2000; TTh: 0200, 1300; TThSSn: 2300, S: 0200
	Cw Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	RTTY Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 A.M., 7 P.M.; TThSSn: 4 P.M., 10 P.M.
	Fast Code Practice	MWF: 4 P.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M.
	Cw Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	RTTY Bulletins	Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M.
	Voice Bulletins	Dy: 9:30 P.M., 12:30 A.M.
CDT	Slow Code Practice	MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M., 9 P.M.
	Fast Code Practice	MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M.
	Cw Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	RTTY Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Voice Bulletins	Dy: 8:30 P.M., 11:30 P.M.
PDT	Slow Code Practice	MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M., 7 P.M.
	Fast Code Practice	MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M.
	Cw Bulletins	Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M.
	RTTY Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Voice Bulletins	Dy: 6:30 P.M., 9:30 P.M.

Code practice and cw bulletin frequencies: 1.835, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 147.555 MHz.

RTTY bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.

Voice bulletin frequencies: 1.835, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7-1/2, 10, 13 and 15 wpm.

Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 wpm.

On MWF, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz.

Code practice texts are from *QST* and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from February 1981 *QST*, pages 9 and 82" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 82.

On Fridays UTC, a DX bulletin replaces the regular bulletin transmissions.

Cw bulletins are sent at 18 wpm; Teletype bulletins are sent at 60 wpm with 170-Hz shift, then repeated on 110-baud ASCII.

W1AW is open for visitors Monday through Friday from 7:30 A.M. to 1 A.M. EDT and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EDT. If you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, RTTY at 15 minutes past the hour, and cw on the half hour.

W1AW will be closed on May 25, July 4 and September 7.

Station staff: Chief Operator/Asst. Communications Mgr. C. R. Bender, W1WPR; Chris Schenck, W1EH; Charles Chadwick, K8AXL.

SCM ELECTION NOTICE

To all ARRL members in the Southern Texas, Colorado, San Francisco, British Columbia, Sacramento Valley, Los Angeles, Georgia, West Virginia and Washington sections: You are hereby solicited for nominating petitions pursuant to an election for Section Communications Manager. A petition, to be valid, must contain the signatures of five or more full ARRL members residing in the section concerned. Photocopied signatures are not acceptable. No petition is valid without at least five signatures *on that petition*. No member may sign more than one petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (CD-129) are available on request from ARRL headquarters but are not required. The following form is suggested:

(Place and date)

Communications Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned full members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section Communications Manager for this Section for the next two-year term of office.
(Signature . . . Call . . . City . . . ZIP . . .).

An SCM candidate must have been a member of the League for a continuous term of at least two years and a licensed amateur of General class or higher (Canadian Advanced Amateur Certificate) immediately prior to receipt of petition at Headquarters.

Petitions must be received at Headquarters on or before 5:30 P.M. Eastern Local Time, June 5, 1981.

Whenever more than one member is nominated in a single section, ballots will be mailed from Headquarters on July 1, 1981, and returns counted August 18, 1981. SCMs elected as a result of the above procedures will take office October 1, 1981.

If only one valid petition is received for a section, that nominee shall be declared elected without opposition for a two-year term beginning October 1, 1981.

If no petitions are received for a section by the specified closing date, such section will be resolicited in October *QST* and an SCM elected through the resolicitation process will serve a term of 18 months.

Vacancies in any SCM office between elections are filled by appointment by the communications manager.

You are urged to take the initiative and file a nominating petition immediately.

John P. Lindholm, W1XX
Communications Manager

SCM ELECTION RESULTS

The following elections were conducted for two-year terms of office beginning April 1, 1981:

Balloting Results: In the Arizona Section, Erich J. Holzer, N7EH, received 595 votes and H. J. "Bart" Paine, K7CC, received 357 votes. Mr. Holzer is declared elected.

In the Arkansas Section, Dale Temple, W5RXU, received 305 votes and H. G. "Jerry" Deadman, W5KKO, received 100 votes. Mr. Temple is declared elected.

In the Northern Texas Section, Phil Clements, K5PC, received 988 votes and Lawrence W. Bradford, KM5Y, received 231 votes. Mr. Clements is declared elected.

In the Wyoming Section, Richard G. Wunder, WA7WFC, received 68 votes, Charles L. "Jess" Fike, WA7SGG, received 51 votes and Leo A. Bush, WA7NHP, received 40 votes. Mr. Wunder is declared elected. QST

Strays

HELP A KID USE OSCAR

The OSCAR Education Program and school teachers in your area need you help! We need hams experienced in OSCAR communications to assist educators in bringing the excitement of satellite communication into their classrooms. These ham volunteers can help in several ways, ranging from giving a brief explanatory talk with a two-way or receive-only demonstration to helping an educator set up a school station.

The ARRL will provide you with all the support material needed to give a successful classroom demonstration. In return for your services, we will send you a complimentary copy of *The Radio Amateur's Handbook*, 1980. For more information, contact Mark Wilson, AA2Z, OSCAR Education Program Manager, ARRL, Newington, CT 06111.

OSCAR Operating Schedule

	OSCAR 7			OSCAR 8			
Date (UTC)	*Orbit No.*	*Time UTC Hr Mn*	*EQX W. Long. (Degrees)*	*Orbit No.*	*Mode*	*Time UTC Hr Mn*	*EQX W. Long. (Degrees)*
1 April	29,169	0032	85.4	15,658	X	0119	78.7
2 April	29,182	0126	99.0	15,672	A	0124	79.9
3 April	29,194	0026	83.8	15,686	A + J	0128	81.1
4 April	29,207	0120	97.4	15,700	J	0133	82.3
5 April	29,219	0019	82.3	15,714	J	0138	83.5
6 April	29,232	0113	95.8	15,728	A	0143	84.7
7 April	29,244	0013	80.7	15,741	A + J	0004	60.2
8 April	29,257	0107	94.3	15,755	X	0009	61.4
9 April	29,269	0006	79.1	15,769	A	0013	62.6
10 April	29,282	0100	92.7	15,783	A + J	0018	63.8
11 April	29,295	0155	106.3	15,797	J	0023	65.0
12 April	29,307	0054	91.1	15,811	J	0028	66.2
13 April	29,320	0148	104.7	15,825	A	0032	67.4
14 April	29,332	0047	89.6	15,839	A + J	0037	68.6
15 April	29,345	0142	103.2	15,853	X	0042	69.8
16 April	29,357	0041	88.0	15,867	A	0046	71.0
17 April	29,370	0135	101.6	15,881	A + J	0051	72.2
18 April	29,382	0035	86.4	15,895	J	0056	73.5
19 April	29,395	0129	100.0	15,909	J	0100	74.7
20 April	29,407	0028	84.9	15,923	A	0105	75.9
21 April	29,420	0122	98.5	15,937	A + J	0110	77.1
22 April	29,432	0022	83.3	15,951	X	0115	78.3
23 April	29,445	0116	96.9	15,965	A	0119	79.5
24 April	29,457	0015	81.7	15,979	A + J	0124	80.7
25 April	29,470	0109	95.3	15,993	J	0129	81.9
26 April	29,482	0009	80.2	16,007	J	0133	83.1
27 April	29,495	0103	93.8	16,021	A	0138	84.3
28 April	29,507	0002	78.6	16,035	A + J	0143	85.5
29 April	29,520	0057	92.2	16,048	X	0004	61.0
30 April	29,533	0151	105.8	16,062	A	0009	62.2
1 May	29,545	0050	90.6	16,076	A + J	0014	63.4
2 May	29,558	0144	104.2	16,090	J	0018	64.6
3 May	29,570	0044	89.1	16,104	J	0023	65.8
4 May	29,583	0138	102.6	16,118	A	0028	67.0
5 May	29,595	0037	87.5	16,132	A + J	0033	68.2
6 May	29,608	0131	101.1	16,146	X	0037	69.4
7 May	29,620	0031	85.9	16,160	A	0042	70.6

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, 145.950 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 25.8006° W. in a period of 103.1931 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.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Tom Frenaye,* K1KI

APRIL

1

West Coast Qualifying Run (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0500Z April 2 (9 P.M. PST April 1). 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 94 of this issue.

4-5

ARRL Open CD Party, phone, March *QST*, page 76.

SP DX Contest, March *QST*, page 82.

VS6 Activity Days, March *QST*, page 82.

Wisconsin QSO Party, March *QST*, page 82.

8-9

DX-YL to NA-YL Contest, cw, March *QST*, page 82.

11-12

ARRL Open CD Party, March *QST*, page 76.

ARRL International EME Contest, part 1, March *QST*, page 76.

International Gagarin Cup Competition, March *QST*, page 82.

Common Market DX Contest, March *QST*, page 82.

15-16

DX-YL to NA-YL Contest, phone, March *QST*, page 82.

16

W1AW Qualifying Run, 10-35 wpm at 0300Z April 17 (10 P.M. EST April 16). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See April 1 listing for more details.

18-19

SP DX Contest, phone, March *QST*, page 82.

YL ISSB QSO Party, phone, March *QST*, page 82.

QRP ARC QSO Party, from 2000Z April 18 until 0200Z April 20, phone and cw. Exchange signal report, state/province/country and QRP number (power input if nonmember). Work stations once per band regardless of mode for QSO and multiplier credit. Member QSOs count three points, others two points, except non-W/VE QSOs count four points. Suggested frequencies: phone — 1810 3985 7285 14,285 21,385 28,885 50,385; cw — 1810 3560 7040 14,060 21,060 28,060 50,360; Novice — 3710 7110 21,110 28,110. Multiply QSO points by sum of states/provinces/countries. Use the following power multiplier to figure final score: ×10 if less than 1 watt input, ×6 for 1 to 3 watts, ×4 if 3 to 10 W, ×2 if 10 to 30 W, ×1.5 if 30 to 100 W, ×1 if 100+ W. Add 200 bonus points for 100% battery power, 500 points for 100% solar or wind power. Log must be received by May 20. Send to QRP ARCI Contest Chairman, William W. Dickerson, WA2JOC, 352 Crampton Dr., Monroe, MI 48161.

25-26

ARRL Midnight Special, from 0900 to 1100Z April 26 (Sunday morning). First hour, 40-meter cw; second hour, 75-meter phone. Suggested frequencies: 3875-3925 and 7040-7080 (Novices 7125). Exchange serial number and state. Be accurate with call signs/exchange! S.a.s.e. for complete results; top scorers will be listed in *QST*. Mail entry by May 11 (two weeks) to ARRL.

Helvetia Contest, sponsored by USKA (Switzerland), from 1500Z April 25 until 1500Z April 26, 160 to 10 meters, cw and phone. Exchange signal report and serial number. HB9 stations will also send two-letter designation of their canton (county). Possible multipliers: ZH BE LU UR SZ OW NW GL ZG FR SO BS BL SH AR AI SG AG TG TI VD VS NE GE JU. Count three points per HB9 QSO, multiply by sum of cantons worked on each band. Mail logs within 30 days to TM USKA, K. Bindschedler, HB9MX, Strahleggweg 28, 8400 Winterthur, Switzerland.

Trophy H. M. King of Spain Contest, sponsored by Agrupacio Radioaficionats Calella, from 2000Z April 25 until 2000Z April 26, with a four-hour rest period, all bands, all modes. Work EA stations only. EA stations will send signal report and province. Others send signal report and serial number. Multiply QSO total by sum of provinces per band for final score. Commemorative certificate for 75 QSOs. Mail entry by June 10 to Agrupacio Radioaficionats Calella, Apartado 181, Calella, Barcelona, Spain.

Utah QSO Party, sponsored by the Utah ARC and Utah DX Association, 24 hours UTC April 25. Exchange signal report and state/province/country (county for UT stations). Non-UT stations count three points per QSO, except five points for UT Novice/Tech QSOs. UT stations count three points per QSO, except UT Novice/Tech count five points per QSO. Multiplier for UT stations is states/provinces/countries per band; non-UT stations count UT counties per band. Suggested frequencies: cw — 1810 and 60 kHz from low end; phone — 3980 7280 14,280 21,380 28,680; Novice — 3710 7110 21,110 28,110. Mail entry by May 31 to UDXA c/o Curt Wilbur, K7CU, Box 27311, Salt Lake City, UT 84127.

26

W1AW Qualifying Run, 10-35 wpm at 2300Z (6 P.M. EST). See April 16 listing for more details.

MAY

2-3

County Hunters SSB Contest, from 0001Z May 2 until 2400Z May 3 with two mandatory off periods from 0800Z until 1200Z. Suggested frequencies: 3920-3940, 7220-7240, 14,275-14,295, 21,375-21,395, 28,575-28,595. Keep 3925-3935, 7225-7235 and 14,280-14,290 clear for working mobiles only. Mobiles may be worked each time they change counties or bands (second band contacts for multiplier points only). County line contacts can count for two multipliers. Fixed stations can work other fixed stations only once during the contest. No contacts on net frequencies. Exchange signal report, county and state. Score one point with U.S. or Canadian stations, five points for DX (including KH6/KL7) and 15 points for mobiles. Final score equals number of U.S. counties plus Canadian stations worked multiplied by total number of QSO points. Complete log and summary data must be received by June 15. Send to John Ferguson, WØQWS, 3820 Stonewall Ct., Independence, MO 64055.

Alexander Volta RTTY DX Contest, sponsored by the SSB and RTTY Club of Como and ARI, from 1200Z May 2 until 1200Z May 3, 80 to 10 meters. Single-operator and multi-single categories. Count two points for QSOs in your own CQ Zone (contacts with your own country do not count). Other QSO points figured by use of Exchange Points Table available for an s.a.s.e. — IRCs from address below. Contacts on 3.5 and 28 MHz are worth double. Multiplier is DXCC countries per band, add one bonus multiplier if same country worked on at least four bands. W/VE/VK call areas also counted as separate countries. Exchange signal report, serial number and CQ Zone. Entry must be received by June 20. Mail to G. Vulpetti, I2VTT, Box 37, I-22063 CANTU, Italy.

8

ARRL Frequency Measuring Test, begins with a call-up at 0200 and 0500Z May 9 (10 P.M. EDST May 8 and 1 A.M. EDST May 9). W1AW transmitters will be on the air simultaneously on 20, 40 and 80 meters for the duration of the test but, to correlate your readings with those of the umpire, measurements should be made during the specified periods. Approximate frequencies and measuring periods for the early run are 14,050 kHz between 0207 and 0212Z; 7005 between 0215 and 0220Z; and 3510 between 0223 and 0228Z. For the late run, 14,075 between 0507 and 0512Z; 7090 between 0515 and 0520Z; and 3530 between 0523 and 0528Z. Submit your averages for each period to be compared with the umpire, a professional frequency-measuring laboratory. Indicate how many readings you took to form your average. Your report must be received at ARRL Hq. by May 21. W1AW will transmit official results in an ARRL Bulletin beginning May 23.

9-10

ARRL International EME Contest, part II, March *QST*, page 82.

World Telecommunications Day Contest, phone, sponsored by the Liga de Amadores Brasileiros de Radio Emissao (LABRE). Saturday, May 9, 24-hours UTC. (Cw May 16.) 80-10 meters. Single operator and multioperator/club categories. Exchange signal report and ITU zone. Contacts with your own country for zone credit only. Count one point for same zone, different country QSOs, three points for same continent, different zone, and five points for different zone, different continent QSOs. Multiply QSO points by total number of ITU zones worked (not per band) for final score. Awards IRCs for results. Mail by June 30 to LABRE, U.I.T. Contest Coordination, P. O. Box 07-0004, 70000 Brasilia, DF, Brazil.

CQ-M Contest, sponsored by the Radio Sports Federation of the USSR, from 2100Z May 9 until 2100Z May 10, 80-10 meters, phone and cw. Do not use the bottom 5 kHz on 80 and 40 meters and the bottom 10 kHz of 20-15-10 meters. USSR stations will send signal report and region (oblast) number. Others send signal report and serial number. Count one point for contacts on your own continent and three points for others. Contacts with your own country for multiplier only. Multiply QSO points by sum of countries worked per band for final score. Single-operator all band, single-operator single band and multioperator single transmitter categories. Badges to those making 10 QSOs. Mail entries by July 1 to CQ-M, Box 88, Moscow, USSR.

10 Meter RTTY Contest, March *QST*, page 82.

Rocky Mountain Division QSO Party, from 1800Z May 9 until 2400Z May 10. Work CO, NM, UT and WY stations only. Exchange signal report and state (RM stations also county). Count one point per phone QSO, two points for cw, and three points for club (/C) stations. Multiply by sum of RM states plus counties per band (RM stations multiply by states, RM counties and DX countries (max. 5). Add bonus of 50 to total for working five RM Novices, RM mobiles add 100 points if operated from three counties, RM clubs add 100 points if five operators made at least 10 QSOs. Suggested frequencies: phone — 3900 7270 14,300 21,370 28,570; cw — 60 kHz from low end; Novice — 3725 7125 21,125 28,125. Mail entry by June 15 to Buster Boatman, KAØCLS, 8973 W. Harvard Dr., Lakewood, CO 80227.

12

W1AW Qualifying Run

16-17

World Telecommunications Day Contest, cw

Massachusetts QSO Party

Michigan QSO Party

Florida QSO Party

28

W1AW Qualifying Run

30-31

CQWW WPX Contest, cw

Iberoamerican Contest, phone

JUNE

6-7

New York QSO Party

13-14

ARRL VHF QSO Party

20-21

All Asia Contest, phone

27-28

ARRL Field Day

*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 — SCM/SEC: E. Roy Ellis, VE6XC. ASCM: VE6AMM. STM: VE6ABC. NMs: (ATN) VE6ABC, (APSN) VE6AFO. Hinton 2-M rptr burned to ground last month, due back on Feb. 5. For a small club that means a lot of work. NARC provided communications for Minor Hockey in Edmonton. Congrats to VE6BJD for passing his Advanced tkt. Alberta Hamfest preparations are underway. Traffic: VE6BBL 131, VE6CHK 117, VE6ABC 48, VE6HO 37, VE6XC 16, VE6QN 13, VE6CE 11, VE6YW 5, VE6AVZ 4, VE6WN 4, VE6AHB 3.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — My goodness, what has happened in January, traffic has fallen to almost zero on all the nets even the big ones. VE7QC, Net Manager BCPSC check-ins remained high total for the month, 4890. BCEN reported 429 checked in net in the 691 minutes total net time and very little QTCs. VE7BF in hospital with heart trouble, VE7ABS is improving from heart problems. VE7AP shack fuses blew and wall burst into flames whilst operating. Little damage because he was there. Cause — poor wire in loomex cable (?). VE7TE is back to work after extended sick time. Traffic: VE7FB 84, VE7CCJ 81, VE7ZK 72, VE7FAZ 56, VE7BLO 24, VE7BZI 13, VE7BIX 8, VE7BNH 5.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst SCM: VE4JP. SEC: VE4TR. STM: VE4RO. NMs: VE4s VJ AEJ TE NM. Merit certificates for ten or more years of public service have been sent to the following: VE4s JP NE PA RO CR JA JW XN TE. This will be updated as information is available. Both VE4GJ and VE4US doing well after a stint in the hospital. MMN QNI 531, QTC 38, sess 31; MEPN QNI 1209, QTC 38, sess 31; MTN QNI 307, QTC 81, sess 31; WRIN QNI 144, QTC nil, sess 4. Traffic: VE4AEJ 57, VE4PG 52, VE4JA 32, VE4RO 32, VE4TE 31, VE4AAD 14, VE4AAT 13, VE4AJE 9, VE4FK 9, VE4NE 9, VE4AFO 6, VE4AFW 5, VE4EN 4, VE4AAF 2, VE4AAU 2, VE4AP 2, VE4NM 2, VE4OE 2, VE4AES 1, VE4LB 1, VE4XQ 1.

MARITIME — NFLD: SCM, D. R. Welling, VE1WF — A/SCM: VO1FG. NM: VE1WF VO1JN. SEC: VE1EI. STM: Open. New appointment: OBS VE1OC. Congrats. Hosp: VE1NJ VE1AQO. Silent Keys: VE1AKR VE1YY. New net operating on 7.200 kHz every Sunday at 1100Z covering VE1 and VO. New amateur classes began in St. John's Nfld. Another interesting article in Kings Co. (NS) ARC Bulletin by VE1BC. Amateur classes also started at Greenwood, NS. VE1XF gave interesting talk on traffic at the MAARC meeting. APN 31 sess, QNI 179. QTC 62, time 365 mins. Nil report from Nfld Net. Need more news, keep it coming gang and will put in this column. Traffic: VE1WF 251, VE1LCR/RO 95, VE1ZD 22, VE1XF 16, VE1KR 12, VE1BPM 6, VE1BSH 4.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL. SEC: VE3GV. STM: VE3QI. No, it's not a new STM, VE3ATU is now VE3QI. The Senior Citizens ARC station, VE3LMB, located at the Grandview Lodge in Thunder Bay, has an "on the air" schedule each Tuesday from 1330 to 1530 EST for senior citizen participation. Operation is on the 20 and 15-meter bands. All Canadian Senior Citizen stations, as well as other amateur stations are invited to check in. The late delivery of QST is being looked into by the Post Office, after many complaints. VE3EQE and CPG enjoying a new FT-107M. It may be too late to register, but don't forget the Dayton Hamvention on the 24th thru 26th of this month. VE3IBV has been appointed OBS. The Guelph Flea Market will be held on June 13th. VE3ASH is Bruce Co. ARC's Amateur of the Year, while VE3LPE was their most active amateur. By obtaining your Advanced certificate, you acquire additional privileges and extra flexibility that will add to your operating pleasures. Don't put off that extra study and cw practice, you are probably more capable now than you will ever be in the future. VE3EFX continues to maintain a weekly article on Amateur Radio in two local newspapers. Scarboro ARC has introduced the "Forefathers Award" with details available from their awards chairman, VE3GGO. VE3GFN has written a book titled, "Student notes for a comprehensive introduction to Amateur Radio." July 10, 11 and 12th are the dates for the 7th annual Ontario Hamfest at Milton. Ottawa ARC, with a membership of 300, began in 1932 as the Ottawa Amateur Radio Transmitting Society. The Kingsmere Traffic Net operates Mon/Wed/Fri sessions on repeater VE2KPG, courtesy of VE2GV. VE3KJ has written a two part article on the beginning of the CJ Net in the Oakville's "Hot Bananas." Help the QSL Bureau help you by having your envelopes on file with them. VE3GFS is now VE3PK and VE3BXV is VE3KD. Traffic: VE3CWA 414, VE3KK 264, VE3DPO 242, VE3HGJ 194, VE3HTL 188, VE3GT 187, VE3JLL 179, VE3ATU 146, VE3GNW 89, VE3ISW 66, VE3GFN 64, VE3WM 57, VE3CYR 49, VE3BVG 47, VE3GOL 47, VE3DVE 44, VE3KXB 32, VE3LNN 32, VE3FPI 31, VE3IXB 30, VE3AJN 26, VE3BZB 22, VE3DUK 17, VE3FGV 15, VE3EWD 13, VE3ANJ 11, VE3DZK 9, VE3AYZ 8, VE3DZH 8, VE3EFX 7, VE3IFP 7.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2FFE. The official ARRL, CRRL station, VE2QST, was first on the air the 10th of January for the CD Party (cw) and will be in the April Open CD Party. The station will transmit bulletins and will be active in League contests. VE2PJ very active on the QTN, (Quebec Training Net) teaching beginners net procedures. With deep regret, I have to report the passing of two well known amateurs: VE2HI and VE2BW. Malgre une temperature tres froide plusieurs amateurs se sont rendu a Granby pour la soiree annuelle de VE2TA. Traffic: VE2FKI 47, VE2EC 42, VE2PJ 39, VE2FFE 32, VE2BP 21, VE2EKC 18, VE2FSA 18.

SASKATCHEWAN: SCM, Bill Munday, VE5WM — STM: VE5XC. SEC: VE5II. NMs: VE5DC VE5HG VE5SF VE5WM. Net Reports: SATN, 31 sess, 373 QNI, 21 QTC; SPN, 30 sess, 1252 QNI, 45 QTC; PWXN, 31 sess, 692 QNI; SKTN2 31 sess, 399 QNI; RARA2 30 sess, 504 QNI, 9 QTC. Regretfully I announce the following have become Silent Keys: VE5CB VE5HM. Thanks to VE5AE for his fine work as past SCM. Congrats to the following appointees: SEC VE5II, DEC VE5ACI. CRRL Bulletins are being aired on the SK phone and cw nets as well as RTTY. An experimental SSB net has been started by VE5DX on 145.200 MHz at 0200Z weekends with QNI from Willaston ND and SK stations. Traffic: VE5AE 31, VE5KS 27, VE5HG 26, VE5WM 16, VE5TT 9, VE5UX 8, VE5BBD 7, VE5XS 5, VE5II 4.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ. STM: WA3WIY. PSHR WA3WIY 102, K3JI 101, N3AKC 89, WA3DUM 85, W3DKX 62. The Delaware QSO Party scores show G4HBI 595, SVØAU 45, and VE3KK 40, DX winners with N4CMJ 450, KAØDGR 360, and WBØMUU 300, 3 top Out-of-State winners and K3HBP & WB2JGP 28 054 Kent Co., K3JL 16,461 Sussex Co., and AB3D 7,791 N.C. Co. winners in Delaware. Ex-N3BDG's Extra call is KC3A while N3BOM is a new General. Novices include KA3s GTF GTK GTL GTM GTN and GTQ. DTN QNI 373, QTC 70; DEPN QNI 68, QTC 20. Traffic: W3PQ 195, N3AKC 82, WA3WIY 64, K3JL 50, W3DKX 42, WB3FOC 37, WB3DUG 27, N8NA 22, KA3DPR 17, WA3ZBI 15, W3FEG 13, K3ZXP 7, W3WD 4.

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	552	302	62	AA3B
EPAEPTN	3917	6 P.M. Dy	486	186	31	AJ3R
PFN	3958	5 P.M. M-S	311	373	27	WA3WQP
PTTN	3610	6:30 P.M. Dy	303	87	31	AG3R

Local and vhf nets reporting: D3ARES Luz Cty ARES, Mtg Cty ARES and ATN with a total QNI 277, QTC 51 in 23 sess. OBS reports: W3CL WB3JYZ and W3VA OO reports: W3FAF W3GVR and W3KEK. OVS reports: W3GOA and KA3DZD. PSHR reports: AJ3R WB3CAI WA3VIL WB3GZV WA3WQP W3YZW WA3EHD WB3HTW WB3JYZ W3GOA AA3C N3BFL KB3LF N3AZT N3AIA KA3DZD and KC3B. PTTN report for Dec: QNI 264, QTC 123 in 30 sess. EC SET reports were received from AA3C and W3ID. New appointments: WA3YOE to DEC for District 6 which comprises Lackawanna, Luzerne and Wyoming Counties. W3YZW to EC for Luzerne County KA3FKD and WB3GZV to OBS. WB3FAA WB3FKP and WB3FYT to OES, KC3B to OO and W3YZW to ORS. Congrats to all. EPAEPTN welcomes WB3FKP. PTTN welcomes N3BKV N3BBY and WB3FKP. New members EPA are N3AZT and WA3EHD. Nice to hear K3MCJ and W3AXA back in the tfc nets. New gear dept: KB3LR a TS830. N3AZT W3LXY and WA3OFD IC2AT HTs. Congrats to AA3C who has successfully completed the HS-3 course and to WB3FVJ who received her DXCC Award. KA3GSP new Novice op in Hatboro and new Novice ops from Murgas ARC Novice class are KA3GUG KA3GRR KA3GRS KA3GRT and KA3GRU and all are studying to upgrade. WA3CKA now working for cw DXCC. W3HK donated beautiful new ARRL flag to the Mt. Airy VHF RC. K3UKW reports Holmsburg ARC has purchased a new MI COK repeater and will be installed shortly. WA3YOE new DEC for Dist. 6 expects to have D6ARES net in operation by April first. New officers for Tamaqua Area ARA: W3VA, pres.; WB3JZP, vice pres.; WA3OFD, secy.; KB3CH, treas. New officers for Penn ARC: WA3FOF, pres.; KA3AAE, vice pres.; K3DLS, secy.; W3PR, treas.; WB3CRW, cor. secy. Murgas ARC for '81: WB3FYT, pres.; WB3FAA, vice pres.; WA3YON, secy.; K3JML, treas. Holmsburg ARC: WA3AOP, pres.; WB3BTC, vice pres.; K3HIN, secy.; WB3IFY, treas.; WB3ADN K3AIJ trustees. Central Columbia School Dist ARC: WB3GZV, pres.; WB3KZZ, vice pres.; WB3KRH, secy.; WB3HDN, treas.; K3AKZ, trustee. WB3FEH now KC3B. According to reports received here, the big guns in the section are being loaded for the up coming VHF Contest in June. Due to lack of proper facilities, the EPA Section dinner scheduled for the Phila area has been moved back to the fall. Hazleton ARC has started a new Novice class with KA3CAS and K3PGI as instructors. Traffic: WA3WQP 476, K3JSZ 434, K3YL 382, AJ3R 323, W3IPX 148, KC3B 142, WA3EHD 137, N3BFL 132, WB3JYZ 119, AA3B 112, W3DP 107, W3FAF 107, W3BI 103, W3VA 94, WB3CAI 90, KB3LF 87, N3AZT 52, N3CD 52, WB3GZV 48, WB3CUF 35, WA3VIL 32, WA3OFD 25, WB3HTW 22, W3ID 15, K3WPI 13, W3ADE 10, W3CL 10, N3CP 10, KA3DZD 10, WA3YOE 10, WA3CKA 8, W3YZW 8, K3EIP 7, N3AIA 6, AA3C 6, W3AXA 4, K3RHI 3, AF3Z 2.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrew, W3FA — All of us were saddened when W3WV became a Silent Key. He had been active on our nets, and did research on shortwave radio, and was a giant in the field of radar. WA3TAI, your SEC, is looking for those EC reports. N3AGM cured a bad TVI problem with filters. WB3BFK is back at the old stand after checkups at the Vets Hosp. W3OYY tapes his net sessions AK3X is reliable. W3DFW claims to be the biggest chow hound in MDC. WA3FUJ prints all MEPN address labels on his new computer. WB3GZU makes BPL regularly. W3FZV enjoyed the CD party along with AK3X. DX contacts for W3LDD are leveling off. K3KMO is working 80-meter DX with 20 watts. N3QA reports a new Jr. Op., the first. Note all PON's new start time 5 P.M. local 3905 net on Sunday. N3BLP WA3THK and WB3KOW made it a family affair — all upgraded. See WB3HGM and W3DOI amateur classes Salisbury and Laurel respectively. W3XE makes the final MDC QSO party report listing guest winners W5WG VE3KK K9GDF W2CO K7SOD WA4YUU and WA3JXW. MDC winners N3GB/WB3JRU K3HPG KA3T W3GN and W3ABC. The Columbia Radio Club will carry on the tradition. OO reports from K8SYH/3 K3DI and W3MR. N3AFM finds little stirring on six meters. KA3T moves fast to stay even. KA3DUC does the daytime nets. KA3DXZ busy with the Mont. County RACES/ARES, and WB3LTA puts out a good bulletin for this gang. W3CDQ looks ahead. W3ECN still has the same call. W5NZ/3 and KA3CDO live in the same town. W3CVE operates WB3IVO and moves a passel of his own traffic. W3ZNW is back on 80-meter RTTY. K3AW showed his popular antenna demo to the AARC. K3JSZ did yeoman service handling Italian earthquake traffic. The Chesapeake Bay Weather and Traffic Net meets on 147.705/105 at 1100 and 1500 every weekday and public holiday from April 1 thru November 15. A boon for bay boaters. Net/manager/sessions/traffic/QNI average. MDC PON/W3OYY 5/14/22.6. WR PON/W3DFW 22/32/22.9. MEPN/WB3GZU 31/268/22.9. Toppers W3LDD, K3ONU. Others W3ADO KA3ARH KA3CDO and WA2YFM. Traffic: (Jan.) WB3GZU 647, WB3IVO/W3CVE 322, W3FA 207, W3FZV 106, AK3X 84, WB3BFK 72, KA3T 53, K3KMO 26, KA3DUC 15, W3LDD 13, W3ECN 10, WA3FUJ 9, W3ZNW 4 (Dec.) WB3IVO/W3CVE 225.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — SEC: W2HOB. STM: WB2LCC. It is with regret that I announce the resignation of our STM, KF2U. Due to his many work obligations he found the workload of the position to be too much at the present time. Throughout the past year he has done much to make my job easier, and has made significant contributions to the betterment of our small section. We wish him the best and are assured of his continued high level of participation in ARES and NTS. A Wacom 4 cavity duplexer to replace the current section RTTY repeater homemade unit has been ordered. This combined with the recently received Super Stationmaster will serve to increase the repeaters output a whopping amount. If you are not currently using the machine, please don't waste any time doing so. You may run 170 or 850 Hertz shift using the standard AFSK tone frequencies. The repeater is not carrier operated and will not repeat voice, so don't bother trying. It can be keyed up only with a standard RTTY mark tone. The frequency is 147.945/.345, and the location is smack in the middle of the New Jersey pinelands, so no matter where you are in SNJ making this machine should be a breeze. Traffic: WB2IQJ 214, KA2GSL 109, WB2PKG 80, AA2C 75, AA2H 70, WB2LCC 65, KC2A 60, WA2CUW 48, WA2HEB 38, K2YBN 38, KB2OE 34, WA2TWK 27, W2ZQ 18, K2UL 9, WA2GTJ 8.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. NMs: N2APB WB2AZW WA2ELD W2FR K2KIR K2KQC WA2MFV WA2PUU WA2ZJP W2ZOJ. DEC: WA2DHZ WB2NAO. ECs: N2ALI KA2AYZ W2BYO KA2CMQ K2CWD WA2DHB K2OUR W2EWO W2FEY WA2GJI W2GLH WA2HSB WB2JWD WA2LWH WA2NAC WA2OVT WA2PHH WA2PUU WB2QZL WA2VAM WA2VCM WB2VSJ

Net	Freq	Time/Day	QNI	QSP	QND	Mgr.
NYSCN	3677	1000/Su	47	11	4	W2MTA
NYPON*	3913	1700/Dy	720	220	31	K2KQC
NYSPTEN	3925	1800/Dy	1017	82	31	AA2Y
ESS	3590	1800/Dy	523	94	31	W2WSS
OCTEN*	34/94	1815/Dy	468	103	31	WA2MFV
STAR/E*	325/925	1830/Dy	247	53	31	WB2AZW
Q NET	31/91	1830/Dy	519	6	31	KA2CMQ
BSN	93/33	1900/Dy	537	14	31	WA2WXG
NYS/E*	3677	1900/Dy	521	243	31	W2ZOJ
SLVARES	31/91	1930/Su	45	1	4	WB2NAO
YCARES	3942	1930/W				N2ALI
JCARN	10/70	2000/Dy	293	11	31	WA2WAX
WNYEGN	3955	2000/3d Su				W2BCH
OARCN	25/85	2015/W	76	0	4	K2VTT
WDN*	04/64	2100/Dy	776	142	31	N2APB
CNYTN*	90/30	2115/Dy	477	90	31	WA2PUU
NARASEN	22/82	2130/Su	47	2	4	WA2JPM
NYS/L*	3677	2200/Dy	397	197	31	W2ZOJ
STAR/L*	325/925	2215/Dy	136	25	23	WB2AZW

*Part of National Traffic System. No January BPL. Southern Tier loss, Silent Key WA2UKK; He was vital to many hamfests. Appointments: (ORS) WA2s AIV IYB ELD WB2LJK K2RN W2FR. (OVS) K2QR W2FR WB2LJK. (OO) WA2AIV WB2KLD. (EC) KA2CMQ St. Lawrence. (NM) W2FR WA2ELD. (OES) WA2FFH K2UNY. District Emergency Coordinators for ARES have been appointed: WB2NAO, eight county Northern District, and WA2DHZ, nine county Southern District . . . more ECs still needed. Tompkins County ARC annual bash a success, 45 attended; K2OOD crowned coaxial king. Bastions of Lake Country celebrate. W2PHQ 78th, W2RQF 80th, happy birthday. PSHR: W2ZOJ 117, W2MTA 106, N2APB 98, W2GLH 97, WA2KOJ 92, WA2ZJP 91, W2AET 85, KI2D 85, KA2CTU 79, WB2AZW 73, KA2GHM 67, KB2GT 63, WB2MVC 62, N2BLX 60. OO reports: W2AET KI2D(2) W2RQF. Acid level dips hear Onondaga Lake; K2DTO sports new "traffic watch" bathrobe; WA2OYR big hit at scout show Johnson City Mall; Southern Tier Hamfest at Owego May 2; WNY/Southern Ontario Repeater Council officers: AE2T WA2TVT VE3AMZ; WB2PEE at Boy Scout Camporee Cherry Valley; JCARC officers: WB2ASL WA2TER KA2GCP WB2YCA; LARC W2AED WA2MQM KA2DVV WA2FWW; SVARA K2QR N2BLX WA2ZSC WA2QEL. Traffic: (Jan.) WA2HSB 316, W2ZOJ 314, WA2ELD 302, W2MTA 256, N2APB 178, W2GLH 169, W2FR 107, WB2AZW 98, KA2CTU 93, KA2CLT 86, WB2IDS 84, W2AET 78, KI2D 74, WA2ZJP 72, WA2KOJ 61, WB2OWO 61, WB2MVC 58, N2BXB 48, KG2D 39, KB2GT 37, WB2OIX 36, N2BLX 35, AF2K 30, AE2T 28, WA2MFU 28, AF2A 26, WA2AIV 20, W2PPS 19, W2RQF 16, W2GJ 10, WB2LJK 10, WB2TXK 10, WB2NAO 8, K2DNN 7, K2VR 3, KA2DBD 1. (Dec) WA2ELD 417.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM & STM: N3EE. SEC: WA3JBQ. DEC: WB3JDI. NMs N3FM W3NEM W3MML & WA3PXA.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPACW	31	443	163	3585	7:00 P/Dy
WPAPTN	31	637	117	3983	6:15 Dy
WPA2MTN	31	691	83	146.28/88	8:00 P/Dy
NWPA2MTN	30	407	14	146.04/64	9:00 P/Dy

N3FM ask to be relieved of the ASCM position at the end of 1980 and WA3JBQ has resigned as SEC effective Jan. 31, he is being transferred to Baltimore. I want to thank both for all their assistance the last two years. N3FM will now be the NM of the WPACW net, he has been doing this with the ASCM duties. The new ASCM will be N3EE and the SEC will be AB3Q, please cooperate with them. Club officers for 1981: So. Hills Brasspounders and Mod. are WA3ZNP, pres., WB3DHF, v.p.; WA3KOD, secy.; WA3ZNO, secy.; W3MML W3QNI & WA3SRD, dir. North Hills ARC — WA3WOX, pres.: W3GT, v.p.; W3TZW, secy.; WA3ZPL, treas.; W3XX, act. mgr.; N3MB, dir.; K3RN, trustee. Foothills RC — WB3HZM, pres.; K3EAS, v.p.; KA3EGE, secy.; KA3DFK, treas.; WB3LHG, act mgr.; WB3EKR, mem. at large. Conemaugh Valley ARC — WA3BIX, pres.; W3SNN, v.p.; WB3FBI, secy.; WB3FEL, treas.; W3MIM, trustee. Fort Armstrong Wireless Assn

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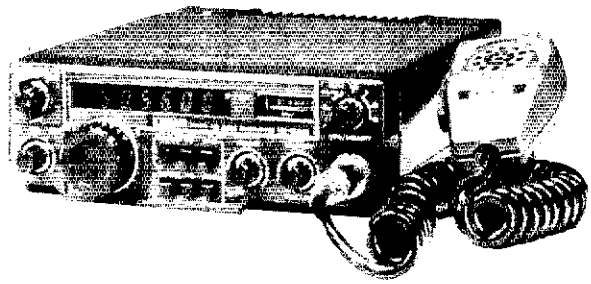

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- Programmable band scan.
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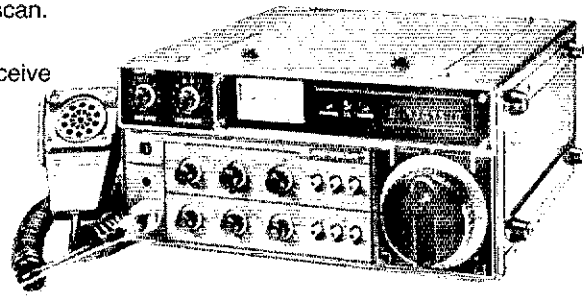
- Variable repeater split capability.
- Multifunction multimode.
- Available from authorized ICOM dealers in either 430-439.9999 or 440-449.9999 megahertz versions.



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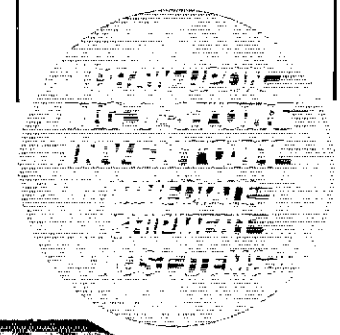

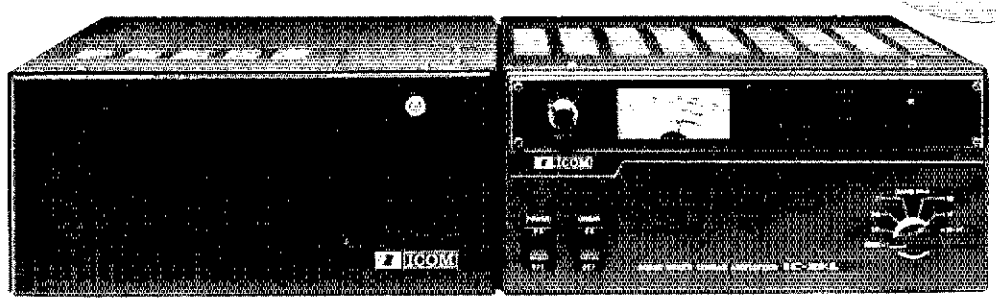

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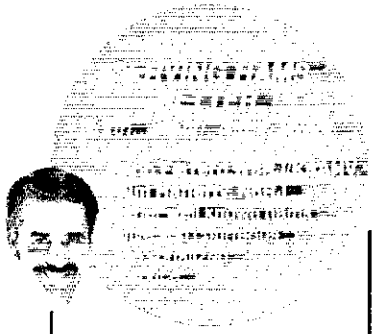

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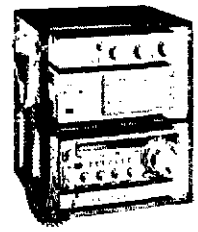

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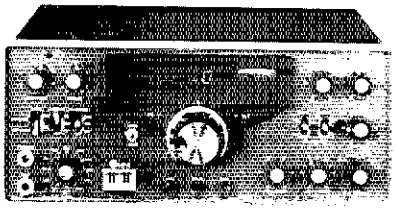
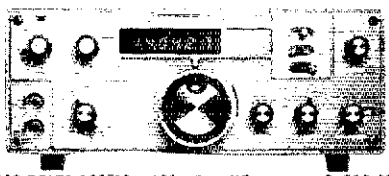


546C OMNI-D (C) 9 Band HF Xcvr	$1289.00
280 18A power supply	169.00
255 Deluxe 18A supply w/spkr	199.00
243 Remote VFO	189.00
217 500 Hz 8 pole CW filter	55.00
218 1.8 KHz 8 pole SSB filter	55.00
219 250 Hz 6 pole CW filter	55.00
645 Dual paddle Ultramatic keyer	85.00
1140 DC circuit breaker	10.00



580 DELTA 160-10m 200w Dig. HF xcvr	$ 869.00
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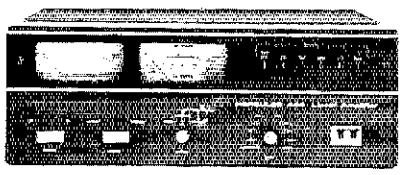
255 Deluxe 18A supply w/spkr	199.00
282 250 Hz CW filter	50.00
285 500 Hz CW filter	45.00
283 Remote VFO	189.00
287 Mobile mount	TBA
289 Noise Blanker	39.00
645 Dual paddle Ultramatic keyer	85.00
1140 DC circuit breaker	10.00



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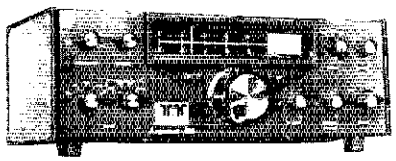

515 ARGONAUT 80-10m 5w SSB/CW xcvr	469.00
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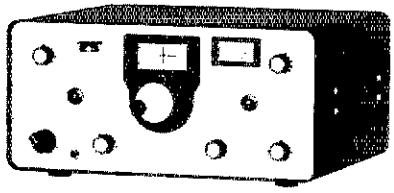
210 1A AC power supply	34.00
210/E 1A AC power supply, 115/230vac	39.00
670 Single paddle keyer	39.00
645 Dual paddle Ultramatic keyer	85.00



570 CENTURY 21 80-10m 70w CW Xcvr	$379.00
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670 Single paddle keyer	29.00
1170 DC circuit breaker	10.00
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— WB3KDY, pres.; KA3EHN, v.p.; W3FSA, treas.; K3JVJ, editor, Wash. City Am. Com. — WB3JOB, pres.; WA3DIP, v.p./secy.; WB3GWR, treas. Horseshoe ARC — K3OIH, pres.; WB3FIA, v.p.; WA3VUP, secy./treas.; WB3FYX, act. mgr., WB3EFO, ed.; WB3GXG, asst. ed. Traffic: (Jan.) WA3PXA 216, W3EGJ 203, KA3DT 194, K3CR 147, N3FM 99, W3AS 82, AC3N 78, WA3UNX 71, N3WS 69, N3KB 66, N3EE 55, W3KMZ 54, K3SMB 47, N3BKV 43, W3HDH 42, W3NGO 32, W3MML 30, KA3DEH 25, K3HCT 21, W3RUL 21, WB3JGD 20, W3KUN 17, W3SN 16, KA3BGC 15, WB3JDI 14, KA3BRO 13, WB3GUK 12, AF3B 8, WA3ONT 7, WB3EFO 6, W3EXC 6, WB3IAB 6, K3VQV 6, KA3ETC 5, W3KYN 5, W3TTN 4, W3LOD 1, (Dec.) W3AS 248, N3BKU 26

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP — Asst SCM: W9RYU. SEC: W9QBH. STM: WB9JSR. NM: WB9JSR.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	0030/0400	312	62
Ill Phone	3915	2130 Dy	79	
NCPN	3915	1200/1700 Dy	63	27
IEN	3940	1400 Su	11	4
W9VEY Mem Stn 2 Meters			9	4

WB9LUK KB9MZ WB9VEB K9ZIZ W9AUO are the new officers of the Central Ill Amateur Radio Club and over $500 worth of prizes were given away at the very successful Christmas party. WD9DVJ N9BQV N9GB KA9FMX are the new officers for Western Illinois Amateur Radio Club at Quincy. K9ZWU WA9FIH K9ENZ K9ZWV WD9GDA WA9MJJ are the new officers for the Six Meter Club of Chicago. On March 8th, the Sterling-Rockfalls Amateur Radio Society will hold its annual hamfest at the Sterling High School Field House at 1608 4th Ave. Sterling, IL. The Tri-Town Radio Amateur Club will hold a dinner dance on May 1. WB9ZBF WB9ZFO W9QLZ are the new officers for the Starved Rock Radio Club. Congratulations to: KA9EGW for passing the Advanced, N9AJB for passing the Extra, and WD9FZL for passing the General test. Spring is the time to fix up the ole antenna farm and get ready for the spring tornado season. Preparedness is the name of the game and the following new EC's are recruiting ARES members in their areas: WA9NPZ Kendall Co., KB9RC Warren Co., KN9BAM Ford Co., WB9VKC Adams Co., K9BNI Clinton Co., W9KSU Franklin Co., WB9UEA Perry Co., KD9L Knox Co., W9SSP McDonough Co., WD9FFD Piatt Co., and N9AEE Livingston Co. A very special thanks to W9PRN for fine leadership during his past position as SCM and the unmentioned thanks from the members who appreciated his 276 section activity write ups. W9PRN will continue the betterment of Amateur Radio as Director of the Central Division, congratulations from all. The 04-64 repeater of Flanagan has increased their public service coverage by increasing the antenna to the 400 foot level. KB9QY W9CJX KA9DKV W9ERI are the new officers for the Shawnee Amateur Radio Assn. of Carbondale, which will be celebrating its 25th year in 1981. W0RJW who started ham radio at the age of 12 will be celebrating his 25th year this year. KA9JNP new Novice. W9QBH had a well attended forum on traffic handling and emergency communications at the Wheaton Hamfest on Jan. 25. WD9EVV reports that the noon session of the Northern Central Phone Net will be reinstated. The CAND had 498 messages in 31 sessions and Ill participation was 100 percent with WB9WGD W9JIJ W9HOT W9NXG WD9FDB. The new Illinois Section Emergency Coordinators Net on 3915 the 1st and 3rd Sundays had a QNI of 34 and shooting for representation from each county. The Northeast Ill Emergency Net had a QNI of 306 in 4 sessions. Traffic: (Jan.) W9NXG 365, W9JIJ 234, K9PNG 155, K9BVE 129, W9OYL 116, WB9WGD 110, K9EEA 110, KB9X 90, WB9JSR 88, W9OK 75, W9TLU 47, W9RJW 43, W9LNQ 35, WB9QFO 32, KN9BAM 31, W9HOT 26, WD9EVV 14, W9HBI 13, N9BJQ 6, WD9HZF 6, W9QBH 6, W9HPG 4, WD9EBO 2. (Dec.) WA9BFV 66, (Nov.) W9HBI 25.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9QYY, QIN WD9GXW, ICN N9AEI, VHF W9PMT, IWN K9DCX, IPN W9DLF, IPON K9RGH. January net reports:

Net	Freq.	Time/UTC/Daily	QNI	QTC	Time	Sess.
ITN	3910	1330/2300	2624	263	1951	61
QIN	3656	1430/0100/0400	915	363	2149	93
ICN	3708	0014	158	30	642	31
IPN	3910	2130	1282	128	913	21
IWN	3910	1315	1023		434	31
IPON	3910	1300 Su	76	2	67	4

Hoosier vhf nets report: QNI 3579, QTC 145, Bulletins 18, Time 3789 for 18 nets. D9RN Indiana stations 100 percent W9JUN W9QLW K9CGS W9DLF. 9RN 100 percent Indiana stations W9JUJ W9QLW W9EI WD9GXW N9HZ K9WWJ WB9UYU W9XD WA9QCF KB9IT. QTC 458 in 1275 min. CAND 100 percent Indiana stations W9DLF W9JUJ W9QLW K9CGS. QTC 498 in 31 sess. Appts OBS — WD9DRM WA9OKK W9JUJ. EC — WD9GXG Posey County, K9POP Rush County, WB9RCV Spencer County, WB9SOY White County. Silent Keys: K9YBZ Indianapolis, W9UDD Ft. Wayne. EC reports: WB9SOY WD9BHR K9BLK WD9DVA N9AST WD9JLT W9RTH WB9QKK WB9VIW K9POP WD9JAB K9TE WA9UGP WB9ZHL W9DO W9QWI W9TIZ KA9BLN WB9WWB N9AJM WB9LCN KB9JK KA9FDF K0KJ KC9C N9AHP W9MJI K9BRF K9FVN. Congrats to Dubois County EC N9AHP and WD9ITS WD9IPP K3INC KA9ECY KA9IWH for their work during the power outage in Jasper, IN. CQ the HAWK Roost, the Hoosier Amateur Women's Club this is K9ILK calling the club call K9BVU and answering is Adah Elliott, W9RTH, 721 Centennial St., Seymour, Indiana 47274, club secretary. I am sure W9RTH would welcome any YL's or XYL's interested. Present members are: WA9HLW W9RTH K9ILK WA9EYL WB9BJH WA9BWT W9JYO W7NJS WA9BGE K9FZX W5TOK WA9YIF W9NBW K9RXK WB9LWZ WB9SJD WD9FIC WB9ZCH WB9UKD WB9SHG WD9HEE WB9NXW WD9EZP WD9FIV W9JUJ W0LFA WB9YXH WA9DPO WB9IGY KA0JOK W9ZLB. Their net meets at approximately 1400Z on 3910 Sat. The HAWKs give the Hoosier 500 Award, if interested contact W9RTH. I would like to thank KA9JKV for the LCARC publication Short Skip and announce the LCARC banquet April 4, 1981 and hamfest June 21, 1981. I was sorry to hear that the Murphy's Law award went to WD9GSZ for the month from WWVARC. Our sympathy to WA9GJZ for his stay in the hospital. Sure wish you well. Let's all support our local Skywarn program this spring and be aware of the local weather conditions. Traffic: (Jan.) W9JUJ 763, W9FC 258, WD9UYU 124, W9QLW 120, W9OYY 90, N9AEI 83, W9WKM 77, W9EI 73, W9PMT 66, WA9QCF 53, K9DCX 46, W9DLF 42, W9XD 37, KA9EJT 35, WB9LCN 27, KB9II 22, W9ZGC 22, WA9OKK 21, K9WWJ 20, W9URQ 17,

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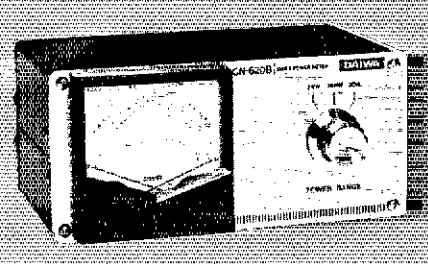

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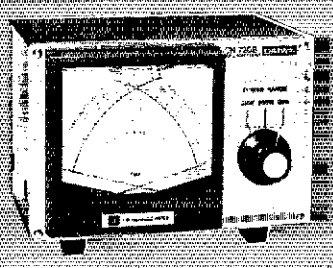
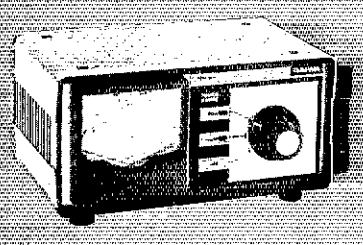
6.5 x 3 x 4 in.

Model CN-720B (New 4 Kw Scale)



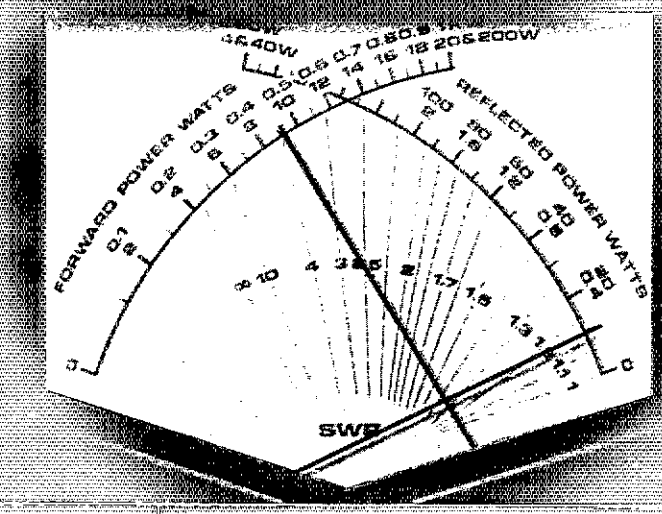
Frequency Range: 1.8—150 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 3 Ranges (Forward, 20/200/2000 Watts)
(Reflected, 4/40/400 Watts)
Dimensions: 180 x 120 x 130 mm;
7 x 4.75 x 5 in.

Model CN-630

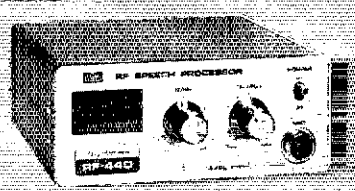


Frequency Range: 140—450 MHz
SWR Detection Sensitivity: 5 Watts min.
Power: 2 Ranges (Forward, 20/200 Watts)
(Reflected, 4/40 Watts)
Dimensions: 180 x 85 x 120 mm;
7.12 x 3.37 x 4.75 in.

Cross Needle Meter



RF Speech Processor
Model RF-440



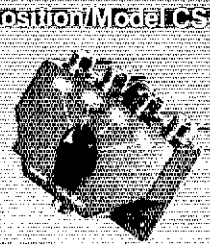
Talk Power: Better than 6 dB
Clipping Threshold: Less than 2 mV at 1 kHz
Panel Meter indicates clipping level
Bandwidth: 2200 Hz at 6 dB down
Frequency Response: 300-3000 Hz at 12 dB down
Distortion Less than 3% at 1 kHz, 20 dB clipping
Output Level: More than 50 mV at 1 kHz

Coaxial Switches

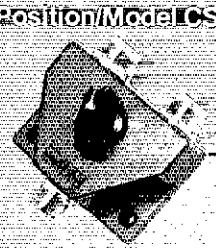
Power Rating: 2.5 kW PEP, 1 kW CW
Impedance: 50 Ohms
Insertion Loss: Less than .2 dB
VSWR: 1:1.2
Maximum Frequency: 500 MHz

Isolation: Better than 50 dB at 300 MHz;
better than 45 dB at 450 MHz;
adjacent terminal
Unused terminals grounded
Connectors: SO-239

4 Position/Model CS-401



2 Position/Model CS-201



Exclusive USA agent for these units; Inquiries invited.

Write for literature.

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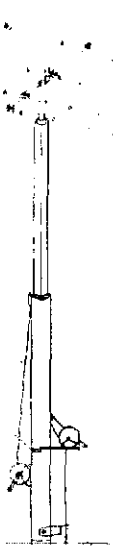
ANTENNA SYSTEMS/ TOWER HARDWARE



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LIST $289
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ALLIANCE HD73 ROTOR
LIST $159
SPECIAL $99

TELETOW'R 40-FT. CRANKUP MAST STANDARD
LIST $259
SPECIAL $199

BREAKOVER AND OTHER MODELS AVAILABLE

BUTTERNUT VERTICAL ANTENNA & ACC.

HF5VIII	80-10 mtr. Vertical	$ 89
TBR-160	160-mtr. Coil Kit	$ 33
RM Kit	Roof Mount Kit	$ 33
STR Kit	*80-mtr. Stub Tuned Radial Kit*	$ 20

HY-GAIN ANTENNAS

TH5DX	New 5-EL Triband Beam	$209
TH6DXX	6-El. Triband Beam	$239
TH3MK3	3-El. Triband Beam	$179
TH3JR	3-El. Triband Beam	$139
TH2MK3	2-El. Triband Beam	$119
HY-QUAD	2-El. Triband Quad	$209
402BA	2-El. 40-mtr. Beam	$179
205BA	5-El. 20-mtr. "Long John"	$239
155BA	5-El. 15-mtr. "Long John"	$149
105BA	5-El. 10-mtr. "Long John"	$ 99
204BA	4-El. 20-mtr. Beam	$189
203BA	3-El. 20-mtr. Beam	$119
153BA	3-El. 15-mtr. Beam	$ 69
103BA	3-El. 10-mtr. Beam	$ 59
DB1015A	3-El. 10/15 mtr. Beam	$129
64B	*4-El. 6-mtr. Beam*	$ 49
66B	6-El. 6-mtr. Beam	$ 89
18HT	Hy-Tower 80-10 mtr. Vert.	$279
18AVT/WB	80-10 mtr. Trap Vert	$ 85
214B	14-El. 2-mtr. Beam	$ 33
2BDQ	80/40 mtr. Trap Dipole	$ 49
5BDQ	80/10 mtr. Trap Dipole	$ 89
BN86	80-10 mtr. KW Balun	$ 14

OTHER HY-GAIN MODELS IN STOCK — CALL!

KLM

KT34A	4-El. Triband Beam	$319
KT34XA	New 6-El. Triband Beam	$479
7.0-7 3-4A	*4-El. 40-mtr. Beam*	$629
7 2-1	40-mtr. Rotatable Dipole	$159
144-148-13LB	13-El. 2 mtr. Long Boomer	$ 79
432-16LB	16-El. 432 MHz Long Boomer	$ 69
144-150-16C	16-El. 2 mtr. "Oscar" Ant.	$ 99
420-450-18C	18-El. 435 MHz "Oscar" Ant.	$ 59

Power Dividers, Circularity Switchers, and other popular KLM Antennas in stock — Call!

HUSTLER

5BTV	40-10 mtr. Vert.	$ 79
4BTV	80-10 mtr. Vert.	$ 99
G6-144-B	2-mtr. Base Vertical	$ 69
G7-144	2-mtr. Base Vertical	$ 99

HF Mobile Resonators Standard (400W) Super (2KW)

10 & 15 mtr.	$10	$15
20 mtrs	$12	$18
40 mtrs.	$15	$21
75	$17	$32

Bumper mounts, springs, folding masts, Supergain 2-mtr. Mobile Colinear Antenna in Stock — Call!

MINI PRODUCTS

HQ-1	Miniquad	$139

CUSHCRAFT ANTENNAS

A3	New 3-El. Tribander	$169
A4	New 4-El. Tribander	$209
A74	New 40-mtr. Kit for A3/A4	$ 55
R3	20-15-10 mtr. Motor Tuned Vertical	$219
AV5	*80-10 mtr. Trap Vertical*	$ 89
20-3CD	3-El. 20-mtr. Monobanded	$165
20-4CD	4-El. 20-mtr. Monobanded	$239
15-3CD	3-El. 15-mtr. Monobanded	$ 82
15-4CD	4-El. 15-mtr. Monobanded	$ 98
10-3CD	3-El. 10-mtr. Monobanded	$ 59
10-4CD	4-El. 10-mtr. Monobanded	$ 75
A50-5	5-El. 6-mtr. Beam	$ 59
617-6B	6-El. 6-mtr. "Boomer"	$169
32-19	19-El. 2-mtr. "Boomer"	$ 75
214B	14-El. 2-mtr. "Boomer"	$ 59
214FB	14-El. 2-mtr FM "Boomer"	$ 59
228FB	28-El. 2-mtr. FM "Power Pack"	$188
220B	220 MHz Boomer	$ 69
ARX2-B	2-mtr. "Ringo Ranger" II	$ 38
ARX450B	450 MHz "Ringo Ranger" II	$ 38
A147-20T	2-mtr. Vert & Horiz Beam	$ 59
A144-10T	10-El. 2-mtr. "Oscar" Ant.	$ 39
A144-20T	20-El. 2-mtr. "Oscar" Ant.	$ 56
A432-20T	20-El. 432 MHz "Oscar" Ant.	$ 45
A14T-MB	Dual "Oscar" Ant. Mounting Boom	$ 20

HY-GAIN CRANK-UP TOWERS

HG37SS	*37 Ft. Self Supporting*	$ 529
HG52SS	52 Ft. Self Supporting	$ 839
HG54HD	54 Ft. Heavy Duty Self Supporting	$1629
HD70HD	70 Ft. Heavy Duty Self Supporting	$2499
HG50MT2	50 Ft. Side Support	$ 659

TRISTAO-PRATT CRANK-UP TOWERS

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TX-455	55 Ft. Self Supporting	$ 899
TX-472	72 Ft. Self Supporting	$1639
HDX-555	55 Ft. Self Supporting-Extra Heavy	$1449
HDX-572	72 Ft. Self Supporting-Extra Heavy	$2359

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FK2548	48' 25G Foldover Tower	$ 659
FK2558	58' 25G Foldover Tower	$ 739
FK2568	68' 25G Foldover Tower	$ 799
FK4548	48' 45G Foldover Tower	$ 929
FK4558	58' 45G Foldover Tower	$1029
FK4568	68' 45G Foldover Tower	$1119

(Freight paid on all foldover towers. Prices 10% higher west of Rocky Mountain states).

ALL ROHN ACCESSORIES IN STOCK — CALL!

CALL FOR INFORMATION ON $1200 FREIGHT PAID *ROHN TOWER ORDERS*

GALVANIZED STEEL TOWER HARDWARE

3/16" EHS Guywire	$11/100 ft.	$99/1000 ft.
1/4" EHS Guywire	$14/100 ft.	$129/1000 ft.
5/32" 7 x7 Aircraft Cable		$10/100
3/16" CCM cable clamps (3/16" or 5/32" cable)		$0.30
1/4 CCM cable clamps (1/4" cable)		$0.40
1/4 IH Thimble (fits all sizes)		$0.25
3/8 EE (3/8" Eye & Eye turnbuckle)		$5.50
3/8 EJ (3/8" Eye & Jaw turnbuckle)		$6.00
1/2 EE (1/2" Eye & Eye turnbuckle)		$8.50
1/2 EJ (1/2" Eye & Jaw turnbuckle)		$9.00
3/16" Preformed guy deadend		$1.45
1/4" Preformed guy deadend		$1.65
6"-dia. 4-ft. long earth screw anchor		$11.50
2"-dia. 10-ft. long heavy duty mast		$35.00
500D Guy insulator (5/32" or 3/16" cable)		$0.85
502 Guy insulator (1/4" cable)		$1.80

ROTORS & CABLES

Hy-Gain HDR-300 (25 sq. ft.)	$399
Alliance HD-73 (10.7 sq. ft.)	$ 99
Alliance U-100 (Elevation Rotor)	$ 39
CDE CD-45-2 (9 sq. ft)	$ 99
CDE HAM 4 (15 sq. ft.)	$159
CDE TAILTWISTER (30 sq. ft.)	$229
8 Conductor Rotor Cable	$0.18/ft.
Heavy Duty 8 Conductor Rotor Cable	$0.36/ft.

COAXIAL CABLE AND CONNECTORS

RG213/U (Mil spec. RG-8/U-Brand New)	$0.29/ft
RG-8X	$0.15/ft
1/2" 50 OHM Copper Hardline	$1.10/ft.
1/2" Copper hardline connectors	$22.00
1/2" 50 OHM Poly Jacketed alum. hardline	$0.69/ft
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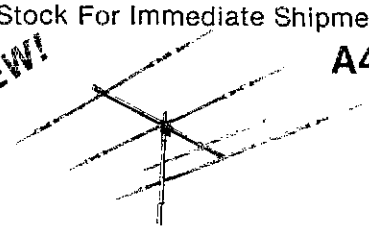

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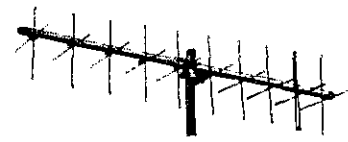

A147-20T
2-10 element Yagis on 1 boom
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2M Boomers at big savings:

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214FB	2.2 λ	$59.00 **SAVE $20.95**

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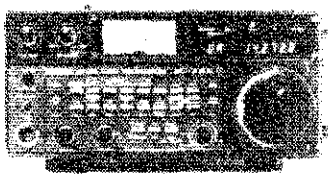

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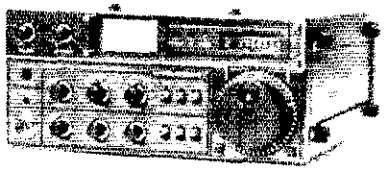
9 band coverage — fully WARC compatible covering 10-160M. Continuous receive from 100KHz to 30MHz including AM. Digitally synthesized with dual VFO's in 10Hz steps. Pass Band Tuning in CW, SSB and RTTY modes. RF speech processing included. Power output adjustable from 10-100W PEP.

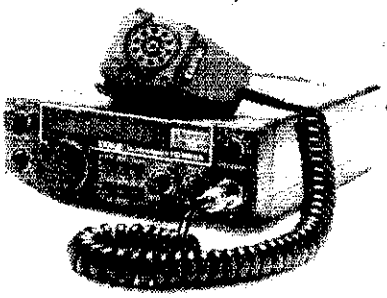
IC-251A 2M ALL MODE



CALL FOR SPECIAL PRICE

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

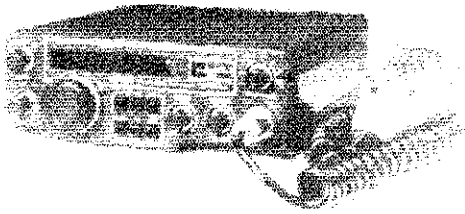


143.800-148.195 MHz, 25W FM. Dual VFO's with 5 memories. Band scan/Memory scan also included. 7.3"(W)x2.5"(H)x8.8"(D).

CALL FOR SPECIAL PRICE

Optional Encoding Microphone Available

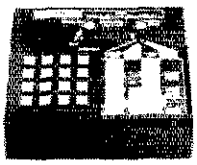
IC-260A 2M ALL MODE



CALL FOR SPECIAL PRICE

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)

AEA MORSEMATIC



- Dual Microcomputers provide many features.
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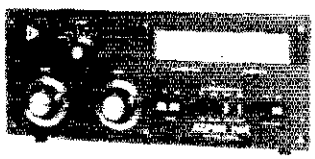
- Morse trainer mode with programmable speed-up.
- Beacon mode for VHF DX scheduling.
- Automatic serial number sequencing.

ALPHA



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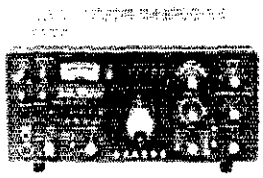

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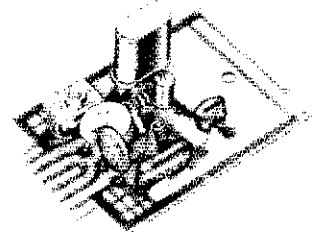
Plug-in Transistor Oscillators

HIGH FREQUENCY (20 MHz — 160 MHz)

- Signal Generators For Receiver Alignment
- Quick-Change Plug-In Oscillators

Five transistor oscillators covering 20 MHz-160 MHz. Standard 77°F calibration tolerance ± .0025%. The frequency tolerance is ± .0035%. Oscillator output is .2 volts (min.) across 51 ohms. Power requirement: 9 vdc @ 10 ma. max.

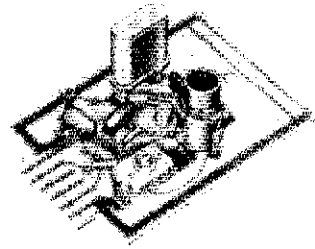


Catalog Number	Oscillator Type	Oscillator Range	Temperature Tol. –40°F to 150°F	Oscillator (Less Crystal) Price
035200	OT-124	20-40 MHz	± 0035%	$10.21
035201	OT-146	40-60 MHz	± 0035%	10.21
035202	OT-161	60-100 MHz	± .0035%	10.21
035203	OT-1140	100-140 MHz	± 0035%	10.21
035204	OT-1160	145-160 MHz	± .0035%	10.21

LOW FREQUENCY (70 KHz - 20,000 KHz)

- *Band Edge Markers*
- Frequency Markers For Oscilloscopes
- Portable Signal Standards
- Accessory Cases

Four transistor oscillators covering 70 KHz — 20,000 KHz. Trimmer capacitor for zeroing crystal. When oscillator is ordered with crystal the standard will be ± .0025%. Oscillator output is 1 volt (min.) across 470 ohms. Power requirement: 9 vdc @ 10 ma. max.



Catalog Number	Oscillator Type	Oscillator Range	Temperature Tol. –40°F to 150°F	Oscillator (Less Crystal) Price
035205	OT-11	70-150 KHz	± 015%	$10.21
035206	OT-12A	150-400 KHz	200-600 KHz ± 01%	10.21
035207	OT-12	400-5,000 KHz	600-5,000 KHz ± 0035%	10.21
035208	OT-13	2,000-12,000 KHz	± 0035%	10.21
035209	OT-14	10,000-20,000 KHz	± 0035%	10.21

SUPPLEMENTAL CRYSTAL ORDERING INFORMATION FOR ICM OSCILLATORS

Please refer to the "4" Series Crystal Specification Sheets. **(Available on request.)** Prices on crystals will vary with frequency being ordered.

CALIBRATION TEMPERATURE:
Customer's choice, usually 26°C.

RANGE: Depends on crystal frequency being ordered.

TYPE: CS ② is recommended.

HOLDER:
F-605 ① for all except crystals below 160 KHz.
F-13 ⑧ required for crystals below 160 KHz.

LOAD:
OT-11, OT-12, OT-12A . . . 24PF ④
OT-13, OT-14 . . . . . 20PF ③

OT-124, OT-146, OT-161, OT-1140, OT-1160 . . . . . SERIES ⓪
ALIGNMENT OSCILLATORS, Models 812, 814 . . . . . 32PF ⑤

Note: Circled numbers refer to numbers on Crystal Specification Sheets

EXAMPLES

OT-11 Catalog Number – 4 1 1 2 8 4 (75 KHz*, CS, F-13 Holder, 24PF)

OT-14 Catalog Number – 4 3 3 2 1 3 (10.5 MHz*, CS, F-605 Holder, 20PF)

OT-1140 Catalog Number – 4 7 4 2 1 0 (120 MHz*, CS, F-605 Holder, Series)

**All "4" Series Catalog Numbers require crystal frequency specified by Customer.*

FOR ADDITIONAL INFORMATION WRITE:

ICM

INTERNATIONAL CRYSTAL MFG. CO. INC. • 10 NORTH LEE • OKLAHOMA CITY, OKLA. 73102

KA9BLN 15, WD9IAA 14, W9RTH 14, WB9AWI 12, WB9YAY 12, W9ZW 11, WA9OHX 10, W9WEI 10, K9CGS 9, K9KTB 9, WD9ART 8, K9FVN 8, W9IRT 7, N9BJX 6, K9DIY 6, WD9EXI 6, WD9JAB 6, WD9DWD 5, N9AST 5, WB9AJY 5, W9BDP 2, KC9C 2, WD9EPU 2, WB9KQT 2, WA9JNC 1, W9KMY 1. (Dec.) WD9DVA 91, KB9IT 54, K9DCX 35, W9LKU 31, W9AIG 7, WB9UJY 3.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTO. BWN, 3985, 1230Z, QNI 1006, QTC 1080, WB9YPY. BEN, 3985, 1800Z QNI 898, QTC 200, WB9ESM. WSBN, 3985, 2300Z, QNI 1214, QTC 251, WD9FSZ. WNN, 3723, 0000Z QNI 244, QTC 54, N9AUG. WIN-E, 3662, 0100Z QNI 382, QTC 104, W9DM. WIN-L, 3662, 0400Z QNI 285, QTC 96 K9LGU. XPO, 3925, 1801Z QNI 492, QTC 47, WA9NIX. NWTN, 34/94, 0030Z QNI 500, QTC 47, WB9YPY. GR. RAY, 72/12, 0230Z Wed, QNI 20, QTC 0, WB9NRK. WB9YXY has Advanced. W9NA on OXCC Honor Roll. W9SM operational on all bands with beam on 20-15-10 and dipoles on 80 and 40. WB9WBV and WD9HTG have Generals. Sorry to report W9EVL a Silent Key. KA9CPA made BPL. Rib Mountain Repeater Assn is installing a receiver for ELT, hoping they can help if and when a plane goes down. BEN had emergency session on January 21, 75 meters had 33 checkins covering 25 counties and 3 states involving simulated nuclear disaster at Point Beach Nuclear Plant. New Net Manager for WIN-E is W9YCV. A big thank you to W9DM for your superb job in that position. WB9OWR has etchs. KA9FIH has WAS and WAC worked. Wisconsin Slow Speed net is again activated, give this net your full support. Traffic: (Jan.) KA9GPA 1961, W9CXY 233, WD9IUX 260, WD9FSZ 212, N9AUG 214, W9YCV 186, WB9YPY 171, K9FHI 125, WB9RGO 99, W9DND 97, K9AKG 76, WD9DHF 74, WD9AJA 72, W9IEM 69, WD9BCM 66, WB9ESM 66, W9UCL 63, WA9WYS 54, K9AQ 51, W9CJE 51, N9BCX 50, AG9G 50, WB9NRK 50, W9DM 45, W9IHW 42, W9LDO 42, K9JPS 39, WB9ICH 35, WB9ABF 32, W9SO 32, W9UW 31, WA9GGH 29, N9CP 27, WB9BRE 26, WB9JSW 26, W9FDY 26, K9HDF 25, KB9NG 25, KB9CV 23, WB9WHQ 23, KB9FM 19, K9ANV 18, K9UTQ 18, K9UU 18, KA9HPQ 12, KB9W 11, WB9YPZ 9, WB9PAW 7, K9GDFF 5, KA9IHR 5. (Dec.) WB9RGO 105, KA9HPQ 13.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WAØQIT. STM: AFØO. SCM Helen Haynes, as of this writing, has returned to the hospital, this time for replacement hip surgery. She has been back on the air briefly, but unable to handle any traffic. AFØO and WAØQIT have been sharing her SCM duties. The usual after-holiday lull has hit the Minnesota traffic system, with most of the avid traffic handlers taking a little rest (before the Easter rush starts). The section congratulations go to WBØUOP, of Saint Cloud, who upgraded from Novice to Technician on January 9th and to NØBSG who went from General to Advanced on January 2nd. New callsign KFØS has been assigned to KBØJA of St. Charles. Several new RACES nets have begun operation and are going strong. WDØBGS, of Litchfield, is really making a strong pitch for warm bodies, as EC of Meeker County. Keep up the good work. Net reports:

Net	Mgr.	Freq.	Time	QNI	QTC
MSN/1	AFØO	3685	0030Z	215	89
MSN/2	KØJCF	3685	0300Z		
MSPN/N	WAØAIN	3945	1700Z	596	59
MSPN/E	KCØT	3929	2345Z	1072	154
MNAWXN	WDØCGM	3929	0015Z	555	350
MSSN	NO NM	3710	2315Z		

Traffic: (Jan.) WAØTFC 209, WØHZU 193, WBØTHZ 127, WDØCGM 113, WDØDFX 88, KCØT 88, AFØO 86, WØPET 64, WBØNZB 58, KAØEPY 52, KØPIZ 48, WAØAIN 45, KBØMB 44, KØCSE 34, WØISJ 25, WØGRW 14, WAØQIT 10. (Dec.) WØGRW 61, WØPET 54, NØJP 8.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — SEC: WBØTFF. OBS: WØDM. SNM: WAØCRH. OO: WDØCLB. We express our sympathy to the families of WØRQE and KØTWH. Congrats to WDØBRL upgrade to Extra; to AKØT who got in 3rd place nationwide on phone SS with 221,000 pts. Wish WØZVN and new bride Best Wishes. Grand Forks 2nd repeater has good signal reports and is on 146.43/147.03. Carrington repeater is back on 04/64. WDØDFT was reelected pres. for Hawknest Club. Officers of Teddy Roosevelt Club is WDØDAJ, pres.; WDØDAJ, vice pres.; WAØFEU, secy./treas. They meet the 1st Monday at the public library. KL7CR has retired from AF and moved to the Bowman area. Welcome and hope to hear you soon. Traffic: WAØRWM 401, KBØIP 81, WAØCRH 45, KA7AWS 17.

SOUTH DAKOTA: SCM, Erwin C. Helmbuck, KØOTZ — I want to apologize for the missing Dec column. Near as I can tell, it was delayed in the mail. I will get this in earlier to avoid that. I will be getting a letter out to ECs very soon to solicit reports on activities, and to get some info on problems. Also a note to clubs, I would like the secretary to send a short note about activities and who the current officers are. PLEASE KEEP ME INFORMED. I would like some input about the column. Do you want net reports or traffic? There is not room for both. Several Rapid hams are going to be on the 160M contest with a big commercial vertical. Traffic: (Jan.) WØZWL 623, WAØUEN 151, WAØVRE 128, WØHOJ 121, KØAIE 115, WØDVB 98, KØFRE 86, WDØBMR 79, WAØTNM 53, WØKJZ 48, WBØOMF 27, WØRWE 10. (Dec.) WØZWL 667, WØMZI 626, KØFRE 134, WAØVRE 132, WØHOJ 121, WAØUEN 119, WDØBMR 114, WØDVB 113, KØAIE 106, WØKJZ 84, WAØTNM 83, WBØOMF 36, WAØRWE 3.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAU — SEC: K5TML. NMs: WA5LGN W5MYZ W5POH WA5ZWZ. Nets. ARN 3.995 0030/dy 1136 70 WA5LGN, OZK 3.760 0100/dy 247 27 W5MYZ, APN 3.937 1200/M-S 712 33 W5POH, M-Bird 3.928 2230/M-F 786 22 WA5ZWZ, SCARC 28.765 0230 M & T 68 10 K5HZ. On Dec 17, MARC members played Santa at Children's Hospital, Little Rock. KA5HQO acted as control. MARC annual Xmas meeting was held at Conway, Dec 13th. New officers of CAREN: W5ODF, pres.; N5CAK, vice pres.; KB5HW, secy./treas. *CAREN provided comm for Twin City 10 mile race, Jan. 18.* NWAARC will sponsor Novice class starting Mar 3rd. For more info contact KC5AB, 2808 Rife Cir., Rogers. NWAARC Hamfest May 16th, Siloam Springs. U of A RC being activated. New EC Saline Co, KA5JQO, cancel EC WB4BWC. Renew following EC: W5POH WA5ZWZ; ORS: W5EU WB5GOH W5KL K5RO W5UAU. Traffic: K5BIL 28, W5UAU 22, WB5GQH 11, N5EL 5, W5KL 4.

LOUISIANA: SCM, Jim Giammanco, N5IB — The NO VHF Club provided comm. for the Mardi Gras Marathon with such good success that they have been asked to do it again next year. New officers of the Jefferson ARC are

Hustler Tribander 3-TBA

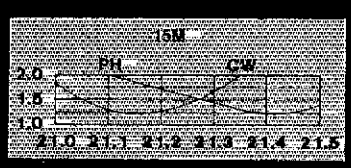
The Rugged, Reliable 10, 15, and 20-Meter Yagi You've Been Waiting for Is Now Available.

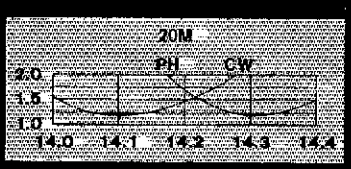
This exciting new tribander sets the pace for dependable performance with its two in one trap design — and the solid construction you've come to expect from Hustler. In fact, its durable design is partially based on concepts used in the time-tested and world-renowned Hustler 4-Band Trap Vertical.

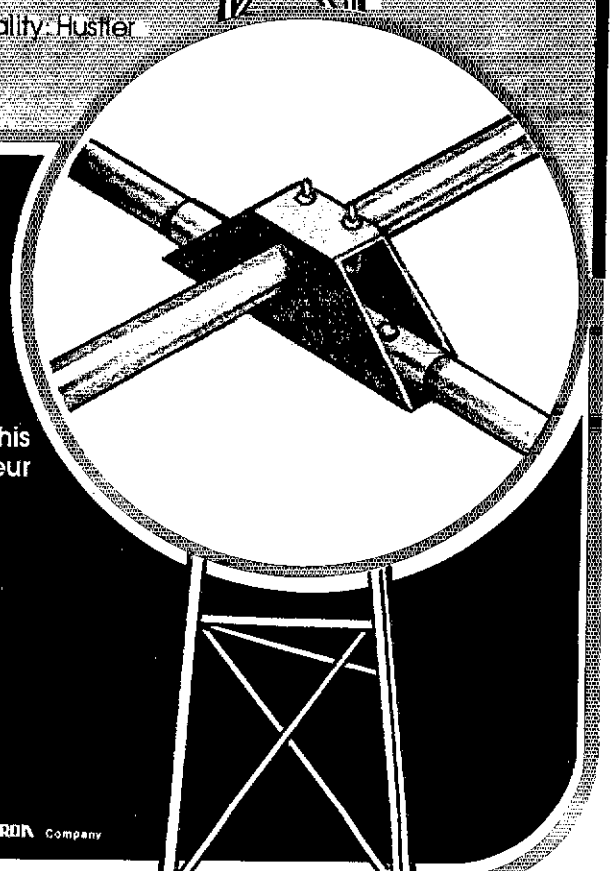
The 3-TBA is the smallest full-featured tribander available today. It offers excellent front to back ratio and SWR at resonance. Plus, it is engineered to provide the widest possible bandwidths with superior power handling capacity.

A special heavy-duty saddle prevents mechanical distortion. Although light enough to ship UPS, and enable use of smaller, less expensive rotors, the 3-TBA can manage windloads up to 100 MPH! Its turning radius is only 14 feet.

All in all, you can't surpass the Hustler 3-TBA for top triband quality. Hustler — still the standard of performance.







For more information on this and other fine Hustler amateur radio products, contact:

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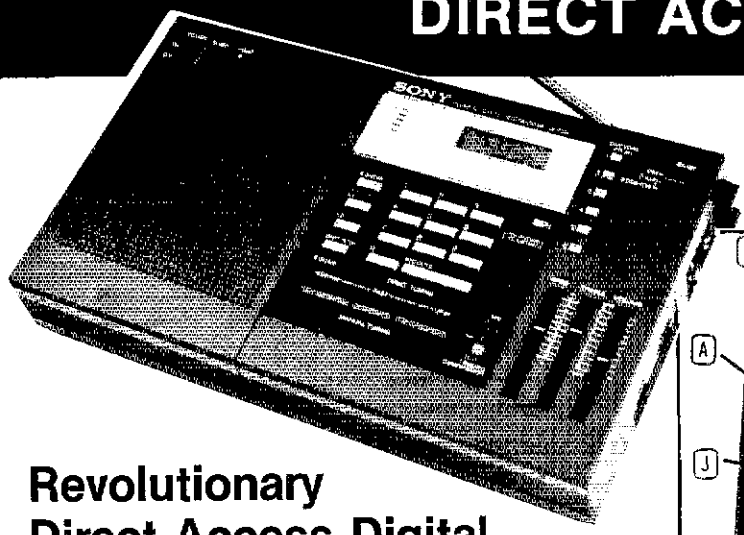
INTRODUCING SONY'S NEW DIGITAL DIRECT ACCESS RECEIVER!



only **$299.95** plus $5.00 shipping

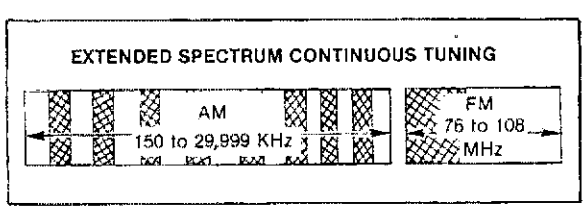
Revolutionary Direct Access Digital Shortwave Scanner

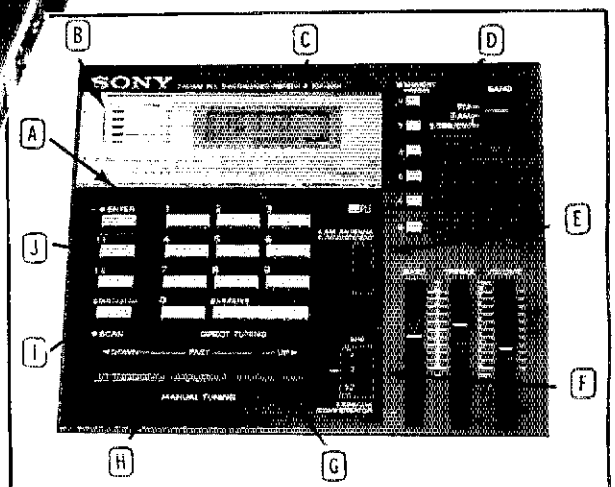
- **Continuous Scanning of LW, MW, SW, & FM Bands**
- **Instant Fingertip Tuning—No More Knobs!**
- **6 Memories for Any Mode (AM,SSB/CW, & FM)**
- **Dual PLL Frequency Synthesized—No Drift!**

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 relection 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.





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
J High/Low Limit Buttons

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

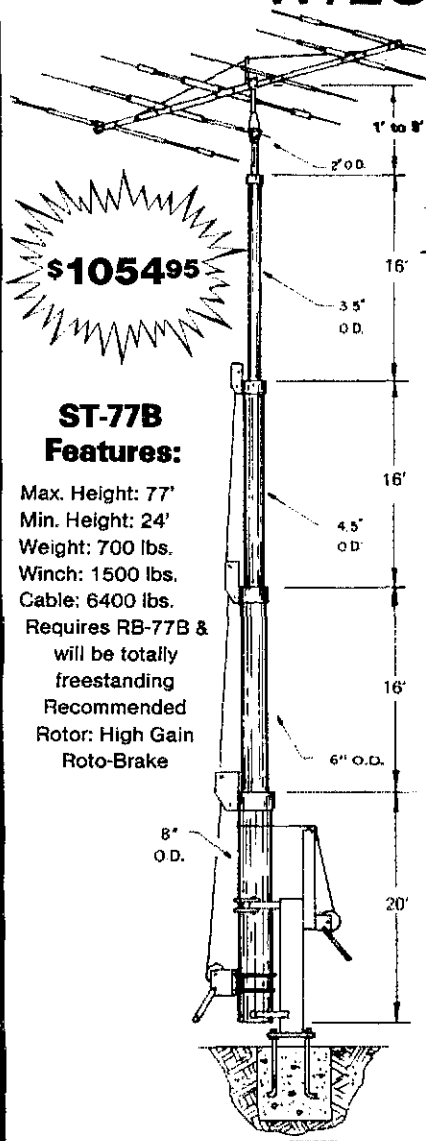
CIRCUIT SYSTEM: Fm Superheterodyne; AM Dual conversion superheterodyne. **SIGNAL CIRCUITRY:** 4 IC's, 11 FET's, 23 Transistors, 16 Diodes. **AUXILIARY CIRCUITRY:** 5 IC's, 1 LSI, 5 LED's, 25 Transistors, 9 Diodes. **FREQUENCY RANGE:** FM 76-108 MHz; AM 150-29,999 KHz. **INTERMEDIATE FREQUENCY:** FM 10.7 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)

SPECTRONICS, INC.
1009 GARFIELD ST. OAK PARK, IL. 60304

PHONE
(312)848-6777

WILSON SPRING SALE

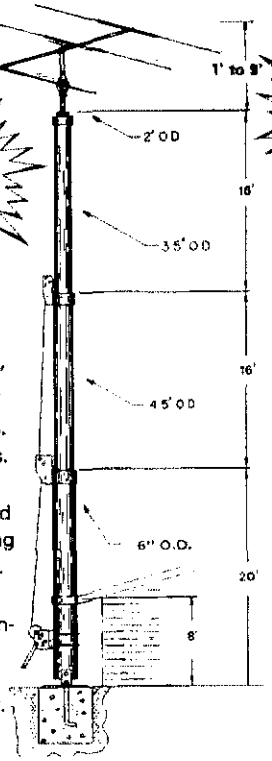
— FACTORY DIRECT —



$1054.95

ST-77B Features:

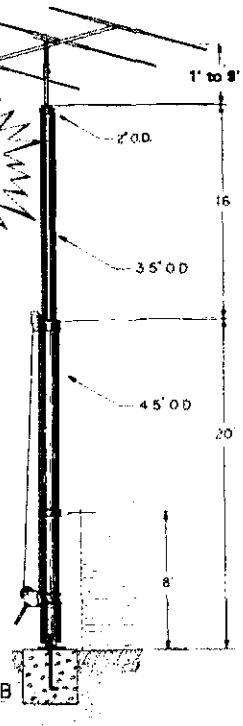
Max. Height: 77'
Min. Height: 24'
Weight: 700 lbs.
Winch: 1500 lbs.
Cable: 6400 lbs.
Requires RB-77B & will be totally freestanding
Recommended Rotor: High Gain Roto-Brake



$609.95

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.



$369.95

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.

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'

WIND LOADING			
Tower	Height	Sq. Ft.	
ST-77B	69	16	Square Footage Based on 50 MPH Wind
	77	10	
MT-61B	53	18	
	61	12	
TT-45B	37	18	
	45	12	

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 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.

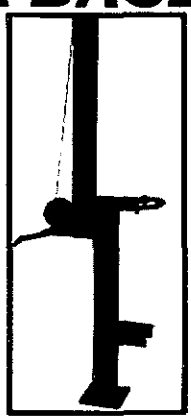
The ST-77B cannot be mounted against the house and must be used with the rotating tilt-over base RB-77B shown below.

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.

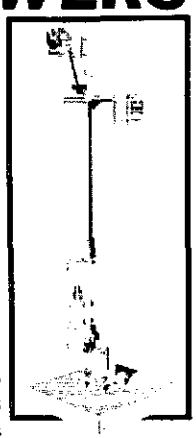
FB-45B . . 112 lbs. . . $189.95
FB-61B . . 169 lbs. . . $269.95



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. . . $259.95
RB-61B . . 229 lbs. . . $339.95
RB-77B . . 300 lbs. . . $509.95



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 4-1-81 thru 4-30-81
Specifications Subject to Change Without Notice.

WSI WILSON SYSTEMS, INC.
4286 S. Polaris Ave., Las Vegas, Nevada 89103

WILSON SPRING SALE

WV-1A

$59.95 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)

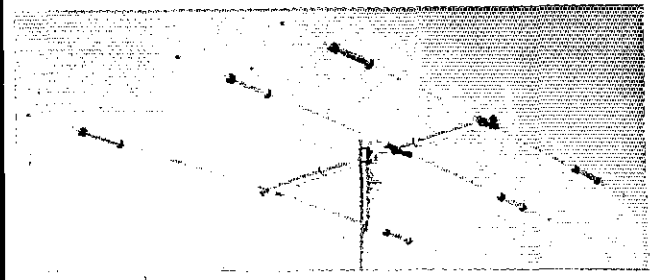
SPECIFICATIONS

- 19' total height
- Self supporting — no guys required
- Weight — 14 lbs.
- Input impedance: 50
- 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.

SY-33



SALE **$149.95**

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 ⅛" 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 ¼" 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	Wind Loading @ 80 mph .. 114 lbs.
Maximum Power Input .... Legal Limit	Assembled Weight (approx.) ... 37 lbs.
Gain (dBd) ..... Call Factory	Shipping Weight (approx.) ... 42 lbs.
VSWR at Resonance 1.3:1	Direct 52 ohm feed .....
IMpedance ..... 50 ohm	No Balun Required
F/B Ratio ..... Call Factory	Maximum Wind Survival ... 100 mph
Boom (O.D. x Length) .... 2" x 14'4"	Number of Elements 3
Longest Element ..... 27'4"	Turning Rdius ..... 15'9"
Maximum Mast Diameter ... 2" O.D.	Surface Area ..... 5.7 sq. ft.

33-6 MK $59.95

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.

AVAILABLE ONLY FACTORY DIRECT

CALL **1-800-634-6898** TOLL FREE

WSI WILSON SYSTEMS, INC.

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PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

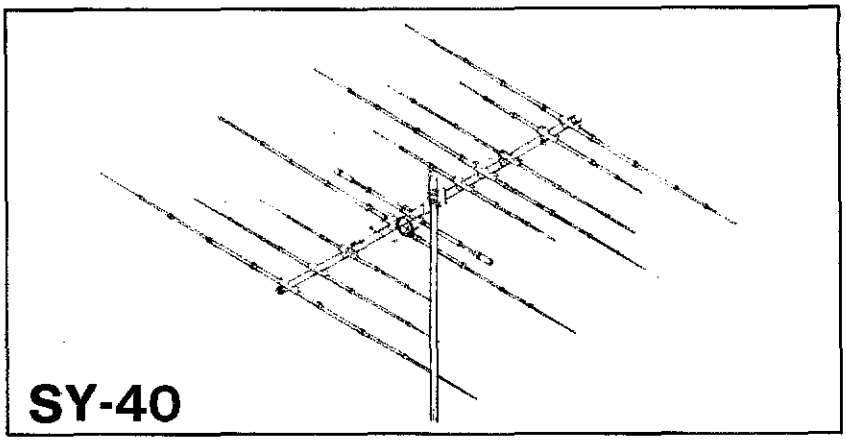
WILSON SPRING SALE

SALE

$299.95

REGULAR $374.95

- ★ 3 MONOBANDERS on 1 Boom
- 4 elements on 20 mtrs FULL SIZE
- 4 elements on 15 mtrs
- 5 elements on 10 mtrs



SY-40

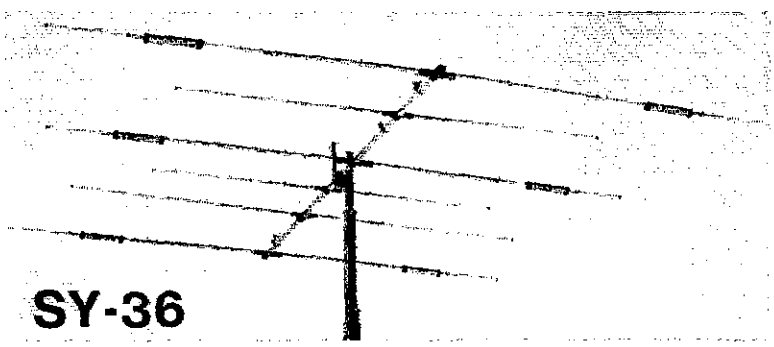
The sytem 40 is the answer to the DXer who does not have space to stack monobanders yet wants the advantages they offer. Through the use of our split beta matching method, only one feed line is required and complete coverage of both the phone and cw bands are available with only one setting.

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 ..... 84 lbs.
Gain ..... Call Factory	Turning Radius ..... 22'6"	

SALE

$199.95



SY-36

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 ..... 29'6½"	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.

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K5PO, pres.; WB5RNM, v.p.; WA5YFQ, secy.; N5RH, treas.; AJ5Y WA5HAX KB5GQ K5SV dir. Send info on any public service nets that your club may operate to your SCM for inclusion in the new ARRL Net Directory. The Sabine ARC is sponsoring a Novice training class, with about 20 students enrolled. The film "World of Ham Radio" is being shown daily in the waiting room lounge of the VA Hospital in Shreveport, using the hospital CCTV system. The LA Section will participate in the Operation Red Cross Message Relay. Watch for details in QST and on the nets. N5ADF is a newly appointed EC for East Baton Rouge Parish. Louisiana still needs an SEC, volunteers are being accepted now, so hurry and beat the rush! Don't forget the Baton Rouge Hamfest, the first weekend in May.

Net	Freq.	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M. Dy	314	119	N5RB
LTN	3910 kHz	6:30 P.M. Dy			N5EK
LSN	3703 kHz	7:30 P.M. M-F	340	50	WD5EAE
LRN	3587.5 kHz	6:30 P.M. Su 8 P.M. W	18	1	N5RB
LEN	3910 kHz	8:00 P.M. Su			

Traffic: N5RB 98, K5TL 85, WD5EAE 72, W5VMY 52, WB5UVX 48, K5WOD 47, N5BFV 42, WD5FLM 38, WD5CWK 23, N5IB 20, WB5ODJ 19, WB5IKT 10, WD5GJB 8, WD5BJT 6, WB5LWP 4.

TENNESSEE: SCM, Earl Leonard, KB4G — SEC: W4NZW. STM: WB4PRF. Time to list our nets again to reflect the change to daylight time.

Net	Freq.(MHz)	Day/Time(UTC)	Mgr.
TEMPN	3980	M-F 1040	WA4EWW
TMPN	3980	M-F 1145 SuSaH 1400	W4PFP
TEPN	3980	Tu-Sa 2330	K4YOL
TN	3635	Dy 0000	W4ZJY
TSN	3710	Tu-Sa 2300	NG4J
MTTMN	28.8	Tu & F 0100	WB4CHS/ W4GVC
ETTMN	28.7	W-F 0100	WB4NFI
ET VHFN	50.4	TuThSa 2300	WA4SXM
	145.2	WF 0100	WB4DZG
CCN	146.07/67	TuThSa 0100	W4TZG
NTPSN	146.16/76	M-F 2230	N4BCA
CTSFMAN	146.19/79	M 0100	WA4HAM
TCDWN	146.31/91	W 0100	WA4BOC
WT VHFN	146.37/97	Dy 2330	WA4VVX
LEN	147.63/03	W 0030	WD4EOX
MCRN	147.72/12	Dy 0030	WB4VXW
RC AFESN	147.72/12	F 0100	W4EBT
METEN	147.90/30	Tu-Sa 0100	KD4C
PRN	3980	M-F 0200	WB4YPO
ETHEN	147.72/12 146.22/82	W 0000	K4TKQ

Will catch up on appointments and certificates next time. Hope to see you on the nets. Traffic: NG4J 481, WB4PRF 324, W4OGG 201, WB4BKF 193, W4ZJY 178, W4WXH 143, W4DDK 70, W4MRD 68, K4VM 55, WD4SIG 49, K4WOP 38, WD4NRJ 32, KC4MW 28, W4RUW 19, K4YOL 18, K4UMW 16, KY4L 14, W4PFP 11, W4TYV 11, KA4IKT 10, W4PSN 10, KA4GSS 9, K4VMO 6, WA4BWW 4, AF4T 4, KA4BSG 3, W4DPO 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest KZ4G. January nets reporting (section nets)*

Net	QNI	QTC	Net	QNI	QTC
MKPN*	1146	105	BARES	56	9
KTN*	1539	164	4-ARES	43	4
KYN*	337	154	5-ARES	65	5
KSN*	208	55	CARN	216	28
KRN*	552	26	PAEWTN	380	42
KNTN*	463	135	9RN-D	68%	258
KPON	92	5	CAN-D	100%	498

Hope everyone enjoyed the hamfests at E-town & Glasgow. OBS reporting from WA4UQA shows the Lexington area getting all bulletins. KU4A has received the Satellite CC certificate. Bullitt ARS turning out more Novices. Hope to see everyone during the hamfest season. de K4DZM ex SCM. Traffic: K4YZU 185, K4JLX 105, K4DZM 89, KB4OZ 81, KA4GFU 69, WD4LXX 68, KS4V 63, WD4ONV 49, WA4EBN 41, WD4IYI 41, K4HOE 39, KA4MZY 38, WA4AVV 35, KA4SAA 35, WB4ZDU 33, KA4ZAT 24, WD4BSC 23, WA4OMH 23, WA9OTD 23, W4PKX 20, WA4AGH 19, KA4MBF 19, WB4APC 18, KA4IKH 18, K4AVX 16, WD4JTD 16, WB4AUN 15, WA4NOG 15, W4CDA 14, WD4COF 13, KA4GVJ 12, WA4SWF 12, K4MHL 10, WB4ILF 9, WA4YPO 9, WD4CJQ 8, KA4FJR 5, W4TPB 4, WD4LTD 2.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: WB8FLK K8RCT W8VWY. NMs: WD8BHE WA3DHB K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WA8RNB WD8RNQ WB8YDZ K8ZJU.

Net	Freq.	Time/Day	QNI	QTC	Sess.	Mgr.
OMN*	3663	1800 Dy**	1528	421	93	WA8PIM
MITN*	3953	1900 Dy	844	341	31	WD8LRT
GLETN	3932	2100 Dy	1470	142	31	K8DTG
MACS*	3953	1100 Dy	730	117	31	K8LNE
MNN*	3722	1730 Dy**	637	111	62	WD8BHE
UPN*	3922	1700 Dy	860	80	35	WA8DHB
BR	3930	1730 M/S	431	32	25	W8HIN
SEMTN*	146.64	2045 Dy	167	29	29	WA8RNB
MEN	3930	0900 Su	130	8	3	W8HIN
WSSBN	3935	1900 Dy		(N/A)		W8POZ
VHF nets	16 reports		1253	78	88	WD8NKT

*NTS nets. Times local. **QMN late net, 2200; MNN late net 2000. 3932 kHz is MI emergency frequency. Traffic workshop Su 3953 kHz, 1600. ARES net Su 3932 kHz, 1730. ARES (U.P.) Thur. 3922 kHz, 1730. New OBS: N8ABA. New ORS: WD8IBY. OO reports: WA8MVR K8JH W8QG W8RUO KE8X. OBS reports: AF8D W8MPD WA8RNB. Silent Keys, with deep regret: WA8IML WD8LRX WA8UMQ W8RPN W8SUV W8WSA. Congrats to new QCWA member KE8X (ex-W3GQJ), 25 years this month. N8ABA has his very first two-meter rig and is putting it to good use with local ARES. MCRC is changing the basis for its annual Ivory Olinghouse Field Day award for ARRL affiliated clubs in MI. The original method of total score divided by transmitter class proved to be biased in favor of fewer transmitters, thus defeating the purpose of the award, which is to promote general activity in Field Day. Henceforth, the winning club will be the one with the highest percentile rank calculated on a class-by-class basis. More details in a forthcoming affiliated club mailing from this office. I'm pleased to note a continuing upswing in stations qualifying for PSHR, with a record 19 this month, up from 13 a year ago. Apologies to several whose December traffic count got missed. You'll see 'em added to this month's listing. Congrats to W8POZ, new manager for WSSBN. BPL for January: KA8CPS WD8LRT. Traffic: (Jan.) KA8CPS 444, WD8LRT 414, WB8MTD 338, AF8V 294,

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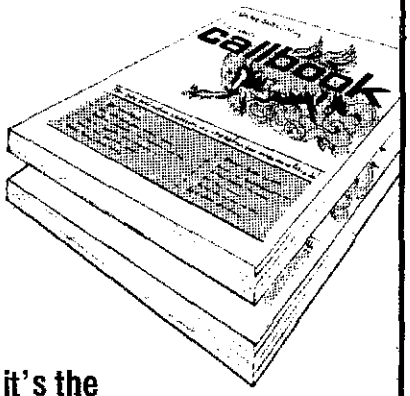

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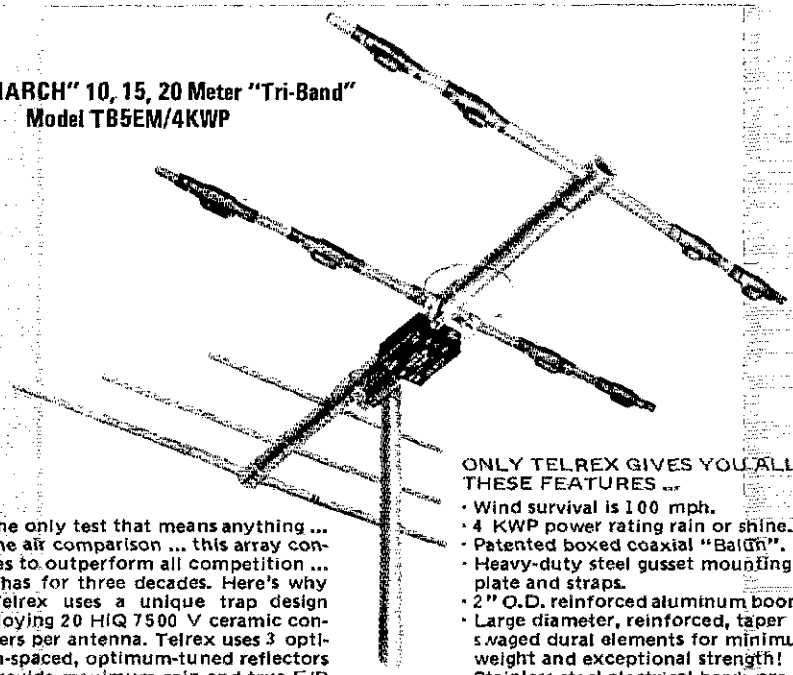

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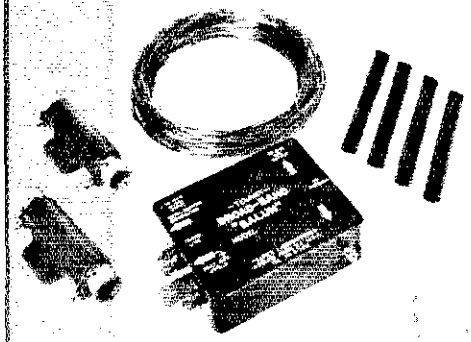

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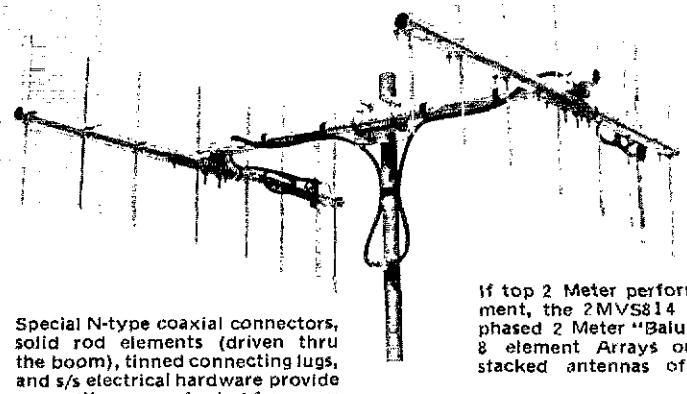

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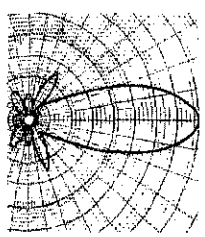

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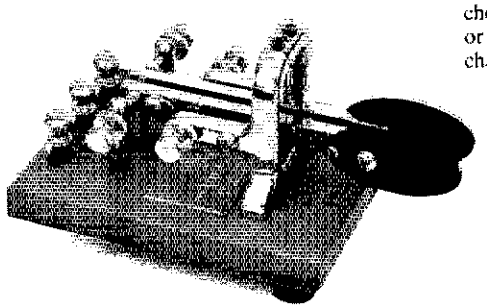

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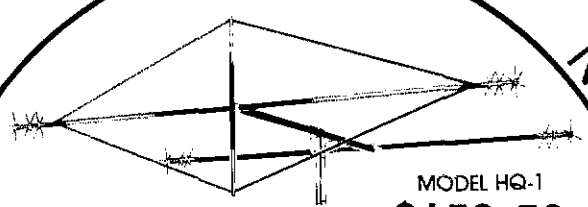

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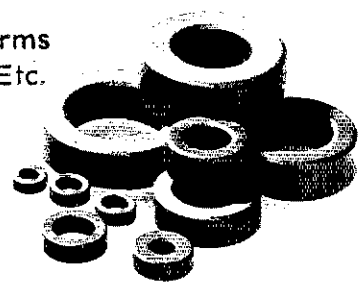

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OHIO: SCM, Allan L. Severson, AB8P — Asst SCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: K8AAZ WD8KBW K8OZ WD8QMP WB8YGW. Net reports:

Net	QNI	QTC	Sess.	Time(local)	Freq.
BN	594	282	62	6:45/10 P.M.	3.577
BNR	185	26	29	6 P.M.	3.605
ONN	241	54	31	6:30 P.M.	3.708
OSN	256	117	31	6:10 P.M.	3.577
OSSBN	3068	713	93	10:30 A.M., 4:15 & 6:45 P.M.	3.9725
O6MN	311	36	31	9 P.M.	50.169

In less than 2 months it will be time for the 1981 Ohio State ARRL Convention. K8JE and his Hamilton County ARPSC crew are working on final details at this time. The convention, set for June 13 & 14, promises to be a really worthwhile affair and one for the "don't miss" list. Meanwhile, the DARA folks are polishing plans for the annual Dayton Hamvention which promises to be greater than ever. On April 24, 25 and 26 Dayton will, as usual, play host to the Amateur Radio world. Congratulations to W8ILC, elected to a two year term as eight area representative to the Emergency Communications Advisory Committee. Upgrades: to Extra — KA8FFV and WB8VPE; to Advanced — WD8MIO WD8MTM WD8OQE KB8WG WB8OHF & WB8ZTK. The Jackson County ARC is now affiliated. Congratulations! We have a new local net in Southeast Ohio — Tri-state Amateur Net, per net manager WB8OHU. Congratulations there too and watch for their listing next month. Apologies to WB8JGW for the typo in the February QST. Chappie covers much territory but we really don't expect that much of him. LEARA v.p. is WB8JYR. Club elections: OH-KY-IN Amateur Radio Society — WB8RSC, pres.; WD4OFJ, vice pres.; WD8JAJ, rec. secy.; K8DHK, corr. secy.; K8THT, treas. CLARC — W8HFK, pres.; KA8CFW, vice pres.; KA8DKV, secy./treas. EC appointments: WD8OME, Warren Co. and WB8ZOL, Logan & Champaign Counties.

Local Nets	QNI	QTC	Sess.
BRTN	379	129	31
BARF (Dec.)	105	28	24
Barf (Jan.)	76	17	23
COARES	104	13	3
FIRELANDS RED CR.	58	1	4
HURON CO. ARC	47	5	4
LCNWARES	499	175	31
MASER (Dec.)	81	3	1
RARA	78		5
TSHAC	797	149	29
VWCEN	32	2	2

Traffic: (Jan.) W8PMJ 375, K8AAZ 357, K8OZ 204, WD8DDE 147, WD8DYW 133, AB8P 131, N8CW 123, WB8JGW 122, WD8KBW 120, K8AN 114, WA8GMT 105, WB8DMF 98, W8OZK 93, W8JMD 92, K8DL 87, WB8MEK 87, KF8J 85, N8XX 83, KA8DJZ 82, KA8KFW 71, WD8DTG 68, W8TP 64, WB8WTS 64, N8AKS 63, W8MOK 55, KB8YS 52, WB8BHL 51, WD8OMP 51, WB8UBR 50, WD8RIB 47, WA8BUW 43, W8WEG 41, K8JA 37, WB8YTD 37, W8GGX 35, WA8MAZ 35, WB8TTQ 35, WB8YGW 35, W8EK 32, WD8OYO 32, WA8HGH 31, WD8PMW 31, WB8SIQ 30, K3RC 27, WB8QHV 26, WD8NEC 22, WA8SED 21, WD8AWM 19, W8UPD 18, K8YUW 18, WB8CJU 17, W8RG 17, N8CDQ 17, N8AUH 16, K8KWO 16, WA8MAZ 16, WA8RPK 16, N8AIB 14, W8BTRK 14, K8PYT 13, WA1QAA 13, KA8CDE 11, N8JR 11, K8CKY 10, WD8EMS 10, W8HVA 10, W8MGA 10, WB8MRL 10, W8ZM 10, W8IM 9, WD8JIK 9, WD8LZW 8, WB8QHU 8, W8CAR 7, WB8VLR 7, N8AHK 6, WB8PIY 6, WB8YUS 6, WD8EKI 5, WB8WRO 5, WA8BOV 4, K8JE 4, WD8MIO 4, WB8NHV 4, WD8OYK 4, WB8RUW 4, N4VY 4, WB8KRD 3, W8OQL 3, N8AJU 2, W8EDU 2, WB8NTR 2, N8CGA 1. (Dec.) K8SCH 143, K8BYR 97, K8BYS 70, W8ILC 29, K8DHK 8.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. vydareny, WB2VUK — SEC: KB2TM. STM: WA2SPL. ASCM: KB2KW W2IT K2AV. NM: W2WSS WB2IXP N2BDW WB2ZCM WB2EAG WA2SPL WB2HDU W2ZOJ. 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. PD3 results: overall — Dutchess, Putnam, West., Orange, Sull., Schen., Albany, Ulster, Col/Grn., Rens., Sar/WAR/Wash., Rock. Scores were quite close. For CMC award, Put, Orange, West. — first three. For accuracy, Orange, SAR/WAR/WASH, West. There was not that much spread between the scores. All did very well. Next month's column WILL have the results of PD4 from 15 March! W2IT is looking for additional comments as we hope to have this PD in its final format shortly. Attention all affiliated clubs! You should have your annual report forms by now. Please complete them and send them into ARRL ASAP! If you want the annual report, *you must send in the mailing label! BPL: WB2HDU* PSHR (Jan.): N2BDW W2BIW WB2EAG WA2EQW WB2HDU WB2IXR KB2KW WB2MCO WA2SPL W2YJR WB2ZCM. PSHR (Dec.): WB2IXR KB2KW WB2SON. Traffic: WB2HDU 684, WA2SPL 254, WA2JBO 160, WB2ZCM 154, WB2EAG 147, WB2MCO 98, W2BIW 90, N2BDW 83, N2JK 71, W2IQK 66, WB2IXR 54, WA2EQW 42, W2YJR 38, KB2KW 35, W2EFU 33, AA2Y 22, K2HNW 18, WB2SON 18, K2MI 16, WB2VVS 5, WB2ELA 2. (Dec.) KB2KW 119, WB2SON 26.

NEW YORK CITY — LONG ISLAND: SCM, John H. 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 WB2TOC Mgr; NLI Phone 3928 kHz 1815 WA2SEL Mgr; Nassau VHF 146.04/64 2100 M, W, Sun 2100 WA2SQE; Big Apple M-F 147.915/315 2000 KA2DBW; Suffolk VHF M-F 144.74/145.37 2030 N2BKK; NLI Ten Mtr Phone 28.710 2100 Tue, Th, Sat KA2GFU. All times are local. The Suffolk County is again sponsoring the FCC Amateur Radio exams at Stony Brook on May 9,

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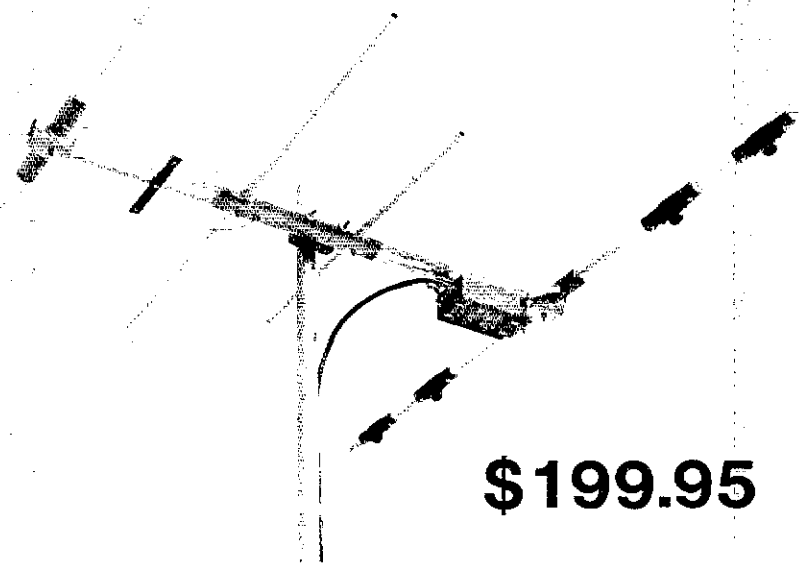

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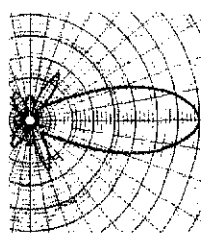

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Bands: 30-50, 118-136 AM, 144-174, 421-512 MHz.

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Bands: 32-50, 118-136 AM, 144-174, 421-512 MHz.

The *Bearcat* 300 is the most advanced automatic scanning radio that has ever been offered to the public. The *Bearcat* 300 uses a bright green fluorescent digital display, so it's ideal for mobile applications. The *Bearcat* 300 now has these added features: Service Search, Display Intensity Control, Hold Search and Resume Search keys. Separate Band keys to permit lock-in/lock-out of any band for more efficient service search.

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Get a coupon good for a $25 rebate when you purchase a *Bearcat* 300, 250, 220 or 210XL; $20 rebate on model 160; $10 rebate on model Four-Six Thin Scan and $5 rebate on the *Bearcat* 5. To get your rebate, mail this coupon with your original dated sales receipt and the *Bearcat* model number from the carton to Electra. You'll receive your rebate in four to six weeks. Offer valid only on purchases made betwen April 1, 1981 and May 15, 1981. All requests must be postmarked by May 30, 1981. Limit of one rebate per household. Coupon must accompany all rebate requests and may not be reproduced. Offer good only in the U.S.A. Void where taxed or prohibited by law. Resellers, companies, clubs and organizations–both profit and non-profit–are not eligible for rebates. Employees of Electra Company, their advertising agencies, distributors and retailers of *Bearcat* Scanners are also not eligible for rebates. Please be sure to send in the correct amount for your scanner. Pay the listed **CE** price in this ad. *Do not* deduct the rebate amount since your rebate will be sent directly to you from Electra. Orders received with insufficient payments will not be processed and will be returned.

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50 Channels • Crystalless • Searches Stores • Recalls • Digital clock • AC/DC Priority Channel • 3-Band • Count Feature.

Frequency range 32-50, 146-174, 420-512 MHz.

The *Bearcat* 250 performs any scanning function you could possibly want. With push button ease you can program up to 50 channels for automatic monitoring. Push another button and search for new frequencies. There are no crystals to limit what you want to hear. A special search feature of the *Bearcat* 250 actually stores 64 frequencies and recalls them, one at a time, at your convenience.

Bearcat® 220

List price $449.95/**CE price $289.00/$25.00 rebate**
Your final cost is a low $264.00

Aircraft and public service monitor. *Frequency range 32-50, 118-136 AM, 144-174, 420-512 MHz.*

The *Bearcat* 220 is one scanner which can monitor all public service bands plus the exciting AM aircraft band channels. Up to twenty frequencies may be scanned at the same time.

Not only does this new scanner feature normal search operation, where frequency limits are set and the scanner searches between your programmed parameters, it also searches marine or aircraft frequencies by pressing a single button.

Bearcat® 210XL

List price $349.95/**CE price $229.00/$25.00 rebate**
Your final cost a low $204.00

18 Channels • 3 Bands • Crystalless • AC/DC

Frequency range: 32-50, 144-174, 421-512 MHz.

The *Bearcat* 210XL scanning radio is the second generation scanner that replaces the popular *Bearcat* 210 and 211. It has almost twice the scanning capacity of the *Bearcat* 210 with 18 channels plus dual scanning speeds and a bright green fluorescent display. Automatic search finds new frequencies. Features scan delay, single antenna, patented track tuning and more!

NEW! Bearcat® 160

List price $299.95/**CE price $189.00/$20.00 rebate**
Your final cost is a low $169.00

16 Channels • 3 Bands • AC only • Priority Dual Scan Speeds • Direct Channel Access

Frequency range: 32-50, 144-174, 440-512 MHz.

Would you believe...the *Bearcat* 160 is the least expensive *Bearcat* crystalless scanner.

This scanner presents a new dimension in scanning form and function. Look at the smooth keyboard. No buttons to punch. No knobs to turn. Instead, finger-tip pads provide control of *all* scanning operations, including On/Off, Volume and Squelch. Of course the *Bearcat* 160 incorporates other advanced *Bearcat* features such as Priority, Direct Channel Access, Dual Scan Speeds, Automatic Channel Lockout, Scan Delay and Auxiliary. All this performance in sleek, contemporary styling. And at a price so low, it astounds even us!

Bearcat® 5

List price $134.95/**CE price $94.00/$5.00 rebate**
Your final cost is a low $89.00

8 Crystal Channels • 3 Bands • AC only

Frequency range: 33-50, 146-174, 450-508 MHz.

The *Bearcat* 5 is a value-packed crystal scanner built for the scanning professional — at a price the first-time buyer can afford. Individual lockout switches.

Bearcat® Four-Six ThinScan™

List price $189.95/**CE price $124.00/$10.00 rebate**
Your final cost is a low $114.00

Frequency range: 33-47, 152-164, 450-508 MHz.

The incredible, *Bearcat* Four-Six Thin Scan™ is like having an information center in your pocket. This three band, 6 channel crystal controlled scanner has patented Track Tuning on UHF. Scan Delay and Channel Lockout. Measures 2¾ x 6¼ x 1". Includes rubber ducky antenna. Order crystals for each channel. Made in Japan.

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Fanon Slimline 6-HLU

List price $169.95/**CE price $109.00**

Low cost 6-channel, 3-band scanner!

The *Fanon* Slimline 6-HLU gives you six channels of crystal controlled excitement. Unique Automatic Peak Tuning Circuit adjusts the receiver front end for maximum sensitivity across the entire UHF band. Individual channel lockout switches. Frequency range 30-50, 146-175 and 450-512 MHz. Size 2¾ x6¼ x 1". Includes rubber ducky antenna. Order crystal certificates for each channel. Made in Japan.

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List price $149.95/**CE price $99.00**

6-Channel performance at 4-channel cost!

Frequency range: 30-50, 146-175 MHz.

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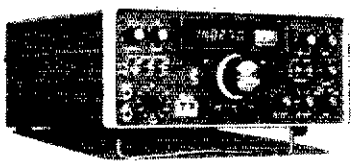

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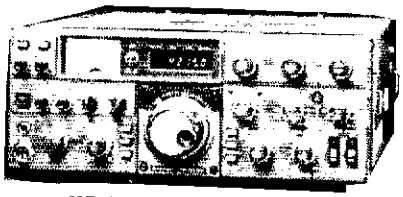
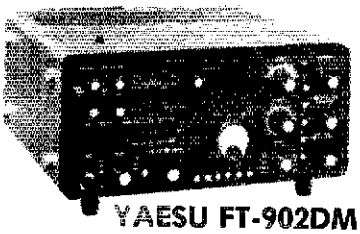
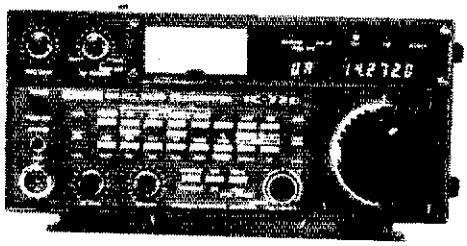


KENWOOD TS-830S



YAESU FT-902DM

DRAKE TR-7



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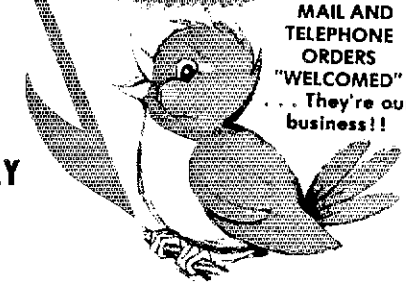

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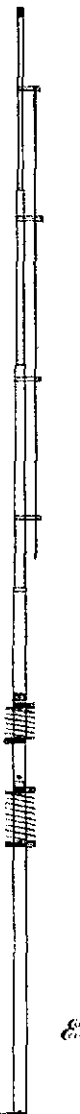

Only Butternut's HF5V-III with Differential Reactance Tuning leaves the entire antenna active on 10, 20, 40, and 80 meters! On 15 a loss-free linear decoupler provides a full unloaded quarter-wave conductor (with the ad-added advantage of decreased wind loading and lower center of gravity).

★ Compare active element lengths band-for-band for the HF5V-III and *any* multi-trap design of similar height; when it comes to SWR bandwidth, efficiency, and overall performance, there's really no comparison! And if your rig covers 160 meters, what other antenna offers six-band capability?*

★ No lossy traps or unsightly, wind-catching "top hats".

★ Useable on adjacent MARS frequencies with little or no adjustment.

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★ Easiest five-band vertical to assemble and adjust.

★ Sleek, trim design makes the HF5V-III "XYL approved" and requires no guying.

*With optional TBR-160

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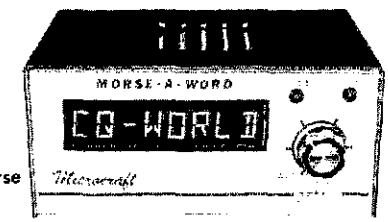

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please send 1980 610 forms only, along with s.a.s.e. to WB2QIY, cut off date is 15 April. XYL of WB2YUJ is now KA2EMF and Jr. Op is KA2EMH. WA2ZHA is at NYU Med Center undergoing tests, hope is all well. Please note there is now a slow speed net, NLS, on 3710 kHz at 1800 local. WB2EUF is Net Mgr. WB2DCJ is now the DEC for Suffolk County. LIMARC Flea Market is May 17, hopefully there will be an ARRL booth there, look for me there and stop by to say hello. New officers for HARC are W2TP, pres.; WB2DQP, v.p.; K2ILF, v.p.; WA2ZHA, secy.; K2RO, treas., WA2APT WA2WKV, dir. Officers for Suffolk County ARC are WB2QIY, pres., KA2T, v.p., AG2P, treas.; WA2UWF, corr. secy.; WB2TYN, rec. secy. Suffolk County ARC is holding a flea market on Sept. 13. Please remember that all station activity reports now go to me. I can usually be found on one of the nets. Also, I hope that everyone is making plans for Field Day, we will try to set up one or two sessions of NLI on emergency power for handling traffic. New LILCO ARES Net meets *Thursday 2000 local on 145.37/144.77. Traffic:* W2AHV 146, KA2CNN 101, KA2CRY 86, W2MLC 62, WB2TQC 53, WB2EUF 50, K2GCE 45, KG2S 24, KG2S 24, W2LWB 23, WB2IDP 21, KA2ELB 16.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, WA2MVQ — SEC: WB2VUF. STM: W2XD. NMs: N2CR N2BOP *W2PSU KA2GQQ W2TCA W2UEZ & WB2IOJ.*

Net	Mgr.	Freq.	Time/Days	Sess.	QNI	QSP
NJN/E	W2UEZ	3695	7 P.M. Dy	31	470	154
NJN/L	W2UEZ	3695	10 P.M. Dy	31	311	119
NJSN	WB2IOJ	3735	6:30 P.M. Dy	31		
NJPN	N2CR	3950	6 P.M. Dy	35	651	253
NJVN	W2TCA	49/49	10:30 P.M. Dy	31	331	99
OBTTN	N2BOP	72/12	8 P.M. Dy	31	745	164
UCETN	KA2GQQ	85/6857	30 P.M. Dy	31	317	80
NJRTTY	W2PSU	147.51	ATOSTART	31	40	36

The Northwest NJVN NM, N2BNB, reports 4 sess, 47 QNI, 7 QSP. Nice to get the "Ka-Chunker" report from JSARS and read: Monmouth County ARES is being reestablished with their first meeting being held at Fort Monmouth MARS bldg. Additional reorganizational information can be obtained from WA7DPK/2 or KA2GTE. All hands ALERT: NJ Superior Court has ordered K2AHL off the air due to a TVI complaint suit filed by a neighbor. The judge said he would ask the FCC to "suspend" K2ALH's license. So far it has cost K2AHL $7,000 and an appeal is estimated at another $10,000 and he is willing to continue the fight if there are indications that the amateur community is behind him. Metroplex Amateur Communications Assn reports a list of upgrades: Extra — KA2AYR WB2WMJ KB2RV WB1BZQ & WB2JST. Advanced — N2BSI WA2PWM KA2CEU & WA2MHQ. N2NY gave a live and taped demonstration of SSTV at the Feb meeting. The April meeting will feature KB2RV on "Videotape outakes" and WA2BGE will speak on "China, reawakening," illustrated with slides. Holmdel ARC reports their 440 repeater is now on the air on 443.125/448.125 MHz. BARA reports the following *upgrades: Extra — WA2RHQ; Advanced —* N2BQP N2ATL and N2BGU. The following are new club officers: K2TM, pres.; KB2EI, v.p.; WA2INW, secy.; WA2ASC, treas. Their hamfest will be Sun, April 5, 1981, at the Bergen Community College. The Ramapo ARC reports: the club is sponsoring a VHF QSO party from 1800Z March 28 until 0400Z March 30. Exchange signal report and ARRL section. One QSO point for each 50-144 MHz contact, two points for 220-430 MHz contacts, and 3 points for 1215 MHz and up. Multiply by the sum of ARRL sections per band. Rules are the same as for ARRL VHF QSO parties, except fm operation not permitted below 450 MHz. Use ARRL VHF QSO party or similar forms; or send s.a.s.e. to RAMARC for entry forms. Mail by April 27 to Ramapo Mountain ARC, P.O. Box 364, Oakland, NJ 07436. *W2UEZ received the WB2VEJ* Memorial Award for 1980 service to 2RN. KB2TY says thanks for all the get well QSLs. Old Bridge Radio Assn. held its annual supper party in Jan with 150 guests attending. W2XD appointed 2RN/C2 Asst. Mgr. and assigned TCC slot by N2YL. WA2MVQ attended a meeting *in Dallas and had an eyeball with K1WGA. WA2MVQ is* retiring from Roche Labs after 20 years service. N2BNB has a Lunar 2-mtr amp so he can work the 49/49 traffic rptr. WB2KLF now an ARRL Life Member. KA2ERG will head dozens of hams to help with Boys' International Soccer tournament in Westfield during Memorial Day *weekend. Morris County Office of Emergency Manage*ment now has RTTY on WR2ANF. Split Rock ARA has received and accepted the proposal to link with WB2LCC rptr in SJJ. Traffic: (Jan.) W2UEZ 256, K2VX 201, KF2T 199, AG2R 152, AF2L 132, W2XD 127, KA2CYZ 112, WA2MVQ 110, N2BNB 91, KB2HM 78, N2BOP 63, WA7DPK 47, WB2KLF 46, KA2HNQ 39, W5DTR 29, WB2RMJ 28, N2SU 27, K2WM 26, N2AYJ 22, KB2TY 22, N2BQL 21, W2UH 19, N2BC 16, WA2CLP 15, WA8ZNH 15, KA2IFX 14, W2CC 12, WB2RLO 11, W2NKD 8, WB2AIU 4, W2ZEP 2. (Dec.) KA2FXA 26.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, K0CY — SEC: W0RPK. STM: KA0X. NM: WB0AVW W0YLS WD0HND. Spring is *here and it appears many PR projects are being planned.* QSP is the new publication from the Iowa City clubs. New RC net with W0UIZ on 7235 Sun mornings at 9:30. Welcome KF0F and KA0BBO as new OBS of the section team. New Novices in Des Moines: KA0s JVJ JVK JVL JVM JVN JVO and JVP. Recognition to upgrades N0AOE K0RAJ W0ZPM KA0GSC KA0GZU KA0HYM KA0JGB. New OSCAR stations heard: AK0P WB0URA. Mt. Pleasant officers for 1981: WB0VHB KA0BTE WD0ENR WA0KLD. Des Moines officers: K0PCG KA0ILR WD0GRT W0ANZ N0BDF. I do appreciate the support of ICN and ITEN. ITEN is a good way to contact section officials. ICN is a valuable training net, keep up the good work. Support the efforts of the SEC and ECs in the preparation of the storm season, we need your help. CAND represented by WA0AUX 100% again. TEN reports 100% representation by W0SS W0YLS AE0R KA0X WB0UPF K0GP N0SM W0FO, W0AIX planning an Amateur Radio seminar with Iowa State. Net reports:

Net	UTC/Days	Freq.	QNI	QTC	Sess.
75 Phone	1830 M-S	3970	1298	41	27
75M Phone	2330 M-S	2330	1197	48	27
TLCN	(0030-0400) Dy	3560	406	115	62
ICN	0100 TThS	3513	48	8	12

Traffic: WA0AUX 284, W0SS 143, W0YLS 87, KA0X 86, K0GP 79, WB0KHO 71, AE0R 58, N0SM 44, K0CY 41, WB0QAM 27, WB0UPF 24, WB0AVW 21, WD0CON 16, W0LFF 16, W0BW 14, AI0K 12.

KANSAS: SCM, R. M. Summers, K0BXF — SEC: W0KL. NMs: W0OYH W0FT. Midwest Division Convention Oct 3 and 4, 1981, at Salina. Put it in your date book and be sure and attend. Contact WD0BNC for more informa-

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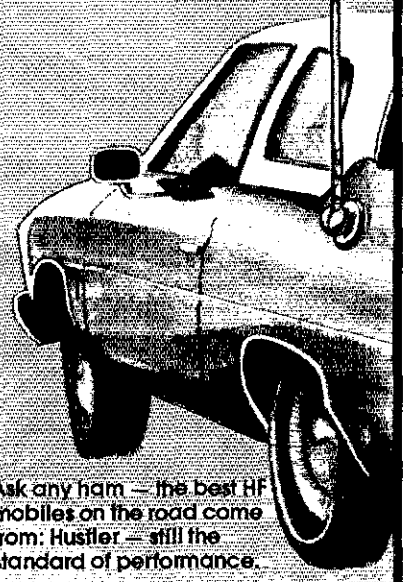

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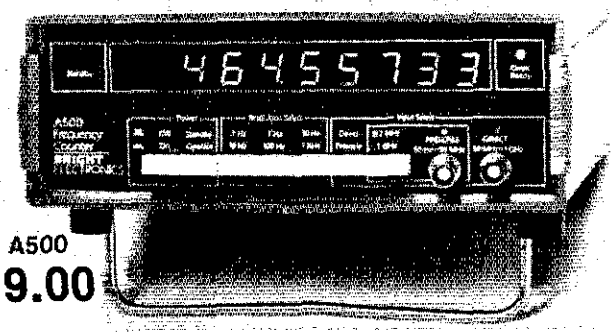

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Resolution (least available gate times vary) 50Hz-50MHz 50MHz-500MHz 500MHz-1100MHz	1Hz 10Hz NA	1Hz 10Hz 100Hz
Accuracy over Temperature (short term)	1 PPM 17°C -30°C.	1 PPM 17°C -30°C.
Sensitivity 50Hz-50MHz 50MHz-500MHz 500MHz-1100MHz	1-10MV 10-50MV NA	1-10MV 10-50MV 50-100MV
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6. Have you had any previous losses during the past three years? If so, please give details.
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Description (Including Manufacturer's Name, Model and Serial Numbers or Other Identification)	Purchase Price $	Replacement Cost $

8. To figure your premium complete the following:
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   - Total amount of Insurance $_____
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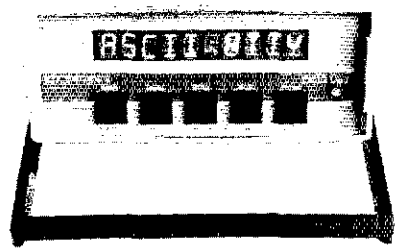

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tion. Kansas WX Net report for Jan. QNI 1099, QTC 554. Kansas Phone Net QNI 335 and QTC 17. Kansas CW Net QNI 347, QTC 131. Kansas Sideband Net QNI 1432, QTC 107. Many thanks to the few new signals we are hearing in the NCS spots of late. Those of you who have not dared yet take the plunge — JUMP. It is worthwhile. Still looking for more cw activity — 3610 kHz is the spot any evening about 7 or 10 P.M. How about that manager spot for a slow speed net, it's not filled yet. Congrats to WØRT for placing 2nd in the 1980 ARRL September QSO party. Congrats also to the new officers of Wichita ARC for '81: AKØE, pres.; WBØOCK, vice pres.; WDØDSX, secy, WDØHAG, treas.; WBØZNK, prog. chmn. Was also sorry to hear of the passing to Silent Key rank WA4SGN of Wichita, Tech-Ni-Chat Club, also of Wichita, elected WAØTNS, pres.; WAØNGV, vice pres.; KØKCH, treas.; WBØOSF WAØSPL WDØDSX as bd mem. Traffic: (Jan.) WØOYH 151, WØHI 99, WØAM 94, WØIT 79, WDØACG 72, WAØLBB 71, WØFIR 66, WBØYLP 49, KØBXF 49, WØCHJ 31, WØFDJ 19, KØYTA 11 WØRBO 9, WØPB 5. (Dec.) KØFZ 177, NØBLD 5.

MISSOURI: SCM, L. G. Wilson, KØRWL — Asst SCM: WØOTF. New officers for the Eastern Ozark Amateur Radio Club are : WBØPUK, pres.; W6RP, vice pres.; WØFWY secy.; WBØUEB, treas. Congratulations to WBØOSW on his retirement after 45 years from the First National Bank in Kansas City. Thanks to NØLO and KAØCBW for their help with the MEOW Net.

Net	QNI	QTC	Net	QNI	QTC
ACE	46	1	MOSSBN	842	78
NEMOE	146	1	MON (DEC)	240	361
HBN	387	26	MON2 (DEC)	181	134
MEOW	320	16			

Congratulations to the following upgrades: General — WAØZIF; Advanced — KAØAVG. I am in the process of making out all new appointments and endorsements. They should be in the mail soon, but it is a slow-moving job, so please be patient. We have a new STM in the person of WBØLFY and need a volunteer for SEC. WBØFKY resigned due to personal reasons and I would like to thank him for a job well done. Our deepest sympathy to the families and friends of WØDVC WØTNW and WØMCL who joined the ranks of the Silent Keys. Traffic and net reports need to be sent to the STM prior to the 11th of the month. Traffic: KØONK 754, WØBMA 312, WØOUD 198, KØSI 98, KØBM 78, KØPCK 53, NØSS 42, WØOTF 41, KAØP 36, KAØE 20, KØRWL 10, WAØZWP 9, WAØKUH 8, NØSFP 5, WAØEMX 5, WBØLFY 3.

NEBRASKA: SCM, Shirley M. Rice, KAØBCB — NE Section looking for 100% participation in the radiograms to Am Red Cross Centennial. WØEWO became a Silent Key in Feb. WBØSXN elected pres N. Platte RC, WDØEGK pres Lincoln ARC. WØWKP received 1980 Jerry Cox Mem Award, WDØFJG upgrade to Adv, KAØEQE to Gen, KAØGCE to Tech. WAØDXY on new Kenwood. WDØBOD on new 6-Mtr gear. Hats off to WØFOB for 894 QTC for Midwest DX QSL Bureau in 1980, WDØCID es WDØBOG for 92% participation cw TEN. FB guys! Any brass pounders to help make it 100%, try 3579 kHz Dy 0145 es 0330 UTC. "Try it, you may like it". All news from your clubs and areas most WELCOME! Traffic: WØFQB 272, WDØCID 234, KØBRS 109, KAØBCB 82, WDØBOG 69, WØEUT 66, WBØSXM 52, WDØAHV 37, NØAJO 23, WØZN! 22, WØNIK 12, WBØSGB 12, WAØCEX 11, WBØGMO 10, WAØDXY 9, WBØGWR 7, WBØSXN 5, WAØPCC 4, WØWZR 2.

NEW ENGLAND

CONNECTICUT: SCM, Stan Horzepa, WA1LOU — SEC: W1SY. STM: KA1KD. Asst SCM: WB1AIU.

Net	Freq.	EST	Sess.	QTC	QNI	NM
CN	3640	1900 + 2200	62	335	425	K1EIR
CPN	915/315	1800/1000 Su	31	93	282	WB2PJU
NENN	3720	1815	31	70	118	WB1CPF
NVTN	28/88	2130	30	74	369	WA1ELA
RTN	13/73	2100 M-Sa	22	81	192	WB1CPF
WCN	78/18	2030	31	89	424	W1DPR

High QNI CN: K1EIR WB1ESJ AK4L WB2PJU; CPN: K1AQE WB1GXZ WA1WQG. High QTC Nutmeg: KA1DZV. Former SCM, Bill Pace, W1ID/W1ILV, passed away leaving a great gap in the Amateur Radio community. W1ID was always willing to lend a hand to Novice and veteran alike; he will be missed. State Representative KA1KC has introduced House Bill 8235 which would limit town ordinances that overly restrict ham radio antenna heights; contact your legislators and ask them to support the bill. The Connecticut Phone Net has moved to two meters, courtesy of the Amateur Radio Educational Association's (AREA) repeater on 147.915/315 MHz. New appointees: W1DPR NM WESCON, WB2PJU NM CPN, KA1BHT ORS, K1EUW ORS, WB1GXZ ORS. The 4th Annual PVRA Flea Market will be held on May 3 at Penny High School in East Hartford; contact K1NFE for details. New officers of the Meriden ARC: WA1VHR, pres.; WA1TRY, v.p.; K1LHO, treas.; KA1FGI, secy. Upgrading: Extras N1API and KA1ML, Advanceds WB1FYN and WA1TTC, and 42 Novices via Bethel Middle School ARC! The South Meriden Amateur Group Roundtable meets Sundays at 1900 on 28.710 MHz. Want to talk to your SCM?...WA1LOU checks into CPN most evenings and will gladly QSO with you after the net. And spring sprungeth! Traffic: WB1CPF 313, W1EFW 275, WB2PJU 222, K1GF 221, K1EIR 158, AK4L 138, WB1ESJ 132, WB1GXZ 107, KA1BHT 94, KA1DZV 93, WB1DN 64, W1OD 63, W1XX 53, K1XA 46, WA1WQG 45, K1AQE 41, WB1CRH 34, KA1KP 29, K1OQG 28, KA1KD 25, W1KV 19, K1CE 16, K1EUW 11, WB1ASH 7, WA1LOU 7, W1CUH 3, W1IGF 2.

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	425	337
EMRIPN	KA1BJY	3.898	1730/Dy	404	252
EM2MN	KA1CGP	90/30	2000/MWF	282	73
EM2MN	KA1CGP	145.8	2000/TTh		
NEEPN	K1BZO	3.945	0830/Su	61	16
HHTN	K1BSO	04/64	2230/Dy	474	170
EMRISS	N1BHH	3.715	2030/Dy	163	50

Still nothing much to report on the license plate fee reduction legislation. I talked with Rep Mike Rea and he said a number and committee should be assigned soon. He did say that he has been getting a lot of calls from other reps on the bill, so he is enthusiastic about it. At the hearing we will need reps to get up and support our bill, so keep after your rep. If you need to know who he is, let me know. Quannapowitt Club had WA1MTS present his slide show on his trip to Israel and the Holy Land. Middlesex Club member K1CEI learned that his family in Italy was okay after the earthquake. How'd he get the info? 10 and 20 meters, how else. The Massasoit Club didn't have a meeting in Dec. they had a potluck

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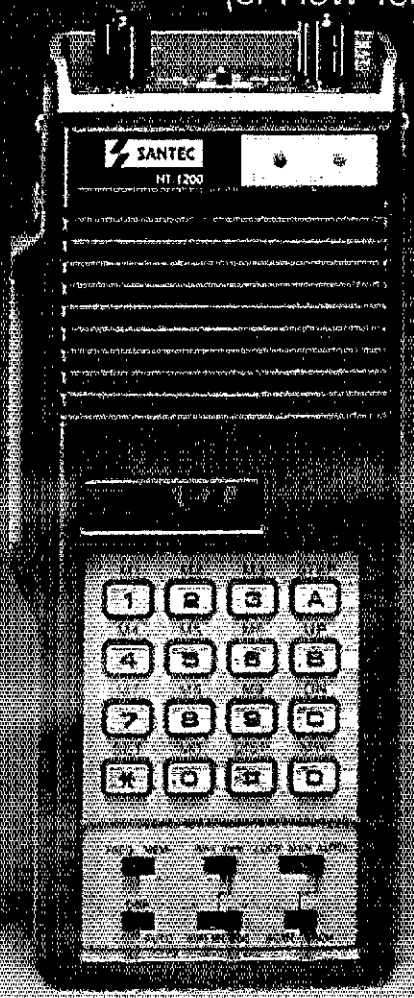

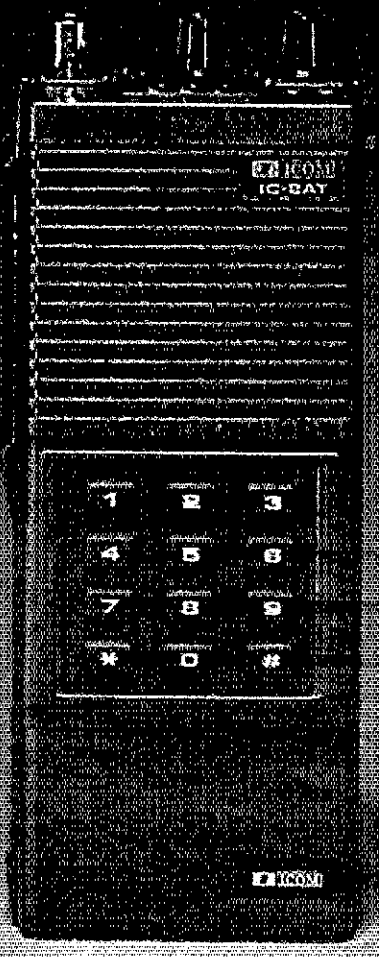

It's a little unfair to compare the features of the ICOM IC-2AT to those of the SANTEC HT-1200: the ICOM doesn't even claim to offer the big rig features that are packed into the SANTEC. This is really like comparing apples and oranges, but a quick match-up of features may surprise you if your biggest concern is cost. If you like the little extras you can buy for the IC-2AT, you'll love the SANTEC ... it actually delivers more for less.

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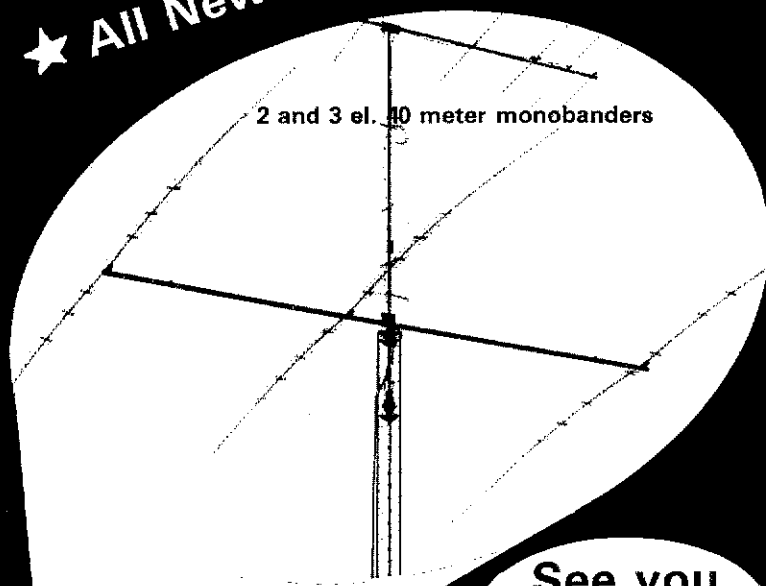

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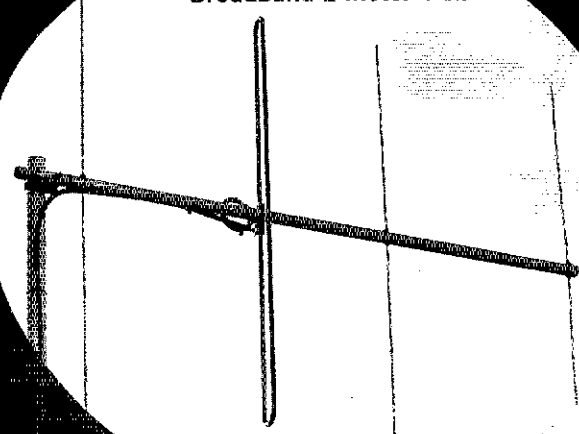

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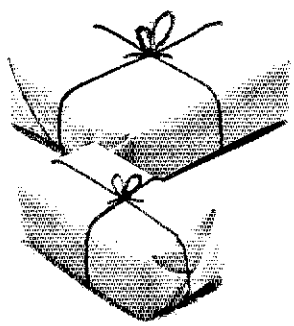

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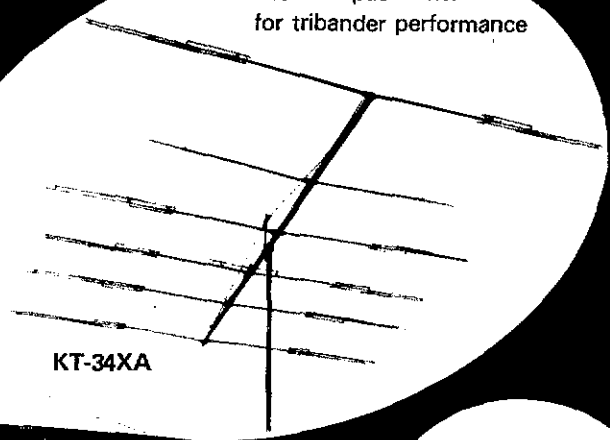

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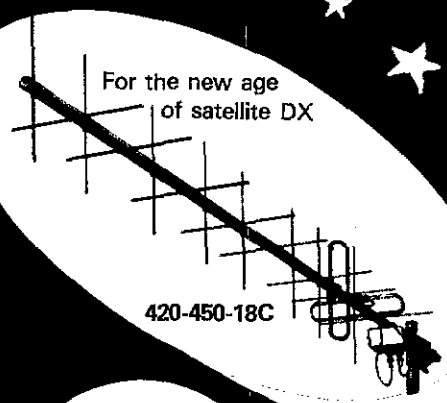

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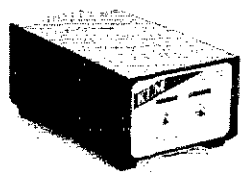

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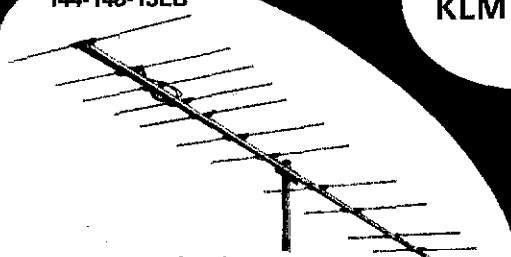

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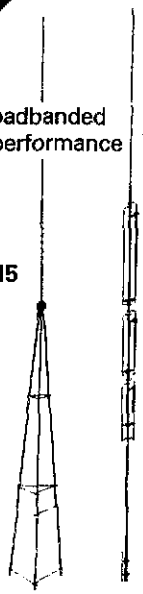

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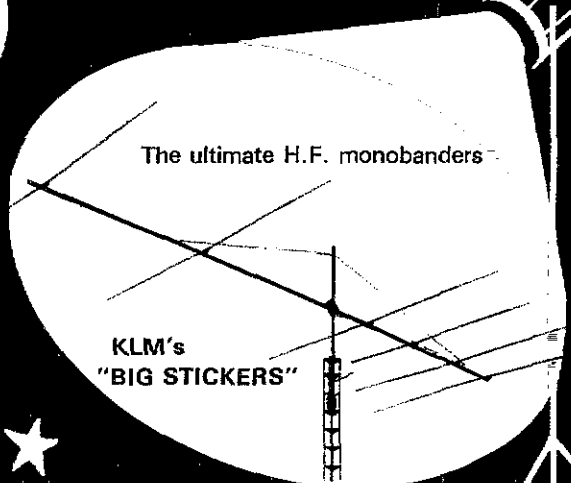

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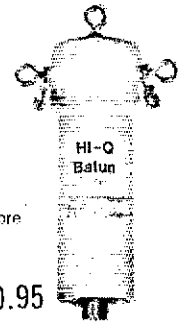
HI-Q BALUN



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- Replaces center insulator
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- For full legal power and more
- Helps eliminate TVI
- With SO 239 connector

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Replaces center insulator

Handles full legal power and more

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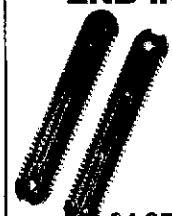
HI-Q ANTENNA END INSULATORS



Rugged, lightweight, injection molded of top quality material with high dielectric qualities, and excellent weatherability. End insulators are constructed in a spiral unending fashion to permit winding of loading coils or partial winding for tuned traps.

May be used for

- Guy wire strain insulators
- End or center insulators for antennas

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- Construction of antenna loading coils or multiband traps

Patent No 4 091 359

DIPOLES

MODEL	BANDS	LENGTH	PRICE WITH HI-Q BALUN	WITH HI-Q CENTER INSULATOR
Dipoles				
D-80	80-75	130	$28.95	$24.95
D-40	40-15	66	28.95	24.95
D-20	20	33	24.95	20.95
D-15	15	22	22.95	19.95
D-10	10	16	22.95	18.95
Shortened dipoles				
SD-80	80-75	90	41.95	37.95
SD-40	40	45	28.95	24.95
Parallel dipoles				
PD-8010	80,40/20,10/15	130	49.95	39.95
PD-4010	40,20,10/15	66	34.95	29.95
PD-8040	80,40/15	130	35.95	31.95
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Dipole shorteners - only, same as included in SD models				
S-80	80-75		$11.95/pr	
S-40	40		$10.95/pr	

All antennas are complete with a HI-Q Balun or HI-Q Antenna Center Insulator. No. 14 antenna wire, ceramic insulators (50' nylon antenna support rope (SD models only 50) rated for full legal power. Antennas may be used as an inverted V and may also be used for MARS or SWLs.

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supper. Great idea! Sturdy Memorial Club sponsored a Civil Defense meeting in Attleboro which was attended by 16 hams and c.d. officials. Norwood Club graduated 8 from their Novice class and is planning a banquet. Glart Club reminds us that the FCC is using a new 610 form and all new applications must be on this form. ARRL has some or contact Boston directly. Chelmsford CLub got a tour of the Milstone radar site in Westford. Billerica Club had talks by members W1IHN (CROWBARS), WB1DFV (ARES) and W1CLF (portable 2 el 2-mtr beam). Mitre Bedford Club received a nice letter from member K1ED who is presently in Greece and getting in his share of DXpeditioning. Wellesley Club was active as a club in the Jan VHF Sweepstakes. EMRIPN mgr, KA1BJY, in his newsletter, reminded us traffic handlers what a great job W1EOF (SCM RI) has done on the net, particularly in recruiting RI members. He is retiring as SCM but not from the nets — thank goodness. Instead of a club newsletter, the 1200 Club meets on 72/12 Tues nites. W1NF still working W1MZ/MM all over the world. W1GXT got his 4-250B going on 10. WB7TPY gave talk to Boston Red Cross on ham radio. Traffic: (Jan.) WB1DHW 734, WA1TBY 360, KA1CMR 243, KA1BJY 193, NB1M 79, W1DMH 78, WB1EZT 58, WB1GWS 56, KA1CGP 53, W1ATX 50, W1XA 44, WA1DXI 29, KA1MI 20, WB7TPY 19, K1BZD 14, W1PJ 12, WA1FNM 8, KA1CC 5, K9HI 4, KA1R 3, W1LE 2. (Nov.) KA1BJY 234.

MAINE: SCM, Cliff Laverty, W1RWG — STM: W1BJ. SEC: KL7IJG. W1BJ has been appointed STM effective Feb 1. W1KX has been appointed net manager of PTN to succeed W1RWG who needs to devote more time to SCM. Ellsworth Amateur Wireless Assn elected K1ROG, pres.; W1BJ, v.p.; W1CCN, dir.; KA1BRA, secy. KL7IJG gave an effective talk and demonstration of ham emerg radio at Androscoggin Radio Club. Yankee ARC successfully provided comms for Tri-State Road Rally utilizing Streaked Mtn, Mt Washgtn, and simplex. PSHR: W1RWG 108, AK1W 100, AF1L 75, WA1YNZ 68, W1BJ 66. Sess/QNS/QTC: CMEN 9/141/13, SPSN 5/38/12, SGN 27/1292/145, MSN 13/98/15, AEN 4/58/2, PTN 31/405/155, RACES 4/48/25, BN 27/952/0. Traffic: W1RWG 142, W1BJ 125, W1KX 110, WB1BYR 102, AK1W 91, AF1L 60, W1HDC 59, W1JTH 40, W1AHM 38, K1TVT 25, W1BMX 22, WA1JZP 18, KA1EKT 15, N5YX 10, KA1AIF 9, KA1CFU 9, KA1ENL 8, WA1ZJL 7, W1OTQ 3, W1CTR 2, WA1MUX 2.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — STM: W1TN. SEC: AK1E. NMs N1NH & K1OSM. Coos County EC, K1OIQ, says his major activity is keeping Mt. Washington repeater on the air. WB1HJO setting up SSTV on 2 meters. WA1HMO now Extra with new Apple computer. W1BYS met several Florida hams that square dance. The Nashua Area Radio Club held another outstanding mall show. Theme was. ASK ABOUT AMATEUR RADIO. Seen on Hyways: K1MRK & WB1EFX. The Hoss Traders Deerfield extravaganza will be May 9. New editor of Nashua ARC paper will be KA1FPT. K1OX contest station is ready for ARRL DX tests. N1AYT WB1HMO WA1YIO & WA1YNJ now Extra. Club officers Concord Brassbounders: W1VVX, pres., KA1AUK, vice pres.; WB1DXN, secy/treas, W1JY is on RTTY. KA1AUA now General. K1NOR is on SSTV. W1AQO is enjoying retirement. Congrats to AK1E, the new SEC, & K1OSM, new NM for GSFM Net. Spring is on the way — cheer up. Happy Easter to all. Traffic: W1TN 224, AK1E 200, N1HH 190, W1GUX 176, KA1CXP 143, KA1BJ 95, K1OSM 90, K81A 85, W1MHX 41, N1ALM 31, W1CUE 22, KA1BBI 18, W1ALE 12, KA1CJI 9, W1NH 7, K1NH 2.

RHODE ISLAND: SCM, J. Titterington, W1EOF — WA1OSL, NM, reports RIEM 2-Mtr Tfc Net had 22 sessions, QNI 182 and QTC 35. Election time at clubs — new officers at W1AQ: KA1MO, pres.; WA1CVF, vice pres.; WA1LAD, secy.; W1DK, treas. At Hope Valley: KA1CDW, pres.; KA1ABI, vice pres.; N1AGG, secy.; KA1CQQ, treas. At PRA: N1AKO, pres.; K1DT, vice pres.; W1GS, secy.; WA1TAQ, treas. Congrats to all. N1ASR is now Extra with new call KB1G. W1YNE busy with Florida State Fair tfc on 20-mtr RTTY. WA1YUH is in hospital again. To our new hams, find and join your local club — as you move along toward your upgrading, a club can make the road a lot smoother. If you cannot find a club, contact this station. Traffic: W1EOF 328, KA1FE 144, KA1FBR 65, N1RI 21.

VERMONT: SCM, Bob Scott, W1RNA — STM: WB1ABQ. SEC: W1VSA. This month has been very low in receiving inputs from various clubs, nets, and individuals on various activities. Must be the below normal temperatures have kept everyone close to the fire. It has been noticed there have been a few more showing up on various nets. VTN on 3614, 1900 local, nightly, would like to have a few more ONIs. GMN 27/555/60; SSB 31/537/85; Carrier 27/414/52; RFD /84/12; VTN 31/81/10; VPN 4/70/4. WB1CZE had rig problems that kept him off the air most of the month. K1BQB is back in full swing. W1KOO, rptr, having southernly exposure problems! Traffic: WB1ABQ 69, K1BQB 69, N1ARI 61, W1RNA 17, AE1T 13, WB1CZE 2.

WESTERN MASSACHUSETTS: SCM, Art Zavarella, W1KK — ASCMs: W1BVR K1BE. STM: W1TM. SEC: W1JP. NMs: W1UD W1UPH. New ORS: K1BE; OES: W1UPH. Milestone 60th anniversary award QCWA #211 to our venerable W1BVR. New hilltopping by W1ZPB with 2-m HT from NE skitops. KA1EBA will be missed from WMTN due to work sked, but WB1FXJ fills in nicely. W1WF tribander frozen west 'til spring. W1EFC busy with phone nets but keeps his area south of Worc. in good tfc condx. WA1ITL making more frequent, welcome visit WM Phone Net. PSHR: WB1HIH 104, K1JHC 91, W1TM 70. Traffic: W1TM 218, K1SSH 174, W1UD 144, WB1HIH 143, K1JHC 82, W1KK 72, W1JP 65, WA1YYW 61, W1EFC 32, K1NWE 28, WB1FXJ 24, W1YI 19, K1BE 12, W1UPH 11, W1ZPB 11, WA1DNB 7, W1BVR 5, WB1DBN 4.

NORTHWESTERN DIVISION

ALASKA: SCM Fred S. Wegmer, KL7HFM — ASCMs: AL7AC KL7IBG. SEC: KL7EWO. STM: AL7O. The Alaska Section congratulates the Juneau EC on his additional appointment as assistant director for Alaska. KL7CQ given a clean bill of health from a recent cardiac bout. KL7DG reports extensive QRP activity daily 2400-0400 UTC 21.060 MHz. KL7L doing a fine job managing TCA, but she needs help, so anyone who can meet TCA skeds please give her a call. AL7AW & AL7O report progress on a new 2-mtr repeater in Tok. Should give excellent coverage over parts of the Alcan Hwy in Alaska and some in Canada. KL7IBY sez the new Div of Emerg Svcs office in Wasilla shud be back on the air this summer in grand style. Most hearty congrats to KL7FD and crew for a fine Iditarod job this year. KL7JIG at the helm of the Anc ARC reports a new IRS tax status which shud make

Announcing the Heathkit VF-7401
2-meter FM Digital Scanning Transceiver

Optional Micoder II Microphone/Auto Patch Encoder lets you phone through repeaters with auto patch input. Draws power from the 7401, so no mike battery is necessary.

The Squelch Control also functions as the receiver's sensitivity control to stop scanning only upon reception of "full-quieting" signals, skipping the weak ones.

The 100 kHz Selector button controls the VF-7401's tuning in 100 kHz increments. **The 7401's 1 MHz Selector** button lets you choose any 1 MHz segment of the 2-meter band.

The 10 kHz Selector advances in 10 kHz steps. In Scan, as it recycles from "9" to "0," it also causes the 100 kHz readout to advance by one digit. Depress once to resume scan function.

LED indicates 5 kHz position.

The 0 kHz/5 kHz Switch gives you an effective choice of 800/2-meter channels in 5 kHz steps.

Dim/Bright Switch for bright illumination of frequency read-out and meter for daytime, and lower intensity for safe mobile operation at night.

The Manual/Scan Switch lets you choose your frequency manually, or have the VF-7401 find an active channel for you.

Lock/Latch Switch. In Scan Latch mode, a channel latch-up signal inhibits scan circuits when signal is detected, and the 7401 stays on that frequency. If it detects a 4-8 second break in received signal, scanning resumes. In the Scan-Lock mode, once the receiver scans to a signal, it remains on that channel until reset.

More features that make the VF-7401 the 2-meter rig that belongs in your shack and vehicle

No more searching through repeater guides while mobiling in unfamiliar territory – your new Heathkit VF-7401 will find the active channels for you. It will even alert you to band openings. You're going to enjoy building your VF-7401... and you're going to love using it. The VF-7401, the ultimate 2-meter rig... from the more than 200 Hams at Heath.

- Adjustable, 15-watt (nominal), solid-state, narrow-band FM Transceiver. Fully synthesized digital circuitry provides full-band coverage without need for added crystals.
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- "Power-up" on a pre-programmed frequency of your own choice, such as your favorite repeater.
- Convenient detachable mike using 4-pin connector.
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- Sturdy SO-239 rear-panel antenna jack.
- Chassis-mounted power and external speaker plugs.
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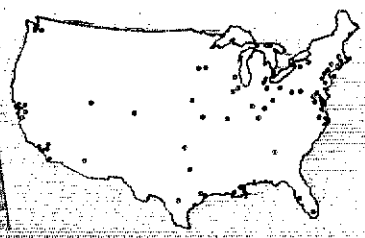

The new VF-7401 is featured in the latest Heathkit Catalog. For a free copy write: Heath Company, Dept. 009-764, Benton Harbor, MI 49022. Or visit the nearest Heathkit Electronic Center in the U.S. or Canada where Heathkit products are displayed, sold and serviced. See the white pages of your phone book for location. In the U.S., Heathkit Electronic Centers are units of Veritechnology Electronics Corporation.

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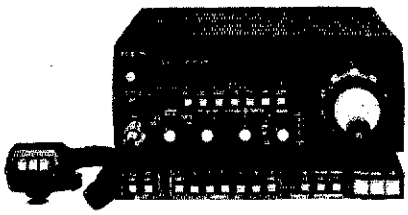
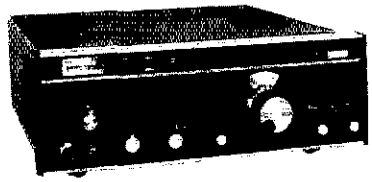
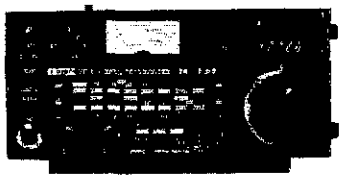


YAESU

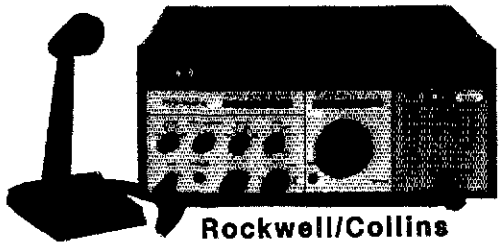
FT-101ZD, FT-107M, FT-480R, FT-707, FT-720RU, FT-720RVH, FT-902DM



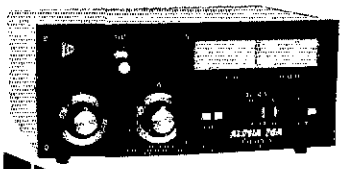
DRAKE TR-7 & R-7
L-7 2KW Linear Amplifier



ICOM Model -720



Rockwell/Collins
KWM-380



ETO Alpha 76PA
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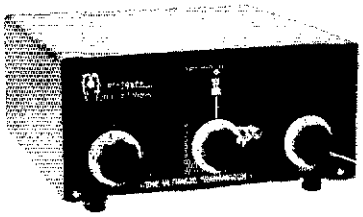

Murch Model UT2000B

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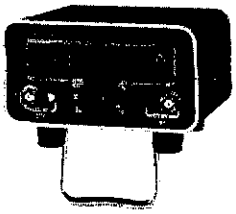

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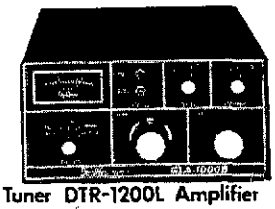

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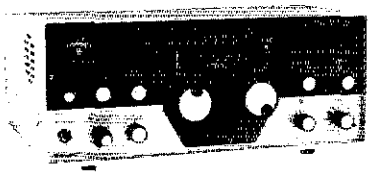

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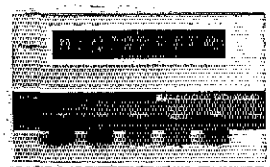

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Most advanced RTTY systems on the market are designed for multiple applications. As a result these systems are burdened with options and features which are seldom used in amateur radio. These features add to the cost, complicate operation and in some cases even compromise performance.

The 800 does not attempt to double as a hobby computer or a timeshare terminal. It was designed expressly for use as a specialty mode communications terminal for amateur radio, and nothing else. By focusing our attention on this simple concept, we are able to provide a product which works better, costs less, and is easier to operate than those systems which try to do "everything" and end up doing nothing very well.

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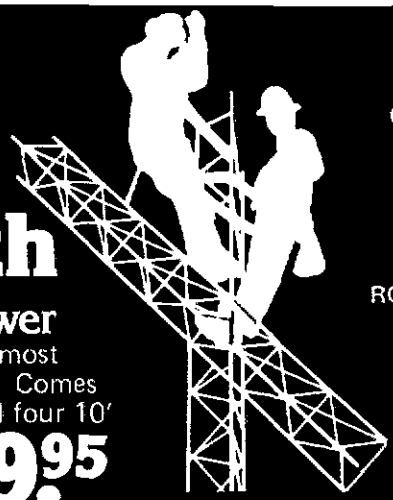

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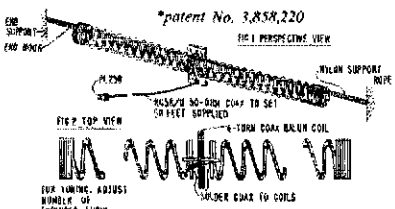

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IDAHO: SCM, Lem Allen, W7JMH — Congrats to new Pocatello Club officers: WA0PYU, pres.; KA7ASY, v.p.; WB7PTX, secy.; N7DN, treas.; W7ONL, ce. The Boise Club also has new officers: W7SC, pres.; WA7NNH, secy.; WB7ERP, treas.; WB7QET W7YUX AF7L WA7ESU, dir.

Net	Freq	Time	Sess.	QNI	QTC
FARM	3935 ssb	7 P.M. Dy	29	1481	12
CD	3990 ssb	8:10 A.M. M-F	22	627	4
IMN	3635 cw	8 P.M. M-F	22	249	81
MINI-CASSIA	146.52/52 fm	8 P.M. Sa	4	17	0
Harrison	146.40/147.00 fm		4	105	0

Have the telephone numbers of the following officials handy so that you can act quickly in an emergency: sheriff, police chief, fire chief, Red Cross, Salvation Army and any other agencies that might need notification *in your area. Traffic:* W7GHT 263, K7JV 94, W7JMH 16.

MONTANA: SCM, Robert Leo, W7LR — Enjoyed annual Butte ARC dinner in Walkerville. After April 1st, send your SCM reports to Les Belyea, N7AIK, Box 327, Belgrade MT 59714, to reach him before the 7th of each month. See articles in recent World Radio News about MT XYL hams: W7QYA, WB7UTJ. IMN QNI 249, QTC 81. Big Sky 40-mtr Net QNI 193, QTC 12, 2-mtr ARES Net QNI 49. Missoula area VHF officers: KA7DDV KB7F K7IMZ W7PX WA7VTT W7CJB. Expect 37/97 on Union Peak in Feb. K7WNE leaving for Minneapolis. WB7DZX again PSHR. K0PP on program at Seaside Convention. K0PP W7HAH made 160 mtr WAS. MTN Dec QNI 966 QTC 167. New Capitol City (Helena) ARC officers: KA7M W0OML N7AQW. OTH is Box 511, Helena, 59624. Traffic: (Jan.) WB7DZX 111, W7DEO 83, W7NEG 13, W7DB 4, W7LR 4, W7LBK 2. (Dec.) W7TGU 800.

OREGON: SCM, William R. Shrader, W7QMU — SEC: K7OLN. STM: W7VSE. Section nets:

Net	Time/Day	Freq.	QNI	QTC	NM
BSN	*0145Z Dy*	3908	919	52	K7WPC
OSN	0230/0600Z Dy	3587	473	378	KB7JW
OARES	0115Z Dy	3993.5	559	169	W7HLF
	0230Z Dy	3993.5	88	14	
WCN	0300Z Dy	3706	385	180	K7ZIG
PTTN	0300Z Dy	147.76	661	143	W7LRB
PdxARES	0330Z Dy	147.32	798	40	K7WWR
LBLARES	0330Z Dy	146.79	902	10	WB7QQH
SO ARES	0315Z Th/Sa	146.94	249	34	KA7DBS
SO FM	0230Z Tu	146.6	112	3	W7FDU
MPARES	0300Z Tu/Th	147.02	125	2	WA7ZAF

BSN broke its activity record during Dec. Great Work K7WPC and gang! New officers of Salem ARC are: K7AHT, pres.; KA7CUI, vice pres., KB7CT, secy.; KA7CKC, treas. New officers of SORC, Grants Pass, are: WA7ULK, pres.; KA7GZG, vice pres.; W7CPV, secy.; KA7BRN, treas. Good Luck!! New Novice: KA7IMH. Upgrades: WB7CBH (Adv) and KA7GHR (Gen). JCARES Net now called Southern Oregon ARES Net reflecting coverage changes. MPARES Net late totals Dec: QNI 130, QTC 2. Traffic: (Jan.) W7VSE 549, KB7JW 363, W7LRB 350, K7NTS 190, WA7LGN 156, WA7WBE 156, WB7OEX 133, W7LNE 115, WA7IHS 93, W7QMU 45, W7FDU 26, K7WWR 24, W7TC 20, KA7DBS 14, W7HLF 12. (Dec.) W7DAN 9.

WASHINGTON: SCM, Bob Klepper, W7IEU — SEC: WA7RWK. STM: W7DZX. Nets reporting this month: NTN QNI 1422, QTC 101; WARTS QNI 3275, QTC 189; NWSSBN QNI 770, QTC 38; WSN QNI 678, QTC 209; EWTN QNI 69, QTC 59; IETN QNI 149, QTC 68; PSTS QNI 147, QTC 91; SCARES QNI 124, QTC 15. When you hold an appointment there are some obligations that go with it. One of them is to report to your SCM monthly. I would appreciate hearing from those who haven't been doing this. New officers of Radio Club of Tacoma are: W7SFT, pres.; AJ7P, vice pres.; K7OLC, treas., KA7GZQ, secy.; W7GCI W7RGD N7ARO WA7ENB, bd. Hamfest season starts in April with Yakima making a change to April 5, followed by Skagit on the 18th. W7GPW and WB7VLW are co-chairman for Mike & Key FD activities. Vancouver Hamfair will be May 9 es 10. New officers of Skagit ARC (SARC) are: W7ADM, pres.; W7EVI, vice pres., W7GHO, secy/treas.; W7LFA, card mailer; K7JUT tail twister; W7BCT W7PGY, trustees. West Seattle ARC enjoyed Al7I's presentation on handhelds and batteries. W7ERH tested his emergency generator during a three hour power outage. New officers for Western Washington DX club are: WA7GRE, pres.; K7LAY, vice pres., W7FCB, secy.; W7BQG, treas.; K7DS N7AIF K7ZR W7OTO K7RS WB7WEI, trustees. Westlink Bltns aired on the 36/96 (W7UZB/R) rptr at 7:30 P.M. Mon. New officers of Tri-City ARC are, N7BES, pres.; WB7WNZ, vice pres.; WA7EMM, secy; WB7PHP, treas.; KA7ASC, trustee of WR7AED. K7RWU received nice thank you letters for Sno-King rptr Christmas baskets. Chehalis ARS very appreciative of the donation of two-meter rigs by a local business. New officers of Radio Amateurs of Skagit County (RASC) are: KB7NR, pres., K7TUJ, vice pres.; KA7DSB, secy/treas. K7RS has volunteered as QSL manager for BEARS, Mt Baker ARC (MBARC) had 55 persons attend their Christmas dinner. RASC finally won one, they beat the MBARC for the annual Bunny Hunt Challenge Cup trophy. New officers of Lower Columbia ARA (LCARA) are: KB7QN, pres.; KB7LQ, vice pres.; WB7PEI, treas.; N7COG, secy., WA7ILC, trustee. MBARC plans to put complete study guides of all levels of licenses in the county and city libraries for circulation. Bears planning to update the club station (K7NWS) with relocation of the new hamshack. Their IC230 has been updated to cover subband repeaters. Spokane Swaptest is April 25 contact KA7DDU for info. Traffic: W7DZX 687, WB7TQF 363, WB7WOW 274, K7GXZ 185, K7CTP 128, W7IEU 114, WA7BDD 109, W7FJZ 109, AD7G 89, W7GB 81, N7AFZ 72, WA7RCR 40, WB7CFH 22, W7BUN 21, W7LG 16, W7ERH 15, KA7CSP 13, N7RV 9, AG7M 8, W7APS 6, N7DH 6, KD7G 4, W7AIB 2, WA7EDQ 2, WA7OJI 2.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF VE2AOV/W6 SEC: WB6KDU. *It is with deep regret* that I report W7JXK a Silent Key. His many friends will miss him and the NTS has a big pair of shoes to fill. N6RO busy preparing for a multi-multi effort in the ARRL DX tests. W6OA dividing his time between traffic and his computer. Section CAC member K6XO was active in the 10-meter test. N6NE busy with classes at UC. SBARA new members: KA6BOI WB6MLC WD6FFF KA6CYH W6JTR. LARK presented their first annualy J. K. Murphy award to KA6SLZ in recognition of his personal efforts toward the advancement of Amateur Radio. Congrats! LARK new members: WB6YBZ WD6COG EBARC new officers: N6DR1, pres.; WD6FTM 1st v.p.; WD6AKC, 2nd

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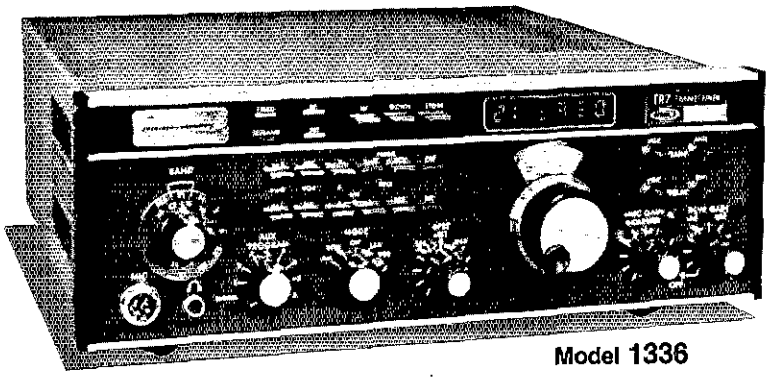

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True Passband Tuning—The TR7 employs the famous Drake full passband tuning instead of the limited range "i-f shift" found in some other units. The Drake system allows the receiver passband to be varied from the top edge of one sideband, through center, to the bottom edge of the opposite sideband. In fact, the range is even wider to accommodate RTTY. This system greatly improves receiving performance in heavy QRM by allowing the operator to move interfering signals out of the passband, and it is so flexible that you can even transmit on one sideband and listen on the other.

Unique Independent Receiver Selectivity—Space is provided in the TR7 for up to 3 optional crystal filters. These filters are selected, along with the standard 2.3 kHz filter, by front panel pushbutton control, independent of the mode control. This permits the receive response to be optimized for various operating conditions in any operational situation. Optional filter bandwidths include 6 kHz for a-m, 1.8 kHz for narrow ssb or RTTY, and 500 Hz and 300 Hz for cw.

Broadband, Solid State Design—100% solid state throughout. All circuits are broadbanded, eliminating the need for tuning adjustments of any kind. Merely select the correct band, dial up the desired frequency, and you're ready to operate.

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Effective Noise Blanker—The optional NB7 Noise Blanker plugs into the TR7 to provide true impulse-type noise blanking performance. This unit is carefully designed to maximize both blanking and dynamic range in order to preserve the excellent strong-signal handling characteristics of the TR7.

* NOTE: Transmitter coverage for MARS, Government, and future WARC bands is available only in ranges authorized by the FCC, Military, or other government agency for a specific service. Proof of license for that service must be submitted to the R. L. Drake Company, including the 500 kHz range to be covered. Upon approval, and at the discretion of the R. L. Drake Company, a special range IC will be supplied for use with the Aux7 Range Program Board. Prices quoted from the factory. See Operator's Manual for details. (Not available for services requiring type acceptance.)

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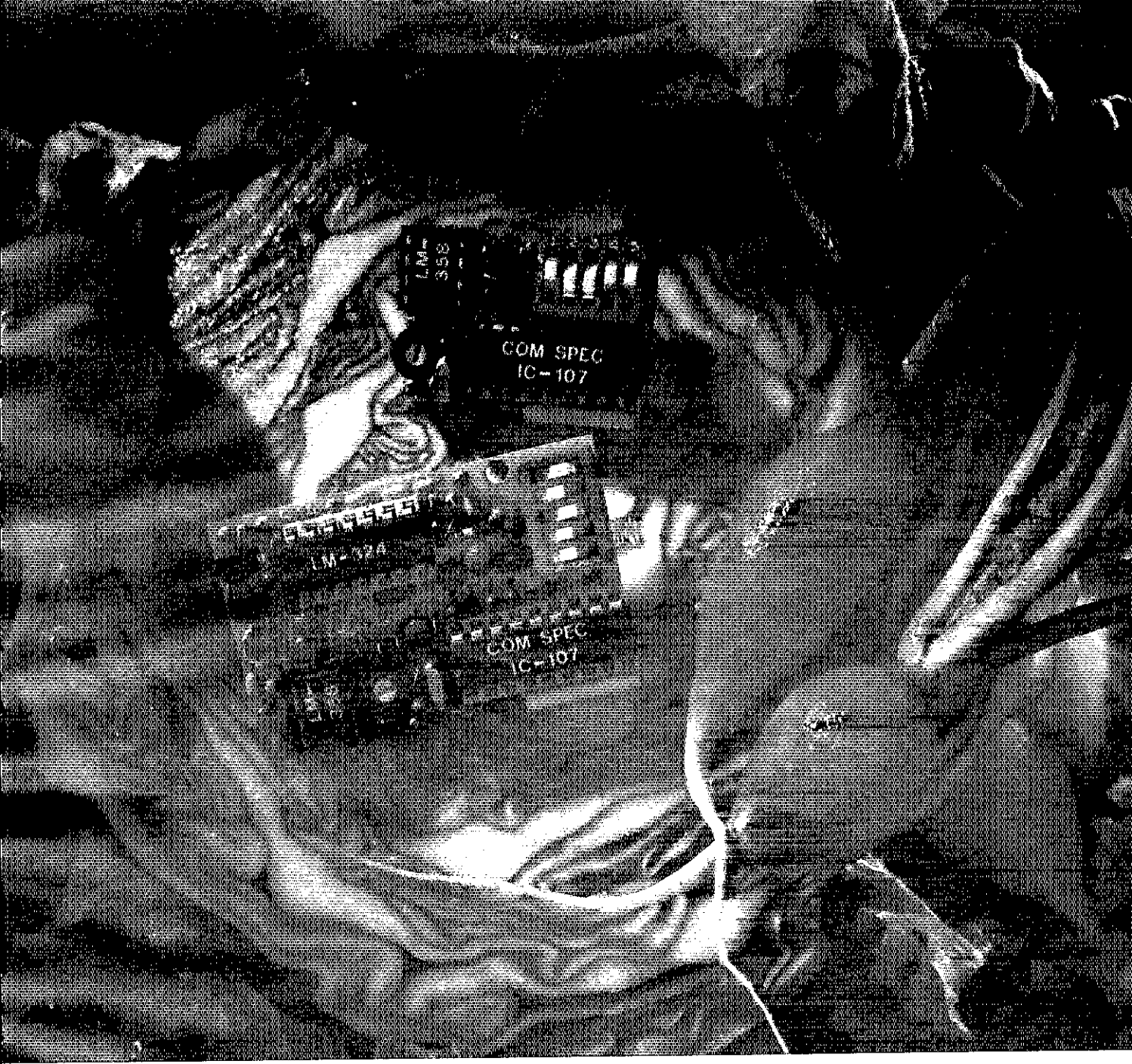

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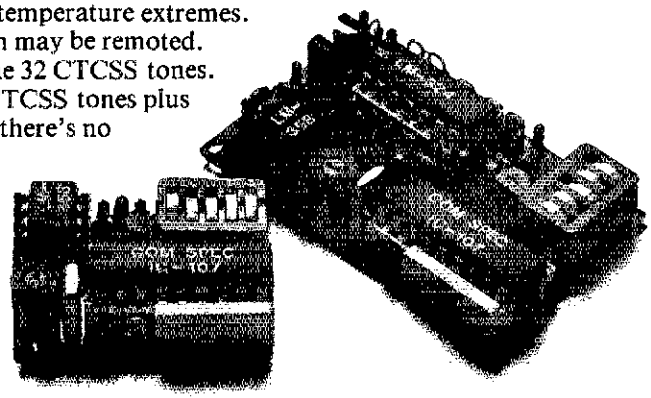

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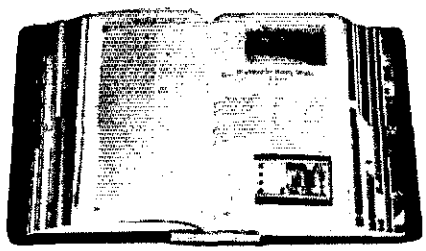

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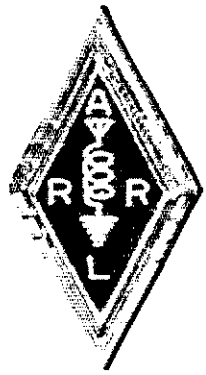

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SCM - RED; NM, SEC, STM, DEC, EC - GREEN; ORS, OVS, OO, OBS, OES, IW - BLUE;
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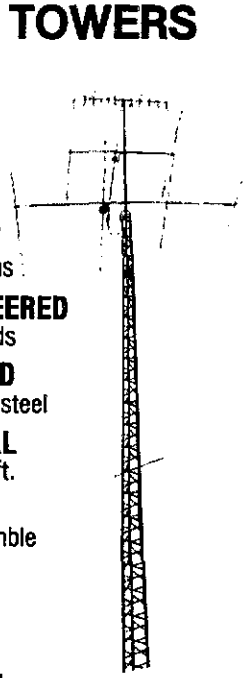

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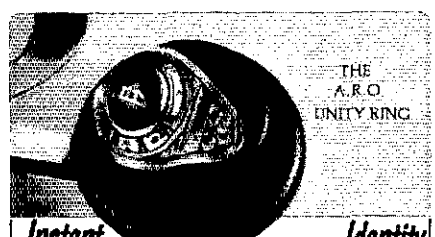

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v.p.; WB6NAH, 3rd v.p.; WD6FRP, secy.; WD6FYF, treas. MDDARC's "The Carrier," featured a two page photo spread on their Christmas party. Traffic: (Jan.) W6OA 120, WB6UZX 23. (Dec.) WB6UZX 31, N6RO 4.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. Congratulations to KB7Q on his completion of 5BWAS. Field Day is getting closer, be prepared. Field Day chairmen for Las Vegas are K7SN and KB7OX. Snow has at last come in great quantities to Lake Tahoe, heard an interesting QSO by two hams on skis as they swished down the slopes the other day. KB7MV, EC for Washoe County, conducting drills each week on 0161, 7 P.M. Thursdays. Nevada Sagebrush Net meets nightly 7:30 P.M. on 3906 kHz. Traffic: N4AKX 367, W7BS 94, W7CX 7.

PACIFIC: SCM, J. P. Corrigan, KH6DD — STM: W0KON, Sec: KH6CKJ. EC Maui: KH6H, EC OAHU: KH6ILR. New officers for Hon. ARC are. KH6JJP, pres.; KH6KH, vice pres.; KH6CKJ, secy.; KH6EVY, treas. Emerg ARC (Honolulu) said KH6ILR reelected president and he promises further sophistication of EARC-run repeaters and more community service. KH6BHJ has moved to Pac. N W. KH6FV continues yeoman work at Oahu Civ. Def. RACES. License Plates have all come in according to Carter. Good to see KH6HQ and YF KH6INK active in club admin again. KH6CIZ now control for city hall rptr. Ice storm knocked out Haleakala repeater in early Februray. Traffic: KH6U 5.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: WB6GFJ. ASCM: AI6T. The Oroville Amateur Radio Society officers are: WB6MDQ, pres.; KA6LCQ, secy.; KA6FLP, secy.; WB6YKQ, treas. The Calif. Amateur Radio Skywarn Net and the National Weather Service held a training meeting in Carmichael. The Nevada Co. ARC will be having their meetings in the Christian Church, 135 Winchester Ave., Grass Valley. The North Hills ARC has moved their meetings to the Gethsemane Lutheran Church, 4706 Arden Way, Carmichael. Congrats to KA6FLP on making General class. K6RP has moved to Woodland. Start getting your garage cleaned out for the Spring Ham Swap. Check with North Hills for details. Traffic: W6RSP 46, W6SX 29, W6DEF 14, WA6OWH 2.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. STM: K6TP. Congrats to new NM of RN6, W6IPL and new OBS, KB6LO. Ham radio exhibit was set up for one day in Rohnert Park. WA6WTT reports relocation and increased coverage for 145.13 repeater. WB6SRM WA6DTU W6BYS WB6GZT K6SEX KB6LO are active as instructors for various Novice and upgrade classes. Sorry to report W6JXK and WA8CGA as Silent Keys. W6HHP contacted Santa (W6RNL) for students at Ridgewood School. New hams and upgrades to Tech: KA6KXI; General: KA6MQH N6DSW; Extra: N6BLN K6ANP. W6EAJ active again. San Francisco RC will conduct Wouff Hong ceremony at Fresno convention in May. PSHR: W6RNL. Traffic: (Jan.) W6IPL 243, W6RNL 168, K6TP 94, K6TWJ 55, W6GGR 28. (Dec.) W6NL 683, KB6LO 121, WB6HZO 18, W6GGR 12, WA6QXV 6.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. Asst SCMS: W6TRP WA6HIN WA6YAK. New officers of the Delta ARC are: K6GZN, pres.; WB6ICL, v.p.; WD6DQA, secy.; WA6WRP, treas. The Fresno ARC, Central Valley RC, and Kern County ARC helped in the UCP Telethon. WB6LZU is KD6LO. KA6IFI is KU6A. KA6GAF is Tech. K6LJG has a TS830S. WA6YAB has a TS520SE. W6DPD has an Azden PCS 3000. KA6LDD and WB6VUS are Silent Keys. WA6JDB has a clock. All amateurs are urged to read and to comment on the plain language rewrite of the amateur rules. NCN QNI 1879, QTC 547. N6AWH made PSHR. All SJV amateurs should report their activity to the SCM. See page 8 of QST for address. The ARRL Pacific Division Convention is May 15-17 at the Hacienda Inn, Fresno. Come and meet K6DUE WTFB K1FHN W0BWJ W6ZM and all your friends. Write FARC Hamfest, P. O. Box 783, Fresno, CA 93712 for details. Traffic: N6AWH 146, K9YBM 65, WA6YAB 14, WB6TTP 9, WA6JDB 8, W6DPD 6.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. A talk on freq synthesizers was given to SCCARC by N6BIU. SCCARC reports WB6ENB and WD6BJB ar Silent Keys, and welcomes new members K6TCN N6DGZ KA6MNM K6UPX and KA6MIQ. Officers for 1981 are WA6HKP, pres.; N6BSU, v.p.; K6TAM, secy.; K3NVV, treas. LERA ARC had a demonstration and talk about their new 220 rptr. N6CBW upgraded to Advanced. SMRC reports W6UQ is Silent Key. New officers of SMRC are: K6KXB, pres.; N7TD, v.p.; WA6FXC, secy.; W6MKM, treas.. They meet 3rd Fri at Beresford Rec Center in San Mateo. New members of SCVRS are WA6OUW WB6YWS N6BXO W6TWO W6LFX N6CYS WD6ADF WB6STW KA6JDF WB6LND WB6JBO WA6TJM K9KAE and KA6GKK. Memorex ARC has begun license classes for employees during noon hour, with N6XV coordinator. SLVRC welcomed KA6MZP as a new member, and they also heard N6BIU talk on synthesizers. Don't forget Pacific Division Convention in Fresno, May 15-17. For info write Box 783, Fresno, 93712. EC W6ASH report nearly 60 stns check into SPECS net each week, and all members are assigned to specific agencies. WB6IZF rcvd a IC2AT as a present, and reports Skywarn plans are finalized. W6MMG wishes he had more time to work all that good DX. (Me too!). WB6HBL listening and some DXing, and thinking of a new ant. EMARC meets last Monday of month at Electronics Museum with the following at the helm. WB6VAL, pres.; WD6FLG, vice pres.; W6OOI, secy.; N6ATD, treas. Gabilan ARC officers are. K6IYD, pres.; KB6GV, v.p.; K6TEH, secy/treas.; and they will be assisting the Almaden Bike Club with communications. Traffic: W6YBV 243, W6KZJ 85, W6RFF 31, W6ZRJ 26, W6ASH 10, WA6HAD 4.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ed Stephenson, AB4S — ASCM: N4UE. STM: WD8NYN. SEC: WA4BFT. NMs: CN AB4V, CMN WD8NYN, THEN WD4CNR, JFK WD4CNQ, NCSSB WB4CES, CNN WD4JJK. Check in to one or more of these NC nets: CMN 3927 kHz 7:45 A.M., CNN 3715 kHz 6:15 P.M., JFK 3923 kHz 6:30 P.M., CN 3573 kHz 7 P.M. & 10 P.M., THEN 3923 kHz 7:30 P.M., NCSSBN 3938 kHz 7:30 P.M. These are NC Section nets. Many local 2 meter nets also active. Silent Keys: KB4CX WB4DQQ WD4JIE W4UOU. 2-meter repeater linking: Raleigh-Asheboro-North Wilkesboro now a reality. Much of the design work done by K4ITL. Congratulations to: N4BEX to Advanced, Brightleaf ARC had 14th anniversary, and W4PNY President of Cabarrus ARS. Cape Fear ARS holding weekly demos for college students. See

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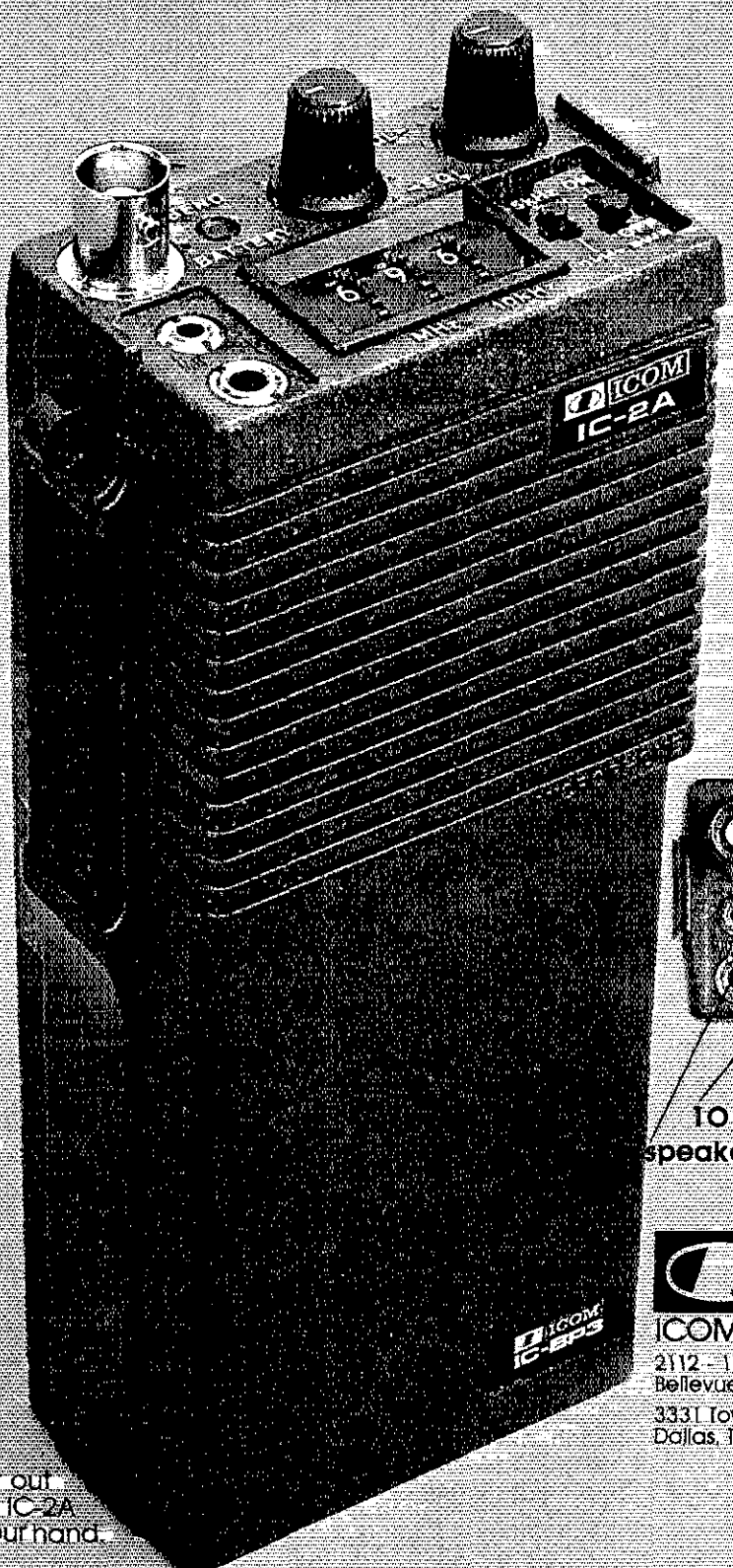

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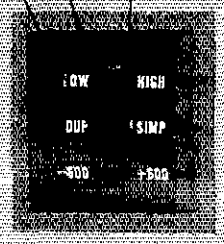

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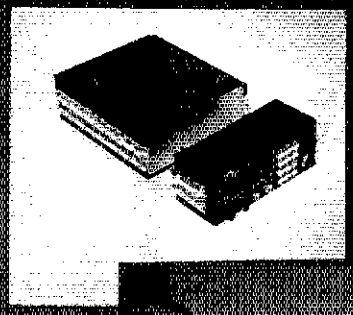

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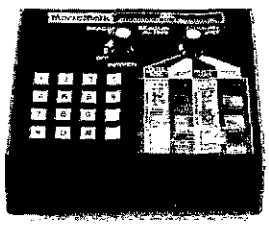

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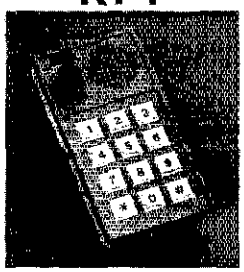
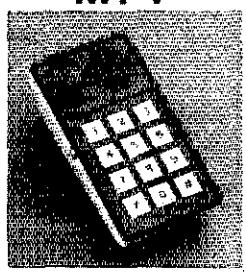


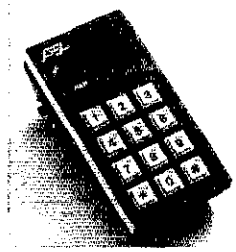
Keyer Trainer

MT-1



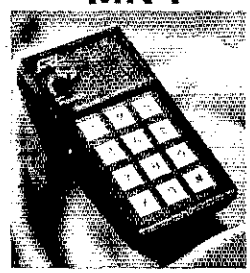
Morse Trainer

CK-1



Contest Keyer

MK-1



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Memory Capacity (Total Characters)	500			500		400	100/400	400	
Message Partitioning	Soft			Soft		Hard	Hard	Hard	
Automatic Contest Serial Number	Yes			Yes		No	No	No	
Selectable Dot and Dash Memory	Yes	Yes		Yes	Yes	No	No	No	No
Independent Dot & Dash (Full) Weighting	Yes	Yes	Yes	Yes	Yes	No	No	No	No
Calibrated Speed, 1 WPM Resolution	Yes	Yes	Yes	Yes	Yes	No	No	Yes	No
Calibrated Beacon Mode	Yes			No		No	No	No	
Repeat Message Mode	Yes			No		Yes	Yes	Yes	
Front Panel Variable Monitor Frequency	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Message Resume After Paddle Interrupt	Yes			Yes		No	No	Yes	
Semi-Automatic (Bug) Mode	Yes	Yes		Yes	Yes	No	No	No	No
Real-Time Memory Loading Mode	Yes			Yes		Yes	Yes	No	
Automatic Word Space Memory Load	Yes			Yes		No	No	Yes	
Instant Start From Memory	Yes			Yes		No	No	Yes	
Message Editing	Yes			Yes		No	No	No	
Automatic Stepped Variable Speed	No	No	No	Yes	No	No	No	No	No
2 Presettable Speeds, Instant Recall	No	No	No	Yes	No	No	No	No	No
Automatic Trainer Speed Increase	Yes	Yes	Yes						No
Five Letter or Random Word Length	Yes	Yes	Yes						No
Test Mode With Answers	Yes	Yes	Yes						No
Random Practice Mode	Yes	Yes	Yes						Yes
Standard Letters, Numbers, Punctuation	Yes	Yes	Yes						Yes
All Morse Characters	Yes	Yes	Yes						No
Advertised Price	**$199.95**	**$129.95**	**$99.95**	**$129.95**	**$79.95**	**$139.95**	**$ 99.50/ $139.50**	**$229.00**	**$129.95**

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MT-1P (portable version of MT-1) with batteries, charger, earphone **$139.95**

ME-1 2000 character plug-in memory expansion for MM-1 **$ 59.95**

AC-1 600 Ma. 12 Volt wall adaptor for MM-1 with ME-1 **$ 14.95**

AC-2 350 Ma. 12 Volt wall adaptor for all AEA keyer and trainer products except MM-1 w/ ME-1 **$ 9.95**

DC-1 Cigarette lighter cord for all AEA keyers and trainers except MT-1P **$ 5.95**

MT-1K Factory conversion of MT-1 to KT-1 **$ 40.00**

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE OR OBLIGATION.

All our keyers (except the MT-1) will operate with any popular single lever or lambic squeeze paddle and will key any type of modern amateur transmitter with no external circuitry required. AEA keyers are as easy to operate as a four function calculator. The internal AEA computers are all pre-programmed for the features shown above. Each AEA product is fully RF protected and receives a complete elevated temperature burn-in and test before it is shipped from the factory.

Ask a friend how he likes his AEA keyer compared to anything else he has ever tried, then JUDGE FOR YOURSELF. See the AEA keyer and trainer family at your favorite dealer.

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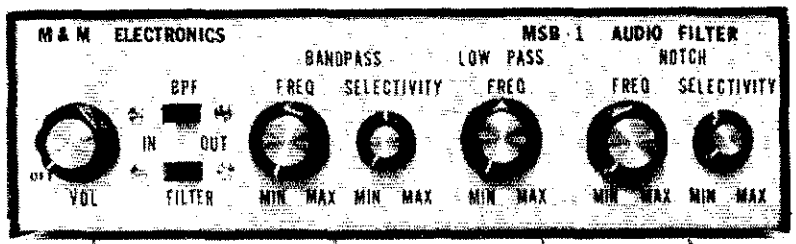
MSB-1 AUDIO FILTER $84.95



1 WATT AUDIO AMPLIFIER

TUNABLE BANDPASS FILTER

8 POLE TUNABLE LOWPASS FILTER

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The MSB-1 Audio Filter consists of four basic filters arranged to provide the maximum in flexibility and effectiveness during CW or SSB reception. The four basic filters are as follows:

1. **Fixed High Pass filter with a 3dB cutoff frequency of 300 Hz.**
2. **Notch Filter tunable from 300-3,000 Hz. The bandwidth of the notch is also adjustable. Notch depth is greater than 50 dB.**
3. **Eight pole Low Pass Filter tunable from 300-3,000 Hz.**
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The fixed tuned high pass filter, tunable notch filter, and tunable low pass filter are engaged at all times. The tunable bandpass filter can be switched in for further shaping of the audio. This means that all three tunable filters can be engaged at the same time *and tuned independently.*

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TOWERS

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you all at the Raleigh ARS Hamfest, April 12. Please route to me news items of interest to the NC Section. Traffic: WD8NYN 353, WD4CNQ 291, WD4CNR 258, W4EAT 159, WD4JJK 128, WA4UTC 128, AB4S 116, K4VHT 110, AB4V 106, W4HKB 102, K4MC 98, WB4WII 98, *AB4J 97, WA4SRD 90, K4NLK 79, KU4W 78, WD4RDT* 67, WA4OBR 62, KZ4Z 56, K4DHX 54, W8PJS 45, K4XE 41, WB4UJH 38, WD4AIE 36, W4VTP 36, NE4J 34, KA4ODX 33, WB4CYN 29, KF4R 28, WD4ABZ 26, WB6OTS 25, N4CJJ 24, N4AET 22, W4FMN 21, W4ACY 20, K4IWW 20, N4UE 20, KC4AM 15, W4RVE 14, W4WXZ 14, WD4BCX 9, WD4LOO 7, W2JDB 6, WA4CUD 5, WA4IHG 4.

SOUTH CAROLINA: *SCM, Richard McAhee, W4MTK* — Asst SCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NM WA4SJS W4ODE. Congrats to the following: KA4LRM (N) for receiving her WAC certificate, WB4NBK for working HCI's on 6 meters, WA4JWS for receiving 1st place in 73 Magazine for 160-Meter phone in SC. Checkins/traffic: SC SSBN 1470/175; Blue Ridge 2-m Net 1905/73; Anderson 2-m Net 645/21; GN 695/326: SC Noontime Net 320/75; Lancaster City 2-m Net 219/12; Western SC Emergency Net 105/18; Newberry ARES Net 64/4; Trident ARC ARES Net 81/0; Dixie 6-m SSBN 11/0; SC 2-m SSBN 57/0; SC ARES Net 23/0. Traffic: K4ZN 335, W4ANK 210, W4ODE 163, W4NTO 93, W4FMZ 51, KA4AUR 41, W4MTK 34, WB4UDK 22, WB8TCT/4 19, NC4F 10, W4FVV 10, WA4JWS 10, K4RVC 9, NC4Y 9, WD4EDM 7, K4LYU 7, WA4MCG 7, WA4VYS 7, W4DRF 6, WB4QHF 2, WB4NBK 1.

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	294	737	KZ4K
VSN	6:30	153	644	WB4KSG
VN	7:10	345	689	W4SUS
VLN	10:15	120	499	WD4ALY
VNTN	Noon	152	330	WD4FTK

BPL — WA4EQW/M (that's all mobile, all cw, folks!), WB4PNY and W4JK. Congrats to KB8IA who made PSHR along with the 11 others who have discovered it's an added benefit of flexible operating. Thankfully, we're hearing less and less of those who shun one mode or another; more and more from those accepting the challenges of multimode traffic handling proficiency. Appreciation to STM KY4K for the hard work required in tabulating the traffic stats for this column. The section level Virginia Novice Net should be perking by the time you read this. Interested? Contact KY4K or K4JST. N4IF says one knob operation of Omni and new antenna makes life simpler. WB4FDT celebrated 14 years as licensed ham and W4UQ joined us again after a year's absence. Welcome back! WA4TVS is recruiting for the Accomack Co. ARES and DEC N4NK is adding some life to the Capitol District. Good luck, and nice to hear you active again — you've been missed. KZ4K KY4K N4AZI and WA4STO have been enjoying not only RTTY, but the help of those fine amateurs who provide us with on-the-air computer services. Hope to see WD4FTK and WA4CCK on RTTY soon! The Virginia Section still needs Official Observers, and Official Bulletin Stations. Don't be bashful, sing out (not on the air!) if you would like to help keep Virginia on top! Contact any of the League officials for further info. Traffic: (Jan.) W4JK 512, WB4PNY 501, W4SQG 318, WA4STO 292, KZ4K 280, WA4CCK 248, W3ATO 207, WA4EQW/M 193, WD4FTK 168, K4JST 146, W4SHJ 126, WB4FLT 117, N4AZI 106, W4SUS 105, W3BBN 92, KY4K 91, N4RF 91, K4JM 86, K4KDJ 85, WA4LJI 78, WB4KSG 76, N4YO 75, WA4QWC 66, N4YE 62, W4YVG 61, K4EJ 57, W4NWM 55, W4SVG 48, KA3DTE 46, KB8TA 41, K3RZR 40, WD4ALY 35, WA3LVC 32, KB4TW 32, N4IF 31, KA4IUM 31, WA1VRL 28, N4BJX 25, KA4ETG 23, WB4RWY 23, WB4FDT 22, WB4ZTJ 21, W4FNA 20, WB4UHC 19, W4LXB 18, WB4ODZ 18, K4VWK 18, W4CFV 17, W4UQ 17, WB4KIT 15, KI4W 14, WB4DQZ 13, WA4YIU 12, N4CIR 11, WD4IUV 11, WA4RTS 11, KA4ERP 10, WD4KOJ 10, WB4MAE 10, W4KXE 8, W4OKN 8, KC4QL 7, KC4HN 6, WB4RKN 6, WD4DUU 5, W3BBQ 4, W4JUJ 4, N4LE 4, W4PVA 4, WB4ZNB 4, N4DCL 3, N4DW 3, WD4RDF 3, W4YE 3, W4KX 2, N4NK 2, K8LGA 2. (Dec.) WB4KSG 89, W4GTH 58, N4CIR 27, W4OKN 26, K8LGA 14, W4CFV 12, WD4DUU 6, N4LE 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — STM: KD8G. SEC: K8QEW. NMs K8MHR W8FZP KD8G WD8LDY. New Novices in Oak Hill: KA8LSC KA8LSD KA8LSE KA8LSF and KA8LSG. New General in Oak Hill N8CIC. WA8YTM has received WAC on ssb. WD8OQE now KB8XM. WA8CTO has been appointed as Assistant Director for Roanoke Division.

Net	Freq.	Time(Z)	QNI	QTC	Sess.
Hillbilly	14290	1600 Su	189	46	4
WV Phone	3990	2300 Dy	675	84	31
Phone-MD	7235	1700 Dy	349	36	31
WVN	3567	2400 Dy	258	75	31
Novice	3730	2330 Dy	105	50	31
KFC 2M	87/47	0130 Tu	52	8	4

KD8G 128, W8CAL 37, W8FZP 37, K8MHR 35, N8AJC 35, WD8POG 35, W8HZA 34, WD8LDY 31, KD8X 20, WD8DHC 17, WD8DIN 17, KA8ETV 17, KA8HAL 17, N8CFY 16, KA8FEU 15, K8QEW 12, AI8I 9, K8TW 7, WB8UOY 7, N8CFX 6, W8YP 6, WD8MJE 5.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WBØMCL. NM: NØAXQ WØHXR WØAIT KBØZ. The SEC reports that some realignment of ARES districts is in process and the ECs are working with the Red Cross in up-dating the emergency communications plans. The 146.34/.94 repeater near Denver can now be linked to the Western Slope for emergencies *and for ARES training sessions. Your input to the FCC* on Docket 80-729 "Revision of the Amateur Radio Service Rules into Plain Language," is encouraged. The Colorado Council of Amateur Radio Clubs has published a Colorado callbook with over 6000 listings. It is available from the various clubs or from WBØDUV, treas. of CCARC. The Colorado Frequency Coordinator reports that all 2-meter repeater pairs have been assigned for Eastern Colorado. The Northern Colorado Amateur Radio Club will host "Super Fest 3" hamfest in Greeley CO on 6 June 1981. Nets: Columbine 27 sess, QNI 1221, QTC 63, informals 222, QNF 1175, HNN 23 sess, QNI 1754, QTC 144, informals 269, QNF 1262. Traffic: (Jan.) NØBQP 2554, WØWYX 1972, WAØHJZ 841, KØDJ 372, KBØZ 170, WØLAF 104, WØRF 101, KAØGHA 73, WØGO 44, WØNFW 34, KDØM 32, WBØUWE 7, WØGW 2. (Dec.) WØLQ 154, WØNFW 7.

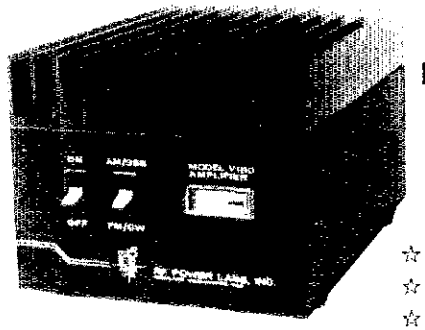
NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. WB5NNG and KG5L. Southwest Net (SWN) meets daily on 3583 kHz at 1930 local and handled 246

LINEAR POWER AMPLIFIERS

160 - 80 - 40 - 30 - 20 - 17 - 15 - 12 - 10 - 6 - 2 METERS

(1.8 to 148 MHz)

MODEL: V350



MODEL: V180

- ☆ Built-in 115/230 VAC Supply
- ☆ AM-FM-CW-SSB-RTTY
- ☆ 60dB Harmonics
- ☆ 60dB Spurious
- ☆ Heavy Duty Design

All Solid-State!

- ☆ Illuminated Panel Meter
- ☆ Automatic T/R Switching
- ☆ VSWR Protected
- ☆ +13V/3A Accessory Socket
- ☆ *U.S. Manufactured*

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

* Used with the V360, V350, A1000, A1000X, C500X /
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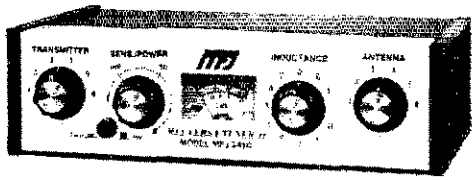
VISA

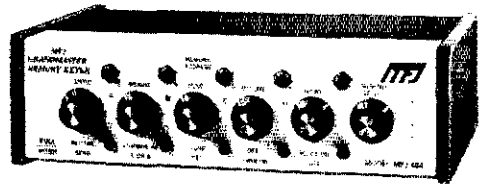
MFJ 941C Versa Tuner II



MFJ-941C
$89.95 (+$4)

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.
SWR + dual range wattmeter (300 & 30 watts full scale, forward and reflected power). *Sensitive meter* measures SWR down to 5 watts output.
More flexible antenna switch selects 2 coax lines, direct or through tuner, random wire/balanced line, or tuner bypass for dummy load.
12 position efficient airwound inductor for lower losses, more watts out.
Built-in 4:1 balun for balanced lines. 1000v capacitor spacing.
Matches everything from 160-10 meters: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.
Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.
MFJ-945, $79.95, like model 941C but less ant. switch. Optional mobile bracket for either model is $3.

MFJ 484 "Grandmaster" Memory Keyer



MFJ-484
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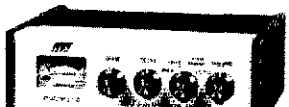
Up to twelve 25 character messages plus 100, 75, 50 or 25 ch. messages (4096 bits).
Repeat any message continuously or with pauses of up to 2 min. LEDs show use.
Record, playback, or change messages instantly at touch of a button. Memories are resettable with button or touch of the paddle.
Built-in memory saver — 9 V battery takes over when power is lost.
Iambic operation with squeeze key. Dot-dash insertion. Optional BENCHER paddle $42.95 + $4.
Dot-Dash memories, self-completing, jam-proof spacing, instant start.
Panel controls: Speed (8-50wpm)/Record; Weight/Memories Combined; Tone/Tune; Delay (0-2 min.)/Repeat; rotary Vol/On-Off; Memory Select; Message Buttons select desired 25 ch. messages; Memory Reset button.
Ultra reliable solid state keying: grid block, cathode, solid state transmitters (−300 V, 10 mA max; +300 V, 100 mA max). Operates 12-15 VDC or 110 VAC with optional adapter, $7.95 + $2. Size 8x2x6". **MFJ-482, $99.95,** four 25 or 50 + two 25 ch. messages; **MFJ-481, $89.95,** two 50 ch. messages. **Get the best seller keyers**-MFJ "Grandmasters."

MFJ 410 "Professor Morse" Code Generator/Keyer



NEW LOW PRICE
Save $20
MFJ-410 Now Only **$129.95** (+$4)

Use it to learn, use it to operate. It sends *unlimited random code* in random groups for practice; *never repeats* sequences. And when you're on the air, it's *a full feature keyer.*
Vary speed from 5-50 wpm; meter readout.
Vary spacing; give fast sound to low speed.
Alpha or alphanumeric with punctuation.
Built-in speaker and phone jack; tone and vol. Ideal for classroom or private use.
Full feature keyer includes vol., speed, tone and weight controls, tune switch, dot-dash memories, keys grid block, cathode, solid-state rigs. Optional BENCHER paddle $42.95 + $4. Operates on 9-18 VDC, two 9 V batteries or 110 VAC with optional adapter $7.95 + $2. Size 7x2x6". **Get "Professor Morse"** — you'll never outgrow it.

MFJ Dual Tunable SSB/CW Filter "Signal Enhancer"

MFJ-752B **$89.95** (+$4)

Dual filters give unmatched performance.
The primary filter lets you *peak, notch, low pass or high pass* with extra steep skirts.
Auxiliary filter: *70 dB notch, 40 Hz peak.*
Both filters tune from 300 to 3000 Hz with variable *bandwidth from 40 Hz to nearly flat.*
Constant output as bandwidth is varied; linear frequency control.
Switchable noise limiter for impulse noise.
Simulated stereo sound for CW lets ears and mind reject QRM.
Inputs for 2 rigs, switch selectable. Plugs into phone jack. Two watts for speaker. OFF bypasses filter. 9-18 VDC, 300 mA or 110 VAC with optional adapter $7.95 + $2. 10x2x6". **MFJ 751, $69.95,** similar, primary filter only, less high pass & noise limiter.

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favorite products from the world's leading manufacturer of amateur radio accessories

GMT Clock/ID Timer

MFJ-102
$32.95 (+$4)

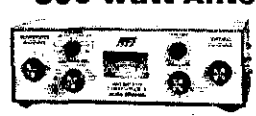
NEW 12/24 Hour Digital Clock/ID Timer Switch from 12 hr. to GMT, to "seconds" readout, ID timer or elapsed timer. WWV sync, solid-state, blue 0.6" digits, reg. alarm + indicators. 110 VAC, 60 Hz, 6x2x3".

KW Dummy Load With Oil

MFJ-250
$29.95 (+$4)

Rated at 1 kW CW or 2 kW PEP for 10 min., half that for 20 min., cont. at 200 W CW, 400 W PEP, non-inductive 50 ohm resistor, quality transformer oil (no PCB), VSWR under 1.2:1 to 30 MHz, 1.5:1, 30-300 MHz, 2:1, 300-400 MHz. Coax conn., vent cap., 7½"h x 6⅝" diam.

300 Watt Antenna Tuner



MFJ-949B
$139.95 (+$4)

Does it all! Built-in dummy load, SWR, forward and reflected power meter, antenna switch, balun, matches everything from 1.8-30 MHz (coax, random wires, balanced lines), coax conn., binding post, 10x3x7".

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- **Add shipping & handling charges in amounts shown in parentheses**

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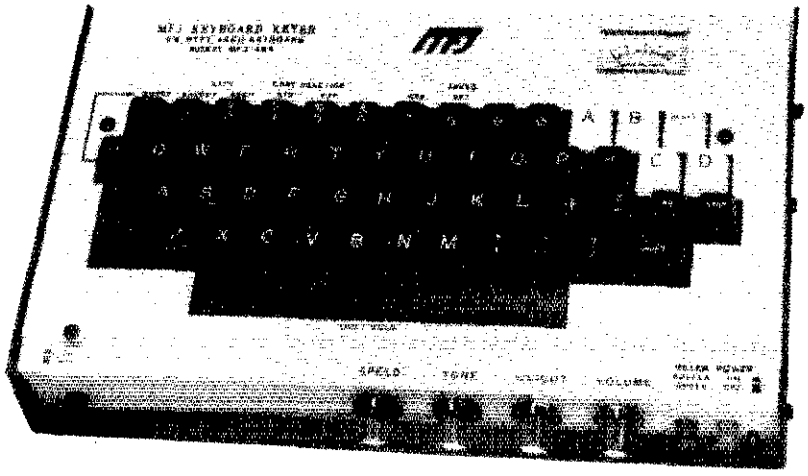
MFJ Super Keyboards



5 MODES: *CW, Baudot, ASCII, memory keyer, Morse code practice.* ***TWO MODELS: MFJ-496, $339.95.*** *256 character buffer, 256 character message memory, automatic messages, serial numbering, repeat/delay.* ***MFJ-494, $279.95.*** *50 character buffer, 30 character memory, automatic messages.*

MFJ brings you a pair of 5 Mode Super Keyboards that gives you more features per dollar than any other keyboard available. You can send CW, Baudot, ASCII. Use it as a memory keyer and for MORSE code practice.

You get text buffer, programmable and automatic message memories, error deletion, buffer preload, buffer hold, plus much more.

MODE 1: CW

The 256 character (50 for 494) **text buffer** makes sending perfect CW effortless even if you "hunt and peck."

You can preload a message into the buffer and transmit when ready. For break-in, you can stop the buffer, send comments on key paddles and then resume sending the buffer content.

Delete errors by backspacing.

A meter gives buffer remaining or speed. Two characters before buffer full the meter lights up red and the sidetone changes pitch.

Four programmable message memories (2 for 494) give a total of 256 characters (30 for 494). Each message starts after one ends for no wasted memory. Delete errors by backspacing.

To use the ***automatic messages***, type your call into message A. Then by pressing the CQ button you send CQ CQ DE (message A).

The other automatic messages work the same way: CQ TEST DE, DE, QRZ.

Special keys for KN, SK, BT, AS, AA and AR.

A lot of thought has gone into human engineering these MFJ Super Keyboards.

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 when power is off.

Weight control makes your signal distinctive to penetrate QRM.

MODE 2 & 3 (RTTY): BAUDOT & ASCII

5 level Baudot is transmitted at 60 WPM. Both RTTY and CW ID are provided.

Carriage return, line feed, and "LTRS" are sent automatically on the first space after 63 characters on a line. This gives unbroken words at the receiving end and frees you from sending the carriage return. After 70 characters the function is initiated without a space.

All up and down shift is done automatically. A downshift occurs on every space to quickly clear garbled 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.

MODE 4: MEMORY KEYER

Plug in a paddle to use it as a deluxe full feature memory keyer with automatic and programmable memories, iambic operation, dot-dash memories, and all the features of the CW mode.

MODE 5: 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 lists (with answers).

Insert space between characters and groups to form high speed characters at slower speed for easy character recognition.

Select alphabetic or alphanumeric plus punctuation. You can even pause and then resume.

MORE FEATURES

Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests.

Repeat function allows repetition of any message memory with 1 to 99 seconds delay. Lets you call CQ and repeat until answered.

Two key lockout operation prevents lost characters during typing speed bursts.

Clock option (496 only) send time in CW, Baudot, ASCII. 24 hour format.

Set CW sending speed before or while sending.

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.

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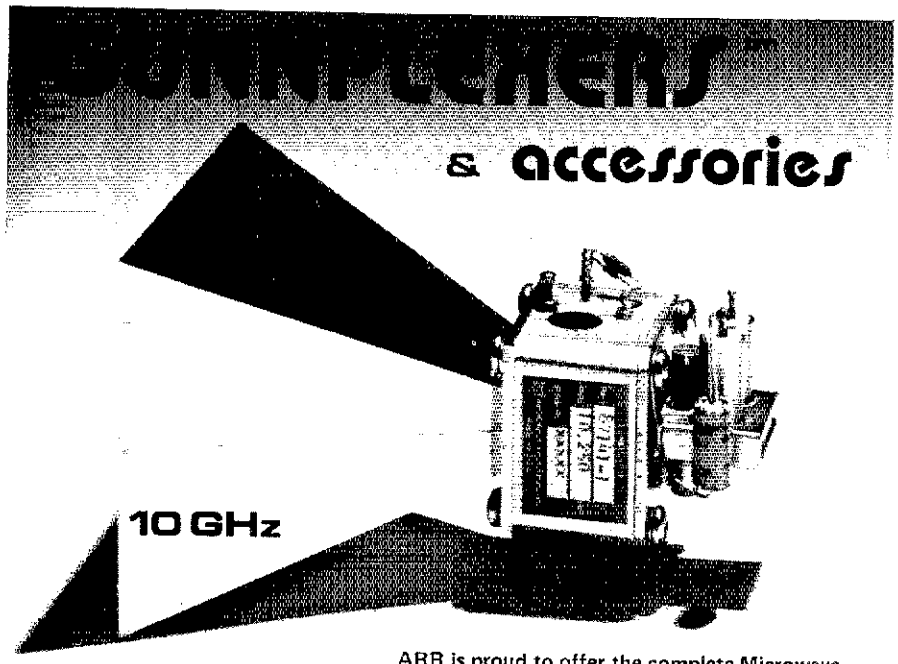

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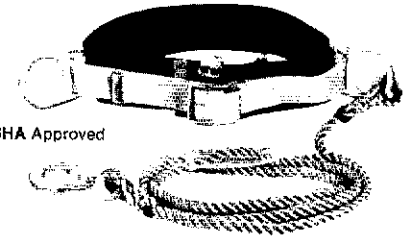

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msgs with 301 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3939 kHz at 1800 local and handled 164 msgs with 1248 stations in. New Mexico Breakfast Club meets daily on 3940 kHz at 0700 local, handled 64 msgs with 842 checkins. Yucca 2-Mtr Net handled 34 with 615 checkins. Sad to report passing of WA5FPS WB5HBF & WB5SOT. W5WGW not doing well, but W5FPB making good progress after three heart attacks. Our tnx to W5RKS & XYL in assisting W5FPB. All looking forward to Bean Feed in Las Cruces April 26. Joint CAP/NMESC mtg in Abq well received. Traffic: W5DAD 376, N5NG 289, W5JOV 107, W5ENI 104, KA5DDW 78, KG5L 70, WA5MIY 22, KB5LI 16.

UTAH: SCM, Royce Henningson, K7QEQ — SEC: WB7FCB. STM: W7OCX. W7RG reports that the Utah VHF Society Road and Weather Net had 1297 checkins for January. N7RG earned the net certificate on the Beehive Utah Net. WA7MEL reports that a multitude of operators responded on 2 meters and 7272 kHz to assist during the state-wide power outage that happened in January. Traffic: K7HLR 210, WA7MEL 82, W7OCX 71, WA7JRC 16.

WYOMING: SGM, Chester C. Stanwaity, W7SDA — WB7NHR and KA7FKT have organized a cw net. This net will meet on 3715 kHz at 1815 local time beginning March 1. This will be primarily a training net with a code speed of ten words per minute. Novices are welcome to participate. KA7FKT will be net manager. W7HNI celebrated his 50th year in Amateur Radio January 30. His first license was issued January 27, 1931 with an effective date of January 30, 1931. His first call was W9DHA. Congratulations. KA7GVG new General in Casper. KA7DFR and WB7OFK new Advanced and WB7RRZ new General all of Cheyenne. Congratulations. WB7NHR reports WCN held 22 sessions with 749 QNI and 22 QTC. WA@PFJ reports Jackalope Net held 27 sessions with 622 QNI and 1 QTC. Traffic: W7SOT 756, WA7GYQ 260, WB7NHR 105, K7TFW 39.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. New officers of Muscle Shoals ARC: K4JXS, pres.; K4OXU, vice pres.; WA4ZDW, secy./treas. New officers of Huntsville Area YL ARC (HAYLARC) are: WA4AXA, pres.; WB4TJE, vice pres.; WA4MLK, secy.; WA4DJW, treas. Montgomery ARC new officers are: N4AN, pres., WA4VXH, vice pres.; N4ANM, secy.; K4BTP, treas. HARC is holding Novice classes in code and theory in Jan. The BARC started their Novice and General classes in code and theory in Feb. Both these clubs offer a good opportunity to get your license. Contact the clubs for details. BARC had several get their Extras. WA4JDH, STM for Ala., suggests more stations originate traffic. All nets need the practice and the additional traffic counts. AENB CW Net (3.575) 254 QNI, QTC 83. Fone net (3.965) QNI 2018 in 35 sess, 142 messages. DRN5 was represented 100 percent from Ala. by W4CKS KA4GHA WA4JDH and WA4PIZ. BARC supplied communications for the third annual marathon run in Birmingham on Feb. 1, headed by WA4RNP. EC for Jefferson County, BARC will host the Southeastern Convention in B'ham May 16-17th at their annual hamfest. FCC will be there early in the morning on the 16th, so come then if you wish to take the tests. Remember to use the Form 610 dated Aug. 1980, the only form the FCC will accept. Traffic: (Jan.) WA4JDH 1110, W4CKS 137, WA4PIZ 81, K4AOZ 53, W4IBU 40, WA4JPK 24, KC4MT 22, WD4DHI 18, K4UMD 15, WB4TVY 10, KC4GS 6, W4CNG 6, N4CSX 4, WA4RMP 4. (Dec.) WA4PZ 77.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. ASEC: WA4PUP. STM: W4WXA. Chief OBS: W4BIA. Major section net schedules will be published on alternate months. Due to new commitments, W4PIM had to resign as GSN NM. K4EV assumes his duties. Tnx guys. W4LHH now retired & having a ball ragchewing & catching up on projects. S.E. DX Club installed following new officers at a recent banquet: WA4SSU, pres.; WA4VDE, v.p.; KV4I, secy.; WA4WQH, treas.; N4OE, act. mgr. W4RA, ARRL VP, presented League charter & ARRL flag to Coastal Area Repeater Society in Savannah and installed KA4BLS, pres.; KA4OCI, v.p.; WB4UGG, secy.; WB4ZBV, treas.; WB4KOZ, mal.; AB4B, act. mgr.; WA4KUC engr. WA4EGB recovering from open heart surgery. WA3NAZ Flight Instructor at Ft. Benning Flying Club. WB4HXE reports Metro Atlanta Emer. Net meets Tues. evenings at 2100 local on 22/82. N4UZ has 42 states on 160 cw. Please send Silent Key reports to me with copy of obituary if possible. Colquitt County HRS new officers are: W4NWB, pres.; K4UPP, v.p., AA4P, secy./treas.; WB4MYJ, trustee. Clayton County (CARES) Net meets Mon. at 8 P.M. on 147.03. Officers are: KA4AJR, pres.; WB4BOP, v.p.; W4NJQ, secy./treas. K4VHC has done FB job getting ARES program in section fully activated. All interested amateurs please check into the ARES net on Sun. afternoon on 3975 at 1700 local. Albany ARC doing well and new leaders are: WA4VYR, pres.; WD4ICC, v.p.; WD4IBT, secy.; KB4AJ, treas.; KB4OLQ, editor; WA4HGS WD4IBO KA4KBZ KA4KLN K4LPG KA4OIB K4XA, bd. Many clubs in the section providing classes for new amateurs. This is the true spirit of Amateur Radio. We are now approaching the season for violent weather. Please get involved when the need occurs. NWS & the citizens of Georgia appreciate what we do in providing the necessary communications when this WX arises. Remember the Columbus ARC Hamfest on March 28th & 29th. (Traffic: WA3NAZ/4 344, W4WXA 143, W4PIM 113, W4ELO 58, KA4ZM 55, W4GH 50, WB4NTW 40, WB4LBM 38, K4EV 28, W4FIZ 26, KA4ATM 25, WB4RUJ 22, W4HON 15, AA4EI 14, KA4PRD 14, W4BIA 10, K4BAI 6, W4CMX 6, K4JNL 6, K4PIK 4, N4UZ 2.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: N4WA. NM: N4BZH WD4DNC KF4U. Congrats to the DARC and the hamfest committee for a great National Convention! KC4CT now has 253 countries confirmed on his DXCC. OPARC invites checkins to the Korn Kobblers Net, Fri. at 9 P.M. EST. 1981 officers of GARS are: WA4PWF, pres.; KU4F, v.p.; WA4AXJ, secy., WD4GOR, treas.; N4AUY, rptr dir. "GARS Wars" FD show seen by NOFARS. KA4RRN, son of N4EC, now NCS on OFNS. Gulf Coast ARC meets 4th Mon. at Colonial Hills Civic Clubhouse. GCARC and HCARA planing area callbooks. 13 TARS members visited Thomasville EOC. WA4DSW W4CUJ & KC4N reworked 31/91 rptr with excellent results. W4WL wrapping up Novice classes in Citrus Co. Jax clubs providing comm for Good Turn Day and River Run. WD4GUZ & WA4WAX now upgraded to Adv & General respectively. K4DXR has new mini-quad and active on RTTY. West Volusia Co ARS installed vhf antennas at Red Cross shelters in Pierson & Seville. WD4MLQ sports new TR-7. Gulf Coast QCWA chapter is

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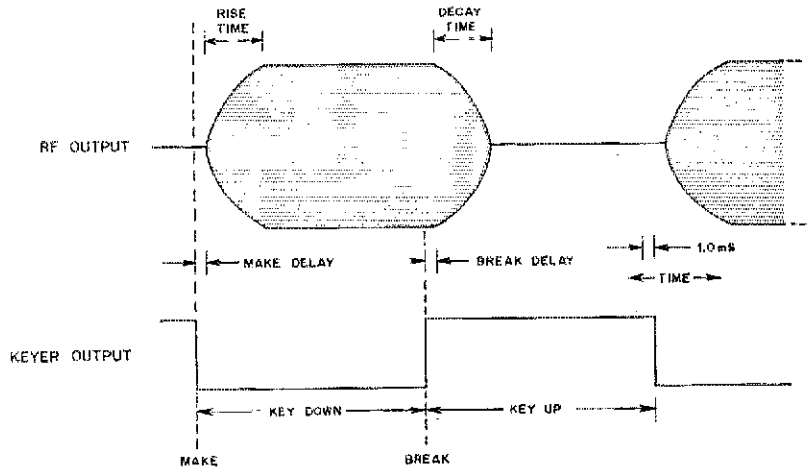
Shaping and Timing in CW Keying Systems



Detractors of Morse radiotelegraphy have been declaring it obsolete for decades, yet its popularity persists. Aside from the obvious pleasure it provides proficient operators, the cw mode has two principal advantages: efficiency and simplicity. Interestingly, the most exotic vhf/uhf communications (EME and meteor scatter) are conducted almost entirely with cw. The efficiency and simplicity of cw are closely related — because the signal is a simple two-state code, the ear can process it very efficiently.

The simplicty of cw carries over into equipment design, too. Unfortunately, some amateur and commercial designers, pursuing simplicity to its ultimate economic reward, have ignored certain fundamental principles. The most important of these is *shaping* of the rf keying envelope.

On-off keying is a form of amplitude modulation and generates sidebands either side of the nominal transmitted frequency. The amplitude of the rf signal rises from zero to full strength some time after the key is closed, and returns to zero some time after the key is opened. The lengths of these transition intervals and their waveshapes determine the bandwidth occupied by the signal. In the illustration, the envelope rises from zero to full amplitude in 5 ms. The waveform of the rise or attack interval resembles 90 degrees of a sine wave having a period of 20 ms, or a frequency of 50 Hz. Classical a-m theory tells us that the occupied bandwidth will be 100 Hz. If the waveform deviates from sinusoidal, harmonics are present and the bandwidth will be some integral multiple of 100 Hz. The decay time is just as important as the rise time; whichever is shorter or has the greatest harmonic content will determine the bandwidth of the emission.

League publications have long promoted 5-ms rise and fall times for cw keying envelopes. This figure was not chosen arbitrarily. Part 2.202 of the FCC rules defines the required (20 dB) bandwidth for an A1 emission as $B_n = BK$, where B_n is the necessary bandwidth in hertz, B is the telegraph speed in baud, K = 3 for normal communications paths and K = 5 for fading paths. A speed of one *baud* is one unit pulse per second. A unit pulse is the shortest signaling interval. In Morse telegraphy a dot occupies one unit pulse, as does a space. The keying waveform shown in the drawing is a string of dots each having a duration of 20 ms. Since there will be 25 such dots in a second, the keying speed is 50 baud. We are more accustomed to words-per-minute than baud when dealing with Morse code, so let's apply the conversion formula from the 1981 *Handbook*: wpm = dots/second × 2.4, or 25 dots/second × 2.4 = 60 wpm — a fair clip! We'd only use this speed under excellent conditions, so lets set K = 3. The 20-dB bandwidth is 50 baud × 3 = 150 Hz. This value differs from the 100 Hz derived earlier because the formula is based on a larger energy spectrum and recognizes that the keying waveform isn't likely to be purely sinusoidal. Also, we defined the rise and fall times to include the complete transition interval for ease of illustration. Measuring the rise and fall times according to the 10 percent to 90 percent convention shortens the times somewhat and tends to further reconcile the two bandwidth values. Given a 150-Hz bandwidth, how fast can we communicate over a fading (DX) path? Setting $B_n = 150$ and K = 5, solving the equation $B_n = BK$ for B produces a telegraph speed of 30 baud, which is approximately 35 wpm.

Analyzing the keying bandwidth from two approaches (envelope transition time and sending speed) shows that rise and decay times on the order of 5 ms are adequate for all practical ear-copy speeds. Some may argue that these signals won't allow the popular code-reading machines to be used to their full potential, but with careful processing the received signal can be regenerated for machine compatibility.

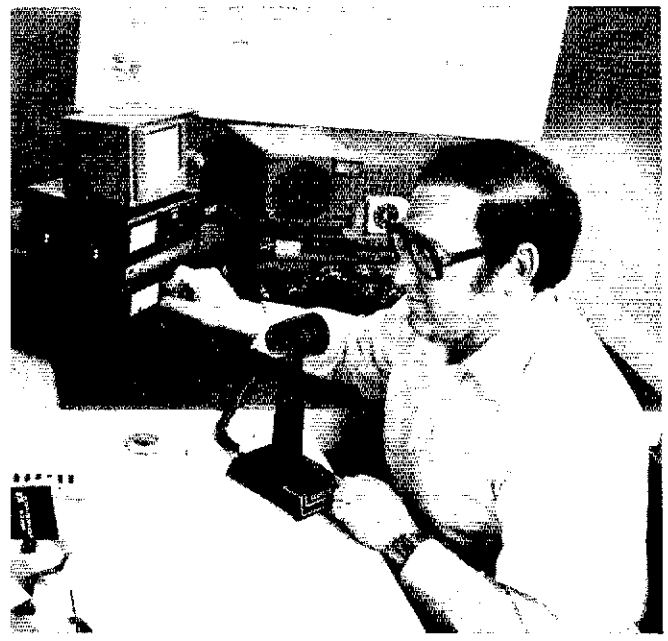
Many signals today (including those from some expensive manufactured gear) have transition times considerably shorter than the ideal 5 ms. Additionally, some of these are ridden with steps, spikes and horns, which further aggravate the problem. These signals occupy much more spectrum space than necessary and cause annoying key clicks several kilohertz away from the nominal transmitting frequency.

Assuming you've tailored your keying envelope for clean 5-ms rise and fall times, can you operate 75 Hz from the band edge? Not quite — the FCC equation gave us 150 Hz, but that's a 20-dB bandwidth figure. Part 97.73 requires all out-of-band energy to be down 40 dB, so unless you can look at your keyed output signal on a spectrum analyzer, you'd better stay in at least 200 Hz.

The illustration also shows a delay between the key closure and the beginning of the envelope buildup. This would seem to shorten the keying pulse, but there's an identical delay between the key opening and the beginning of the decay. Thus, the rf envelope is shifted in time with respect to the keying signal. Since there's no pulse-width distortion, the envelope delay can be ignored in simple applications. However, in a sequenced break-in (QSK) system where the keyer output must control T-R switching and muting, the timing becomes critical. The "make" delay is advantageous, in that it allows complete muting and antenna changeover before the rf signal starts building up. But if the station instantly reverts to receive status with the uplift of the key, the "break" delay may cause the transmitter to become unterminated or to dump rf power into the receiver — a most unpleasant circumstance. The point here is that one must know the behavior of his or her rf output signal in relationship to the keyer waveform in order to implement a truly effective station control system.

Chapter 11 of the 1981 *Radio Amateur's Handbook* contains a full treatment of modern keying circuits with applications to station control systems. Interest and activity in cw communications is increasing in two major directions. One of these is high-speed operation. To this end, chapter 11 features a buffered Morse keyboard and a deluxe PIN diode QSK system. At lower speeds, a significant signal-to-noise ratio improvement can be achieved with *coherent cw*, a specialized technique that is introduced in chapter 14. You'll want the new *Handbook* for up-to-date coverage of cw and all of the other facets of Amateur Radio. See it at your dealer, or you can order a copy directly from ARRL. — *George Woodward, W1RN*

For more information about *The 1981 Radio Amateur's Handbook*, see page 133 of November 1980 *QST*. To order, see page 151 of this issue.



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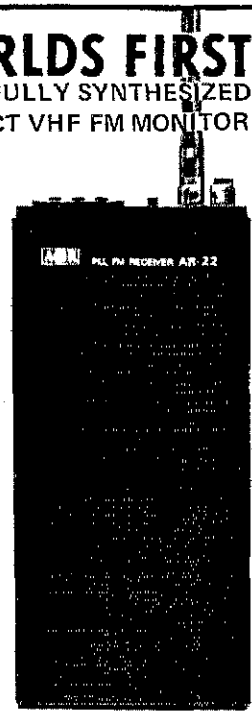

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being formed. Active on RTTY in Gulf Coast area are KA4FYD W4LMW & KT4Q. WA4CRI now D4RN rep for FMTN & N4PL is asst. mgr. K4RNS active on 2 meters. DBARA used 2m to provide marathon run comm. WA2GIN WB3EKM WA4OJY & WD4MFJ worked hospital casualty drill in Escambia Co. Santa was relayed via radio to hospitalized children thanks to Pensacola FM Assn. LMARS presented plaques to AB6I and WA4VLX for outstanding service to the club. Traffic: WD4IIO 436, W4SIZ 412, WA4CRI 388, WD4HIF 384, N4PL 363, WA4EYU 200, N4EC 113, WB4FJY 97, W4KIX 84, KF4U 81, W4MGO 76, KC4MM 74, WD4DIU 63, N4BZH 60, N4AXN 57, W4JL 56, WA2GIN 53, W4BSP 52, AA4FG 47, WB4EXA 39, WB4DTS 37, WA4STZ 34, WB4TZR 33, KA4ASJ 28, KB4T 25, WA4NMH 14, W3IDO 13, K4RNS 13, N4UF 13, W3QQ 9, N4BOY 4.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. January was a tight month for traffic with a total of only 9415 being reported by 45 stations and only 4 stations qualifying for BPL. In spite of this, we had a bumper crop of 15 stations qualifying for PSHR. Your SCM attended the Sarasota Hamfest January 17 and the QCWA luncheon there. This affair had good attendance and seems to be "catching on." We were, however, disappointed in the attendance at our SCM/STM/SEC Forum where the speakers and chairmen outnumbered all others in attendance. It did give AA4WJ a chance to practice his ARES presentation which he hopes to have smoothed up, with slides and all, for the Orlando bash March 15th. Our "relative new" Division Director, W4RH, gave a fine presentation on ARRL and Regulatory matters at the QCWA luncheon and showed a lot of the "old Larry Price expertise" at fielding questions from the floor. W3CUL reports she is all ready for the Tampa Fair, and its several thousand messages, which begins February 7th. KE4O reports he has a new 2 kW linear, which he is finding very useful on 4RN and EAN liaison chores. We welcome K4BR, recently retired and settling in Clearwater. He is father of WD4COL, one of our prominent traffickers and high-standing PSHR. N4APZ is wife of WD4COL. Both she and K4BR are proud owners of new Azden PCS 3000 rigs. Pinellas County amateurs are gearing up for the annual Festival of States activities in St. Petersburg. The Night Parade is set for March 31st while the Day Parade is April 4th. Each of these events takes about 50 radio amateurs to provide safety communications. The Gasparilla Parade in Tampa, February 9th, will probably be supported by Tampa Bay Repeater Association, as usual. In April, Emergency Coordinators will be contacting each Red Cross Chapter to solicit a message to be sent to ARC Convention, W4PAY, Fairfax, VA, congratulating Red Cross on their 100 years anniversary. There are 3000 ARC Chapters in the USA, and we want a message from each one. We will do our part to get all those chapters in our section. AA4WJ is coordinator of this effort. He will be asking the ECs to do the legwork at the local level. Let's help him get the job done right. Let's route the messages into the National Traffic System and give NTS a chance to show 100 percent delivery of all 3000 messages. Traffic: W3CUL 3294, W3VR 784, K4SCL 480, WA4PFK 473, WB4FVV 423, K4TH 419, WD4AWN 405, W4NFK 368, WD4COL 293, K4ZK 272, NC4H 214, W4GPL 188, WB4WYG 175, WA4EIC 151, WB4AID 150, KA4ASZ 142, N4KB 106, KE4O 105, WB4PIB 101, N4ET 97, VE3BSY 90, KA4LNA 75, KB4OW 64, WD4CHO 55, W4ESH 55, W4LX 50, K4EUK 48, W3TLV 44, W4DVO 41, WA4HXU 40, WB4GCK 36, WD4APM 34, AA4WJ 29, KA4BBA 20, WA4IOG 13, W4AZJ 12, WB4GSV 12, W4SMK 12, WB4SNX 11, WA4BYT 9, WB4KYE 9, W4UIO 7, W1NJM 5, W4JM 2, WD4LWT 2.

WEST INDIES: SCM, Julio Negroni, KP4CV — Plans for the West Indies Section upcoming convention are running at high gear. SE Director will be the dinner speaker and an interesting program of papers, speeches and forums has been prepared. STM NP4D will be recipient of a special award for his fruitful efforts in the establishment of operational traffic nets in the section. There is a growing interest among WINS and WINC participants to get PSHR and BPL. OBS KP4DJ will experiment with a novel design by KP4EMX which will facilitate OBS retransmissions. WP4BDS is participating in the Novice Roundup. PSHR: NP4D 88, WP4BCV 47. Traffic: NP4D 230, KP4DJ 104, KP4U 88, KP4FBT 65, KP4EMX 62, KP4EMY 9.

SOUTHWESTERN DIVISION

ARIZONA: SCM, W.L. Haskell, AC7D — SEC: N7EH. STM: W7EP. London Bridge RC '81 officers: W7LVB, pres.; W7YHC, vice pres., WB7FXX, secy.; KA7BTC, treas. CC RC '81 officers: KA7BHF, vice pres., N9AGM, vice pres.; W7YS, secy/treas.; WA7NXL, editor. N7FU assgnd EC, is also inst. Novice classes at CC ARC. KA7HNN is now a Tech. WB7QEG is now a Gen. Congrats. AI7Z will be in Saudi Arabia by the time you read this. Keep your ears pealed if your looking for a HZ! On the 24th of Jan. '81, the AZ Cactus Net reached a high of 2400 consecutive days of operation — 3915 kHz, 0100 M-F, 2230Z SSu. They will soon be a member of the NTS. W7EP, AZ STM, wkg out detail. If you haven't heard, Dec. 15, 1980 all amateur applications MUST be made on the new Aug '80 version of FCC form 610. Do not use obsolete forms. Regarding Station Activity Rpts, CD-210, specifically related to TTC-when sending your rpt by mail or msg, pse provide breakdown, ie, Orig, Rec, Sent, Dlvd es total. This takes little time, but sure helps ur SCM in rptg to ARRL. Your SCM had a little problem with his "ticker" during this rpt period; many tnx for the LL's and especially K7JKM who picked up all of the ttc rpts for the mo. The AAA5 RC, Phnx (fast Scan A-5) is in the process of coord. with ARA for installing their ATV rept at White Tanks-an ideal location. A-10 Net: QNI 1116, QTC 158; SWN: QNI 301, QTC 246. Traffic: W7EP 163, AF5Z 97, W7AMM 76, W7OIF 61, K7UXB 49, K7KVV 42, WA7KOE 39, K7MC 36, W7LVB 23, KB7HA 20, KA5DDW 18, K7NMO 16, K7NTG 15, K7JKM 13, WA7NXL 11, AC7D 9, N7EH 7, WB7QOM 4, WA7WEB 3, W7DQS 2.

LOS ANGELES: SCM, Stan Broki, N2YO — ASCM: N6UK. SEC: WB6FAK. STM: W6INH. Congratulations to the following new appointee's: N6ZH DEC, WB6ZAL EC, KB6EX EC, WA6LAU EC, WB6PWA DEC, AK6Y EC, W6PGM EC, KE6B EC. The following OES stations have been established. KB6FB KD6BX WD6AUW KK6L. KB6FC has a new QTH at 1228 Berkeley St. #1, Santa Monica, CA 90404. I recieved club bulletins from the following clubs this month. W6SD San Fernando Valley ARC, W6VPZ Northrop RC, So. Cal. ATV Club, W6OFK San Gabrial Valley ARC, K6AA United Radio Amateurs Club, W6KA Pasadena ARC, Western Amateur Radio Association, W6TRW TRW ARC, So. Cal. DX Club, and W6VIO JPL ARC. Keep the bulletins coming and please underline in RED items you would like to see in this col-

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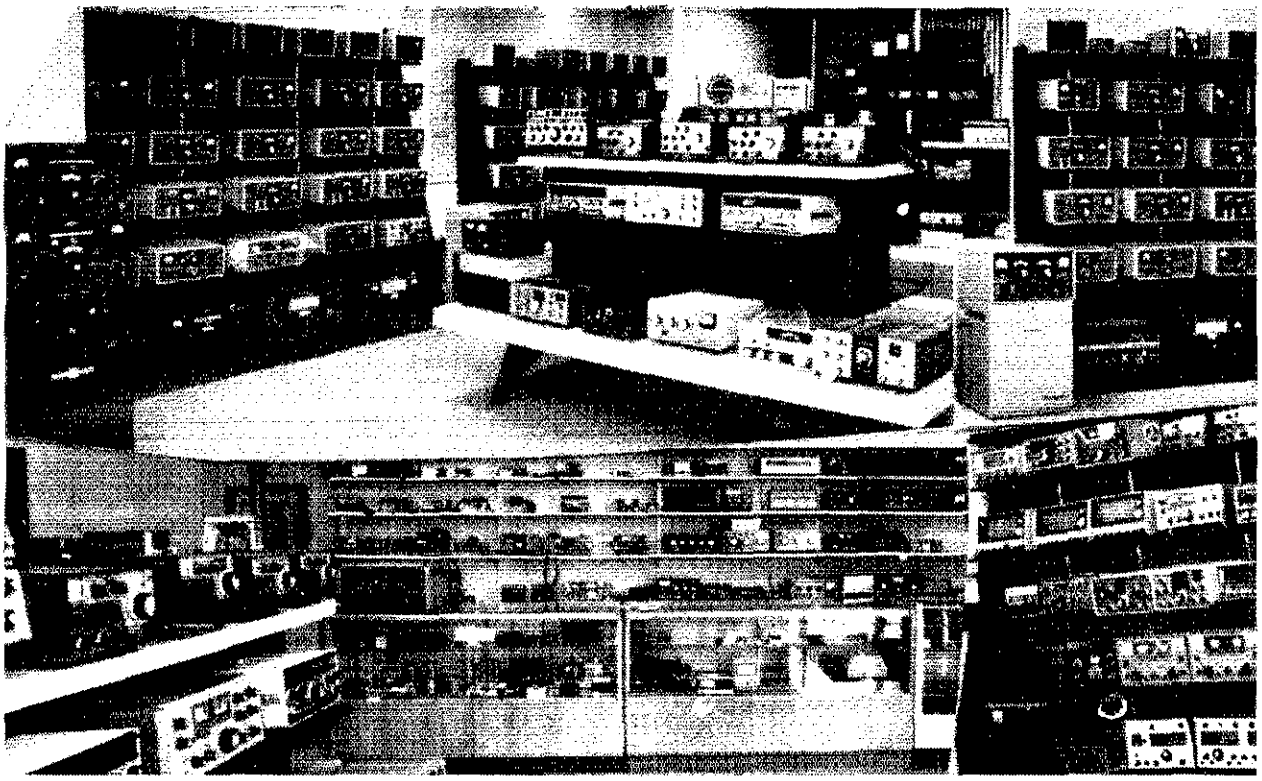

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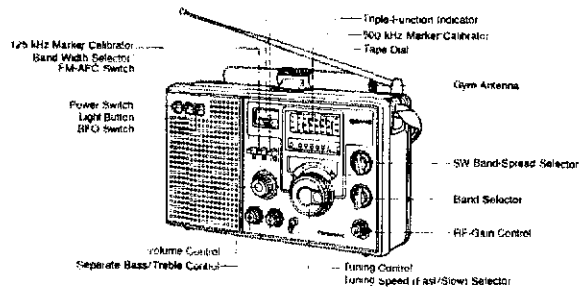

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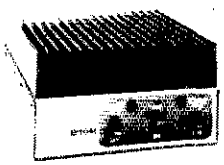

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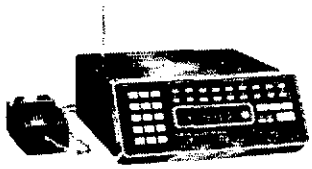

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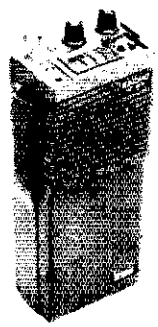

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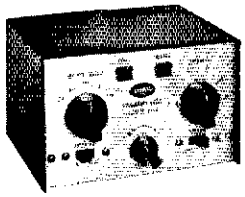

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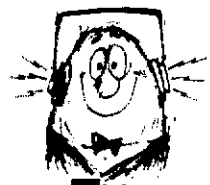

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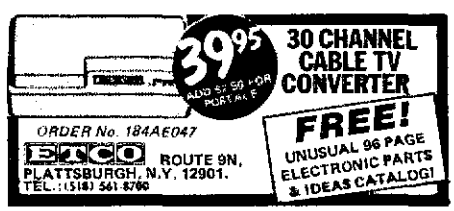

umn. New officers in some of the clubs took office in Jan. So. Cal. DX Club new president is N6NI, W6VIO president is N6MP. Pasadena Radio Club's new president is KD6C. The new director for the L.A. Council of Amateur Radio Clubs is WB6ZEP. Congratulations to all the new officers. If I have missed some, please let me know. OO reports this month: N6HE 3, K6CL 6 W6TOG 38, K6KA 80. K6CL recieved a card from one individual thanking him for hearing a problem with his HW 101 he was not aware of. With transceivers, the OO's job is a real help. Keep up the good work. Traffic: (Jan.) W6INH 168, KB6OT 109, K6OWA 91, K5DY 65, KB6FC 62, WA6OCM 59, K6INK 41, N6PZ 39, WA6LVO 34, W6BWG 31, K6CL 26, W6NKE 24, KT6D 21, WB5EKU 20. (Dec.) WA6YEO 41, N6HE 10.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. STM: KA6A. SEC: W6UBO (now an "Extra"!) New Asst STM: WD6CSL. New ECs: WA6HOM (Riverside Red Cross), W6ZZZ (SB Red Cross), WB6BZZ (SB RACES Dist. #4), WB6SEL (SB RACES Dist #5), KS6T (SB RACES Dist #8). New OESs (& AESs): WB6OSP N6ADV WA6CNN WA6PTU. OC Council ARO new officers: WB6GCT, chmn.; KA6HNY, vice chmn.; WB6DCB, secy/treas. Desert Waves ARC (Blythe) new officers: KA6KPX, pres., WA6VHB, vice pres.; N6ANL, treas.; KA6HCE, secy. Hughes Fullerton EA ARC new officers: N6MN, pres.; W6UYW, vice pres.; W6XT, treas. WA6JKZ, secy. Barstow ARC new officers: KA5FDX, pres.; WD6BNG, vice pres.; WA6OVW, secy/treas. Anza Valley Radio Club new officers: K6VDS, pres.; KA6FJC, secy/treas. Counties Amateur Teleprinter Society (SCATS) new officers: K6RD, pres., WA6LNH, vice pres.; WB6INV, treas.; WA6RIK, secy. Teenage AR Society pres. WA6ZGQ, invites young hams on Thur 8 P.M. Net (WB6YPX/RPT — 147.315/.915). The Committee For Legal Maritime Mobile Amateur Radio Operations under the chmnship of N6OX has been successful in discouraging illegal operators at sea with the cooperation of many maritime mobile nets. OES KA6NLY headed 20 hams who provided comm for the Crosby So. PRO-AM Golf Tournament (for the benefit of Hoag Hospital in Orange County.) EC W6RF reported over 60 hams in the section lead by WA6SLP provided comm for Parker 400 Off-Road Race. Please note there are several changes in important Calif NTS nets since last year. Pacific Area Net — 14.3175 MHz 11:00 A.M. (PAND/1) & 2:30 P.M. (PAND/2). 3675 kHz 8:30 P.M. (PANE). Sixth Region Net: 7275 kHz 10:45 A.M. (RN6D/1) & 1:45 P.M. (RD6D/2) & 3:30 P.M. (RN6D/3). 3655 kHz 7:45 P.M. (RN6F/1) & 9:30 P.M. (RN6F/2). So Cal Net 3598 kHz 7:00 P.M. (SCN/1) & 8:15 P.M. (SCN/2). 147.645/.045 9:00 P.M. (SCN/V). 3637.5 kHz (SCN/RTTY). ARES members are needed as spotters for the Gordon Bennett Balloon Race April 25-26 with communications headed by AK6Y; if intrested in helping, contact SEC W6UBO. Traffic: (Jan.) N6ANL 404, KN6C 275, WB6QBZ 216, AI6I 160, K6ZCE 123, W6NTN 95, WD6CSL 79, WA6ODA 73, KA6A 92, KA5FDX 47, W6RE 45, KA6HNY 14, K6WI 12, KA6HJK 6, WA6WZO 3, WB6IGL 2. (Nov.) N6AED 298.

SAN DIEGO: SCM: Arthur R. Smith, W6INI — STM: N6GW (222-5575). SEC: W6INI (273-1120). Asst SEC: N6RD (224-1574). No. County Tfc Net held 30 sessions handling 54 msgs. The net meets daily at 2000 on Palomar ARC's rptr, 146.13/73. This net provides excellent opportunity to learn traffic handling. Try it! ARC of El Cajon officers for 81 are: AD6O, pres.; WB6VSL, v.p.; WA6COE, secy.; WB6PIE, treas. The club gave its "Ham of the Year" award to WA6COE. K5WTA is new OBS. He will distribute bulletins via RTTY. WB6ERF has upgraded to Extra. WB6HMY busy collecting rainfall reports for the weather service. KM6I has TCC assignment to EAN. New call signs: KA6KVS to N6DSU, KA6IZS to N6DSX. San Diego QCWA officers are: K6AM, pres.; K6UV, v.p.; W6OSD, secy.; N6LY, treas. "Plain language" regulations proposal, Docket 80-729 merits your close attention. I will be available to clubs during April and May to discuss this in detail, if requested. SANDRA's new repeater building on Mt. Otay is nearing completion. It is a feat of perserverance by a dedicated few lead by pres. WA6JTB. Traffic: KT6A 437, N8GW 201, W6HUJ 148, KM6I 134, K6HAP 33, W6DEY 27, N6AT 16, WA6UFY 4, W6UQF 1.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — SCTN Data Commun. mtg. held on RTTY and computers. Real need outlined by OES head in crisis relocations. Joint stds set for multi-agency use. Exciting new field for publ. svc. ops... SBAR Co. ARES signs agreement with sheriff, CHP to follow. Thousand Oaks ant. ordin. has Conejo Vly ARC activated under WA6ZAX/K6UEF + help from attn. clubs and HQ... New 23cm rptr on Red Mtn., Ventura by WA6EJO et al. New ATV interest group formed in SBAR via N6CFO. Authors: W6RIC - 6 page primer "Using A.R. in Emerg"; K6YD - Guide for So.Cal Net/2 tfc NCSs; WB6UNH - 5 x 8 "Emerg. Comm. Team" handbook for A.R. employees of Industrial firm. OO. W3TO busy issuing advisories to careless hams. PSHR: W6POE 14, K6YD 73. Traffic: W6ZRR 104, K6YD 94, N6YH 8.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst. SCM: AE5C. STM: W5VMP. SEC: W5GPO. NMs: AA5J KK5B AE5I N5BT. The Texas Slow Speed Training Net meets nightly (M-F) on 3745 kHz @ 1900 local time and needs your QNI. This is a fine way to learn cw tfc. handling. Net Mgr. is WA5KHE. D/FW QNI 575, QTC 124/114 in 31 sess. TSN QNI 342, QTC 41 in 31 sess. New TSN mgr is WD5JIM. Congrats to W5HMR who retires as TTN NM. Great job! ARES nets: Graham area: 147.84/.24 @ 1930L/Thurs. Wichita Falls area: 146.34/.94 @ 1900L/Mon. The Panhandle Tfc. Net meets daily on 3933 kHz @ 0000Z. *The net roster includes over 200 members*, with an average QNI of 50+; a real good outlet for your Texas/Oklahoma panhandle tfc. The KCARC of Abilene now has a permanent meeting place: the YMCA, second Thurs. @ 1900L. New Dallas ARC officers: WB5RBM, pres.; WB5FDF, v.p.; WB5JZU, secy., KB5DR, treas. New officers for the West Texas ARC (Odessa): KB5FP, pres.; KB5MM, v.p.; N5AOU, secy/treas.; N5AOU, editor. Red River Valley ARC (Paris) officers: WB5NGB, pres.; KA5CJJ, v.p.; WB5JFL, secy/treas.; WB5ZEH, act. Panhandle ARC (Amarillo) officers: WB5IZH, pres.; W5MVJ, v.p.; WD6GOX, secy.; W4YID, treas. If your county has no ARES program, contact W5GPO via the TTN (Texas Tfc Net 3961 @ 0000Z, dy) who is our Section Emergency Coordinator. He will work with your group and get things rolling for you. Congrats are in order to the 17 operators who made PSHR (Public Service Honor Roll) this month. This is a new record for our section! Your SCM, SEC, several DECs and ECs met in Wichita Falls on Feb. 12th with the Texas Dept. of Public Safety to formulate an AHES-DPS communications plan for the

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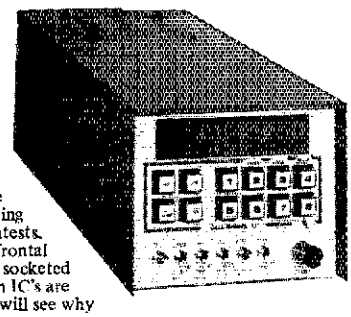

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N.TX Section. Full details of this meeting next month in this column. The Panhandle ARC of Amarillo has been authorized by the city to occupy the old DPS Hq. bldg. for a meeting place, EOC, and club station (W5WX). A 300ft tower goes with the bldg!!! We should all be so fortunate!! This points out the advantages of maintaining a good ARES/Public Safety relationship between the amateur community and gov. officials. While I am on the subject, the Texas Panhandle region is probably the best organized, best trained, best equipped network of ARES units in the entire country. Truly a model for all to copy! Traffic: W5TI 357, K5BNH 231, W5CTZ 203, N5BT 169, AA5J 153, WD5EUE 139, WD5JYI 102, KB5UI 98, WA5KHE 96, KA5AZK 70, KA5IWF 60, KK5B 50, N5CEK 45, W5HMR 43; WA5QFD 43, W5GPO 35, WD4SIH 35, WB5BKM 32, WB5LAT 30, W5VMP 20, WB5YYK 19, K5PC 18, AE5I 13, AJ4F 12, W5TAH 8, W5ERT 7, K5QKM 7, K5HGX 2.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Asst SCM: Ray Miller, W5REC. January was moderately quiet as far as activities went in Oklahoma. Hope everybody is getting their emergency gear ready for spring storm season. W5DDI and WA5VHN Silent Keys, both will be missed. KA5KAV, new call at Boswell. Know of several classes under way, and each trip to examiner seems to bring someone new on the air or upgraded. Lawton-Ft Sill Hamfest, April 4-5; Broken Arrow Swap Meet, May 9th, Ham Holiday '81, July 24-26. C.u. there?? Traffic reports from 25 stations, 2 OOs reported, 2 OBS reports. W5AS now has pacemaker keeping him regular. FB. Mid-winter meeting of Okla. Repeater Society at Altus was well attended by an active and interested group. FB discussions and demo's. Next meeting at Ham Holiday '81. 6 Okla. traffic nets met a total of 141 times in January and averaged 18 QNI and 5 QTC per session. Traffic: WB5NKC 360, KF5A 160, W5REC 141, W5RB 139, WD5IRB 120, K5CXP 110, WA5RKU 94, WB5NKD 89, WA5OUV 87, KB5EK 86, WD5IFB 75, W5AS 66, W5IQL 60, W5VLW 56, WA5FSN 51, W5UYH 47, W5VXU 43, W5SUG 42, WB5ELG 34, K5CAY 41, W5DDI 31, WB5EAY 27, W5VOR 26, NØIN 7, W5FKL 6.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — ASCM/STM: N5TC. SEC: AK5N. With the holiday season past, the traffic totals were down this month, but thanks to the 34 stations who reported. K5DL, OO, sent in a good report of activities monitored on the new 10 MHz band. The objective is to determine how much of the band is likely to be useful for amateur operations when it is made available. WA3OVC is now KN5H and is active with the TDXS. WD5JJS, OFS, OVS, reporting this month. KA5KPT and KA5HOM have been upgraded to tech. WA5QCP reports working VP9WB for a new country on 6-mtr. I am very pleased to report that WB5RFQ is the new EC for Washington County. WA5RVT WD5AAH and N5FN attended a joint meeting of the Bryan and Texas A&M ARC. The three of us comprise one of the Emergency Response Teams organized under the Texas DPS. A demonstration of this concept was presented along with a talk by N5FN. Welcome to KA5KRI KA5KRH and KA5KSD. KA5KRI received his Novice and upgraded to Tech two days later. The Brenham ARC celebrated one year of ARRL affiliation with a banquet. KB5KZ reports he enjoyed working the CD Party on phone. A number of Houston area hams supplied communications for the Houston Marathon. They were organized by W5CKC. Harris County DEC. WD5JIM elected NM for TSN. K5RG reports overhauling his SB 303 and that his 2-Mtr mobile rig was "ripped off". The annual 7290 Traffic Net picnic will be held in Kerrville on April 24, 25 and 26. For more info, contact the 7290 Traffic Net, P.O. Box 126, New Braunfels, TX 78130. Traffic: WB5YDD 405, W5KLV 402, W5SHN 136, KB5TC 109, WB5MMI 102, W5SBE 86, W5BGE 80, W5TFB 80, WA5RVT 79, K5PE 73, WB5YRV 64, WD5JIM 53, KB5NX 50, K5RG 40, WD5GKH 26, KA5BSN 25, N5FN 24, KA5GYJ 22, KA0CSM 14, WB5EFJ 14, AK5M 14, K5HZR 12, WD5AAH 11, KM5J 7, WD5DQR 6, KD5O 3, K5RVF 2, KB5KZ 1.

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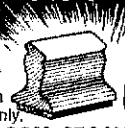

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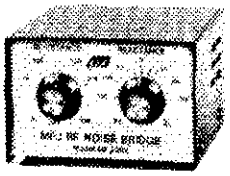

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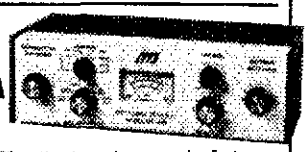

One of the finest 300 watt antenna tuners made. Features Dummy load, SWR meter, forward and reflected power meter, antenna switch, balun. Matches coax, wires, balanced lines from 1.8 to 30 mhz.

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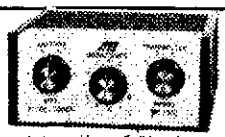
OPTIONAL AC ADAPTOR 7.95

MFJ-900 ECONO TUNER



Matches coax, random wires, balanced lines. Full band coverage 1.8 to 30 MHZ. Up to 200 watts RF Output. Efficient airwound inductor.

Reg. 44.95
Add 4.00 shipping and handling.
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Lets you zero in and notch out interfering signals at the same time. Primary filter has tunable peak, notch. Built-in Noise Limiters for SSB, CW. Inputs for 2 radios, switch selectable. Easy installation requires no modifications for most rigs.

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Regency HR-212
Regency HR-2B
Regency HR-312
Regency HR-2MS
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Yaesu FT 202R

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146.01T	
6.61R	
6.04T	6.52R
6.64R	6.55T
6.07T	6.55R
6.67R	6.58T
6.10T	6.58R
6.70R	6.94T
6.115T	7.60T
6.715R	7.00R
6.13T	7.63T
6.73R	7.03R
6.145T	7.66T
6.745R	7.06R
6.16T	7.69T
6.76R	7.09R
6.175T	7.72T
6.775R	7.12R
6.19T	7.75T
6.79R	7.15R
6.22T	7.78T
6.82R	7.18R
6.25T	7.81T
6.85R	7.21R
6.28T	7.84T
6.88R	7.24R
6.31T	7.87T
6.91R	7.27R
6.34T	7.90T
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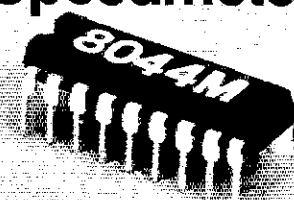

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* M-480: MemoryMate	124.95
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8044: Keyer-On-A-Chip (ARRL Hdbk '77-'81)	14.95
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(1) Advertising must pertain to products and services which are related 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 — W7GAO/6 Box 530, Santa Rosa CA 95402.

CQ and QST 1950-1978 also 73 and Ham Radio issues for sale. Two dollar minimum order. Cost 50 cents each 1976 and later issues, all other 30 cents each including USA shipping. Send, s.a.s.e. chronological order and payment to W6LS. 2814 Empire Ave., Burbank, CA 91504. Available issues and refund sent within one month.

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, $12 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.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, Box 192, Garrison, NY 1052.

THE Veteran Wireless Operators Association, a nonprofit organization of communications people founded in 1925, invites your inquiries and application for membership. Write V.W.O.A., 118 River Drive — Bay Ridge, Annapolis, MD 21403.

ANNUAL EVANSVILLE TARS Hamfest May 17, 1981. Vanderburgh County 4-H Fairgrounds. Open at 6AM CDT. All indoors except flea market. 2 seminars: Indiana SCM on traffic handling and Bob Heil on 2-meter repeates and 10-meter fm. Tasting table for the ladies. Admission $1 per adult. Indoor tables $5 each. Flea market $1.50. Talk-in 147.75/15 or 146.19/79. For table reservations and other info contact Tom, 2851 Wayside Drive, Evansville, IN 47711.

MAY 17 & Sept. 20, LIMARC sponsor ARRL HAMFAIR '81 at Islip Speedway Islip Ave (Rte. 111), Exit 43 Southern State Parkway. Over 350 exhibitors including manufacturers and dealers. No reservations needed. Call at nite for info. Sid Wolin, K2LJH, 516-379-2861 Hank Wener, WB2ALW 516-484-4322.

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The 18HT "Hy-Tower" is the only full size, automatic band-switching vertical antenna for 80 thru 10 meters on the market today! It features a unique stub decoupling system which effectively isolates various sections of the antenna so than an electrical ¼ wavelength (or odd multiple of a ¼ wavelength) appears on all bands. As a result, the VSWR is less than 1.5:1 at resonance 80 thru 10 meters.

Typical 2:1 VSWR Bandwidths are:

- **700 kHz on 10 meters**
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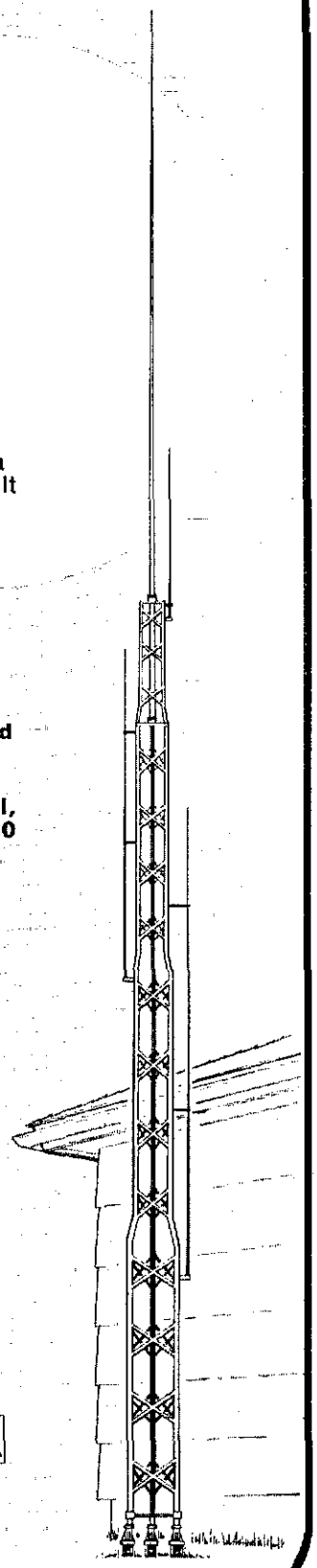
- **250 kHz on 80 meters**

With the addition of a base loading coil, the 18HT also provides exceptional 160 meter performance!

Many 18HT's have been in service for 15 years or more and they still deliver "original spec" performance. This enviable record is the result of Hy-Gain's no-compromise attitude toward materials and construction. The 18HT is complete with a 24-foot galvanized tower that supports the entire system without guys in winds up to 75 mph. The top section consists of dependable 6063-T832 taper swaged aluminum tubing that extends the antenna to an overall height of 50 feet. A special hinged base allows complete assembly on the ground and permits easy raising and lowering.

Hy-Gain offers a wide selection of vertical antennas as well as a complete line of beams and crank-up towers. Write for detailed information today!



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Pre-assembled: Model 370-11

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Complete with • wire • traps • end insulators • 50 ft RG-8/U, PL-259 connector • heavy duty cast aluminum and steatite center connector.

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ARX2B	2 mtr. Ringo Ranger	$ 31.50
ARX450	450MHz "Ringo Ranger"	$ 30.00
A147-11	11 Element 146-148MHz Beam	$ 30.00
A147-22	22 Element "Power Pack"	$ 95.00
A144-10T	10 Element 2 mtr. "Oscar"	$ 37.00
A144-20T	20 Element 2 mtr. "Oscar"	$ 52.00
A2148	14 Element 2 mtr. "Boomer"	$ 56.00
A214FB	14 Element 2 mtr. FM "Boomer"	$ 56.00
ARX2K	135-170 MHz "Ranger Kit"	$ 18.00
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TH5DX	5 Element Triband Beam	$ 199.00
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105BA	5 Element 10 mtr. "Long John"	$ 95.00
155BA	5 Element 15 mtr. "Long John"	$ 145.00
205BA	5 Element 20 mtr "Long John"	$ 235.00
402BA	2 Element 40 mtr. Beam	$ 175.00

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4BTV	40-10 mtr. Vertical	$ 79.00
5BTV	80-10 mtr. Vertical	$ 99.00
BBLT-144A	5/8 Wave 2 mtr. Mobile Trk Lip-17' Coax	$ 30.00
HO1-10	10 mtr. Mobile Trk-17' Coax	$ 26.00
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210XL	6 Band 18 Channel Crystalless *(-25)	$ 209.00
220	7 Band 20 Channel Crystalless *(-25)	$ 259.00
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Increases range up to 10 times

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45G	10' section	$ 82.00
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BX-48	48' Self Supporting (6 sq ft)	$ 199.00
BX-56	56' Self Supporting (6 sq ft)	$ 259.00
HBX-48	48' Self Supporting (10 sq ft)	$ 259.00
HBX-56	56' Self Supporting (10 sq ft)	$ 335.00
HDBX-40	40' Self Supporting (18 sq ft)	$ 249.00
HDBX-48	48' Self Supporting (18 sq ft)	$ 299.00
FK2548	48' 25G Foldover Tower	$ 875.00
FK2558	58' 25G Foldover Tower	$ 875.00
FK2568	68' 25G Foldover Tower	$ 965.00
FK4544	44' 45G Foldover Tower	$ 1100.00
FK4554	54' 45G Foldover Tower	$ 1225.00
FK4564	64' 45G Foldover Tower	$ 1335.00

Freight paid on all foldover towers

Prices 10% higher west of Rocky Mountain states

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3/16	EHS Guy Wire (3990 lbs)	1000 ft.	$ 125
1/4	EHS Guy Wire (6650 lbs)	1000 ft.	$ 155
5/32	Cable	100 ft.	$ 20

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RG8X	Berk-Tek mini 8 low loss foam	$14/100 ft	$60/500 ft
RG8U	Columbia Super Flex	$26/100 ft	$120/450 ft

HYGAIN CRANK-UP TOWERS

HG37SS	37' Self Supporting	$ 529.00
HG52SS	52' Self Supporting	$ 839.00
HG54HD	54' Self Supporting Heavy Duty	$ 1629.00
HG33MT2	33' Side Support	$ 649.00
HG35MT2	35' Side Support	$ 399.00

Crank-up towers shipped direct from factory to you

ROTORS AND ROTOR CABLE

Alliance HD-73 (10.7 sq ft)	$ 99.00
Alliance U-100	$ 38.00
C.D.E. CD-45-2 (8.5 sq ft)	$ 99.00
C.D.E. Ham-4 (15 sq ft)	$ 159.00
C.D.E. Tailtwister (30 sq ft)	$ 229.00
8 Conductor Heavy Duty Rotor Cable 2 # 18 and 6 # 22	per 100 ft. $ 25.00
8 Conductor Extra Heavy Duty Rotor Cable 2 # 16 and 6 # 22	ft 35¢

Shipping not included.
Prices subject to change without notice

THE WABASH County ARC will hold its 13th annual hamfest on Sunday, May 17, 1981 from 6:00 AM until 3:00 PM at the Wabash County 4H Fairgrounds, Wabash, IN. Admission will be $3 at the gate or $2.50 advance. There will be plenty of food and parking. Also will have camping spaces available for Saturday night. Talkin on 7.63/.03 or .52 simplex. For tickets or more info send ans SASE to Dave Spangler N9ADO, 45 Grant St., Wabash, IN 46992.

SANTA MARIA Amateur Radio Swapfest June 14, 1981. Sponsored by the Satellite Amateur Radio Club. For info on awards, swaptables, dinner and much more, mail inquiries to: Santa Maria Swapfest 1600 E. Clark 49, Santa Maria, CA 93455.

MAY 2, 1981 22nd STARC Ham Fest at the Treadway, Route 17C, east of Owego. Flea market, vendors, talks, women's program. Lunch available at several sites. Gate $2. Evening Buffet $10 which includes admission to day's activities but early reservations by April 15 are advisable because of limited seating. Info: D.R. Vasilow, W2EWO, Star Rte. 1, Box 35 Owego, NY 13827, 607-687-1515. Hotel accommodations Debbie Chambers 607-687-4500, the Treadway. Talk-in 16-76, 52. Camping nearby at the Hickories.

ILLINOIS: Civil Air Patrol, Waukegan Squadron, First Annual Spring Hamfest. Lake County Fair Grounds, Ill Rt 120 & US45 April 18 at 0700-1700. Large indoor flea market, food, free parking. Donation $2. Tables $1.50 first come basis. Talk in on 146.94. Further info 312-244-2134 or SASE Ed Rehm W9NXR 637 Emerald, Mundelein, ILL 60060.

PENN-CENTRAL Hamfest May 3rd, 1981. Woodward Twp Firehall Route 220 south Williamsport, PA. Open 8AM-? Set-up 6AM vendors talk-in 146.13/.73 and 146.52 Advance tickets $2.50, at gate $3. Send SASE for info and tickets to: K3QDA Richard Sheasley RT 1, Linden, PA 17744.

YORK COUNTY Pa. Hamfest new location new date. York Fairgrounds September 27, 1981. 250 inside tables 500 tailgate spaces. Make reservations now. Information contact K3POR Leroy Frey 170 S. Albemarle St., York PA 17403.

QSL Cards/Rubber Stamps/Engraving

TRAVEL-PAK QSL Kit — Converts Post Cards, Photos to QSLs. Stamp brings circular. Samco, Box 203, Wynantskill NY 12198.

DELUXE QSLs. Samples 25c. Petty, W2HAZ, P. O. Box 5237, Trenton NJ 08638.

DON'T buy QSL cards until you see my free samples — or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. Little Print Shop, Box 9848, Austin TX 78766.

DISTINCTIVE QSL's — Largest selection, lowest prices, top quality photo and completely customized cards. Make your QSL's truly unique at the same cost as a standard card, and get a better return rate! Free samples, catalogue. Stamps apreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

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QSLs by W7HUL. Samples 50c. 8511 19th Ave N.W., Seattle, WA 98117.

FREE samples — stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSL cards — Eyeball cards — Rubber stamps — Name tags — Emblems — gift items — free catalog — Rusprint, Box 7575, Kansas City, MO 64116.

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QSLs samples and catalog 50c. Ritz Print Shop, 5810 Detroit Ave., Cleveland, OH 44102.

CLUB Call pins: 3 lines, 1-1/4, $1.55 each. Call, first name and club, colors: blue black or red with white letters. Catalog — Arnold Linzner 2041 Linden St., Ridgewood NY 11385.

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FREE Samples — Stamp appreciated. Samcards, 48 Monte Carlo Dr., Pittsburgh, PA 15239.

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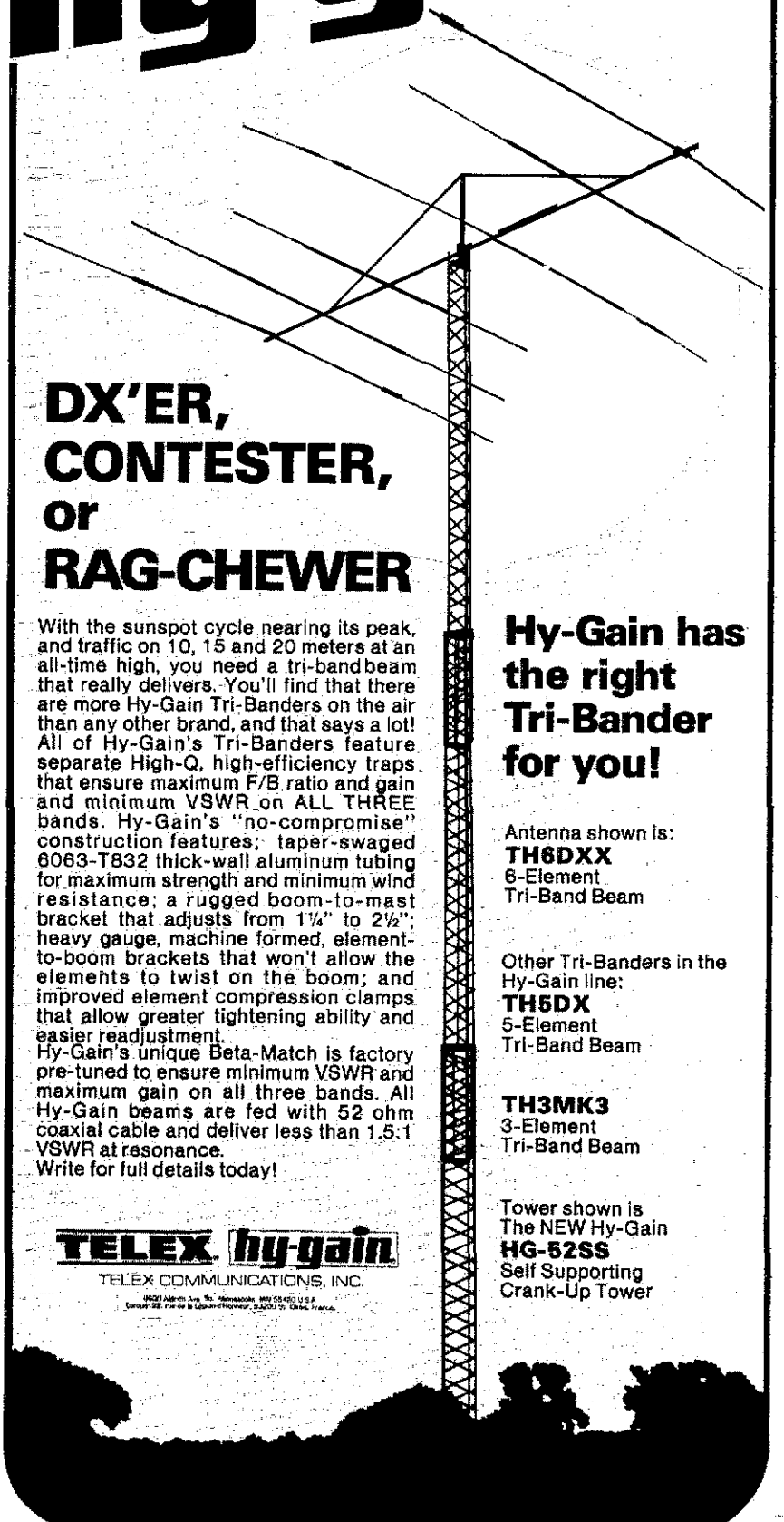

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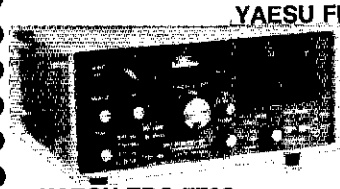

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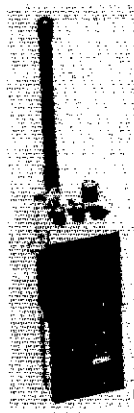

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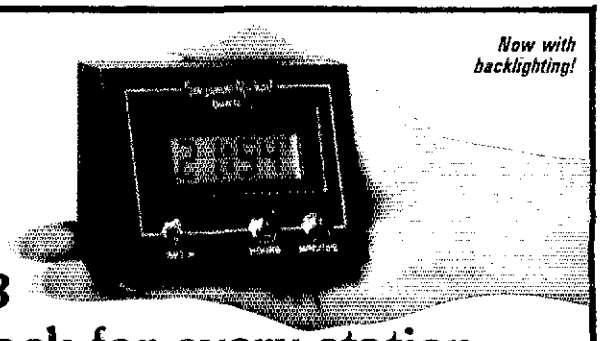

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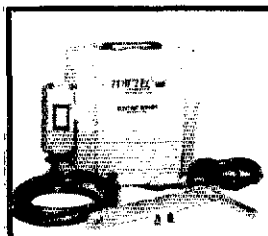

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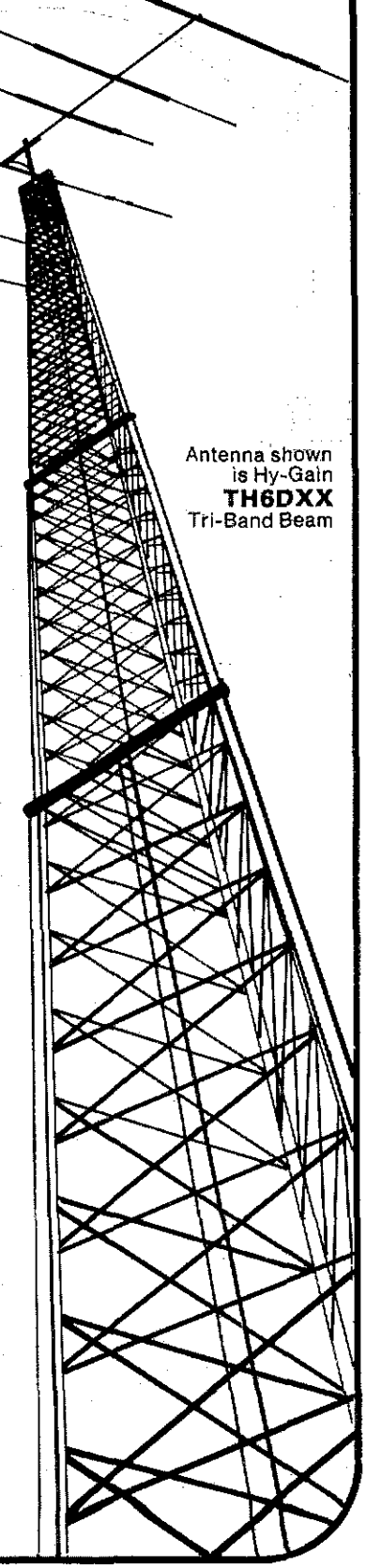

HG-52SS
Self-Supporting Crank-Up Tower

Antenna shown is Hy-Gain **TH6DXX** Tri-Band Beam

The Hy-Gain Model HG-52SS is a 52 foot self-supporting crank-up tower designed for antenna loads of up to 9.0 square feet in winds up to 50 mph. This all steel constructed tower is hot dip galvanized after fabrication to ASTM specifications. Features include extra-strength diamond web bracing and an improved guide system for the telescoping sections, which provides rigid, close tolerance structural support while leaving the tube ends open for complete surface galvanizing and unrestricted moisture drainage. Rotators, including the Hy-Gain 300 and CDE Tailtwister, can be mounted inside the top section on the rotor mounting plate included with the tower. The HG-52SS is easily raised and lowered by manual or optional electric winch system. A thrust bearing is available which bolts to the top section and accommodates masts up to 2 inches in diameter. The HG-52SS is easily erected on a limited area site, and can be readily retracted to a 21 foot height for service of the antenna.
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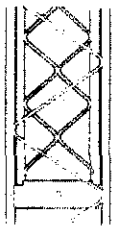

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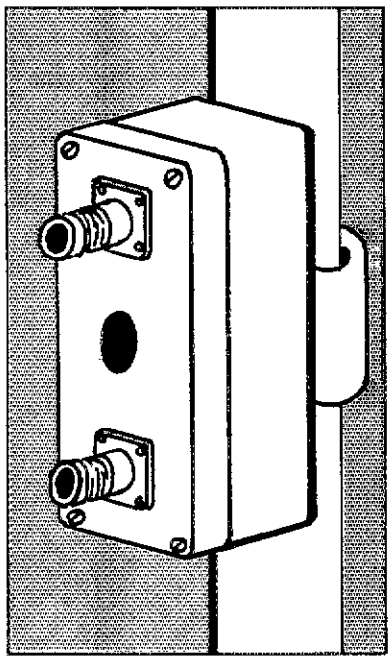

- **Uses a single coax line to feed antenna**
- **Housed in weather-tight box**
- **Coaxial relays for switching preamp in and out of transmission line**
- **Eliminates line loss at front of receiver**
- **Preamp performance same as Lunar's standard GaAs FET preamp**

By mounting your preamp at the antenna, you achieve the maximum performance improvement to your receiving system because there is no degrading of the signal with the loss caused by the coax in front of the receiver.

Some means of switching the preamp out of the line to allow the transmitter to be connected to the antenna is a necessary requirement. Usually multiple coaxial relays are used which result in a large mass dangling precariously at the antenna feedpoint. Lunar's mast mounted switching GaAs FET Preamp contains within a single package: The preamp and the necessary relays for both switching the preamp in and out of a single transmission line, plus providing protection for the preamp.

SPECIFICATIONS:
Power handling capability:
144 MHz—1 KW
220 MHz—1 KW
432 MHz—.75 KW
DC Power requirement: 350 mA at 13.5 VDC.
Insertion loss: .5 dB nom.
Dimensions: 7" x 5" x 4"
Weight: 2 lbs.

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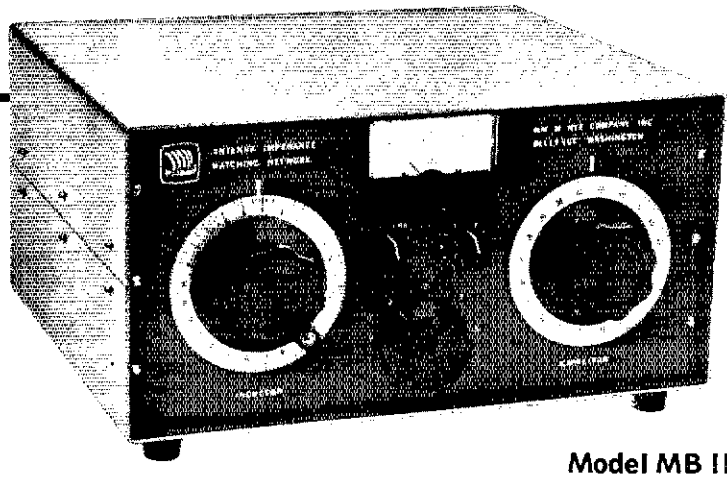

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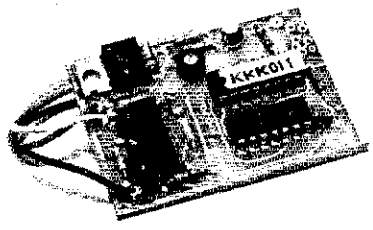

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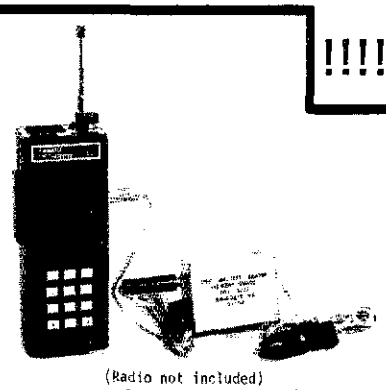

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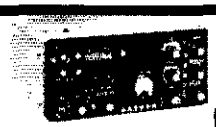

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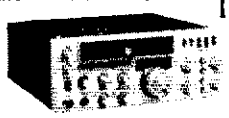

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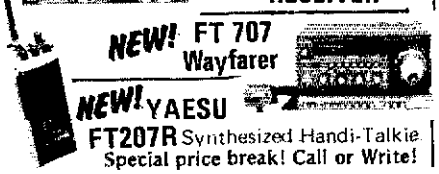

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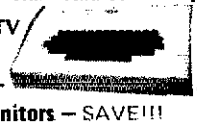

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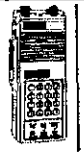

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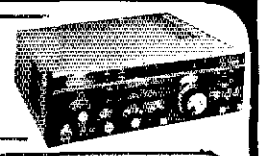

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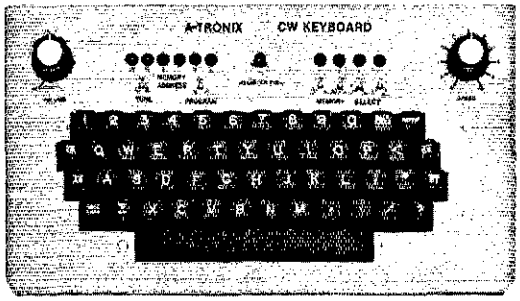

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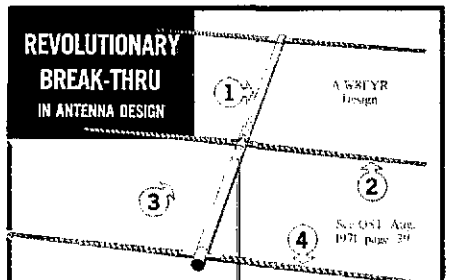

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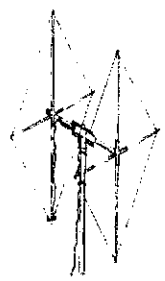

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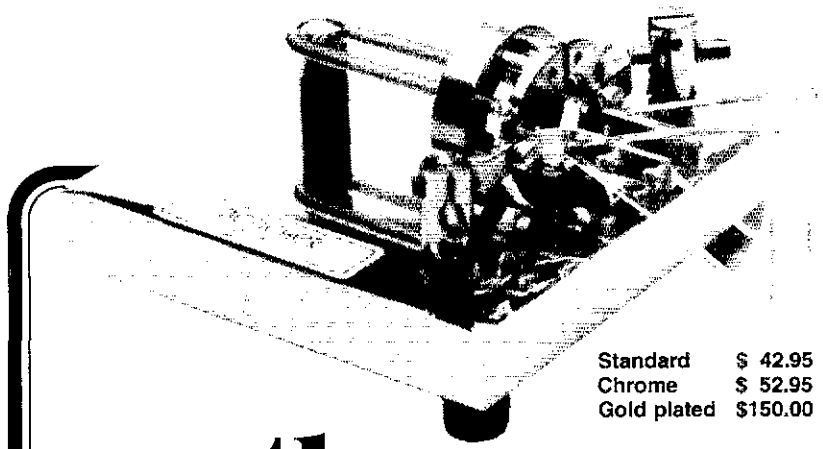

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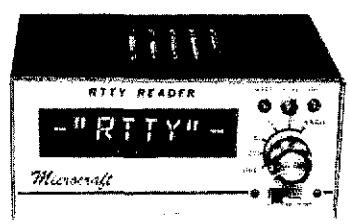

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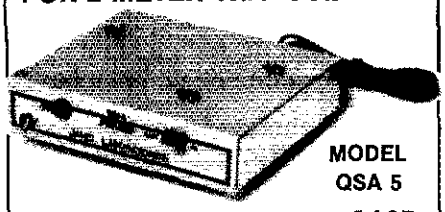

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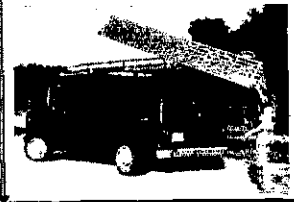

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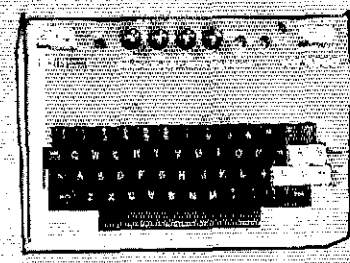

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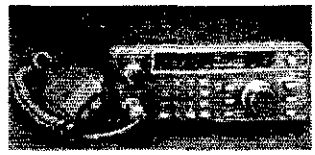

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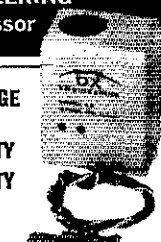

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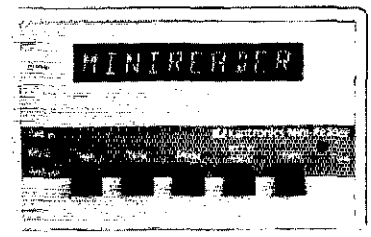

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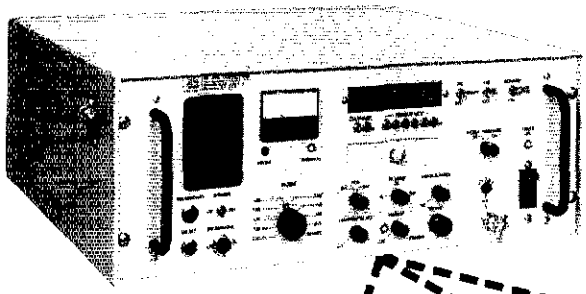

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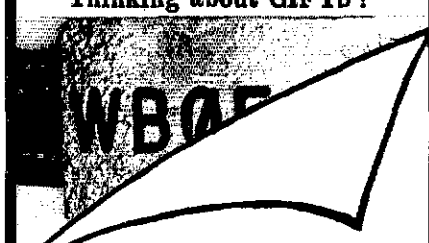

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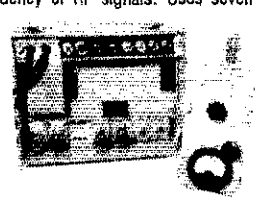

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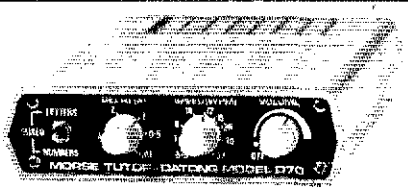

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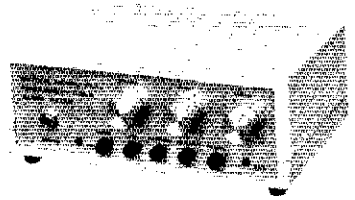

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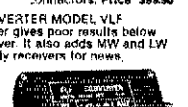

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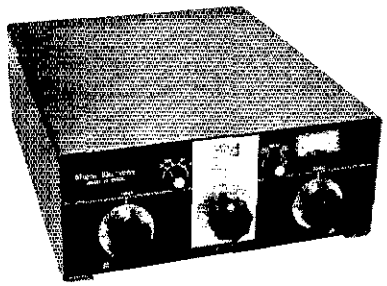

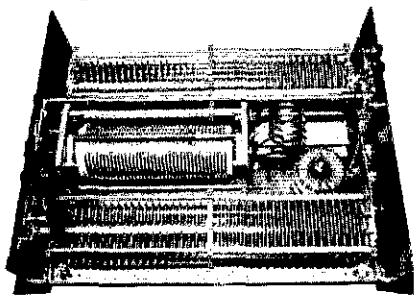

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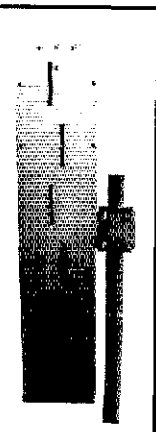
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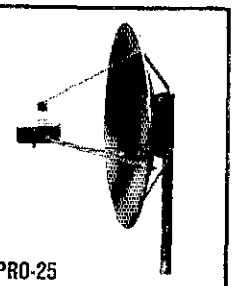
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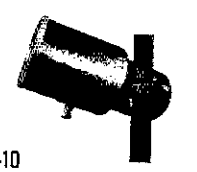
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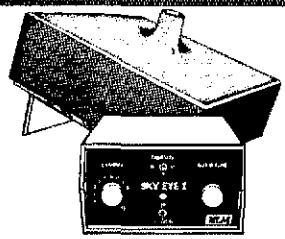

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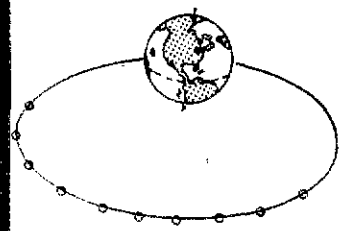

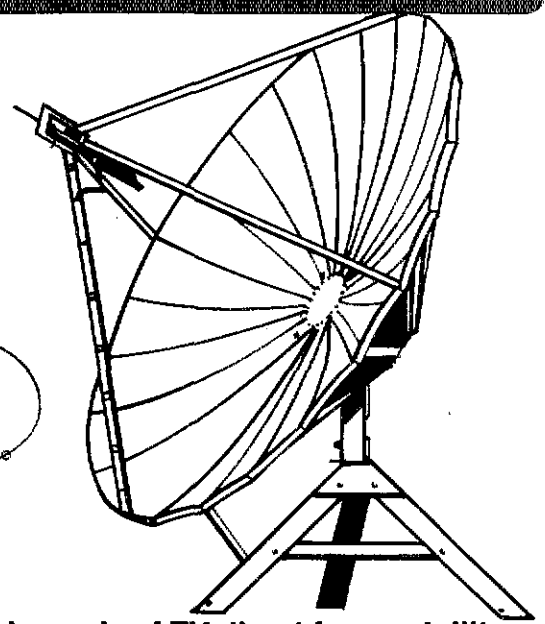

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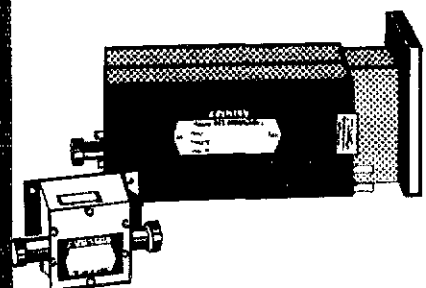

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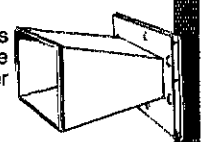

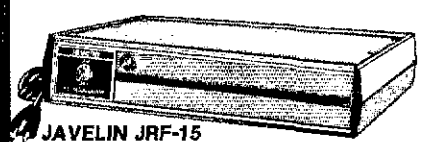

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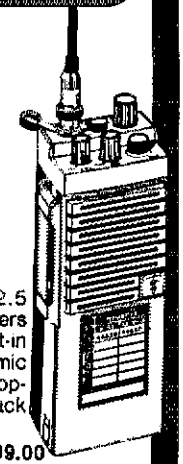

YAESU FT-404R hand-held FM transceiver "The Handie"

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Base station operation at its best. All band operation (160-10 meters) on SSB and CW with WWV/JJY (receive only). This nocompromise rig features built-in AC power supply, digital plus analog frequency display, highly effective noise blanker, variable IF bandwidth, rugged 6146B final tubes, auto semi-break-in CW with sidetone, frequency counter, and built-in fully adjustable VOX. Optional DC power requirement: 13.8 VDC. With WARC bands.

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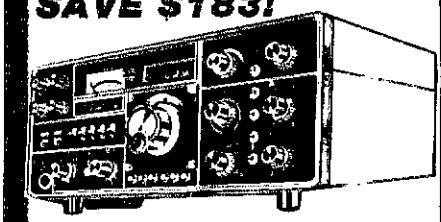

YAESU FT-902 DM all mode HF transceiver

Covers 160-10 meters, LSB, USB, AM, CW, FM, FSK. Features RF speech processor, LED frequency display, memory. Power requirement: 110 to 220 VAC or 13.8 VDC.

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YAESU FT-680R microprocessor controlled 6m all mode transceiver

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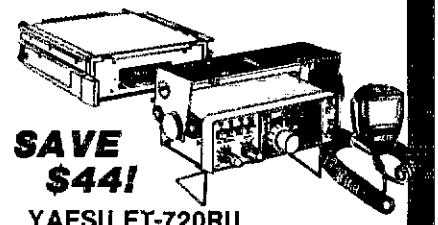

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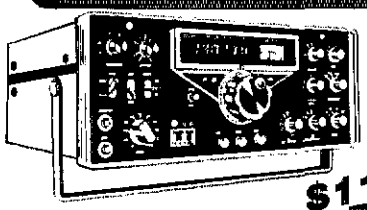

TEN-TEC 546 Omni Series C HF transceiver

$119 OFF!

Covers 160 thru 10 meters with crystals supplied for 18 and 24.5 MHz bands. Features digital readout, S/SWR meter, VOX, notch filter, noise blanker and speaker. Full break-in on CW with 200W input with 50 ohm load. Requires 12-14 VDC. Power supply 255 List 169.00..... **152.10**

1070.00 List Price 1189.00

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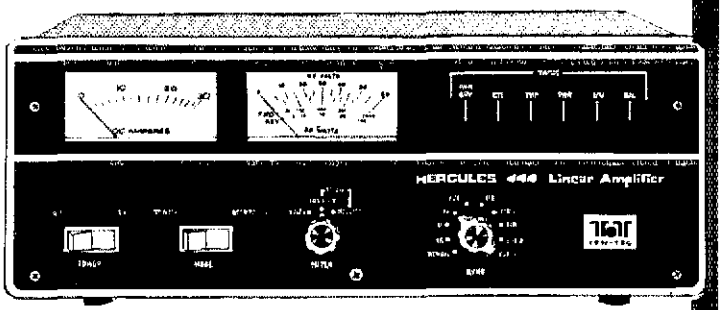

TEN-TEC 444 solid state KW linear amplifier

No tubes and no tuning required! The 444 covers 160-15 meters and features instant break-in, built-in power supply and forced air cooling. It also has 6 status monitors with LED's, 2 meters and 5-pole filters. 1000W input, 600W output, typical. Styled to match the Omni transceiver.

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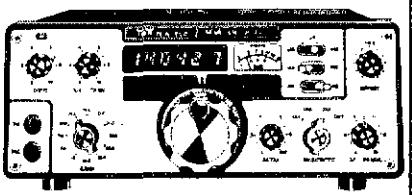
TEN-TEC model 570 Century 21 CW transceiver

Great for the novice or dedicated CW operator. Features 70W input, full break-in, all solid-state, built-in speaker, and overload protection. Receives CW and SSB but transmits CW only. Also has linear crystal mixed VFO. Adjustable sidetone and built-in power supply. Cyrstals provided for 80 thru 10 meters.

314.10 List Price 349.00



TEN-TEC 580 9-band solid state HF transceiver

Covers the new WARC bands at 10, 18 and 25 MHz, 160-10 meters, 10.0 to 10.5 MHz, SSB, CW, RTTY or SSTV. Has QSK instant break-in, VOX, PTT, notch filter and SWR meter. 200W SSB and CW. Requires 12-14 VDC. 280 power supply optional list 149.00..... **134.10**

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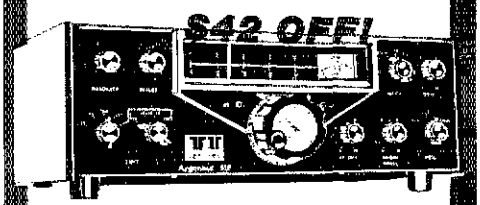
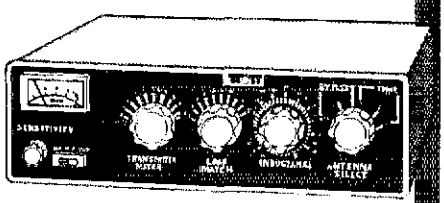


TEN-TEC Argonaut 515 HF transceiver

Mini size solid-state rig covers 3.5, 7, 14, 21 and 28 MHz plus 3 new WARC bands. Has full CW break-in, CW sidetone and no tune up required. 5W input and 2W output with LED RF indicator. Requires 13.8 VDC.

386.10 List Price 429.00



TEN-TEC 228 antenna tuner/SWR bridge

With a built-in SWR bridge, meter, and antenna select switch. Covers 1.8 to 30 MHz. Matches 50-75 ohm output, balanced and unbalanced. 200W intermittent, 100W continuous.

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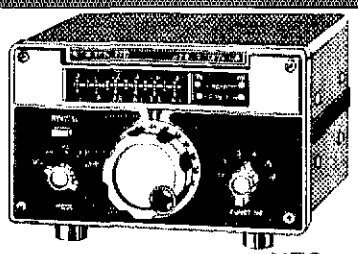

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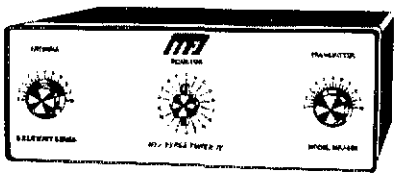

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Matches coax, balanced lines and random wires 1.8 to 30 MHz. Heavy duty 4:1 ferrite balun.
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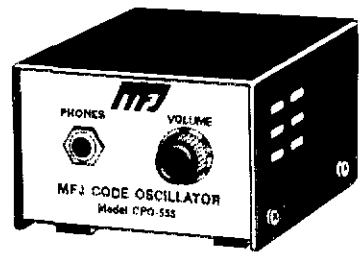

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Send crisp clear code with plenty of volume. Features self contained speaker, tone and volume controls. Uses 9V battery and 555 IC timer.
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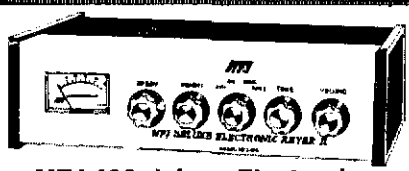

MFJ-408 deluxe Electronic Keyer II with speed readout
Read up to 50 WPM. Has socket for Curtis memory, random code generator & keyboard. Uses Curtis 8044 IC & features dot-dash memories, weight, speed, volume, tone controls & speaker. Sends iambic, auto., semi-auto. & manual. RF proof keying. Battery operated. 2.5 mm phone jack for external power. (6-9 VDC) Optional AC adaptor.
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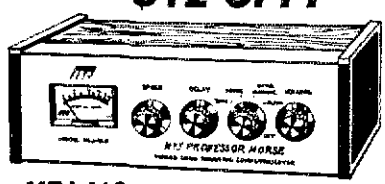

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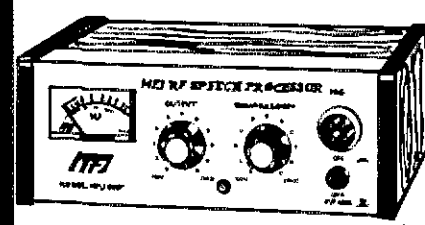

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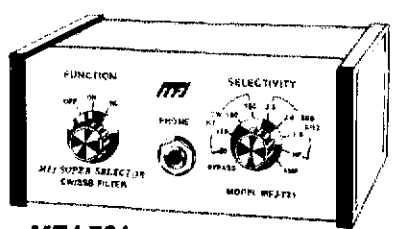

MFJ-721
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Features speaker and phone jacks, inputs for 2 rigs and aux. 2 watt amplifier, 20dB. Plugs into phone jack. Requires 9-18 VDC.
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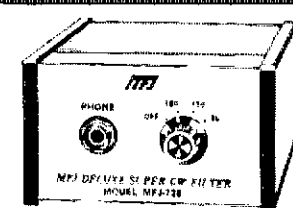

MFJ-720
deluxe super CW filter
For the ultimate in performance. Features 80 Hz CW filter, SSB filter, and selectable peak and through noise limiting. Plugs into phone jack and has 2 watts per speaker. Speaker and phone jacks, inputs for 2 rigs and aux. 2 watts amp. 20 db. Requires 9-18 VDC.
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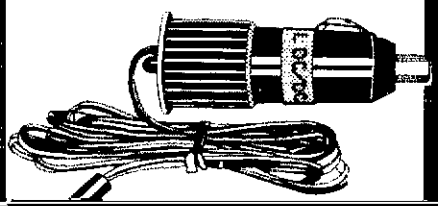

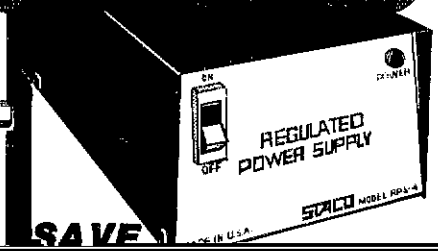

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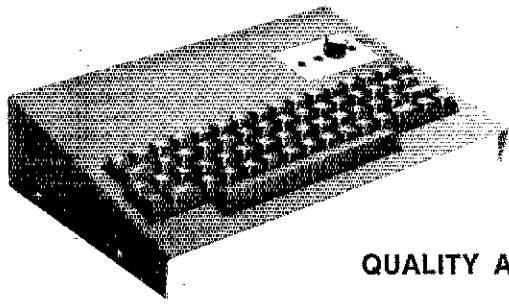

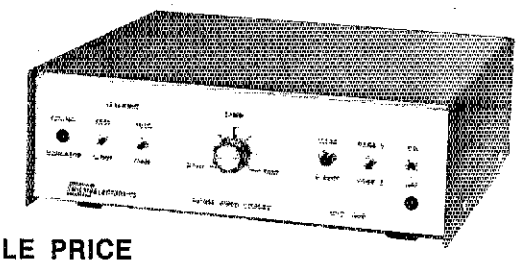

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SELL: YAESU twins FL-101, FR-101S, cw filter both excellent. 617-548-7265.

NOVICES Ideal rig, Heath SB104 solid state cw/ssb transceiver. Must sell. Sacrifice at $425. Includes power supply and cw filter. N4PJ 703-860-8678.

NEED DIAL assembly Heath DX100 VFO control W2BDQ 201-843-2346.

SALE: Omni D, 252 MO p/s, Ten Tec keyer — Ten Tec overvoltage protector 1150 — Ten Tec mike. $650. You pay shipping. Bert Lockard, WA3YTB, 302-227-9239.

SELL National SW-3 $100, Johnson Matchbox 250 $35., will ship. SB-401/SB-301 $300, Johnson Courier 500 watt amp $90, both local pickup or will deliver reasonable distance. W4NDF 87 Lake Haven Park, Dunedin, FL 33528 813-734-3474.

SALE: Yaesu 2 meter transceiver CPU2500R w/keyboard mic. Complete w/Avanti window antenna $339. HyGain tri-bander TH6DXX brand new in carton. Ship freight collect $199. KA3BJD Gary 202 Hempstead Lane Wallingford PA 19086. 215-565-4564.

WANTED: radar range — azimuth indicator IP-217/APS-42A or similar. Send condition, price. Leon Smith, W5UOE, 3108 N. Lincoln, Stillwater, OK 74074.

SHACK CLEAN-UP: Hallicrafters SX-115 receiver, $275.; Morse-A-Word 8 cw reader $145.; Courier ssb CB conversion $90.; CDE BT-1 rotator $40.; ERC audio filter SL-55 $35. WB2CLL Box 57, Readington, NJ 08870. 201-534-9642.

10-DA microphone w/G stand — $45. Logarithmic speech processor — MFJ LSP-520BX — $35. Ken Gordon, 613 Salem End Road, Framingham, MA 01701 — 617-879-0591.

FOR SALE: Viking Ranger, $90. Viking 11 w/VFO, $120. Wanted: 1925 and earlier QSL cards, Grebe CR-9, CR-18. W3HWT 329 Evergreen Dr., North Wales, PA 19454.

MOTOROLA MX340 immaculate 4 channels 2.5 watt. (H33AAU1140A) with 6 batteries and MX charger. Manuels, no scratches. $600. 518-891-3324. WB2MSL.

WANTED: Burnell straight telegraph key with closing switch. K9EY P. O. Box 1225, Bloomington, IN 47402.

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.

HEATHKIT HW101, ac-supply and speaker, cw filter, manuals, $300, college student must sell, WA3ZOH, 814-838-9763.

FOR SALE: HW-101 with ps, mint condition $325; Johnson 275 watt Match Box, mint condition $75. Dan Zdanowicz, 310 Tenth Ave., Haddon Heights, NJ 08035, 609-546-0962.

TEN TEC 544, cwf, nb, 242 remote VFO, $550, K4RV.

SELL: Heath IP-2715 battery eliminator. Operates 13.8 V dc rigs in bench or fixed station applications. new. Best offer. WB8IPG, 26316 Falmouth, Warren, MI 48089.

TR-4, AC-4 power supply — speaker Excellent operating condition. $375. W4YHB.

SELL CLIPPERTON-L with CM-1 modified for ten meters $350 cashiers check you ship WØRE Box 36 Coaldale CO 81222 303-942-4262.

WANTED: junction box JB29A from 522, for my collection, Weaver W5PMX, 12404 Roadrunner, El Paso TX 79934.

FOR SALE: QSTs 1941 thru 1980. Early years all in binders. $75. Robert Falk 7744 Western Ave., Omaha, NE 68114.

WANTED: Heathkit GR-78 shortwave receiver, mint. Bill Danielsen, 916-644-1218.

SELL: Venus SSTV monitor and Venus camera $500. Info-Tech M-300C keyboard $375. W5ZNN, 1115 W. 2nd Ave., Corsicana, TX 75110.

SELL: 1 kW plus amp deck, with 8295 tube, vacuum variables, blower, and all metering. 2-32 MHz coverage. Made by TMC! Write for specs. $175. Buy: L4B with dead power supply, state price and condition. Repeaters 144, 220, 440. autopatch equipment. any prop pitch motor. K4RN, Dan, Box 312, Versailles, KY 40383 or 606-873-9959.

WANTED: One or more of the following klystrons — Varian type VA204 or Sylvania type SYK4333A (formerly K4203), state condition and price to: R.F. Fisher, Box 47 EJC Decatur, MS 39327. Telephone 601-635-2111 extn. 224.

FOR SALE: Absolutely mint Kenwood TS820S (W6TOG mods, magicom processor, cw filter) and VFO820, with service manuel = $800.; RCA 6 hour video cassette recorder VCR6000, 7 day memory = $700.; Telrex 40M329 40 meter 3 element beam (pick-up only) = $400.; Swan WM3000 peak reading watt meter, 0-30 MHz = $75.; Tennelec MS1 synthesized 16 channel scanner = $100.; Gonset G-76 power supply and speaker = $10.; 1000 foot reels of 12 copper wire = $30. each. Shipping additional. James Grandinetti, P. O. Box 106, Lakewood, NJ 08701, 201-363-3937 after 6:00 P.M.

WANTED DEC PDP11 boards and equipment also have many Motorola and GE FM units for sale, s.a.s.e. for list. K4CLE Rote 3 Box 11B Charlotte, TN 37036.

HENRY 2K-4 linear with 10 meters used less than 20 hours. $950. 30L-1 linear round emblem $525. Both in excellent condition. Cliff, W9EKD, 6927 Primrose Ave., Indianapolis, IN 46220 Phone: 317-255-4860.

MICROLOG AKB-1 keyboard Sanyo VM4209 monitor ARV-2 decoder w/Morse/RTTY ASCII/AFSK these units have been equipted with most factory options s.a.s.e. for list of options will ship UPS on receipt of certified check $925. W1ZZF, 104 Coral Drive Hudson, FL 33568.

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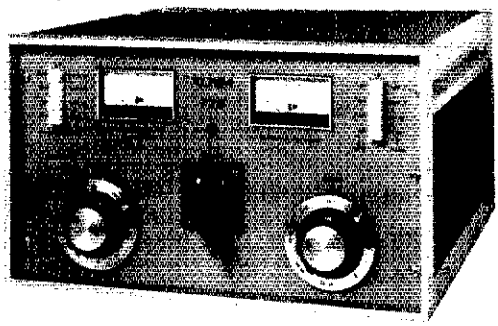
ETO ALPHA 77DX



- Alpha 77DX: The ultimate amplifier for those who demand the finest.
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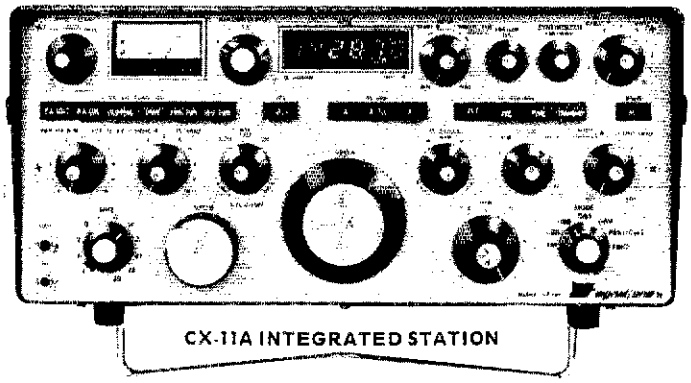
- Filter Capacitor: oil filled, 25 mfd
- Bandswitch: 20 AMP 6 KV
- Teflon - Insulated Toroid Inductors
- QSK CW: Full break-in, (2) vacuum relays
- Tuning Capacitor: Vacuum
- Cooling: Ducted air, large, quiet blower, computer grade
- Price: $4495, limited warranty 24 months, tube by Eimac
- Other Alphas: 78-$2895, 76CA-$2195, 76PA-$1995, 76A-$1695, 374A-$2195
  77SX $5395 (EXPORT ONLY)

signal/one CX-11A



CX-11A INTEGRATED STATION

- POWER OUTPUT: 150 watts CW/SSB output all bands (2) MRF 422 Finals
- OPTIONAL POWER OUTPUT: 220 to 225 watts CW/SSB output
- SYNTHESIZED FREQUENCY COVERAGE: All amateur bands 1.8-30 MHz in full 1 MHz bands, plus 4 additional 1 MHz bands for future expansion
- TWO PTO'S: Dual receiving, transceive on either,ior split operation
- QSK CW: Full break in, vacuum relays.
- SELECTIVITY: Two 8 pole plus one 4 pole filter deliver 20 pole 1.4:1 shape factor (6dB/60dB), plus post detection 1.5, 1.0, .4 and .1 KHz band width
- BUILT-IN: A/C supply, 115/230V, 50/400 Hz, Hypersil® transformer
- IF shift, noise blanker, RF clipping, CW keyer, notch/peak filter
- SERVICING: Self service easiest of any transceiver by using gold plated sockets for transistor and IC replacement
- QUALITY: All military and computer grade, 100% American made.
- PRICE: $5900, mfg. by Signal/one Corp., Phoenix, AZ 85021.
- LIMITED WARRANTY: 12 MOS.

Phone Don Payne, K4ID, for SPECIAL WINTER PRICES, Brochure, and OPERATING EXPERIENCE on the CX-11A and Alphas.

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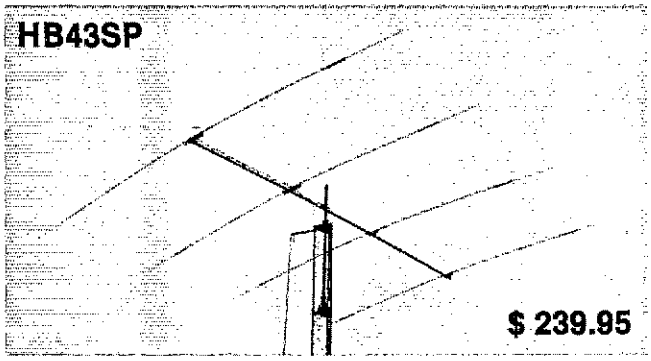
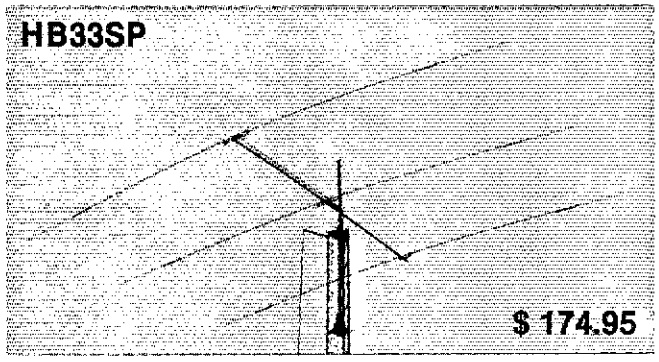
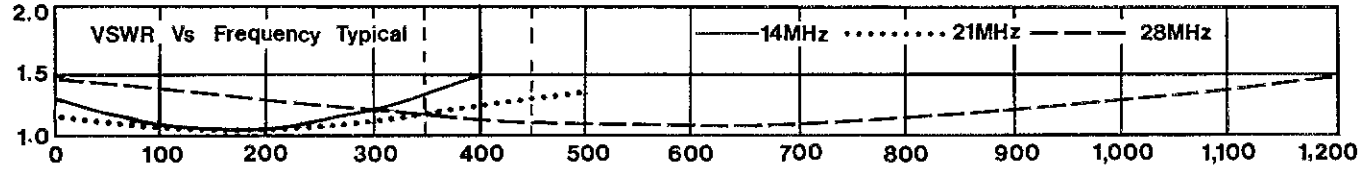
HB9CV SUPER MULTIBAND SERIES





MODEL	BANDS	ELE-MENTS	ELE-MENTS PER BAND	PWR MAX	VSWR	IMPEDANCE	MAX ELEMENT LENGTH	BOOM LENGTH	TURN-ING RADIUS	WIND SURFACE AREA	WIND LOAD @80 mph	BOOM DIA-METER	MAST SIZE	WT.
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"	1½-2"	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.
- ☐ VSWR Bandwidth (1.5:1): 14.0-14.35, 21.0-21.45, 28.0-29.2 MHz. Typical 1.1:1 at resonance.
- ☐ Highest quality materials throughout. All tubing 6061-T6 aluminum alloy. Stainless steel fasteners for all electrical connections. Tubing is cut and drilled to precision tolerances for easy assembly.
- ☐ Superior performance when compared against conventional yagi designs. (Call factory for gain dBd and front to back ratio.) All elements active on all bands. No unused elements.
- ☐ Light weight and low wind area for simpler installation.

SPECIFICATIONS

MODEL	BAND	ELEMENT	Z	VSWR	PWR RATING	MAX EL LENGTH	BOOM LENGTH	WEIGHT	PRICE
MULTIBAND ANTENNAS								PRICES EFFECTIVE APRIL 1, 1981	
HB43SP	14/21/28	4	50	1.2:1	2KWpep	27'	19'8"	38	$ 239.95
HB33SP	14/21/28	4	50	1.2:1	2KWpep	27'	13'2"	27	174.95
TE43L	7/21/28	4	50	1.5:1	1KWpep	22'6"	16'5"	33	174.95
MV4BH	7 Thru 28	Vertical		1.5:1	2KWpep	13'5"		5.5	59.95
RD3	7/21/28	Dipole	50	1.5:1	2KWpep	22'8"		9.1	89.95
HF HB9CV MONOBAND ANTENNAS		(*Dual Drive Swiss Quad)							
HB10F3	28	3	50	1.2:1	2KWpep	17'9"	9'10"	11.5	63.95
HB10F4	28	4	50	1.2:1	2KWpep	17'8"	13'2"	15.2	77.95
HB10F5	28	5	50	1.2:1	2KWpep	17'8"	19'8"	18.1	113.95
HB15F3	21	3	50	1.2:1	2KWpep	23'4"	13'2"	17.4	72.95
HB15F4	21	4	50	1.2:1	2KWpep	23'9"	19'8"	27.6	135.95
HB15F5	21	5	50	1.2:1	2KWpep	23'9"	26'3"	41.2	199.95
HB20F3	14	3	50	1.2	2KWpep	34'9"	16'5"	39.6	135.95
HB20F4	14	4	50	1.2	2KWpep	37'8"	26'3"	49.5	199.95
HB40M3	7	3	50	1.5	1.5KWpep	38'	32'10"	52	295.95
SQ10*	28	2	50	1.5	2KWpep	11'3"	9'11"	12	61.95
SQ15*	21	2	50	1.5	2KWpep	14'6"	13'2"	15	63.95
VHF ANTENNAS									
SQ81*	50	2	50	1.5	2KWpep	5'11"	5'11"	5.5	59.95
HB6F6	50	6	50	1.2	2KWpep	9'10"	19'8"	17.6	89.95
HB6F8	50	8	50	1.2	2KWpep	9'10"	26'3"	22.5	119.95
SQ22*	144	Dual 2	50	1.2	2KWpep	22.5"	6'8"	4.1	54.95
AX210N	144	2x10	50	1.2	2KWpep	42.5"	11'7"	7.7	89.95
AX210NW	144	Dual 2x10	50	1.2	2KWpep	42.5"	11'7"	21.4	189.95
TE214W	144	Dual 14	50	1.2	2KWpep	40.2"	19'8"	26.4	189.95
SQ007*	432	Dual 2	50	1.2	2KWpep	8.0"	2'6"	2.6	79.95

MODULAR ROOF TOWERS

TE35A	11.5' Roof tower with bearing & rotor plate	$ 149.95
TE55B	18' Roof tower with thrust bearing & rotor plate	214.95
TE75C	25' Roof tower with thrust bearing & rotor plate	279.95
2 0 B	6 5' Add on tower section for TE35A & TE55B	64.95
KS050	Thrust bearing for mast diameter 1¼-2" OD	19.95
KS066	Thrust bearing for mast diameter 1½-2¼" OD	29.95

ROTATORS

KR400	Azimuth rotator rated for 8.6 S.F. wind load	$ 99.95
KC038	Lower mast brackets for KR400	9.95
KR500	Elevation rotator rated for 7.5 S.F. wind load	189.95
KR2000	Azimuth rotator rated for 32 S.F. wind load	289.95

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SELL: Heathkit HR-10B receiver with HRA-10-1 xtal calibrator, $90. DX-60, $70. BC-342-N Completely Restored, With manual. WB6DJQ 916-644-1218.

DENTRON 3kW Super Super Tuner, $119., VHF Eng. Blue Line 432 MHz amp, $100.; 5 volt 5 amp power supply $15. W2WHK 210 Utica St. Tonawanda NY 14150 716-692-5451.

HW101, HP23, HS1661, $375. nice, factory aligned and tested, still in factory carton. SB200 linear $350. new tubes, VHF, Engineering HT, $50. Regency HR2B $85. Mobile, Alabama W4TSV, 205-478-9427 nites. 205-432-1705 days.

EXTRA AUTEC AF-1 active audio filter $50 and Vomax SPBP-4 voice processor with power supply $175. mint cond FOB Short 703-885-7510.

SWAN 500C with 117X speaker/power supply. Had TLC. No modifications. Original carton. $375. W1JEC 203-653-6829.

WANTED: Remote VFO, Model 8010 for Tempo 2020, Jim Fritsch, KBØMC, Box 23, Reads Landing, Minnesota 55968 — 612-565-2131.

HW-8, matching supply, keyer, $150. 10 meter ssb CB, Huystler antenna, $100. Will ship C.O.D. KA7GCS, 503-252-0724.

DRAKE FS-4 Synthesizer, mint, $300. WB9YJF 217-267-2734.

HAMMARLUND SERVICE: Will align and refurbish your Hammarlund Receiver per original factory alignment procedrue. 14 years factory experience. Original Hammarlund Service Manual and limited quantity of recently acquired old stock Hammarlund Parts. SASE for reply. Wayne Cordell K4HCS. Blue Ridge Communications, Rte. 4, Weaverville, NC 28787. 704-645-7070.

HEATHKIT SB-102 clean, 400 hz filter, HP-23B (fixed) HP-13B (mobile) power supplies, all manuals. $350 or best offer W6YKE 707-942-4649.

CAYMAN ISLANDS OTH for sale. Small two storey house on lot approx. 88 x 100 feet having large living room, dining room, two bedrooms, two bathrooms, radio room, double carport and shed within two miles Georgetown and sea. Available fully furnished and complete with EZWAY RBS40 foldover tower, TA33 beam, 80/40 dipole and choice of rigs including linear amplifier. Asking US $90,000 some finance available. ZF1AK, Box 1029, Grand Cayman, British West Indies or phone 809-94-94832.

HALLICRAFTER HT32A for sale $125 pick-up only. 805-832-5500 or 831-4166 Bakersfield CA K6GLJ.

FOR SALE Collins 75S3 rcv 32S3-B tx Rn Ln — 516 F2 p.s. 312 B4 console — CP crystal pack All manuals and cables $1400. 201-384-1264, Jack H. Garretson, 67 Juniper Street, Dumont, NJ 07628 W2AOM.

SELL: Drake MN2000 tuner $175. Eico model 950B resistance capacitance comparator bridge $40. Both excellent. W7TF 208-437-4146.

YAESU 101B, mint, fan, 160 xtal, orig. carton, manual, $395 shipped UPS. Also ITC Multi 2000, perfect, $195. Collins 51J3, only modification product detector, $195 pick up only. Kern, W2BAK, 201-871-4727.

FOR SALE: C.E.I. receiver 30-1000 MHz with scope, rack mounted in cabinet $1,200.; Drake SPR-4 receiver, factory aligned — $350.; Army radio set AN/VRC-16 FM transceiver with power supply, 20-28 MHz, 16 watts — $60.; Army receiver R-108-GRC, 20-28 MHz $25.; Navy signal generator SG1/ARN, 88-140 MHz (same as H. P. Booton 211-A) $150.; Palomar FC60 frequency counter 0-30 MHz $75.; Swan SWR-1A bridge, 3.5-150 MHz $25.; Ameco TX62 2 & 6 meter transceiver $25.; Ameco VFO model 621 $15. Shipping additional. Robert Schillaci, P. O. Box 75, Osbornville, Brick Town, New Jersey 08723, 201-255-2822 after 6:00 P.M.

SELLING TEMPO FMH 2m, TT, $90; Wilson SY-33 triband beam $110. KA1LO, POB 799 Avon CT 06001 203-678-1116.

AZDEN PCS2000 2mfm with touchtone, mint $270. Heath IM1210 digital multimeter $65. K1OD/9 812-334-2520.

WANTED spare pair of Eimac 8875's. Send price and condition info to: Lee W9OY, 2901 Willowpark, Champaign, IL 61820.

SOLD 2-NT! Three, brand new, 6HF5 finals left. $19. plus shipping. W8DVY, 7096 Pickway. Cincinnati, OH 45238.

MOTOROLA HT-220, vhf 6 freq., slimline, serial H23FFN-1130C w/nicad $375. uhf HT-220, 2 freq., Slimline, w/nicad $350. HT-220 nicad charger $30. Dave Engler, 2331 Kralt St., So. St. Paul, MN 55075. 612-451-7629.

COLLINS sell out — KWM2 516F2 ac $588. 75S1-32S1 516F2 $578. All wing, clean good gear. MP1-dc sply $66 516F-2 dc 24V input $66. 351D-2 mobile mount for KWM2 $55. All firm. First bank check gets them. Phone 615-833-2724. F. E. Coble, N4LX, 251 Collier Ave., Nashville, TN 37211.

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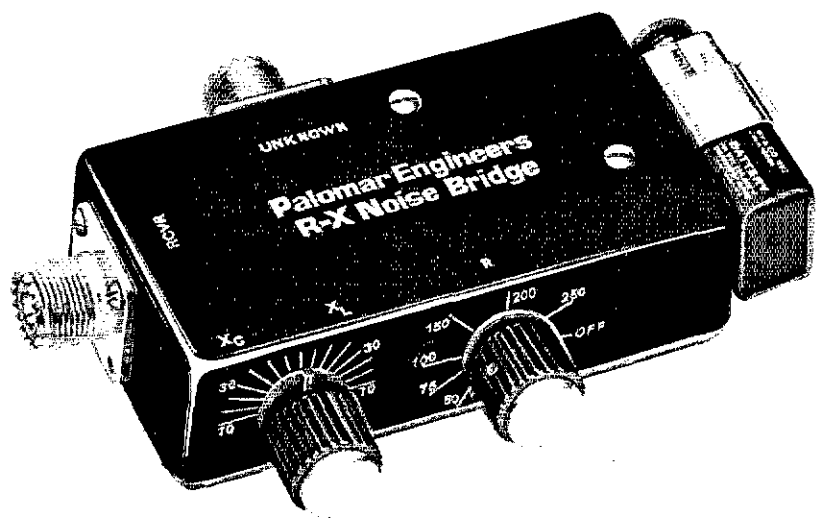
SELL TEMPO 2020 $395 also Heath 40W 2m amp $20 WA4ASF 813-863-3358.

TS520 xcvr with cw filter and speaker N7EU 209-292-7060 $450.

R-X Noise Bridge



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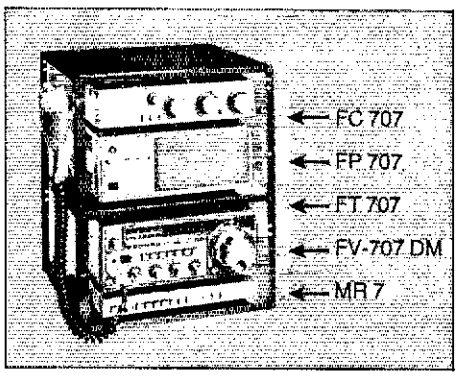

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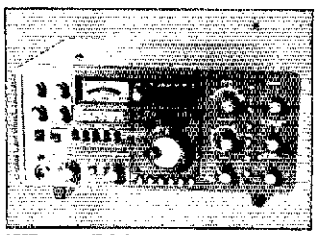

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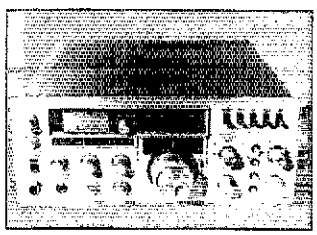
N&G PRICE 1195.00



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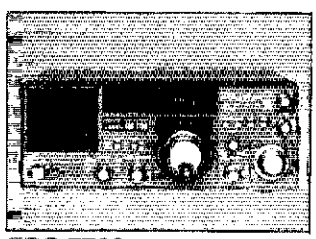

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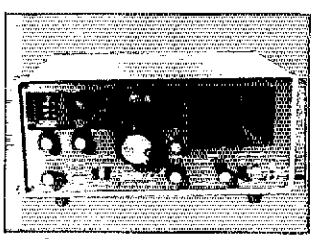

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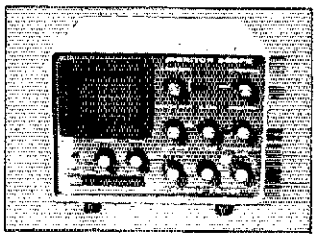

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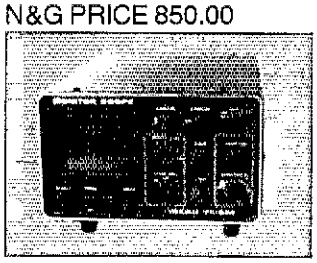

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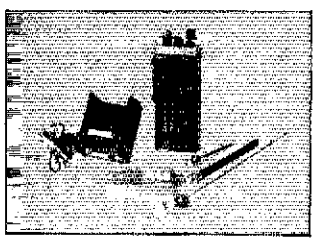
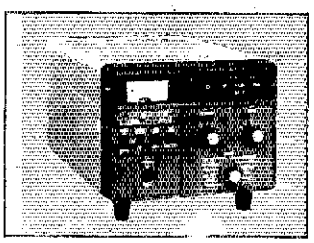


FT 207 HANDLE
LIST 300.00



FT 901 TRANSVERTER
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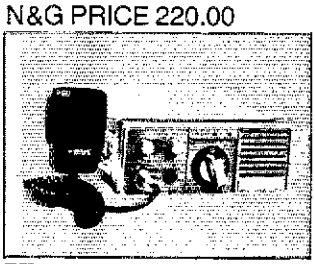

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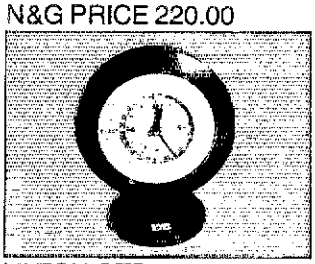

YAESU QTR 24 hr.
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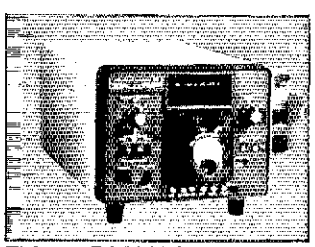

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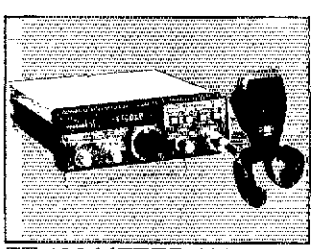

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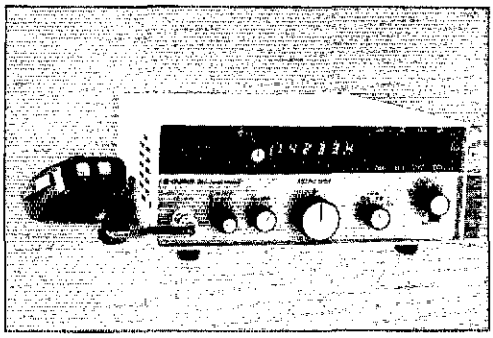

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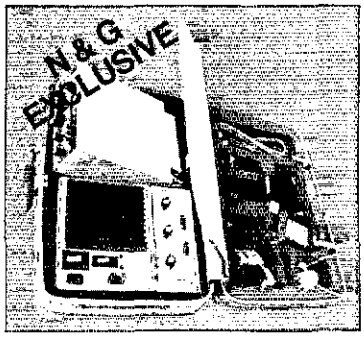

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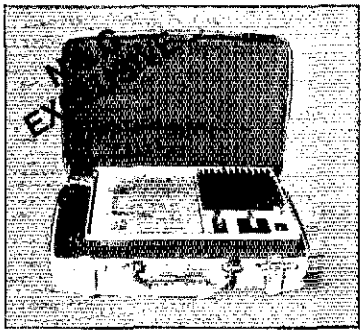

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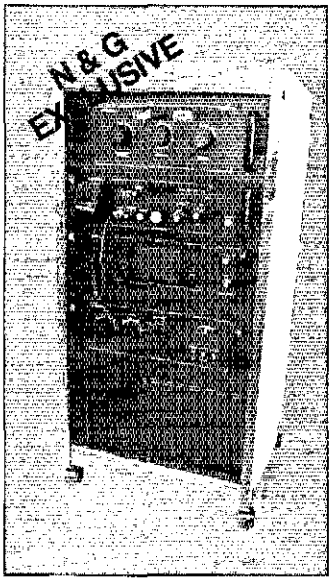

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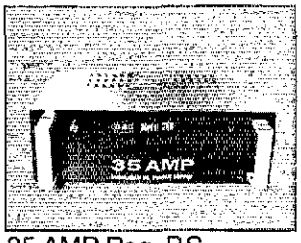

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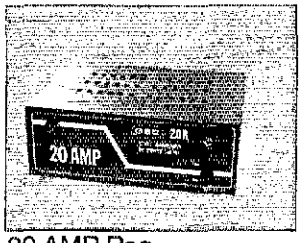

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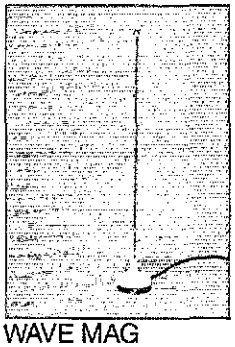

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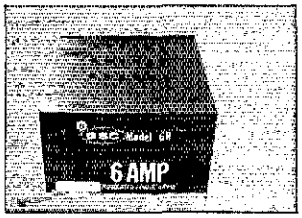

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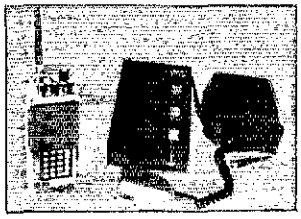

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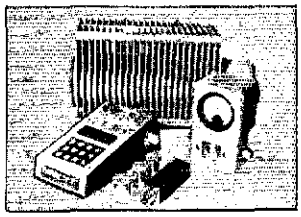

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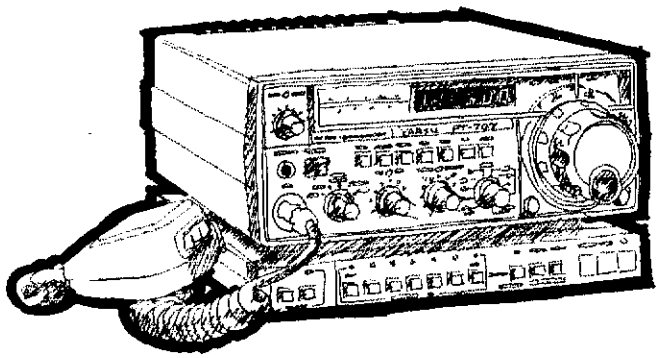

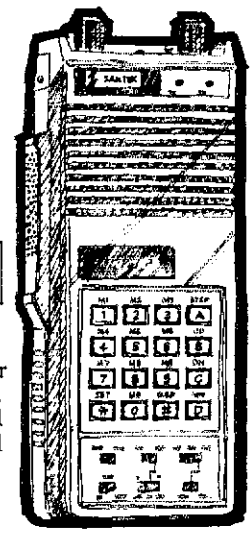

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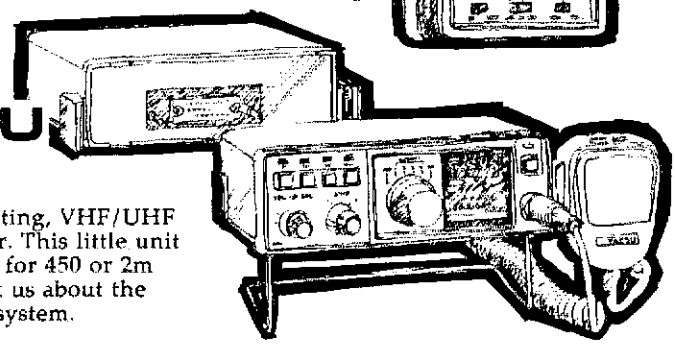

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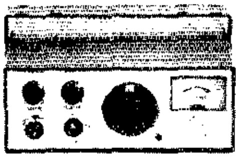

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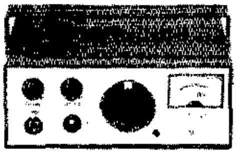

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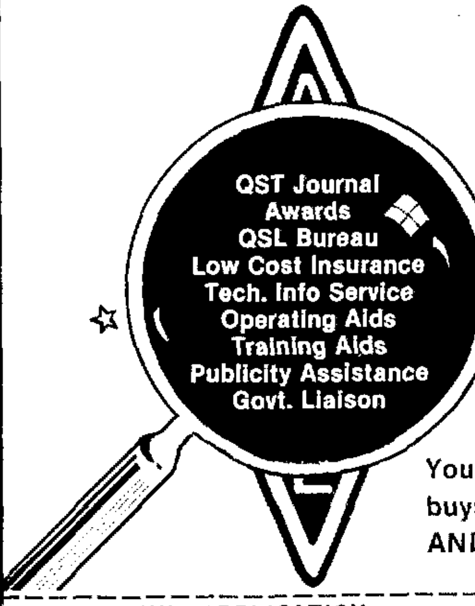

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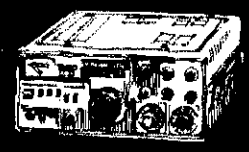

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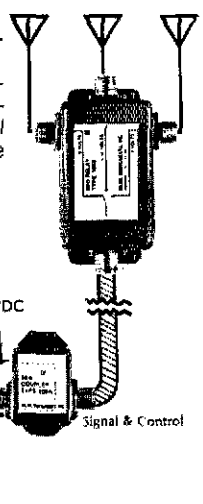

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T8040	Traps Only		$19.95
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SL-80	80	63'	$35.95
SL-40	40,15	33'	$34.95
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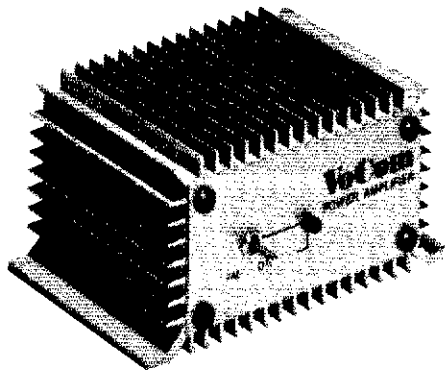

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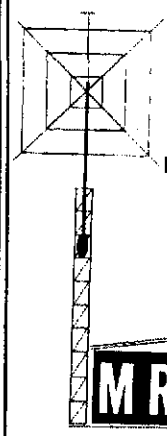

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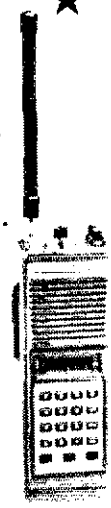

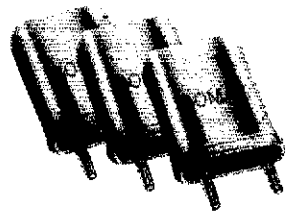

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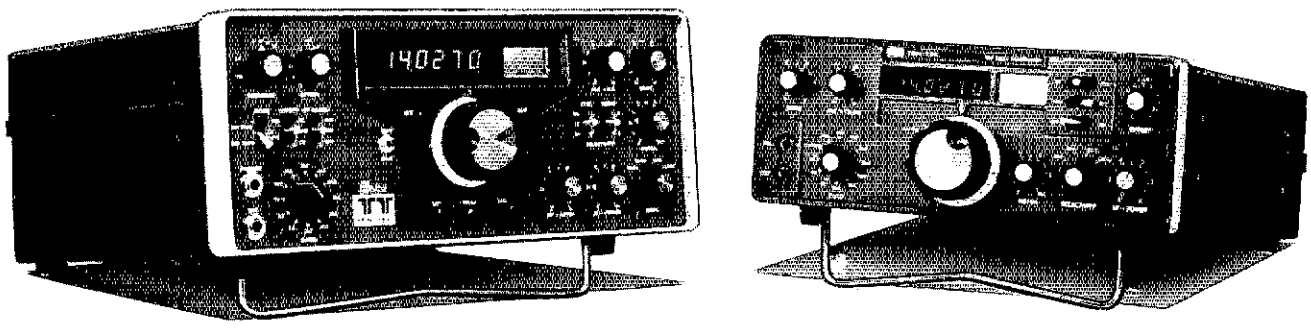

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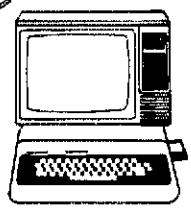

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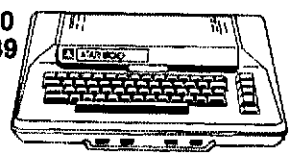

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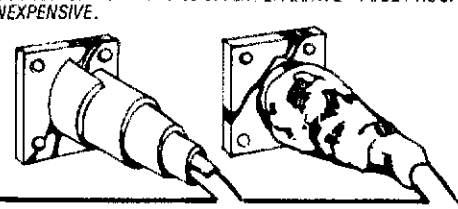

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HEATHKIT SB-303, SB-401, SB-600 w/3 filters; mint condition $475. Bob Marian, 1050 Abbott Ave., Milpitas, CA 95035. 408-946-1734.

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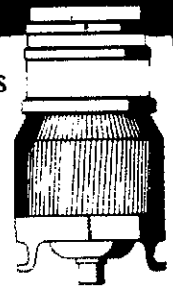

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287	Mobile Mount	TBA
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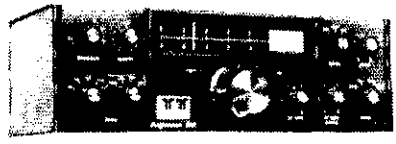

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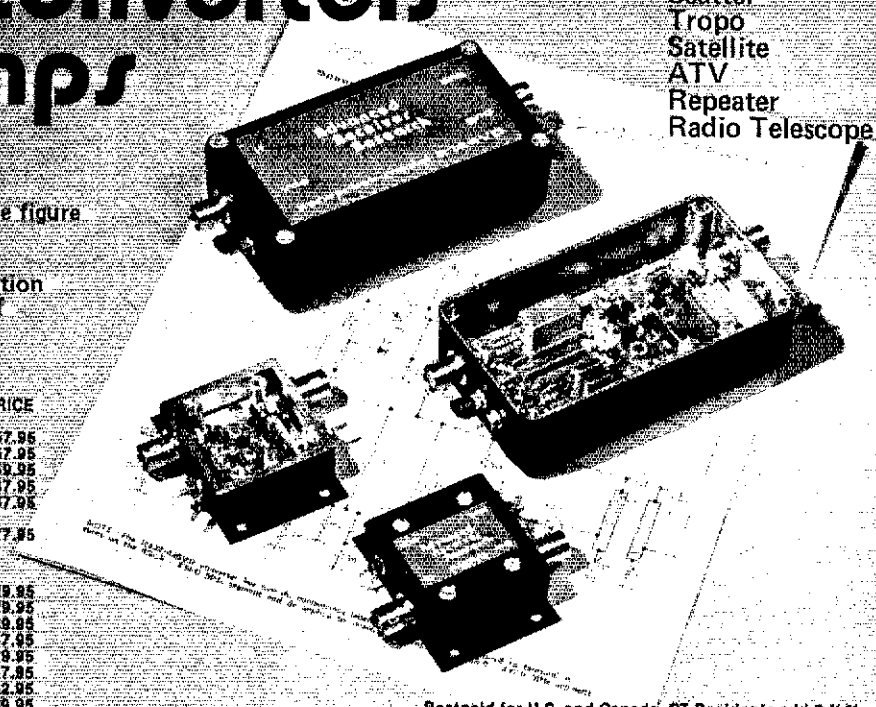

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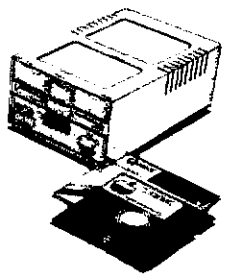

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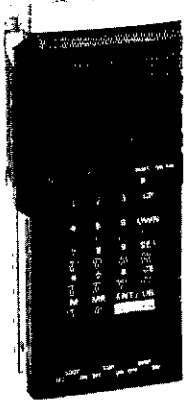

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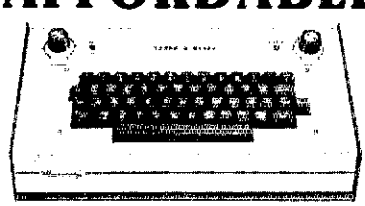

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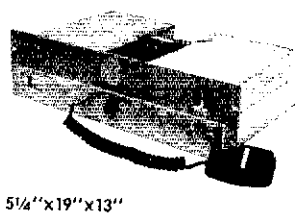

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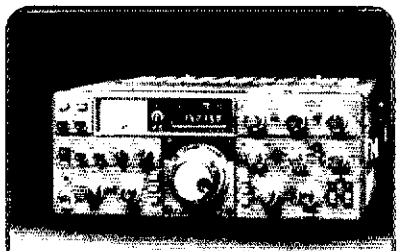

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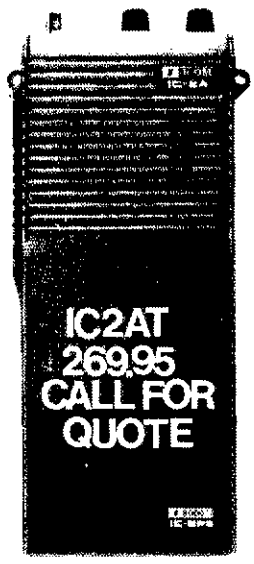

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		200	2.6	8.8
		300	3.3	10.8
		400	3.8	12.8
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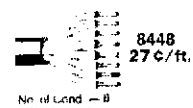

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for Kenwood TR-9000 scans 5 memory channels. Stops on busy and resumes when carrier drops. Uses existing controls. No switches to add. Installs easily inside rig. Assembled-$39.95

IC-280

Band Scanner

for Icom IC-280 scans band in 47 seconds. Stops and locks on busy. Uses existing controls, no switches to add. Installs easily inside control head. Assembled-$29.95

Memory Scanner

for Icom IC-280 adds a fourth memory channel and scans all four plus the dial frequency. Stops on busy and resumes when carrier drops, or busy channel can be locked in. Operates thru addition of subminl switch (Off, Scan, Lock). Installs inside head. Assembled-$39.95

Band and Memory Scanners

installed together allow scanning of either or both. SPECIAL-order both for $59.90

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- Digital readouts display scanned frequency.
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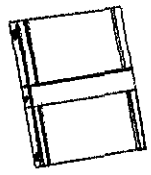

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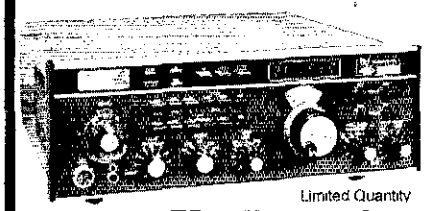

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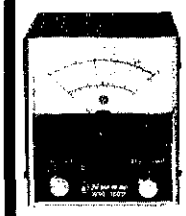
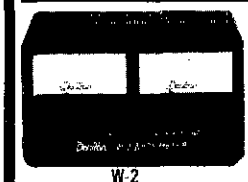


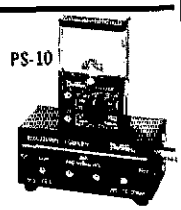
SWAN WATTMETERS

SWAN WM-1500 (left) In-Line Wattmeter. Four scales read zero to 5, 50, 500 or 1500 Watts, forward or reverse. Full scale accuracy better than +-10%, 2-30 Mhz; usable with reduced accuracy up to 50 Mhz. 50 ohms, SO-239's. 6"h x 6"w x 4½"d, 2 lb. *(Regular $74)*..... ***Now $59***

SWAN WM-6200 (right) Through-Line type Wattmeter for 50-150 Mhz. Reads zero to 20 or 200 Watts & VSWR 1:1 to 3:1. Accuracy: +-7% Power, +-5% VSWR. SO-239's 4"h x 8"w x 5½"d, 3 lb. *(Regular $87)* ..... ***Now $59***



W-2



PS-10

DenTron W-2 Wattmeter. For 1.8 to 30 MHz. Dual meters simultaneously show forward & reflected power. FWD scale 200/2000w, REF scale 200w; 5% accuracy. Remote sensor box. 3½"h x 7"w x 6"d *(Regular $129)*..... ***Now $99***

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DenTron Multi-PS-10 A complete 10 K Ohm per volt VOM that doubles as a 20/200w RF wattmeter and SWR bridge. 3.5 to 150 Mhz, 2½" scale. *(Regular $49)* .. ***Now $29***

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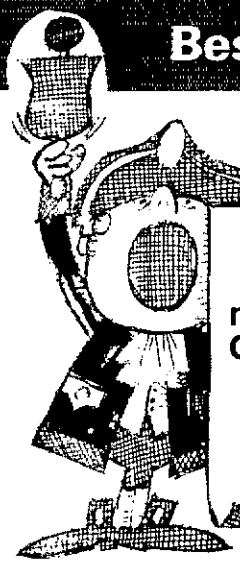

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Free coffee and doughnuts from 8:30 to 9:00 a.m.

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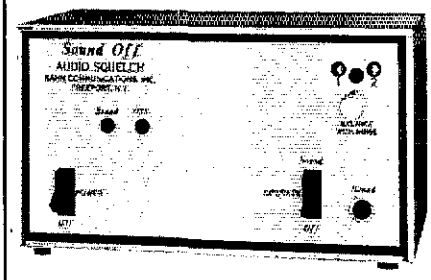

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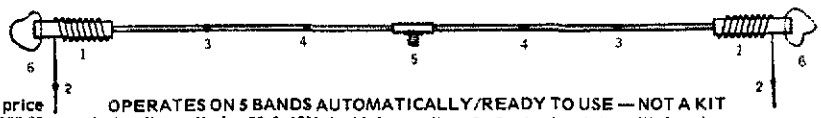

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GIANT Reductions on all remaining test equipment & books on my Feb. list. Still many good items, will go low. Small S.a.s.e. for final list. Joe Cohen, 200 Woodside Ave., Winthrop, MA 02152.

10 METER fm Hy-Gain CB conversion, 6 watts out, 2 simplex 4 repeaters, on ARRL band plan. $60. KA9CAR 815-455-0073.

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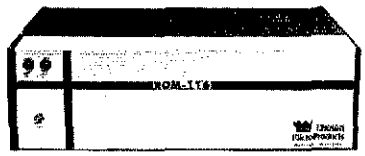

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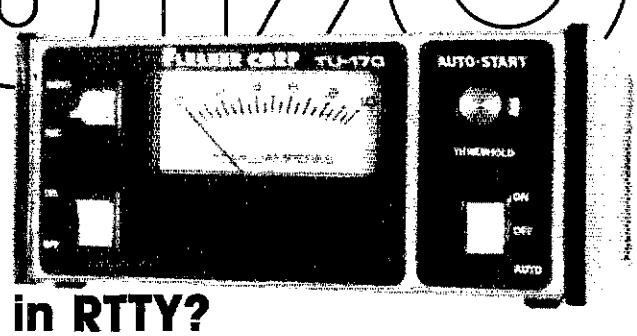

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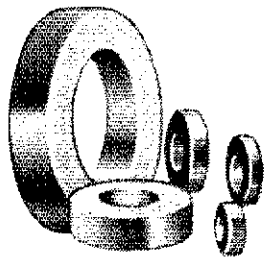

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T-68	57	47	21	.68	.95
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T-37	42	30	15	.37	.60
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F-114	1500			1.14	2.50
F-87	900	300		.87	1.25
F-50	750	250	5000	.50	.80
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Note: all items can be used with the 101ZD series except (*) items.

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FC-901	Antenna tuner	199.00
XF8.9HC	CW filter	45.00
XF8.9B	AM filter	45.00
XF8.9HCN	350Hz filter	50.00
ZD-1	Digital readout	150.00
FV-1012	Remote VFO	175.00
DC-101ZD	DC-DC conv.	60.00

ACCESSORIES FOR 207R

NC-1A	15hr drop-in chgr.	51.00
NC-7	3hr drop-in chgr.	90.00
NBP-9	Battery pack	23.00
FBA-1	Battery sleeve	8.00
LCC-7	Leather c. case	35.00
TA-2	Telescope antenna	9.40
FTS-32E	32 tone CTCSS	40.00

MICROPHONES

YE-7A	Hand mike 101ZD	17.00
YD-148	Hi-lo desk mike	32.00
YD-844A	Hi-lo desk mike	32.00
YM-21	Noise cancelling	20.00
YM-22	Keyboard scan	69.00
YM-23	Keyboard encod.	69.00
YM-24	Speaker mike	32.00
YM-34	Desk mike 107/707	31.00
YM-35	Scan 107/707	20.00

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BASE STATION EQUIPMENT		List Price
251A	2M FM, SSB, CW	$749.00
551	6M, SSB, CW	479.00
551D	6M 80W, 12V, with EX107, EX 108	699.00
551D / PS	6M 80W with AC Supply PS20	899.00
720	9 band HF Xcvr, 12V DC/Mic	1349.00
720/PS	9 band HF Xcvr, AC & 12V Sup/Mic-PS15	
	9 band HF Xcvr, AC & 12V Sup/Mic-PS15	1498.00

MOBILE TRANSCEIVERS		
22S	2M FM 10W 22CH Programmable	299.00
255A	2M FM 25W Synthesized	389.00
260A	2M MBL, SSB, FM, CW	499.00

PORTABLE TRANSCEIVERS		
2A/NiCD	2M 800 CH, HT w/Nicad, Chgr.	239.95
2AT/NiCD	2M 800 CH, HT w/Nicad, TT pad, Chgr.	269.90
202S	2M SSB Portable	279.00
402	430 MHz SSB Portable	389.00
502A	6M SSB Portable	239.00

POWER SUPPLIES		
3PE	AC to 12V Supply 3A/Spkr	
	3A/Spkr	95.00
PS15	12V Power Supply	149.00
PS20	12V Power Supply	199.00

ACCESSORIES		
HM8	8 pin mike w/TTN	49.50
SM2	Desk mike	39.00

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HD-73 ALLIANCE ROTOR — SALE $99.95

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Does Your Shiny New Rig Really Have:

"STATE-OF-THE-ART" SELECTIVITY

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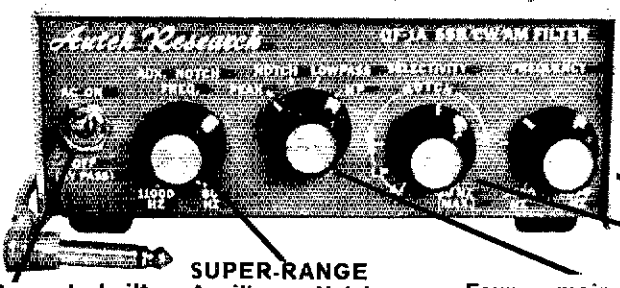

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QF-1A Active Filter

For SSB & CW

PATENT PENDING

Only $65 ppd. U.S.A.

115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

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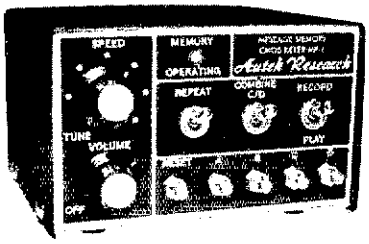
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM!** Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST.**) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.
Also remembers name, QTH, contest exchanges.
Record anything you want in seconds!

Model MK-1 $99.50 ppd. U.S.A.

Our classic **MK-1** should make you wonder why anyone would buy an ordinary keyer, when memory costs so little! Records 4 messages. Just select "record," tap the A, B, C, or D message, and start sending at any speed! Record over old messages as easily. Playback by tapping the same button. Each message holds about 25 characters (letters, numbers). Total 100 characters. Handy repeat switch repeats message forever until reset. Very useful for **CQ's. YOU SIT BACK AND WAIT FOR A CALL!** Another switch combines two messages for 50 characters. "Memory-saver" feature standard.

This "state-of-the-art" keyer pleases beginners and CW "pros" alike. **DOT AND DASH MEMORIES. TRIGGERED CLOCK. IAMBIC. SELF COMPLETING. JAM PROOF. 5 to 50+ WPM. LATEST CMOS FOR LOW CURRENT.** Built-in monitor, speaker. Widely adjustable tone, volume. Perfect weighting at all times. No fiddling with an adjustment that varies with speed. **NEW: DUAL TRANSMITTER OUTPUTS** key **ANY** modern (post 1963) ham rig directly without a battery or relay, including difficult-to-key solid-state rigs. 115VAC supply built in, or connect 9-14 VDC to rear panel. Use with **ANY** paddle. 6x3½x5". Burned-in and tested. Sockets for **IC's.** Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! MK-1 used to set new world's CW record. A single operator worked 3992 DXQSO's & 275 bandcountries in only 48 hours! Get the choice of champions — AUTEK.

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Please Rush ppd. via Speedy UPS.

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- ☐ MK-1 Keyer at $99.50
- ☐ ME-1 Expander for MK-1 at $40 (factory installed)
- ☐ ME-1 Owner installed at $30 (save $10)

Add 4% tax in Fla. or 6% tax in Calif. Add $3 each to Canada, Hawaii and Alaska. $2 for UPS air. Add $15 each elsewhere (shipped air).

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The FT-107 Series with "DMS"

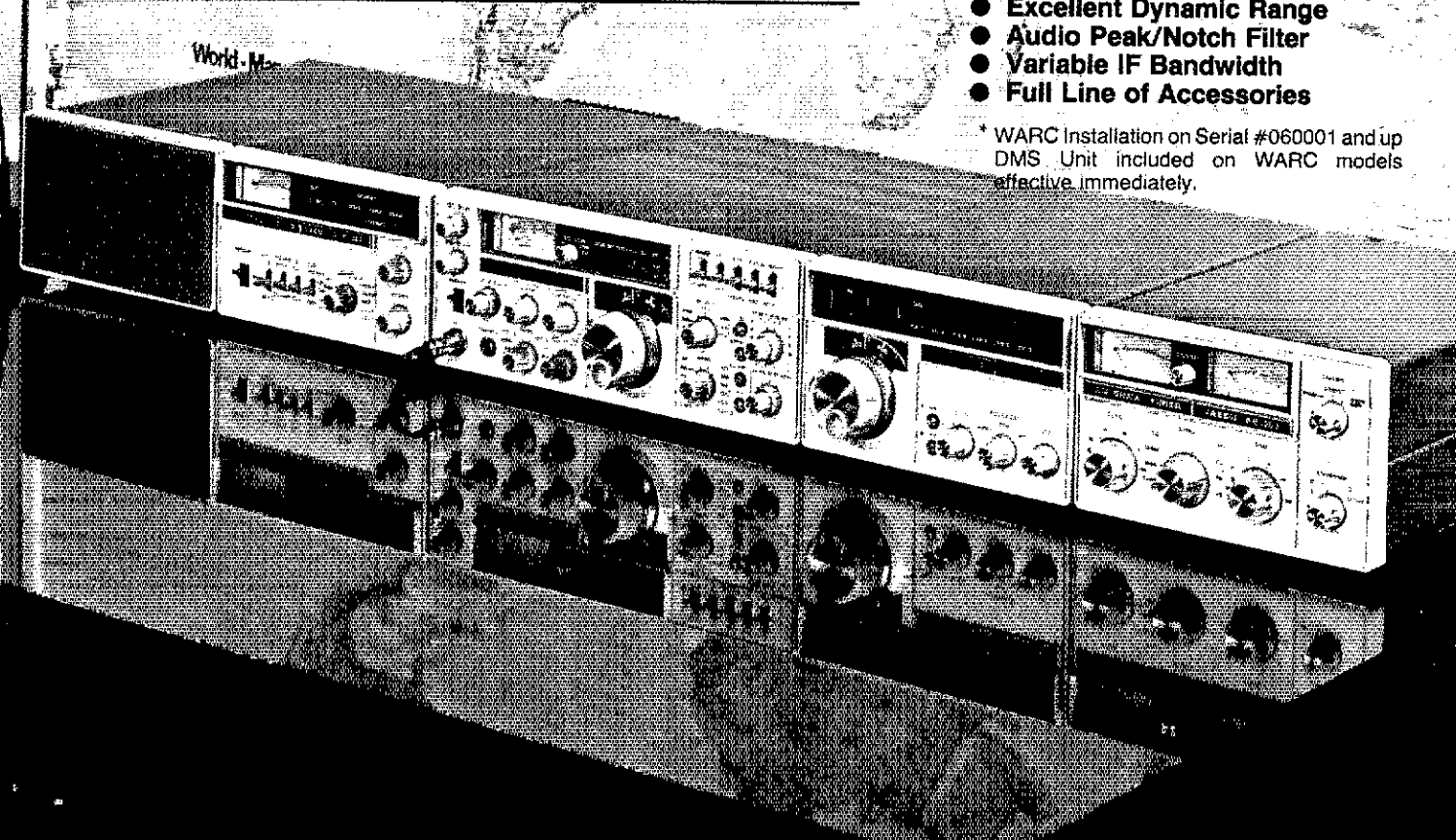
"It's A Cut Above The Rest"

FEATURING DIGITAL MEMORY SHIFT

12 discrete memories. Stores individual frequencies or use as 12 full coverage VFOs (500 kHz each)

- **All Solid State**
- **240 watts DC Input SSB/CW**
- **160-10 Meters, WWV ***
  (includes new 10, 18, 24 MHz bands) *
- **RF Speech Processor**
- **SSB, CW, AM, FSK**
- **Built-in SWR Meter**
- **Excellent Dynamic Range**
- **Audio Peak/Notch Filter**
- **Variable IF Bandwidth**
- **Full Line of Accessories**

* WARC Installation on Serial #060001 and up DMS Unit included on WARC models effective immediately.



The FT-107 has been created as a result of a blending of technologies — computer, solid state and RF design. By careful utilization of these disciplines and the experience gained from our FT-301 series, YAESU has achieved an HF transceiver which offers unique features (e. g. "Digital Memory Shift"), efficient operation and a level of performance that has been previously unattainable.

FT-107 TRANSCEIVER SPECIFICATIONS

(Receiver Section)

Sensitivity: 0.25 uV for 10dB S/N, CW/SSB, FSK
1.0 uV for 10dB S/N, AM
Image Rejection: 60dB except 12/10 meters (50dB)
IF Rejection: 70dB
Selectivity: SSB 2.4 kHz at —6dB, 4.0 kHz at —60dB.
*CW 0.6 kHz at —6dB, 1.2 kHz at —60dB.
*AM 6 kHz at —6dB, 12 kHz at —60dB
Variable IF Bandwidth
20dB RF Attenuator
Peak/Notch Audio Filter
Audio Output: 3 watts (4-16 ohms)
Accessories: FV-107 VFO (standard not synthesized)
FTV-107 VHF/UHF Transverter
FC-107 Antenna Tuner
SP-107 Matching Speaker
FP-107 AC Power Supply
(specify internal or external)

* AM/CW Filters Optional

(Transmitter Section)

Power Input: 240 watts DC SSB/CW
80 watts DC AM/FSK
Opposite Sideband Suppression: Better than 50dB
Spurious Radiation: —50dB.
Transmitter Bandwidth 350-2700 hz (—6dB)
Transmitter: 3rd IMD —31dB neg feedback 6dB
Transmitter Stability: 300 hz after 10 min. warmup
less than 100 hz after 30 min.
Antenna Input Impedance: 50 ohms
Microphone Impedance: 500 ohms (mic optional)
Power Required: 13.5V DC at 20 amps
100, 110, 117, 200, 220, 234V AC at 650 VA *

* with optional power supply

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The radio.

481

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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.

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.

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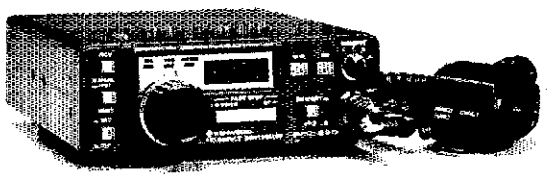

Optional DFC-230 Digital Frequency Controller
Allows frequency control in 20-Hz steps with UP/DOWN microphone (supplied with DFC-230). Includes four memories (handy for split-frequency operation) and digital display. Covers 100 kHz above and below each 500-kHz band. Very compact.