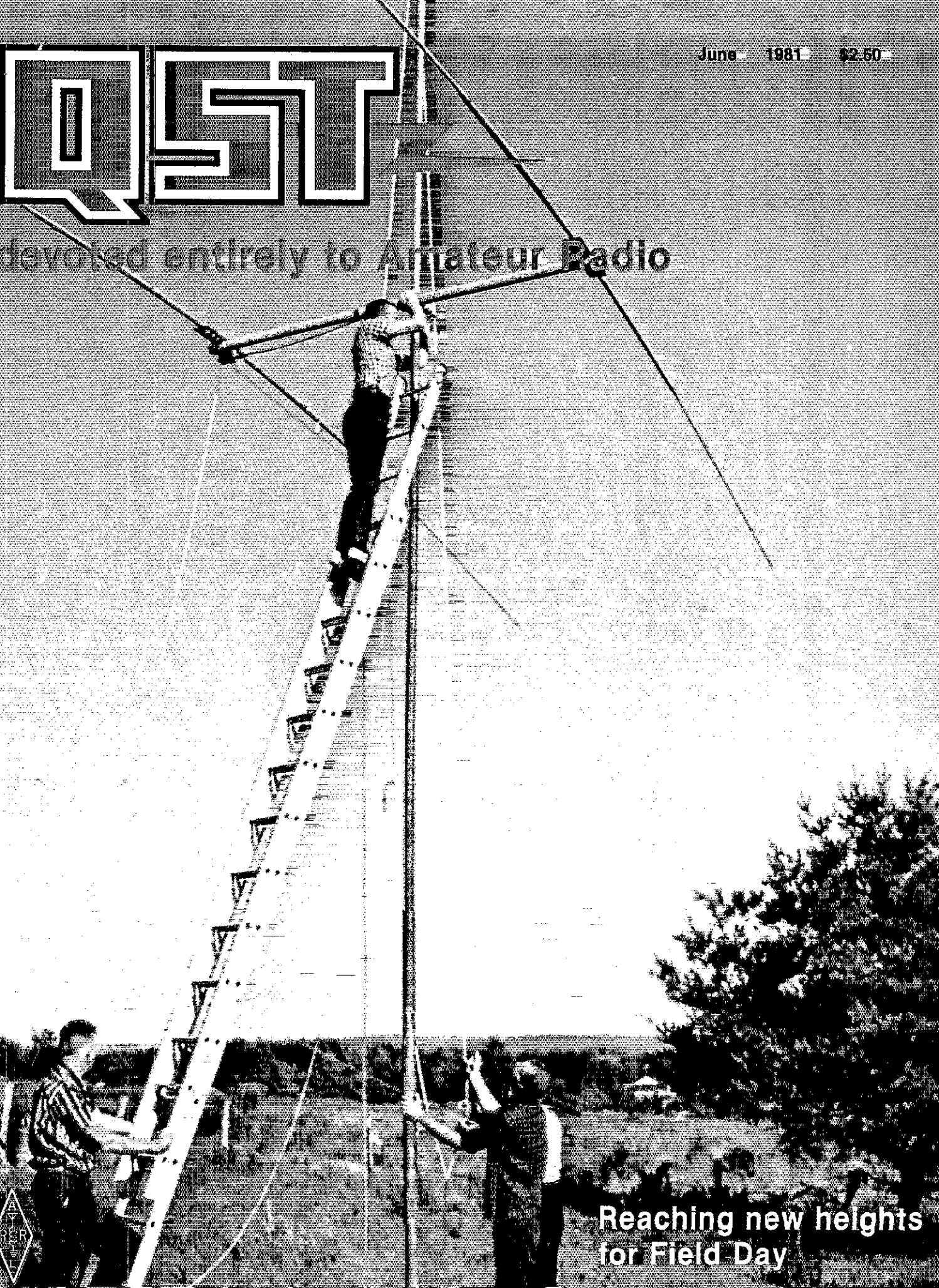
QST

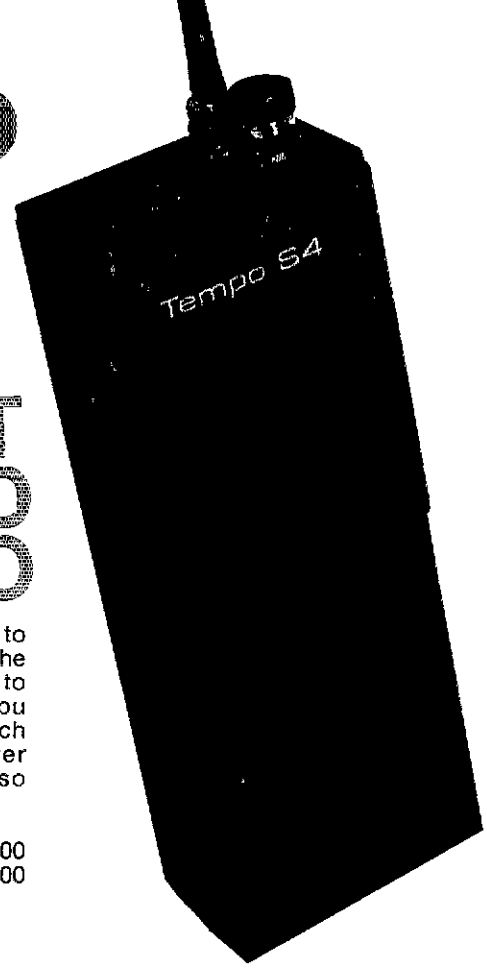
June 1981 $2.50

devoted entirely to Amateur Radio



Reaching new heights for Field Day

tempo does it again



THE WORLD'S FIRST 440 MHz SYNTHESIZED HAND HELD RADIO

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

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

Tempo S-1

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

Tempo S-5

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

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

*For use with S-1 and S-5

Tempo S-2

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

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

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

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

Optional Accessories for all models

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

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

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

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

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

53 YEARS OF SERVICE

Henry Radio

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

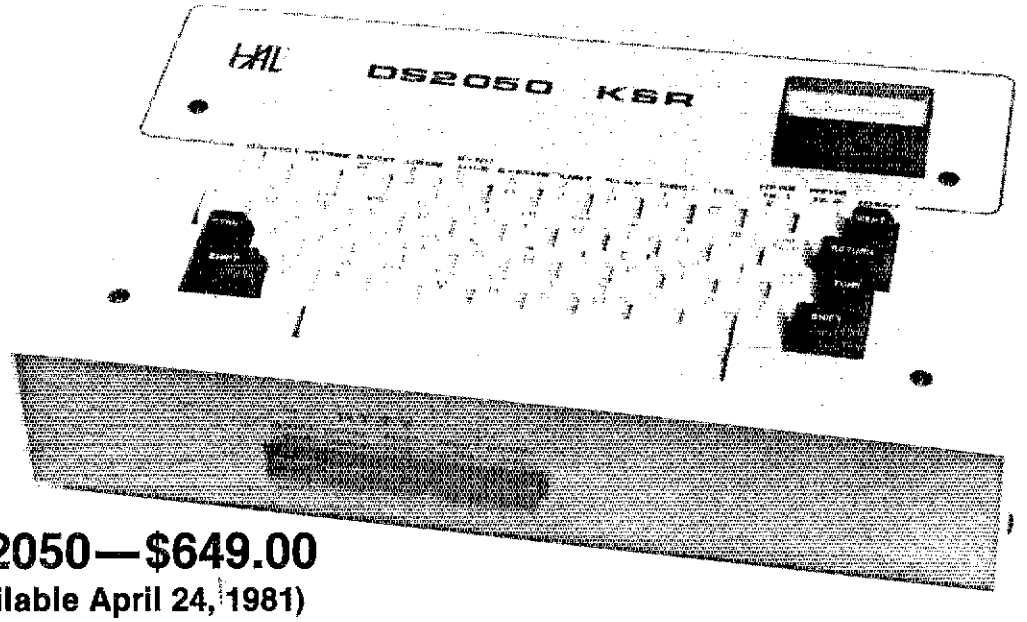
2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820-1234
931 N. Euclid, Anaheim, CA 92801 (714) 772-9200
Butler, Missouri 64730 (816) 679-3127

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.

BY POPULAR REQUEST...

The Best Features Of Two Proven HAL RTTY Models
Are Now Available In ONE Convenient New Unit—
The

DS2050 KSR



DS2050—$649.00

(Available April 24, 1981)

- Self contained RTTY and CW terminal —RTTY demodulator is now internal!
- Best features of BOTH the DS2000 and ST5000 in one package.
- Simplified connections to your transceiver with standard phono connectors.
- Front panel tuning meter (rear panel scope connectors).
- Both 170Hz and 850Hz shifts for receive and transmit.
- Full high voltage loop[1] compatible for printers, keyboards, and tape transmitters (TD's).
- Full length 72 character lines—24 line screen.
- Pretype either 255 character transmit buffer or the full 1728 character screen.
- Two programmable HERE IS messages with CW ID.
- Keyboard Operated Switch (KOS) for automatic TX/RX control.
- Bright-dim display of received or transmitted text.
- 1-100 wpm CW; 60, 66, 75, 100, 133 wpm Baudot RTTY; 110 or 300 baud[2] ASCII RTTY.
- Word wrap-around, Unshift On Space (USOS), and Synchronous Idle Transmit.
- Edit as you type with WORD transmit mode.
- Built-in demodulator is a proven ST5000 demodulator, not a simple compromise.

[1]Use your own high voltage loop supply.
[2]External modem recommended for 300 baud.

WHEN OUR CUSTOMERS TALK *WE LISTEN*

HAL COMMUNICATIONS CORP.
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URBANA, ILLINOIS 61801
217-367-7373

DS2050 . . . . . $649.00
MR2000 . . . . . $169.00
ESM914 . . . . . $169.00

ICOM IC-730

ICOM's Go-Anywhere HF Rig for Everyone's Pocketbook

Compact.

Only 3.7 in (H) x 9.5 in (W) x 10.8 in (D) will fit into most mobile operations (compact car, airplane, boat, or suitcase)

Affordable.

Priced right to meet your budget as your main HF rig or as a second rig for mobile/portable operation.

Convenient.

- Unique tuning speed selection for quick and precise QSY, choice of 1 KHz, 100 Hz or 10 Hz tuning.
- Electronic dial lock, deactivates tuning knob for lock on, stay on frequency operation.
- One memory per band, for storage of your favorite frequency on each band.
- Dual VFO system built in standard at no extra cost.

Full Featured.

- 200W PEP input—powerful punch on SSB/CW (40 W out on AM)
- Receiver preamp built-in • VOX built-in
- Noise blanker (selectable time constant) standard
- Large RIT knob for easy mobile operation
- Amateur band coverage 10-80M including the new WARC bands
- Speech processor—built-in, standard (no extra cost)
- IF shift slide tuning standard (pass band tuning optional)
- Fully solid state for lower current drain
- Automatic protection circuit for finals under high SWR conditions
- Digital readout • Receives WWV • Selectable AGC
- Up/down tuning from optional microphone
- Handheld microphone standard (no extra cost)
- Optional mobile mount available

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June 1981 *Volume LXV Number 6*

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THE COVER

Ah, Field Day! Complete rules appear in May *QST*, page 80; a ladder mast is described in this issue, page 24. *(Photo courtesy George Hart, W1NJM)*

Contents

The best amplifier value just got better....

Clipperton-L, now with tuned input.

Clipper[illegible] Sixteen amateurs [illegible] together as the first group in 20 years to set foot on the remote French island Clipperton. Their goal - 30,000 QSO's in just 7 days.

If you're like most of us, a rare DXpedition is more a dream than a reality. But the Clipperton Linear Amplifier from DenTron brings the thrill of a DXpedition to you.

The Clipperton-L™ was inspired by the famous DXpedition on which 3 MLA-2500's were used. We built the Clipperton with 4 rugged, economical 572 B's in the final to provide a full 2KW PEP on SSB and 1KW CW on 15 through 160 meters. With features like hi-lo power selector for equal efficiencies at 1 or 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 $749.50.
FCC Type accepted.

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Dedicated to making amateur radio more fun.

DX

1,500 CONTACTS

120 COUNTRIES

A4

IN 2 DAYS

"I used your new A4 during the 1981 Phone ARRL DX contest. It was dynamite!! In 24 hours I had worked 99 countries. After 48 hours my total was 125. The A74 add-on kit allowed me to work 28 countries on 40 meters alone. It added new versatility to my 40 meter activity. By the end of 48 hours I had worked almost 1500 contacts with 285 multipliers. Thank you for making my operating more fun." ART HAMBLETON, K1LL.

SPECTACULAR PERFORMER

Top performance, easy installation, 4 band operation, and moderate price are yours with Cushcraft's new A4, 4 element beam. A4 operates on 10-15-20 meters. A74 add-on kit expands operation to either 40 meters or the new 30 meter WARC band. New engineering gives better performance through improved trap design with fewer parts, less installed weight and greater strength. You too can experience exciting DX contacts with A4 available through dealers worldwide.

*Logs to be verified

cushcraft CORPORATION

THE ANTENNA COMPANY
48 Perimeter Road, P.O. Box 4680
Manchester, NH 03108

Hear there and everywhere.

Easy tuning, digital display, professional quality

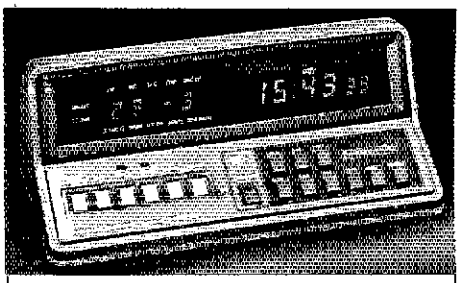
R-1000

The R-1000 is an amazingly easy-to-operate, high-performance, communications receiver, covering 200 kHz to 30 MHz in 30 bands. This PLL synthesized receiver features a digital frequency display and analog dial, plus a quartz digital clock and timer. Its easy-single-knob tuning and high sensitivity, selectivity, and stability make the R-1000 a favorite amongst Radio Amateurs, shortwave listeners, engineers, maritime communicators, and others who demand high quality in a general-coverage communications receiver.

R-1000 FEATURES:

- **Continuous frequency coverage from 200 kHz to 30 MHz**
  Receives shortwave, medium-wave, and long-wave bands.
- **30 bands, each 1 MHz wide**
  Easy-to-use band switch with large knob.
- **Five-digit frequency display and analog dial**
  Accurate digital display with 1-kHz resolution and illuminated analog dial with precise gear dial mechanism.
- **Built-in quartz digital clock with timer**
  Precise 12 hour clock with AM and PM indicators. Timer turns on radio for scheduled listening, and even controls a recorder through remote terminal.
- **Up-conversion PLL, wideband RF circuits**
  Provide exceptional performance and easy operation without the need for band-spread, preselector, or antenna tuning. Excellent sensitivity, selectivity, and stability.
- **Step attenuator**
  0-60 dB in 20-dB steps. Prevents overload.
- **Three IF filters for optimum AM, SSB, CW**
  12-kHz and 6-kHz (adaptable to 6-kHz and 2.7-kHz) filters for AM wide and narrow, and 2.7-kHz filter for high-quality SSB (USB and LSB) and CW reception.
- **Communications-type noise blanker**
  Eliminates ignition and other pulse-type noise. Superior to noise limiter.
- **Recording terminal**
  For external tape recorder.
- **Tone control**
  For desired audio response.
- **Built-in 4-inch speaker**
  For quality sound reproduction.
- **Dimmer switch**
  Controls S-meter and other panel lights and digital-display intensity.
- **Three antenna terminals**
  Wire terminals for 200 kHz to 2 MHz and 2 MHz to 30 MHz. Coax (SO-239) terminal for 2 MHz to 30 MHz.
- **Selectable operating voltage**
  AC voltage selector for 100, 120, 220 and 240 VAC. Also adaptable to operate on 13.8 VDC (with optional DCK-1 kit).

More information on the R-1000 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.



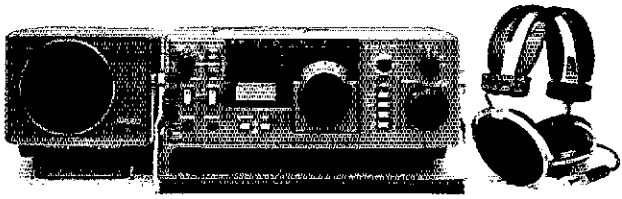
HC-10 Digital World Clock

- **Two 24-hour displays with quartz time base**
  Right display: local (or UTC) hour, minute, second, day. Left display: month, date, world time in various cities, memory time (QSO starting time), and time difference (in hours from UTC).
- **Time in 10 cities around the world**
  Plus two additional programmable time zones.
- **"TOMORROW" and "YESTERDAY" indicators**
- **Memorizes present time**
  And recalls later, for logging purposes.
- **High accuracy**
  ±10 seconds/month

KENWOOD
...pacesetter in amateur radio

Matching accessories:
- SP-100 external speaker
- HS-5 deluxe headphones

Other accessories not shown:
- HS-4 headphones
- DCK-1 easy-to-install modification kit for 12-VDC operation



Specifications and prices are subject to change without notice or obligation.

Power up.

40 W, 15 memories/offset recall, scan, priority, DTMF touch-pad

TR-7850

Kenwood's remarkable TR-7850 2-meter FM mobile transceiver provides all the features you could desire, including a powerful 40 watts RF output. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch touch-pad (DTMF) encoder. A 25-watt output version, the TR-7800, is also available.

TR-7850 FEATURES:

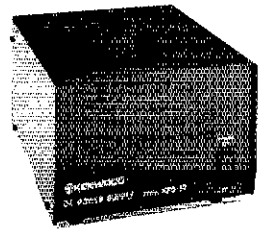
- **Powerful 40 watts power output**
  Selectable high or low power operation. High 40-watt output provides reliable signal for wide area coverage.
- **15 multifunction memory channels, easily selectable with a rotary control**
  M1-M13...memorize frequency and offset (±600 kHz or simplex). M14...memorize transmit and receive frequencies independently for nonstandard offset. M0...priority channel, with simplex, ±600 kHz, or nonstandard offset operation.
- **Internal battery backup for all memories**
  All memory channels (including transmit offset) are retained when four AA NiCd batteries (not Kenwood supplied) are installed in battery holder inside TR-7850. Batteries are automatically charged while transceiver is connected to 12-VDC source.
- **Extended frequency coverage**
  143.900-148.995 MHz, in switchable 5-kHz or 10-kHz steps.
- **Priority alert**
  M0 memory is priority channel. "Beep" alerts operator when signal appears on priority channel. Operation can be switched immediately to priority channel with the push of a switch.
- **Built-in autopatch touch-pad (DTMF) encoder**
  Front-panel touch pad generates all 12 telephone-compatible dual tones in transmit mode, plus four additional DTMF signaling tones (with simultaneous push of REV switch).
- **Front-panel keyboard**
  For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones.
- **Autoscan**
  Entire band (5-kHz or 10-kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds, unless CLEAR or mic PTT button is pressed to cancel scan.
- **Up/down manual scan**
  Entire band (5-kHz or 10-kHz steps) and memories, with UP/DOWN microphone (standard).
- **Repeater reverse switch**
  Handy for checking signals on the input of a repeater or for determining if a repeater is "upside down."
- **Separate digital readouts**
  To display frequency (both receive and transmit) and memory channel.
- **LED bar meter**
  For monitoring received signal level and RF output.
- **LED indicators**
  To show: +600 kHz, simplex, or -600 kHz transmitter offset; BUSY channel; ON AIR.
- **TONE switch**
  To actuate subaudible tone module (not Kenwood-supplied).
- **Compact size**
  Depth is reduced substantially.
- **Mobile mounting bracket**
  With quick-release levers.

More information on the TR-7850 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

KENWOOD
...pacesetter in amateur radio

Matching accessory for fixed-station operation:
- KPS-12 fixed-station power supply for TR-7850

Other accessories not shown:
- KPS-7 fixed-station power supply for TR-7800
- SP-40 compact mobile speaker



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Midwest Division

Iowa — Bob McCaffrey, KØCY, 3913-29th St., Des Moines 50310 (515-279-8978)
Kansas — Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Larry G. Wilson, KØRWL, 5415 E. 97th St., Kansas City 64137 (816-966-8953)
Nebraska — Shirley M. Rice, KAØBCB, 510 East 16th St., Scotts Bluff 69361 (308-632-4337)

New England Division

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

Northwestern Division

Alaska — Fred S. Wegmer, KL7HFM, 1910 Rosemary St., Anchorage 99504 (907-274-3464)
Idaho — Lemuel H. Allen, Jr., W7JMH, 1800 S. Atlantic St., Boise 83705 (208-343-9153)
Montana — L. C. "Les" Belvea, N7AIK, P. O. Box 327, Belgrade 59714 (406-388-4253)
Oregon — William R. Shrader, W7QMU, 2042 Jasmine Ave., Medford, 97501 (503-773-8624)
Washington — Robert L. Klepper, W7IEU, 7027 51st NE, Marysville 98270 (206-659-3005)

Pacific Division

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

Roanoke Division

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

Rocky Mountain Division

Colorado — Lawrence E. Steimel, WØACD, 1750 Roslyn St., Denver 80220
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112
Utah — Royce Henningson, K7QEQ, P. O. Box 1267, Moab 84532 (801-259-5016)
Wyoming — Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82001 (307-634-7385)

Southeastern Division

Alabama — James M. Bonner, K4UMD, Rte. 15 — Box 246, Birmingham 35224 (205-788-2003)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31904 (404-322-2856)
Northern Florida — Billy F. Williams, Jr., N4UF, 911 Rio St. Johns Dr., Jacksonville 32211 (904-744-9501)
Southern Florida — Woodrow Huddleston, K4SCL, 219 Driftwood Ln., Largo 33540 (813-584-0984)
West Indies — Julio Negroni, KP4CV, Georgetown, No. 269, Rio Piedras, PR 00927 (809-764-8099)

Southwestern Division

Arizona — Erich Holzer, N7EH, 3526 E. March Pl., Tucson 85713 (602-326-8976)
Los Angeles — Stanley S. Brokl, N2YQ, 2645 North Marengo Ave., Altadena, CA 91001 (213-798-8827)
Orange — Fred Heyn, WA6WZO, 962 Cheyenne, Costa Mesa, CA 92626 (714-549-8516)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (714-273-1120)
Santa Barbara — Robert N. Dyruff, W6POU, 1188 Summit Rd., Santa Barbara, CA 93108 (805-969-3073)

West Gulf Division

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

THE AMERICAN RADIO RELAY LEAGUE, INC.

"It Seems to Us..."

DXCC

As you may know, among the operating awards programs sponsored by the League is one called the DX Century Club, or DXCC. Any amateur who has contacted amateur stations in 100 countries and who possesses written confirmations (QSL cards) for those contacts, is eligible to participate (although in the U.S. and Canada only League members, who bear the cost of administering the program, may apply). Endorsements to the basic award are issued, and an "Honor Roll" is maintained of those who have made it into the top 10 positions (i.e., those who need fewer than 10 countries on the current DXCC list). Without a doubt, DXCC is the foremost awards program in Amateur Radio today, with almost 35,000 certificates issued since its inception and with tens of thousands of amateurs actively seeking the basic award or their next endorsement.

DXCC has a long history, and a proud tradition. The first DX award was Worked All Continents (WAC), sponsored then, as now, by the International Amateur Radio Union. By the 1930s, WAC was so common that a new measure of DX prowess was needed. Developments are described in an October 1935 *QST* article by Clinton B. DeSoto, entitled, "How to Count Countries Worked":

> For ten years or so it has been impossible to work any *farther*, in terms of terrestrial miles; the only room for expansion is to work as many *places* as possible. The first recognition of this fact resulted in the inauguration of the WAC certificate. Totalling the number of countries worked followed quite naturally. . . . With the world WACing at a terrific rate these days, faster by far than ever before, the number of countries worked is increasingly becoming the criterion of excellence among outstanding DX stations.

The first list of ARRL "countries" appeared in January 1937 *QST*, and the DXCC award was announced in September of that year. Today, the ARRL DXCC list has evolved into a list of 318 political or geographic entities that is the standard measure of DX achievement in Amateur Radio.

One reason for DXCC's popularity is that counting countries worked is such a natural thing to do; people were collecting countries before DXCC was ever created, and no doubt would be today even if there were no such award. Another is that, from the very beginning, participants in the program have been held to high standards of honesty and ethics.

Fortunately, in discharging its responsibility to maintain the integrity of the program, the Hq. staff has enjoyed solid support from the DX fraternity. Even so, from the start there have been occasional jokers whose egos needed more attention than their operating talents could earn. "How's DX?" in August 1947 *QST* had this to say:

> Last month the postwar DXCC listings were presented for the first time, minus the call of a certain W who had submitted 100 cards. The DXpert undoubtedly thought he had himself a foolproof racket, because not a single one of the submitted cards was a forgery or unusual in any way. As a matter of fact, they were all cards received directly from the foreign stations. Why then, you ask, did we toss the guy out? Well, maybe we were a little hasty and narrow-minded, but this great DX man had been sending plenty of cards to stations claiming contacts that never took place!
>
> Apparently a number of foreign operators, trying to be good Joes and figuring they had slipped up on their logging, sent the guy enough cards to make up his 100. But our pal didn't reckon with the many careful foreign stations who smelled a rat and tipped off the gang at Hq. . . .
>
> The $64 question is, of course, what kind of a guy does it take to pull a trick like that? We just hope he cuts out this column and tacks it on the wall where he thought his DXCC certificate would go! Any suggestions as to what he can do with the cards?

Over the years, others have tried submitting counterfeit cards reflecting varying degrees of ingenuity. Happily, such goings-on have been the rare exception and generally have involved lone individuals whose ethical standards somehow got warped. For the DXCC Desk, which sees about 600,000 authentic cards per year and which has access to a tremendous store of DX-related information, their creative efforts have been pretty easy to spot.

Unhappily, the Awards Committee recently was shown evidence of a fake QSL scam that is apparently intended to turn the rare cards earned by amateurs over the years into worthless bits of paper. For reasons known only to themselves, a small group of misguided DXers has fabricated phony cards for a number of rare DXCC countries and has spread them rather liberally around the countryside. How many cards have been circulated is anyone's guess; all we know is that not many have been submitted for DXCC credit.

How do we know? Because the DX community is not about to put up with such shenanigans, now any more than in 1947.

Already, one holder of DXCC has been disqualified from further participation under DXCC Rule 11, which reads:

> Any altered or forged confirmations submitted for CC credit may result in disqualification of the applicant. The eligibility of any DXCC applicant to reapply, and the conditions for such application, shall be determined by the Awards Committee. Any holder of the Century Club Award submitting forged or altered confirmations must forfeit his right to continued DXCC participation.

As we say, there has been one disqualification already. There may be more.

Participants in the DXCC program expect the award to be administered in accordance with the highest standards. This responsibility is felt very keenly by all members of the Awards Committee, and is one we will do our utmost to live up to. If you happen to have in your possession a "rare QSL" confirming a contact that you didn't make — well, a word to the wise should be sufficient. — *The ARRL Awards Committee*

League Lines...

Problem: Three flags (Canadian, U.S. and ARRL), and only two flag poles at ARRL Hq. from which to fly them. Solution: Director Ed Metzger, W9PRN, when he was at Hq. in January for new-director orientation, expressed the desire to contribute the necessary third pole in memory of his wife, Mary. The new flag pole has been installed. Our thanks to Ed for his generosity and thoughtfulness.

The FCC has relocated its Philadelphia, Pennsylvania district office. The address is One Oxford Valley Office Building, Room 404, 2300 East Lincoln Hwy., Langhorne, PA 19047, tel. 215-752-1324. There has been no change in the Amateur Radio examination schedule: Written tests -- Mondays, Tuesdays and Wednesdays, 10 A.M. until 12 noon (except holidays). Amateur Radio code tests -- Tuesdays and Wednesdays at 9 A.M. only. No appointment necessary.

Radio amateurs have been experiencing delays in license processing, especially if item 9 on the FCC's form 610 has been checked "yes." Item 9 asks whether the applicant's antenna structure is less than 6.1 kilometers (3.8 miles) from the nearest airport runway. If it will be, the applicant must check yes. If, however, after consulting Amateur Rule 97.45, you determine that you would not have to notify the Federal Aviation Administration (FAA), write the words "20-ft. rule," "lower than slope rule," or "shielded from airport," whichever is applicable, next to the answer block. This should speed up the process for applicants living near airports.

If you want to extend your League membership at the present dues rate, please note that the deadline for doing so is approaching. Applications for new membership, membership renewal or extension (maximum of three years) under the present dues rate must be received at Hq. no later than June 30. Members in the U.S. may extend present membership for a term of one year at $18, two years at $35 and three years at $51. For members in Canada or elsewhere outside the U.S., the present rate is one year at $26, two years at $51 and three years at $75, U.S. funds, because of the added expense of mailing QST outside the U.S. For Life Membership, the fee is currently $450 in the U.S. and $650 elsewhere, U.S. funds, payable in one lump sum or in eight quarterly payments over a two-year period. Effective July 1, annual dues for ARRL membership will be $25. That will, because of postal surcharges, be $30 for members in Canada, and $33 for members elsewhere outside the U.S., U.S. funds. Life Membership for the U.S. will be increased to $625, $750 for Canada and $825 for foreign Life Memberships, payable in one lump sum or in eight quarterly payments over a two-year period, U.S. funds.

Senior Citizens. In order to protect those who are retired and on fixed incomes, the ARRL Board of Directors established a special dues rate, available upon request, for Full Members over 65 years of age. The Senior Citizen rate, effective July 1, is $20 in the U.S., $25 in Canada and $28 elsewhere, U.S. funds. Senior Citizens must send proof of age when requesting this special rate. A copy of a driver's license or birth certificate is acceptable, or anything else that shows a birth date.

The ARRL Repeater Directory, 1981-1982 edition, is now available from your dealer or from Hq. for $1. If you have purchased one without a 4-page "slip sheet," you should ask for one from "Special Requests," c/o ARRL Hq. The slip sheet corrects a juxtaposition error that affects parts of the 2-meter listings of the states of Pennsylvania, Ohio and Oklahoma.

Two bills in Congress, H.R. 3239 in the House of Representatives and S. 821 in the Senate, will give the FCC authority to charge fees for licenses it issues. The Commission has not required payment of fees for any license since January 1, 1977 because its fee schedule then in effect was found to be unlawfully excessive. At press time, neither bill proposed a figure for an Amateur Radio license fee; however, one may be proposed in the so-called "mark-up" sessions by amendment. W1AW will carry a bulletin giving details on any further developments. ARRL does not object to fees which are reasonable and related to services amateurs get from the Commission.

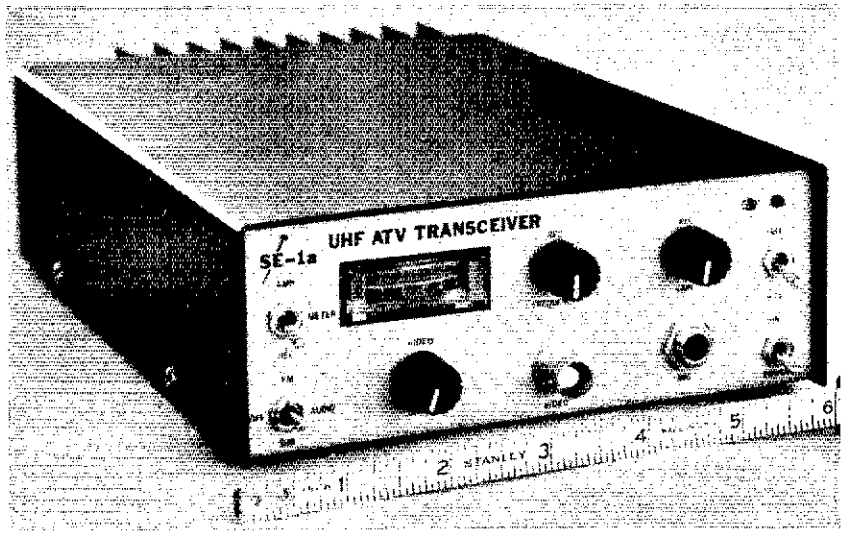
The petition filed by ARRL for 20-meter phone band expansion down to 14,150 kHz, reported on in April 1981 QST, page 67, has been assigned RM-3860.

The petition filed by ARRL for the new 10.1 MHz band, which proposes that General class and higher license holders be permitted A1 and F1 operation, with a power limit of 250 watts input on the band, has been assigned RM-3855. This petition was also reported on in April 1981 QST, page 67.

All About Amateur Television

Or how I learned to see myself as others see me!

By Henry B. Ruh,* KB9FO



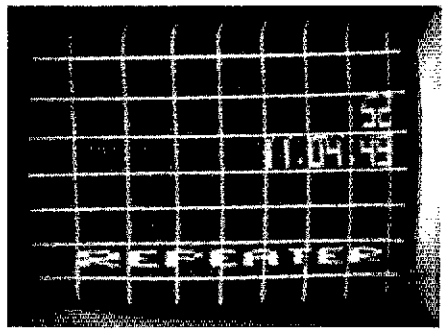
(Photo courtesy Science Workshop)

There has been an explosive increase in amateur television (ATV) activity in the past few years. Many hams who were involved in ATV years ago and a number of newcomers are discovering that ATV is inexpensive, fun and educational, allows for a more vivid expression of self, and provides a vital public service. ATV has come of age.

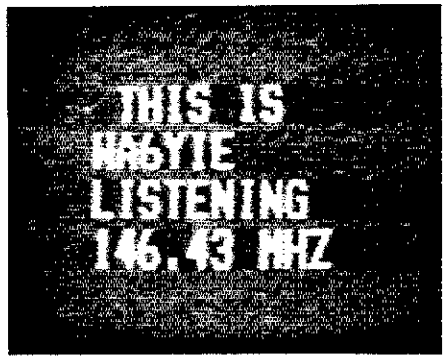
ATV is identical to the type of TV you are accustomed to watching in your living room. The technical standards are basically the same. Video is transmitted by amplitude modulation. The audio is transmitted in any one of a number of ways: on a 4.5 MHz subcarrier (as with commercial TV), by frequency modulating the video carrier (called on-carrier sound), or by using another amateur frequency (such as 2 meters) for separate sound transmission.

Fun With Repeaters

There are ATV repeaters similar in operation to the more familiar 2-meter fm repeaters. Three different types of ATV repeaters exist. Some (such as WR4AAG, Washington, DC), operate in-band. These receive a TV signal in the 450-MHz band and repeat the signal in the same band.



An example of the display presented by a computer-operated ATV repeater. The picture conveys time, signal report and test pattern information. *(Photo courtesy W6ORG/RPT)*



Self-explanatory — an ATV CQ!

The obvious advantage is that you need only *one* antenna for transmission and reception. As your station becomes more sophisticated, or if you live close to the repeater, you can also monitor your own transmitted signal (full duplex). Most operations are half duplex — you take turns transmitting and receiving.

Some ATV repeaters operate crossband; you transmit to the repeater in the 450-MHz band and receive the repeater signal in the 1240-MHz band. This requires the use of two antennas and two transmission lines, but it allows you to become interactive with the repeater; you "talk" to the repeater and it "talks" back to you. Many of these repeaters are connected to computers, which you access with an ASCII keyboard while transmitting afsk. The repeater/computer digests your input and sends something back to you which is displayed on a video screen: games, signal reports, computer-remembered messages, the output of your own computer program, weather maps, weather radar pictures or videotaped replays of previous transmissions. Not only can you interact with the repeater, but your friends can join in the fun since everyone can watch and take turns transmitting to the repeater. A sophisticated system can accommodate more than one "player" by using dif-

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ferent inputs and a common output. Play chess or bridge with the computer or your friends. Transmit computer to computer and watch the results on the screen. Your imagination is the key.

A third type of repeater system would incorporate different inputs/outputs or special TV modes such as narrow-band TV. This system is used in Europe where the signal bandwidth is more restricted than in the U.S. The usual technique is to restrict the video baseband to 1 or 0.5 MHz. Australian amateur systems have one freedom not permitted in the U.S.: They can have an output in the 35 cm band which is in the middle of the uhf TV band. This allows the public to watch as well! Of course, you could provide a receiver and modulator and put your signals on you local cable TV system.

ATV Past

In the early days (before 1960), it was common practice to use a commercially available uhf TV tuner or converter modified to operate on 420 to 450 MHz. These tuners proved to have a 14-dB or higher noise figure, and a severe lack of gain (sometimes no amplification at all), resulting in a 7- to 20-dB conversion loss. It's no wonder that uhf TV reception was then problematic! Such receivers would pick up a 500-watt TV signal 1 or 2 miles (1.6 or 3.2 km) distant, but anything beyond that was sheer luck. So if you tried the TV tuner approach earlier and lost interest because you couldn't see anything, that's the reason why! Modern receivers, converters and preamps have typical noise figures of 1.5 dB or better and often a gain of 20 dB or more. Today, there's no squinting through the "snow" even when viewing the output of a station using a 10-watt transmitter at a distance of 60 miles (100 km).

Before 1975, all ATV work was done with horizontally polarized antennas. Over the years, we have changed to vertical polarization. Why? Primarily because the *repeaters* are vertically polarized. DXers use horizontal polarization, but unless you live in the great midwest (anything between the east and west coast mountain ranges), you probably won't be DXing anyway. ATV repeaters use vertical polarization to achieve omnidirectionality. While commercial TV stations use antennas that have omnidirectional horizontal gain, ATVers haven't discovered the slot radiator, traveling wave or pylon type antennas and have resorted to using vertical gain antennas of the multi-dipole or Station Master types. This is probably because such antennas can be purchased off-the-shelf and the others would have to be built.

Getting Started

You can build your own equipment, or buy it, either in semi-kit form or right off-the-shelf for plug-and-play (appliance) operation. A typical ATV station can be put together for about half the price of an hf transceiver or the price of a 2-meter fm rig — about $250 to $350. If you're an "appliance" operator, you will spend more to get the same results as the ham who is able and willing to build or scrounge some of the equipment. A lot of ATVers got on the air for less than $50 by using cast off equipment and gear bartered for at hamfests. You already own the most essential item, a TV set. Other equipment you'll need includes the receiver and transmitter, a TV camera, some low-loss coaxial transmission line and an antenna. A list of suppliers and the equipment they offer is shown in Table 1. You are encouraged to write for their catalogs.

Receiving: A complete ATV receiving station may be yours by merely connecting the output of a 439-MHz converter to your TV set and an antenna to the converter input. Converters range in price from $10 for the simple Varactor tuner type to approximately $80 for the more deluxe units which include low-noise rf amplifier stages and doubly balanced mixers.

Transmitting: Modern ATV transmitters have provisions for both on-carrier and subcarrier audio. The on-carrier audio capability is needed if you're going to be using an ATV repeater. Most of the ATV repeaters use a separate receiver to recover the frequency-modulated on-carrier audio signal. This is because most ATVers started with a 450-MHz fm rig and added video provisions to it. Today, you can purchase units that fit in the palm of your hand and are powered from a 12-V dc source capable of supplying a few amperes of current. (The power supply should be no problem since you probably have one in your shack already. If not, a simple supply may be built or purchased.) Low-power transmitters cost about $80 and a power amplifier approximately the same; even complete transceivers are available.

Video Sources: The required video input for the transmitter can be obtained from a TV camera or other video source such as a video tape machine. Camera requirements are minimal. It should deliver a 1-V composite video signal, have either interlaced or random scanning, and horizontal and vertical sync pulses which need not conform exactly to any technical standard. A closed-circuit TV (CCTV), surplus commercial, home video, or home-built camera may be used. Prices can range from as little as $10 for a camera purchased at a hamfest to as much as $850 for a first-class color camera. A means of supporting the camera will be needed. Most cameras can be fitted to a standard photographic tripod or, in a pinch, be suspended from the ceiling with a length of wire.

If you own or have access to a video tape recorder (VTR) or a slow-scan TV (SSTV) setup, you can use that as a video source as well. With the VTR, you can make your own programs and record what you're receiving off the air. This is especially nice when friends ask you what you do with your ATV gear — show them the tape!

Your Studio

Probably the most often overlooked

Table 1
ATV Equipment Suppliers

Suppliers	*Equipment*
P.C. Electronics 2522 Paxson Arcadia, CA 91006	Transmitters, receivers, antennas, converters, cameras, semi-kits, ATV repeaters, amplifiers, accessories
Aptron Labs 3623 Grandview Dr. Bloomington, IN 47401	Transmitters, receivers, antennas, converters, ATV repeaters, accessories (for 450 MHz only)
Science Workshop P. O. Box 393 J Bethpage, NY 11714	Transceivers, converters, accessories
Denson Electronics P. O. Box 85 Rockville, CT 06066	Cameras, monitors, surplus TV equipment
Spectronics, Inc. 1009 Garfield Oak Park, IL 60304	Antennas, some surplus equipment
Applied TV Research (ATV Research) 13th and Broadway Dakota City, NE 68731	Cameras, monitors, accessories, kits

item in any ATV station is lighting. While our eyes do not easily recognize shadows and areas of relative darkness, the camera will tend to emphasize these differences and produce pictures that look different on the TV screen than they appear to our eyes. Areas of interest must be lighted evenly. The best way to do this is to use three lights: a general flood light to the left and right of the camera position, directed toward the area of interest, and a back light, shining from above and behind the subject. The back light helps to eliminate shadows and separates the subject from the background. A photographic light bar may be attached to the camera mount to allow the light source to follow camera movement.

The amount of light required will depend on the camera being used. Older cameras need anywhere from 600 to 1000 watts to light a given area, newer monochrome and early color cameras 300 to 600 watts, and the newest cameras 100 to 300 watts. The newer cameras also have much better automatic light compensation and are not blinded by "hot spots" (highlights or bright back-lighting). Cameras, lenses and studio lighting are covered in detail in the listed publications.[1,2,3]

You will undoubtedly want to show photos, slides and drawings to your "audience." An easel placed in a convenient area may be used to do this. A roll of RTTY paper placed behind a panel with a slot at the top through which to pull the paper becomes a quick and easy way to write messages. You can even use paper towels and crayons!

Antennas and Transmission Lines: You *must* use a good antenna and transmission line if you expect decent results at uhf. At these frequencies and in lengths exceeding 20 feet (6 m), you might regard RG-8/U as a dummy load. A *short* length of RG-8/U or other cable of good quality is okay for use as a "pigtail" up near the rotator, but that's about it. If you're contemplating the use of CATV cable, be careful. CATV trunk cable is checked only to 300 MHz. Even the Superbrand cable is swept only to 400 MHz. Also, CATV cable connectors are expensive and hard to get. Homemade connectors on CATV coax are generally poor at these frequencies. Heliax cable at a cost of approximately $1 per foot (0.3 m), less at hamfests, is to be desired. Since you'll buy the cable only once, you might consider using cable such as 1/2 inch (12.5 mm) Andrew Heliax. The best compromise between price and performance at 450 MHz is 7/8 in. (22 mm) air dielectric Andrew Heliax. It costs about $2 per foot (0.3 m). Purchase a sufficient length to allow for gradual bends; sharp bends in this type of transmission line must be avoided. The transmission line should be fastened to the tower to prevent wind flap and provide mechanical support.

Ernie Williams, WB6BAP, operates the ATV camera for the Rose Parade coverage while an unidentified friend relays information.

Brass type UHF or N connectors should be used to ensure low loss and long life. Avoid using adapters as they introduce loss; every decibel at these frequencies makes quite a bit of difference in signal strength. The connectors should be attached securely to the transmission line and each connection weatherproofed using PVC tape or other methods.

A uhf antenna offering a gain of 15 dB or more should be used. The Cushcraft DX-420 is about the least expensive commercial unit available and it works well. The J-Beam model MBM-48, offers superb performance in a small package. It is a skeletal slot array that has about 5.5 dB of gain. KLM's 420-450-27 is a multiple-driven-element Yagi design with 27 elements. All three antennas have proved themselves in actual use. If you can afford to purchase more than one antenna, stack as many of them as you can. Don't worry about size. At uhf, you can mount a 200-element array in the space required by a 10-meter monobander with room to spare. You can even tell your neighbors that it's a new TV antenna. (Well, it is!)

Perhaps you would like to build your own antenna using one of the number of different designs that have appeared in various amateur publications over the years. Once a particular design is chosen, do not deviate from the given dimensions; measure them accurately. A 1/2-inch (13 mm) error at 450 MHz has more of an effect on antenna performance than it does at 20 meters! Measure twice, cut once, and you should be set.

Remember that treetops are your electrical ground at 450 MHz. "Earth" may be up 50 feet (15 m) or higher if you live in a wooded area. You must get the signal above the treetops if you expect a working range of more than a few miles. If this principle is put into practice, you'll find that your 450-MHz working range is nearly what you would expect on 2 meters.

On The Air

At this point, you can get on the air and have fun. What can you expect from your low-power unit? Well, the known record for a 1/4-watt ATV signal is a distance of 215 miles (346 km). Granted, this is unusual, but a 10-watt transmitter is reliable for communicating over distances of 20 to 30 miles (32 to 48 km), and often as much as 60 miles (100 km), depending on surrounding terrain and the antenna system used.

While on the subject of power, remember that the video is amplitude modulated except that it is *negative* modulation. During a-m phone operation, the carrier level increases when you modulate. With ATV video, the carrier level *decreases* with modulation. This is done to reduce the effects of noise on the stability and viewability of the picture. Since the modulation is subtracting from the carrier level, the output power (as indicated on a wattmeter) will indicate a lower level of power during modulation than with an unmodulated carrier.

If you desire a more technical explanation of the makeup of a TV signal, excellent texts are available.[4-8] *Amateur Television Magazine*[9] is a bi-monthly compendium of all ATV activity and provides a continuing source of information.

Building Up

A couple of additional items will help "sharpen up" your ATV station operation. One of the more valuable aids is an rf monitor/demodulator. A TV set/converter combination will not permit accurate off-the-air monitoring because it will overload. The inexpensive (about $25) rf monitor/demodulator allows you to

Notes appear on page 14.

demodulate your transmitted signal and view it on an oscilloscope or video monitor. It is the only way you have of seeing what your signal really looks like without going to a friend's house a mile away and viewing it in his shack.

The second item is a video monitor. With it, you can observe video information *before* it is fed to the transmitter so that you can align your shots, watch VTR playback and so on. A simple selector switch will allow it to be used for all video sources. New monitors cost about $150 and are well worth it.

Outdoors with ATV

Sooner or later, you'll want to explore the great outdoors. There's no reason why your ATV station can't follow you. ATV has been used from Field Day sites, mountaintops, airplanes, hot-air balloons, ships, rooftops, cars, trucks, vans and motel rooms.

There have been numerous fly-bys at hamfests by TV-equipped planes. I was pleased to work with Tom, W6ORG, for the first airplane-to-airplane TV QSO while we both flew over Lake Mead near Las Vegas, Nevada. ATV has been used to transmit parades for shut-ins and allowed Santa to visit children in hospitals. It was responsible for the closing of a car theft and "chop shop" ring when an ATV fly-by revealed several stolen cars and travel trailers to interested police who happened to be viewing the ATV demonstration. During the Tournament of Roses Parade in Pasadena, ATV televised the traffic flow for the Los Angeles Police Department. ATV can create a real public image for Amateur Radio. The possibilities are endless! If nothing else, set up a camera and CCTV monitor and let the folks look at themselves looking at themselves!

I hope the information presented here has provided you with some ideas and will perk your interest in ATV. The next "BCNU" you transmit could mean just that! QST

Notes

[1]Ruh, "Amateur Television in a Nutshell, Vol. 2," Available from *ATV Magazine*, 7391 W. Highway 46, Ellettsville, IN 47429, $9.95 postpaid (available October 1, 1981).

[2]Zettl, "Television Production Handbook," third edition, Wadsworth Publishing Co., Belmont, California.

[3]*Teaching Health Professionals Interpersonal Skills: Using Television*, Vol. 5, Available from National Medical Radio Visual Center, Center for Communicable Disease Control, Atlanta, Georgia.

[4]Ernst, "Fernsehternempand als Hobby," Available from W. Keller and Co., Stuttgart, West Germany.

[5]See note 1.

[6]See note 2.

[7]*Amateur TV Handbook*, RSGB. Available from Ham Radio Bookstore, Main St., Greenville, NH 03048.

[8]Presti, *ATV Handbook*. Available from Aptron Publications, P. O. Box 323, Bloomington, IN 47402, or Ham Radio Bookstore, Main St., Greenville, NH 03048.

[9]*ATV Magazine*, 7391 W. Hwy. 46, Ellettsville, IN 47429. Subscription rates for this bi-monthly publication are $7.50 in the U.S. and $10 outside the U.S.

New Products

RMC-RADIO CERAMIC CAPACITORS

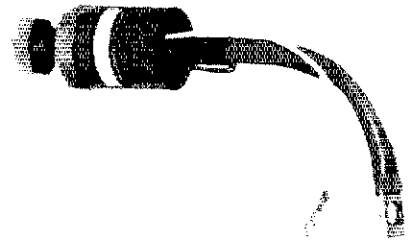
☐ The new type 5050L, 0.5 × 0.5 × 0.2 inch (13 × 13 × 5 mm), leaded and unleaded ceramic multilayer capacitors recently introduced by RMC-Radio Materials Corporation provide up to 5.6 μF capacitance in a compact, bond-metallized package. They are for use in filters, in delay lines, in thick-film technology, for high frequency bypassing and for direct insertion into pc boards. The capacitors are available in COG, X7R and Z5U EIA class codes and offer exceptional frequency stability and low leakage.

For further information, contact: RMC-Radio Materials Corporation, 4242 W. Bryn Mawr Ave., Chicago, IL 60646. — *Paul K. Pagel, N1FB*

MCG DC CROWBAR

☐ The Model LVC-1H is only one-fifth to one-third the size of conventional crowbars, making it ideally suited for applications where small size and low cost are important parameters. The unit has a trip voltage of 5 to 35 V dc (higher voltages available on request) at a current level of 55 A continuous. The LVC-1H has been designed to operate over a very wide temperature range.

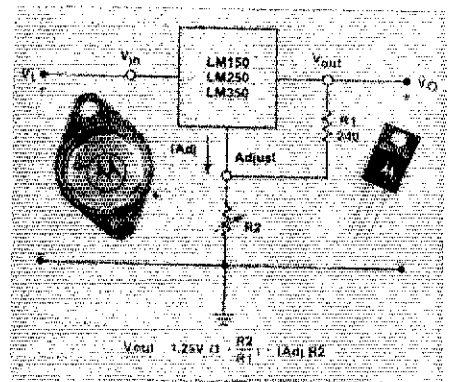
This crowbar is especially useful in applications where high dc transients may destroy ICs, microprocessors, microprocessor power supplies, etc. By shorting the dc bus in the event of power-supply failure, the crowbar prevents wholesale damage to expensive electronic components. Recovery is automatic when power is removed temporarily. Further information may be obtained from MCG Electronics Inc., 160 Brook Ave., Deer Park, NY 11729. — *Paul K. Pagel, N1FB*



MOTOROLA ADJUSTABLE 3-TERMINAL POSITIVE VOLTAGE REGULATORS

☐ Motorola has introduced a series of 3-terminal positive voltage regulators capable of supplying in excess of 3 A over an output voltage range adjustable from 1.2 V to 33 V. The LM150/250/350 are exceptionally easy to use and require only two external resistors to set the output voltage. Internal current limiting, thermal shutdown and safe area compensation are employed making these devices virtually failure proof.

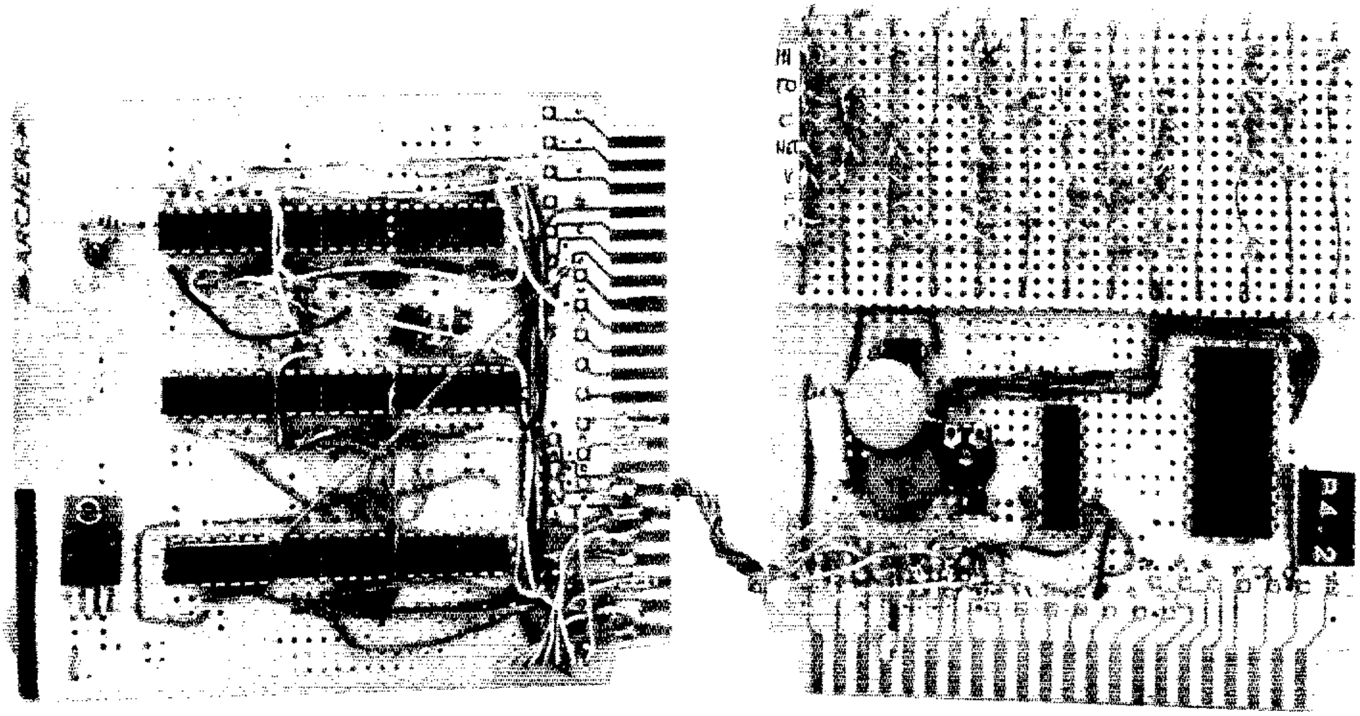
The LM150 series serves a wide variety of applications including local on-card regulation, adjustable switching regulation and a programmable output regulation. It also serves as a precision current regulator. These devices are available in a TO-3 metal case and in a low-cost, industry standard TO-220 plastic case. Further information may be obtained from Roger Ianikowski, Motorola Semiconductor Products Inc., P. O. Box 20912, Phoenix, AZ 85036. — *Paul K. Pagel, N1FB* QST



Mnemonic Encoder — Lets You Know What Your Repeater Is Up To

Wish you had an inexpensive device that would allow your repeater to talk back to you? This may be the board of your dreams!

By Robert DeMattia,* AK1J



Okay, so you've heard one of those microprocessor controlled repeaters crank out "beer" when someone "times-out." You wish your repeater could do that too, but you can't afford new logic. The circuit described in this article will solve your dilemma. It can make your repeater crank out seven short messages or mnemonics at a cost of about $25 and a few hours of your time.

Circuit Description

Fig. 1 shows the entire circuit. There are seven input lines which are normally high. When one goes low, its value is decoded into BCD format. This BCD value is then loaded into U3. U5A provides an enable pulse to U3 that is delayed by an amount of time approximately equivalent to the propagation delay of U3. Any value greater than zero at the input of U3 will also cause a strobe signal to be sent to the control logic (U6 and U7).

This logic is turned on by the strobe, which in turn starts the clock, U9. U9 drives a binary counter, which feeds a 4-line to 16-line demultiplexer. Depending on the input of this demultiplexer, one of its 16 lines goes low from its normal high state. This provides the potential for a diode, connected across the input line of data selector U11, to bring the input line down from its normally high state. The data selector chooses one of the seven input lines, depending on the value stored in the 7475. The input line is normally high. However, the input line goes low when a diode is connected anode-to-input and cathode-to-demultiplexer-output and when that particular output is low. The inverted output of the 74151 changes to a high, enabling a code oscillator or such.

While this is happening, the PTT output goes high, enabling the repeater transmitter to turn on. When the counter reaches 1111_2, a clear pulse is sent to the 7475, to the control logic and to the counter itself. Notice that the 7475 is cleared by enabling it temporarily. You

*Worcester Polytechnic Institute, Box 1464, Worcester, MA 01609

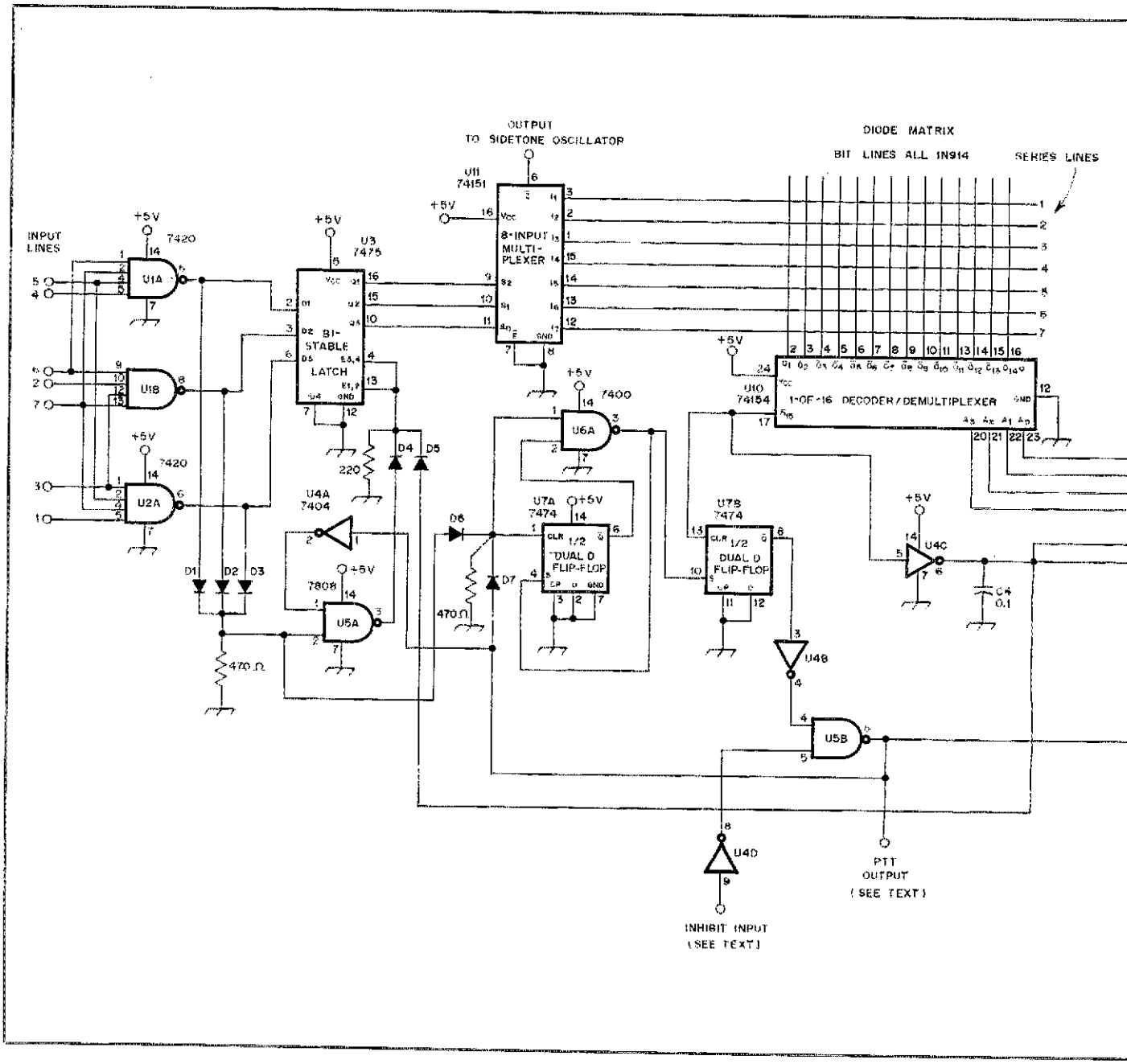


Fig. 1 — The Mnemonic Encoder circuit. Pins not shown on ICs are not used and not connected. Noise suppressor capacitor C1 should be as close as possible to U8.

C1, C2, C4 — 0.1 μF disc ceramic.
C3 — 22 μF, 16 V electrolytic.
D1-D6, incl. — Small-signal, general-purpose silicon, 1N914 or equiv.
Diode matrix diodes — Small-signal, general-purpose silicon, 1N914 or equiv.
R1 — 100-kΩ, thumbwheel potentiometer.
U1, U2 — TTL, dual 4-input NAND gate IC, 7420.
U3 — TTL, bistable latch IC, 7475.
U4 — TTL, hex inverter IC, 7404.
U5 — TTL, quad 2-input AND gate IC, 7408.
U6 — TTL, quad 2-input NAND gate IC, 7400.
U7 — TTL, dual D flip-flop IC, 7474.
U8 — TTL, divide-by-sixteen counter IC, 7493.

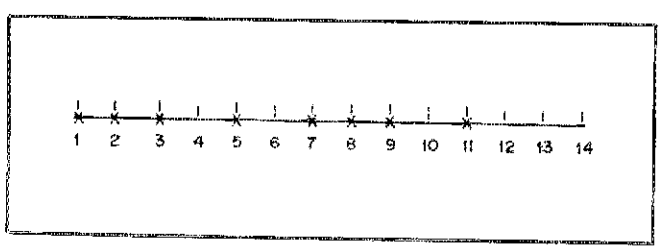


Fig. 2 — Example coding diagram for a diode matrix to send C. Numbered tick marks refer to output lines of demultiplexer. X indicates that a diode should be installed at this junction; no X indicates that the junction should be left open.

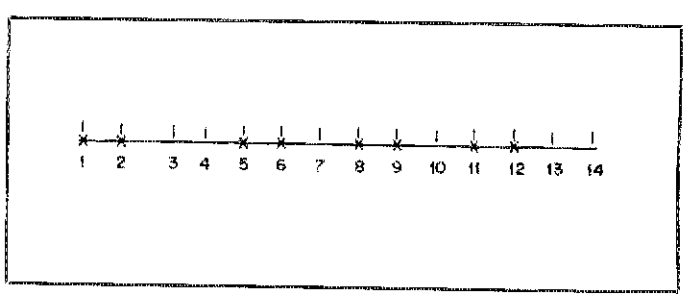
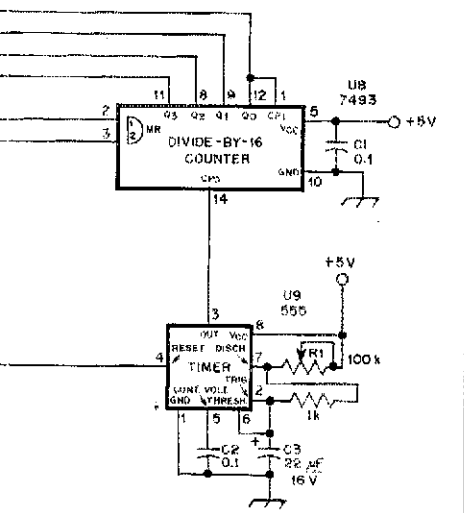


Fig. 3 — Coding diagram for "fudging" the message TO. The method and purpose are described in the text.

DECIMAL-VALUES OF CAPACITANCE ARE IN MICROFARADS (μF); OTHERS ARE IN PICOFARADS (pF OR μμF); RESISTANCES ARE IN OHMS; k = 1000



U9 — Timer IC, 555.
U10 — TTL, 1-of-16 decoder/demultiplexer IC, 74154.
U11 — TTL, 8-input multiplexer IC, 74151.

may be asking "What if a value is still present at the 7475 input? Won't that value load?" Yes. However, study the control logic more carefully, particularly U6A and U7A. It is designed not to react to a strobe pulse unless it first clears. Therefore, the circuit cannot recycle.

Programming the Diode Matrix

Programming the matrix is quite straightforward — no Karnaugh maps here! Start at bit 1 of the demultiplexer. Choose one of the data input lines. Now wire a diode with the anode to the input line and cathode to the demultiplexer when you want the sidetone on. To program a dot, you would wire one diode. A dash would be 3 consecutive diodes. Don't forget spacing! There should be one space between dots and dashes in the same letter and three spaces between different letters. The proper sequence for the letter "C" is illustrated in Fig. 2.

You may have to "fudge" a bit, since you have only 14 bits to work with. For instance, on the KIBA repeater in Boston, it was desired to have the machine say "TO" for timeout. It is obvious that TO just doesn't fit. Because all the elements are dashes, each dash was shortened 1 bit as was the letter space. The result is that TO sounds a little bit faster than the rest of the messages. Fig. 3 gives a diagram of how we "fudged" TO.

Input and Output

All the input lines should be controlled by something compatible with TTL. Either a device with a high impedance to low output or a TTL high to low output is recommended. The inhibit input is designed to freeze the circuit whenever the input is high. This works when the circuit is in the middle of a cycle as well as before the code has started. It should be used with care. Control device levels for it should be the same as described for the input lines.

Both the CODE and PTT outputs are TTL levels. The PTT output goes from its normal state of 0 V to +5 V when the circuit is activated. The CODE output goes high whenever the sidetone should be on. Again, care should be used not to allow these outputs to sink too much current. If you are not sure, use a simple npn transistor such as a 2N2222 in conjunction with the outputs. With the proper care, this circuit should work with almost any repeater control system.

What to Say

If you can't think of enough things to say, here is what was used in Boston. When the repeater is controlled off or on, it sends a C. When the phone patch rings, it sends a P. As mentioned above, if someone times out the repeater, it sends TO. If there has been a recent power failure, it sends PI. A V is sent in conjunction with a circuit that is used for testing Touch-Tone pads. When the repeater first comes up after not being used for a while, it sends HI following the repeater i-d. If a net is scheduled for the evening, the repeater sends NET during the day to remind everyone. Obviously, there are external controls that are needed for most of these functions. Many repeaters already have them and, therefore, the interfacing is left to you. What do you want your repeater to say?

Strays

AMATEURS AWEIGH!

☐ The crew of the *USS Samuel Eliot Morison (FFG-13)*, the Navy's newest guided missile frigate, would like an Amateur Radio station for recreational and educational purposes. Anyone wishing to donate a setup, including transceiver with phone patch capability and a vertical trap antenna, should contact CDR Larry J. Andrews, *USS Samuel Eliot Morison (FFG-13)*, FPO Miami, FL 34092.

TA PROFILES

☐ We extend our thanks to ARRL Technical Advisor Daniel N. Petersen, WA6OIL, for his services as our consultant on pc-board fabrication, circuit packaging and microwaves.

Dan is 29 years of age and has been licensed as WA6OIL for nine years. He now holds an Advanced class license. Employed as an engineering technician at Digital Development Corporation, Dan's job is creating a working prototype from an engineer's rough sketch. He says, "getting a gizmo to work from hieroglyphic symbols scratched on the back of an envelope certainly keeps one's brain sharp."

Dan enjoys electronics as a hobby, and has fun building his own test equipment and communications gear, sometimes from the box on up. Dan and his wife Patti, KA6DOZ, reside in San Diego, California. — *Marian Anderson, WB1FSB*

Meet TA Dan Petersen, WA6OIL.

I would like to get in touch with . . .

☐ Sinclair ZX-80 computer users interested in forming an ssb net or in exchanging programs and technical information via newsletter. Marty Irons, K2MI, 46 Magic Circle Dr., Goshen, NY 10924.

Coherent CW — The Practical Aspects

Part 2: In Part 1, the concept of ccw was described. You'll now see how you can put the concept into practice.

By Charles Woodson,* W6NEY

Coherent cw operation imposes two basic requirements at the transmitting end. First, the keying must be done within the time frames established by a stable frame reference. These frames must be sufficiently regular to enable the receiving station to determine accurately when they occur. Second, the carrier frequency must be stable within a hertz or so during the contact, including all keying periods. The time frames can be established by a frequency standard with the reference signal being divided by CMOS or TTL to produce pulses which define the frame. Many ccw stations use standards such as those described by Kelley,[1] although any comparable standard would do.

To keep the frames accurate within 1/20 of a period for 10 "windows" per second requires a stability factor of 1/720,000 Hz per hour of contact. Since the standard mentioned is accurate and stable to less than 1 part in 10^7 over the required period, it exceeds the required accuracy easily. A station standard suitable for supplying the 10-Hz keying reference and the ccw filter frame reference is shown in Fig. 7.

Keying

Fig. 8 shows a simple system that may be used for ccw keying. I have adapted both the Heath HD-10[2] and the Accu-Keyer[3] for ccw operation. The Accu-Keyer is superior because of its 1-bit memory. At present, I use an AKB-1 keyboard, which is available with a ccw option. I've also used a KIM-1 computer for generation of ccw and ASCII. The computer uses its internal timing clock to generate an interrupt at the beginning of each frame period. The clock frequency must be adjusted precisely for such use.

Hand sending of ccw is different from ordinary random-frame cw and takes a while to learn. This is because dots, dashes and spaces can only occur in pre-established frames and we are accustomed to initiating dots, dashes and spaces whenever we wish. With a bit of practice, the initial sending errors decrease to near that of the error rate of ordinary cw keying. You learn to hold the key down until you hear a dot or dash start and then

*2301 Oak St., Berkeley, CA 94708

[1]Notes appear on page 23.

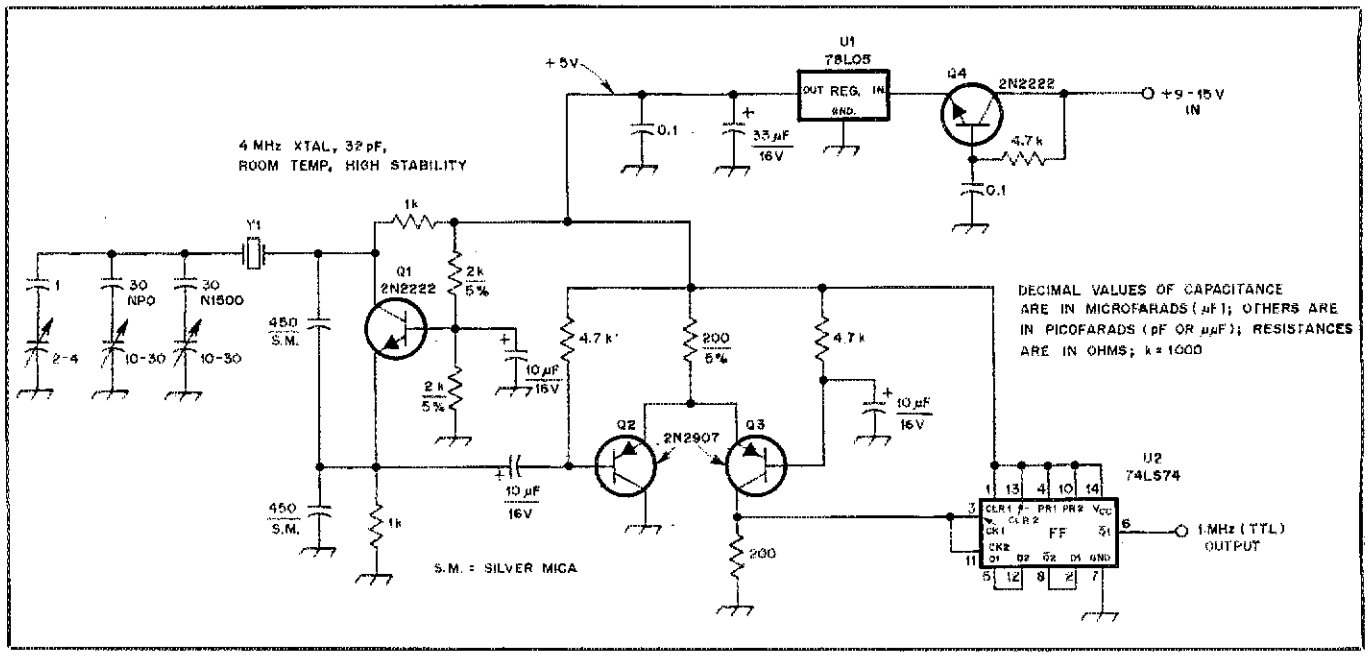


Fig. 7 — A 1-MHz frequency standard for ccw station use.

you're able to send in rhythm with the frames for a word or phrase. A keying monitor is a must!

Transmitter Stability

The receiving filter passband requires that the transmitted frequency be stable during the contact period. This is perhaps the most difficult parameter to be met for cew operation. For a cw signal time frame of 0.1 second, a 14-MHz signal must be stable to within 1 or 2 Hz. High-quality crystal oscillators have such stability except when a varying load is placed upon them, as when a transmitter is keyed. During keying, the frequency of a typical transmitter crystal oscillator will shift approximately 50 Hz. Under ordinary circumstances this wouldn't be noticed, but for a cew signal, this would mean loss of reception because the shift is more than five times the receiving filter passband and would equate to a 20-kHz shift of a regular cw signal. Such shifting produces an amusing situation. When copying with the cew filter in the presence of strong interference, the interfering signals sometimes appear to swish up and down the band during keying. Even if they cross the cew frequency, the time they are in the filter passband is small. The result is that they have relatively little effect on the cew signal itself. However, these interfering signals — through cross-modulation, overloading early receiver stages, and their effect on age — can (and often do) cause problems.

Transmitter stability has been achieved by using high-quality crystal oscillators which are not keyed and which are followed by several stages of amplifiers and buffers to nullify the loading effects of keying. A schematic diagram of such a transmitter-exciter is shown in Fig. 9. The power output of this exciter is about 0.1 watt and it has been used by itself (with an antenna matching network and keyer in

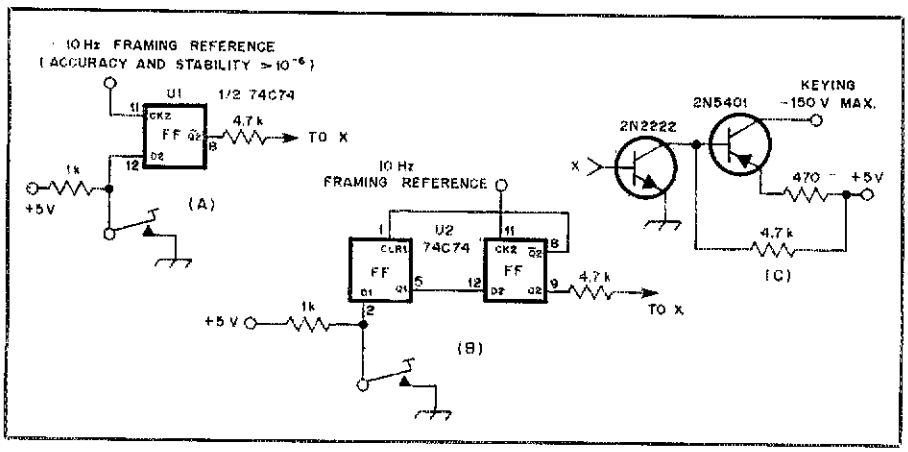


Fig. 8 — Two simple cew hand keyers. The key must be kept closed until the beginning of a frame, determined by the framing reference signal. Once transmission is initiated, although the key may be opened, the transmitter will remain keyed until the end of the frame period is signaled by the framing reference. The keyer at B includes a one-bit memory which makes coherent keying by hand much more convenient. When the key is closed, the first flip-flop is set and remains set even if the key is opened. When the clock pulse arrives, the second flip-flop is set, which causes the first to be cleared unless the key is still closed. If your rig uses inverted TTL keying, use the $\bar{Q}$ output.

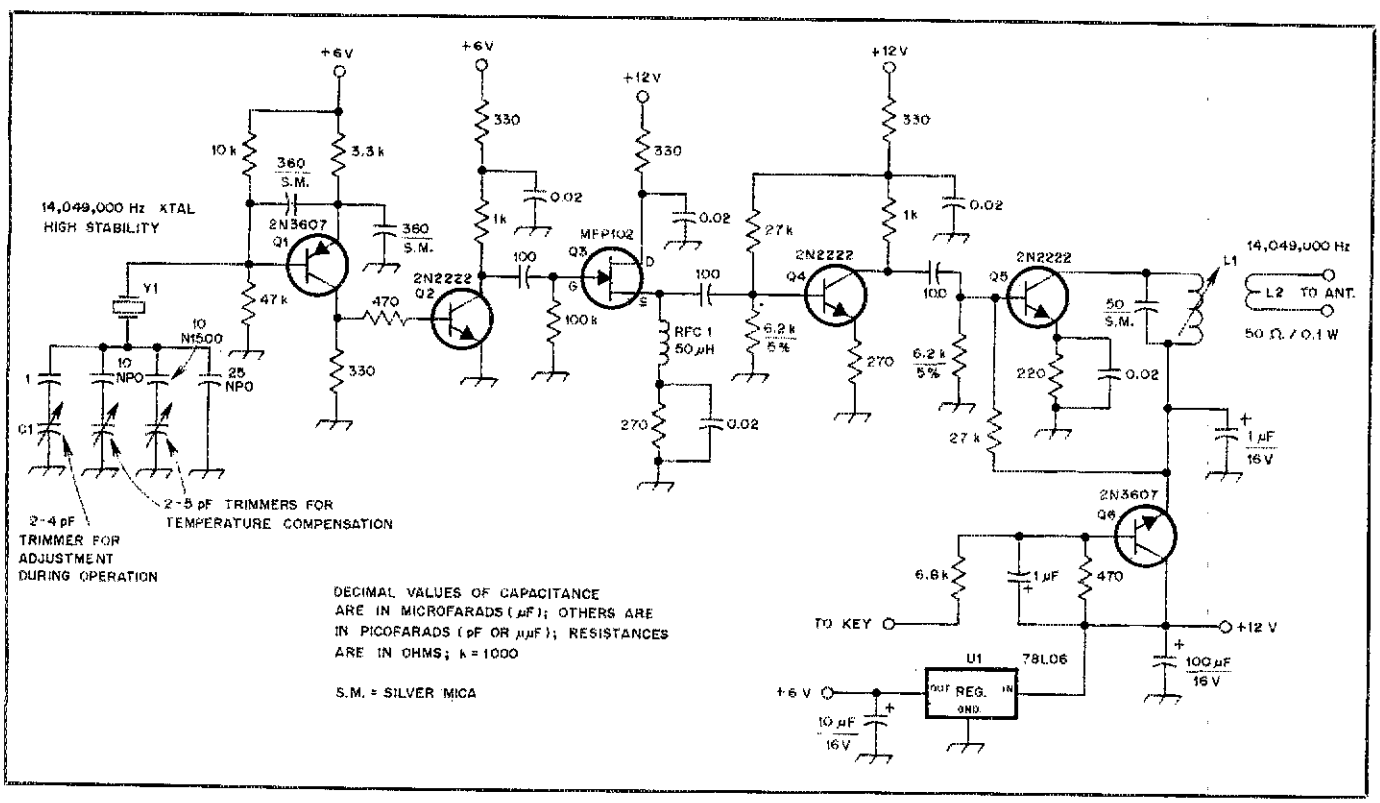


Fig. 9 — Schematic diagram of a low-power cew exciter/transmitter. The capacitance from the crystal to ground should total about 32 pF. Fixed capacitors should be high quality ceramic or silver mica types. C1 is used to adjust the frequency of operation and affects the total capacitance by less than a picofarad once temperature compensation has been achieved with the other trimmers (see text).

L1 — Miller 4404, approximately 2.5 μH, end of L1.
L2 — Two turns no. 18 enam. over "cold"
Y1 — Fundamental mode crystal, 32 pF load capacitance, room temperature, high accuracy crystal. Available from ICM, 10 North Lee, Oklahoma City, OK 73102.

the final stage) and as a VFO replacement. Tests have shown that after a 30-minute warm-up period the oscillator is stable within a hertz during keying and remains so for over an hour. The crystal tuning allows VFO-type operation over a 20-Hz range. To facilitate stability, very little power is drawn from the oscillator and two stages of isolation are used to minimize the load on the oscillator by later stages. In most situations, particularly when the rig is left on all the time, the N1500 compensation capacitor and corresponding trimmer may be omitted and a fixed capacitance value added in parallel with the rest of the units. When the temperature compensation trimmers are used, they are adjusted while measuring the operating frequency at two different temperatures, say, 68 and 86° F (20 and 30° C). One trimmer is adjusted to decrease capacitance and the other to increase capacitance by a like amount. The frequency is measured at the two temperature extremes again and this process continued until the oscillator frequency is the same at both temperatures.

Another method of transmitter frequency stabilization is to use PLLs to control the frequency of oscillators and use a highly stable oscillator as a reference for the PLL. A direct-conversion receiver employing this technique was described by McCaskey.[4] Maynard used a 5.0- to 5.5-MHz synthesizer output and a 9-MHz frequency standard to control an HW-8.[5] I have used a method which mixes the HFO, BFO and VFO frequencies of a double-conversion transceiver (SB-303/SB-401 combination), locking the result by controlling the VFO frequency.[6] A simple scheme (shown in Fig. 10) is used for locking the VFO (LMO) of an SB-303 receiver by using the built-in variable capacitive diode circuit employed for fsk operation. A high-impedance voltmeter connected to point C can be used to monitor the lock condition. During operation, the VFO is tuned slowly across the frequency of the standard; frequency lock occurs about 250 Hz above and below the reference frequency. Once locked, the crystal oscillator controls the receiver frequency and it can be set more accurately than the VFO. The crystal oscillator can be replaced by a 5.0- to 5.5-MHz synthesizer which is controlled by a suitable reference frequency; Petit has designed such a synthesizer which operates in 100-Hz steps.[7]

A block diagram of the transmitter currently in use at my station is shown in Fig. 11. The 12.9-MHz crystal oscillator is designed for high stability. Similar oscillators are used for operation on 21 and 28 MHz. The synthesizer is controlled by a 1-MHz oscillator similar to that described in Fig. 7. The two oscillators run continuously and are connected to the doubly balanced mixer, but the 14-MHz stage following the mixer is keyed. This allows break-in operation on the same frequency.

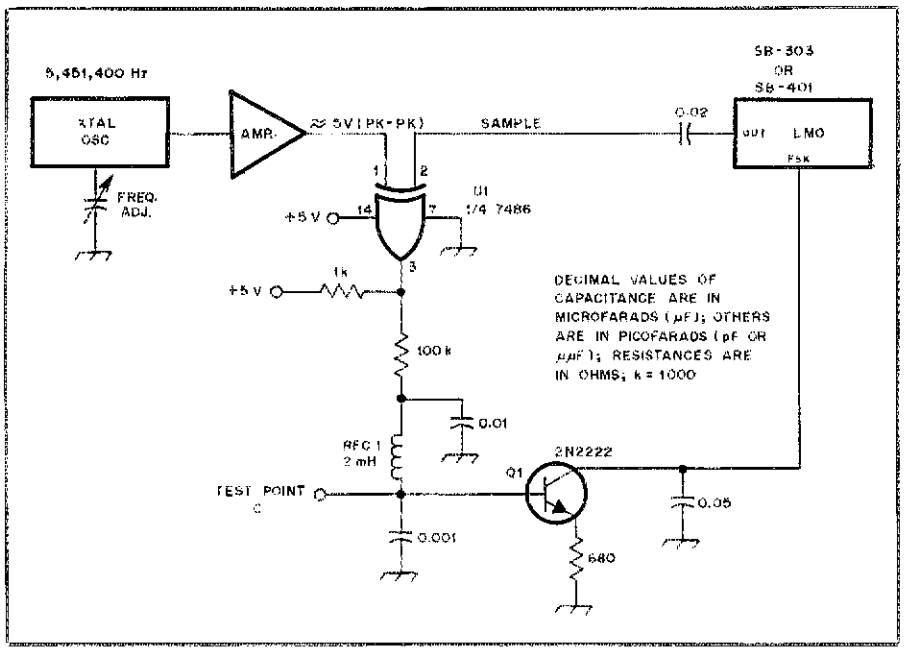


Fig. 10 — This method may be used to lock the LMO of the popular Heath SB series of equipment. Point C is a test point which is used to monitor the lock condition (see text.)

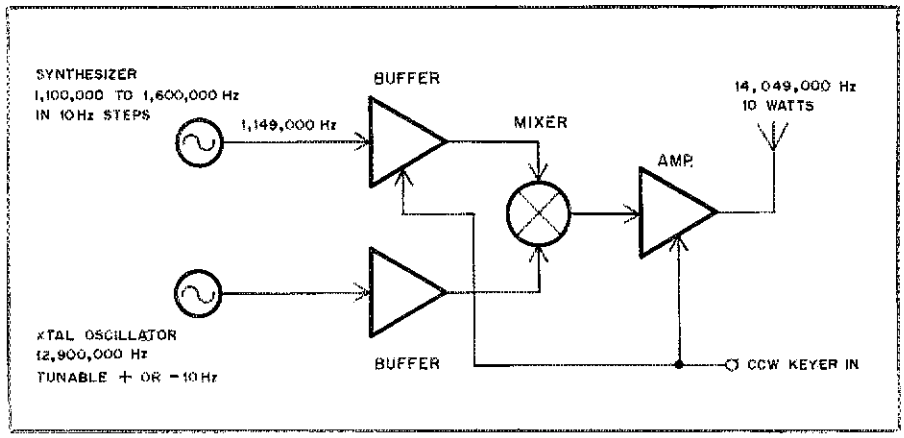


Fig. 11 — Block diagram of the transmitter used by the author. The two oscillators run continuously for improved stability.

Receiver Requirements

In addition to the cew filter, the receiver must exhibit stability on the order of 1 Hz over the length of a contact and have a tuning resetability which is less than the bandwidth of the filter. Searching for a signal while using a filter bandwidth of only 10 Hz requires almost 200 times as long as it takes to tune a band using a filter with a bandwidth of 2.1 kHz. If the phase and frame size were also unknown, it would take over 1000 times as long to tune a band searching for a cew signal as it takes to look for an ordinary cw signal. That is why current practice involves agreeing on a precise frequency and frame length in advance. Adequate stability is easy to obtain with good crystal oscillators in receivers when temperature has been stabilized by a long warm-up period and a stable environment exists.

Fig. 12 is a block diagram of the receiver currently in use at my station. Rough tuning is done by adjusting the hf crystal oscillator and the BFO, which have ranges of about 800 Hz, to the desired frequency. The VFO of the cew filter center frequency reference (four times the center frequency) is used for fine tuning over a range of about 25 Hz. An i-f strip similar to one designed by Hayward[8] provides performance superior to others I have used. Best results are obtained when the age is controlled by the age output of the cew filter.

Keitaro Sekine, JA1BLV, uses a crystal-controlled FT-901 and also has

built a 2980- to 3080-Hz RC VFO for use as the reference for the center frequency of the cw filter. Oscillators in the transceiver have been stabilized by using temperature compensation methods and high-stability crystals.

The Filter

A practical coherent digital filter may be seen in Figs. 13, 14 and 15. The first CD4060A6 is used as a switching mixer while the second controls the sample and dump functions. An audio signal output may be derived from a digital mixer (such as shown in Fig. 14) driven by the output from the two channels. The signal is the difference between the two and can be made single-ended by using an op amp, or both channels may be fed to A/D converters for computer input. A frame reference for the cw filter is shown in Fig. 15.

A Microprocessor-Controlled Filter

The logic diagram of Fig. 16 is that of the computerized system which has been used at my station. The switching mixers are essentially the same as those used in the filter described previously. A computer program controls the A/D conversion and dump functions. Computer con-

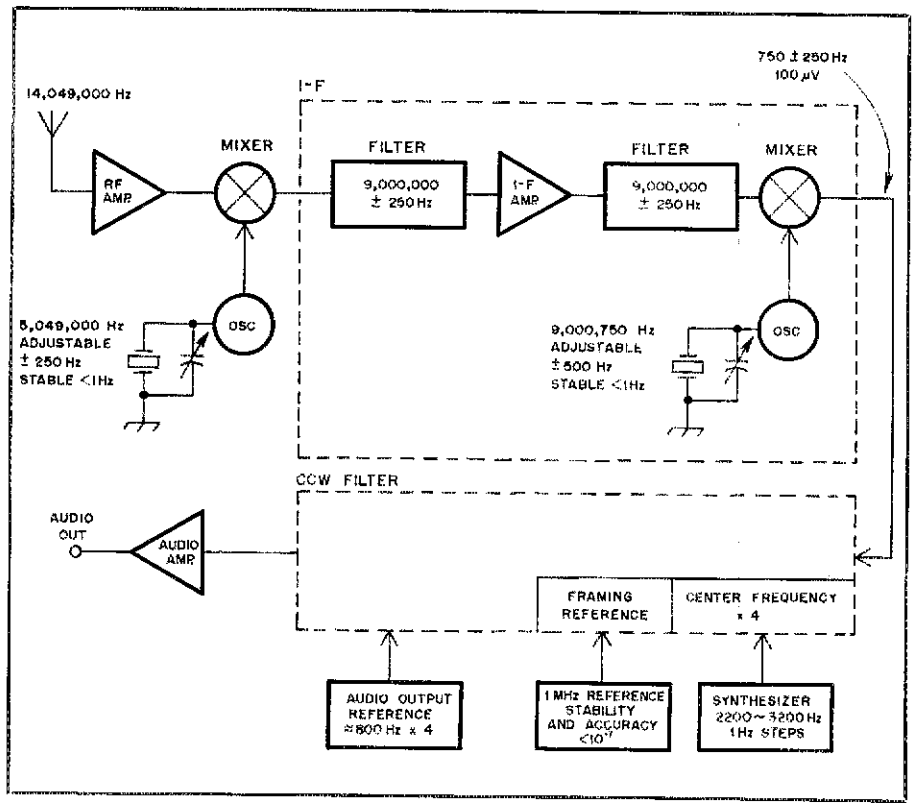


Fig. 12 — A block diagram of the receiver used by the author.

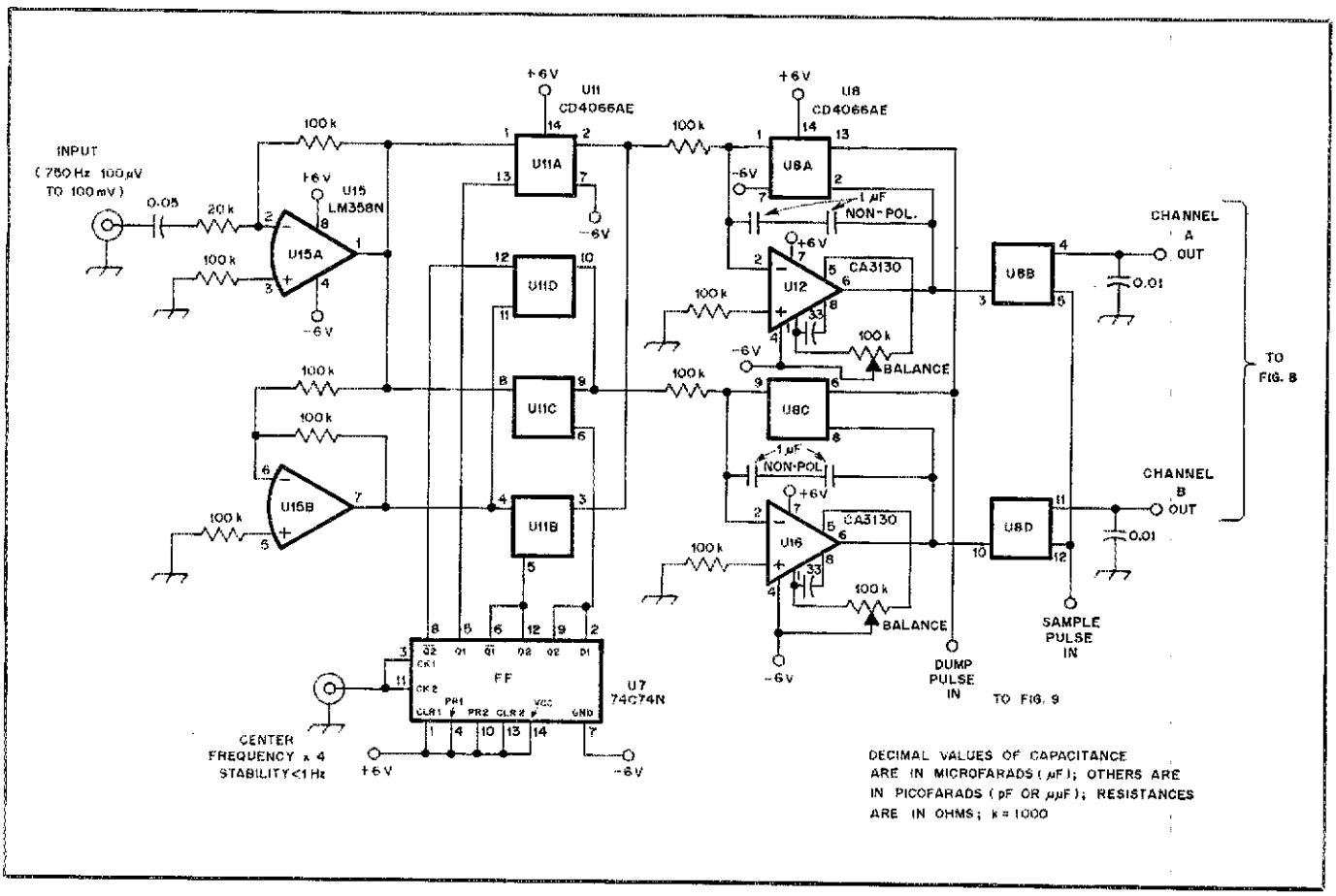


Fig. 13 — The front end of the coherent cw filter described in the text.

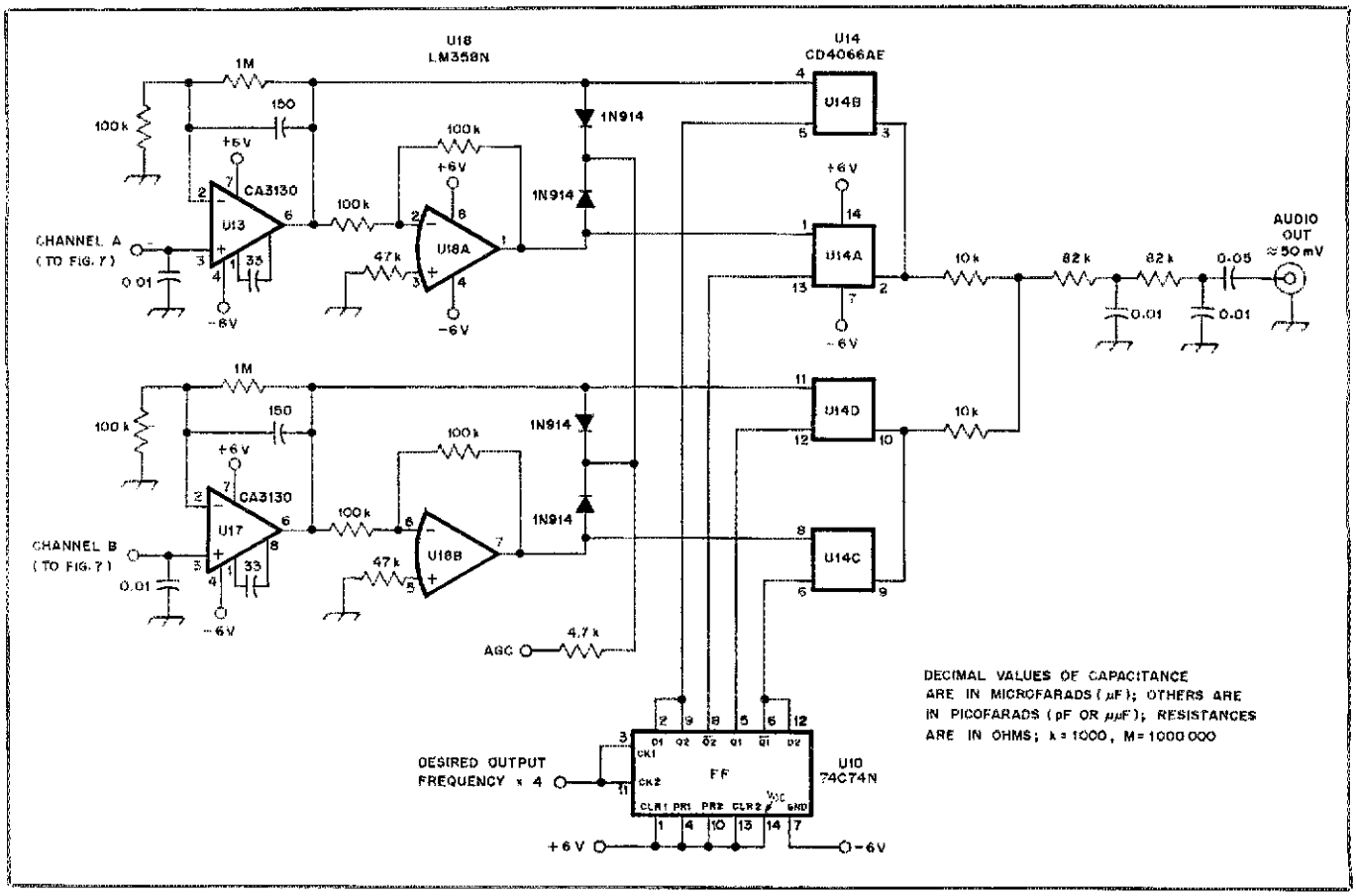


Fig. 14 — This portion of the cew filter employs digital mixing to generate an audio output.

trol of the mixer has been employed, but use of an operator-controlled VFO is a convenience. The 1-MHz internal clock is stabilized and used to define the cew frames. Phase is adjusted by the computer program. This is done by operator command. The operator indicates an advancement or retardation of the framing phase in 10 ms increments by pressing a computer key. I have experimented with a computer program to adjust framing phase automatically, but have not yet found a satisfactory way to maintain framing phase lock during breaks in the QSO caused by QRM or pauses. Between control of the sample and dump functions, the computer also converts the received Morse signals to ASCII code and transfers the ASCII code to a CRT character display terminal or printer.

Weak Signals and Noise

The reception of weak cew signals is quite different from that of ordinary weak cw signals. Under standard conditions, as the cw signal gets weaker, QRN or QRM remain as "no signal" output and we eventually end up with a noise level dependent upon the bandwidth of the filter. With cew, noise is a series of "dots" in frames and varies randomly in intensity. With the cew filter, output is limited by design to one frequency and a weak signal is characterized by missing and extra dots randomly mixed with the desired signal.

Frame phase adjustment is important because if it is not accurate, a blurring of the dots and dashes into adjacent frames occurs. This makes the signal unreadable and it might go unnoticed if it is weak. When receiving a series of dots (a standard part of a cew CQ), you can tune for maximum contrast between dots and spaces. With a strong signal, even a 10% phase error can be noticed. A slight lead error causes a weak mark just *before* each dot or dash while a lag error results in a weak mark just *after* the dot or dash.

Operating Practices

Under favorable conditions, it is often convenient to operate the cew filter at shorter than optimal frame periods. With 0.01-second frames, the bandwidth is around 100 Hz and phase adjustment makes little difference. Although selectivity is reduced and signal level decreased by 10 dB, this method is used during initial signal detection. Once a signal is located, phase adjustment and longer frame periods may be used to optimize reception.

Phase tuning may be used instead of tuning a band of frequencies. This is accomplished by using an agreed-on frame length and frequency of operation and tuning for proper phase by adjusting the filter phase. Once phase adjustment is close, the frequency may be fine tuned as well. Present practice calls for sending a 15-second stream of dots to help in frame acquisition. A steady carrier of 10 seconds duration is an aid when fine tuning to frequency.

Time-reference signals from stations such as WWV may also be used to adjust the keying and reference frames of cew receiving filters. Such adjustment must take into account the electromagnetic distance of the standards station to the receiving station as well as the electromagnetic distance between communicating stations. This procedure allows phase to be fixed and the operating to be the primary parameter which must be considered. Communication between stations located in Japan and California has been successfully accomplished using this technique. It is, however, a more difficult procedure to follow than phase tuning.

Conclusions

Cew offers the possibility of employing some interesting operating techniques. Suppose Amateur Radio stations of the world agreed to operate at frequency multiples of 10 Hz. This would provide 20,000 channels at the bottom 200 kHz of

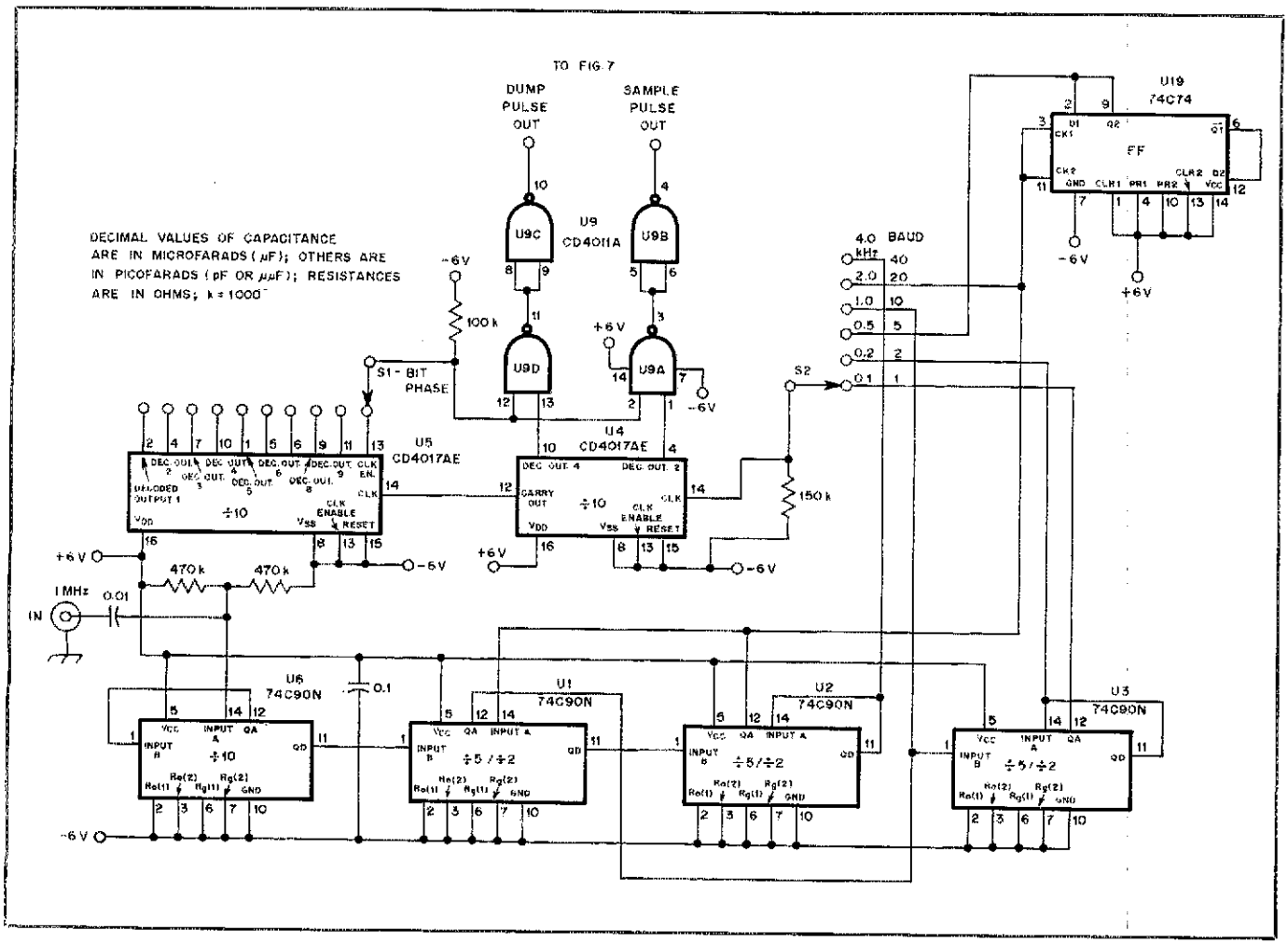


Fig. 15 — Frame reference circuitry of the ccw filter.

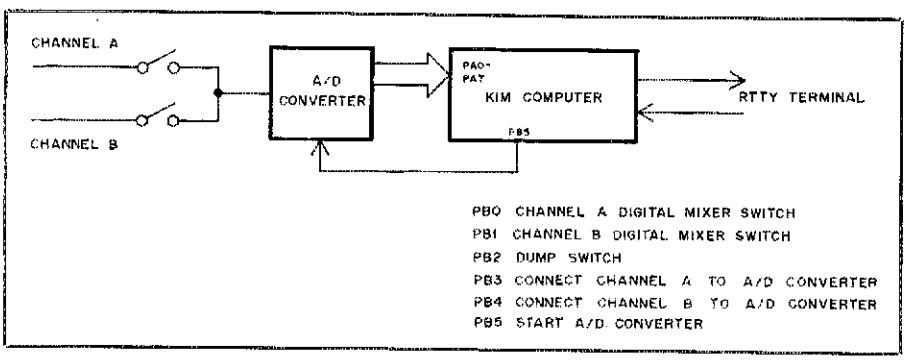


Fig. 16 — An experimental computerized ccw filter system used by the author. The filter used is similar to that of Figs. 13, 14 and 15, except that all switches are computer operated.

a band. If operators further agreed on sending in frames synchronized to 0.1-second UTC time pulses, you could set the framing (about a 0.03 second delay) to correspond to the distance of the stations you wish to contact, say 6200 mi (10,000 km). Once this is set, a check of the channels may be made for a station at the desired distance. Generally, you could detect signals at distances of 5000 to 7500 mi (8000 to 12,000 km) without further adjustment. Imagine microprocessor control over the entire procedure and the automatic detection of stations a particular distance away!

Coherent cw is a useful technique which improves communications effectiveness in excess of 20 dB. This factor can be used to offset poor propagation conditions, small or poorly located antennas, or low-power operation. It has the potential to be as revolutionary to cw as ssb has been to phone communication.

Acknowledgment

Many of the ideas presented here are based on ideas of Ray Petit, W7GHM. It is impossible to discuss ccw without mentioning him. This article has benefited considerably from critical comments and suggestions from Jim Maynard, K7KK, and Ray.

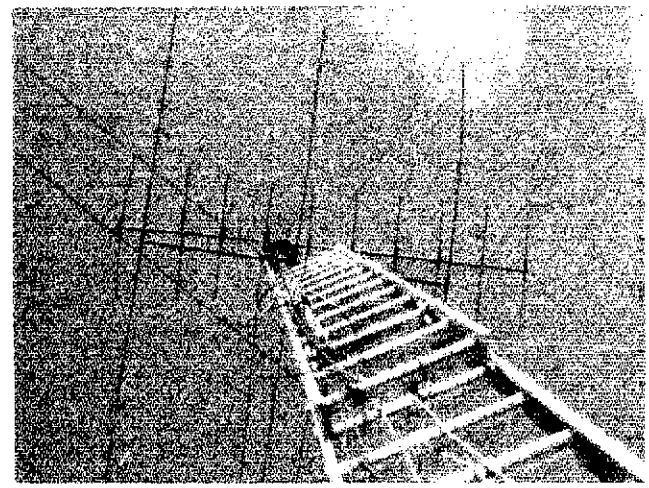
Notes

[1]Kelley, "Universal Frequency Standard," *Ham Radio*, February 1974.
[2]Woodson, "Conversion of the HD-10 Keyer to CCW," *CCWN* 1975:43.
[3]Tyrrell, "Modifying the Accu-Keyer for CCW," *CCWN* 1976:68.
[4]McCasky, "The Coherent Ten-Tec: A Practical CCW Station Assembly," *CCWN* 1975:24.
[5]Maynard, "HW-8 for CCW," *CCWN* 1978:153-155.
[6]Woodson, "Stabilization of the SB-303 Receiver for CCW," *CCWN* 1975:60.
[7]Petit, "Synthesizer for 5 to 5.5 MHz," *CCWN* 1976:65.
[8]Hayward and DeMaw, *Solid State Design for the Radio Amateur*, ARRL, 1977, pp. 225-235.
[9]Double sided, drilled, glass epoxy printed circuit boards for the filter are available from the author at a cost of $40. The ARRL and *QST* in no way warrant this offer. Most component parts may be obtained from Jameco Electronics, 1021 Howard Ave., San Carlos, CA 94070.

A Ladder Mast

Step up to a new high in expedient antenna supports. An aluminum ladder will extend your Field Day signal.

By Keith D. Baker,* VE2XL



There are occasions when a temporary support is needed for an antenna system, e.g., antenna testing, site selection, emergency exercises and Field Day. Ordinary aluminum extension ladders are ideal candidates for this service. They are strong, light, extendable, weatherproof and easily transported. Additionally, they are readily available and can be returned to normal use once the tower project is concluded. A ladder tower will easily support a lightweight triband beam and rotator (see the cover of October 1979 *QST*).

The First Step

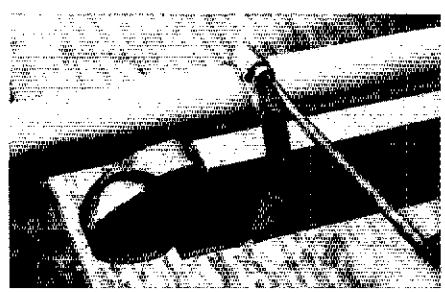
With patience and ingenuity one person can erect this assembly. One of the biggest problems is holding the base down while "walking" the ladder to a vertical position. Once it is up, I use 1/4 inch (7 mm) polypropylene rope to guy the tower; the rope guys are arranged in the standard fashion with three at each level. If you have help available, the ladder can be walked up in its retracted position and extended once the antenna and rotator are attached. The lightweight pulley system found on most extension ladders will not be strong enough to lift the ladder extension and survive. You will need to replace this with a heavy-duty pulley and rope. Make sure when attaching the guy ropes that they do not foul the operation of the sliding upper section of the ladder.

There is one hazard to avoid. Do not climb or stand on the ladder once it has been extended — even so much as one rung. If the locking mechanism should fail, you would likely lose a limb or two, if not your life. The risk simply isn't worth it. Never, ever, stand on the ladder and attempt to raise or lower the upper section. Do all the extending and retracting with the heavy-duty rope and pulley!

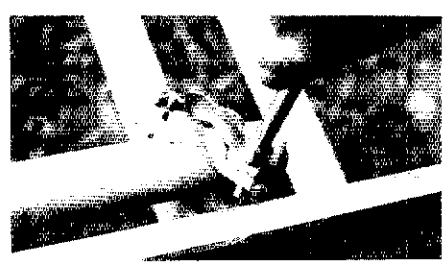
If you are going to raise the ladder by yourself, here are some pointers that may help. First of all, make sure that the rung latching mechanism is operating properly before you begin. The base must be hinged such that it does not slip along the ground during the erection activity. The guy ropes should be tied and positioned in such a way that they serve as safety constraints in the event that you lose control. You should have available a device, e.g., another ladder, for supporting the ladder during the rest periods. After the ladder is erect and the lower section guys tied and tightened, raise the upper portion one rung at a time. Do not raise the upper section higher than it is designed to go (you may pay a high price for the extra height).

Finding suitable guy anchors can be an exercise in creativity. Fence posts, trees and heavy pipes are all possibilities. If nothing of sufficient strength is available, you can drive anchor posts or pipes into the soil. Sandy soil is the most difficult to work with because it does a very poor job of holding the anchor. I have driven a discarded back axle from a car into the ground to use as an anchor; it is substantial. When I am finished with it, I use a chain and car bumper jack to remove it.

Above all else, keep the tower and antenna away from power lines. Make sure that if you lose control, nothing can touch the lines. Disassemble by reversing the process. Ladder towers are one of the best bets for "quickie" antenna supports. See you on FD. QST



Hose clamps can be used to secure the mast to the ladder leg. *(All photos by VE2XL)*



U bolts are used to clamp the lower end of the mast to one of the upper rungs of the ladder.

Walking the ladder up to its vertical position. Keith, VE2AQU, supports the mast with a second ladder while Chris, VE2FRJ, checks the ropes.

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Amtor, an Improved Error-Free RTTY System†

Sitor, Spector, Microtor and now Amtor — what do they have in common? For one thing, the underlying principles are similar. More importantly, they just might usher in a new era for RTTY communication.

By J. P. Martinez,* G3PLX

Since getting a microprocessor-based home computer working at my station, I've spent some time using it to perform many of the functions of conventional RTTY equipment. The flexibility of the microprocessor (μP) also made possible the experimentation with techniques using other than the well-known start-stop RTTY code. In the UK, we are permitted to carry on experiments of this sort on 2 meters and above, so no time was lost in trying out synchronous systems where no start-and-stop bits are sent and the clocking of data is done by accurate frequency standards at both stations. Some forward-error correction codes were tried in which additional check-bits sent with the data enable the receiver to correctly reconstruct the original data in the event of the presence of some erroneous bits. This proved promising, being about 6 dB better than conventional RTTY.

Another area explored is the ARQ (Automatic ReQuest) whereby any errors at the receiving end are detected by the use of extra parity bits, and a request is made for the repeat of the bad character by the receiving station. One such system, requiring both stations to operate in the duplex mode, gave spectacular results via OSCAR satellites. Under this circumstance, there was complete immunity to fading, interference and errors associated with keeping the receiver on tune. Loss of signal merely caused temporary pauses in the traffic.

Adapting this system to everyday amateur operating practice proved difficult until the "discovery" of an ARQ system already in use in the maritime service for Telex traffic. This system can be used by two stations in simplex communication on the same frequency by working in a synchronized quick-break fashion. On-the-air results from this system were similar to those of the duplex technique. It became clear, therefore, that it would be very useful to amateurs, not only on vhf, but also on the hf bands.

Since this system is already an international standard (CCIR Recommendation 476) and is in worldwide use, we had no difficulty in gaining permission for its use on hf by UK amateurs. Commercially, this system is known by various trade names such as Sitor, Spector and Microtor. To avoid confusion with the commercial equipment, the name "Amtor" has been devised to refer to any amateur use of the system described in CCIR 476. What follows is a description of how Amtor works. I hope to show that this ingenious system could have a lot to offer and that it can be readily implemented by modern μP techniques using either a home computer or a dedicated unit.

First Principles

Imagine two stations, A and B, in simplex communication on ssb with the operators desiring to exchange messages reliably under poor conditions. If A sends three words, for example, B replies with "Roger" or "Say again." A then goes on to the next three words or repeats the last three. If A cannot tell, however, whether B said "Roger or "Say again," then he will have to say instead of three words, something like "Please repeat." To make matters worse, if B cannot tell whether A gave three words or said "Please repeat," leading B to transmit "Say again," then A gets completely confused and doesn't know what to say. This may seem trivial, but if we are to automate this verbal ARQ system, a better method must be found.

In Amtor, A sends three characters in a burst of synchronous frequency-shift data. B, in response, sends the acknowledgement signals in the reverse direction as a single character. How, then, can Amtor provide a solution for the communication problem mentioned above? A practical approach is to encode the acknowledgement signals differentially using two control characters we may call C1 and C2. When B is copying correctly, he replies with C1 and C2 alternately after each block. If a bad block is received, he repeats the same control code as the last time. If A sends "Please repeat," then B repeats the same control code as the last time. Thus B's reply is the same for a "Please repeat" block as for an error. It doesn't matter, therefore, if the bad block was a "Please repeat" block.

In the ssb example, B knows when errors have occurred because he cannot recognize a word. This works because the number of recognizable words is much smaller than the number of different sounds. To put it another way, language contains redundancy. The only errors that will pass undetected are those which transform one word into another. This can be minimized by careful choice of words. There are 32 recognizable characters in the teleprinter system. These

STA Granted for Experimental Error-Free Amateur RTTY

The Federal Communications Commission in 1980 granted Special Temporary Authority to four licensed radio amateurs for the purpose of conducting tests with an error-free mode of amateur teleprinter communication (Amtor). This authorization permits the use of digital teleprinter code as described in CCIR Recommendation 476 (Rev. 74). It expires November 30, 1981.

Participants in this STA are William C. Meyn, K4PA, of Reston, Virginia; Charles A. Roettcher, K3FLS, of Washington, DC; Melvin Leibowitz, W3KET, of Wilmington, Delaware; and Walter E. Kaelin, KB6BT, of Saratoga, California.

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†Translated and reprinted from OZ (Denmark), November 1980.

Table 1

Conversion Between Amtor Code and Murray Code

The codes are transmitted left to right. The higher frequency of the fsk signal is represented by "1."

Murray Code	*Ltrs*	*Figs*	*Amtor Code*
11000	A	—	1110001
10011	B	?	0100111
01110	C	:	1011100
10010	D		1100101
10000	E	3	0110101
10110	F		1101100
01011	G		1010110
00101	H		1001011
01100	I	8	1011001
11010	J	bell	1110100
11110	K	(	0111100
01001	L	)	1010011
00111	M	.	1001110
00110	N	,	1001101
00011	O	9	1000111
01101	P	0	1011010
11101	Q	1	0111010
01010	R	4	1010101
10100	S	'	1101001
00001	T	5	0010111
11100	U	7	0111001
01111	V	=	0011110
11001	W	2	1110010
10111	X	/	0101110
10101	Y	6	1101010
10001	Z	+	1100011
00010	carriage return		0001111
01000	line feed		0011011
11111	letters		0101101
11011	figures		0110110
00100	space		0011101
00000			0101011
	RQ		0110011
	beta		1100110
	alpha		1111000
	control 1		1010011
	control 2		0101011
	control 3		1001101

normally are transmitted by 32 combinations of 5 data bits. If 5 data bits are used, any bit error will transform one character into another and the error will pass undetected. Amtor has the advantage of using 7 data bits giving 128 combinations of which only 32 are recognizable. Careful choice of which 32 are used minimizes the possibility of an undetected error. One would not, for example, have chosen two codes that only differed by one bit. In fact, only those codes with three zeros and four ones are used, making it easy to check for errors at the receiving end. There are 35 such codes, and so the three spares are available for control purposes. Among these is the RQ character used by the transmitting station to signal "Please repeat." There is also the idle character known as beta. A third character, alpha, is explained later in this article. The C1 and C2 codes and C3, to be explained shortly, are also 7-bit characters from the same set. Since these are always sent only in the reverse direction, they are never confused with the others. The conversion from Amtor code to standard teleprinter characters is shown in Table 1. Note that this code is designed to translate easily to and from the Murray code.

The changeover in direction of transmission is not left to the operators, for there could be a misunderstanding if the link fades out just before the expected end of an "over." There are two ways to signal for the changeover. The sending station may end an "over" with the two-character sequence +? or the receiving station operator may press the TRANSMIT button. By either method the receiving station stops replying with C1 or C2 and instead acknowledges with C3. Upon receiving this information, the sending station transmits the block "beta-alpha-beta." In response, the receiving station transmits an RQ character, whereupon the transmitting station goes to the receive mode. Bursts of data from each station are so timed that even if both are transmitting blocks momentarily, each one can still receive one character of the other's block in the position expected to be a control code. This seemingly complicated process does ensure that the changeover proceeds in an orderly manner and cannot go awry, no matter what.

Timing of the various signals is shown in Fig. 1, with some of the possibilities for errors. Note that the two stations do not behave identically in respect to timing. One is called the master station and the other the slave for reasons which will become apparent shortly.

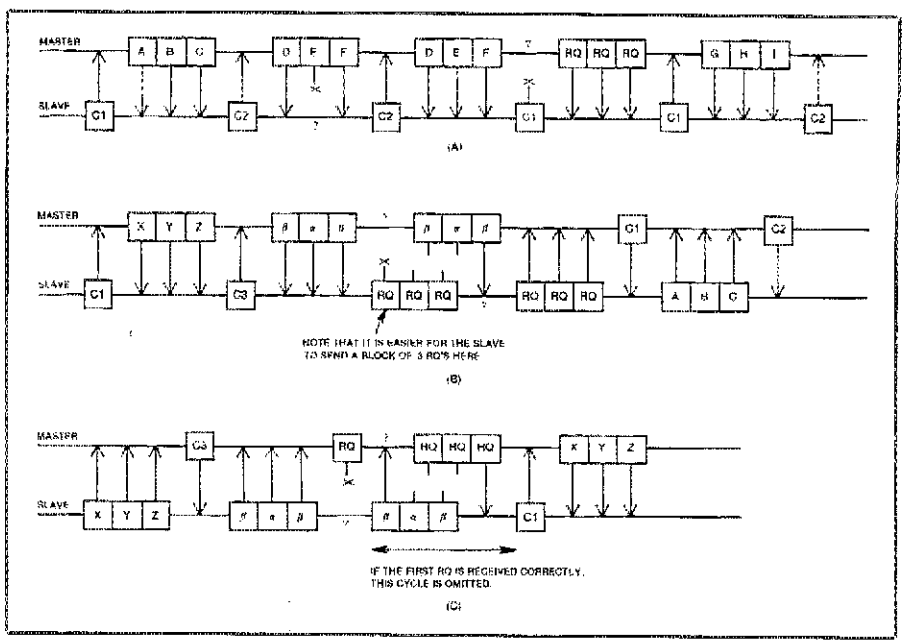


Fig. 1 — Timing of various Amtor signals. Included are some possibilities for errors. As you study this illustration, note that the two stations do not behave identically in respect to timing. One station is designated as the master, the other as the slave. Shown at A is a representation of the master sending to the slave, with errors. At B is a situation where there is a changeover from master to slave sending. The master is once again sending to the slave in the situation at C.

Performance

Although Amtor, in common with any ARQ system, eliminates virtually all errors resulting from the radio link, it is worthwhile pausing to see exactly how good it is. A simple analysis can be made by supposing that the radio link alternates between perfect copy and perfect random noise. With only noise in the receiver, all 128 7-bit patterns are likely to be received with 34 of these being acceptable (the RQ character is treated the same as an error). Thus the chances of a whole block of three being accepted by mistake is $(34/128)^3$ or about 1.9%. Therefore, with no signal, the receiving printer will be idle for 98.1% of the time while the system is asking for repeats and will be printing garble for 1.9% of the time. This compares with 100% correct copy when the signal is good.

By using the foregoing information, we can calculate the proportion of garble to good copy for various proportions of good signal to bad. A similar analysis for the reverse path shows that when there is no signal in this direction, 0.8% (1/128) of the message is unwittingly lost into thin air. The combined effect of these factors is shown in Table 2.

Synchronization

Since Amtor is a synchronous system with no start and stop bits, the timing at both ends must be stable. Some means must be found to get the two stations in step and to keep them that way over a period of time, even if the two clocks are only slightly different in speed. The synchronization procedure starts with the first station (the master) sending a special sync block repeatedly. The slave station continuously shifts in received bits until 21 consecutive bits correspond exactly with the expected sync pattern. The slave then starts to reply in the gaps, sending back

Table 2

Amtor Performance

The assumption is made that the signals in both directions alternate between perfectly good and perfectly bad.

Percentage of Time Signal is Usable	*Percentage of Transmitted Message Received Correctly*	*Number of Spurious Characters Printed, as Percentage of Transmitted Message Length*	*Time Taken as Multiple of 100% Signal Case*
100	100.0	0	1.00
90	99.9	0.2	1.11
80	99.8	0.5	1.25
70	99.7	0.8	1.42
60	99.5	1.2	1.66
50	99.2	1.9	2.00
40	98.8	2.8	2.50
30	98.2	4.4	3.30
20	96.8	7.5	5.00
10	93.0	16.9	10.00
5	85.2	35.6	20.00
2	61.7	91.8	50.00
1	22.7	185.5	100.00

one of the control codes. The master station, meanwhile, has been shifting in received data bits during the gaps in its transmissions. When it recognizes two consecutive control codes, it stops sending sync blocks and changes to sending traffic. In fact, to guard against the possibility of the slave getting the sync pattern right, just by chance, the master sends two different sync blocks alternately, and the slave must get them both in order correctly to lock in. The first of these blocks has an RQ in the second character, with two alphabetic characters in the other two positions. At the same time, the second block has two more alphabetic characters in the first two positions with an RQ in the third. The RQ characters prevent the four alphabetic characters from printing out at the slave station. These four characters can be chosen by the users, but must be agreed upon beforehand by the operators at the two stations concerned.

In commercial maritime service, these characters form a selective-calling code; but for amateur use, the four-character group suggested for all random QSOs is, perhaps not surprisingly, CQCQ, so that the two sync blocks are C,RQ,Q and C,Q,RQ. Alternatively for "sked" QSOs where a random reply might be unwelcome, the letters can be made up from the last four letters in the station call sign.

To accommodate any slow drift in timing between the two stations after initial contact, the slave station monitors the timing of the data transitions received from the master. If these tend to drift away from the optimum point, i.e., half way between the adjacent sampling instants, then the local clock is shifted to correct this. Thus, the slave timing follows exactly that of the master. The master uses the same technique to make sure it is sampling the signal from the slave at the optimum instants.

Resynchronization

The drift correction is very slow in action. As a result, it is not easily disturbed by short periods of interference. However, if contact is lost completely for some time, then both stations must reestablish the correct timing. This is done by operator intervention and restarting the contact as if commencing a new QSO. When both stations have been receiving errors or requests for repeat for 32 blocks, then they both will automatically drop back to the synchronization procedure, with the sending station retaining any unsent message in a buffer. A remarkable feature of the system is that it remembers which station was sending before the interruption, and when back in sync again, a change of direction is made automatically if required. The remainder of the interrupted message is then sent without gaps or errors.

Timing Considerations

CCIR Recommendation 476 specifies the block repetition rate at 2.222 per second and the data rate within bursts at 100 bits per second. Thus, a block of three characters takes 210 ms and a control code 70 ms, leaving 170 ms in which neither station is transmitting. At first it might seem like a good idea to allow the biggest margin of time for delays in antenna changeover relays, and to arrange the slave station to reply 85 ms after the end of the master's transmission. The effects of distance between the two stations, however, cannot be ignored. This is particularly so for intercontinental QSOs. The velocity of radio waves is 186.4 miles/ms (300 km/ms). As a result, the slave station will receive a delayed signal from the master, and the resultant reply will be received late at the master station by 2 ms for every 186.4 miles (300 km) separating the two stations. Thus, to make sure that this slave reply is not obliterated by the next master transmission on long-distance QSOs, the slave must reply as soon as possible after receiving the signals from the master. With practical equipment, and taking into account delays through various filters in the equipment, it looks as though 12,400 miles (20,000 km) is about the maximum range for Amtor to function successfully. In other words, it will just about cover the world on hf, at least by short path, but rules out some satellite possibilities and moonbounce.

Amtor in Practice

Is Amtor really practicable for radio amateurs? From our experience in the UK, the answer is a definite "yes." Many stations in the UK have Amtor in operation using a program written for 6800-based μP machines. A special-purpose unit has also been designed that is essentially a small μP system which will allow any station furnished with conventional RTTY equipment to extend operating capabilities to Amtor. No specialized μP know-how is needed to construct this unit. It is available in the UK in kit form for £76 (about $170). Most stations have found that their existing equipment will change over from transmit to receive and vice versa in less than 10 ms. Only minor modifications have been needed in other equipment. If anything, performance has been better than Table 2 suggests. In one recent QSO where a comparison was made between conventional RTTY and Amtor, with hard copy from both ends to check the errors, G3PLX and G3RSP/MM, working with 50 W erp over a 6200-mile (10,000-km) path on 20 meters, conventional RTTY was producing barely 20% copy while Amtor showed an impressive 99.3% copy, although slowed down by QRM to 25 wpm. Amtor has also been used on nonoptical vhf paths to send such sensitive data as μP machine-code instructions for updating the Amtor program itself as the project developed.

Conclusion

I believe that the Amtor system described in this article is ideally suited to Amateur Radio operation. My hope is that radio amateurs in other countries will join those of us in the UK who have been using this mode. In spite of its complexity, Amtor can be implemented using modern microprocessor techniques which have become available recently. Readers interested in further information on the μP program flow chart are directed to Ref. 1, while further information on the special-purpose unit mentioned will be made available in Ref. 2. Microprocessor enthusiasts with 6800-based machines are invited to contact the writer for further details of the software that is available.

References

1. "Amtor, An Improved RTTY System Using a Microprocessor," *Radio Communication* (RSGB), August 1979.
2. "Amtor, The Easy Way," *Radio Communication*, (to be published).

Easy 50-Ω Feed for a Helix

Looking for an easy way to match that helical antenna? Here's a new twist that will keep you from going in circles.

By Joe M. Cadwallader,* K6ZMW

Recent interest in circular polarization (cp) on the vhf and uhf bands is growing, perhaps partially because of AMSAT-OSCAR Phase III and other satellite work. One of the most popular cp antennas is the helix, first described in depth by J. D. Kraus.[1] The helix is easy to build and very forgiving of minor dimensional errors owing in part to its rather broad (70%) bandwidth. For this reason the actual performance of a helix closely matches the theoretical performance.

Problems and Cures

While working at 1296 MHz, where I've used both a quadhelix[2] and a helical feed for a dish, I found two deficiencies of the helix. First, terminating the helix at a connector in the center of the helix (Fig. 1) is mechanically awkward and electrically rather undefined. I chose to terminate the helix in an N connector mounted on the ground screen at the periphery of the helix (Fig. 2). Simply connect the helix conductor to the N connector as close to the ground screen as possible (Fig. 3). Then adjust the first turn of the helix to maintain uniform spacing of the turns.

This modification goes a long way toward curing the second deficiency of the helix — the 140 Ω nominal feed-point impedance. Troetschel's approach[3] solves the feed impedance problem nicely in multiple helix arrays, but matching 50 Ω coax to a single helix is still a problem. The traditional quarter-wavelength matching section has proved difficult to fabricate and maintain. But if the helix is fed at the periphery, the first half turn of the helix conductor (leaving the N connector) acts much like a transmission line — a single conductor over a perfectly conducting ground plane. The impedance of such a transmission line is:

$$Z_0 = 138 \log \frac{4h}{d}$$

where Z_0 is the impedance of the line, h is the height of the center of the conductor above the ground plane and d is the conductor diameter (both h and d must be in the same units of measure). The cross-sectional detail of Fig. 1 diagrams this. Clearly, the impedance of the helix is 140 Ω a turn or two away from the feed point. But as the helix conductor swoops down toward the feed connector (and the ground plane), h is getting smaller; therefore, the impedance is dropping. The 140 Ω nominal impedance of the helix is being transformed down to a lower value. For any particular conductor diameter, an optimum height can be found that will produce a feed-point impedance equal to 50 Ω. Preferably the height should be kept very small, and the diameter should be large. Apply power to the helix and measure the VSWR at the operating frequency; adjust the height for an optimum match.

[1]Notes appear on page 29.

*23427 Clearpool Pl., Harbor City, CA 90710

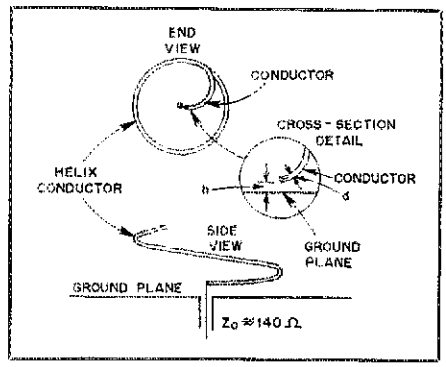


Fig. 1 — End view and side view of traditional helix configuration. Cross-sectional detail shows "standard" method for attaching feed line to the helix.

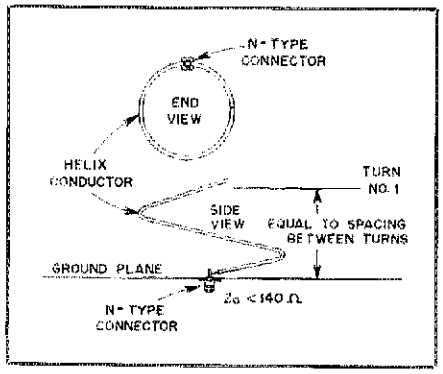


Fig. 2 — End view and side view of peripherally fed helix.

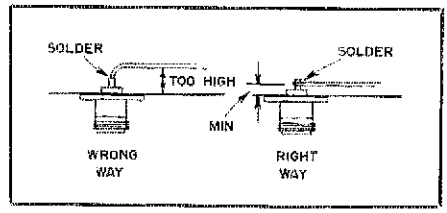


Fig. 3 — Wrong and right ways to attach helix to N connector.

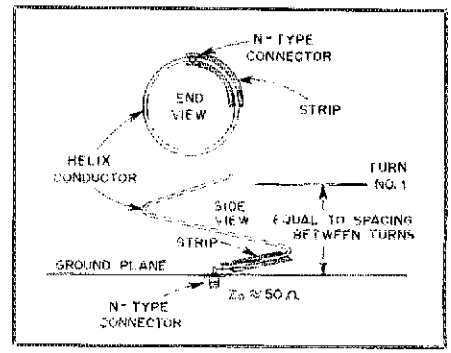


Fig. 4 — End view and side view of peripherally fed helix with metal strip added to improve transformer action.

Typically, the conductor diameter may not be large enough to result in a 50-Ω match at practical (small) values of h. In this case a strip of thin brass shim stock can be soldered to the first quarter turn of the helix conductor (Fig. 4), as described recently by Kraus.[4] This effectively produces a larger diameter conductor which causes the impedance to drop further. The edges of this strip can be slit every 1/2 in. (12 mm) or so, and bent up or down (toward or away from the ground plane) to tune the line for an optimum match.

This approach will yield a perfect match to nearly any coax. The usually wide bandwidth of the helix (70% for VSWR less than 2 to 1) will be reduced slightly to about 40% for the same conditions. This is not enough to be of any consequence for most amateur work. The improvements in assembly, adjustment and performance are well worth the effort to make the cp helix more practical to build and tune.

Notes

[1]Kraus, *Antennas*, McGraw-Hill Book Co., 1950, chapter 7.
[2]*The ARRL Antenna Book*, 13th edition, pp. 260-263.
[3]Troetschel, "A Quadhelix Antenna for the 1215-Mc. Band," *QST*, August 1963, p. 36.
[4]Kraus, "A 50-Ohm Input Impedance for Helical Beam Antennas," *IEEE Transactions on Antennas and Propagation*, Vol. AP-25, No. 6, November 1977, p. 913.

Strays

PRUDENT READING

☐ The National Electrical Code, the purpose of which is ". . . practical safeguarding of persons and property from hazards arising from the use of electricity," has many headings (in Article 810) applicable to Amateur Radio. Among them are: Amateur transmitting and receiving stations — antenna systems, Material, Supports, Avoidance of contacts with conductors of other systems, Splices, Grounding, Grounding conductors — receiving stations, Size of antenna, Size of lead-in conductor, Clearance on building, Entrance to building, Protection against accidental contact, Antenna discharge units — transmitting stations, and Grounding conductors — amateur transmitting and receiving stations. If you would like specific details of these subjects, check your local library for the *1981 National Electrical Code Book*. It may also be obtained from the Construction Book Store, Inc., 1830 NE 2nd St., P. O. Box 717, Gainesville, FL 32602. — *John Reisenauer, KA7BKI*

I-D'ING FOR PROTECTION

☐ According to *Desert AIRE Waves*, you can help protect your gear from theft by engraving it with a number already accessible to the FBI's computer file listing of stolen property, the National Crime Information Center. You should use, for example, your driver's license number preceded by your state's two-letter code, thus automatically linking your name and address to your gear. Don't use your Social Security Number; it is meaningless to this computer. In the event of theft, chances of recovery of your gear are somewhat increased by using this system. — *Worldradio News*

I would like to get in touch with . . .

☐ anyone interested in forming a net of amateurs who are also lawyers. Peter B. Broida, K3SFP, 353 N. Edison St., Arlington, VA 22203.

Three of the four Associate Deans at Yale Law School also happen to be Amateur Radio enthusiasts. They are, from left to right, Edward Dauer, K1CBR, Arthur Charpentier, N1AQM, and James Zirkle, AG1X. N1AQM recently retired, and his gift was a 2-m, hand-held transceiver to keep in touch. *(photo by Sven Martson)*

MOVING? UPGRADING?

☐ When you change your address or call sign, be sure to notify the Circulation Department at ARRL Hq. Enclose a recent address label from a *QST* wrapper if at all possible. Address your letter to Circulation Department, ARRL, 225 Main St., Newington, CT 06111. Please allow six weeks for the change to take effect. Once we have the information, we'll make sure your records are kept up-to-date so you'll be sure to receive *QST* without interruption. If you're writing to Hq. about something else, please use a separate piece of paper for each request.

MOUNT ST. HELENS AWARD

☐ A full-color photographic award showing last year's spectacular eruption is now available by contacting, with no band or mode restrictions, eight or more stations in Clark, Cowlitz, Skamania or Lewis counties, Washington. Any contacts made after March 27, 1980, are valid. Send log information, station calls, dates, signal reports and $2 to: Awards Manager, CCARC, P. O. Box 1424, Vancouver, WA 98668. All proceeds will go to the Reid Blackburn Scholarship Fund. Reid, W7AIA, lost his life in the disaster. — *John Mollan, AE7P*

AMATEUR ANTICS

Strange Antennas

☐ A long time ago, a VE7 was on the air with a good signal. He said he was using his bedsprings as his antenna. His wife was still asleep, he added, and the rig loaded up better that way!

☐ Ted Wion, WA6OJE, reports having great success using his soldering iron for an antenna. One day, Ted was repairing a coax line that was still connected to the receiver. He touched the tip of the hot soldering gun to the inner conductor of the coax, and a few signals jumped out of the 75-meter noise. Thinking that if he could hear them maybe he could work them, he tried and succeeded — with the gun still plugged in the wall! This became a challenge, and Ted claims to have subsequently worked all 50 states and four countries with that unique antenna. He sends a special certificate with his QSL stating that he was using a soldering-iron antenna.

Big Antennas

☐ In the 1967 Sweepstakes contest, Thomas Taormina, WA5LES, and Charles Coleman, K5LZO, strung a V beam from a blimp floating at 185 ft. Each leg was half a mile long, and the array was so heavy that they had to use an automobile to pull the V legs out tight.

☐ During the 1974 Field Day, the operators at K5DUT/5 erected a full-sized, 2-element quad for 75 meters. The array was pulled up on four 60-ft poles, and the loops were spaced 40 ft apart. — *John G. Troster, W6ISQ, 82 Belbrook Way, Atherton, CA 94025*

[Editor's Note: Please send all correspondence to the author at the above address.]

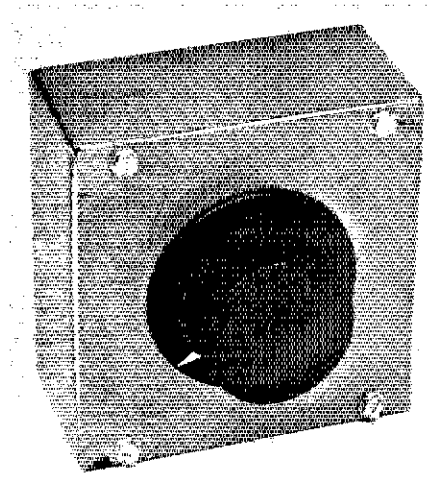
I would like to get in touch with . . .

☐ other amateurs who are pathologists. Philip Altman, MD, 1050 Linden Ave., Long Beach, CA 90801.

• *Basic Amateur Radio*

Julie's Custom Antenna Switch

Hear about the Novice who had to walk behind the bench to change the feed-line cable each time she wanted to switch bands? There must be an easier way.



By Peter O'Dell,* KB1N

Julie looked depressed as she slumped into the visitor's chair in the shack. I had just finished modifying a piece of equipment and really wanted to get on with testing it, but something told me that my star Novice needed a little cheering up and a few words of wisdom. "What's the matter, kid? Run into some misogynic old buzzard on 75?"

The Truth Untangles

"No, I don't pay attention to lids of any kind anymore. I just ignore them. Besides, I don't go for the General until next week, so you know I wouldn't be on 75." There was an edge of irritation in her voice, so I knew that something was really bothering her.

"Good grief! You're not worried about the exam, are you? You shouldn't have any trouble. In fact, my fearless forecast is that you will come home with the Advanced, at least." An icy glare told me that I was still wide of the mark. This one was going to be tough, particularly if she didn't start talking about her problem — I failed ESP-101 back in college.

After a few seconds of silence, I finally broke down and asked, "What is it, then, that has you looking like something that a mangy cat drug in?"

"Gee, thanks for the compliment, teach." Sarcasm oozed from her voice.

"I didn't mean it that way. Normally, you have a very cheery, optimistic attitude. Now you look frustrated and depressed, as if you've given up all hope. What is this insurmountable problem that has you down?" It was obvious by now that Julie was in no mood to respond to my usual string of wise cracks. Too bad.

"Larry brought one of his friends home from the office last night. I think you met him at our barbecue last summer. He was the fellow that everyone called 'tiny'."

Her expression hadn't changed any. Sure I remembered Tiny. As I thought of his massive physique, an overabundance of jokes and wise cracks welled up inside me. But I managed to merely nod to her, indicating that I remembered him.

She continued, "Well, it seems that Larry has been bragging to his fellow workers about how smart his wife is since I got my Novice. I think that they have all heard about every DX contact that I've made. He also told them about the transceiver I built — he didn't bother to mention that it was a kit, though. He's sweet."

Ahah! With that comment about her husband came the first glimmer of a smile. At this point I was wondering if Tiny had become so enthused with Julie's radio that he had eaten it. As I recalled, he had an appetite that matched his frame. Still, she wasn't ready for any wisecracks so I just nodded and waited for her to continue.

"After dinner and getting Danny to bed, the three of us went down to the basement so I could work magic while the two of them looked with awe. Forty was a mess with the foreign broadcasts so I flipped the rig up to 10. The band was wide open to VK-land. I unscrewed the 40-meter antenna and reached for the 10-meter vertical. Well, there it was. The cable was draped across the floor and Tiny was standing on the PL-259. Mashed that sucker flat. He was embarrassed and I was flustered."

"Is that all that's bothering you, Julie?" I asked.

Her eyes spoke long before the words came out: "Of course not. I had a spare PL-259 in the junk box that I quickly put on the cable using the pictorial diagram in the A-Double-R-L *Handbook*. That was a snap. I worked three VKs before the band closed, but I think Tiny was more impressed with my handling of the soldering iron." She had a cynical half-smile now.

I still didn't know what was troubling her, but I felt that I was about to find out. "I got up this morning and asked Larry if he minded watching Danny while I went downtown. So Larry and Danny spent the morning in his garden while I was off to Earl C's Discount House of CBs. What a weird place! I think he probably sells amplifiers to the CBers, but it's convenient to have him here in town.

"I looked around at the racks for a while, then I found what I was looking for: an antenna switch marketed as the Gargler 10-100-Super IV. The box said it was for CBs up to 5 kW. I knew that was preposterous, but I thought that it would handle my 100 watts."

"Oh, my. I'm beginning to get the picture. Tell me what happened." I tried to

*Basic Radio Editor

smile my best reassuring smile because I had this feeling that we would be replacing the solid-state finals in her rig very shortly.

"I mounted the switch to my desk top and attached the cables. I switched the various bands in and out and the receiver *sounded* like things were working. I tried transmitting and found that the rig was not playing quite right. So I put the SWR bridge in between the rig and the new switch. The SWR was higher than I remembered it being but it was especially bad on 10 meters — almost 2:1. I decided that I would worry about that later because the rig will operate with SWR up to about 2.5:1. Well, at least that's what the owner's manual says."

Crispy Cridders

Replacing solid-state finals can be a nightmare — particularly with some of the modern rigs that have such poor owner's manuals. I need a 20× magnifying glass just to see the tiny little schematic, and there is no theory of operation and no voltage readings and no resistance readings. Stumbling around in the dark gives me a headache. If I ever get my hands on the jerk who decided to leave all the essential information out of owner's manuals for Amateur Radio equipment, I'll . . . Julie was speaking again so I had to quit daydreaming and pay attention.

"I fired up on 10 meters and started calling CQ. A DL came back to me and after the preliminaries we got into a ragchew. I noticed a funny smell in the room. I even thought that I was hearing a hissing sound on the sidetone when I transmitted. Suddenly the rig started acting really strange with dial lamps flickering. The output meter showed almost no output. I looked at the switch and smoke was boiling out of it. Larry told me that I screamed loud enough to wake the dead."

"So you blew the finals out?" I tried to speak as gently as possible because I knew how she must feel. I can't say that I was enthused about the job that I was sure we would be doing in a few days.

"No, I don't think that the finals were rated for 5 kW would handle at least 100 W. I guess the thing that has me the most upset is that I thought I had figured everything out for myself this time without having to ask you for advice. I certainly blew it this time."

"Take it easy on yourself. Your logic was absolutely right. Do you happen to have the switch with you?" I had noticed the brown bag when she came in. Come to think of it, I had noticed a slightly acrid odor just after she arrived. I'd even absentmindedly glanced around the room to see if I had trouble.

As she spoke, the pungent fumes permeated our house. I was surprised that my wife didn't call the fire department. Guess she is used to the odors of burning phenolic by now. "Gadzeus! That thing smells awful!" I wasn't joking. "Looks like the case is really some type of plastic. It sure looks like metal, but metal would not bubble like this."

Julie looked on as I removed the three screws that held the case together. Instantly, I spotted several things that were wrong inside. The layout suggested that it had been designed by a deranged gorilla. "Here is where your trouble started. This switch wafer — what's left of it anyway — is made of a phenolic material. It is okay for low level signals, maybe on the order of a few watts or so, but it would never take the rated 5 kW. Look at the layout. These leads must be six or eight inches long. Quiz time! How much is that in millimeters?" I asked.

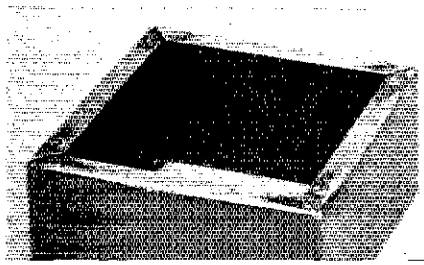
She sat back and thought for a couple of seconds. "There's 25.4 mm per inch, so that should be 150 to 200 mm roughly." I told you she was my star Novice.

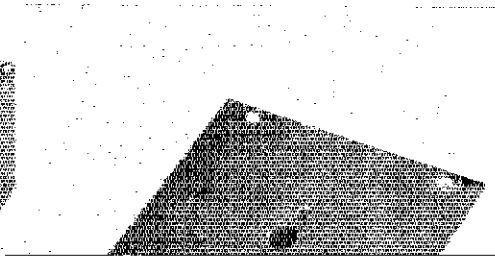
I used a pencil tip to point to one of the solder connections on the lug of an SO-239. "This looks like the culprit that actually did you in. Notice that now the wire is not even connected to the lump of solder on the lug. The black spot on the solder indicates that there has been some arcing. The dull coloring of the solder suggests that it was a cold solder joint to start with. Was the 10-meter antenna connected to this jack?"

She nodded in the affirmative so I continued playing Sherlock Ohms (sorry about that). "I would guess that the lead was touching the solder initially because the SWR was only 2 to 1. It would have been much higher if the connection had been completely open. At some point in your QSO, heat caused the wire to move slightly and break the contact, which led to the arcing at the contact. That would account for the hissing sound you heard. Part of the time, the only *antenna* connected to the rig would have been the switch wafer and connecting leads. This would have induced some heavy voltages or currents in the switch wafer. You are lucky that the switch went instead of turning your finals into *crispy-cridders.*"

All that Glitters is Not . . .

Julie still looked depressed; her voice was weak and high-pitched: "Guess I should have looked inside this thing before buying it. I see what you mean about the poor workmanship now. I'm not sure that I would have known what to look for before. Come to think of it, I now know what should not be inside, but





I still don't know what *should* be there."

"I'm going to let you find out the same way I found out," I said as I reached for a small box on the shelf behind me. (That box is pictured on page 30.) I handed Julie the box, an Allen wrench and a screwdriver, but I didn't have to say one word. She quickly removed the set screw with the Allen wrench and pulled the knob off. I had been so busy thinking how smart I was that I had goofed.

"Julie, guess you will need this too," I said meekly as I handed her an adjustable wrench. She had the retaining nut off in seconds. After removing the four screws on the front, she was somewhat surprised to find that the switch did not come loose with the removal of the front plate. She is not one to spend time contemplating the whys and wherefors; she quickly removed the four screws on the back plate and pulled it away from the housing. (See Fig. 1.)

"Gee, this switch is different. What's it made of? Some kind of ceramic?" She answered her own question before I had a chance to say anything.

"Yes. It is a ceramic wafer with silver-plated contacts. Is that all you notice about it?" My challenge was accepted in an instant as she began analyzing it.

"Obviously, this switch has BNC jacks, but I would assume that any standard coaxial jack could be used. I believe you mentioned in class one night that you are partial to BNCs?" I merely nodded and let her continue without interruption.

"Compared to the Gargler, the lead length is quite short. With the exception of the lead connecting one jack located in the middle of the back panel to the top of the wafer, none of the leads are much over an inch long. Before you ask, that is about 25 mm, right?" She didn't have to ask. Smart aleck!

"Okay, the one long lead that's connected to the top wafer is the input. The rest of the lugs are on the bottom of the wafer and are connected to jacks. Whoops! One of the lugs is grounded. That doesn't make any sense." My sophisticated design had stumped her — well, it really isn't that sophisticated, but she couldn't see the bottom of the wafer clearly.

I handed her an unused wafer (Fig. 2). "Here, this wafer is identical to the one I used to build this switch. Notice that the top of the wafer has only one lug connected to it. The rotor on the top is an unbroken disk that always makes contact with the lug. Flip the wafer over to the bottom side. There are 11 lugs on this side. The rotor on this side is horseshoe shaped with a small rotating contact that is set between the ends of the horseshoe! Ten of the contacts always touch the rotating horseshoe while the small rotating contact always touches one of the stationary contacts. As you've probably guessed, the small rotating contact is electrically connected to the disk on the top side. Any idea of what you can do with the horseshoe portion?"

It didn't take her long to figure out the general direction of things. "Well, the horseshoe would short all the other antennas together and might reduce the interaction somewhat. All but the selected antenna would be at ground potential because one of the contacts is tied to ground."

"You are on the right track. Shorting them together might or might not affect the degree to which they interact. Because there is feed line separating the switch and the antennas, they probably would not be at rf ground."

Julie thought for a minute and said, "That still would make everything connected to the unselected jacks at dc ground." I nodded. She continued, "Wow! That would be great because that would mean you would be protecting your station from any lightning damage."

"Whoa! Slow down, young lady. Let's go back to our discussions of lightning in the class. Lightning is probably the most concentrated, violent and destructive force in nature. I don't know of anything that could sustain a direct hit and survive unscratched. If one of your antennas took a direct hit, chances are you would not find any of the antenna or feed line. In the process it would probably destroy most of the equipment in your shack whether or not it was connected to the antenna or whether or not the antenna was grounded at the switch. The only protection from a direct hit is to disconnect all cables and wires completely and throw them out in your yard every time a storm is brewing. For most people that is not very practical. But it is practical to stay out of the shack and away from the equipment during a storm."

"What will this switch do for me, then?" Julie was puzzled now.

"It should protect you and your equipment from the indirect or secondary hits. It should also protect you from voltages that can be induced in an antenna and feed line by nearby lightning strikes. It can also help dissipate static voltages that tend to build up. It can do a lot for your safety. Just don't ask it to do the impossible. Secondary or indirect hits account for most of the damage to amateur equipment that I know of. That grounded horseshoe helps in another way, too. It improves the isolation between the selected switch lug and the others."

"Where can I get the parts to make a switch like this?" Julie asked. That's what a salesman would call a buying

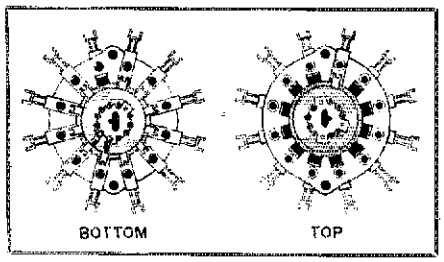


Fig. 2 — Top and bottom views of the Centralab switch wafer.

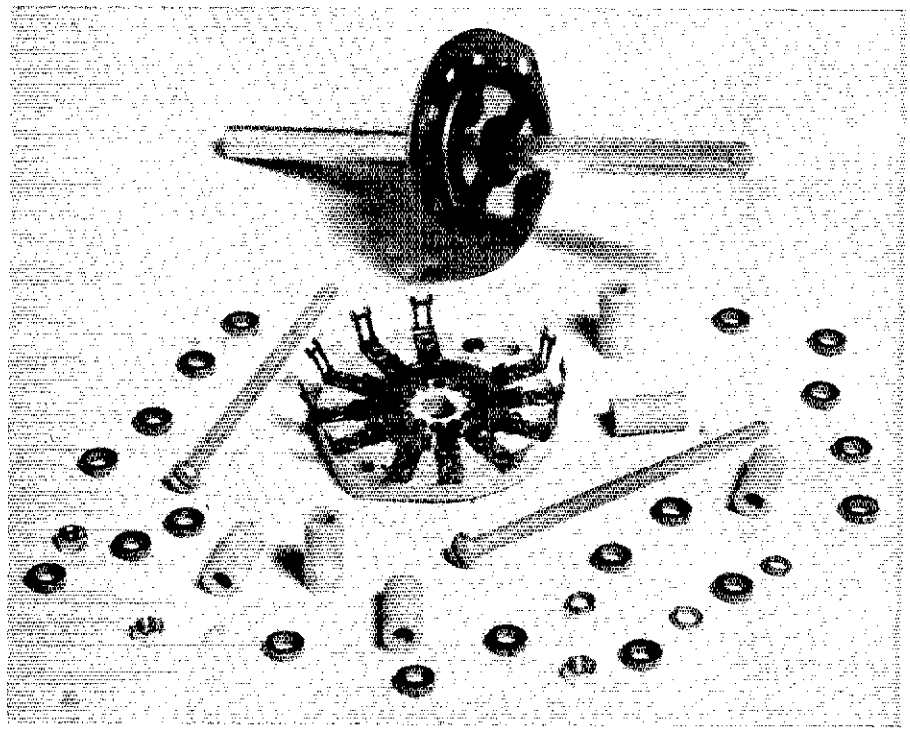


Fig. 3 — The switch wafer, mechanical index and associated hardware. It will be necessary in most cases to trim the length of both ends of the shaft of the mechanical index. This can be done with a hacksaw. Rough edges can be removed with a file or bench grinder.

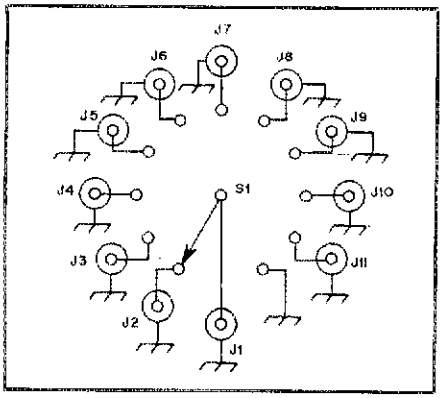


Fig. 4 — Simplified schematic diagram of the switch. (The grounded "horseshoe" of the wafer is not shown.) J1-J11 can be any type of coaxial jack of the builder's choice. S1 is a ceramic rotary switch (shorting) constructed from a Centralab FFD (1 pole, 11 position) "DD" Steatite and a Centralab P-270 mechanical index. The switch is housed in a Bud Aluminum Utility Cabinet (AU-1083-H.G.) which is 2 × 4 × 4 inches (51 × 102 × 102 mm). Any appropriately sized metal housing is acceptable as a substitute. Tests in the ARRL lab indicated that this unit provides at least 30 dB of isolation between selected and unselected ports at 30 MHz and somewhat higher levels of isolation at lower frequencies.

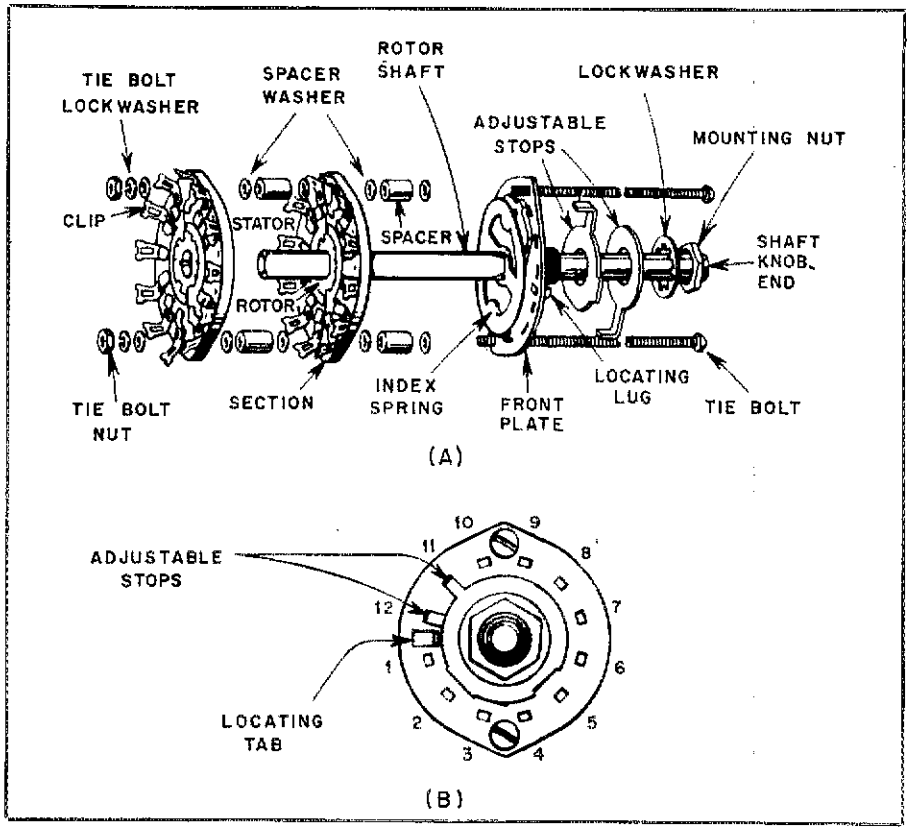


Fig. 5 — Assembly instructions for the Centralab switch wafer and mechanical index at A. More than one wafer may be stacked for complex switching requirements. At B, closeup view of the top of the mechanical index.

signal.[1]

"Centralab makes the switch wafer and the mechanical index which ensures that the contacts are always aligned. It is an old, reliable company that produces top notch parts. Here is the rest of the parts you will need for the switch." (See Fig. 3.)

Julie looked like a totally different woman than the one who had crawled in 30 minutes earlier. She was about to dash out and run for the soldering iron. "Slow down. Think this thing through before you plug in your soldering iron. What else do you need?"

"Let's see. I have five SO-239s that I picked up at the last flea market. I have solder and wire. Ooops, I only have five SO-239s and I need 11. And I need some sort of case to put it in. Guess I am jumping the gun, huh?"

I didn't want to do anything to extinguish her enthusiasm, because I am convinced that is the one quality that an individual needs to be successful at any endeavor. On the other hand, if I let her jump into the project blindly, without adequate preparation, the inevitable setbacks and delays could easily destroy her enthusiasm. "This Bud box is ideally suited for this project because the front and back come off so easily and give full access to anything mounted on either panel. You really should document anything that you build for your station. This is a schematic diagram of the switch (Fig. 4). It may seem silly, but should the need ever arise, a readily available diagram can save lots of time. Everything seems obvious now, but will it be obvious three years from now?"

Julie smiled, "Correct as usual, teach." I don't think she was aware that I often play baby-sitter for my four-year old grandson, who loves to watch *Mr. Rogers*. It is her whimsical way of retaliating against my occasional lapses into pomposity.

I pretended not to notice the jab and went on with my discourse, perhaps slightly more on the humble side. "Centralab provides this diagram with the mechanical index." (See Fig. 5.) "It shows the method for assembling the index and wafer. You can add a second wafer if you have something complex requiring more than one closure at the same time. A good example of that would be band-switching an amplifier or a transceiver. An antenna switch is much simpler and requires only the one wafer."

She nodded. I continued: "Perhaps the only tricky thing is assembling the wafer and index such that the locating tab is in the right position. I wasn't paying attention when I put this switch together and got the index and wafer 180 degrees off. It is no real problem. I just had to determine experimentally where to put the adjustable stops."

Whirlwind Aftermath

The look on her face told me that I had omitted explaining the adjustable stops. "Oh, I forgot to tell you about those, didn't I? The adjustable stops are the washer-like devices with the tabs on them. The tabs fit into holes in the top of the index and limit the switch rotation. If you have three antennas to switch now, limit the rotation to three positions. Later, if you add more antennas, you merely add another jack and move the adjustable stops. So you don't need 11 jacks just yet. How many do you need?"

"I have four antennas so I only need four jacks — ooops, I need five jacks because of the input line. Right?"

"Right! Very good. You could add a sixth jack and use one of the switch positions to select your dummy load. You are all set now. Any questions?"

Julie thought for a minute. "Yes. How did you find out what is inside an antenna switch?"

"Chuck Bender, the chief operator at WIAW suggested that I take one apart and look at it. Several years ago, he was replacing a defective switch at WIAW. He took it apart and found what was inside. Instead of replacing the whole switch, he replaced the wafer. Now he builds all the switches for the WIAW antenna system. This style of construction is fine for frequencies through 10 meters at legal amateur power into 50-Ω systems." She waved good-bye and dashed home for her soldering iron.

It took me a few minutes to collect my thoughts and return to testing my own project. That lady is like a whirlwind!

[1]The wafer, mechanical index and housing along with complete kits are available from Radio-kit, Box 411Q, Greenville, NH 03048.

Hints and Kinks

Conducted By Stuart Leland,* W1JEC

FUME DISPOSAL FOR THE DESK FAX

☐ Back in 1976, I fell heir to some very excellent "burn-off" facsimile paper for weather satellite pictures.[1] Although the pictures were of high quality, the fumes from the arc irritated my respiratory system. I resolved this annoyance with the development of the fume-disposal unit described below.

My first effort to eliminate the fumes was satisfactory for operation with the 240-rpm GOES picture format but was unwieldy when tied to the TIROS-N real-time system described in August 1979 *QST*. With this system you must be able to obtain access to the little rubber roller hidden well beneath the Desk-Fax cover. Consequently, a new "in-line" disposal method (Figs. 1 and 2) replaced my initial disposal system.

[1] This paper is almost identical to Xerox no. 3R830, obtainable in ream quantities from Xerox outlets.

At the heart of the arrangement in Fig. 2 is a Poly-Paks "turbo-jet" blower (cat. no. 92CU5871). It fits frictionally into the end of a coupling for 1-1/4-inch (32-mm) PVC pipe. Reaming the pipe to fit is done with a rotary rat-tail file inserted in an electric drill. After the fitting is completed, this coupling is clamped to a 3 × 3/4-inch (76- × 19-mm) galvanized strap that extends diagonally from the shelf originally occupied by the Desk-Fax transmitting light and a microscope. Existing screws are used.

In order to adapt the 1-1/4-inch brass fittings for coupling to the exhaust hose, a 1-inch (25-mm) PVC coupling will provide a loose fit that becomes tight when wedged with three toothpicks. To secure these picks in place I applied a small amount of Weldwood epoxy. At the other end of the coupling I cemented the female end of a 1-1/4-inch plated brass solder-type sink tail pipe.

A 6-foot (1.8-m) length of 3-inch (76-mm) dia dryer venting hose conducts the fumes away from the Desk-Fax. An empty 3-inch tomato can, with the ends removed, is placed at each end of the hose for interfacing. An appropriate diameter hole is cut in the end of one of the cans to accommodate a length of 1-1/4-inch (32-mm) diameter tail pipe which can be soldered in place with acid-core solder. This piece of tail pipe fits into the female end that is part of both versions of the Desk-Fax modifications. The other can is prepared in a similar manner except that, to reduce air friction, a 1-1/2-inch (38-mm) tail pipe is used.

Being able to vent the fumes outdoors is most desirable, but in some cases this may not be possible. An alternative is to force the fume-laden air through a filter consisting of a substance like kitty litter. Activated charcoal such as that used for aquariums could also serve for filtering out the fumes. Where the burn-off system is used, do provide a means for venting the fumes to protect your lungs. — *Lindsay Winkler, W7AVE, Walla Walla, Washington*

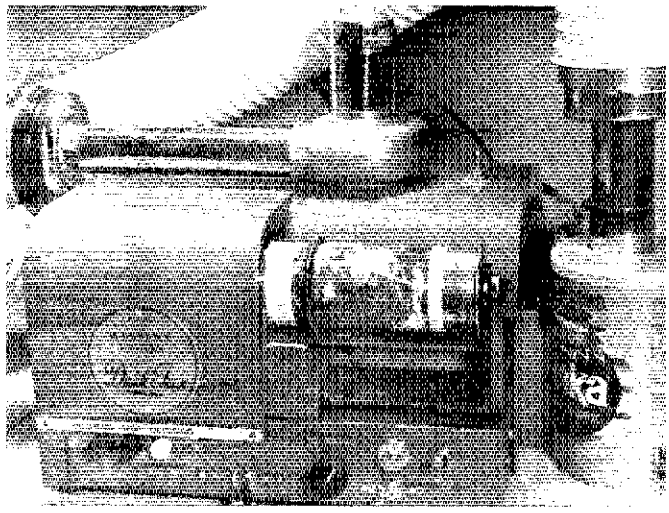


Fig. 1 — To avoid respiratory irritation from facsimile fumes, Lindsay Winkler, W7AVE, devised this exhaust system and that in Fig. 2. This system is for use with the 240-line GOES WEFAX picture system. A surplus blower forces the fume-laden air through the experimental absorption canister shown attached. For more than casual use a canister with less air resistance is needed.

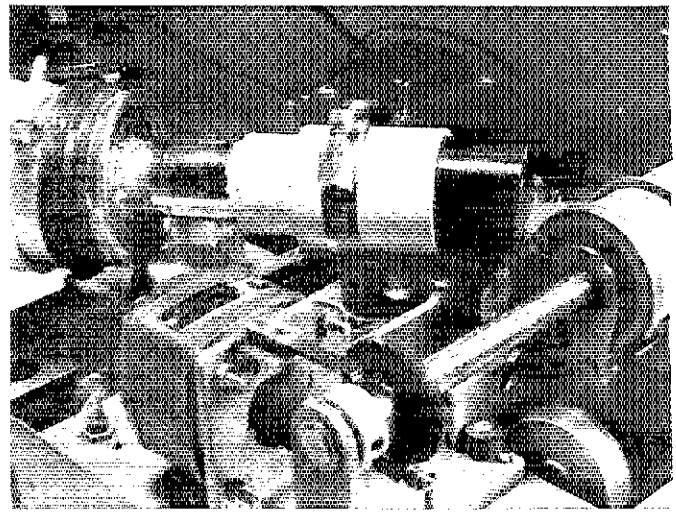


Fig. 2 — The W7AVE in-line fume disposer eliminates the use of the Desk-Fax cover, giving access to the little rubber roller and the "beheaded" screw. See Technical Correspondence, August 1979 *QST*, p. 43 for related information concerning orbiting NOAA satellites having the same picture format as TIROS-N. The blower shown above is adequate for outdoor venting but not for use with the canister shown in Fig. 1.

TR-7 SWR SENSOR PROBLEM CURED

☐ I've had my TR-7 since April of 1980 and have had trouble "talking myself off the air" on voice peaks. The SWR was within the prescribed limits of the owner's manual. It happened so fast that I couldn't see any reflected-power indication, and I became quite discouraged. It was suggested to me that I was experiencing rf feedback, with the peaks too rapid to observe on an SWR meter.

I made extensive checks and changed the ground system, with no results. Finally I decided to change my "Ultimate Transmatch" to the improved "SPC" version by W1FB in July 1980 *QST*. This did the trick! As a bonus, the TVI I previously had on my shack TVI-monitor receiver (channels 2, 3, 4 and 5) vanished! I am much happier with the SPC Transmatch.

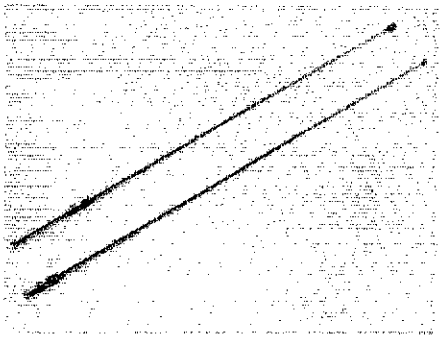
Another effect I noticed before the change was during "barefoot" operation with the TR-7, at which time the rf feedback was worse than when I operated the TR-7 through the SB-200 linear amplifier. This was also cured by changing to the SPC Transmatch. — *Clayton C. Gordon, W1HRC, Millbury, Massachusetts*

[Editor's Note: The TVI cure resulted from the higher Q and band-pass response of the SPC Transmatch, which was the purpose of the original design effort. It is difficult to say just why the rf feedback problem was cured by changing Transmatch circuits, but W8EEF of St. Joseph, Michigan, reported the same cure for his rf-feedback problem when converting from the Ultimate Transmatch to the SPC circuit.]

REPLACEMENT ANTENNA FOR S-1 AND S-5 HANDHELDS

☐ Occasionally I beat Mr. Murphy at his own game. I was quite annoyed when I broke the top section of the telescoping whip from my S-5 hand-held transceiver. Sally, KB1O (she says the rig belongs to her), insisted that I order a replacement. It so happened there were a couple of telescoping whips in my junk box. These

*Assistant Technical Editor



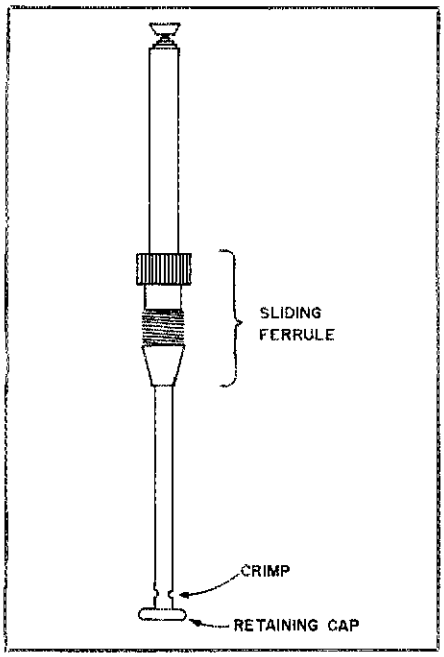


Fig. 3 — The photograph shows the similarity of the modified surplus antenna to the original Tempo antenna as described by Pete O'Dell, KB1N, in the accompanying text. Additional details are provided by the drawing.

had been acquired from Diamondback Electronics[1] for 79 cents each. A quick check revealed that these were exactly the same diameter and the same length as the original. (See Fig. 3.)

In the S-5, the whip slides up and down inside a ferrule that is threaded and mates with the body of the S-5. A retaining cap is crimped inside the bottom of the largest section of the whip to keep the ferrule from sliding off. A tubing cutter easily removed the bottom of the section containing the cap. I slid the ferrule off the original whip and installed it on the replacement antenna. A pair of diagonal cutters made short order of removing the retaining cap. The task was completed by inserting the retaining cap into the bottom of the whip and crimping it in place with the diagonal cutters. Gotcha this time, Murphy! — *Peter O'Dell, KB1N*

HIGH SB-401 PLATE CURRENT TRACED TO CATHODE RESISTORS

☐ Recently I reconditioned an SB-401 transmitter. The two corrections I made may be of interest and assistance to owners of such units.

First, the plate current (actually cathode current) appeared too high. With the transmitter fully loaded and correctly tuned, the plate-current reading was 400 mA instead of 220 mA. The cause of this turned out to be an increase in value of each of the six 10-ohm cathode resistors connected to the 6146 sockets. These resistors are denoted R7 through R13. All six measured anywhere from 14 to 21 ohms. New resistors restored the proper meter reading.

My second correction concerns neutralization. Even with the neutralizing capacitor (C23) fully meshed, true neutralization was not actually accomplished although the sensing meter had gone through a minimum at that point. The solution was the addition of a 10-pF fixed capacitor in parallel with the series fixed capacitor, C24 (7.5 pF), making a total capacitance of 17.5 pF in series with the variable neutralizing capacitor. The result of this was true neutralization occurring with C23 only half meshed. Possibly the 7.5-pF capacitor, C24, had decreased in value but there was no readily available way for me to measure it. Incidentally, operators should reneutralize the SB-401 whenever the 6146s are changed. — *Arthur H. Pedley, W2ZZG, Canajoharie, New York*

IMPROVED PL-259

☐ Until I tried the following modification, I always had trouble removing PL-259 connectors. The addition, shown in Fig. 4, provides better leverage and makes installation and removal of these coaxial connectors much easier. To make the elongated PL-259, begin by removing the sleeves from two PL-259s. Carefully align and clamp the sleeves together with the knurled portions at the outer ends. Solder the two ends together as shown in Fig. 4. After the metal cools, remove any extra solder. Be sure the joint is secure, then test assemble the modified connector. Attach the coaxial cable in the usual manner. — *Cecil D. Magargee, K3TUA, Sharpsville, Pennsylvania*

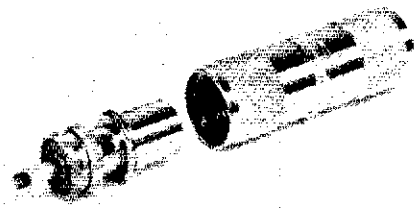


Fig. 4 — An elongated PL-259 can be made by soldering the sleeve portions of two connectors together as shown above. The elongated sleeve enables the operator to obtain better leverage when installing or removing a coaxial cable.

A FAST CHARGER AND REGULATOR FOR THE TEMPO S-1

☐ The fast-charger circuit in Fig. 5 is designed for the Tempo S-1 and S-2 transceivers. It can, however, be made to work with many other hand-held sets. It will power such equipment continuously in both receive and transmit modes while applying a tapered charge to the batteries that can bring a dead pack to full charge in less than an hour and then keep it on trickle charge. No modification of the S-1 is required. The current limiting protects the charger from the inevitable short that occurs as the charger is plugged into the S-1. (See Fig. 5.)

Use of a specially chosen pnp pass transistor (Q1) with low $V_{ce(sat)}$ characteristics allows proper regulation with input voltages as low as 12.3 V, such as might be found in a car when the engine is turned off. Do not install a substitute for this component. Furthermore, be sure to provide an adequate heat sink to ensure thermal stability. Q1 (Motorola TIP42 or equivalent) is available from Motorola MRO (formerly HEP) distributors.

The 14-pin DIP packaged 723 must be used and not the 10-pin unit. It is available from

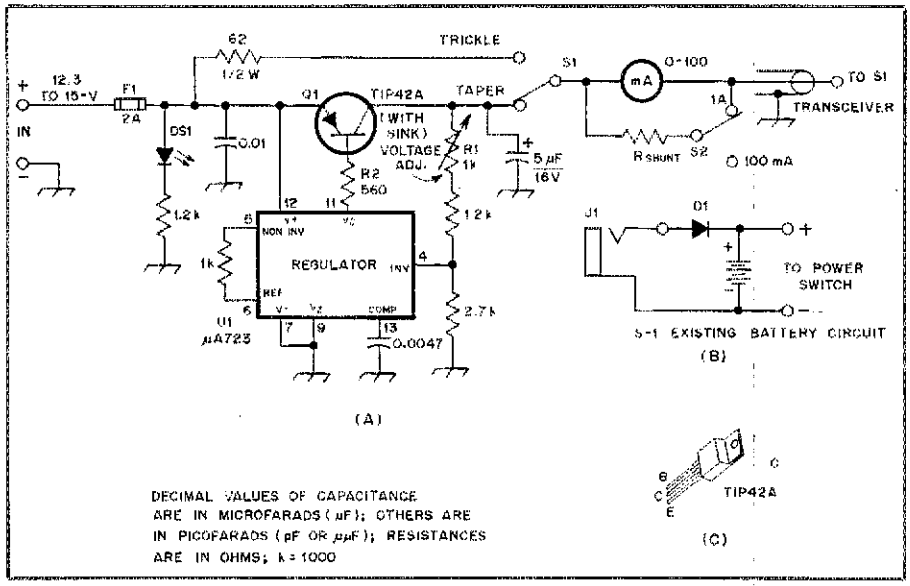


Fig. 5 — Circuit for the fast charger and regulator for the Tempo S-1. Author Joe Moell advises against substituting another transistor for Q1, a TIP42A with heat sink. All resistors are 1/4 watt except as noted. The Tempo S-1 battery circuit is shown at B. The terminal pins of the TIP42A are shown at C.

[1]Diamondback Electronics Co., Box 12095, Sarasota, FL 33578, tel. 813-953-2829. Antenna is part no. B-6311.

Radio Shack (no. 276-1740). Also Radio Shack's pc board potentiometer no. 271-333 is satisfactory for R1. Their no. 276-1363 heat sink will meet the needs of Q1. A nice, but optional, item is the LED indicator, DS1.

For the meter, choose one that has a 100-mA, full-scale movement and make a shunt of Nichrome wire or low-value resistors in parallel to give a switchable 1-ampere range. For best regulation, the unshunted internal resistance of the meter should be less than 2 ohms.

The diode in the S-1, which protects the pack from the momentary short when the charger is plugged in, has a voltage drop of 0.71 V at 25 mA. Therefore, R1 should be adjusted to set the unloaded output of the regulator (measured at the collector of Q1) at 1.43 V × 8 + 0.71 V, which equals 12.15 V. If you don't have a digital voltmeter, you can set R1 in the following manner: (1) Charge the pack with the trickle charger for 14 hours, then unplug it; (2) set the regulator output for 10 V, then connect it to the S-1 in the taper charge mode and slowly adjust R1 upward until the current meter indicates 15 mA.

To check the current limit, connect a 10-watt (or larger) 10-ohm power resistor to the regulator output. The current meter should indicate between 650 and 850 mA. If the indicated current is not within this range, change the value of R2. The value of R2 is not critical.

Depending on how you package the unit, rf can affect the regulator. If rf does affect the operation, install a 0.01-μF bypass capacitor at the input, another at the output and one directly across the 723 regulator supply pins 12 and 7. One of these is included in the diagram.

When using this charger/regulator circuit with other than Tempo hand-held sets, be sure there is a diode between the regulator and the battery pack to prevent damage to the regulator when the input voltage is off. Choose a diode with at least a 1-ampere rating, such as the 1N4001. With the added diode, the charger should work with the Kenwood TR-2400. Be sure, however, you are aware that the battery plug on this radio is "backwards," with the center pin grounded. ICOM has two NiCad packs for the IC-2: The standard one has seven cells and the higher power pack has nine cells. The seven-cell pack requires a lower regulator voltage setting. To accommodate the nine-cell pack, change R1 to a 2-kΩ potentiometer. The input voltage should be at least 13.7 V. Also, note that the two screws on the bottom of an IC-2 battery pack are connected directly to the + and − battery terminals. For this reason a charger stand is practical.

As a final word of caution, do not overcharge NiCads, even with a trickle charger. Unless the radio is in actual use, do not leave it connected to the charger for long periods after charging is completed. — *Joe Moell, KØOV/WA6JFP, Fullerton, California*

CENTURY 21 DRESS-UP

☐ The analog dial and meter faces of the Ten-Tec Century 21 may be made more eye-catching by attaching pieces of colored plastic in front of the cutouts on the subpanel. I used some red plastic (from a discarded box) that I cut to the proper sizes. Quick-drying epoxy, spotted around the perimeter of the plastic, is sufficient to hold it in place. The resultant coloring is quite appealing, especially in low ambient light areas.

Some '21 owners may have found as I did that the ZERO-BEAT and SET DRIVE push buttons stick or become intermittent after a period of use. Replacement of the switches is the route to follow. Substitutions for the original switches may be found at the local Radio Shack store. Two types of switches are available — momentary contact types (275-618) like the originals or push-on/push-off (275-617). The type to use is a matter of personal preference. Some might prefer to use the push-on/push-off switch for the SET DRIVE control; it will maintain a key-down situation without the need for the operator to keep the button depressed during drive or antenna matching network adjustment. Aesthetically, the switches offer a contrasting red/black styling, which adds some pizzazz to the rather conservative gray/black front panel of the transceiver.

The knobs, control nuts and front panel must be removed to gain access to the switch mounting clips. Since these clips are difficult to loosen, it is easier to cut them off with a pair of diagonal cutters. The removal and replacement process should take less than a half hour. — *Paul K. Pagel, N1FB, ARRL Hq.*

REDUCING HW-101 SIDETONE VOLUME

☐ If the cw sidetone volume of your HW-101 is too loud, add this simple and inexpensive modification that was dropped by Heath when the product line was switched from the SB-101 to the HW-101. The circuit boards in the HW-101 still have the holes for the additional components to be added. No retuning is necessary. (See Fig. 6.)

Begin by locating the audio circuit board. Then remove and discard R326 (1 MΩ). Refer to your manual. Temporarily remove R336 (330 kΩ); it will be replaced later. Add C319 (0.005 μF/disc) as shown — this is Heath part no. 21-27 or Radio Shack no. 272-130.

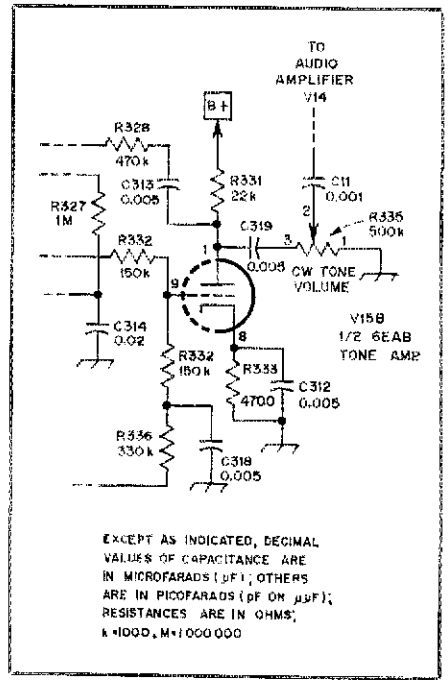


Fig. 6 — Control of the sidetone volume of the HW-101 is accomplished with the addition of a potentiometer, as indicated in the diagram. Stan Smith, VE3IOI, provides the details in the text.

Next, add the volume control, R335 (500 kΩ), which can be Heath no. 10-149, Radio Shack no. 271-1723 or the equivalent. Mount the control from the foil side of the circuit board; space is available adjacent to R336. Be sure to solder the rear of the control cover to the foil. Have the shaft project up through the board. Replace R336 (330 kΩ) as shown. Then pack up, fire up and enjoy! — *Stan Smith, VE3IOI, New Market, Ontario*

ANOTHER APPROACH TO GETTING ON 10 METERS WITH A CB YAGI

☐ Several people advised me at the time I got my ticket in April 1979, to modify an 11-meter CB antenna for use on the 10-meter amateur band. Because I had not seen the WB3GCN antenna modification in March 1979 *QST*, I set about the task in a slightly different way than outlined by Mr. Inverso, but with equally satisfactory results. Luck assisted me in obtaining a very nice 11-meter, three-element aluminum Yagi from a dealer's dusty shelf for $30, and the project was launched.

The elements were shortened according to formulas in *The ARRL Antenna Book*. These state that the driven-element length in feet equals $475/f_{MHz}$, the director length in feet equals $455/f_{MHz}$ and the reflector length in feet equals $500/f_{MHz}$. Since the elements are composed of telescoping sections, the outer section was simply slipped inward slightly and firmly clamped by stainless steel, gas line clamps obtained at an auto parts store. These clamps also permit easy tuning of the elements as needed by loosening the clamps and altering element lengths.

Turning to the *Antenna Book* table entitled "Optimum Element Spacings for Multielement Yagi-Arrays," I found that the element spacing had to *increase* over the spacing distance the CB designer posted. Guided by the graph for spacing from the director to the fed element, I chose a spacing of 0.177 wavelength. This meant the element spacing had to be "blown open" about 5 feet (1.5 meters) over the CB design. An appropriate length of aluminum tubing, therefore, was bolted to the boom to lengthen it.

Information in the back of the *Antenna Book* indicated that the gamma match had to be moved out from 3-3/4 inches (95 mm) to 4 inches (102 mm), accomplished with the cutting of a couple of new straps.

With just simple tools the work can be done in an hour. Time for mounting is additional. The method of mounting is left to the builder.

Although placed deep among 100-foot (30-m) oaks and pines, the antenna really sparkles. On the first try the SWR ranged from 1.0 to 1.3, so it was left alone. West Coast reports jumped to consistent S-9s from previous S-6.

Amateur Radio has its foundation well set on experimentation and ingenuity. My hope is that this simple experiment will be of value to you, increasing your enjoyment of 10-meter operation. — *Dr. F. W. Shield, KA4HIP, Hampton, Virginia*

MARITIME ANTENNA FOR 2 METERS

☐ For some time I searched for a good 2-meter antenna for my boat. Requirements were simplicity, low SWR, insensitivity to location, a single mast without radials and resistance to corrosion. Simple coaxial antennas, as you

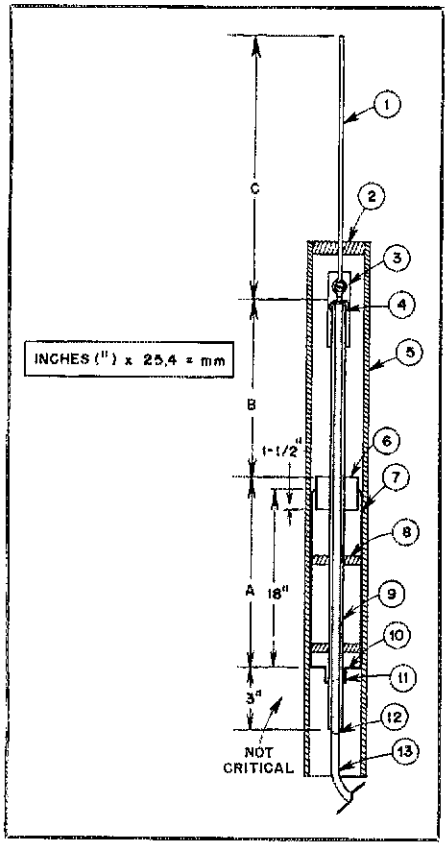


Fig. 7 — When Andy Griffith, W4ULD, operates maritime mobile from his boat, he maintains 2-meter communication with the help of an antenna made in the manner of the drawing. No special tools or materials are required to make this antenna. Identification information related to the encircled numbers of the drawing is as follows: (1) 3/32-in. (2.38-mm) stainless steel welding rod; (2) phenolic or Lucite disc waterproofed with windshield sealer; (3) phenolic or Lucite block; (4) coaxial cable shield soldered to copper tubing with center conductor soldered to lug attached to welding rod; (5) 3/4-in. (19-mm)[1] CPVC pipe, the length determined by the mounting system at the bottom and desired antenna height; (6) tuning sleeve made of brass shim stock soldered in place after adjustment; (7) 3/4-in. OD copper pipe or tubing wrapped with a small amount of tape at the top and bottom to fit snugly; (8) Lucite or phenolic spacing discs (four required) equally spaced; (9) 1/4-in. (6-mm) OD copper tubing; (10) copper disc soldered in place; (11) brass sleeve, 1/4-in. ID hobby tubing or made from shim stock with sleeve soldered in place after adjustment; (12) seal with windshield sealer and tape and (13) RG-58/U coaxial cable with the outer covering removed from the section inside the copper tubing (overall length is not critical).

know, have feed line and location problems. I knew from tearing apart a broken commercial vhf marine antenna that isolation of the feed line was accomplished by a 1/4-wavelength stub at the bottom. I tried this approach, but scaling the commercial antenna dimensions to 2 meters just wouldn't work with readily available materials. Neither did the use of conventional stub and antenna formulas help me to zero in on the three critical dimensions of A, B and C of the accompanying sketch. (See Fig. 7.)

Starting from scratch, I wound up with the 100% adjustable antenna shown in the drawing. The only difference between the prototype and the final antenna is the top half of the original version, which was made from aluminum ground wire with an adjustable sleeve over the top end. Also the experimental model was not enclosed in plastic pipe.

As you can see, the 1/4-wavelength stub at the bottom is adjustable with a sleeve in the top end. The length B is adjustable by sliding the 1/4-inch (6-mm) copper tubing through the sleeve at the bottom of the stub. The top half is adjustable as mentioned above. With all of these adjustments and an SWR meter, it took only 10 or 15 minutes to zero in on the proper lengths. During the tests, the antenna was mounted in a vise placed on a picnic table. The vise gripped the bottom inch of the stub. The minimum SWR at resonance (146.16 MHz) was 1.2:1. Bandwidth for a 2:1 maximum SWR appears to be ±1 MHz.

With the antenna placed in the plastic pipe, the resonant frequency dropped slightly but came back to the desired frequency by nipping 1/8 inch (3 mm) from the top. The final dimensions for 146.16 MHz were:

A = 18-9/16 inches = 2713.1/f

B = 20-1/8 inches = 2941.5/f

C = 19-3/8 inches = 2831.9/f

where f = MHz, and millimeters = inches × 25.4.

The antenna works well on my boat. I have it mounted on an aluminum railing around the center console and held in place by two screw-type pipe clamps. By the way, no special tools are needed to make this antenna. The materials are common, everyday items available to almost anyone. I would add that an ordinary standard-size faucet washer can be substituted for the Lucite disc in the stub. — *Andy S. Griffith, W4ULD, Kinston, North Carolina*

[1]Plastic pipe sizes may vary from those on the labels. The 3/4-inch CPVC used for this antenna measured 7/8-inch OD (22 mm) and 21/32-inch (16.7-mm) ID, a good fit for the 5/8-inch OD stub.

BATTERIES IN THE FREEZER?

☐ The Hints and Kinks item by Glenn Jacobs, WB7CMZ, in January 1981 *QST* under "Extending Battery Life" is the exact opposite of extending life. According to information from the Union Carbide Corporation, batteries do freeze and may become useless if frozen for a period of time. The recommended temperature for maximum storage life is 40°F (4° C). So if you wish to store batteries for a long time, do so in your *refrigerator* — not in the freezer. In addition, be sure to wrap the cells in a plastic bag to prevent moisture formation while in the cold. These batteries should be allowed to warm up in the bag before being used. — *Jordan Kaplan, W9QKE, Chicago, Illinois*

EXTENDING THE HW-22A FREQUENCY COVERAGE

☐ Unfortunately the HW-22A does not cover all of the Advanced portion of the 40-meter band. A simple modification will allow coverage from 7125 to 7220 kHz. Lift the ground side of C205, which is across L6 (the VFO coil), and place an spst switch in series with it to ground. I mounted my switch immediately under the BIAS SET/OPERATE TUNE switch. A ground lug for this modification can be attached to one of the bolts holding the switch. With the switch open, the transceiver covers the frequencies mentioned above. With it closed, the HW-22A will cover the normal 7200 to 7300 kHz. This modification is based on the fact that the VFO operates on the high frequency side of the mixer. I replaced C205 with a silver mica capacitor of the same value as the original disc type (47 pF). — *Ev G. Taylor, W6DOR/W7BYF, Davis, California*

CHARGING NICADS FROM ELECTRICAL SYSTEM IN A CAR

☐ Often when using a battery-powered portable transceiver such as my Kenwood TR-2200A in my car, I have felt the need to operate simultaneously from the electrical system in the car and safely charge the internal NiCad battery pack. The circuit shown in Fig. 8 permits operation from the power system in the automobile, while at the same time providing a tapering charge for a 12 V NiCad pack. The circuit includes reverse voltage protection, a hash filter for transceiver operation, and a voltage and current regulator for NiCad charging. The output color markings are for the TR-2200A accessory cable. — *Leo Finkelstein Jr., WA4AOL, East Greenbush, New York*

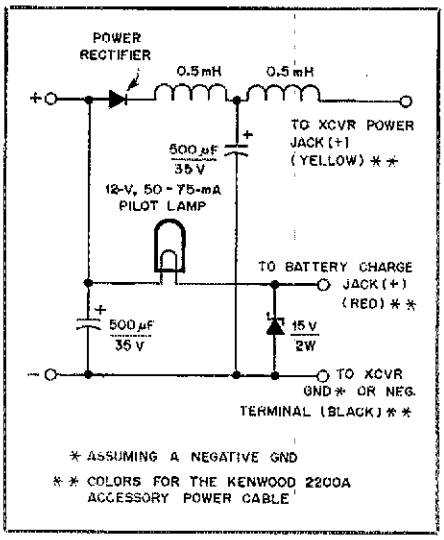


Fig. 8 — Leo Finkelstein Jr., WA4AOL, uses the electrical system of his car to charge his NiCad power pack with the help of this circuit. This arrangement is for use with a negative ground (*). The wiring colors at the right (**) are for the TR-2200A accessory power cable. The power rectifier should be rated at 50 V, 2 A.

DRAKE TRANSMITTER MODIFICATION JUST FOR VOICE OPERATION

☐ The "Hints and Kinks" column for November 1977 contains a suggestion by WA2YPO for improving VOX operation of Drake transmitters by replacing the 6EV7 with a 6AQ8. I did this and it works fine — *on phone*. On cw, with the 6AQ8, the VOX locks up and won't let go, regardless of the control settings. Those who use Drake transmitters on cw should *not* change the VOX tubes. Those working only phone (and missing half the fun of ham radio!) can switch tubes and get improved performance — but *only* on phone! — *Roy Williams, W6VON, La Mesa, California*

Technical Correspondence

Conducted by
Jerry Hall,* K1TD

INSTALL RADIALS AND PROTECT YOUR VERTICAL ANTENNA AGAINST UFOs

I had a technical problem that was beyond my grasp; I was unable to make any contacts on 40 meters. I used a low-cost vertical antenna that is advertised in *QST*, and my ground system was a single ground rod. My SWR indicator showed 1.3:1, and with an antenna tuner I could adjust it to a near-perfect match. However, my field-strength meter showed no output, even though my wattmeter indicated 100 watts! I wrote to ARRL Hq. for help.

The reply suggested I first go outside and look up in the sky to see if a UFO was above my house and sucking up all the 40-meter energy. Then some helpful suggestions were given about the sensitivity of my field-strength meter versus frequency, bad connectors, bad coax and so on. Finally, this tip was offered: Shortened (loaded) verticals without radials are rather inefficient, and there was a possibility that most of my 40-meter energy was merely heating up the earth.

In order to check this last suggestion I epoxied an ordinary general-purpose diode to my ground rod (at a point just under the ground). I waited a day to be sure the temperature had stabilized. I also placed a second diode in the ground as a control (at a considerable distance from the antenna system). I measured the forward resistance of both diodes. Then I went to the radio room, tuned, loaded and called CQ. After receiving no reply I went outside to measure the resistance of the diodes. The control diode showed negligible change, 0.1 Ω but, lo and behold, the diode at the antenna showed a decrease of 3.2 Ω. This told me that the ground *was* heating up (diode resistance decreases with an increase of temperature). Possibly this test could be of help to other amateurs.

Installation of radials *did* restore 40-meter operation. At least now I can stop running outside and looking for that UFO above my antenna. — *Rick Collins, KA8IVZ, 287-1/2 E. State St., Montrose, MI 48457*

EXPANDING THE "NONLINEAR" TO 21 AND 28 MHz

After our article appeared,[1] we received several inquiries about the feasibility of using the amplifier on 15 and 10 meters. We have not tried it; however, the MRF476 transistors are designed for CB service and will perform as rated through 10 meters. It will be necessary to add the appropriate filter for each additional band. Table 1 gives values for 15- and 10-meter filters, based on data taken from Wetherhold.[2]

There have also been inquiries regarding band switching for the Universal Transmitter.[3]

Table 1

15- and 10-Meter Component Values

Band	C1, C4	C2, C3	L1, L3	L2
15 m	100 pF	240 pF	0.486 μH, 11 t. no. 20 enam. wire on T50-6 core	0.588 μH, 12 t. no. 20 enam. wire on T50-6 core
10 m	68 pF	160* pF	0.323 μH, 9 t no. 20 enam. wire on T50-6 core	0.388 μH, 10 t. no. 20 enam. wire on T50-6 core

*160 pF is not a standard value. Connect two or more standard-value capacitors in parallel to total 160 pF, e.g., 10 pF plus 150 pF. All capacitors should be either silver mica or polystyrene. The inductors are wound on Amidon or Palomar toroid cores as indicated.

This is certainly a possibility. It requires addition of a four-pole switch (two poles for the input and two for the output of the PA) with the appropriate number of positions. Use miniature RG-174/U coaxial cable to connect the filters to the switch. For those desiring to know more about the filters, we suggest consulting Wetherhold,[2] the *ARRL Electronics Data Book* and chapters 2 and 6 of *The Radio Amateur's Handbook* for 1981. — *Doug DeMaw, W1FB, and Peter O'Dell, KB1N, ARRL Hq.*

WHEATSTONE BRIDGE SWR INDICATOR

The fascination of VSWR for hams is endless, and no issue of a ham magazine seems to be complete without a description of some VSWR-measuring instrument. All of them certainly are worthy, but by far the cheapest, simplest and most easily constructed device has been neglected. This is the simple Wheatstone bridge, first described in *QST* in the 1950s and appearing in a few subsequent *Handbooks*. See Fig. 1.

The Wheatstone bridge was described in *QST* primarily as a null indicator, but it can be calibrated directly in VSWR. Commercial versions of the Wheatstone bridge are used up to 3 GHz. There are two constraints on the use of a Wheatstone bridge as a calibrated VSWR meter. First, all measurements must be made at the same power level. Second, the signal source must have an impedance of 50 Ω.

The first constraint is easily satisfied by either short-circuiting or open-circuiting the "unknown" terminals and adjusting the applied power for a full-scale reading. This is also a good test for how well the bridge has been built; with no "unknown" connected, the meter should indicate full scale whether the terminals are open or shorted.

The second constraint precludes the use of a grid-dip meter as a signal source. However, even a moderately priced signal generator (the kind having a calibrated step attenuator) will be close enough to 50 Ω to give accurate results.

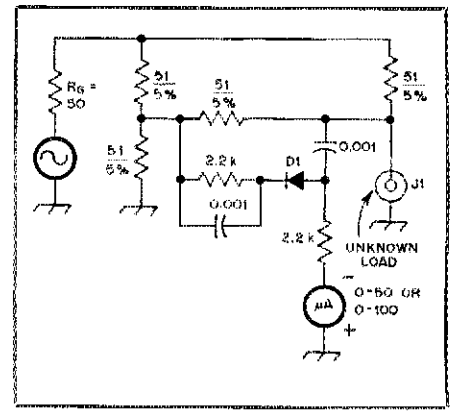


Fig. 1 — The Wheatstone bridge circuit for rf. Resistances are in ohms (k = 1000) and capacitances are in microfarads. See text regarding 51-Ω resistors.
D1 — Germanium small-signal diode, 1N34A or 1N270 or equiv.
J1 — Rf connector of builder's choice.

Either selected 51-Ω composition resistors or 51.1-Ω film units (1% tolerance) may be used. Both types have negligible reactance up to the low vhf region. As with any bridge, construction and layout are all-important. The bridge is calibrated in the normal manner, by connecting known resistances across the "unknown" terminals. — *Harry R. Hyder, W7IV, 1638 W. Inverness Dr., Tempe, AZ 85282*

HUMAN-ENGINEERING THE SWR INDICATOR

Since using an aircraft blind-landing indicator in the IM,[1] I have received many letters discussing the use of special meters in common SWR bridges. This is a summary of those discussions.

The special meter I used is not suitable for the ordinary SWR bridge. Many SWR bridges use only one meter, I believe two meters, one for "forward" (FWD) and one for "reverse" (REV) power, greatly increase the convenience of the bridge. In one form, Fig. 2A, two good-sized meters are nicely balanced on the front panel of the indicator. The ideal 1:1 SWR is indicated with the meter pointers in the position shown. However, during tune-up the meters will swing in the same or different directions. Ideally the FWD will reach full scale while REV goes to zero. Scale switches, wide-spaced meters and pointer movements cause eyestrain.

Use of a combined meter, such as a surplus stereo "level" meter, brings the movements closer together. Replacement of the scale switch with ganged FWD and REV sensitivity potentiometers improves convenience greatly (Fig. 2B).

Note that for a given power level, the connections of the pot cause both meter pointers to rotate in the same direction as the pot knob. Tuning changes may still cause divergent

'DeMaw and O'Dell, "The Basic 'Nonlinear' Amplifier," February 1981 *QST*, page 40.
'Wetherhold, "Low-Pass Filters for Amateur Radio Transmitters," December 1979 *QST*, page 44.
'DeMaw and Shriner, "Transmitter Fundamentals," December 1979 *QST*, page 11.

*Technical Editor, *QST*

'See footnote 2.

'Geiser, "The Impedance-Match Indicator," July 1980 *QST*, page 11.

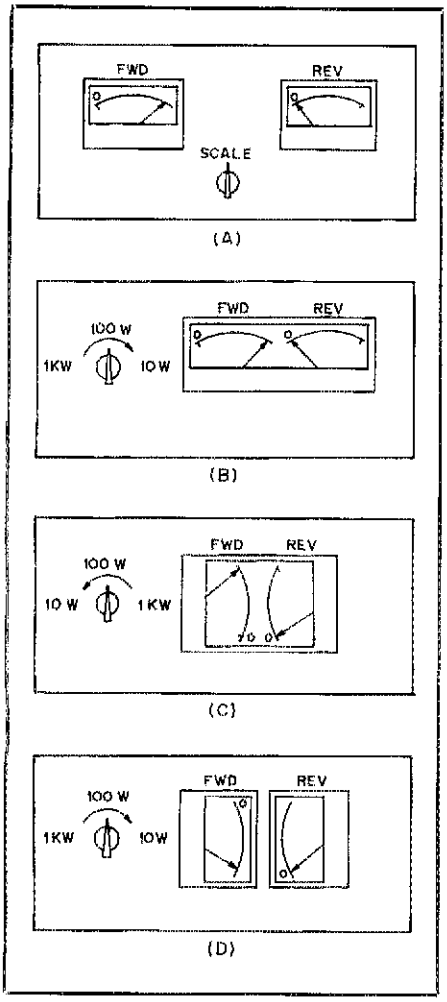


Fig. 2 — At A, a common arrangement of separate forward and reverse power indicators in an SWR instrument. The zeros at the left of each scale indicate the zero-current or resting position of the pointer. Note that a 1:1 SWR is indicated with the meter pointers as near to each other as possible. At B, the use of a small stereo-level meter allows the user to pay more attention to both pointers. The sensitivity pot permits FWD adjustment to full scale. At C, a vertical stereo meter makes meter pointers diverge. Common meters oriented as shown at D seem to make SWR adjustment more natural. Some users prefer this layout upside-down, as it then gives an agreeably positive (upward) deflection for a 1:1 SWR.

meter-pointer movement, but the closeness of the meters makes this less annoying.

Some stereo balance meters have vertical scales with bottom zero. The meter scales are close, but the desirable 1:1 SWR separates the meter pointers as far as possible (Fig. 2C). Reversing both sets of pot connections allows the FWD meter to rotate in the same direction as the pot shaft, but the REV meter moves (properly) in the opposite rotation but same direction (up or down).

Rotating the tops of a pair of conventional zero-left meters toward each other (Fig. 2D) seems to be the most acceptable arrangement. As tuning proceeds, the adjustment pot is rotated clockwise from its counterclockwise position and the FWD pointer follows it. The goal of tuning is to bring both pointers to the lower ends of their scales. Practically, the user seems to develop an urge to keep the pointers together. Pointer divergence resulting from tuning the antenna or matching network in the improper direction soon creates an irresistible sense of wrongness and encourages proper tuning. The foregoing are personal observations and opinions not necessarily supported by any psychological or statistical studies.* — *David T. Geiser, WA2ANU, ARRL TA, R.D. 2, Box 787, Snowden Hill Rd., New Hartford, NY 13413*

PORTABLE QUAD FOR 2 METERS, PART 2

☐ Since publication of my article on the portable quad[1] I have received letters from several readers who have built the antenna, and there appears to be room for improvement in the SWR characteristics. Unfortunately, when I built the antenna I did not have an SWR bridge suitable for use at vhf. Consequently, I relied on data from various publications (*The ARRL Antenna Book*, *The Radio Amateur's Handbook*, and the *World Radio News* article referenced in my article). These publications indicate that quad driven elements may be excited directly by RG-58/U coax (50-Ω

*Two useful references to the results of systematic human engineering design are *MIL-HDBK-759 Human Factors Engineering Design for Army Materiel* and *MIL-STD-1472B Human Engineering Design Criteria for Military Systems, Equipment and Facilities*. I do not represent that these references support the above note.

[1]Decesari, "A Portable Quad for 2 Meters," September 1980 *QST*, page 26.

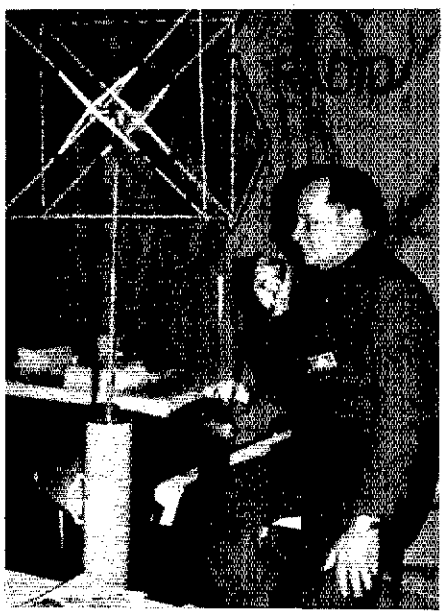


Fig. 4 — Irv Neitlich, N1ATS of Stamford, Connecticut, displays his portable 2-meter quad constructed from Decesari's *QST* article. (In the background is the ARRL booth at the Hudson Division Convention in South Fallsburg, New York.) Immediately after Irv completed the antenna, he fired up his 1-W hand-held and proceeded to access a repeater in Pennsylvania, 65 miles (105 km) away, across hilly and wooded terrain. (*Photo courtesy of K1TD*)

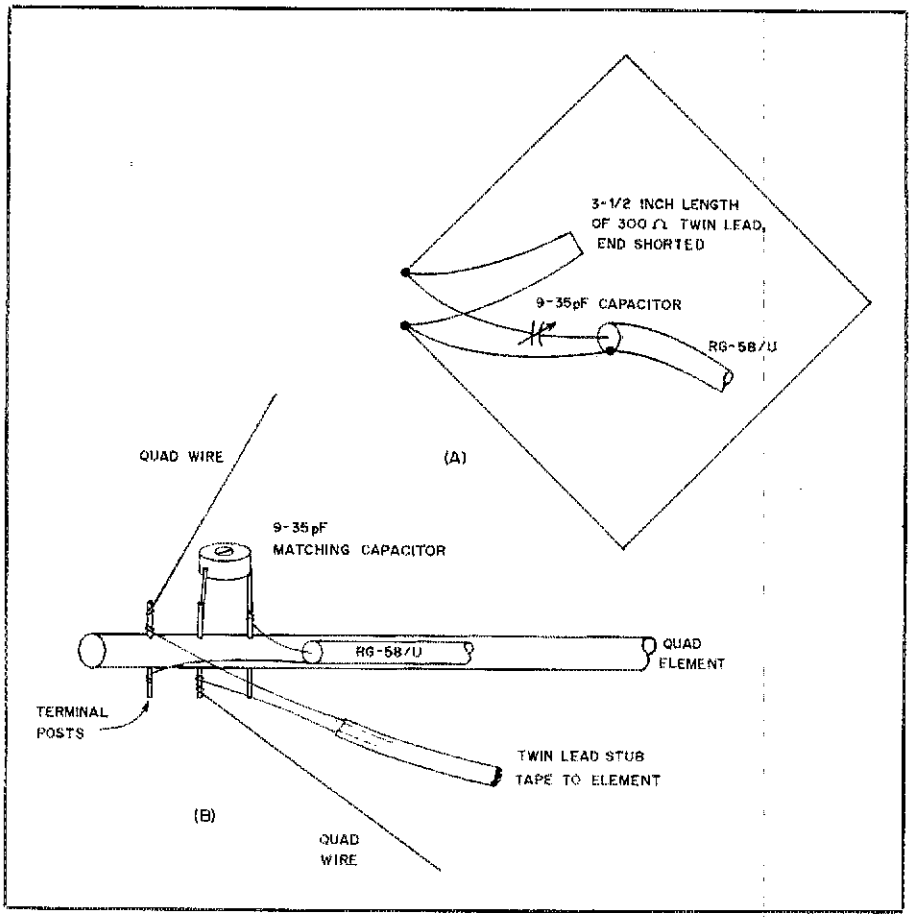


Fig. 3 — The electrical and mechanical modifications to improve the standing-wave ratio of the portable quad.

impedance), thereby implying that a satisfactory impedance match may be obtained. However, the quads built by various readers exhibited typical SWR values of about 3:1.

After receiving these reports, I investigated further. According to the 21st edition of the *Radio Handbook* by Bill Orr, W6SAI, the feed-point impedance of the basic quad loop is about 140 Ω. The value will change somewhat with the addition of a reflector or director element, but it is not really close to 50 Ω. This mismatch would account for the higher SWR readings with the original antenna design.

What is needed, therefore, is an impedance-matching device at the antenna feed point. A 3.5-inch (90-mm) length of 300-Ω twin-lead may be used as a stub and a 9- to 35-pF variable capacitor may be connected in series with the feed line. Fig. 3 illustrates the arrangement. The capacitor is adjusted for minimum SWR, typically 1.5:1 or better.

Mechanically, an additional mounting post is added to the quad element support to permit mounting and soldering the capacitor. The 300-Ω stub may be simply taped to the support, along with the coax line. Although the quad will work well as described in the article (see Fig. 4), improved electrical performance can be obtained by matching more closely. — *Bob Decesari, WA9GDZ/6, 3941 Mt. Brundage Ave., San Diego, CA 92111*

NONPOLARIZED CAPACITORS MADE EASILY

☐ Hams have always been a resourceful lot, often able to improvise and come up with good results. It is in this tradition that I offer the following information for obtaining otherwise hard-to-get values of nonpolarized capacitors, particularly in the tens or hundreds of microfarads range.

It is probably well known that you can make your own nonpolarized capacitors by connecting two equal values of electrolytics back to back, as shown in Fig. 5A. So long as both units maintain their electrical integrity, this is a fine solution. When C1 sees its correct polarity, it offers a low-impedance path to current, thus shunting C2 and preventing C2 from seeing otherwise potentially destructive values (pun intended) of wrong-polarity voltage. When alternating current is applied, the roles of the two capacitors are reversed on each half cycle.

Bear in mind that although this seems to be a parallel connection of capacitors, actually it is not. Current flows first in one, then in the other, so it is not a true parallel connection; the total effective capacitance is the same as that of an individual capacitor. Furthermore, as a rule of thumb, the ac working voltage should be kept below about 0.7 times the dc working voltage rating of the capacitor. For a 450-wVdc electrolytic, applications with 315 V ac should be the top limit. Also, because of the nature of electrolytics, do not operate them far below their rated voltage. For example, if your ac requirement is around 30 volts, don't use 450-V capacitors; select ones with a 50-wVdc rating.

Perhaps now comes a surprise. You can also "roll your own" nonpolarized capacitors by connecting two units in series. Again they work one at a time, so they are not series connected functionally, and the total capacitance is that of the individual unit. The previous remarks about voltage rating apply here as well.

Note the circuit of Fig. 5B. Considering terminal A to be positive, D1 blocks the path to the negative end of C2 while D2 conducts and shunts C2. Both actions protect C2, which otherwise is presented with reverse polarity every other half cycle. The opposite components do their thing on alternate half cycles.

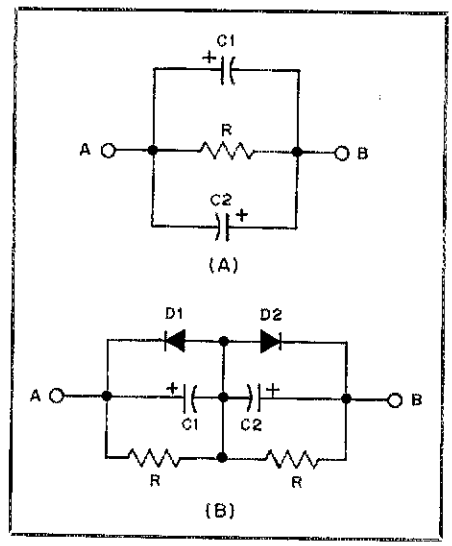


Fig. 5 — At A, a nonpolarized capacitor made by connecting two electrolytic capacitors back to back, and at B by connecting them in series. D1, D2 — Polarity-guarding diodes, silicon rectifier types suitable.
R — Bleeder resistor; 100 kΩ to 470 kΩ, depending upon the active potentials; 1- or 2-W rating.

Both circuits do the same job, but the circuit of Fig. 5B is attractive for two reasons. First, extra protection is afforded by the blocking and shunting diodes, and second, this circuit permits you to make use of electrolytics having a common negative lead — something not possible with the arrangement of Fig. 5A.

Bear in mind that if you use the metal-can electrolytics, the can is "hot" — so take due steps to insulate it or to stay clear of it. There is not such a problem with the tubular cardboard-enclosed capacitors with pigtail leads.

A practical application for these capacitors is in the typical antenna rotator, where a nonpolarized capacitor feeds the drive motor. If it loses capacitance, as all do eventually, the drive motor will not develop proper torque. Operation will be sluggish, or perhaps the rotator won't work at all in a really sad case. Rather than having to special-order a capacitor, you can make your own. — *A. W. (Bill) Edwards, K5CN/MM, Radio-Electronics Officer, R/V Knorr, Woods Hole Oceanographic Institute, Woods Hole, MA 02543*

MODIFICATIONS FOR THE PLESSEY IC RECEIVER

☐ In the April 1981 *QST* article, "Receiving with Plessey ICs," author DeMaw mentioned that an abnormal amount of 120-Hz hum was present in the receiver audio, as well as an age lockup problem in the presence of strong signals. These remarks were based on the performance of a receiver that I built in the ARRL lab. A recent letter from coauthor Chadwick suggested two circuit changes to correct these anomalies.

The hum may be reduced by removing the 270-kΩ resistor from pins 1 and 5 of the SL6310, and replacing it with a 150-kΩ resistor in series with a 120-kΩ resistor. The junction of the two resistors is bypassed with a 2.2-μF electrolytic capacitor to ground. In the original receiver circuit, a 100-μF electrolytic capacitor is connected from pin 12 of the SL6700 IC to ground (the capacitor was accidentally left out of the lab-built receiver and *QST* schematic). This capacitor should be replaced by one with a value of 4.7 to 20 μF to eliminate the age lockup problem. These modifications were tested in the ARRL lab, and receiver performance was exceptional with no noticeable hum or age lockup. — *Gerry Hull, AK4L, ARRL Hq.*

Feedback

☐ The May 1981 Product Review of the Kenwood TR-2400 2-meter transceiver incorrectly stated that 12 of the 16 keys of the keypad function as a Touch-Tone generator. Actually, all 16 keys (digits 0 through 9, *, #, and the standard A, B, C and D signaling tones) perform a particular Touch-Tone function.

☐ With reference to Royle's article, "SSTV in Colour," November 1980 *QST*, Tom V. Segalstad, LA4LN/W3, points out that the deck (those lines in large type beneath the title) and a photo caption are misleading. The wording implies that color SSTV is brand new, when in fact it has been around for years. Tom mentions that one of the earliest long-distance 2-way color SSTV contacts was made between LA2BK in Norway and LA2PH/MM in the China Sea south of Japan, a distance of 5000 miles (8000 km), on August 7, 1973. Monitoring of the received color picture involved the taking of a triple-exposure color photograph of a red, a green and a blue color frame as received and viewed on an ordinary black-and-white SSTV monitor. An appropriate color filter was placed in front of the camera lens for each exposure. Upon development of the color print, the image could be viewed in full color. The Royle article described the first long-distance 2-way color contacts monitored by electronic methods.

☐ In "Results — 1980 Simulated Emergency Test," April 1981 *QST*, the Southwest CW Traffic Net was listed incorrectly under Arkansas. The net should have been listed under Arizona/New Mexico. The ARES report for Rockdale and Newton Counties should have been included with the local activity report from Georgia, not Alabama. The adjusted totals for these two ARRL sections are Georgia — 560, Alabama — 2045.

☐ In "Results, 1980 ARRL November Sweepstakes," May 1981 *QST*, ABØS (plus KØWA), with a final score of 233,988, should have been listed as the top multioperator station on the phone portion of the Sweepstakes. ABØS should also have been listed as the phone multioperator winner in the Midwest Division.

☐ The call sign of Ray Dumas should have read WA1BPG instead of WB1BPG as listed in April 1981 *QST*, "Silent Keys."

☐ In the "W1AW Schedule" in April *QST*, page 94, UTC Slow Code Practice should read Sn: 0200 rather than S:0200.

Product Review

Conducted By Paul K. Pagel,* N1FB

Yaesu FT-707 Transceiver

Do good things still come in small packages? Well, with respect to the FT-707, that old saying could be considered noteworthy depending upon one's point of view — objective, subjective or a little bit of both.

Our review model arrived at Hq. in late October of 1980, just in time for this writer to bundle it up and carry it to Tortola, British Virgin Islands, for a two-week "hamcation" as VP2VGT. It was definitely the proper size for traveling by air after packing it into a portable electric typewriter case along with a keyer, paddle, microphone, antenna wire, coaxial cable and some hand tools. The parcel fit handily under the seat of the 727 jet. The power supply was carried in another suitcase and made the trip in the belly of the plane.

Long Bay Hotel on Tortola proved to be a good testing ground for the FT-707, because the temperature ranged from 75° F (24° C) at night to 95° F (35° C) in the daytime giving the internal cooling fan plenty of exercise whenever the heat sensor actuated it. The fan noise was minimal, but audible, and was considered acceptable in the interest of protecting the transistors in the power amplifier. Also the ac line voltage on the island ramped from as low as 95 to as high as 125 depending on the peak demand at various times of the day. The transceiver continued to operate properly, except for a drop in output power during periods of low line voltage. There were no noticeable effects from the salt air and high humidity respective to overall performance.

We didn't realize it when we left Connecticut, but that particular FT-707 did not contain a cw filter (an accessory). A fair amount of nail biting followed, since 90% of the operation was to be on cw! Fortunately, the FT-707 has an i-f width control, which varies the passband from approximately 300 Hz to 2.4 kHz. This feature made it possible to obtain sufficient selectivity for cw reception, and the problem was solved. It would have been much better, however, to have the 350- or 600-Hz accessory filter installed for enhanced skirt selectivity and ultimate rejection. Both filters are available from Yaesu — so is an i-f filter for a-m reception.

The only anomaly we observed during the two weeks of vigorous operation with the first unit (serial no. OFO20793) was VFO drift. From a cold start to approximately two hours later, the drift was roughly 1.5 kHz. It was gradual enough after the first 15 minutes to pose only minor problems. A second FT-707 (serial no. OJO80841) was obtained after we returned to the USA, and it drifted in a like manner. Scattered reports of substantial drift were also received from owners in the field. We checked this out with Yaesu, and were told that there was no case history problem with drift. We were sent a third review unit, and it drifted only 10 Hz (measured at the antenna jack, key down, 25 watts of output). The test period was one hour long. Close inspection of the VFO interior revealed no evidence of circuit changes or "customizing" of the third review unit. Perhaps the later FT-707s contain different compensating capacitors in the VFO, or the drifting units simply had defective capacitors.

The FT-707 receiver exhibited good dynamic range during the VP2VGT operation. There was no IMD or overloading evident from the strong Region 2 commercial stations to the south of us. Even more dramatic was the ability of the receiver to function satisfactorily when W8JUY/VP2VGW and the reviewer operated the same band (one on cw and the other on ssb). The two stations were only 30 ft (9.1 m) apart and the antennas were even closer. Of course, there were IMD products and hash in the receiver, but no cross-modulation or high-order desensing was noted.

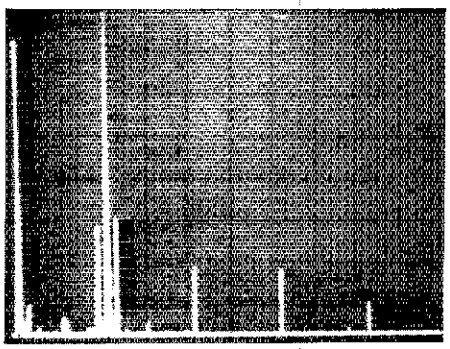


Fig. 1 — Worst-case spectral output of the Yaesu FT-707 operating at 10.1 MHz. Vertical divisions are each 10 dB. Horizontal divisions are each 5 MHz. Worst-case harmonic output is approximately 61 dB down from the fundamental. Worst spurious output is approximately 49 dB down from the fundamental. The Yaesu FT-707 complies with present FCC specifications for spectral purity. All measurements were taken in the ARRL lab.

FT-707 Features

The operating modes are ssb and cw, with a rating of 100 watts output. There is also an a-m mode, for which the output power is specified as 50 watts. Frequency readout is by means of a digital display, but analog readout is also provided.

The S meter uses a string of LEDs, illuminating left to right in accordance with the incoming signal strength. Green, yellow and red banks of lights indicate different regions of signal strength. We had fun giving out signal reports such as, "you're Q5 and S red." The LED "meter" also indicates relative power output and the alc level during ssb operation. There is a built-in speaker, noise blanker, RIT and crystal calibrator. The VOX controls are located on the front panel for easy access.

One can purchase the FP-707 ac-operated power supply as an accessory. It delivers 13.5 volts dc and has a built-in speaker. Another accessory is the synthesized outboard VFO (FV-707DM), which has 12 memory channels. The resolution is 10 Hz. When using the YM-35 mating microphone and FV-707DM synthesizer, the operator can shift the frequency up or down by means of QSY buttons on the microphone — ideal for mobile operation. Yaesu also sells an FC-707 mating Transmatch. The entire setup can be mounted in a special

*Assistant Technical Editor

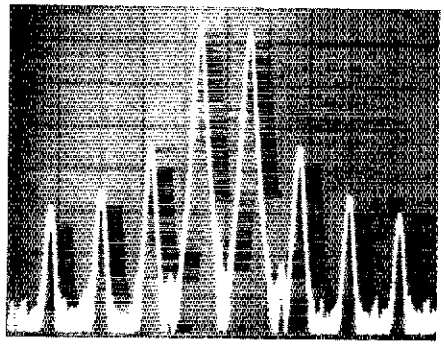


Fig. 2 — Spectral photograph of the two-tone, third-order transmitter IMD characteristics of the FT-707. Vertical divisions are each 10 dB; horizontal divisions are each 1 kHz. Third-order IMD products are down approximately 34 dB from the PEP level, and fifth-order products are down approximately 44 dB. Each tone is 6 dB below the PEP level.

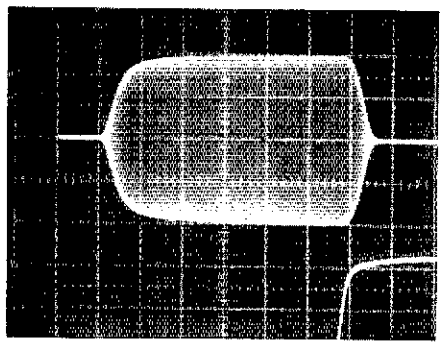


Fig. 3 — Cw keying waveform of the FT-707. The partially visible lower trace is the switching waveform at the key jack, and the upper trace is the output envelope. Output is generated approximately 5 ms after key closure. Good rise and fall times as indicated produce a clickless wave.

Yaesu FT-707 Transceiver Serial No. OJ100772

Manufacturer's Claimed Specifications	*ARRL Lab Measurements*
Frequency coverage: 80-10 meters, inclusive of WARC bands.	As specified plus approx. 60 kHz on low ends of bands and 10 kHz on high end of 80 m, 150 kHz or more on high end of remaining bands.
Readout: Analog and digital.	As specified.
Resolution: Analog — 1 kHz; digital — 100 Hz.	As specified.
KHz, one turn of knob: Not specified.	15
Backlash: Not specified.	Nil.
RIT/XIT range (kHz): ±3	−3 to +3.5
I-f width control: 300 Hz to 2.5 kHz.	As specified.
Receiver attenuator: None.	—
S-meter sensitivity (μv/S9): Not specified.	80 m — 30; 40 m — 27; 30 m — 27; 20 m — 40; 17 m — 45; 15 m — 45; 12 m — 45; 10 m — 71.
Receiver sensitivity: Ssb/cw — 0.25 μV for 10 dB S/N; a-m — 1.0 μV for 10 dB S/N.	Dynamic range measured with optional 600 Hz i-f filter installed.

	80 M	*20 M*
MDS (dBm):	−126	−127
Blocking DR (dB):	noise limited	noise limited
IMD DR (dB):	77 lo 76 hi	83 lo 80 hi
3rd-order input intercept (dBm):	−10.5 lo −12.0 hi	−1.5 lo −6.0 hi

Audio power output (4 ohms): 3 watts.	As specified. Quality good.
Power consumption: At 13.5 volts dc, 20 A (transmit) and 1.5 A (receive).	Not measured.
Transmitter power output (watts): Not specified. Input: 240 watts for ssb and cw; 80 watts a-m.	80 m — 135; 40 m — 120; 30 m — 120; 20 m — 120; 17 m — 120; 15 m — 120; 12 m — 125; 10 m — 125.
Spurious suppression: At least 50 dB.	Approximately 49 dB (see spectral photograph).
Harmonic suppression: Not specified.	>60 dB
Transmitter two-tone, 3rd-order IMD: At least −31 dB.	−34 dB. See spectral photograph.
Key-down limitation: 30 seconds with a 2-minute pause between key-down periods.	Not measured.
Frequency stability: 300-Hz drift over 30 minutes after 10-minute warm-up; then 100-Hz drift after 30-minute warm-up.	10-Hz drift from cold start to 1 hour later. Measured at antenna jack with transmitter key down, 25 watts output.
Size (HWD): 3-5/8 × 9-1/2 × 11-5/8 in. (93 × 240 × 295 mm).	As specified.
Weight: 15 lb (6.5 kg).	Not checked.
Color: Two-tone gray.	As specified.

mainframe that is available from the manufacturer.

Other Considerations

No mention of use with an external amplifier is found in the instruction book, and two letters to Yaesu inquiring about the use of outboard amplifiers elicited no response. There are no terminals available for actuating the T-R circuitry of an outboard amplifier. It appears, however, that the operator could connect an external 12-V relay in parallel with the FT-707 VOX/PTT relay for use in controlling a separate amplifier.

The three WARC-sanctioned amateur bands (10, 18 and 24 MHz) are included in the 80-through 10-meter coverage of this transceiver. *Warning: The U.S. Government has yet to authorize amateur use of these bands!*

The FT-707 appears to be an excellent unit for mobile operation and field use. It can serve nicely as a home-station transceiver as well, and should appeal particularly to those who favor compact equipment. — *Doug DeMaw, W1FB*

THE KLM KT-34XA TRIBAND YAGI ANTENNA

☐ When one thinks of the usual triband antenna, a vision of compactness and compromise generally comes to mind. Not so with the KLM KT-34XA. This antenna is a direct descendant of the KT-34A (a KT-34A to XA conversion kit is available for $225). For a triBander, the '34XA is big: It weighs 68 pounds (31 kg), has a longest element length of 24 feet 8 inches (7.5 m), a 3-inch (76-mm) diameter, 32-foot-long (9.6-m) boom (braced by means of overhead cables) and a projected wind surface area of 9 square feet (0.84 m^2). The turning radius is 21 feet 6 inches (6.5 m), and KLM rates the antenna at a 4-kW capability and a wind survivability of 100 mi/h (161 km/h). A full-sized, 10-meter element has been added as has another tri-resonant element. There are now six working elements on 10 meters and five elements on 15 and 20 meters. KLM suggests that suitable rotators may include the TR-44, Ham M types, HD and KR-400.

Assembly

If your usual plan for antenna erection is from box to tower in one day, forget it! It took about an hour to open and empty the single carton and check the contents against the parts list. There are *many* parts. Approximately 25 hours were required to bring the antenna to the

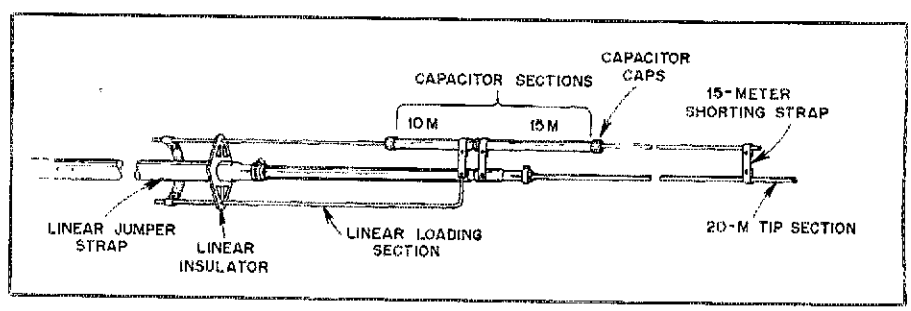


Fig. 4 — A tri-resonant section of the KT-34XA antenna. There are two of these sections in each of five elements. The sixth element is a separate 10-meter director.

point where it was ready for the final test. The excellent instructions include fully detailed drawings of each step of assembly. They are, without a doubt, the best instructions I've seen supplied with any antenna. There are no ambiguities, and it would be difficult to imagine anyone having a comprehension problem despite the antenna complexity.

The hardware is aluminum and stainless steel, with the exception of the cadmium-plated U bolts. This antenna is first class, from nuts to bolts.

The KT-34XA is fed by means of 50-ohm coax through a 4:1 balun (supplied). Transposed aluminum straps are used to drive the second and third elements from the rear, out of phase with respect to each other. The design permits full coverage of 15 and 20 meters and optimized 10-meter coverage from 28 to 29 MHz for the DXer. (Measurements at W1SE indicated the SWR rising only to 1.8:1 at 29.3 MHz.)

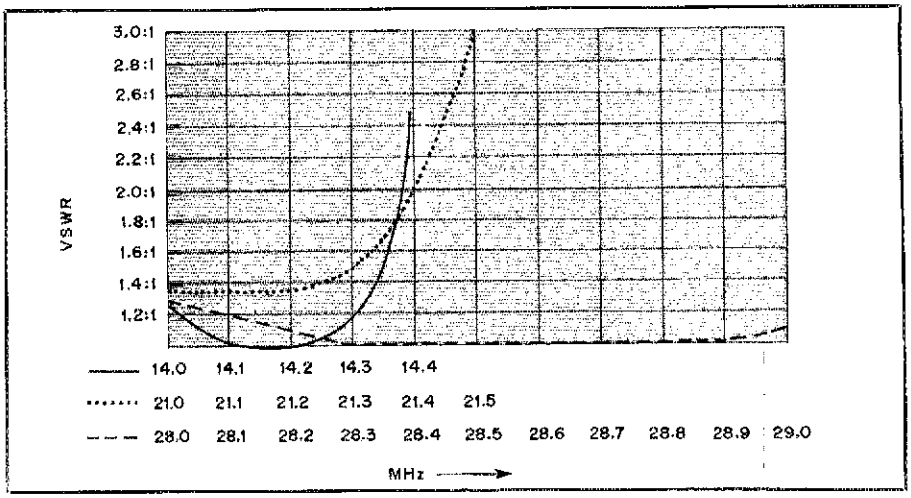


Fig. 5 — SWR curves of the KLM KT-34XA triband Yagi antenna.

Testing

After assembly, following the final test on a short mast, it was necessary for me to partially disassemble the right side of the elements and to remove the elements from the boom. (Marking element lengths and their position on the boom with an indelible marker is a great time saver.) Everything was then taken to the other side of a small brook, over which my tower folds. Here the boom was installed on the tower mast, and the left side of the elements were mated with the boom. The tower was then raised progressively to permit the installation of the right side of the elements. At the point where the top of the mast was approximately 13 feet above ground, the antenna was high enough to permit the insertion of the right-side element tips. Following this, the tower was brought erect, and the installation was complete. Depending on tower type, one could be faced with a different set of circumstances in the final mounting of antenna to tower. At W1SE, the antenna is 60 feet (18.3 m) above the earth.

The first SWR measurements were a disappointment. The SWR at the low end of each band was 2:1 or more. Discussion with KLM disclosed that they had made a change in the plastic material used to form the concentric tubing capacitors in each element. It turned out the plastics supplier had not given them all the information on the characteristics of the plastic. Subsequent changes that KLM made in the plastic material, after the design was "frozen," brought about changes in the resonant frequencies. Changes in the SWR resulted at the most desirable points. KLM did, however, recognize its responsibility to provide kits containing new plastic caps, several larger pieces of aluminum tubing and a new set of instructions and assembly measurements. The old plastic caps are black, while the new ones are off-white and UV resistant.

The antenna was subsequently removed from the tower, the tri-resonant sections disassembled, then reassembled with the new hardware, and the entire erection procedure repeated. Fortunately, this was all during the late summer and early fall; at least we beat the New England winter!

Results

The KT-34XA has now been in use for several months, and extensive operations have been conducted on each band. Operating "barefoot," this reviewer has been able to crack countless DX pileups, frequently with only a second or third call, on both ssb and cw. The number of responses to "first-time" calls has been very gratifying.

Repeated, careful observations at W1SE appear to indicate good gain, front-to-back and front-to-side ratios. Signals that arrive at a high angle will, of course, reduce these ratios. On those occasions, however, when the band is either just opening or closing and the angle of signal arrival is lowest, the ratios appear greatest, and the true performance of this antenna is realized. The KT-34XA triband Yagi antenna is manufactured by KLM, 17025 Laurel Rd., Morgan Hill, CA 95037. Price class: $570. — *Lee Aurick, W1SE*

ICOM IC-551 6-METER TRANSCEIVER

☐ Do you remember the excitement of working DX on the 50-MHz band back in cycle 19 or 20? During those days the standards of comparison were such rigs as the Drake TR-6 and the Heath SB-110. As the sun cranks down after a flurry of activity during the peak of cycle 21, many new DX achievements have been made on 6 meters, and no doubt the ICOM IC-551 played a role in helping vhf operators reach their goals. The size and complexity of the '551 make it light-years ahead of the older tube-type transceivers, yet costs less than, for example, the Drake TR-6 (relative to 1960s prices).

Compact, portable and versatile are the catchwords to describe this transceiver. Operating modes include ssb (both upper and lower sideband), cw, a-m and fm with an optional fm board installed. Frequency control is accomplished by means of two built-in digital PLL VFOs, sharing a common tuning dial. The VFOs may be selected separately, or each used

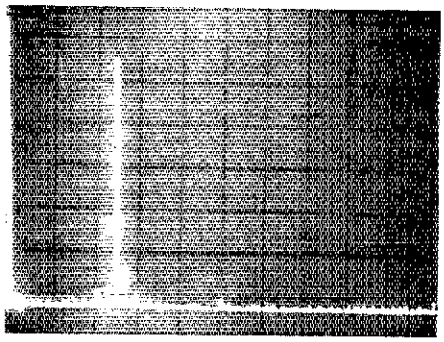


Fig. 6 — Worst-case harmonic and spurious output. At 10 watts output all spurious outputs are at least 63 dB down. Vertical scale is 10 dB per division. Horizontal scale is 20 MHz per division. The tall pip at the extreme left of the photo is the spectrum analyzer zero reference. The IC-551 complies with current FCC spectral purity requirements.

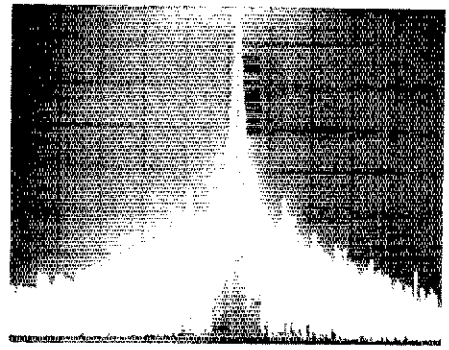


Fig. 8 — Single-tone, narrow-band spectrum of the IC-551. The excessive noise around the carrier is probably from noise generated in the synthesized local oscillator. Vertical scale is 10 dB per division. Horizontal scale is 2 kHz per division.

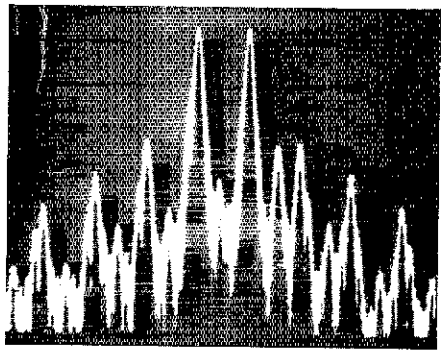


Fig. 7 — Two-tone, third-order IMD spectral photograph of the IC-551. Each tone is 6 dB below the rated PEP output. The test tones are 700 and 1900 Hz. Vertical scale is 10 dB per division. Horizontal scale is 1 kHz per division.

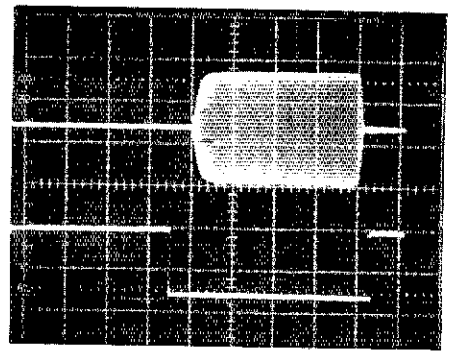


Fig. 9 — Rf envelope and switching waveform of the IC-551. Horizontal divisions are 5 ms. Rise time is approximately 1.5 ms and decay time 1.0 ms. There is 2.5 ms delay between key down and the start of the rf envelope. This waveform will produce key clicks.

ICOM IC-551 Transceiver Serial No. 01575

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 50-54 MHz.	As specified.
Modes of operation: Ssb/cw/a-m/fm	As specified.
Readout: 6 digit, fluorescent-blue digital display.	0.25-in. (6.4-mm) digits.
Resolution: 100 Hz on ssb, cw and a-m; 1 kHz on fm.	As specified.
KHz/turn of knob: Not specified.	On ssb, cw and a-m: selectable, 5 or 50; on fm: 50 or 500.
Backlash: Not specified.	Nil.
RIT range: ±1 kHz.	±1 kHz.
S-meter sensitivity (μV/S9): Not specified.	50.01 MHz, 3.9; 53.9 MHz, 3.
Receiver sensitivity: <0.5 μV for 10 dB S + N/N ratio.	Noise floor (MDS) dBm: −134 Blocking DR (dB): 108 Two-tone third-order IMD DR (dB), high (h) and low (l) products: 82(l), 81 (h). Third-order input intercept: −11 (l), −10 (h).
Audio power output (8 ohm load): More than 2 watts.	1.5 watts.
Power consumption: Receive: Dc — 1.1 A; Ac — 41 W Transmit: Dc — 3.3 A; ac — 98 W	Not measured.
Transmitter rf power output: ssb, cw, fm — 10 W, a-m 4 W.	Ssb, cw, fm — 11.4 W, a-m — 4 W.
Spurious suppression: Better than 60 dB.	63 dB.
Carrier suppression: Better than 40 dB.	Not measurable because of in-band noise.
Third-order IMD: Not specified.	−34 dB (see spectral photos).
Key-down time limitation: Not specified.	No excessive heating noted at 10 W output for 1 hour.
Frequency stability: < ±500 Hz for 60 min, <100 Hz per hour thereafter.	140-Hz drift from cold start to 1 hour later at 5-W cw output.
Size (HWD): 4.3 × 9.5 × 12 in. (111 × 241 × 311 mm).	
Weight: 13.4 lbs. (6.1 kg).	
Color: Black.	

as a transmit or receive "remote" for split operation. Popular frequencies may be programmed into three memories available to the user. The memories may be recalled by means of a front-panel switch, or monitored by means of a built-in scanning function. Scanning may also be used to search for signals contained in a specific frequency block. The user selects the frequency block by storing the upper and lower frequency limits in two of the three internal memories.

Other features include dual-speed tuning, an electronic dial lock (useful for mobile operation), fast or slow agc speed selection and RIT. Optional equipment included with the review unit was the VOX unit, the fm unit and the passband-tuning/rf-speech-processor unit.

Some Highlights

A unique feature of modern transceivers is the use of microcomputers to control the frequency selection circuitry and so forth. The IC-551 is no exception. It uses a microcomputer to control its two VFO circuits, the scan and memory functions, and the frequency display. The microcomputer in the radio is a dedicated device: in other words, the user can "program" it only by use of the front-panel controls.

The '551 is one of the first amateur transceivers to use a switch-mode power supply. A switch-mode power supply differs from the standard power supply in that it operates at a much higher frequency than the 60-Hz line. This allows the inductors in the supply to be very small, resulting in high efficiency.

I would suggest that the prospective or new owner sit down and read the instruction manual thoroughly before firing up the rig. Without reading it you will be able to operate the '551, but no doubt you will miss some of its unique functions.

Performance

On-the-air operation with the '551 was a pleasure, with a few exceptions. The receiver performed well in the presence of strong signals — WIAW is just 3/4 mile (1.2 km) from the reviewer's QTH — and the sensitivity was adequate except for the most demanding weak-signal work. (Jacks are provided for the addition of an external preamplifier.) There is no fixed attenuator in the receive line, but the rf gain control provided enough range for the signals encountered. When the review unit was first operated in the ssb mode, the transmitted audio reports received were very poor, and the passband tuning unit did not function properly. Tests in the ARRL lab confirmed that a problem existed. The unit was shipped to ICOM, and within a few weeks it was returned with defects corrected. According to ICOM, it had been misaligned and had a few bad components. Further checks with the unit operating in the SSB mode resulted in good audio reports being received, but distant stations could not see any signal improvement with the rf speech processor turned on. A-m operation can be quite difficult to use because the transmitted a-m is actually lower sideband with carrier (A3H), and during receive the unit is in the lower sideband SSB mode. This results in having to zero beat the received a-m carrier, but is a problem only if the a-m station is using older gear that tends to drift.

When using the '551 in the cw mode the operator may select either semi-break-in (VOX) or manual transmit/receive switching. The RF POWER control varies the cw output

power, which is useful for trying QRP operation. No cw filter is included with the unit, and there are no provisions for the addition of a filter. Nearby stations reported that the keying of the IC-551 sounded very hard and produced clicks in their receivers. Tests in the ARRL lab confirmed the reports. The keying waveform is shown in Fig. 9. When informed of the keying problem, ICOM America told us they would look into the problem, but we have, to date, received no circuit modifications.

One glitch was found in operation during memory scanning in the ssb mode. If two frequencies separated by more than 1.5 MHz (such as the 50.110- and 52.525-MHz ssb and fm calling frequencies) are loaded into memory and you wish to scan these frequencies, you may experience a problem. The frequency synthesizer randomly does not lock quickly when jumping over a large frequency range. The receiver then "cracks" audibly because of the excessive lock-up time, and this "crack" causes the squelch to open, halting the scanning. This can be quite annoying.

The optional fm unit worked well, and audio quality on both transmit and receive sounded very good. During fm operation the S meter serves a dual purpose — as a signal strength meter and as a zero-center discriminator meter.

Overall, I am pleased with what ICOM has done with such a small package. An optional i-f cw filter would have been nice. On this model ICOM left out the remote frequency-control provision, which makes computer interfacing difficult. Those amateurs who are just gaining an interest in the vhf bands, or old-timers looking for a new 50-MHz rig, should take a serious look at this piece of equipment — not just as a 6-meter radio, but as a tunable i-f for the higher frequency bands. The IC-551 is available from ICOM dealers throughout the U.S. and Canada. In the U.S., the manufacturer's address is: ICOM East, Inc., Suite 307, 3331 Towerwood Dr., Dallas, TX 75234. Price class: IC-551, $480; VOX unit, $55; fm adapter, $105; passband tuning and rf processor, $105. — *Gerry Hull, AK4L*

New Books

☐ *The Art of Electronics*, by P. Horowitz, W1HFA, and W. Hill, published by Cambridge University Press, 32 E. 57th St., New York, NY 10022. Hard-cover edition, 7-1/4 × 10 inches, 716 pages, $24.95.

Paul Horowitz is well known among amateurs for his expertise in circuit design: He developed an amateur-built cw keyboard keyer described in August 1965 *QST*. He is a professor of physics at Harvard University. His co-author, Winfield Hill, is president of Sea Data Corporation.

The authors have demonstrated clearly that a technical book does not need to be saturated with lofty terms, stilted narrative and "yard-long" equations in order to fit the measure of much of today's professional writing. *The Art of Electronics* gets immediately to the point in simple language for each subject treated. It contains the most lucid narrative that this reviewer has found in any similar professional volume in recent years. The presentation of theory and application is not unlike that in *The Radio Amateur's Handbook* (ARRL). In fact, this book would serve nicely as an extension of the *Handbook*. Furthermore, exercises, provided throughout the text, serve as a learning and testing aid. D. Larson of the University of Virginia said that the text of this book "succeeds in taking the student from very close to zero knowledge of electronics (or even electricity) to a point where he would be considered fully knowledgeable, and perhaps even an expert, by typical researchers in the physical sciences."

The book contains 14 chapters, 11 appendices and 44 tables. Chapter 1 covers *E*, *I* and *R*; signals; capacitors and ac circuits; inductors and transformers; impedance and reactance; diodes and other passive components. Chapter 2 deals with basic transistor circuits. Chapter 3 treats feedback and op amps. Active filters and oscillators are discussed in chapter 4. The list goes on and on as one advances through the book. For example, thorough discussions are given on the subjects of power circuits and regulators, FETs, low-noise techniques, digital electronics, digital interface to analog, microcomputers and electronic construction methods. In chapter 13 the authors address the subjects of high-speed and high-frequency techniques, while measurements and signal processing are covered in chapter 14. Each chapter subject has many subheadings and texts that deal with the many facets of overall chapter titles.

This book is highly recommended to amateurs who want to learn modern circuit techniques. It is also an excellent course book for those wishing to teach electronics. You may want this volume in your Amateur Radio library. — *Doug DeMaw, W1FB*

☐ *Seven Steps to Designing Your Own Ham Equipment*, by L. B. Cebik, W4RNL. Published by Howard W. Sams & Co., Inc., Indianapolis, Indiana. Soft cover, 6 × 9 inches, 218 pages plus index, $9.95.

In the last few years political pundits have been fond of saying that the most oppressed group in the United States is the middle class — the rich have no money worries and can afford to pay for anything that they might need, while the poor have no money and the government will take care of their needs. The middle class is left to fend for itself on an insufficient income. Of course, such a statement is a gross oversimplication; however, there is enough truth to it for it to have become a popular cliche.

An analogous situation exists in Amateur Radio. Electrical engineers already know the basics of design and need little help with it. The technically inept appliance operator lets the professional engineer supply all technical information and consideration for him. Heaven help the ambitious, enthusiastic hobbyist who is not a professional engineer but who does not wish to be relegated to the ranks of the appliance operator or perennial kit builder! It is to this audience that L. B. Cebik has addressed *Seven Steps to Designing Your Own Ham Equipment*.

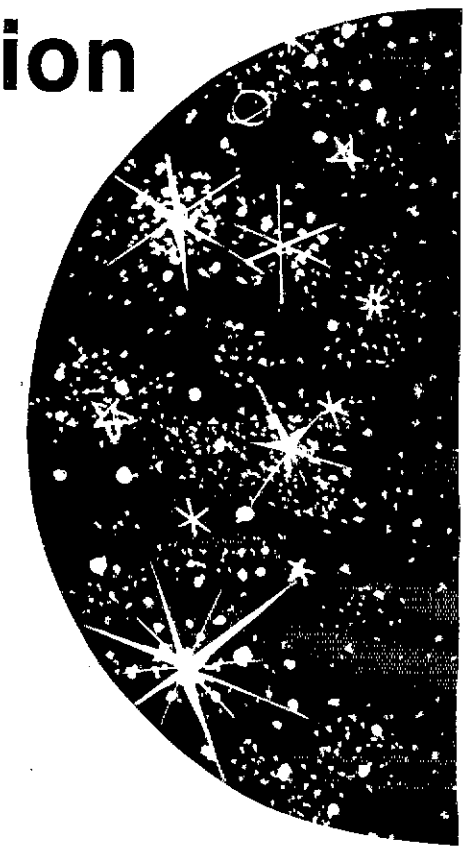
The main purpose of the book is to give the reader a practical *method of thinking* that will result in successful home-designed and -built equipment. This is a "how-to" book on developing a philosophy for dealing with a technical subject, as opposed to being a "how-to" book on a technical subject. Although the book is chock full of schematic diagrams of everything from simple audio oscillators to computers, it is unlikely that anyone would build a circuit from this book. The diagrams are there for instruction, not construction.

Cebik takes the reader from base zero through the final stages in logical, well-laid-out steps. Those beginning design work must first collect a large number of ideas and thoughts. Cebik shows how to go about doing so, but more importantly he shows how to organize and keep them so that the reader can get maximum use from them. The author has included a great deal of information designed to help the reader get maximum benefits from his limited time.

Once the information has been gathered, Cebik feels that the next step is setting goals for the particular piece to be designed. Logical, well-thought-out plans come next. What parameters are important in any given circuit? What aren't? How does one go about logically approaching the layout stage? What is the difference between a good layout and a bad one? Which building techniques will work best? What portion of the circuit should be built first? Why test? Why document? Cebik answers all these questions and more.

Some people (particularly theory-oriented engineers) may disagree with Cebik's seat-of-the-pants approach, but I have found it to be quite useful. I would recommend this book to anyone who wants to build and design, but who has been intimidated by the awesome complexity of modern electronic technology. The little guy in the middle asks, "How do you eat an elephant?" Cebik answers, "One bite at a time. Here is a knife and fork." — *Pete O'Dell, KB1N*

A Piece of the Action — The ARRL Foundation



The Foundation Board has recently steered toward enhanced support of the amateur space program and for scholarships in the spirit of the "advancement of Amateur Radio."

By Richard Palm,* K1CE

The focus on space centered recently not only at Cape Canaveral, but also at nearby Orlando, where the ARRL Foundation Board meeting was held March 13. Its theme, "Amateurs in Space," couldn't have been more timely, as preparations are now being made for the AMSAT-OSCAR Phase III-B project. The Foundation is rallying support for the amateur space program from hams wanting a piece of the action. Since the launch of the Foundation's Twentieth Anniversary Amateur Satellite Fund Drive,[1] thousands of dollars has been raised, showing how strongly amateurs feel about the future of satellites and the advancement of Amateur Radio. To be sure, we still have a long way to go to fulfill the goal of high-performance, long-range satellite communications. But when amateurs are involved, "where there's a will, there's a way."

Highlights

The Foundation Board directed the distribution of monies to the Radio Amateur Satellite Corporation (AMSAT) in support of their work in preparing the Phase III-B spacecraft, and to the WARC Preparation Fund for the defense of amateur frequency allocations worldwide.

New officers and directors were named: William G. Brown, K9LF, vice president; L. Phil Wicker, W4ACY, vice president; Edmond Metzger, W9PRN, director; Paul Grauer, WØFIR, director; and Jay Holladay, W6EJJ, director. Continuing as members of the Foundation Board are President Robert York Chapman, W1QV; Vice President John C. Sullivan, W1HHR; Secretary Andrea T. Parker, K1WLX; Treasurer F. George duPont, WA1SVY; Director John Sanders, WB4ANX; and Director Frank M. Butler, W4RH. There was discussion of several ongoing programs, including the YL ISSB Memorial Scholarship Fund and the Long Island Scholarship Fund. At the invitation of the Board of Directors, distinguished guests ARRL President Harry Dannals, W2HD, and ARRL Secretary and General Manager Richard L. Baldwin, W1RU, addressed the meeting.

What is the ARRL Foundation?

Established by the American Radio Relay League, the Foundation is chartered in the State of Connecticut as a nonprofit organization. Its affairs are governed by a Board of Directors of distinguished radio amateurs as a separate entity from the League.

A Foundation donation is a good way to put something back into a hobby that gives so much — fun, relaxation, competition and the spirit of fraternity. The ARRL Foundation is "for the advancement of Amateur Radio"; last year, in an inspiring message to the Foundation Board of Directors, President Dannals indicated his appreciation for the fine support ARRL/IARU received from the Foundation's WARC Fund.[2] The success at WARC-79 was made possible to a large extent by the WARC Fund and the outstanding support shown by ARRL members. Now that the ARRL Foundation has turned its energies toward the amateur space program, it's apparent that 1981 will be another banner year for Amateur Radio. Why not become a part of tomorrow's telecommunications world today — get a piece of the action! Send your contribution to the ARRL Foundation, 225 Main St., Newington, CT 06111.

*Assistant Secretary, ARRL Foundation

Notes

[1]See February 1981 *QST* p. 9.
[2]See March 1980 *QST*, p. 60.

MINUTES, THE 1981 ANNUAL MEETING BOARD OF DIRECTORS THE ARRL FOUNDATION, INCORPORATED March 13, 1981

1) Pursuant to due notice, the Board of Directors of the ARRL Foundation, Inc., met in annual session at the Howard Johnson's Florida Center Hotel, Orlando, Florida. The meeting was called to order at 9 A.M. with President Robert York Chapman, W1QV, in the Chair, and the following officers and directors present: Mr. John Sullivan, WIHHR, Vice President; Mrs. Andrea Parker, K1WLX, Secretary; Mr. F. George duPont, WA1SVY, Treasurer; Mr. Frank Butler, W4RH; Mr. Stan Zak, K2SJO (outgoing); Mr. L. Phil Wicker, W4ACY (retiring); Mr. Edmond Metzger, W9PRN (newly elected); Mr. Paul Grauer, W@HR (newly elected); Mr. Jay Holladay, W6LJI (newly elected). The Board noted, with regret, the absence of Mr. John Sanders, WB4ANX, because of other commitments.

In attendance, at the invitation of the Board, were Mr. Harry Dannals, W2HD, President, and Mr. Richard Baldwin, W1RU, Secretary and General Manager of the American Radio Relay League, Inc.

2) The agenda for the meeting as prepared by President Chapman was moved to be approved by Mr. Sullivan, seconded by Mr. Grauer and so VOTED.

3) The minutes of the January 19, 1980, Annual Meeting were approved as recorded.

4) President Chapman offered some remarks of welcome to the newly elected Directors and introduced them to the Board. Secretary Parker, experiencing her first Board meeting, was also introduced. Mr. Chapman extended wishes for a successful year, asking for action rather than words.

5) President Chapman called upon Mr. duPont for a Treasurer's report. Mr. duPont stated that for the fiscal year ending June 30, 1980, the Foundation balance sheets showed assets of $25,771.72 with accounts payable at that time of $529.10. For the fiscal year broken down; the total income was $60,863.50 ($8,676 in contributions, 1275 in interest and 912.50 in dividends). There were general expenses totaling $1642.00, office of the President $150.15, office of the Treasurer $46.87 and audit expenditures of $2000.00.

Distributions were made to AMSAT $3000 and for WARC Preparation $35,000, leaving a net undistributed income of $7040.18. Detailed accounting for the fiscal year ending June 30, 1980, are available in the *Audited Financial Statements of the ARRL Foundation* prepared by the firm Ernst & Whinney.

Mr Chapman stated that money was the business of the Foundation. He asked for a motion to accept the Treasurer's report as presented. Mr. Butler so moved, Mr. Sullivan seconded and the Board VOTED affirmative.

A brief explanation of restricted and unrestricted account differences followed. Mr. duPont stated that administrative expenses were allocated to specific accounts according to the activity of those accounts, rather than being weighted as a percentage of the number of dollars in the account. Mr. Chapman thanked Mr. duPont for his detailed report and explanations, particularly for the benefit of the new Board members.

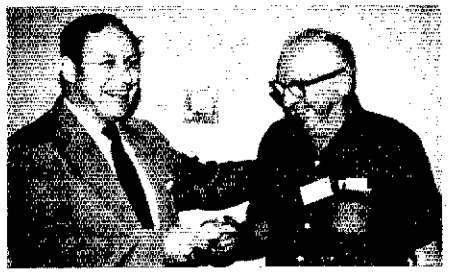
Mr. Chapman postponed the Secretary's report and the Audit Committee's report so that the committee would have an opportunity to refer to the Ernst & Whinney statements not previously provided to them.

6) The Investment Committee reported that the Foundation's assets are in the form of deposit certificates, savings accounts and marketable securities.

7) The Scholarship Committee reported that it has selected two recipients for the Long Island School Scholarships and that a third candidate under consideration would be contacted for additional application information.

8) Mr. Richard Baldwin, W1RU, reported for Mr. Rick Palm, whose presence in Orlando was not economically practical at this time. Mr. Baldwin commended Mr. Palm's thoroughness and efficiency with Foundation acknowledgments and correspondence and Mr. Mike Ziegler's attention as comptroller to detailed record keeping as examples of administrative support of the Foundation by the League staff. He cited a long history of IARU and CRRL cooperation in administrative efforts jointly undertaken and suggested establishing similar policy with the Foundation to allow the staff to proceed with the business of fund raising without the encumbrances resultant from the Foundation's apparent need to be involved in the detailed administrative editorializing. There was some discussion about the recent delays over the Life Member letter as indicative of the kinds of difficulties and encumbrances he referred to.

Mr. Chapman stated he would not take any action without Board approval. Mr. duPont recognized the common interests of everyone present, but that the Foundation, as a tax exempt organization, is a good vehicle to receive donations, large or small, but is not equipped necessarily to solicit them. He feels that the Board, as volunteers and widely separated geographically, cannot and should not concern itself with the details and mechanics of fund raising, but should simply commit itself to the reception of those funds. As administrators, we do not worry about how YL ISSB, for example, raises its scholarship money. We simply receive it from them and disburse it when requested to do so to the properly qualified recipient.



ARRL Foundation President Robert York Chapman, W1QV, right, receives a contribution from ARRL West Gulf Division Vice Director Thomas Comstock, N5TC, at the Foundation Board meeting in Orlando.

Mr. Sullivan and Mrs. Parker concurred, and Mr. Sullivan suggested that the executive committee should be charged with the responsibility of expeditiously advising the President as he deems necessary to secure Board approval on policy decisions.

9) In his brief remarks, Mr. Dannals commented that the dedication of everyone present is not contested. He stated that he stopped the Life Member mailing because of its lack of something he calls "pizzazz." Even though he is not entirely agreeable to all of Mr. Brown's (AMSAT) suggestions, a working relationship with him and his organization can certainly be developed. Mr. Dannals feels that the fewer decision processes there are, the better, and that fund raising from other ideas and sources should not be overlooked.

10) Mr. Wicker reported that the Audit Committee approved the financial statement as prepared by Ernst & Whinney, and Mr. Chapman proceeded to the agenda item calling for Election of Officers.

11) Moved by Mr. Sullivan, seconded by Mr. Holladay and others, the following Officers for the ARRL Foundation were VOTED upon: Mr. Robert York Chapman, W1QV, President; Mr. John C. Sullivan, WIHHR, Vice President; Mrs. Andrea T. Parker, K1WLX, Secretary; Mr. F. George duPont, WA1SVY, Treasurer. Moved by Mr. Sullivan that Mr. Metzger, Mr. Grauer, Mr. Sullivan and Mrs. Parker comprise the Executive Committee. Seconded by Mr. duPont and VOTED unanimously.

In accordance with Article III, Section 1 of the ARRL Foundation By-Laws, Mr. Sullivan nominated Mr. William G. Brown, K9LF, and Mr. L. Phil Wicker, W4ACY, as Vice Presidents of the ARRL Foundation. Seconded by Mr. Holladay and so VOTED unanimously.

12) Relative to earlier open discussion on fund raising and present Foundation programs during Mr. Baldwin's remarks, Mr. Sullivan moved: "That the Board authorize a fund-raising campaign for the amateur satellite program directed to Life Members. The implementation of the campaign shall be conducted by the staff of the ARRL."

The motion, seconded by Mr. Holladay and others, was VOTED unanimously. The meeting was then recessed shortly after 11 A.M. to be reconvened at 7 P.M.

President Chapman reconvened the evening session at 7 P.M. Present were Directors Sullivan, Grauer, duPont and Parker, with Director Metzger and Vice President Wicker arriving following the completion of the roll-call.

13) Action was taken on two motions prepared by Treasurer duPont. The first, prefaced by the action (12) in the morning session was moved, that the President of the Foundation appoint Director John Sullivan to act as liaison to monitor the progress of the fund-raising program and to report periodically to this Board. Seconded by Mr. Grauer and VOTED affirmatively. Secondly, Mr. duPont moved that the Treasurer be authorized to make distributions from the Long Island School Scholarship Fund, not to exceed a total of $1000, to be applied to the awards presently under consideration by the Long Island School Scholarship selection committee. Seconded by Mr. Sullivan and VOTED in the affirmative.

14) Mr. Chapman asked at this time for a report from the Secretary. Mrs. Parker stated that she'd handled correspondence for contributions in excess of $100 requiring the President's tailored acknowledgements. She has prepared Bulletins relative to working committee meetings held periodically at Newington and has distributed ballots soliciting approval of Board action as necessary. For instance, the establishment of the YL ISSB Memorial Scholarship Fund, the recent letter to Life Members and other balloting as has been required throughout the year to carry out the business of the Foundation. The working committee helped the President draw up the editorial which appeared in February *QST*, which has apparently been very well received.

15) There were no questions, and the Secretary's report was accepted as read. Mr. Chapman proceeded to make the following APPOINTMENTS for 1981 to the ARRL Foundation Committees: Audit Committee — Vice President L. Phil Wicker, Director Paul Grauer; ARRL Board Liaison — Vice President John Sullivan; Amateur Radio Satellite Service Liaison — Director Jay Holladay; Scholarship Committee — Director Andrea Parker, Chairman; Vice President L. Phil Wicker, Director Frank Butler; Fund Raising Advisor — Vice President W. G. Brown; Long Range Planning Committee — Director F. G. duPont, Chairman, Director Paul Grauer, Director John Sanders, Director Edmond Metzger.

16) Mr. duPont moved that the 1982 Annual Meeting shall be held at ARRL Hq. in Newington, Connecticut, on or about the third Thursday in January, 1982. Seconded by Mr. Sullivan and VOTED affirmatively.

17) Mr. DuPont moved that the Executive Committee of the ARRL Foundation shall meet in relationship to scheduled ARRL Executive meeting when meeting in Newington, Connecticut. Seconded by Mr. Grauer and so VOTED.

18) President Chapman invited adjournment of the meeting at 7:12 P.M. and introduced Mr. William Brown; K9LF, and Dr. Tom Clark, W3IWI, of AMSAT to the Board. A summary of their presentation follows.

Mr. Brown offered that fund raising simply involves very hard work and entrusting such efforts to the League staff would alleviate the difficulties in dealing with widespread volunteers. AMSAT proposes two campaigns. One is the Life Member mailing and the other he calls a tee-shirt campaign. Either or both could be done under the auspices of the Foundation, the League or AMSAT. He recommends a four-page informational letter on ARRL stationery over Mr. Dannals' signature with a questionnaire, a proven fund raising gimmick, included. The idea of a sweepstakes was suggested. An incentive for submitting a questionnaire will almost always induce people to include a contribution.

Mr. Brown discussed AMSAT's preliminary tee-shirt design and the economics of such a campaign. He feels that 10 or 15,000 tee shirts could realistically "sell" for a $10 donation. He proposes unveiling the tee-shirt campaign at Dayton.

Dr. Clark commented on the proven track record of a tee-shirt campaign. Oriented toward the younger set, tee shirts appeal over a long term, concomitant with the longevity of satellite experimentation and development of communications over several decades.

Both men reported briefly on AMSAT's involvement with Joe Sugarman, W9IQO, a renowned success in mail-order gadgetry, in a separate campaign offering prints. Mr. Sugarman's marketing enthusiasm and success have contributed heavily to the direction of AMSAT's fund-raising rationale.

Mr. Brown asked about acknowledgment procedures and suggestions regarding identifying and approaching affluent amateurs for contributions. Mr. duPont commented that both acknowledgment details and donor history were the province of a development director rather than that of a feature writer on the ARRL staff or a volunteer Board of Directors. Mr. Chapman suggested that the same question be directed to ARRL Board members, that possibly in confidence, of course, some names of affluent hams in various divisions could be ascertained.

Mr. Chapman explained again that the Foundation is a vehicle to handle and distribute funds, but not an organization equipped to actively engage in fund-raising efforts. Mr. duPont remarked that the tax-exempt status of the Foundation dictates particular caution in engaging in any fund-raising effort involving merchandise. He further explained the Foundation's position on distinguishing between funds for the satellite program and funds specified for AMSAT by the donor. He touched on the mechanics of matching-fund allocations. Both he and Mr. Chapman emphasized the specifics of written application to the Foundation before the distribution of any funds is made.

Respectfully submitted,

Andrea T. Parker, K1WLX
Secretary-Director

Computerized Contest Duplicate Checking

Looking for the perfect logger for your Field Day and contest operations? This "computer duper" makes any applicant a winner!

By Paul Zander,* AA6PZ

One of the least exciting but most essential aspects of a successful contest operation is keeping a cross-check list. Without it, valuable time is wasted calling stations that have already been worked. After the contest is over, more time is needed to weed out the duplicate contacts from the log before the final score can be determined.

At the Foothills Amateur Radio Society, K6YA, the annual ARRL Field Day Contest is a very important activity. In past years we have used the ARRL Op-Aid 6 cross-check list, or modified versions. All of these forms had rows numbered 1, 2, 3, etc.; and columns labeled A, B, C, etc. K6YA, for example, was entered by finding row 6, column Y and writing "A." The entry was distinguished from W6YA by an underline. WA calls were circled, and WB calls were double underlined.

This cross-check sheet wasn't too bad, once you got the hang of it. Just the same, it took a good logger to keep the list up-to-date and to advise the operator of duplicate calls. We usually found that some calls had not been entered correctly, and there were 100 to 200 duplicate contacts to cross out before submitting the final score.

The growing numbers of K, N, A and other prefixes have made logging more complicated, thus necessitating a new cross-check system. For the 1978 Field Day, we tried an oversized cross-check sheet with room to write in the entire call. Unfortunately, this sheet was so big that it took up most of the operating table. In some instances, a second logger took the cross-check sheet and sat outside the doorway of the trailer where there was more room.

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Jean Holter, WB6LSN, keeps the Field Day log with the assistance of the HP9825A desktop computer while Bob Van Geen, WB6SHD, operates 20-meter cw. *(photo courtesy Paul Zander, AA6PZ)*

The 1979 Field Day brought a new dimension to the cross-check list and smiles to the loggers. A Hewlett-Packard Model 9825A desktop computer was set up next to each of the four operating positions. The logger merely had to type the call sign he was receiving into the computer, and it informed him instantly whether it was a new or duplicate call. Then, if it had been a new call, the computer was programmed to ask the logger if the contact had been completed so the call could be recorded in the memory. Call signs of stations worked were also printed on a paper strip and recorded on the magnetic data cartridge.

In most respects, the 1979 effort was a typical Field Day. For 24 hours we worked pileups, and even started some of our own. We adjusted antennas in the dark and tried not to trip over guy wires in the cold San Francisco fog. Operators who didn't know how to type had their first hands-on computer experience in the middle of the night. The dawn broke, and we chased cows out of our end of the pasture. Finally, the FD chairman signaled the end of Field Day by switching off the generator. Over 3500 QSOs had been made and recorded — it was well worth the effort.

The real value of the computer was proven afterward. While comparing the computer printout with the hand-written

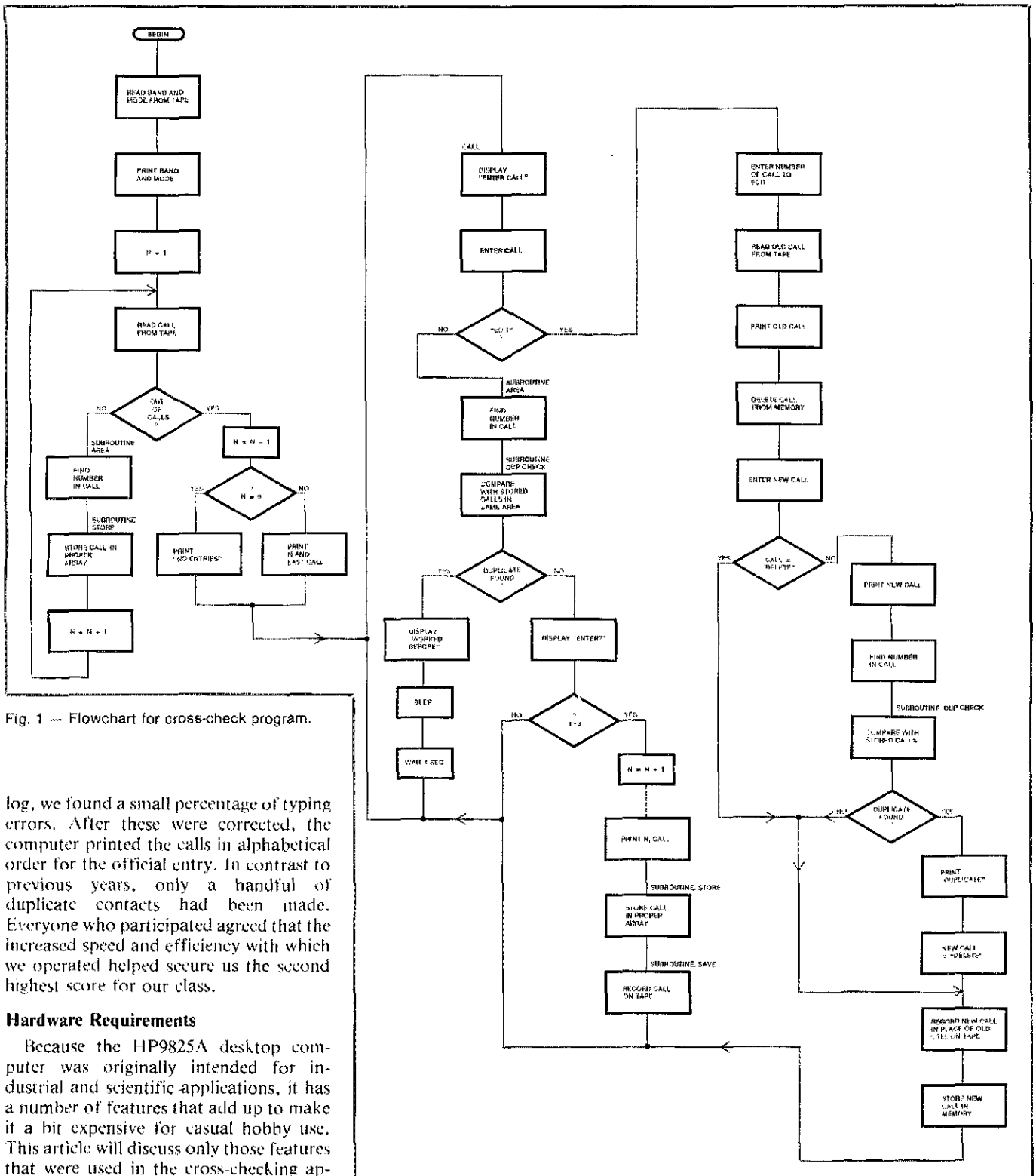


Fig. 1 — Flowchart for cross-check program.

log, we found a small percentage of typing errors. After these were corrected, the computer printed the calls in alphabetical order for the official entry. In contrast to previous years, only a handful of duplicate contacts had been made. Everyone who participated agreed that the increased speed and efficiency with which we operated helped secure us the second highest score for our class.

Hardware Requirements

Because the HP9825A desktop computer was originally intended for industrial and scientific applications, it has a number of features that add up to make it a bit expensive for casual hobby use. This article will discuss only those features that were used in the cross-checking application, representing items to consider if you are shopping for a computer for similar purposes or adapting your own.

In the HP9825A, the operating system occupies roughly 34 k bytes of ROM.[1] There are also almost 24 k bytes of RAM that can be divided between the user program and data storage. The cross-check program occupies just over 4 k bytes, which leaves the rest for storing over 2000 call signs. The computer has a built-in, 16-column thermal printer that is used to list calls as they are entered. A magnetic-tape data-cartridge drive, also built-in, stores the program and prevents calls from being lost in the event of an unplanned power interruption. The tape drive can automatically advance and rewind the tape to find or record files without manual interruption. All of these built-in features make the HP9825A very convenient and trouble free to set up.

Of greater importance, the HP9825A performed without a hint of RFI. Not one of the four transmitters interfered at all with the computers; the computers, in turn, didn't radiate any hash that bothered the receivers.

Operation

The program, as may be seen in the

[1]Notes appear on page 51.

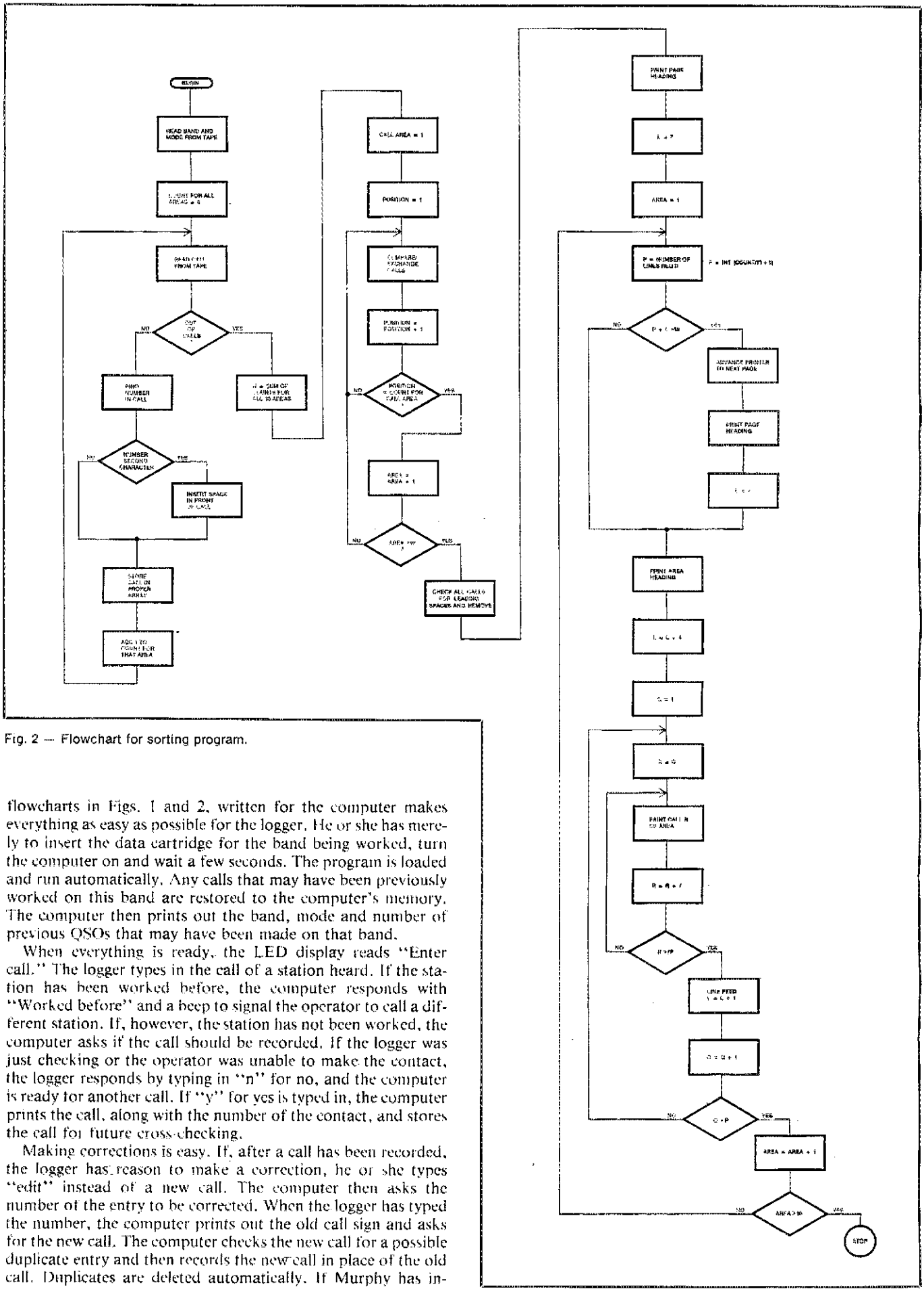


Fig. 2 — Flowchart for sorting program.

flowcharts in Figs. 1 and 2, written for the computer makes everything as easy as possible for the logger. He or she has merely to insert the data cartridge for the band being worked, turn the computer on and wait a few seconds. The program is loaded and run automatically. Any calls that may have been previously worked on this band are restored to the computer's memory. The computer then prints out the band, mode and number of previous QSOs that may have been made on that band.

When everything is ready, the LED display reads "Enter call." The logger types in the call of a station heard. If the station has been worked before, the computer responds with "Worked before" and a beep to signal the operator to call a different station. If, however, the station has not been worked, the computer asks if the call should be recorded. If the logger was just checking or the operator was unable to make the contact, the logger responds by typing in "n" for no, and the computer is ready for another call. If "y" for yes is typed in, the computer prints the call, along with the number of the contact, and stores the call for future cross-checking.

Making corrections is easy. If, after a call has been recorded, the logger has reason to make a correction, he or she types "edit" instead of a new call. The computer then asks the number of the entry to be corrected. When the logger has typed the number, the computer prints out the old call sign and asks for the new call. The computer checks the new call for a possible duplicate entry and then records the new call in place of the old call. Duplicates are deleted automatically. If Murphy has in-

tervened and the QSO was not completed after the call has been recorded, the logger calls the editor as above but enters "delete" as the new call.

The HP9825A not only offers the hardware convenience of performance comparable to a minicomputer in a small portable package, but also the software convenience of a programming language that combines the best features of Algol, BASIC and Fortran. Unfortunately, HPL, as this new language is called, is not widely available for other computers.[2]

The Cross-check Program

In the cross-check program, 10 string arrays are used to store call signs. For example, string array B$ may allow 200 strings of six characters each and be used to store "1" area calls. Similarly, string array C$ could be used for "2" area calls, and so on to K$ for "Ø" area calls. Some call areas are allocated more entries than others. This is because we usually work more 8s, 9s and Øs than 1s or 2s. If you live in a different area, you may want to change the array sizes. Another array is used to keep track of the number of entries in each call area. It would have been easier not to separate the calls into different arrays. The advantage of the approach used is that the computer needs only to check a portion of the calls to find a duplicate. Toward the end of the contest, the computer will take just a fraction of a second instead of up to 6 seconds with the simpler approach of not separating the calls.

While operating in the contest, each time the program receives an input several checks are performed to make sure that the input is a reasonable one. If the input is not reasonable, the program will still not crash. For example, even though a correct call sign will not be more than six characters long, the input goes into a string that is dimensioned for 10 characters. If the input string were only dimensioned for six characters and the logger accidentally types seven, then the computer would respond with an error message number and the logger would be distracted from the real problem at hand — making contacts!

Another example is in the edit routine. Even though the computer asks for the number to edit, the logger could slip and accidentally type a call sign. The input goes into a string, however, and if the string contains one of the correct numbers, the computer proceeds. But, if it is not a number or it contains letters, the computer repeats the request for a number.

The last area of the cross-check program to be discussed is the magnetic-tape storage. Before the contest, a set of data tapes is prepared. First the computer divides each tape into a number of files. Next the cross-check program is recorded in the first file. Then the program is run so that the band and mode can be recorded in the second file. The remaining files on each tape are used to record call signs during the contest.

In the not-unexpected event of a power failure, the computer will automatically rewind the tape, load the program and proceed to read the previously recorded calls from the tape back into the computer memory. To increase the speed of restoring the computer memory, 10 calls can be read at the same time. Then the string is taken apart into 6 character pieces to restore the individual calls. This process continues until all the calls have been read back into the computer.

Sorting Program

After the contest is over and all of the antennas have been taken down, the computer's work is still not done. Although the primary purpose of recording the calls on tape was to prevent a loss of data because of a power failure during the contest, the computer can also be used to prepare the contest report. The sorting program reads the tape and prints out, in alphabetical order, a list of the stations worked.

The computer routine for reading the calls from the data tape is the same, with one exception, as that used at the beginning of the cross-check program. Before the individual calls are stored in the proper array, those calls having the number as the second character are shifted one space to the right, and a blank is inserted in front. Now all calls appear to the computer to have the number as the third character. The "sort" routine can then put the calls in alphabetical order by suffix without the confusion caused by different types of calls.

The actual "sort" routine is referred to by computer programmers as a "bubble sort" because the calls that should be first will "float" to the top of the list.[3] The computer starts with the first call of the first array and compares the last three letters with the last three letters of the second call. If the second call should be first, the two calls are switched. Next the computer compares the first and third calls, then the first and fourth calls and so on, switching the positions of the two calls as needed. By the time it has compared the first and last calls in the array, the computer has definitely found the first call. Then it starts over comparing the second call with all of the others. Last, when it has sorted one array, it repeats the process with the next array until all 10 call signs have been sorted.

The calls have now been sorted by call-number area and by suffix within each area. No attempt is made to sort calls by prefix. During Field Day, it is not common to find many calls with everything identical except the prefix. In a DX contest, a prefix sort would be more desirable. It would take a sophisticated program, however, to put all of the AA, AB, K, N and W calls in one country, but divide the UM8s from the UH8s into two separate countries.

The final part of the program is the printout of the calls. When writing the program, several false starts were made before we found a format that was agreeable to everyone in our club. The first version simply printed the calls in a column of the built-in printer. A list of over 3500 calls is very long! Fortunately, an 80-column line printer was available. We decided that the calls should be in several columns with the calls in order reading down the columns. First the computer has to remove the blank spaces inserted in front of some calls before the "sort" routine. Then the number of lines required for each call area is calculated based on seven calls in a line. The computer selects the calls for each line and prints the line. Since a line printer cannot roll the paper up and down like a manual typewriter, the calls are not actually printed in alphabetical order, but the completed printout reads in alphabetical order. The actual program is further enhanced by provisions that divide the printout into 11-inch pages with headings on each page.

Most of the refinements we thought of during and after Field Day have been incorporated in the programs described here. Everyone who has watched it operate is enthusiastic about the computer. The next challenge is to program one to do the complete log keeping. This will not be easy considering poor typing skills and the imprecise and disorderly sequences of contest exchanges. We'll keep trying, nevertheless, and hope to hear you on the air next Field Day!

Notes

[1] See Rinaldo, "Amateur Radio in the Computer Age," *QST*, Sept. 1979, p. 51.

[2] Copies of the complete HPL program or a BASIC version, as supplied by the author, are available from ARRL Hq. Label the envelope "HPL" or "BASIC" and enclose an s.a.s.e. and $1 to cover duplication costs. ARRL Hq. in no way warrants this offer.

[3] Since writing this program, I have found many other sorting routines that use substantially less computer time than "bubble sort"; one example is an "insertion sort." As the calls are read in from the tape, put them into the array in alphabetical order. This, of course, means finding the proper place for each call and moving some of the previously entered calls to make room.

References

Knuth, *The Art of Computer Programming*, Sorting and Searching, Vol. 3. Reading, MA: Addison-Wesley, 1973.

Standish, *Data Structure Techniques*. Reading, MA: Addison-Wesley, 1980.

Wirth, *Algorithms + Data Structure = Programs*, Englewood Cliffs, NJ: Prentice Hall, 1976.

Paul Zander, AA6PZ, has been licensed since 1963 and has participated in every Field Day since 1965. A design engineer (he holds BSEE and MS degrees), Paul works on spectrum analyzers, signal generators and synthesizers. The author has written several articles for Amateur Radio publications and spends much of his hobby-related time tinkering.

Moved and Seconded

MINUTES OF EXECUTIVE COMMITTEE
MEETING NO. 386
March 10, 1981

Pursuant to due notice, the Executive Committee of the American Radio Relay League, Inc., met at 3:02 P.M. EST, March 10, 1981, at the Howard Johnson's Hotel, Florida Center, Orlando, Florida. Present were Harry J. Dannals, W2HD, in the Chair; First Vice President Carl L. Smith, WØBWJ; Directors Gar Anderson, KØGA, William J. Stevens, W6ZM, and Stan Zak, K2SJO; and General Manager Richard L. Baldwin, W1RU. Representing the General Counsel's office was Chris Imlay, N3AKD. Also present as observers were Vice Presidents Larry E. Price, W4RA, and Noel B. Eaton, VE3CJ; Directors Jesse Bieberman, W3KT, Paul Grauer, WØPIR, Jay Holladay, W6EJJ, Mary Lewis, W7QGP, Edmond Metzger, W9PRN, Gay Milius, W4UG, Leonard Nathanson, W8RC, Lionel Oubre, K5DPG, and Mitch Powell, VE3OT; Vice Directors Linda Ferdinand, N2YL, Evelyn Gauzens, W4WYR, John Kanode, N4MM, O. D. Keaton, WA4GLS, Peter Matthews, WB6UIA, Marshall Quat, AGØX, and Hugh Turnbull, W3ABC; Honorary Vice President Charles Compton, WØBUO; Associate Counsel for Canada B. Robert Benson, QC, VE2VW; Communications Manager John Lindholm, W1XX; and Washington Area Coordinator Perry F. Williams, W1UED.

On motion of Mr. Anderson, the affiliation of the following clubs was approved: Kennebec Valley Amateur Radio Club, Augusta, Maine; Radio Club of the Electrical Engineering Dept. University of PR, Mayaguez, Puerto Rico; Redwood Empire DX Association, Novato, California; Salisbury School Amateur Radio Club, Salisbury, Connecticut; Sun City Center Amateur Radio Club, Sun City Center, Florida; Winn Amateur Radio Club, Winnfield, Louisiana; Benicia Amateur Radio Club, Benicia, California.

On motion of Mr. Zak, approval was granted for the holding of the following ARRL Convention: Nebraska State, March 27-28, 1982, Kearney, Nebraska.

The Committee then proceeded to review the status of several matters of litigation involving radio amateurs.

Mr. Imlay reviewed the Jellinek case (K2AHL), and the difficulty that the League has had in getting any response from Mr. Jellinek and/or his attorney, despite a number of attempts. The Committee approved the text of a draft letter to Mr. Jellinek, and directed that a copy of this letter also be sent to others who had written ARRL Hq. to comment on the case.

Canadian Associate Counsel Benson reviewed the so-called Mississauga case, in which local authorities have found an amateur in contravention of an anti-noise ordinance, by reason of RFI in stereo equipment. The case is now under appeal.

Mr. Imlay reviewed the status of the Karagozian case and the request for additional funding from ARRL by Attorney Lawson. After extended discussion of the merits of the case and the funding that has been supplied by ARRL to date, on motion of Mr. Stevens the Committee directed the General Manager to forward Attorney Lawson an additional $5000 together with a request that the accounting of the several West Coast cases be more clearly defined.

Director Grauer reported briefly on the progress of preparations for the ARRL National Convention at Cedar Rapids in July 1982. Mr. Zak expressed the continuing concern of the Executive Committee that proposed programs are not being submitted in time for proper review by the Executive Committee. Mr. Zak emphasized that such program material must be submitted 30 days in advance.

Director Anderson reported briefly on activities of the Interference Task Force, and indicated that a more complete report would be provided at the Board meeting.

Mr. Dannals reviewed correspondence relating to 7-MHz phone received from a David Wilner, and suggested that at the informal meeting of the Board on Tuesday evening this might be a topic for further discussion.

During the course of the above discussions, Honorary Vice President Victor C. Clark, W4KFC, and Foundation President Robert York Chapman, W1QV, entered the meeting at 4:27 P.M. and Director Butler at 4:31 P.M. Mr. Butler reported briefly on National Convention schedules for the weekend.

There being no further business, the meeting was adjourned at 4:34 P.M.

Respectfully submitted,
Richard L. Baldwin, W1RU
Secretary

Silent Keys

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

K1AAQ, William F. Eglit, Madison, NH
W1DOW, Carl E. Gustafson, Bristol, CT
W1DQA, Connie J. Malinowski, South Deerfield, MA
W1ID, William J. Pace, Middlebury, CT
W1IVK, Chester A. Balicki, Springfield, MA
W1IXC, Evart J. Whitten, Lincoln, ME
W1JYQ, George W. Whitney, Stamford, CT
W1LRZ, William Truland, Lisbon Falls, ME
W1MOK, Myles W. Brennan, Chicopee, MA
K1QIW, Howard W. MacDonald, Hanson, MA
W1PRE, Paul G. Hescock, Brattleboro, VT
W1QGN, Frederick C. Milton, Revere, MA
K1UNM, Ernest H. Scothorne, Naples, ME
KA2AOW, Arthur F. Galan, Ottsville, PA
W2BYY, John F. Brandt, Rochester, NY
W2CSQ, John A. Daniel, Teaneck, NJ
W2DHB, James A. Richards, Huntington, NY
WA2FYZ, George A. Schreiner, Troy, NY
W2HZS, Robinson Woodward, Middletown, NJ
ex-W2MQZ, Elmer R. Burgmaster, Mineola, NY
W2PEZ, Gerald Skudera, Bloomingdale, NJ
WA2RAU, Dr. Sam Rosen, New Rochelle, NY
KA3CPU, Oscar L. Shurwin, Erie, PA
WB3FCT, Edward A. Souza, Baltimore, MD
W3GCI, R. Barlowe Smith, Lewisburg, PA
WB3GOA, Frank J. Shamis, Clifton Heights, PA
W3RQN, Leon R. Borgeson, Troy, PA
W3TZN, William H. Smith, Bedford, PA
K3WEY, William J. Thompson, West Chester, PA
WD4BUJ, Billy V. Geer, Anderson, SC
WA4CKR, Thomas J. Tarlton, Sanford, NC
K4IOL, Charles E. Lemons, Holiday, FL
N4PK, Frank J. Piverotto, Lakeworth, FL
W4RJ, George S. Ramsey, Pikeville, KY
W4SQ, J. Kenneth Hiler, Melbourne, FL
W4TAS, Henry B. McMurria, Bradenton, FL
W4UVF, William C. Patterson, Shephardsville, KY
W4VY, Joe K. Jernigan, Atlanta, GA
W4YYE, Joseph Cromwell, Columbus, GA
W4ZEB, David E. Blake, Bradenton, FL
W5AHE, David H. Elliott, El Paso, TX
W5ALA, Jack T. Moore, Dallas, TX
W5BCF, Benjamin C. Freeman, Port Arthur, TX
W5BVG, Oliver D. Gassett, Waco, TX
*W5CEW, Allen E. Wingate, Shreveport, LA
W5CPW, Richard M. Weeks, Garland, TX
KA5DAB, Betty J. Boyle, Enid, OK
W5DJA, Herbert E. Eversole, San Antonio, TX
W5EDW, Howard R. Dreggors, Dallas, TX
W5EIB, Richard C. Hall, Houston, TX
W5FIW/ex-TI2KF, Newell D. Voss, Brownsville, TX
W5HDS, Thomas M. Hoffman, Jr., Sam Raburn, TX
K5KIX, Eugene G. Pianalto, Tontitown, AR
W5LG, Charles W. Beard, El Paso, TX
K5LHS, Hollis K. Leathers, Muskogee, OK
W5OKA, Carl B. Curtis, Jr., Magnolia, AR
WB5RPE, Ted R. Squire, Truth or Consequences, NM
W6ATQ, Christian G. Bechtle, Redding, CA
WB6ENB, Donald A. Hanaford, Jr., Aptos, CA
K6IZA, Stuart H. Wilson, Oxnard, CA
K6JIX, C. Margaret Wright, Perris, CA
W6JJP, George W. Haines, Jr., Gardena, CA
W6IXK, Ralph B. Smith, Lakeport, CA
W6KCQ, Samuel P. Wright, Lakewood, CA
K6PAX, Paul F. Yost, Sr., Tulare, CA
K6RAZ, Lloyd T. Fink, Hemet, CA
WA6RWU, Yoshio Nishimoto, Mountain View, CA
WA6TPD, Ralph Brickey, Calmesa, CA
W6UQ, Charles E. Thompson, Hillsborough, CA
W6VTS, James L. Abernathy, Palm Springs, CA
K6YUV, Robert A. Raidy, Rialto, CA
N7BKR, Raymond C. Anderson, Salem, OR
K7CCI, Ray H. Baker, Cottonwood, AZ
W7CNA, Clayton "Ed" Laier, Albany, OR
W7HXP, Frank L. Finch, Port Angeles, WA
W7KQC, Arthur Lewis, Sun City, AZ
W7LW, Ray T. White, Portland, OR
W7QVY, Gustav O. Strandberg, Salem, OR
W7QX, Thomas W. Higginson, Salt Lake City, UT
K7UXN/VK3BCB, Elizabeth L. Kuegeman, Eastsound, WA
ex-7ZI, Charles L. Austin, Portland, OR
W8CEB, Michael J. Sies, Martins Ferry, OH
W8DO, James F. Atwood, Jr., Cincinnati, OH
K8HSJ, Charles F. Ferris, Manitou Beach, MI
W8HZG, William R. Foreman, Manitou Beach, MI
WA8IML, Floyd E. Timmons, Detroit, MI
W8JAI, Herbert L. Yankee, North Royalton, OH
K8IWY, Joseph X. Konchar, Chagrin Falls, OH
W8IXI, Leland S. Lovell, Newaygo, MI
K8KII, Edna M. Rundell, Munising, MI
*WA8PFB, Edward D. Knight, Jr., Lewisburg, WV
K8SGA, Larry O. Jambeau, Riverview, MI
WA8TSB, Olen E. Ittland, Adrian, MI
WB8UCI, Herbert Mielke, St. Joseph, MI
*W8WM, William G. Meier, Mason, MI
W8WSA, Guy L. Pattison, Detroit, MI
W8ZEE, Kenneth M. Smith, Pickford, MI
ex-WA8ZKA, Russell J. Hall, Moundsville, WV
N9AVK, Hal D. Tudor, Indianapolis, IN
W9BBR, Joseph A. Brence, Waukegan, IL
W9BHF, Ira C. Huffaker, Galesburg, IL
W9BUI, William P. Keller, Chicago, IL
K9EJK, Frank M. Hendzel, Chicago, IL
ex-WD9CIAF, John Wood, Peru, IN
W9GVV, Henry J. Blocker, Des Plaines, IL
WD9IOP, James F. Winland, Winslow, IN
WA9MNB, Jerome A. Kostuck, Brown Deer, WI
WA9NIG, Peter H. Walstra, Crown Point, IN
K9QDO, Alfred W. Hamilton, Calumet City, IL
W9QM, Lyman R. Schueller, River Grove, IL
WA9TJS, Roscoe W. Davis, Clarksville, IN
K9TKW, James M. Pacourek, Cicero, IL
W9VIG, Oscar D. Cambell, Blue Island, IL
ex-WØACX, George Schater, Lees Summit, MO
NØAZU, Hans P. Nielsen, Gary, SD
WØCRG, Ivan D. Marchant, Hampton, IA
KAØEHR, Raymond A. Jones, Circle Pines, MN
*WBØINH, Earl A. Freeman, Loveland, CO
WBØWCH, Orval C. Sherwood, Hamilton, IA
WAØYMT, Douglas D. Nielsen, Lynch, NE
KH6ECX, Edward W. Smith, Honolulu, HI
KH6JBX, Rafael T. Chargualaf, Sacramento, CA
VE2AA, Adrien A. Auclil, Victoriaville, PQ
VE2BW, Paul Rivard, Montreal, PQ
VE2FJ, Fernand Gaumond, Montreal, PQ
VE3BKM, Vernon E. Huckle, Hamilton, ON
VE3FPW, Alfred W. Lovell, London, ON
VE3HEP, Arthur H. Henwood, Goderich, ON
VE3MDB, Charles C. N. Bailey, West Hill, ON
VE7DGB, Winifred F. Muskett, Victoria, BC
VO1BC, Alton A. S. Earle, St. John's, NF
VO1EF, Malcolm G. Loveridge, Twillingate, NF
KG6AJI, Herman T. Ada, Agana, Guam
PAØKG, K. G. Van Straveren, Madison, NJ
VK3HH, Doug D. Paine, Frankston, Australia
VK9RH, Ray K. Hoare, Norfolk Island, Australia

*Life Member, ARRL

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

Senator Goldwater Introduces Amateur Radio Bill

Senator Barry Goldwater (R-Arizona) has introduced legislation that, if adopted, will make landmark changes to the Communications Act of 1934, having direct impact on the Amateur Radio Service. The bill, S. 929, would give the Federal Communications Commission the authority to establish minimum radio frequency rejection standards for electronic equipment, including television receivers, making such equipment less susceptible to interference from other electronic equipment such as CB radio and Amateur Radio. Other features of the bill include granting the FCC the power to regulate or prohibit the sale or delivery of transmitting equipment to unlicensed persons, the authority to use volunteer licensed Amateur Radio operators for the purpose of monitoring unlicensed stations or amateur stations in violation of the rules and the authority to use volunteer licensed Amateur Radio operators for the purpose of preparing and administering amateur examinations for entry-level amateur licenses, provided that the volunteer test administrator possesses a higher class of license. S. 929 also would exempt Amateur Radio transmissions from the secrecy provisions (Section 605) of the Communications Act, allowing for more self-regulation by the Amateur Radio Service, and would change the license term of an amateur license from five years to 10 years.

In a statement accompanying the introduction of S. 929, Senator Goldwater made the following remarks:

RFI Susceptibility Standards

In the face of an expanding electronic age, with radio frequency energy fields present everywhere and increasing all the time, home electronics equipment (such as television receivers, burglar alarms and the like) have suffered interference due to inability to reject unwanted signals. The solution to the problem consists of incorporation of inexpensive filtering methods into the design of such equipment. This bill would allow the FCC to require that radio frequency interference suppression techniques be incorporated into electronic home entertainment devices by the manufacturers. In the case of low-cost items, which could not profitably incorporate such filtering methods, a simple warning to the consumer as to the susceptibility of that device to radio frequency interference could suffice. Devices manufactured prior to the effective date of the act would be exempt from this requirement. I am reluctant to take this step to extend FCC jurisdiction over a matter that has been left to the marketplace. But after repeated unsuccessful efforts to obtain the electronics industries' voluntary cooperation, I believe we must rely on the FCC for guidance on a resolution of this issue.

Sale of Transmitters to Licensed Persons Only

The matter of unlicensed radio operation in or adjacent to the radio frequencies allocated to the Amateur Radio Service has become a severe problem. This often blatant, illegal activity interferes with legitimate citizens band and Amateur Radio transmissions. Use of high power, amateur transmitting equipment is a constant factor in such illegal operation. This bill would permit the FCC to prohibit delivery of radio transmitters or amplifiers to any person unless that person first exhibits a valid license, thus establishing that such person is authorized to use that equipment legally.

Exemption from the Secrecy Provisions

Amateur Radio, long known as the best radio service in the United States in terms of self-regulation, must be allowed to continue to keep its own house in order, since the FCC does not have the manpower to do so. Amateurs, to do this, must work together. Recent federal court decisions, due to a lack of legislative history, have held Amateur Radio to be included in the secrecy provisions of section 605 of the Communications Act, thus prohibiting amateurs from disclosing among themselves the content of transmissions heard on the amateur bands. This bill would exempt amateurs from this burden, thus allowing them to continue to self-regulate.

Volunteer Monitoring of Rules Violators

The FCC's Field Operations Bureau is now operating at below minimum efficiency levels due to budget and manpower cutbacks. At the same time, interference complaints within the Amateur Radio bands are constantly increasing. While we expect the Commission to correct this matter, it would be beneficial to the FCC to utilize the voluntary services of licensed amateurs . . . to monitor illegal activity in the amateur bands. This bill would allow amateurs to detect, locate and monitor illegal operators, interference problems and the like, to save FCC field personnel huge amounts of time and expense in locating rule violators. Armed with the information obtained from amateur volunteers, FCC personnel can proceed right to the source of the problem, monitor at the predicted times and gather evidence much faster than would otherwise be possible.

Volunteer Examination Administration

Preparation and administration of amateur examinations by amateur volunteers under FCC supervision is another time-saving matter that could cut FCC administrative costs immensely while improving service to the public. Volunteer activity by amateurs under the terms of this bill is specifically stated not to constitute Federal employment for any purpose.

[Editor's Note: The FCC's General Counsel expressed an opinion that the use of amateur volunteer examiners for the Novice program might not be permitted under the Communications Act. S. 929 would address this problem. See "League Lines" in February 1980 *QST* for additional information.]

10-Year Amateur License Term

There is no purpose served by a 5-year amateur term, except to allow the FCC to delete from the rolls those amateur licensees who have died or chosen to not renew licenses. This bill provides for a 10-year license term which would decrease administrative costs in issuing amateur licenses.

The bill would also increase to 10 years the term of licenses for the private land mobile and fixed services and make other changes affecting these services. For example, S. 929 would give the FCC the authority to delegate some frequency coordination functions to non-federal government coordinating committees.

Senator Goldwater, K7UGA, who is the chairman of the Senate Communications Subcommittee, and Senator Robert W. Packwood (R-Oregon), who is the chairman of the parent Senate Committee on Commerce, Science and Transportation, cosponsored the legislation. Other cosponsors are Republican Senators Harrison Schmitt (New Mexico), Ted Stevens (Alaska) and Larry Pressler (South Dakota). Democratic cosponsors are Senators Howard W. Cannon (Nevada), Ernest F. Hollings (South Carolina) and Daniel K. Inouye (Hawaii).

S. 929 is a companion bill to a bill introduced into the House of Representatives, recently, by Representative William E. Dannemeyer (R-California). Much of the language in the Dannemeyer Bill, H.R. 2203, has been incorporated into the Goldwater Bill, S. 929. For more information on H.R. 2203, see "Happenings" in April 1981 *QST*, page 69.

Members who support S. 929 and/or want a complete copy of the bill should contact their U.S. senators' offices for a copy. Hq. would appreciate copies of letters in support of S. 929 or H.R. 2203. Letters of support and/or inquiry regarding H.R. 2203 should be addressed to members of the U.S. House of Representatives.

QUIET-ZONE RULES APPLIED TO REPEATERS IN PARTS OF VIRGINIA AND WEST VIRGINIA

In a Report and Order in Docket 78-352, the FCC has adopted rules requiring that Amateur Radio repeater stations operating within the National Radio Quiet Zone (NRQZ) be coordinated with the National Radio Astronomy Observatory (NRAO) to minimize potential interference to radio astronomy operations conducted by the NRAO at Green Bank, West Virginia, and the Naval Research Laboratory (NRL) at Sugar Grove, West Virginia.

Seven comments, including those of NRAO/NRL, were filed in support of applying the protection procedures of the quiet zone to Amateur Radio stations in repeater operation and to base, fixed and mobile relay stations in the General Mobile Radio Service (GMRS). Eighty-four comments, including comments filed by the ARRL, opposed the adoption of the rules. The comments favoring quiet-zone coordination procedures stressed the astronomer's contribution to the study of the size and nature of the universe, its origins and destiny, and stated that successful operation of a radio observatory requires the prevention of interference before it occurs. Proponents of the rules also pointed out that radio observatories are extremely vulnerable to interference because of the ultra-faint signals they receive.

Robert Bingham of Elgin, Illinois, filed comments in which he agreed that GMRS stations should be subject to the protection procedures because of ". . . the total disregard of the rules exhibited by large groups of [Part 95] users, especially in the 27-MHz portion . . .," but felt that Part 97 operators should not be required to abide by the coordination procedures "as long as there is only a suspicion that interference may happen."

On the other hand, the National Telecommunications and Information Administration (NTIA) favored the proposed rules. "It is inconceivable that the unique national resource of the NRQZ now be allowed to deteriorate. This Office therefore concludes that such action would be seriously detrimental to both the

*Deputy Manager, Membership Services, ARRL

scientific and national defense posture of the United States."

ARRL opposed the NRQZ proposal, saying that such action would contradict the Commission's longstanding program of deregulating the Amateur Service. The League, instead, recommended voluntary, cooperative agreements between the NRAO/NRL and amateurs. The League also questioned the need for the proposal, claiming there had been no complaints that radio astronomy operations have been interfered with. ARRL also noted that NRAO/NRL are not entitled to the claim of harmful interference to their operations when they are listening on frequencies that have not been allocated to them by international regulations. The League also stated:

There are currently eight amateur repeaters within the Quiet Zone. Amateurs in the area have projected that no more than 10-12 new amateur repeaters might be placed into operation during the remainder of this century. It is difficult to understand how such a small number of relatively low-powered repeater stations can represent a hazard to the radio astronomy operations at Green Bank and Sugar Grove, particularly in light of the fact that at this time amateur repeaters comprise no more than four-tenths of one percent of stations in the Quiet Zone. Moreover, it is frightening to believe that these eight amateur repeaters, operating legally on frequencies allocated by international agreement to the Amateur Radio Service, could actually compromise our national defense posture. Is our national defense system so vulnerable that the existence of a handful of legally operating, low-powered stations can represent a threat to our nation's security?

Nevertheless, the FCC concluded that the proposed rules should be adopted thereby applying the quiet-zone protection procedures to the Amateur Radio Service and the GMRS. It pointed out that the rules will apply only to Amateur Radio repeaters and to fixed, base and mobile relay stations in the GMRS. There is no intention to later embrace all amateur stations. It also pointed out that the new rules will not prohibit new stations from the Quiet Zone; rather, it will require only coordination and protection procedures. Further information may be obtained from Maurice J. DePont, at FCC's Personal Radio Branch, Washington, DC 20554.

The following is the text of the amended rules in Part 97, effective May 13, 1981:

In Section 95.17, a new paragraph (g) is added, as follows:

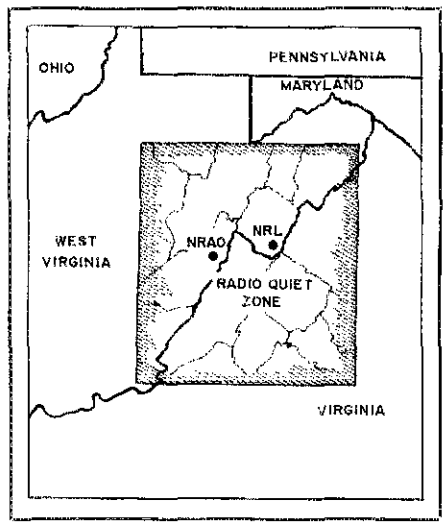
§95.17 Filing of applications.

(g) In order to minimize possible harmful interference at the National Radio Astronomy Observatory site located at Green Bank, Pocahontas County, West Virginia, and at the Naval Research Laboratory site at Sugar Grove, Pendleton County, West Virginia, any applicant for a license (other than mobile, temporary base or temporary fixed) for a new station or for modification of an existing station in a manner that would change either the frequency, power, antenna height or directivity, or location of such a station within the area bounded by 39° 15' N. on the north, 78° 30' W. on the east, 37° 30' on the south, and 80° 30' W. on the west shall, at the time of filing such application with the Commission, simultaneously notify the Director, National Radio Astronomy Observatory, P. O. Box No. 2, Green Bank, West Virginia 24944, in writing, of the technical particulars of the proposed station. Such notification shall include the geographical coordinates of the antenna, antenna height, antenna directivity, if any, proposed frequency, type of emission and power. In addition, the applicant shall indicate in his application to the Commission the date notification was made to the Observatory. If an objection to the proposed operation is received, within 20 days of the receipt of the application, from the National Radio Astronomy Observatory for itself on on behalf of the Naval Research Laboratory, the Commission will consider all aspects of the problem and take whatever action is deemed appropriate.

B. Part 97 of Chapter I of Title 47 of the Code of Federal Regulations is amended, as follows:

In Section 97.85, a new paragraph (f) is added, as follows:

§97.85 Repeater operation.



The area covered by the FCC's National Radio Quiet Zone.

(f) The licensee of an Amateur Radio station, before modifying an existing station in repeater operation in the National Radio Quiet Zone, or before placing his/her amateur station in repeater operation in the National Radio Quiet Zone, shall, after May 13, 1981, give written notification thereof to the Director, National Radio Astronomy Observatory, P. O. Box No. 2, Green Bank, West Virginia 24944. Station modification is any change in frequency, power, antenna height or directivity or the location of the station.

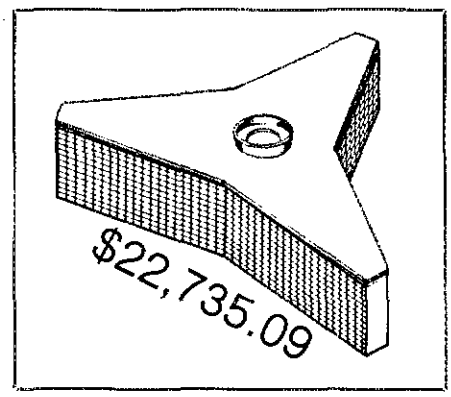
(1) The notification shall include the geographical coordinates of the antenna, antenna height, antenna directivity, if any, proposed frequency, type of emission and power.

(2) The National Radio Quiet Zone is the area bounded by 39° 15' N. on the north, 78° 30' W. on the east, 37° 30' N. on the south and 80° 30' W. on the west.

(3) If an objection to the proposed operation is received by the Commission from the National Radio Astronomy Observatory at Green Bank, Pocahontas County, West Virginia, for itself or on behalf of the Naval Research Laboratory at Sugar Grove, Pendleton County, West Virginia, within 20 days from the date of notification, the Commission will consider all aspects of the problem and take whatever action is deemed appropriate.

TWENTIETH-ANNIVERSARY AMATEUR SATELLITE FUND DRIVE UPDATE

The ARRL Foundation continues to receive fine support from members of the amateur community with eyes on the future of Amateur Radio and satellites. Why not become a part of tomorrow's Amateur Radio world today by sending your tax-deductible contribution to the Amateur Satellite Program, ARRL Foundation, 225 Main St., Newington, CT 06111.



Recent contributors of $100 or more include: Andrew Szenegeto, WIAJR; Claire R. Dyas, WØJCP; W. P. Gearhiser, W5EPW; Roy E. Blair, K4HGX and The Orlando Amateur Radio Club, Inc. - *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

AGREEMENT TO SOLVE RFI PUTS HAM OFF THE AIR

A Springfield, New Jersey radio amateur, Donald Jellinek, K2AHL, has been embroiled in an RFI-related lawsuit with his neighbor which has ultimately resulted in Don's going off the air. Don's problem began in 1977 when he was first informed by his neighbors, the Gersts, that his amateur station was interfering with a stereo radio system. Soon after, the Gersts sued Don for trespass, nuisance, intentional infliction of emotional distress and deprivation of right of privacy. Don's attorney, Alan Bernstein, received case law and other materials from the ARRL general counsel, to prepare a defense that radiocommunication interference is a matter under the exclusive jurisdiction of the federal government. Rather than argue the federal preemption issue, however, the parties reached a settlement which was stipulated before the New Jersey Superior Court, Union County, on April 11, 1978. The agreement was that Don would, at his expense, "cause such attachments to be affixed to the television and stereo units on his neighbor's premises which . . . will completely eliminate any interference . . ." The agreement also stated that "in the event the Gersts acquire additional or substitute equipment, on notice to Jellinek he will cause such remedial service and parts to be supplied as to assure against interference in the operation of said equipment by reason of his transmission, at his own cost and expense." The agreement specifically exempted clock radios, and Don agreed to pay Gerst $1500 as attorney's fees.

Don then increased his tower height to 50 feet in an effort to decrease the interference problem, but his efforts to filter the Gersts' equipment apparently failed. The parties were back in court on September 5, 1979, and the judge ordered Don to abide by his agreement. In a further attempt to comply, Don hired an expert technician to make "repairs" on the Gersts' equipment. Also about this time, Don discharged his first lawyer, Mr. Bernstein, and hired another lawyer, Nathan Reibel. Mr. Reibel worked on setting up appointments for the technician to work on the Gersts' equipment. The technician had some success in eliminating the problem with the neighbor's tape deck, television and a radio; however, the stereo could be shielded on only one of two channels. The technician concluded that there was a defect in the stereo as a result of his inability to solve the problem.

Mr. Reibel, Don's new attorney, then requested that Don be released from his original settlement stipulation, arguing that the agreement had been improvidently entered into and was inequitable and unfair to Don, and that local jurisdiction was preempted by federal law. At about the same time, Don offered to buy a new stereo for the Gersts. However, the Gersts did not accept.

In January 1979, Mr. Reibel filed a motion in court to dismiss the complaint because of alleged harassing telephone calls from the Gersts to Don, which Don had traced to the Gersts' home. His neighbor's attorney filed a

motion in opposition, however, stating that Don had failed to perform his promises under his agreement and that the allegations of harassing telephone calls were hearsay.

No action was taken on these motions, but further testing was done by an audio repair clinic on the Gersts' stereo. It was allegedly found that little or no interference was detected from "low power" operation by Don. However, the attorneys for both sides were exploring the possibility of mutually agreeable "quiet hours" for Don. One proposal was for quiet hours for the period between noon and midnight. Another proposal, this one from the Gersts' attorney, suggested that Don's payment for cable TV for the Gersts might be a solution.

On August 1, 1979, the FCC's Field Office in New York responded to a July 1979 letter from Mr. Reibel, stating that it is not the duty of an amateur to service or filter a complainant's receivers. Yet, in November 1979, the Gersts' attorney again filed a motion to enforce the original agreement. This time, in addition to opposing the motion, Don sued the Gersts, claiming illegal harassment as a result of the alleged phone calls from the Gersts.

Finally, after another offer was made by Don to take the Gersts' stereo to the factory on Long Island for repair, Gerst's attorney filed a third motion to enforce the settlement. At this point Mr. Reibel asked Don whether he wanted to oppose the motion or attempt another accommodation that would probably encompass quiet hours. Another agreement was entered into by both parties on December 12, 1980. Furthermore, the agreement was signed by the Superior Court Judge, indicating his acceptance of the agreement of the dismissal of the case. The agreement, which became an Order of the Court and confirmed the settlement, provided as follows:

"Ordered: (1) The defendant, Donald Jellinek, shall shut down his equipment and not transmit radio communications from his home located at 94 Henshaw Avenue, Springfield, New Jersey; (2) Plaintiff's motions to enforce settlement and in aid of litigant's rights are withdrawn, without prejudice."

Before the Judge accepted the agreement as final, however, he asked Don's attorney why Don would not rather accept quiet hours. Mr. Reibel replied, "I am authorized . . . to tell your Honor that with due regard to all the efforts that we have made to shield the equipment of Mr. Gerst from interference, and although despite those efforts we have been unsuccessful in that regard, my client rather than accepting the hours when he would be permitted to broadcast under the proposed settlement, is willing to state in open Court that he will shut down his equipment." Apparently, rather than risk an adverse determination that would have been appealable, Don decided to end the dispute once and for all.

Don has again been in touch with the League's general counsel about the possibility of continuing the case with League financial assistance. However, the stipulations of the agreements between Don and his neighbor present no issue on which an appeal may be based. Therefore, unless there are further developments that would hold some chance of success, the League is constrained from giving financial assistance to Don.

Don's experience is valuable in one respect, however, as it provides an example from which all radio amateurs should take notice. All hams should try to solve RFI problems and should want to solve the problem as much as the person experiencing the interference. However, no ham should *formally* agree to fix a neighbor's home electronic equipment as a condition of operation of his or her station. As the letter from the FCC Field Office in New York pointed out, a radio amateur does not have the duty to service or filter a complainant's receivers. The greater danger of formal agreements is that a party thereby submits himself to the jurisdiction of the court. It is very difficult, thereafter, to maintain an argument in such cases that federal law preempts the application of state law.

FCC SCORECARD

The following is a list and brief summary of actions pending before FCC which may affect Amateur Radio. Only those proposals that have proceeded to the point of being assigned docket numbers are listed.

Docket 20654[1] — An inquiry into interference from spark-type ignition systems in motor vehicles. Reviewed in 1980, continued without action.

Docket 20777[1] — New rules permitting use of ASCII in the amateur bands. See April 1980 *QST*. The docket remains "open" for future proposals for defining emission types and deregulating the use of radioteletype modes.

Docket 20990[1] — A proposal to allow security and remote-control devices in the amateur bands above 220 MHz on a shared basis.

Docket 78-205[1] — FCC proposal to reimburse the needy who participate in Commission rulemaking proceedings. See May 1980 *QST*, page 55.

Docket 78-250[1] — Inquiry into the administration of code tests to blind and handicapped applicants. See October 1978 *QST*, page 54.

Docket 78-307[1] — Inquiry investigating a consumer-oriented grading system for TV receivers. See January 1979 *QST*, page 63.

Docket 78-369[1] — Inquiry into the susceptibility of electronic equipment to radio-frequency interference (RFI). See March 1979 *QST*, page 9.

Docket 79-140[1] — Inquiry into the creation of a new Personal Radio Service at 900 MHz. See March 1980 *QST*, page 72.

Docket 79-144[1] — NOI into the effects of rf-exposure standards on radio services and equipment, and whether the FCC should consider the biological effects of radio-frequency radiation when authorizing the use of radio-frequency devices. See "Happenings," March and August 1980 *QST*.

Docket 80-7[1] — Proposal to provide frequencies and standards for nationwide Civil Disaster Radio Response program. See May 1980 *QST*, page 55.

Docket 80-135[2] — Proposal to permit the continued use of 420 to 450 MHz for nongovernment radiolocation on a shared, non-interference basis. See May 1980 *QST*, page 56; July 1980 *QST*, page 51; August 1980 *QST*, page 58 and January 1981 *QST*, page 65.

Docket 80-136[1] — Proposal to simplify amateur station i-d rules. See June 1980 *QST*, page 58.

Docket 80-184[1] — Inquiry into changes to International Regulations for Mobile Services WARC. See August 1980 *QST*, page 58.

Docket 80-252[1] — Proposal to permit facsimile and TV transmissions on additional frequencies. See August 1980 *QST*, page 58.

Docket 80-440[1] — Inquiry into amendment of the Commission's rules governing land-mobile radio stations to provide for additional technologies for improving spectrum efficiency. See "Happenings," December 1980 *QST*.

Docket 80-729 — "Plain Language" Rules for the Amateur Radio Service. See February 1981 *QST*, page 49. Comments due June 19, 1981, with replies by August 19, 1981.

Docket 80-739 — Inquiry into the implementation of the 1979 WARC Final Acts. See "Happenings," April 1981 *QST*.

Docket 80-740 — Rulemaking proposal to amend the Commission's rules regarding use of hf radio spectrum below 25 MHz by stations in the Fixed and Land Mobile Services. See "Happenings," February 1981 *QST*.

Docket 80-741[1] — Inquiry into preparation for 1984-85 WARC on geostationary satellite orbit access and use by radio satellite services. See "Happenings," February 1981 *QST*.

[1]Filing deadlines for comments passed, awaiting Commission action.
[2]Some provisions adopted, others pending.
[3]Adopted.

PART 97 RULE WORDING FOR 420-450 MHZ POWER RESTRICTION AMENDMENTS

Recently, "Happenings" reported that the FCC made changes in the power restrictions that apply in certain parts of the United States with respect to the 420- to 450-MHz band. (See April 1981 *QST*, page 66.) The following is the exact wording of the changes to the Amateur Rules, Part 97 of Chapter I of Title 47 of the Code of Federal Regulations:

1. In Section 97.61, subparagraph (b)(7) is amended by adding new subdivisions (v) and (vi) as follows:

(7) * * *

(v) In the State of Massachusetts within an 80-kilometer (50-mile) radius of 41° 45′ N., 70° 32′ W.

(vi) In the State of California within an 80-kilometer (50-mile) radius of 39° 08′ N., 121° 26′ W.

2. In Section 97.421, a new paragraph (c) is added as follows:

§97.421 *Telecommand operation.*

(c) Stations in telecommand operation may transmit from within the military areas designated in §97.61 (b)(7) in the frequency band 435-438 MHz with a maximum of 611 watts effective radiated power (1000 watts equivalent isotropically radiated power). The transmitting-antenna elevation angle between the lower half-power (−3 decibels relative to the peak or antenna bore sight) point and the horizon must always be greater than 10°.

3. A new Section, 97.422, is added to Subpart H of Part 97 as follows:

§97.422 *Earth operation.*

Stations in earth operation may transmit from within the military areas designated in §97.61(b)(7) in the frequency band 435-438 MHz with a maximum of 611 watts effective radiated power (1000 watts equivalent isotropically radiated power). The transmitting-antenna elevation angle between the lower half-power (−3 decibels relative to the peak or antenna bore sight) point and the horizon must always be greater than 10°.

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

CRRL

Less than two years ago, the Canadian Division of the League was incorporated as CRRL. Since then, things have been going well. This month, we'd like to tell you why. We'd also like to indicate some possibilities for the future.

Certainly, CRRL has been well received by Canadian amateurs. It's partly a matter of tradition. The Canadian Division of the League was created in 1920, at the request of Canadian amateurs. Over the years, The Old Man, the Wouff Hong, relaying messages at midnight, Field Day and Sweepstakes have come to mean as much to Canadian amateurs as to American amateurs. CRRL represents a *continuance of these traditions.*

It's also a matter of service. CRRL is part of the League as a whole. Its members share in all the services of the League — *QST*, WIAW code practice and bulletins, the QSL bureaus, contests, awards and field organization for public service. But then, CRRL adds many distinctively Canadian services — the CRRL license manuals and questions books, the *CRRL Newsletter*, the CRRL OBS system and this column, to provide up-to-date news of interest to Canadian amateurs; the films, slides and tapes available from three locations in Canada; and continual representation of Canadian amateurs to DOC and other government agencies, and to IARU.

The CRRL also provides accessibility to people, from top elected officials down. CRRL President Powell travelled 25,000 miles in 1980, speaking to clubs and hamfests in every province except Newfoundland and PEI. If there was a flea market, hamfest or Amateur Radio convention, and CRRL knew about it, CRRL representatives and workers were there helping with problems, distributing materials, and gathering the information and impressions that have made CRRL a number one spokesman for Canadian Amateur Radio.

And there are lots of representatives and workers. The handful of people who got things rolling two years ago has expanded to become a dedicated, hard-working team. The qualifications of those who expressed confidence in CRRL *and are now on that team constantly* amaze us. There are technical writers such as VE7BTG; satellite and packet radio people such as VE1SAT; professional engineers such as VE3AR. Not dabblers in these fields, they are experts who have offered to share their knowledge for the good of the hobby.

What about the future? This October, the first CRRL elections will be held. Members will choose their regional directors, a CRRL secretary who will also be the ARRL Canadian vice director, and a CRRL vice president who will also be the ARRL Canadian director. (As with many organizations, the CRRL president is chosen by the membership-elected board.)

No matter whom the CRRL membership choose, there will be more and better services, and they will be coming from Canada. Amateurs across Canada often mention that they value League services, but because of difficulty converting Canadian to U.S. funds, inability to find a U.S. stamp for that s.a.s.e., potential hassles with customs officials, or just the idea of writing to a U.S. address, they have never taken full advantage of their League memberships. They say they would appreciate being able to receive League services from a Canadian address and being able to pay for League materials, and even memberships, in Canadian funds.

Of course, this has already begun, and that leads us into some long-range thinking. At the *last ARRL Board meeting, several ARRL* directors mentioned to CRRL President Powell that since CRRL volunteers were supplying Canadian League members with many of the services normally supplied by Newington, it might be appropriate to CRRL to have some part-time, *paid* help. Of course, many CRRL volunteers have been thinking the same thing! And a few of them, as they mail off yet another bundle of QSL cards, or a *Canadian Licence Manual*, or a batch of contest forms, can even imagine a small antenna farm with a real CRRL Headquarters building and people whose daily *work* is Canadian Amateur Radio.

That's just a dream now. It would require a lot of careful thinking and an unprecedented generosity on someone's part. But perhaps someday it might become a reality.

U.S. 20-METER PHONE-BAND EXPANSION

Unless the FCC has already ruled on Petition for Rulemaking RM-3860, having to do with the League's proposed expansion of the U.S. 20-meter phone band, there is still time for Canadian amateurs to make their views known. Interested parties should write directly to FCC, Washington, DC 20554, referring specifically to RM-3860 in their letters. CRRL has filed an official objection to the proposal, on behalf of Canadian amateurs, and has also asked DOC to do the same. (Details of the proposal appear in "Happenings," April 1981 *QST*, p. 67.)

CRRL NEWS

CRRL membership continues to climb. As of 1981, March 3, CRRL membership was 6572. This figure does not include an additional 195 subscriptions to *QST* for schools and libraries.

The CRRL Central QSL Bureau, now in St. John, New Brunswick, makes it possible for DX stations to send QSL cards to Canadian amateurs without the trouble and expense of sending cards to 10 individual bureaus. During January and February of this year, bureau workers received, sorted and forwarded 63,384 cards to individual bureaus! New Central Bureau Manager Andy McLellan, VE1ASJ, reports that he and his helpers currently process about 2000 cards a day.

CRRL's John Gowron, VE4ADS, and Gil Frederick, VE4AG, recently appeared on the *Today's World Show*, on CKY-TV, Winnipeg. Show organizers used part of the film, *World of Amateur Radio*, and gave John and Gil an opportunity to explain the hobby. DX, public service and the work of the League in Canada received special attention. John will be following up with talks to several nonamateur groups and with an appearance on a Winnipeg open-line radio show.

Other CRRL people have been busy, too. VE7FDR has been speaking to clubs on Vancouver Island, VE3OT to clubs in Ontario. VE3KSX has been working on the CRRL cloth patches and decals that so many amateurs have been requesting. VE2IJ continues to work with RAQI, who are producing the French translations of the CRRI. *Licensing Manuals.*

The CRRL Questions Book, by Lou Beaubien, VE7CGE, and members of Burnaby ARC, has been revised and expanded to become the *CRRL Questions and Answers Book*. This useful study aid will be available this month, price to be announced.

WITH THE DOC

DK9OF has asked CRRL about reciprocal operating in Canada. He plans to use 2-meter fm as he bicycles from Quebec to Western Canada this summer. Because of the present wording of DOC's Section 50, *having to do with reciprocal licencing privileges for* foreign amateurs, DK9OF will have to operate below 146 MHz. He will be unable to use our many Canadian repeaters.

DOC has released results of the February 4 examinations. For the Amateur certificate, 497 wrote — 435 tried the theory with 55% passing; 398 tried the regs with 70% passing; 229 tried the code with 35% passing. For the Advanced Amateur certificate, 259 wrote — 244 tried the theory with 52% passing; 192 tried the regs with 77% passing; 136 tried the code with 46% passing.

DOC has finalized examination dates for 1982. They are February 10, April 21, June 16 and October 20. In each case, application forms must be submitted to DOC four weeks before date of writing. Remaining examination dates in 1981 are June 17 and October 21.

Last year, CRRL asked DOC to permit repeater operation in the 10-meter band. Before making a decision, DOC wants additional input from amateurs. Write directly to DOC, 300 Slater St., Ottawa, ON K1A 0C8.

U.S. manufacturers have been contacting DOC for information on packet-radio systems used by Canadian amateurs. DOC refers such requests to CRRL and CARF. A new packet-radio system, the first in the U.S., recently went on the air in San Francisco. The system uses techniques developed by Doug Lockhart, VE7APU, and members of the Vancouver Digital Communications Group.

PUBLICATIONS AVAILABLE

Need some good summer reading? Try *From Spark to Space: the Story of Amateur Radio in Canada.* This interesting 143-page book traces the development of Canadian Amateur Radio from the days of Marconi until recent times. It was written by Bill Parker, VE5CU, *and members of Saskatoon ARC, back in* '67. Copies are only $3, postpaid. Write to Saskatoon ARC, Box 751, Saskatoon, SK S7K 3L7.

Interested in awards? Get a copy of the new *Amateur Radio Awards Directory* by Garry Hammond, VE3GCO. This directory contains maps, rules, checklists and application forms for over 150 of the "most attractive, prestigious and sought-after awards available"! Copies are $6.50 postpaid. Write to Garry at 5 McLaren Ave., Listowel, ON N4W 3K1.

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

Correspondence

Conducted By Bruce R. Kampe,* WA1POI

MORE NOVICE AID

☐ I am a member of the ARRL, and teach Amateur Radio Novice classes in St. Paul eight months out of the year. I also do volunteer work with the HANDI-HAMS and enjoy it very much. I know of over 80 new Novices who have come from our classes in the last four years.

I am very unhappy with all the Amateur Radio publications at present, including *QST*, because there is so little attention devoted to Novices or beginners in our hobby. In the past I have not recommended *QST* to Novices. Instead I have recommended *Ham Radio Horizons* because there was usually something in that publication benefitting Novices. In my book, the Novice of today is the real amateur of tomorrow and needs all the help he or she can get.

In the November 1974 issue of *QST*, an excellent article for Novices is on page 51. Also, December 1978 *QST*, pages 46 and 47, is excellent, and is pictured beautifully so a Novice could interpret everything clearly. I believe the monthly inclusion of articles such as these would be a great uplift to the Novice or beginner.

I hope future issues of *QST* will include simple and constructive items for the benefit of Novices and amateurs of the future. — *Warren J. Koppy, WBØKIS, St. Paul, Minnesota*

[Editor's Note: The articles Mr. Koppy is referring to are: Koerner, "Constructing and Installing a Simple Coax-fed Halfwave Dipole," Dec. 1978, and Koerner, "Resistors, Capacitors and Inductors," Nov. 1974.]

APRIL FOOL?

☐ I want to tell you how much I enjoyed your April Fools' article on page 9 of April *QST*, the "It Seems To Us . . ." column concerning a dues increase. Thank goodness you weren't serious about that. — *Chris Gay, KU4A, Lexington, Kentucky*

ANTENNA RIGHTS

☐ Most people worry only about zoning ordinances and building permits that are needed for the installation of ham antenna systems. You should also check your deed and title to your land to see if there are any protective covenants that prohibit the placing of any tower, pole or similar structure on *your own property!* These restrictions will also appear in the title search of your property when buying a used or new home.

You may not be aware that you waived your rights (or not aware of your rights) when you made settlement on your house and land that legally binds you to these protective covenants. These covenants were originally designed to protect all the homeowners in your housing development, for aesthetic reasons, to enhance the neighborhood appearance and to keep property values from declining. These covenants may be part of the land and deed for as long as 10-25 years, and at that time they may be automatically renewed for another 10-25 years unless changed by the members of your housing development. Violation of any one or more of these covenants could result in litigation against you by a neighbor or neighbors.

These covenants are another "blow" against the ham radio operator who may not even be able to use his own land for the installation of his dream "antenna farm." If these covenants are to appear on agreements of sales and deeds on an even larger scale in the future, what do you think might become of the proud ham operator with his "antenna farm"? "Extinction" might just happen to be the proper phrase for this kind of legal terror and intimidation.

It appears that more and more "single-home" housing developments, townhouses, twin homes, duplexes, condominiums and apartments are placing more and more restrictions on aesthetic appearances of their buildings, and in turn, these restrictions are slowly taking away your rights. What are these rights? They are your freedom of speech and free use of your own land and property as you desire, to name just a few of your civil rights that are being slowly withdrawn.

Take it from one who has been on that route and knows from first-hand experience. Check that agreement of sale and deed before you sign that dotted line. Don't spend hundreds or thousands of dollars in the courtroom. Don't be forced by a Judicial Court Order to dismantle your antenna system, tribander/tower, phased verticals, dipoles etc.

Hams must become united around the globe to end this legal intimidation that is occurring right before our eyes. This has been brought out in *QST* so many times in the past few months. Hams have had lawsuits brought against them because of TVI, RFI, tower and other antenna installations. Where does it all end? Who will put a stop to it all? The answer, fortunately, lies with you as an individual and as a ham operator. — *Robert N. Wilderman, K3SRO, Lansdale, Pennsylvania*

TWO-WAY TROUBLE

☐ Your article on page 69 of April *QST* concerning interference to amateur operations on the 2-meter band caused by leaky cable TV systems tells only half the story. Of greater concern to vhf operators (and hopefully to the League) should be the extreme susceptibility of leaky cable systems to unwanted reception of even very low-power 2-meter signals and the consequent TVI suffered by the cable subscriber.

In my neighborhood, the cable TV company uses 145.25 MHz for their channel 18, which happens to be a rather popular sports network station. Anytime I transmit anywhere in the 2-meter band, my neighbors with leaky cables and/or components suffer severe disturbance to their reception. In addition to eliminating illegal radiation on a frequency assigned to the Amateur Radio Service, the cable companies should be compelled to maintain their systems so that unwanted signals do not leak *in*.

Being unable to use one particular frequency is a very minor nuisance compared to the extreme aggravation of being unable to transmit on any frequency in the band without being accused of causing television interference. The local cable company is very prompt and efficient in correcting individual problems. What is needed is legislation with teeth covering the entire industry. Keep after 'em! — *Roy Williams, W6VON, La Mesa, California*

WHAT'S IN A NAME?

☐ It never ceases to amaze me that the range and scope of Amateur Radio is so great and is still expanding by leaps and bounds. A casual glance through *QST* or any of the other publications offered to the Amateur Radio society will immediately indicate to the observer that Amateur Radio is not just "getting on the air."

Almost without exception a newly licensed ham will begin experimenting and testing, modifying and improving. At first it may be only an antenna modification or tweaking up an old transmitter. Soon the experimenter may be "working" Teletype or slow-scan TV or perhaps exchanging data via satellites which have been designed, built and put into orbit by radio amateurs. Amateur Radio operators are observing, plotting and documenting solar activity and phenomena and are experimenting from very low frequencies through the radio spectrum to frequencies of tens of gigahertz.

Meaningful information concerning our hobby's achievements passsed over the air or submitted to Amateur Radio publications, such as *QST*, is indexed by *Applied Science and Technology* in the United States Library of Congress.

Each person possessing this tremendous wealth of knowledge and manpower has been given the official name "Amateur Radio Operator," as stated on the individual's license from the FCC.

It is this writer's opinion that "Amateur Radio Operator" is now a grave misnomer. With all due respect and warmest thanks to our "Ham" ancestors, I feel that we are now a community of Radio Communication Scientists and our licenses should indicate this.

If I am wrong, I will sit down and be quiet. If I am right, I would like to ask the ARRL to help us in our endeavor to be recognized as Communications Scientists (which we are) and not just "Amateur Radio Operators." — *Conrad B. Barber, WA6RGX, Oakland, California*

SURVEY FEEDBACK

☐ I just finished my second reading of the article, "Survey of Amateur Radio, 1980," in March 1981 *QST*. I am very impressed with the League's efforts, via a highly competent investigation, to discover who we are as reflected by what we think, what we have done and what we do. By commissioning such a study, it appears to me that the League has clearly demonstrated that it seeks to represent Amateur Radio not only with zeal, but also from a position of sound knowledge. — *Bradford Williams, N6ART, San Diego, California*

*Membership Services Assistant, ARRL.

Washington Mailbox

Conducted By Richard K. Palm,* K1CE

"Plain Language" Rewrite — The 11th Hour

A totally new look for Part 97 will be the result of the Commission's rulemaking proceeding in Docket 80-729 — the "Plain Language" rewrite proposal. There's still time to let your voice be heard by sending your comments to the Commission before the deadline, June 19, 1981. An introductory discussion of this crucial federal proceeding appeared in February 1981 *QST* ("FCC Proposes 'Plain Language' Rules", pp. 49-51). This month, we'll look at more highlights, the posture adopted by the League and how individuals can become involved in the federal rulemaking process.

Q. What is ARRL's position in Docket 80-729?

A. A working committee has been established for the purpose of compiling members' remarks and producing a formal submission to the Commission based on this membership input. At its meeting in Orlando March 11-12 1981, the Board of Directors formulated and adopted a policy statement regarding the FCC proposal at Minute 77:

1) ARRL believes that radio amateurs have proven themselves capable of understanding (and obeying) the rules for the amateur service as they are presently written.

2) However, the League does not desire to oppose legitimate attempts to improve and strengthen the manner of presentation of amateur rules.

3) Therefore, the League supports the concept of plain language rules and will concentrate its comments on the substance of the proposal contained in Docket 80-729.

4) In its study of the proposed rules the League has already identified several areas of concern where it is believed that substantive changes are being introduced. For example, a few areas of concern already identified include:

A) The basis and purpose of the Amateur Service appear to be restated in a way which reduces the traditional scope of the rationale for the service.

B) The deletion of any specific references in the rules to net operation.

C) An apparent error in proposed rule 30 regarding permitted antenna heights.

5) The League's plan for dealing with Docket 80-729 is to:

A) Collect comments from ARRL officials, members and other interested parties.

B) Seek a meeting between ARRL representatives and FCC staff and/or commissioners to discuss areas of concern in accordance with Commission rules for ex-parte contacts.

C) File comments offering, where appropriate, constructive alternatives to the Commission proposals.

By the time this appears in print, the majority of the work will have come to fruition. All interested parties will have the opportunity to reply (deadline for reply comments is August 19, 1981).

Q. How can I participate in this proceeding?

A. Simply jot down your ideas on a piece of paper and send the original and five copies to the FCC Secretary, Washington, DC 20554. This is a golden opportunity for amateurs to become involved in an important matter facing Amateur Radio. If you'd like a personal copy of the complete proposal, send a dollar (to help defray costs of printing and mailing) to ARRL, 225 Main St., Newington, CT 06111.

*Assistant Manager, Membership Services, ARRL

Table 1

Highlights of Docket 80-729: "Plain Language" Rules

PROPOSED RULE

§97.34 (AR Rule 34) May I transmit communications for third parties?

a) Your AR station may transmit third party messages only under certain conditions. A third party message is one the control operator (first party) of your station sends to another station (second party) for anyone else (third party).

b) Third party messages include those which are spoken, written, keystroked, keyed, photographed or otherwise originated by or for a third party, and transmitted by your AR station live or delayed.

c) Your AR station may only transmit third party messages to AR Service stations located within —

1) Places where the AR Service is regulated by the FCC (see AR Rule 42);

2) Places where the AR Service is regulated by another Agency of the United States Government; *AND*

3) Places where the AR Service is regulated by a country which has a treaty with the United States allowing AR Service stations to exchange messages for third parties.

d) You can get a list of countries which have a third party agreement with the United States from the FCC, Washington, DC 20554.

e) Your AR station must not transmit third party messages while it is being automatically controlled (see AR Rule 47).

EXPLANATION

This rule replaced §97.114 (a) and (b), and §97.79(d). We simplified the existing rules and included an explanation of third party messages in the proposed rule. We also added information on transmitting one-way communications for third parties. The basis for this addition is that one-way communications do not meet the definition of third party messages. We deleted the reference to "delivery" of third party communications in the proposed rule to make it consistent with Article 41 of the ITU rules. Article 41 refers only to the transmission of third party communications being prohibited.

PROPOSED RULE

§97.56 (AR Rule 56) Do I have to make my AR station and its records available for inspection?

a) If an authorized FCC representative requests to inspect your AR station and its records, you or the control operator must make the station and its records available for inspection.

b) The FCC may inspect your station and its records at reasonable times. The FCC considers that a reasonable time to inspect your station is any time during the business day or any time your station is transmitting or has just finished transmitting.

EXPLANATION

While there is an existing rule on inspection of AR station records in Part 97, the proposed rule on inspection of AR stations is new to this part. We are proposing to add this for the Amateur Telecommunications Services because the FCC believes that the addition is necessary to encourage compliance with these rules. We have similar station inspection rules for our other radio services.

PROPOSED RULE

§97.36 (AR Rule 36) How may I use my AR station in an emergency?

a) You may use your AR station in any way possible to help a vehicle or ship in distress. When your station is on a vehicle or ship in distress, you may use it in any way possible to get help.

b) You must, at all times on all frequencies, give priority to emergency communications. Messages concerning the immediate safety of life or the immediate protection of property are emergency communications.

c) The FCC may declare a Communications Emergency (CE) whenever normal public communications are disrupted. The CE declaration will —

1) Give the dates and times the CE is to start and end;

2) Give the CE area;

3) List the frequencies to be cleared of all communications except emergency communications during the CE;

4) Grant temporary waivers to the AR Service rules.

d) During a CE, your station may not transmit on any cleared frequency, unless it is transmitting emergency communications to or from, or within the CE area. Other AR Service frequencies may also be used for emergency communications during the CE, but will not be cleared of other communications.

e) If you want the FCC to declare a CE, you must ask the FCC Field Office in the area where communications have been disrupted to declare it.

f) Within the State of Alaska, or within 92.6 kilometers (50 nautical miles) of the State of Alaska, your AR station may transmit emergency communications on the frequency 4383.8 kHz if —

1) The control operator has an AR General, Advanced, or Amateur Extra operator class license;

2) The transmissions are directed to another station within the State of Alaska authorized for emergency communications;

3) The emission is single sideband;

4) The transmitter power output is not more than 150 watts PEP; *AND*

5) Your station is not transmitting from an aircraft.

EXPLANATION

This rule replaces §97.107 and portions of §97.61 and 97.91. We rewrote the proposed rule in simpler language to make more clear the procedures for using an AR station in an emergency. We also added paragraphs (a) and (b) to the proposed rule. They are based on Article 36, Section 2 of the ITU rules.

PROPOSED RULE

§97.57 (AR Rule 57) What do I have to keep in my station records?

a) You must keep the following items in your station records for all types of operation:

1) A copy of each letter telling the FCC of your name or address change;

2) Your license (or other authorization) or a photocopy;

3) A current copy of the Amateur Telecommunications Services Rules, with amendments;

4) A copy of each response to an FCC Discrepancy notification;

5) Each written permission you receive from the FCC; and

6) A copy of any other correspondence to or from the FCC about your AR station license or your license (or other authorization).

b) When your AR station is in repeater operation, you must keep a computation of its AHAAT and ERP (see AR Rule 44) in your station records.

c) When your AR station is being remotely controlled (see AR Rule 43), you must keep the following items in your station records:

1) The names, addresses and AR station call signs of all control operators you have authorized;

2) A functional block diagram and a technical explanation that describe operation of the control link; ("Control link" is the equipment that accomplishes remote control between a control point and a remotely controlled station.)

3) A description of measures taken to protect the station from access by unauthorized persons;

4) A description of the measures taken to prevent unauthorized operation by activating the control link or by some other means;

5) A description of the measures for shutting down the station if the control link stops working correctly; and

6) A description of the means used to monitor the transmitting frequencies.

d) You must keep your station records for the term of your license (or other authorization).

EXPLANATION

We propose to eliminate all logging requirements in the existing rule. Eliminating these requirements will ease an unnecessary recordkeeping burden imposed on licensees. We have replaced the existing rule with a proposed rule requiring that licensees keep certain items in their station records for the term of their licenses. In replacing the existing rule, we deleted the items that stations in repeater and auxiliary operation must keep in their station logs. However, we are still requiring that licensees who operate stations by remote control or in repeater operation keep certain items needed for compliance verification in their station records (rather than in log books). We are also requiring that licensees keep their station records for the terms of their licenses. QST

YL News and Views

Conducted By Jean Peacor,* K1IJV

Family Affair

"Increasingly, Amateur Radio is a family affair, pursued ardently by wives and daughters as well as by husbands and sons." This is but one of the interesting observations made as a result of the recent "Survey of Amateur Radio, 1980," described in March 1981 *QST*.

From time to time, stories of all-ham families have been covered in "YL News and Views." If I remember correctly, one of the largest families in this category was a family of 10, all licensed radio amateurs. I now have news that Amateur Radio has encompassed an entire family of three generations. Is this a first?

Sam, W3FIQ, and Evelyn, W3JQV, Baker, of West Springfield, Pennsylvania are the parents of Bonnie Rea, KA3FDG. Bonnie and her two sons, Mat, KA3FII, and Mark, KA3GXQ, live in Cranesville, Pennsylvania, and complete this representation of three generations of radio amateurs.

Sam at one time could have been depicted as "Man and His Radio": He started it all, and he had an avid interest in emergency communications. In 1956 Sam was given an Edison Radio Amateur Award special citation for his help with emergency communications during the heavy snowstorm that paralyzed traffic and communications in the Erie area during the Thanksgiving holiday of that year. Also in 1956, Evelyn received her Novice license, "Man and His Radio" now shared.

Evelyn obviously had a good teacher for she, too, has become adept at handling emergency communications — an interest that began through Amateur Radio. Evelyn's activities were featured in a local newspaper article when she was recently certified as an Emergency Medical Technician dispatcher by the U.S. Department of Transportation. This national certification came about after she attended training sessions in Weirton, West Virginia. She has been a dispatcher at the West County Communications Center for four years, which led to her recent certification as an Emergency Medical Technician by the Pennsylvania Department of Health. She has also completed a Governor's Justice Commission course in emergency communications.

Sam and Evelyn's interests in radio communications have now carried over to their daughter and her two sons, all of whom have set goals about how to continue to provide communications for others. Bonnie, who works as a nurse's aide while studying for a nursing degree, was elated when she and her two sons all became Novices. They are the only known three generations in Amateur Radio in the Erie area. Mat is 13 years old and in the seventh grade; Mark is 10 and in the fourth grade. Both boys attend academies having missionaries and missionaries' children who will one day be several thousand miles away. The Rea's already see that Amateur Radio can provide an important link home for many people. Bonnie, Mat and Mark are all working toward upgrading.

Three Generations — all radio amateurs. Left to right, in the back row are KA3FGD and KA3GXQ; in front are W3JQV, KA3FII and W3FIQ.

What began as "Man and His Radio" has grown to cover three generations. Amateur Radio is increasingly, a family affair.

AN ELMER IN BILLINGS

"One of the first obstacles for a person seriously interested in Amateur Radio is finding a local amateur to provide assistance. This volunteer amateur is called an Elmer." *So states the Radio Amateur's Handbook*.

The majority of *QST*'s readers are licensed Amateur Radio operators. Citing all the Elmers responsible for all the licensees would no doubt produce a list long enough to span the globe. Elmers come in different shapes, sizes and genders.

Margie Huddleston, WB7TWG, of Billings, Montana, is an Elmer. Thanks to Margie, Billings has added to its licensed Amateur Radio YL population. Margie has been licensed since 1977 and holds a hard-earned General ticket. She well remembers being intimidated by radio theory; the OMs who helped her were so knowledgeable, and there were so many things foreign to her that had to be learned. But, she did it.

It wasn't long after becoming licensed that Margie became very much involved in the Yellowstone Radio Club in Billings. She presently serves as secretary/treasurer, her second term, and is editor of the club newsletter, "Splatter." Her main interests are emergency planning, traffic handling and rag chewing. She is a member of ARRL, YLRL and Army MARS.

When a few women began to show interest in her radio activities, Marge decided that a class was in order. She asked a friend, Gary Brown, WB7TYN, if he would teach theory to such a class if she would teach Morse code, rules and regulations. The class was organized.

Three-hour classes were held at Marge's home once a week. Although, for some, the class schedule had conflicts with other interests, once the day and time were set, everyone came every time; moreover, they were usually early. Four women signed up — two were wives of fellow hams, one came not really understanding what Amateur Radio was (her husband joined the class later). Eagerness and enthusiasm ran so high that the class learned far more than what was needed to become a Novice. As a result, Amateur Radio welcomes Carol Parker, KA7JMU; Linda Harris, KA7JMV; and Mary Anne Bruley, KA7JMW, to its ranks. Two others from the class expect their licenses momentarily. All plan to upgrade in June.

Thanks to Marge's idea to have a class, Billings' YL population has quintupled; a newly licensed OM has been added as well. Marge is an Elmer in the true sense of the term. Her idea helped five new radio amateurs overcome the first obstacle of finding local amateur assistance. Now they can branch out into the whole exciting world of radio.

*Country Club Dr., Monson, MA 01057

Margie Huddleston, WB7TWG, active Elmer who organized a mostly YL Amateur Radio class.

Linda Harris, KA7JMV (left), and Mary Anne Bruley, KA7JMW, are two of the newly licensed YLs from the Billings' class.

FIELD DAY — JUNE 27 AND 28

A few outstanding events happen but once a year. Field Day is one. Are there any YL clubs that will be operating during this event? Certainly many YLs will be joining their local radio clubs to participate in their activities. Pictures and news of your activities during this exciting weekend will be most welcome.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

Aiming Microwave Antennas

One of the features of antenna systems used at microwave frequencies is that high gain may be realized with physically small antennas. For most purposes the achievement of high antenna gain, and hence high effective isotropic radiated power and effective receiver sensitivity, is highly desirable since this will maximize communication range. Associated with increasing antenna gain, however, is decreasing antenna beamwidth, i.e., the higher the antenna gain the more accurately it has to be pointed. The problem that then arises is one of knowing in what direction to point the antenna with sufficient accuracy to take full advantage of its gain (and also the design of a mechanical system capable of pointing the antenna with that degree of accuracy).

The beamwidth of an antenna can be estimated roughly from its gain. The relationship between gain and beamwidth holds quite well for parabolic dishes and reasonably well for optimized arrays of Yagi-type antennas. For nonoptimized arrays having stacking distances too large or too small or for arrays having an appreciable percentage of their pattern contained in lobes other than the main lobe, the relationship given below may not hold.

Gain (as power ratio) = $30000/H° \times V°$

where H° = horizontal 3-dB beamwidth and
V° = vertical 3-dB beamwidth.

For example, a 3-ft-diameter dish used at 10 GHz has a gain of about 37 dBi (power gain of 5000) substituting in the above formula yields (horizontal × vertical 3-dB beamwidth) = 6. Assuming equal horizontal and vertical beamwidths (which is a reasonable assumption with most dish feeds), this indicates a beamwidth in both planes of 2.45°. Thus, to take full advantage of the gain of this antenna, one must know in what direction to point it with an accuracy of better than 1/2° (and be physically able to point it with that accuracy). An aiming error of only 1.2° will result in a loss of 3 dB of signal. Note that this applies to vertical as well as horizontal aiming!

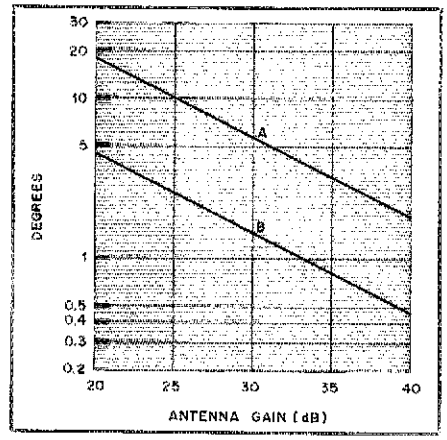


Fig. 1 — Approximate relationship between antenna gain and beamwidth. A — 3-dB beamwidth. B — Aiming accuracy required for less than 1 dB of gain loss.

So how do we know in what direction to point the antenna? Well, measuring bearings from a map is not an accurate method because the projection system used in drawing most maps does not reproduce great circle bearings (which are the bearings we need). There are maps that do reproduce great circle bearings, but they are only good for one particular point on the earth's surface and so have to be custom drawn for any given QTH.

In order to determine the bearing and distance between any two points on the earth's surface, it is only necessary to know their latitudes and longitudes. The relationships are as follows: If point 1 has latitude R°N, longitude S°W, point 2 has latitude X°N, longitude Y°W.

Distance between point 1 and point 2 in nautical miles is

$$D = 60 \cdot \cos^{-1}(\sin R \cdot \sin X + [\cos R \cdot \cos X \cdot \cos(Y - S)])$$

1 statute mile = 0.869 nautical mile.

Bearing from point 1 to point 2 is

$$\cos^{-1}\frac{[\sin X - (\sin R \cdot \cos Z)]}{(\sin Z \cdot \cos R)}$$

where $Z = \frac{\text{distance (nautical miles)}}{60}$

This assumes that point 1 is west of point 2. If point 1 is east of point 2, then the true bearing = (360° − calculated bearing).

The difference between a map-measured bearing and the true great-circle bearing between two points depends on where on the earth the points are and what map is used. Try measuring and calculating for a few points and see how much difference there can be. The points don't have to be close together, either. Don't forget that contacts over 2000 km have been made on 1296 MHz, and over 750 km on 10 GHz.

ACTIVE "COLD" NOISE SOURCE

An active "cold" noise source, or COLFET as named by the authors, is described in the April 1981 issue of *IEEE Transactions on Microwave Theory and Techniques* in an article by Frater and Williams. Described mathematically is a GaAs FET circuit (this is *not* a construction-type article) that, using an MGF 1402, simulates a 50-Ω load with a noise temperature of 50°K (at 1400 MHz).

Such a circuit has obvious applications in noise-figure measurements of low-noise amplifiers or as a reference load in radiometry experiments. The circuit seems to operate by using a source inductance that is transformed by the capacative input impedance of the FET into an effective, noiseless resistor in the gate circuit.

WEST COAST NEWS

"Chip" Angle, N6CA, has written from Lomita, California, about some interesting work he is doing on 1296-MHz amplifiers. He has developed a single-tube, 7289 water-cooled amplifier that can put out about 200 W of (slightly compressed) power with 390-W dc input and 10 W of drive. Though this operation is somewhat (!) above the manufacturers' recommended operating limits, the tube seems to survive quite well. I look forward to seeing more details of this amplifier when he has finished his testing.

Among other items, Chip has also sent circuits of two microstrip preamps he has developed using the NEC 21889 (available for about $50), one for 432 MHz and one for 1296 MHz. The preamps use Teflon circuit boards, and Chip has measured their noise figure at 0.5 dB for the 1296-MHz version and 0.4 dB for the 432-MHz version. I'd be happy to forward copies of Chip's circuits to interested readers in return for an s.a.s.e.

MOONBOUNCE

1296-MHz EME activity seems to be on the increase. Reading through recent issues of Al Katz's "432 and above EME News," I found about 18 stations in 11 countries currently active, with several others almost operational. One advantage of EME at these higher frequencies is that less power is needed since the increased gain of a fixed-size antenna more than compensates for the increased path loss. Recent low-power tests by the G3WDG group have detected 1296-MHz EME echoes using a 20-ft-diameter dish and only 12 W of transmitter power!

Activity is also appearing again on 2304-MHz EME. A series of tests was conducted in March by W6YFK, DJ4AU and PAØSSB, unfortunately with only partial success. The DJ4AU group had been hearing 12-dB echoes the day before the test, but blew their klystron amplifier two minutes after the start of their first sked. PAØSSB heard W6YFK at good "O" copy (full call signs copied), but W6YFK only heard PAØSSB at "T" copy (signals detectable but not strong enough to read). No contact resulted. More tests are scheduled after station improvements have been made. In the meantime, DJ4AU is looking for a replacement 3SK2500SG klystron; if anyone can help, please let me know. [dst]

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

How's DX?

Conducted By Ellen White,* W1YL/4

The Medium is the Message

Well, how *do* you go about finding out what is going on in the world of DX? Old-timers and purists like to rely on their own activity and on their constant surveillance of the bands to make their own brand of DX meaningful. Newer types have grown up in DXing being comfortable with nets, alerting systems and (wisely used) the "list."

The printed word has a very real built-in problem, in that the time that elapses from hearing something on the air and getting it into print is formidable. Monthly journals (such as *QST*) face this to a greater degree than do monthly newsletters. What to do? Accept the fact that you may well want to supplement your journal's historical documentation with more-rapidly-acquired printed information. The last few years have seen an escalation in the amount of useful information in print. The items below represent a cross section of bulletins and newsletters passing across this writer's desk during the past two months. The list is not necessarily complete, but is generally indicative of what is available. Your request, with an s.a.s.e., will usually bring a sample issue with subscription information forthwith.

Long Skip, official publication of the Canadian DX Association, published by the Toronto DX Club, P. O. Box 717, Station Q, Toronto, ON M4T 2N7. *Long Skip*, popular and well respected, focuses on DX, contests, etc. and offers an outgoing QSL service for subscribers only.

The Geoff Watts DX Newsheet, published by the Radio Society of Great Britain, 35 Doughty St., London WC1N 2AE, England, weekly. This is a reliable perennial with a concise listing of stations, dates QRV, frequencies to check, DX Silent Keys, succinct contest date reminder and propagation forecast.

The Long Island DX Bulletin, 109 Willow Ave., Huntington, NY 11743, bi-weekly. This bulletin covers what is active (by country name) with a generally timely finger on the pulse of what is happening in DX. An accurate, proven newsheet, it includes an abbreviated propagation forecast by N4XX.

The DXers Newsletter, Box 1458, Morristown, TN 37814, bi-weekly. Includes N4XX and KH6BZF propagation predictions, "on the bands," calls, frequency, UTC, day, and the area the activity report comes from, QSL routes and current DX information.

The W6GO/K6HHD List, Jay and Jan O'Brien, Box 700, Rio Linda, CA 95673, monthly. A source of current information on the easiest way to get those QSLs, the *List* is actually a computer readout of over 5000 DX stations and their managers, plus other related info.

The DX Bulletin, 306 Vernon Ave., Vernon, CT 06066, weekly. Alphabetizes activity under headings of the low bands, then by continent with call, frequency, time plus the area the report is from. Editorializes.

QRZ DX (DX Tips for Big Guns and Little Pistols), Box 494 Howe, TX 75059, weekly. Averages eight pages, first page usually carries a DX photo, N4XX/KH6BZF propagation, W6RQ sunspot plot, current DX info and who has been heard on the bands. Calls are grouped alphabetically on separate bands; K5FUV "comments" are featured.

HR Report, Greenville, NH 03048, bi-weekly. An "all-around" mailing, this newsletter has always dealt heavily on DX matters, propagation and DX openings in a timely manner.

Worldradio, 2120 29th St., Sacramento, CA 95818, monthly. Using a newspaper format, this publication includes dramatic, personal and humanitarian uses of Amateur Radio, along with a variety of DX-associated information.

The Totem Tabloid, Western Washington DX Club, Inc., 8627 Fauntlee Crest, S.W., Seattle, WA 98136, monthly. An excellent paper by a DX-oriented club, the *Tabloid* is chock full of appropriate information.

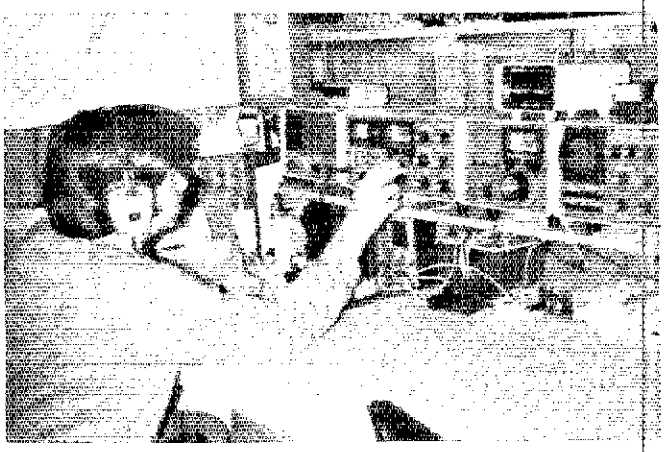
Other meaty club papers are produced by the Northern and the Southern California DX Clubs.

Several extracts to follow catch the flavor of some of these publications. Other useful and interesting DX reference materials, from books to bulletins, will follow as well.

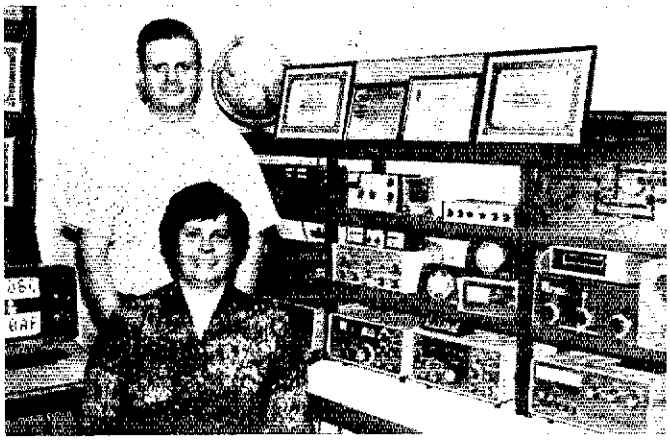
TAKING THE PULSE

K5FUV's comments in a mid-April issue of *QRZ DX* strike a resonant chord with anyone away from DXing for any period of time, let alone a week! "This feel for what's going on can be very important in one's day-to-day DXing. Knowing the propagation, who comes in from where and at what time, can make a big difference in your DX success when the big one comes on. If you know an odd time that the band is open to a certain direction, you have an advantage over the competition that can be turned into a QSO without fighting a pileup. To gain this advance, take a band (except 20). Stay on the band all week. Don't go to any other band for the whole week. Listen early, listen late and turn the antenna a lot. You'll find a lot of things happening you didn't realize, include openings to areas of the world that may seem strange, such as JA and Europe on 15 meters at 0900Z. Catalog this information, and next time you're looking for the rare one, try a time and band that's not the same as the pack is using. It really works. Just don't get too far out of touch."

*19620 SW 234 St., Homestead, FL 33031



In April we introduced that venerable OT, ZL2GX — as smitten with DX now as he was "then." This month we turn our attention to a young Canadian, thanks to the tip from Quebec SCM VE2BP. Fourteen-year-young VE2EAR is a three-year veteran of DXing, showing all those signs we know too well! Guy uses an FT-101B and radiates with a TH6DXX. This young DXer has an impressive box score: 170 worked with 146 confirmed as of the beginning of this year. *(VE2AS photo)*



The family aspect of DXing is not to be denied — witness Shirley, SVØBC, and OM Kent, SVØAP. The Larsens enjoy their DXing from that Greek Island in the Eastern Mediterranean — Crete. The exotic modes are their favorites, and they're readily available on RTTY, SSTV, OSCAR and ssb. The Larsens are on daily from 1430 to 1600Z and periodically can be found weekends and holidays and from 0500 to 1900Z. For direct QSLs send to Capt. William K. Larsen, Box 711, APO, NY 09291.

ONE-LINERS

Shared chuckles from the April 1981 issue of the Northern California DX Club's paper *The DXer:*

"DXing is too important to take seriously."

"Working for a living is the curse of the DXing class and an abomination during a weekday DXpedition."

"It's extremely rare until you work one, then it's rare until you get the card, and then you'll work three in one evening without half trying."

"What's the frequency of your landline?"

DX ESSENCE

A mid-April meeting of the Western Washington DX Club, Inc., ably heralded in their literate monthly *The Totem Tabloid* what must have proven to have been an interesting presentation by WB7CYC regarding NASA's search for extraterrestrial intelligence. And, who but hard-core DXers can better understand the endless hours searching a band (usually fruitlessly) for a weak, wavering signal from some astronomically distant station? The frequencies, equipment and techniques may be a little different, but the thrill of the chase is the same. We know! We've been there!

DXCC CREDIT CHECK

Some conferring with DXCC maestro W3AZD reveals that certain cards should be held up when submitting for DXCC. For various reasons credit is not being offered. You'll save both postage expense and time on both ends of the circuit by avoiding sending the following to Hq. with your next endorsement. *Unauthorized operation:* A6XJA, HP2XBA (in Canal Zone before Oct. 1, 1979), K4YT/5R8, KV4KV/D, TG7AA, TG9CH (Nov. 24-25, 1979 only), TH8IM (TL8JM is OK), VR1BE/KH1, 4W2AA, 60ØDX (before July 28, 1980), 7Z2AP, 9U5DS (bootlegged since late 1977), 9U5IM, 18JN/FH8, A6 ton or after Feb. 11, 1979), F8KGU/TL8, all Walvis Bay. K1CO/Pf7 (Oct. 27-28, 1979 only). *Shipboard Operation:* J3AAE, J3ABD, WØYR/VP2V, WB8HUP/VP2V, ZB2A, ZB2FU, ZB2GM, 6O4LS.

DEGREE OF DIFFICULTY

We've now arrived at Group 5, the last tabulation of W1NG's handy compilation. If you don't have a contact from any of these countries, chances are you'll have to wait for a major DXpedition or a major change in their political situation. Good luck! IS 3X 4W 5A 5R 5X 7O 7Q BY C9 CEØX E1 FB8W FO(Clipperton Is.) KP6/KH5K PYØ(St. Peter & Paul's Rocks) S9/CR5 T1 TZ VKØ(Heard Is.) VK9(Willis Is.) VS9K VU7(Andaman & Nicobar Is.) VU7(Laccadive Is.) XU XV XW XZ YA ZA.

POSTAGE PAINS

An error in the April column was caught rapidly by sharp-eyed WB3IQE and KB2OM. Please, do *not* enclose anything in an Aerogramme; it is meant for economical air letters *only*. Under current postal rates, 30¢ is an excellent value compared with 40¢ for 1/2-ounce airmail to places other than the Caribbean and Central America (35¢ for these areas). All depends on whether you are corresponding, just sending a card or both. We note that an airmail QSL to most places is now priced at 38¢ — this certainly makes the best postage bet, other than your ARRL Outgoing QSL Service. Unless you're super hot to get a speedy card direct, use the service. Ask Hq. for printed details on both the incoming and outgoing service to keep with your logbook for ease of use. S.a.s.e. appreciated.

ARRL NATIONAL CONVENTION

This Orlando, Florida, event held in mid-March featured an extensive DX program, a real winner in terms of planning, performance and attendance. The frosting on the cake was this paragraph in the program booklet: "In any activity there will always be a top echelon, and in Amateur Radio it is the DXers. The years have shown that DXers are smarter, more technically proficient, more innovative, more open-minded, more evocative, more understanding, richer, taller and they are the ones with most of the tall towers and big linears." [I think they missed good looking! Ed.]

TOP BAND TRIUMPH

LA5HE reports that W7FS and LA5HE worked on 160 February 14, 1981, at 0525 UTC, probably the first Norway-West Coast QSO on Top Band. That same day, at 0550Z, VE1AK and LA5HE made it both ways for what was probably the first LA-VE QSO on that band. Congratulations!

THE MONTH'S MAIL

☐ DX is where you find it — witness the planned VHF-style DXpedition to Antigua and Montserrat (June VHF QSO Party) by WA8ONQ and Co.

☐ W4FOA now has all of the 7Q7AA logs and says that there is no other 7Q7AA in existence.

☐ W2BN continues to receive QSLs for YJ8NPS and wants to make it clear that he is not the QSL manager nor is he connected in any way with this operation. The manager for YJ8NPS is KB2KN.

☐ To help DX stations have a crack at all states within the zero district, the Ø District Net has been activated Tues./Wed. at 1530-1630Z on 28.597 MHz. Even *this* group is having trouble getting a "rep" from North Dakota! Any takers check with WØXK.

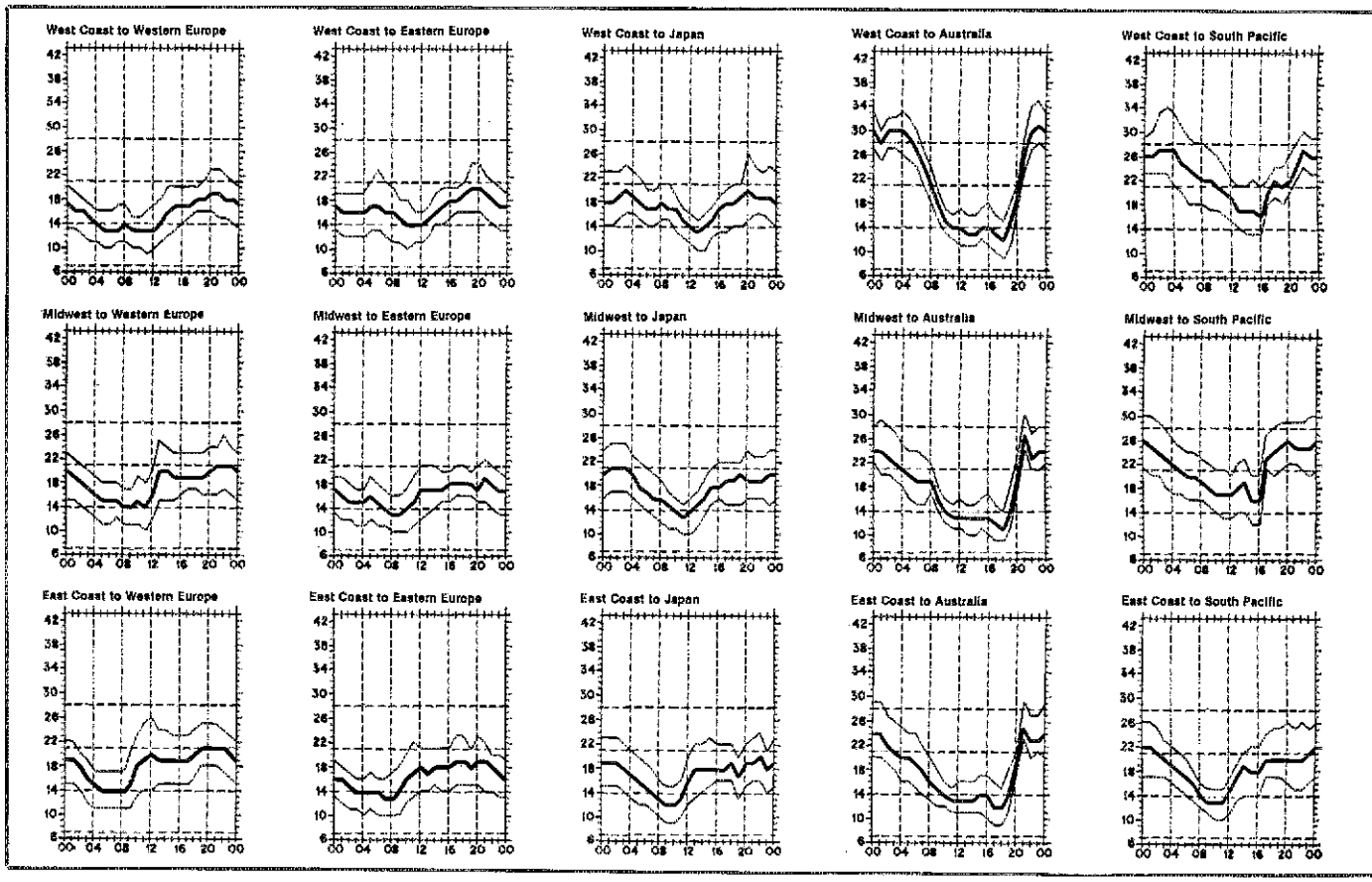
☐ WA7QDG has now retired from the U.S. Foreign Service and can be found at 5904 Dayton Ave. No., Seattle, WA 98103 (for those still-need QSLs for his operations at 5NØRBB, XV5AA or HS1APA).

☐ K2LE/DU2 was plenty QRV for the cw DX Test, working 1400+ stations. QSL via W2AYT.

☐ *Please* stand by for QRP stations, implores K7BTB of our DX brethren.

☐ W3IF notes that the *SO* prefix is routinely given to foreign amateurs operating in Poland.

☐ Kudos to former Alaska SCM KL7DG, newly retired from the FCC Monitoring Station in Anchorage. Look for his QRP signal on 15 meters, 0000-0500Z.



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

DX PERVASIONS

Sometimes it seems as if the very air we breathe is permeated by our DX feelings, not just in direct relation to the hobby. Haven't you noticed how DX is creeping into the nonham world? Witness the DX Toothbrush recently called to our attention by KA1BSZ. This writer also has noted some nifty timepieces in the marketplace bearing that appellation *DX* right on the watch face. It does seem to restore your confidence knowing that the rest of the world is finally beginning to get with it.

QSL Corner

Administered By Joan Becker

ARRL-Membership Overseas 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 Overseas 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 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 utilize 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.

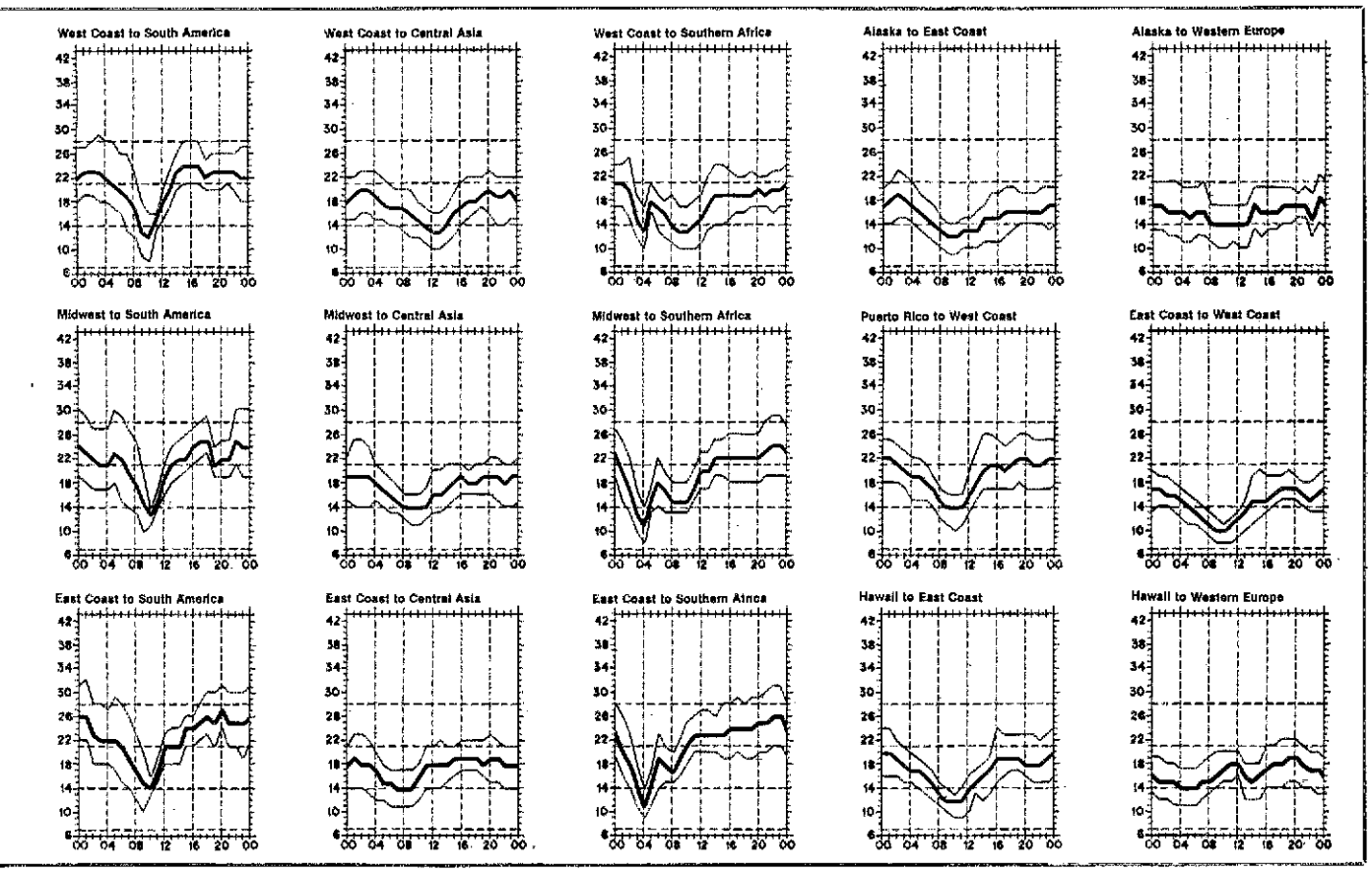
QSL MANAGER VOLUNTEERS

KB5PO
WB2RAJ
VE1ACK
KB2KN is the manager for YJ8NPS. The information in May *QST* is in error.
WA2VDE not manager for TU2HH
W2GC not manager for KC6JC
K7DX not manager for any JA stations.
K4ZGB is no longer manager for any station.
C6ACY is no longer in C6A land; he is now KP4BZ. QSL via KP4 bureau.
DDXA is no longer the QSL manager for KM6BI, but still has the logs for the period of July 8, 1978, through March 30, 1980. W5RU will still honor these QSLs.

QTH information — KB7IJ/KH2, Rich Blaney Jr., Box 78 NAS-AGANA, Guam, FPO San Francisco, CA 96637. HL9UZ, Tom Hughes, 55 AUN, Co., Box 62, APO San Francisco, CA 96301. A22ZM, P. O. 20202, Gabrone. FY7BO, P. O. 856, Cayenne. P29NSF, P. O. 165, Rabaul, Papua, New Guinea. WA6GKJ/KP4, P. O. 942, FPO Miami, FL 34053.

Here is some QSL information for those of you who would like to QSL direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

A22PH (A22BX)
A35JT (K9AUB)
A35PF (K9KB)
C5ACO (W2TK)
C5ADH (KB8KS)
C5ADT (G3UMK)
C6ABA (G3AMR)
CN8AT (OE3NH)
CN8CO (WB3KGY)
CT1ANO (CT1ZA)
CT2CJ (AG1K)
CT2DP (W4PKM)
FWØVU (DL2RM)
HKØEHM (WD9DZV)
HL9RB (WD4NBX)
I3AHW (WB2RAJ)
J88AH/WB2AMO
KHØAC (K7ZA)
P29RS (W2INY)
VP2KAO (K2AOQ)
VP2KAP (WB2JVM)
VP2MCL (K1ZZ)
VP2MFC (K1ZZ)
VP8PP (W6TKV)
ZB2EO (K3MNW)
4NØRA (YU1ELM)
4Z4XB (KA5BBL)
8P6CQ (W2LZX)
9Y4JA (AC3A)



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 June 15 to July 15, 1981, assume a sunspot number of 134, which corresponds to a 2800-MHz solar flux of 179.

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 February 20 through March 16, 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

DA1UO/137, DF2PW/135, DF8BD/107, DF9BV/102, DK6UR/109, DKØZR/130, DJ8GM/125, DL8AC/101, DL8PI/105, EA2QU/236, EA5FP/157, G2FSP/343, G3IMA/219, I3POM/181, I4EAT/269, I4KYQ/107, IØHMD/170, IV3TQE/276, JA1EMQ/107, JA1JAT/118, JF1VST/141, JH1XUP/149, JI1QPU/260, JA2ADH/326, JA2JJP/127, JH2PYX/114, JA4ENN/106, JA5GJD/217, JA6EIC/105, JA7FWR/100, KH6D/103, LA8QI/111, OH1AA/276, OK1AOJ/108, OK2BLG/232, OK2RZ/329, PY8HP/120, SM2BUW/123, SM7FDO/277, SM7FHJ/102, XE1OZ/101, XE1VV/237, YU2CCJ/177, YU2LM/112, YV5DTJ/100, KA1A/108, KA1CDC/102, W1BET/105, W1CTF/102, W1MDL/101, W1QGN/100, WA1JKI/100, WA1UDU/105, K2BLA/100, K2SCX/100, KA2APZ/101, KA2CLQ/101, KA2ELT/104, N2ABW/106, N2DR/139, W2HBL/138, W2HFQ/110, W2OEH/285, W2SEN/106, WA2PSU/113, WB2QLO/124, AF3E/300, AF3T/273, AF3W/103, K3CET/103, K3PA/139, KA3CFR/110, KA3CTY/105, KB3HE/221, W3FG/109, WA3ZGS/101, K4EJG/100, KA4JMZ/101, KA4Y/245, KB4HU/133, KG4J/110, N4RI/103, W4NTO/172, W4RWB/101, WA4BCN/110, WB4QGI/300, K5JV/128, KA5AGB/119, KA5FUI/100, K5HTF/104, WA5JVQ/114, WB5QVI/103, WD5RVY/101, K6SR/105, WA6SJQ/100, WB6VJX/109, KB7QI/105, W7LI/125, W7LT/105, W7SK/100, WB7REV/110, WB7SOH/103, WA9CTH/109, WA9IAF/129, WA9TAH/102, WB9MHX/109, WD9DID/101, WD9DZV/106, AJØX/325, KCØQ/180, NØHH/101, WØGN/112, WØMJN/127, WAØBNX/105, W9FFQ/120, W9OHF/102, WA9CTH/109, WA9IAF/129, WA9TAH/102, WB9MHX/109, WD9DID/101, WD9DZV/106, AJØX/325, KCØQ/180, NØHH/101, WØGN/112, WØMJN/127, WAØBNX/105

Radiotelephone

DK6UR/109, DKØZR/111, EA5FP/123, EA5SP/228, EA9HA/211, G3WFM/105, HI8GB/108, I3EJ/129, I5GKS/226, JF1VST/138, JI1QPU/218, JA2JJP/126, JH2PYX/114, JA5QJD/215, OH1AA/246, OK2BLG/159, OK2RZ/316, OK3CMX/103, PY8HP/107, SM6IOI/107, SMØGYX/112, VE3KXF/102, XE1VV/234, K1SYI/103, W2HBL/137, WB2QLO/123, KB3DH/101, N3AKX/102, WB3HAH/100, WB3IVL/143, K4DLU/116, KA4FQZ/100, KA4Y/144, KG4J/104, N4AOC/103, N4BS/122, W4FC/101, K5JV/117, KK5I/117, W6WBG/114, WA6JVQ/113, K6VMN/152, KI6A/102, KV6B/100, WB6DAD/104, W7ICX/102, WB7WQE/101, K8CCP/116, K8DB/262, KB8VN/109, N8BQB/106, W8HFK/100, WA8TMI/105, WB8CGW/103, WD8BHA/129, WD8ICO/106, WD8PFI/117, WD8PTI/117, K9PVY/101, KB9MI/104, W9MTV/101, WA9IAF/108, WB9SYT/100, NØHH/101, WØMJN/117, WBØTPQ/113

CW

DF2PW/110, JH1BZJ/136, JH1XUP/104, JI1QPU/209, JA8DNZ/117, OH1AA/157, OK2BLG/180, OK2RZ/125, ON6RR/115, SM5CGT/100, SM7FDO/241, AA2F/123, K2BLA/100, KA2GCS/107, WA2CSO/107, WA2ISH/103, WB3HAZ/105, AA4U/128, KA4Y/105, W4FGH/113, W4NTO/106, KA5CEH/132, KR6B/102, N6DM/110, WB6VJX/102, KB7MO/126, K8DD/126, W8REY/110, WD8MRC/101, W9CA/109, KCØQ/160, WØGN/112

RTTY

SM6AEN, SM7CLZ, I5KG

160 Meters

GD4BEG

5BDXCC

W3ODJ, K4SE, OJ2MM, W3FV, GD4BFG, OH1AA, GW4BLE, W2WZ, (#), (1000), (K2XA), W6CYX, W5PZA, K1XA, WA4ZLP, WØUO, N6MU, VE7DFW, W2TZ, UA6LEZ, UR2RCU, OH2AC, OK1KYS, K4SLP, LA5NM, W6NPY

Endorsements

Mixed

A51PN/177, DF9RW/215, DF9ZP/156, DJ3TF/200, DJ4XC/204, DJ5GG/280, DK9MC/205, DL1BG/178, DL1LD/317, DL8IH/163, EA7TV/208, F6CUK/277, G3COJ/212, HBØLL/309, HP1AC/253, I2DEZ/330, ISØDTK/205, IV3BCB/160, JE1BQE/164, JF1SLN/160, JH1BZJ/264, JH1CJQ/325, JR1ARK/204, JA3CHO/292, JF3KNQ/142, JA5ELM/225, JH7BRG/267, JA8DNZ/305, LA1H/261, LA6OT/279, OE1BFW/289, OF1KJW/140, OK1AOR/201, OK1ATZ/220, PAØFX/354, SM4CEZ/118, SM6DYK/300, UR2AR/347, VE3BXF/159, VE3FEA/187, VE3GFN/250, VE3LDT/210, VE3LGQ/325, VE3XK/294, VE5RA/287, VE7WL/281, XE1FX/264, XF4MDX/131, YU1NZW/231, YU3CM/296, YU3TZZ/153, YV5CWO/319, YV5DFI/320, ZL2ASM/261, ZS6RM/350, AD1V/150, K1AGL/226, K1CC/310, K1RQ/275, K1VJH/286, K1VKO/277, K1WJ/301, KA1BU/274, KA1DOS/158, N1AFW/151, W1AB/327, W1AXA/352, W1BL/301, W1GG/325, W1GKK/365, W1ICV/290, W1JNN/203, W1KLY/293, W1QJR/339, W1VV/305, WB1HKV/125, K2GP/160, K2ENT/227, K2GAT/270, K2IJ/280, K2UU/315, K2ZRO/300, KD2G/157, N2AQH/263, N2VW/264, W2ARQ/270, W2GND/237, W2IIX/170, W2MIG/313, W2MT/245, W2PSU/316, W2QKJ/315, W2RSJ/290, W2XN/350, WB2OMU/313, AI3Q/258, KA3CXB/131, N3ACU/174, N3AUE/180, N3GW/199, W3DDG/133, W3HTW/292, W3HYJ/295, W3NQC/157, WB3HAZ/290, WB3HTK/176, WB3IGR/204, WB3IVL/144, WB3LGO/219, AA4AR/301, AA4NA/282, K4BBF/330, K4IR/312, K4KFH/302, K4LNO/270, K4LTA/321, K4SV/283, K4TFI/281, K4XP/310, K4YXJ/260, KK4A/150, KQ4M/177, KS4Z/300, KT4D/224, KU4J/282, KV4F/289, N4AXR/270, N4BCN/151, N4BQD/175, N4GG/304, N4SW/200, W4BD/295, W4BRE/335, W4DJJ/300, W4EEO/338, W4MGX/283, W4OMY/125, W4OWJ/329, W4RIM/310, WA4CXZ/312, WA4NXQ/122, WA4OOM/301, WA4VCC/218, WB4CCT/180, WB4TDH/295, WB4VMS/125, WB4VSO/201, WD4NBX/236, K5OA/319, K5OG/280, K5VNJ/308, KB5IY/130, KE5J/180, KG5J/147, N5CT/200, W5KFN/305, W5TZN/154, W5UP/323, WA5IGD/283, WA5QZH/228, WA5TOS/250, WB5FCO/129, WB5TZZ/250, WD5HMX/180, WD5JYU/129, K6KCM/176, K6OJO/324, K6SP/310, K6YKI/300, K6ZXS/289, KB6JK/228, N6DM/160, N6HC/180, N6HR/319, N6MA/219, N6VR/308, W6DN/320, W6DSY/129, W6DU/280, W6EKW/156, W6GO/300, W6KH/348, W6NLG/224, W6VD/305, WA6AUD/313, WA6IGU/177, WB6APX/322, WB6BPZ/211, WB6DXU/312, WD6EDY/120, WD6EQP/124, K7OXB/300, KD7X/200, N7RO/327, W7DAZ/240, W7EDA/251, W7ETZ/326, W7HR/282, W7LHO/175, W7OK/303, W7SFF/255, WB7WIM/245, AI8D/200, K8GG/281, K8HVJ/293, K8NW/302, K8RD/311, K8TL/323, KA8AEO/153, N8BC/198, W8ELE/311, WB8KBZ/262, WA8KEM/259, WB8JEY/298, WB8RJX/264, WB8VKL/182, WD8DXN/173, WD8KWT/200, K9BB/300, K9BIL/251, K9BLY/183, K9BQL/166, K9CJK/325, K9TN/311, KB9DO/200, KB9IG/253, KC9A/139, N9AGB/129, N9BT/151, N9BX/274, W9ALI/288, W9IL/178, W9NGA/305, W9NUD/175, W9NYW/180, W9VNE/326, WB9BGJ/300, WB9LFD/229, WB9TOU/159, WB9UAO/141, WB9VGJ/176, WD9COI/163, WD9DEE/250, WD9DKJ/158, WD9FPG/232, WD9IIC/267, WD9IOS/150, KØALL/316, KØAXU/225, KØBUR/332, KØCVD/225, KØTB/175, KAØALX/155, WØBTD/349, WØIZ/318, WØNB/292, WØPBK/121, WØUO/286, WAØDCO/251, WBØWAD/231

Radiotelephone

CE3GN/270, CE5CN/152, CT1FL/326, D4CBS/324, DA1MV/183, DF8FD/210, DF9ZP/156, DJ6FN/306, DL4YAH/178, EA7TV/145, F3DJ/344, G3COJ/175, G4FJT/152, GM4FIW/225, HI8XHJ/141, HK3DDD/251, HP1XKZ/213, I1YJQ/150, I2AHG/322, I2DEZ/326, I4CSP/233, I6MRD/175, I6ZAJ/221, I8ACB/300, I8HZT/153, I8IHG/233, IØHMD/169, IØICM/214, IV3TQE/276, JE1BQE/133, JF1SLN/151, JH1BZJ/234, JH1CJQ/308, JR1ARK/161, JA2ADH/325, JF3ILZ/202, JF3KNQ/142, KL7D/279, KL7HDS/208, LA7EU/175, OA4JR/312, OE1BFW/286, OK1MP/326, PY4AKL/305, PY6CN/305, UR2AR/335, VE3FEA/177, VE4AS/306, VE4BJ/301, VE7WL/265, VO1CU/319, VP2VBK/265, WP4API/175, XE1FX/256, XE1LCH/247, XE1MDX/189, XE1OW/259, XE1OX/259, XF4MDX/127, YU1NZW/174, YV5CWO/319, YV5DFI/320, ZS6RM/344, K1MEM/300, KA1BU/274, N1AFW/138, N1API/178, W1AB/252, W1EQD/174, W1FZ/349, W1GG/216, W1GKK/341, W1ICV/290, W1JNN/172, W1NM/204, W1YOU/251, K2ENT/227, K2EY/241, K2GAT/270, K2MRB/177, K2UU/313, K2YIY/280, KA2ELW/180, KD2G/154, N2AQH/263, N2VW/264, W2ARQ/269, W2HXF/279, W2IIX/169, W2MIG/309, W2OFH/281, W2PSU/307, W2QKJ/294, W2QWS/335, W2XN/339, WA2BDP/259, WA2CBB/255, WA2HKS/204, WB2QMU/307, K3KA/291, K3LDE/154, N3AUE/164, W3HYJ/292, WB3KOJ/200, WB3LGO/206, AA4AR/301, K4BBF/330, K4LNO/270, KA4BFT/213, KB4HU/133, KC4BH/228, KC4LQ/176, KQ4M/171, KT4G/290, N4AXR/270, N4CLT/142, N4DQF/132, N4GG/225, W4BRE/334, W4DJJ/296, W4EEO/321, W4KOQ/185, W4PKM/207, W4RNZ/199, WA4CXZ/311, WA4INQ/270, WA4NXQ/122, WA4OOM/290, WA4VCC/198, WA4VCX/124, WB4CCT/142, WB4COO/160, WB4QGI/300, WB4VNZ/175, WB4VQO/203, WB4ZIM/218, WD4DZF/125, WD4KWR/160, K5OA/318, K5SSB/242, K5VNJ/304, K5YYI/219, KA5ASD/255, KB5FU/262, KE5J/154, W5HJA/341, W5UP/311, W5UR/327, WD5DII/250, K6OJO/323, K6PU/315, K6RLY/165, K6ZXS/288, KB6JK/228, N6AHV/214, N6HC/130, N6NA/336, W6GO/293, W6NLG/224, W6QWJ/125, W6USG/324, WA6AUD/311, WA6MHZ/205, WB6BPZ/210, WB6PSY/255, K7KDS/178, K7OXB/282, KB7MO/209, N7RO/321, WB7WIM/245, K8EX/200, K8GG/269, K8HVJ/285, K8NW/301, K8TL/175, N8BIB/150, W8KBZ/248, W8ZET/327, WA8KEM/200, WB8VKL/176, WD8EMI/259, WD8JAB/262, WD8PUG/202, K9BIL/233, K9BQL/156, K9LUX/180, KB9IG/253, N9AGB/127, N9BX/229, W9HPS/341, W9MWD/220, W9NUD/122, W9OKL/201, W9ZX/254, WB9BGJ/300, WB9JBH/225, WB9LFD/228, WB9TOU/157, WB9VGJ/175, WB9YJW/241, WD9COI/163, WD9EWT/139, WD9IIC/185, KØALL/303, KØBUR/331, KØRDJ/182, NØAOP/225, WØIZ/268, WØNB/260, WAØLMK/179

CW

DJ0GD/205	VE3BX/259	K2BZT/266	K3KA/261	N4RJ/307	K6YK/252	W6GO/225	K8TL/173	K9MM/306
HA8UB/175	YU1NZW/173	W2GND/127	AG4S/225	W4DJJ/182	KB6EP/126	WA6IGU/151	W8CEU/239	WD9IIC/199
HP1AC/200	W1FZ/269	W2MIG/266	KA4BFT/159	W4MPY/215	N6HC/128	WA6VJP/125	W8KBZ/143	KØCVD/189
JI1VLV/233	W1GG/176	W2PV/230	KU4J/163	N5AIL/183	N6JM/139	W7EDA/151	WA8KEM/110	KBØAB/154
JH7BRG/273	W1YY/260	AD3R/120	N4GG/150	W5UR/245	N6VR/209	K8HV/220	WB8JEY/271	WØNB/221

DXCC NOTES

Honor Roll reminder: Those wanting to update their Honor Roll standings or make the Honor Roll must have their cards into Hq. no later than June 30, 1981. Cards arriving after June 30, 1981 will not be included in the Honor Roll listing.

Strays

NOTES OF GOOD CHEER

☐ Hugh K. Cotton, W8FPM, injured in an automobile accident in 1978 and completely paralyzed from the neck down, has been on life-support systems since then. He would appreciate receiving cards and letters; send them to Hugh at this address: Veteran's Hospital, 3rd floor, room 302A, Third St., Dayton, OH 45428.

GATHERING IN MEXICO

☐ The Radio Club Queretaro is sponsoring a national ham convention for Mexico on July 2-4 in conjunction with the 450th anniversary of the city of Queretaro. More information may be obtained from the club at P. O. Box 632, Queretaro, Qro, Mexico. — *Ray Wangler, W5EDZ*

GOLD STAR FOR ATTENDANCE

☐ Charles Scholten, W9BZU, of Manitowoc, Wisconsin, has been present at every ARRL National Convention, with the exception of only three, since 1938. As evidence, Charles offers 21 convention programs. Can anyone duplicate or better this record?

The Tanners of Great Neck, New York, smile proudly — all of them are Extra Class licensees! In back are Alyson, AD2B, and Mike, AD2C; Dave, W2DT, and youngest son Joe, AD2D, are in front. They undertook their Amateur Radio studies as a family project with obviously successful results. *(photo courtesy W2DT)*

"THE THRILL OF VICTORY . . ." AND AMATEURS

☐ Organizers of the National Sports Festival, scheduled for late July in Syracuse, New York, are asking Amateur Radio operators to provide communications between the command post and all athletic events. The six-day festival, which is held in non-Olympic years to help U.S. athletes prepare for future competition, provides a good opportunity for Technician class and higher licensees to get involved in one of the largest public service activities held in that area. Interested, qualified amateurs should send an s.a.s.e. to CNYARO, Box 144, Syracuse, NY 13215. — *Vivian Douglas, WA2PUU*

I would like to get in touch with . . .

☐ amateurs in foreign countries who would like a pen pal in the U.S. I am 15 years old. Adam Boettiger, KA1FYF, P. O. Box 237, Norwich, VT 05055.

☐ radio operators who trained at Ft. Riley (Kansas) Cavalry Radio School and became members of the Sabers and Sparks Radio Club around 1943-44. George Makris, KA1BDP, 8 Malcolm Rd., Stoughton, MA 02072.

The recent Miami Hamboree was the gathering place for these members of the W-OH Finn-Net. Shown are: front row (l-r) WA1ORP, OH2VX, W5WCP, W1BHH, OH2TM and OH2IL; back row (l-r) OH2NP, KB2HN, OH4SE, W8DQB, OH2XA, K1KVJ and OH2QI. Further information about the Finn-Net may be obtained from WA1ORP, Box 97, Waquoit, MA 02536. *(photo by OH2TM)*

Adella Mueller, N3DQ, demonstrates SSTV to third-grade students in Hickory, Pennsylvania. Each year, Adella and her husband Art, WA3BKD, introduce students to the wonders of Amateur Radio using methods from solving simple puzzles in Morse code to listening to DX stations. Interest is always high. The secrets — presentations geared to the children's learning level and the natural affinity of youthful curiosity and Amateur Radio. *(photo by WA3BKD)*

Frustrated waiting for rare DX confirmations? Not so Red Layton, WB7DGP (right) of Tucson, Arizona. He patiently awaited his QSL card from HV2VO of the Vatican Observatory, and was surprised (to say the least!) when Father Edmond (left), while on a business trip to Arizona, delivered his card. "QSL direct" will never have the same meaning for Red! *(photo courtesy WB7DGP and Solid Copy)*

Hamfest Calendar

Conducted By Marjorie C. Tenney,* WB1FSN

[Note: Sponsors of large gatherings should check with League Hq. 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.]

Arizona: Hamfest '81, sponsored by ARCA (Amateur Radio Council of Arizona), will be held July 31, and August 1-2, at Fort Tuthill, Flagstaff, across from the airport. Talk-in on 22/82. Commercial exhibitors, open swapmeet, prizes, ladies' and children's activities, food and beverages. Campgrounds available. Friday and Saturday night dinners will be sold by limited advanced ticket sales (information available on request). Advanced registration tickets $2 or 3/$5. For more information, contact Michael Joseph, N7BYE, P. O. Box 14951, Phoenix, AZ 85063, or tel. 602-269-1691.

British Columbia: The Maple Ridge ARC is hosting Hamfest '81 July 4-5 at the Maple Ridge fairgrounds, 30 miles east of Vancouver. Registration: hams $4.50, nonhams $2, under 12 free. Dinner and dance $10. Food, prizes, swap & shop, bunny hunt, ladies' program. Camper space (no hookups). Talk-in on 146.34/94 and 146.19/79. For more information and advanced registration contact Bob Haughton, VE7BZH, Box 292, Maple Ridge, BC V2X 7G2.

†California: The Satellite ARC will hold its 1981 Santa Maria Radio Swaptest and BBQ at Union Oil's New Cove Picnic Grounds, south of Santa Maria off U.S. 101 on June 14 from 10 to 4. Awards, swap tables, QTH and QBK contests, R/C model helicopters, "T" hunt. Swap tables $2.50 each (approximately 2 ft. × 6 ft). Dinner tickets $7 adults, children 6 to 12 $3.50, under age 6 are free. Talk-in on 146.34/94. For tickets or info write to Santa Maria Swaptest, 1600 E. Clark #49, Santa Maria, CA 93455.

Connecticut: The C.Q. Radio Club will hold a two-day ham radio flea market June 20-21, at the Torrington Drop-In Center, East Albert St., Torrington, from 9 A.M. to 5 P.M. Indoor tables for sellers, outdoor area for tailgaters. Bake sale, refreshments, prizes and free parking. Admission $2. Table space $5 per table, or $3 per half table, tailgaters $2 per space. Talk-in on 146.25/85, 147.84/24 and 52. For reservations, tickets and general info contact Gil Donovan, WB1DVD, 50 Wood St., Torrington, CT 06790; Dave Johnstone, WB1COB, 19 Margerie St., Torrington, CT 06790; or The C.Q. Radio Club, P. O. Box 692, Torrington, CT 06790.

Idaho: The Treasure Valley Radio Association will sponsor the Fourth Annual TVRA Hamfest at the Payette, Idaho Mini-Dome June 20-21. The Voice of Idaho Club will help with the festivities. Activities include an ARRL representative, commercial exhibitors, swap tables and auction, prizes, ladies' programs, games and movies for the kiddies and free overnight parking for self-contained RVs. Further information can be obtained from Earl Medeiros, WB7RFS, 825 Orchard Park Dr., Fruitland, ID 83619, or Ben Cook, W7MHR, 78 N.W. 5th St., Ontario, OR 97914.

Illinois: The 52nd anniversary and annual hamfest of the Egyptian Radio Club, Inc., W9AIU, will be held at the club grounds near Granite City, on Sunday, June 14. Doors open at 8 A.M. Free coffee and donuts, prizes, refreshments, flea market, bingo, cake walk, children's activities, plenty of parking. Admission $1 in advance, and $2 or 3/$5 at the door. Tickets available from club members or write to Bess J. Nelson, KBØPG, 4 Covey Ct., Florissant, MO 63031 with s.a.s.e. Talk-in on 146.16/76 and 52 (all day), 3.993 MHz (6 A.M. to 10 A.M.)

†Illinois: The Six Meter Club of Chicago Hamfest will be held June 14 southwest of Chicago at Santa Fe Park, 91st and Wolf Rd., Willow Springs. Advance registration $1.50, at the gate $2. Large swappers' row, refreshments, AFMARS meeting, displays in pavillion, picnic grounds, plenty of parking. Advance tickets from Val Hellwig, K9ZWV, 1420 South 60th Ct., Cicero, IL 60650. Talk-in on 52 or WR9ABC, 37-97 (PL2A).

Illinois: Come see us on Father's Day. The IAARC will hold its 16th annual hamfest and flea market on June 21, at the Morgan County Fair Grounds in Jacksonville. Limited free indoor space, large outdoor flea-market area, free coffee and doughnuts from 8 to 9 A.M., food available. Talk-in on 52. Tickets $2 or 3/$5. See WB9RAT or WD9EBK for more info.

Indiana: The Lake County ARC will hold its 9th Annual Hamfest on June 21, at the Lake County Fairgrounds in Crown Point. Gate opens at 8 A.M. All tickets $2. Talk-in on club repeater 147.84/24 and on 52. Contact: "Mike" Evanson, KA9COM, 8037 Monaldi Dr., Munster, IN 46321.

†Indiana: The 35th Annual WVARA Hamfest will be held on June 21 at the Vigo County Fairgrounds, Terre Haute, south of I-70 on U.S. 41. Overnight camping available. Free outdoor flea market, covered flea market $2 for 12 ft × 12 ft space with some tables and ac available. Prizes, bingo, food and refreshments, giant shopping mall nearby. Advance tickets $2 or 3/$5, at gate $3, children under 12 free. Talk-in on 25/85 and 52 simplex. For tickets and information: s.a.s.e. to WVARA Hamfest, P. O. Box 81, Terre Haute, IN 47808.

†Kansas: The Pittsburg Repeater Organization, Inc. will hold its annual hamfest and picnic on June 14 at the Cunningham Park shelter house in Joplin, Missouri. For more information write to: P.R.O., P. O. Box 1303, Pittsburg, KS 66762, or Galen Helmkamp, WAØYVQ, 2108 Countryside Dr., Pittsburg, KS 66762.

Maine: The Yankee Radio Club will hold the Yankee Hamfest '81 on June 20 at the Oxford County Fairgrounds, Oxford. Computer displays, talks, ladies' and youth programs, swap tables, flea market, manufacturers' booths, cw contest, prizes, buffet dinner in the evening. Registration and dinner $8, $7 for early registration. Gate admission $2.50. Camper hookups available Friday and Saturday nights, $2 per night. Talk-in by Don Dean, W1BYK, on 146.28/88 and 52. For more information and registration send s.a.s.e. to Edward M. Fahey, Jr., W1OKS, 19 Farwell St., Lewiston, ME 04240.

Maryland: The Frederick Amateur Radio Club is sponsoring the 4th annual Frederick Hamfest, Sunday, June 21, at the Frederick Fairgrounds, East Patrick St., Frederick. Free parking, prizes, demonstrations, exhibits, flea market, tables and fm clinic. Grounds open 6 A.M. for commercial displays and tailgating, general admission 8 A.M. Donation $3, tailgating $2 extra, YLs and children free. Food and drink services provided from 6 A.M. Talk-in on 52. Further info: Hamfest Directors — Rick, N3RO, Peg, N3AIJ, 9425 Glade Ave., Walkersville, MD 21793, tel. 301-898-3233; commercial exhibits — Russell Kulp, Jr., AD3W, 9422 Glade Ave., Walkersville, MD 21793, tel. 301-845-6190.

Massachusetts: The Northern Berkshire Amateur Radio Club will hold its annual hamfest July 11-12 at Cummington Fairgrounds, Cummington. Dealers welcome. General admission $3 advance, $4 at the gate; family $5 advance, $6 at the gate. From Springfield: I-91 north to Northampton, Rte. 9 west to Cummington. From Pittsfield: Rte. 9 east to Cummington. Talk-in on 146.31/91. For further information contact: Herb Blake, WA1YQG, P. O. Box 567, North Adams, MA 01247.

†Michigan: The 7th annual Midland Hamfest, sponsored by the Central Michigan Amateur Repeater Association, Inc., is June 13 from 8 A.M. to 2 P.M. New location: The Great Hall, Valley Plaza, 2914 W. Midland Rd., Midland. Video tapes of the Saturn flyby. Table space $6 per 8-ft table. Trunk sales, $2 per space. Prizes, parking. Tickets $3, children under 12 free. Talk-in on 146.13/73 and 52. For overnight accommodations, tel. 517-496-4710. For further information, contact Carol V. Hall, WD8DQG, tel. 517-772-0363.

†Michigan: The annual Monroe County Radio Communications Hamfest is June 14 from 8 A.M. to 3 P.M. at Monroe Community College on Raisinville Rd., Monroe. Tickets $2 at the gate, $1.50 in advance. Wives and children free. Parking, contests, auction and displays. Plenty of table space. Talk-in on 146.13/73 and 52. Contact Fred Lux, WD8ITZ for information, P. O. Box 982, Monroe, MI 48161 or call 313-243-1088, Hot Line.

†Mississippi: The Chickasaw Amateur Radio Association will sponsor the Tri-State Hamfest June 13-14 in Hernando. Hours are 1 to 5 P.M. on Saturday and 8 A.M. to 2 P.M. on Sunday. Admission $3. ARRL Forum, DX forum, prizes, ladies' activities, lunch. Talk-in on 31/91, 52 and 3.987. Further information and reservations from CARA, P. O. Box 2, Hernando, MS 38632, tel. 601-368-9785.

Montana: The Sidney (Montana) ARC will hold the 26th annual Eastern Montana Hamfest June 20-21 at the Richland County Fairgrounds in Sidney. Overnight parking, flea market, used-gear auction, prizes and contests for all. Pot luck lunch Sunday. Talk-in on 52 and 7240 kHz. Contact Ron Martini, N7BMR, Box 449, Sidney, MT 59270.

New Jersey: The Raritan Valley Radio Club, W2QW, will hold its 10th annual hamfest and flea market on June 20, 8:30 A.M. to 4 P.M., rain or shine, at Columbia Park, Dunellen. Prizes, snack bar, $3 sellers, $2 lookers. Talk-in on 146.625/025 (W1QW) and 52. For further information call KB2FF at 201-369-7038, 9 A.M. to 4 P.M.

New York: The Staten Island Amateur Radio Assn. will hold its flea market on June 13 from 9 A.M. to 4 P.M. on the grounds of All Saints Episcopal Church, Victory Blvd. and Wooley Ave. (take I-278 to Victory Blvd. exit, 1/2-mile east on Victory Blvd.). $3 for sellers, provide own tables. Talk-in on 146.28/88 and 52. For further information, send s.a.s.e. to: WA2AMT, P. O. Box 495, Staten Island, NY 10314.

†New York: Radio Central ARC will hold its 3rd annual hamfest on Sunday, July 12, from 9 A.M. to 4 P.M., on the grounds of Mt. Sinai Elementary School, Rte. 25A, Mt. Sinai, Long Island. Prizes, food, cw contest. Buyers $1.50, wives and children free, sellers $3 per space. Talk-in on WA2UEC repeater or 52. For further information, please contact Lew Franklin, WB2VJO, 6 Jackson St., Nesconset, NY 11767, tel. 516-265-5614.

†Ohio: The Champaign-Logan Amateur Radio Club will hold its annual hamfest on June 14 at the Logan County Fairgrounds, S. Main St. and Lake Ave., Bellefontaine. Prizes, food, parking. Admission $1.50 advance, $2 at the gate. Tables $3. Talk-in on 52 and 147.60. For reservations, tickets or more details, write to Paul Amerine, WD8NEB, P. O. Box 185, West Mansfield, OH 43358, tel. 513-355-5352.

Ohio: The Clinton and Highland County Radio Clubs will sponsor their annual hamfest and flea market on June 14 at the Clinton County Fairgrounds on SR 22 in Wilmington, from noon to 9 P.M. Admission $3, flea-market space free with admission ticket. Sheltered area, come rain or shine. Food, auction, prizes. Camping available at nearby parks and camp grounds. Talk-in on 147.72/12, 147.81/21 or 146.52. For further information, contact Bob Lewis, KE8E, 192 Northview Rd., Blanchester, OH 45107, tel. 513-783-2740, evenings.

Ohio: The 14th annual Goodyear ARC Hamfest will be held Sunday, June 14, from 10 A.M. to 5 P.M. at Goodyear Wingfoot Lake Park, near SR 224 and 43 east of Akron. Dealer areas and flea-market space available to ticket holders, no additional charge. Tables available for picnickers, plus concession stands. Family admission $3. Prizes and free parking. Talk-in on 04/64. For further information contact Don Rodgers, WA8SXI, 161 S. Hawkins Ave., Akron, OH 44313.

Ohio: The Lancaster and Fairfield County Amateur Radio Club will hold its annual hamfest on June 21 at the P & R Party Barn, 4 miles west of Lancaster on Rte. 188, from 9 A.M. to 5 P.M. $2 in advance, $3 at the gate. Flea-market tables $2 (many inside), tailgaters $1. Activities for the whole family. Talk-in on 147.63/03 or 52. For more information write Box 3, Lancaster, OH 43130.

Pennsylvania: The Harrisburg RAC annual Firecracker Hamfest will be held on July 4th at the Shellsville VFW picnic grounds, Exit 27 off I-81 north of Harrisburg. Shade trees and pavillion, parking for 1000 cars. Admission $3, wives and children free. Tailgating $1.50. Talk-in on 52 and 16/76. For more information contact Richard A. Kerlin, K3AMI, 635 Lenker Rd., Harrisburg, PA 17111.

†Tennessee: The Plateau Amateur Radio Club will sponsor a hamfest July 4-5 at the Cumberland County Community Complex in Crossville. Admission $1. For further information contact PARC, P. O. Box 2621, Crossville, TN 38555.

West Virginia: The 19th annual TARA Hamfest, sponsored by the Tri-State Amateur Radio Association, will be held at Camden Park, Huntington, on June 7 from 9 A.M. to 5 P.M. Set-up time is 6 A.M. to 9 A.M. Commercial exhibits, large flea-market, ladies' and children's activities, prizes. Overnight space for self-contained RVs. Admission $3, children 12 and under free. Talk-in on 16/76. For more information write to Tri-State ARA, Box 1295, Huntington, WV 25715.

†ARRL Hamfest

*Convention/Travel Coordinator, ARRL

Coming Conventions

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

September 18-20
Dakota Division, Rochester, Minnesota

September 26-27
Roanoke Division, Virginia Beach, Virginia

October 2-4
South Florida Section, Clearwater

October 2-4
Texas State, Houston

October 3-4
Midwest Division, Salina, Kansas

October 9-11
Southwestern Division, Scottsdale, Arizona

October 10-11
Delta Division, Memphis, Tennessee

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

OHIO STATE CONVENTION

June 12-13, 1981, Cincinnati

A northern suburb of Cincinnati, Sharonville, will host this convention. Registration, hospitality room and Wouff Hong will be featured at the motel Friday evening. A flea market will open at 7 A.M. Saturday at Scarlet Oaks Career Development Campus; commercial exhibits begin at 8 A.M. Excellent prizes will be awarded.

Meet ARRL President Harry Dannals, W2HD, Great Lakes Division Director Leonard M. Nathanson, W8RC, and others. Computer Interface with Ham Radio, Teaching Ham Radio, VHF Amplifier Construction, FCC and ARRL are among the 18 forums.

Saturday's banquet will feature as principal speaker Ohio Congressman John Ashbrook. The Ohio Amateur of the Year and others will also be featured. Make reservations by June 8; the cost is $12.75. Convention registration is $5 by May 29, then $7. Flea market, as available, is $7 per space (limit four). For further information, write to Cincinnati ARRL '81, P. O. Box 46311, Cincinnati, OH 45246. Motel information should be directed to LaQuinta Motor Inns, 11335 Chester Rd., Cincinnati, OH 45246, tel. 513-772-3140. Mention the convention for special rates, available at least through May 29.

Talk-in will be on 146.07/67, 16/76 and 28/88. Family activities will also be an attraction.

GEORGIA STATE CONVENTION

June 20-21, 1981, Atlanta

The Georgia State ARRL Convention and Atlanta Hamfestival will be held on June 20 and 21 at the Atlanta Marriott Hotel. Over 100 commercial exhibitors will be showing the latest in ham and computer gear. The exhibit hall will be open from 9 A.M. to 5 P.M. on Saturday and from 9 A.M. until 3 P.M. on Sunday. The gigantic, covered flea market opens at 6 A.M. both days. Flea-market spaces are available on a first-come, first-served basis at $8 per space per day. There will be plenty of forums on DX, technical subjects, vhf, computers and many other topics. Registration is $4 in advance, $6 at the door. If you do not receive a pre-registration mailer before May 15, write to The Atlanta Hamfestival, 4870 Westfalia Ct., N.E., Atlanta, GA 30342. For hotel reservations, write directly to the Atlanta Marriott Hotel, Courtland St. and International Blvd., Atlanta, GA 30303, or call 404-659-6500. Mention the Atlanta Hamfestival for special room rate. Talk-in will be on 146.22/82.

WEST VIRGINIA STATE CONVENTION

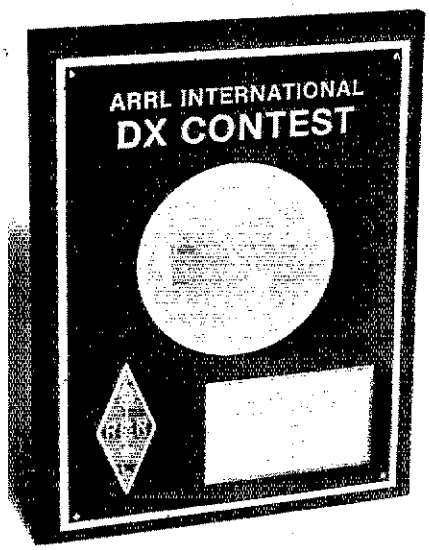
July 4-5, 1981, Jackson's Mill

The 23rd annual West Virginia State ARRL Convention, sponsored by the West Virginia State Amateur Radio Council, will be held at Jackson's Mill 4-H Camp, near Weston, on July 4 and 5. Commercial exhibitors and flea marketers are welcome — no charge. There will be many prizes — including some for the ladies and children.

The program will include an ARRL forum, cw contest, technical forums and various meetings. Guest speaker from the League will be John Lindholm, W1XX.

Registration will be $6 at the Mill, or $5 in advance. Dormitory-type lodging and meals are available at a reasonable rate. For more information contact Karl D. Morris, WB8GDY, 1009 Sand Hill Dr., St. Albans, WV 25177. Come to the beautiful mountain state and enjoy an Amateur Radio convention with friendly people. QST

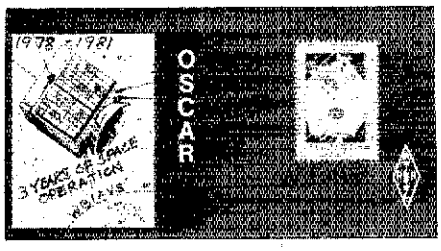
Strays



Shown is one of the more than 75 plaques that were recently mailed to winners of the 1980 ARRL International DX Competition. The multicolored, etched and engraved plaques have sparked an increase in overseas DX-Competition participation, and over 100 plaques have been offered for the 1981 contest!

AMSAT-OSCAR 8 COMMEMORATIVE QSL CARD

☐ Each year, the ARRL issues a special QSL card to anyone who sends a report of receiving signals from the AMSAT-OSCAR 8 satellite during a specified operating period. The 1981 QSL features the Soviet 4-kopeck postage stamp devoted to Amateur Radio satellite activities. This stamp is the first to show the spacecraft RS1 and RS2, which were launched seven months after OSCAR 8. The message, "October 1978 — Radio Amateur Sputniks," is highlighted.



March 5 marked the completion of three years of successful operation for OSCAR 8. It has provided flawless service to Amateur Radio operators, students and teachers worldwide. Designed to last only three years, OSCAR 8 will now last much longer because of the operations management by volunteer Amateur Radio command stations in Europe, Australia, Canada and the U.S.

Anyone may receive free information about Amateur Radio satellites by writing to the ARRL, 225 Main St., Newington, CT 06111. *— Bernie Glassmeyer, W9KDR, OSCAR Program Manager*

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

A VHF/UHF Primer — Antennas

The lead portion of this column over the last few months has been devoted to the basics of the world above 50 MHz. The first in that series, carried in the March issue, dealt with a general review of what bands we have at vhf and uhf as well as a review of their general propagation characteristics and activity patterns. In April, the subject of equipment was examined. At that time, a treatment of antenna systems was promised for a future column. Here it is.

It is often correctly stated that the antenna is the most important item of equipment in any radio setup. Nowhere is this more true than on the bands above 50 MHz. Fortunately, it is one of the items most easily fabricated by the home constructor. Those who wish to "roll their own" can find design and construction information for a number of vhf and uhf antennas in *The Radio Amateur's VHF Manual* and *The Radio Amateur's Handbook*. In addition, *QST* has, over the years, carried a variety of construction articles for effective vhf/uhf antennas. One such design has had a particular impact on operation on the 2-meter band and above. This is the quagi by K6YNB/N6NB that appeared in April 1977 *QST*. An update of that article, which included a longer-boom version of the 70-cm quagi, can be found in February 1978 *QST*. Even for the neophyte antenna builder, the quagi represents a good choice because, if directions are followed closely, little can go wrong. For those who prefer the Yagi approach, a series of designs that appear to work well have come along in recent years. These are the designs developed by the National Bureau of Standards, some of which are described in the 1981 *Radio Amateur's Handbook*. A more exhaustive treatment of the NBS information is presented by Joe Reisert, W1JR, in the August 1977 issue of *Ham Radio Magazine*.

Note that all of the antenna designs discussed above and all that follow are intended for weak-signal, long-haul work. This discussion does not cover "handi-dandy" whips that clip onto your hatband to give your hand-held another half mile of coverage, or those 5/8-wave specials that "bring in all the repeaters within 30 miles of the QTH." I hasten to state that there is nothing wrong with such antennas for the local work for which they are intended, but this column generally deals with a different kind of vhf/uhf operation.

For those who do not wish to construct their own antennas, several manufacturers now offer high-performance designs. This general availability of commercial vhf and uhf antennas that work well is a relatively new development which has occurred over, perhaps, the past five or six years. Prior to that, with few exceptions, most commercial products did not stack up with well-constructed home-built jobs at the various antenna gain tests held across the country. One manufacturer, KLM, probably deserves a major share of the credit for making available to amateurs antennas that performed the way they should for their size and number of elements. And because of their use of a log periodic, driven-element system pioneered by Oliver Swan, the KLM offerings display greater bandwidth and are generally less critical than are most conventionally fed Yagis. It was this criticality that was the undoing of many former commercial attempts, and a lot of home-built efforts as well. The basic designs were okay, but even small departures in element dimensions, including diameter or even boom thickness, were enough to substantially degrade performance. Take, for example, the manufacturer who offered a product similar to the Telrex 15-element, 2-meter beam but with a slightly different method of attaching the elements to the boom. This difference detuned the elements, shifting the resonant frequency of the antenna, upsetting its performance. The simple expedient of cutting 1/4 inch from both ends of all elements made this a fine antenna, worthy of its size.

As stated above, things are different now. Thanks to the several antenna-gain competitions conducted at various locations across the country each year and the widespread dissemination of their results, commercial antennas must measure up or they aren't bought by vhf/uhf enthusiasts who are striving to get the maximum performance from their stations. KLM was soon joined by the F9FT, or Tonna, line of antennas that were for several years not imported into the U.S. N&G Distributors of Miami, Florida, have recently announced availability of these well-regarded products. Lunar and Wilson have recently come on the scene with high-performance vhf antennas, and Cushcraft a year or so ago introduced their line of "Boomers." These have shown up well in several antenna-gain contests and are becoming very popular among the vhf/uhf fraternity. Most of these manufacturers offer antennas for 6 meters through 70 cm. In 70-cm antennas, another name is well known — the RIW, a 19-element Yagi developed by Dick Knadle, K2RIW. The RIW is now being manufactured by Tama of Japan and is available through Lunar Electronics, San Diego. This design provides a mark to shoot at for the other builders of 432-MHz antennas.

So far, I have been talking about single antennas. What about multiple antenna arrays? Cannot one get additional gain by going this route? The answer is a definite yes. For example, in upgrading to moonbounce capability, it is mandatory that one use some sort of multiple antenna array, or a good-size parabolic dish. The group to which this discussion is aimed, however, is the new or prospective vhf/uhf operator and, for them, moonbounce is certainly a project for the future, not the present. I do plan to devote one or more columns in this series to the fundamentals of moonbounce; that will be a few months down the road. For the new vhfer, I recommend staying with the single antenna. Whether you decide to build it or buy, select a reasonable size design. For 6 meters, I would recommend five or more elements. For the higher bands, something equivalent in size to the 2.2-wavelength NBS design would appear to be a good minimum.

What about height? Within reason, the answer is almost always the higher the better. I would argue that 30 feet above ground represents an acceptable minimum. The type and condition of the feed line is very important, particularly on 2 meters and above. Use new, good-quality coaxial cable. If you can get your hands on some 50-ohm "hardline," so much the better. This is sometimes available at flea markets, but don't be fooled by the cable-TV variety that usually has a characteristic impedance of 72 ohms. Such cable is usable but, since most transmitters and antennas are designed for 50 ohms, the use of cable with other impedances requires special precautions if optimum results are to be obtained.

Remember that, almost universally, weak-signal work is done with horizontal polarization. This is contrary to the polarization used for fm operation where compatibility with mobile whips is of primary concern. There is a severe loss of signal when antennas are cross polarized to one another. So, if you want best results for ssb/cw weak-signal work, by all means mount your antenna for horizontal polarization. Next month, I'll present a discussion of some fundamentals of meteor-scatter operation.

Good luck and see you on the bands.

THE TRANS-ATLANTICS REVISITED

A group of mostly East Coast, 50-MHz operators, in company with a group in Europe, have commenced a concerted attempt to accomplish Es contacts across the Atlantic. Both 6- to 6-meter and 6- to 4-meter QSOs will be attempted. Remember that, last summer, several East Coast 6-meter stations contacted ZB2BL, and that VE1ASJ made 6 to 4 hookups with G4BPY, G3COI, G4ENA and G4ENB/A late in 1980. The propagation mode responsible for the 70-MHz signals getting across is not known, although Andy's 6-meter signals were certainly making it via F2. A number of those knowledgeable in the ways of propagation feel that the probability of 70-MHz signals traversing the Atlantic is greater on Es than on F2. After all, the 4-meter band is 20 MHz above our 6-meter assignment. That's a lot in terms of F2 maximum usable frequency, whereas we know that Es must extend to 144 MHz and beyond.

Participating stations on this side are making regular transmissions toward Europe using automatic keyers (beacon style) on the low end of the 6-meter band at times when conditions look promising. They will attempt to listen on both 50 and 70 MHz between transmissions. Liaison will be on 28.885 MHz, if it's open. Otherwise 21.400 or 14.345 will be used. A list of phone numbers of actively participating stations will also be made available to those taking part. A net will be held each Saturday at 1900Z on one of the

*Send reports to Bill Tynan, W3XO, P.O. Box 117, Burtonsville, MD 20730, or call 301-384-6736 and record your message.

above frequencies to discuss progress. Also the 2359Z Tuesday evening net, which meets on 3821 kHz, will be used to disseminate information of success or lack of it.

To this conductor, the prospect of working across the Atlantic via 50-MHz Es is almost as exciting as the trans-Atlantic tests conducted in the 20s when amateur signals first spanned the ocean, must have been to those participating in those historic experiments.

ON THE BANDS

6 Meters — By the time you read this, we ought to be experiencing the beginnings of the summer Es season. It should be an exciting one if many of the nearby DX stations, which became active as a result of F2 propagation, remain on the band to take advantage of the coming Es. One who has promised to do just that is VP2VGR in the British Virgin Islands. Tim is a dedicated and alert operator and should provide a previously rare country to a lot of W and VE stations. Other Caribbean catches to watch for include 8P6KX, 9Y4LL, HH2MC and FM7AD to name just a few. In addition to these resident operators, several interesting DXpeditions are in the offing. K2MUB reports that the North Jersey DX Club is mounting a trip to French St. Martin between June 24 and July 7. The call will be FG0DDV/FS. WA8ONQ writes that he and a group of savvy vhf operators [my description, not his — Ed.] will be operating from Antigua, as WA8ONQ/VP2A, and Montserrat, as VP2MNQ, during the upcoming ARRL VHF Contest and the SMIRK QSO party. This group also expects to operate on 2 meters. VE1AVX plans a trek to Anguilla, activating VP2ET. And probably not last and certainly far from least, K1FJM will be journeying to Cayman Island to appear as ZF2EW for the ARRL event and possibly the SMIRK affair as well.

But as this is being written, at income tax time, the Es season hasn't begun. F2 is still king, at least for those who inhabit the lower latitudes. W7KMA of Phoenix, Arizona, has been having a field day with the South Pacific. Tom reports contacts with ZLs 4OY, 3ADT, 2CD, 3NE, 1AKW and 2AQR around 2000Z April 13. On the 16th, about an hour later, he worked ZL1AVD and YJ8PD! The following day brought a few more ZLs and then, at 2118Z, VK2ASZ both ways on 52.005! As if that were not enough to rub salt in the wounds of us Easterners, on April 19 he came up with VK4AYX, also above 52 MHz. W5UWB near Corpus Christi, Texas, has had his share of good fortune, too. Just after 2030Z April 17, John worked H44PT and YJ8PD. I think I'll move! Another report comes from KH6BZF. Lee says that at 0920Z on April 11 he had a contact with ZS2SS. It is interesting to note that this is only five days short of a year since ZS6LN QSOed three KH6s. These F2 paths certainly appear to display a pattern with respect to the part of the earth favored at particular times of the year.

KØTLM recounts the results obtained in the VP1A DXpedition of which he was a part. They set up shop on March 27 and, beginning at 1945Z, hooked up with ZLs 1AKW, 2CD, 2KT, 3NE, 3ADT, 4LV and 3AQ over a period of about an hour and a half. VKs 1FT, 2BA, 2ASZ and 3OT reported hearing the Belize operation, but Tom could hear nothing on 52 MHz, above which the Aussies are confined. The evenings were whiled away working TE, with catches such as LUs 1DDW, 7DZ, 6DLB, 9AEA, 3EX and 8WAT. That last station was only running a barefoot IC-502! The following afternoon they added ZLs 1AUM and 1MQ to their list of New Zealanders. A contact between ZL1AKW and ZF2DN was overheard. Tom understands that other ZLs also managed to work the Cayman Island station. VP1A was again reported by several VKs but once again, no propagation was present at 52 MHz. South American stations worked via TE the second evening included LU8DYF, LU1DMA and CP8AZ. Just prior to pulling up stakes at 0300Z on the 31st, they worked several other ZLs. Quite an interesting place from which to operate.

The evening hours of April 11 and 12 brought one of the strongest auroras in some time. As an example of the strength are geographical coverage of reflecting medium, K4JSI, in the Virginia suburbs of Washington, worked 11 states using just 10 W and a 3-element beam. Cal's contacts ranged from South Carolina to Iowa.

The SMIRK contest is scheduled, this year, for June 20 and 21. Send an s.a.s.e. to K5ZMS for rules and log sheets.

That's all of the 6-meter information space permits this month. CU around 50.2!

2 Meters — Without doubt, the most outstanding event of this reporting period was the widespread aurora of April 11 and 12. Unfortunately, the big opening occurred so close to deadline that accounts received in time for inclusion are scarce and fragmentary. One report from Montana is contained in a letter from KB7Q. In addition to listing a long string of contacts made on 6 meters, Gene notes that nearby station KA7DLC was active on 2 meters working stations in Utah, Washington and Alberta. W5JTL of Vicksburg, Mississippi, writes that the auroral conditions reached as far south as his QTH. George heard many stations over a period of 30 minutes but was able only to work WØQOA in Topeka, Kansas. WØRT, Kansas, reports contacts with 14 stations in nine states from Colorado (WBØQMN) to Virginia (WA4SBC). Rich says that most signals were 5×9A. VE5JQ, Saskatoon, is new at vhf and hence was anxious to make as much hay as possible on both 6 and 2 meters. Splitting his time between the two bands, John managed 2-meter QSOs with VE6CY, Edmonton, and VE6SW, Calgary, using only an IC-251A and a 5-element beam.

The other major propagation enhancement taking place in early spring was a strong tropo opening which occurred along the East Coast. NI4Z, formerly WD4IXK, of Orlando, Florida, says that the opening began Friday evening, April 3, when stations in Georgia, the Carolinas and Virginia appeared. The following morning, the band had stretched out even farther, and Condy hooked up with W1HHE on Cape Cod and WA4MMP/1, Rhode Island. W1HHE, in turn, reports contacts with Florida stations NI4Z, WD4FAB, WB2RUL/4, W4ZD, N4CNF, WB2OTK/4 and W5HUQ/4; South Carolina stations K4SAO, K4KAE, KB4XU, W4USW and NA4U; North Carolina stations K4CAW, K4GMP, WA4GBE, WA4LBT, KM4K, WB4HIE and K4AGV; Georgians W4ISS, WA4SBC and WA4UAF, as well as WA4GMP in Virginia. Bill also notes that VE1UT was able to work into Florida using a vertical whip. He observes that this was a very strong opening although confined to stations along the coast, at least at the northern end. One participant not along the coast, N4CD in Lynchburg, Virginia, reports working Florida stations AGØT/4, W4WAF, W4ZD, WB2RJL/4 and, a new state for Bob, WA4HBM in Alabama. The strongest part of the opening seemed to be from early in the morning of Saturday, April 4, until about 9:15 AM EST, although W1HHE observed the conditions throughout most of the day and into the evening. WD4FAB in Orlando also cites the tendency of the opening to follow the coast. Dick states that stations in his area were able to take part, but that those in Gainesville, 100 miles (160 km) to the northwest, could not hear the signals from the north.

W8TN of West Virginia is a new catch on 2-meter EME. That news should make a lot of western-state hunters happy. So far, Clark has worked K1WHS while using only 80 W and four Boomers. An 8877 amplifier is completed and should be on as soon as he can get a tube. Another aspiring EMer is WA2OKT/3. Larry has four KLM 13-element beams up but, so far, has no elevation capability. He is looking for skeds during the June ARRL VHF Contest and can be contacted at tel. 213-264-7447. K2OS, using an 8877 and the same antenna arrangement as WA2OKT/3, is also available for schedules on any mode for anyone needing the Empire State. Address Frank Pollino, 8904 Fargo Rd., Stafford, NY 14143.

1-1/4 Meters — N4JS/5 of Meridian, Mississippi, says that he is now running 75 W to a 1-1/4-meter version of the Cushcraft Boomer. The transverter is made up of the new Hamtronics 50-220 modules. John reports that they are excellent and are greatly improved over other older designs obtainable in kit form. From Toccoa, Georgia, WD4IIS writes that he will have an array of four quagis by the time this appears in print. His amplifier is a scaled-down version of the 2-meter, 1-kW "plumber's special" from *The Radio Amateur's VHF Manual*. Information on building the unit is available from WD4IIS for an s.a.s.e.

A very interesting comment is contained in a recent issue of the *Texas VHF-FM Society News*. It was part of an account describing the setting up of a temporary 60-mile fm link in connection with a major hamfest. When they first tried the circuit, signals were weak, but upon changing from the "normal" vertical polarization to horizontal polarization, the signal strength picked up, producing a margin of safety. Remember the old horizontal vs. vertical debate that comes up every few years?

70 Cm — That Gulf Coast, which produces so much good tropo propagation, was at it again the evening of March 30, according to W5UWB near Corpus Christi. After working a string of Louisiana, Mississippi and Florida stations, as well as one in Georgia, on 2 meters, John switched over to his 10-W, 70-cm setup and nabbed W4ODW, K4KJP and WD4JEJ — all in Florida. Quite impressive when you consider that this is a path of about 900 miles (1400 km). The coastal tropo of early April, mentioned in the 2-meter section, produced some fine DX QSOs on this band as well. N4CD of Lynchburg, Virginia, came up with a new state in the form of NI4Z in Florida. WD4CXU of Appomattox, Virginia, and K4CAW of Greensboro, North Carolina, also worked NI4Z — representing a new state for both of them. WD4MBK, one of the operators at W4ATC, the club station at North Carolina State University, also reports working NI4Z, whose 70 W was S-9 plus 20 dB in Raleigh. As an experiment, they reduced power until each was running about 100 mW and still maintained solid copy.

WD4MBK also reports on the success of the East Coast 70-Cm Net which meets each Wednesday evening beginning at 2100 EDT. He says that, even during the winter months, the net boasts regular check-ins from Atlanta to New York City. Net control is usually W4ATC, with K4CAW as alternate. The net makes a good opportunity to check out your station and possibly line up skeds with needed states. Everyone who can hear the net control is invited to check in. Charles also recounts some interesting pieces of information. One concerns the Doppler-shifted reflected signal from K4CAW while that station is running his regular Tuesday- and Thursday-evening schedules with K2RIW. From the plus 140-Hz shift measured, Charles can only conclude that the returns are coming from jet airliners. Many talk, from time to time, about the use of aircraft bounce for completing regular long-haul skeds. Charles also notes that K4CAW has been running schedules with K5JRH in Houston, a 1000-mile (1600-km) path. The two have copied some signals as of early April, but no QSO has taken place yet. Attempts like this push the frontier of vhf/uhf propagation. Let's hear more of work such as this, as well as reports of success or the lack of it.

The moonbounce activities of WB5LUA have paid off in a QSO with KL7WE, representing state number 49. Al now needs only Nevada for WAS.

23 Cm — WA7JUO of Las Vegas, says that he should have a quad of 44-element loop Yagis going for tropo by the time this appears. Sam also expects to have eight to 12 of the same type antennas ready for 23-cm EME soon. The rig produces about 90 W, and he is actively seeking EME skeds. One who has definitely arrived on the 23-cm EME scene is WB5LUA. Al is using a 24-ft stressed dish with a horn feed system developed by W2IMU. Polarization control is included that can be directed from the shack. The amplifier is of the OZ9CR type using six 7289s and it produces 275 W. The receiver front end uses a DXL-2503 GaAs FET with a noise figure of 0.7 dB mounted at the feed point. As of the end of March, WB5LUA has worked K2UYH, VE7BBG, G3LYF, LX1DB, G3WDG and K4QIF.

N6CA passes along information on a very interesting, and potentially useful, project. It's a beacon transmitter, which Chip built along with WA6MEM, to be installed in Hawaii by KH6HME. The rig runs 30-W output to a 25-element loop Yagi. Also included is a 1.4-dB noise figure receiver to be used for two-way work when the transpacific duct appears. It is usually evident several times each year. The frequency of the beacon will be 1296.001 MHz plus or minus 500 Hz.

23-Cm Standings

Figures are states, U.S. call areas (plus VE and XE call areas, plus other DXCC countries not located within the borders of the above) and best DX in miles. Distances are in statute miles for farthest terrestrial contact. (*indicates EME capability.)

K1PXE	13	5	448	W5GVE	1	1	366
K1FO	11	4	405	K5PUF	1	1	290
W1JR	10	4	475	WA5HNK	1	1	250
W1XP	7	5	300	K6ZMW	4	3	405
KA1GT	7	4	360	N6CA	3	2	338
W1QXX	6	3	260	W6XJ	2	3	250
WA2LTM*	17	6	770	W6OQQ	2	2	200
K2UYH*	17	6	770	N6NB/6	1	2	360
W2VC	13	5	537	WB6NMT	1	1	296
K2JNG	10	4	305	N6TX	1	1	112
W2DWJ	10	4	200	N6VI/6	1	1	94
K2YCO	9	6	570	K7GNV/7	3	3	402
K2EVJ	7	5	335	N6CA/7-UT	1	1	345
WA2VTR	6	4	320	N6CA/7-NV	1	1	215
WA2FUZ	5	3	125	W7LUX	1	1	130
WA2EUS	4	5	320	W8YIO	9	6	551
W2PGC	4	4	473	K8WW	6	4	448
K2OVS	3	2	135	WB8PAT	3	3	405
W3HMU	11	5	300	WB8BKC	3	2	165
K3IUV	9	4	290	W9ZIH	10	5	790
WA3JUF	7	4	300	WB9SNR	7	4	500
K4QIF	15	6	790	W9UD	5	4	760
K4NTD	3	2	847	W9HUV	5	3	525
W4VHH	2	1	350	W9JIY	5	3	300
W4LDV	1	1	290	W9WCD	3	3	770
WB5LUA*	8	7	839	W9JTP	3	2	165
K5LLL	2	2	847	W9AAG	2	2	350
W5LDV	2	2	847	WØPW	3	2	97
WB5TCO/5	2	2	218	WØZJY	3	1	170
W5HN	2	1	365	WØMDL	2	2	340
W5UKQ	2	1	365	WØVB	2	2	290
W5HPT	1	1	571	XE2BC	1	1	420
WA5TBE	1	1	372				

Results, 34th ARRL VHF Sweepstakes

One, two — tropo's due; three, four — boost your score; five, six — relay clix; seven, eight — scatter's great; nine, ten — CU AGN!

By Bill Jennings,* K1WJ

It's got to happen sometime — a weekend on which the VHF Sweepstakes coincides with 34 hours of fantastic propagation, huge band openings and an unlimited number of stations to be worked. Alas, that wasn't in the cards for the 1981 SS (January 17-19). It was a rather typical weekend for vhf contesting with most contesters reporting poor to fair conditions — one of those weekends where you just keep plugging away, hoping to catch one of those all-too-rare short openings or wait to pounce on that "new" station which causes a "mini pile up" just as your interest in the contest is starting to wane. Weekends exactly like this allow a real vhf contester to show his or her stuff. A vhf contester will suffer through these "lean" contest weekends, but will also try to turn those adversities to some good advantage by using the very best of operating techniques or by being able to make some mid-contest equipment improvements. Most important of all, he or she will use the present contest as a learning experience for future efforts.

We lost some old "friends" in the '81 SS as 969 entries were received to mark their "passing." Those "friends" were, of course, some real old-timers of all-time division records. Down Oklahoma way, K5CM and multiop partner N5KW just have to get the award for laying to rest the longest-standing, all-time division record. Connie and Pam put the zap on that 22-year-old K5STI multiop record in the West Gulf Division. Just as effectively, in the Southwestern Division, N6NB and second operator N6VJ erased the 18-year-old all-time division record of the W6FNE/6 group by better than doubling the old record score. The K2XR crowd went back a healthy five years and added almost 11,000 points to the previous Hudson Division record. Equally impressive scores assured multioperator stations W3KKN, K9HMB, WA1RWU and WB7DTI positions on the all-time division leaders' record book in their respective divisions.

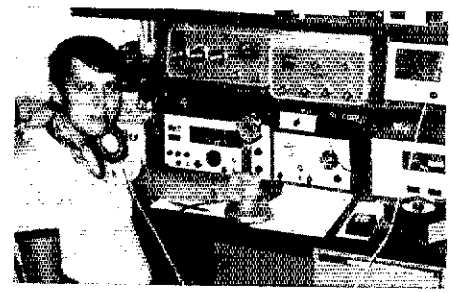
The single-operator assault on those venerable division records was spearheaded by WBØZKG. Overcoming several equipment failures, Charles managed to break the 13-year-old Midwest Division record with 4 kilopoints to spare. WØRGU, one of the honchos of the Rochester (MN) ARC, doubled the previous high single-op score in the Dakota Division, a record that had been established in 1976. WA3AXV, WA1MAO and C6ADV are all due congratulations for efforts in establishing new single-operator records in their own divisions.

In comparing the 1981 SS with its 1980 predecessor, we find a 2% reduction in the number of entries received from the 1980 total of 987. There was also a large drop in the average top-ten, single-operator score. Where the 1980 "top tenner" averaged a score of 57,624 points, the 1981 counterpart averaged a 49,397-point score. There is, of course, always that one exception, and he is old "numero uno" — WA3AXV. Again the top single op in the VHF SS, Ron is the only member of the "returning top ten" whose score increased. HM (His Majesty, of course,) Ron credits his success to those short 6-meter openings on Sunday afternoon and to the addition of a 1296 station to his arsenal. Those eight-point QSOs really do help. WA2DPU moved from number five on the 1980 top-ten list to number two in

*Communications Assistant, ARRL

Single Operator Call Area Leaders — QSOs per Band

	50	144	220	432	1296
WA1MAO	180	370	65	32	—
WA2DPU	223	367	66	73	—
WA3AXV	198	379	97	81	13
W3IY/4	97	179	21	29	—
WA5VJB	60	147	30	17	—
K6KLY	47	113	24	23	—
WA7UQV	55	109	15	—	—
WA8ONQ	175	192	—	26	—
W9EOH	201	152	—	—	—
WBØZKG	152	63	—	9	—
VE3CRU	60	110	11	32	4
C6ADV	5	—	—	—	—

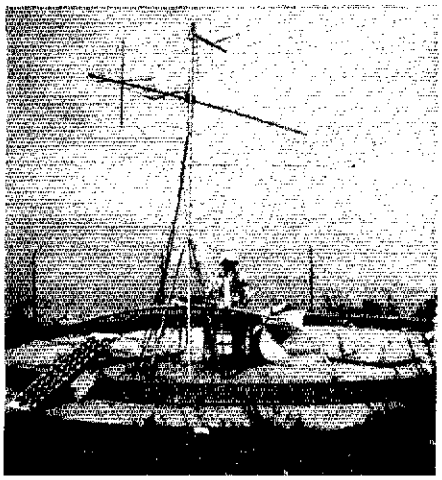


WA5VJB from the Northern Texas Section. Kent turned in the top single-operator score in the West Gulf Division.

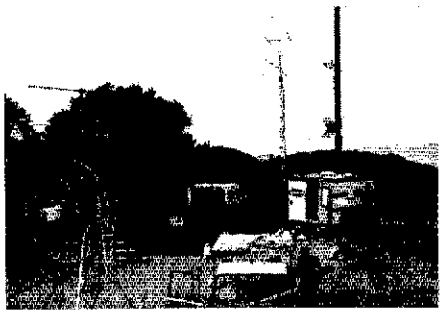
Division Leaders

Single op Call	Score	Division	*Multiop* Call	Score
VE3CRU	13,440	Canadian	VE3LNX	12,880
WA3AXV*	80,770	Atlantic	W3KKN*	52,272
W9OEH	26,122	Central	K9HMB*	72,424
WØRGU*	16,000	Dakota	WØHSC	3116
WB4JGG	8176	Delta	K4VPK	4074
WA8ONQ	38,548	Great Lakes	W8DJY	53,424
K2MLB	31,500	Hudson	K2XR*	76,000
WBØZKG*	16,776	Midwest	KØTLM	9620
WA1MAO*	55,130	New England	WA1RWU*	76,416
WA7UQV	5820	Northwestern	WB7DTI*	10,008
K6KLY	10,668	Pacific	WB6NMV	14,028
W3IY/4	22,560	Roanoke	WA4WZQ	4572
WØYK	2700	Rocky Mountain	AAØL	3528
WA4NPL	2688	Southeastern	WA4NJP	14,910
K6LMN/6	7800	Southwestern	N6NB*	46,750
WA5VJB	10,506	West Gulf	K5CM*	14,910
C6ADV*	120	DX		

*denotes new all-time record



Roger, K6LMN/6, went at the January VHF SS, Field Day style, solar power and all. When "two fun days of contesting" were over, Roger came down the hill as the Los Angeles Section and Southwestern Division single op winner.



The Los Padres Microwave Group, WA6OYS, set up on Red Mountain in Ventura, California. From left to right are: WB6UNH, W6OAL, WB6YQN, WB9KMO and WA6OYS. Not shown are K6HXW and WA6EJO.

Top Ten

Single Operator		*Multioperator*	
Call	*Score*	*Call*	*Score*
WA3AXV	80,770	WA1RWU	76,416
WA2DPU	60,480	K2XR	76,000
W3HQT	55,860	K9HMB	72,424
WA1MAO	55,130	WB1FVS	54,096
WB3CDE	52,170	W8DJY	53,424
WA3WAS	46,376	W3KKN	52,272
WA8ONQ	38,548	N6NB	46,750
W3ZD	37,056	WB3CZG	41,748
K3MWV	33,988	WA3YVE	38,460
W2EIF	33,600	N2BOW	33,640

1981, while WA1MAO made the leap from eight to number four in '81. Congrats to Bill, Stan, and W3HQT, WB3CDE and K3MWV for retaining positions on the top-ten list. Welcome newcomers WA3WAS, WA8ONQ, W3ZD and W2EIF.

Multioperator-station average scores increased to 54,523 points per entry in '81 compared with 46,845 points in 1980. The WA1RWU operators found themselves on the plus side of their 1980 score by over 6,000 points to lead the way as the number-one multioperator score in the 1981 contest. Equipment problems and some really nasty weather conditions put an end to the 'RWU efforts to break the K8III 1979 VHF SS record of 81-k points, but a new New England Division record is a pretty fair consolation prize. W8DJY, W3KKN and WB3CZG are all top-ten multiops you'll probably remember from the 1980 top-ten list. Say "hi" to new multiop top-ten stations K2XR, K9HMB, WB1FVS, N6NB, WA3YVE and N2BOW. We know that several of these "newcomers" to the top ten for multis have been there in years past, but weren't there in 1980.

Club Competition

Time to celebrate a "china" wedding anniversary. It's been 20 years since the Packrats first "married" the title of "top club" in the VHF Sweepstakes back in 1961. Congratulations and best wishes to the Mt. Airy VHF Radio Club, again number one in the SS, unlimited class.

Look in the Western New York listings and you'll see a lot more A, B and C band designations than appeared in 1980 for the same listings. The number two club, the Rochester VHF Group (NY), is in the midst of a major building effort for the VHF SS; but for 220 kilopoints, they would have been on top in 1981. Look out, Packrats.

The Rochester ARC (MN), with virtually the same number of entries, managed to effectively double their 1980 point total to round out the top three in the unlimited class of club competition.

The Ramapo Mountain ARC, second in the medium class in 1981, put out a super effort to take the 1981 medium class club gavel. A well-deserved second place in the medium class was won by the Hampden County Radio Association (MA). Last year's medium-class winner, the South Jersey Radio Assn., slipped into third place, but well within striking distance of the top. Don't count them out for '82.

The local class in the club competition, won by the Gloucester County ARC (NJ), just squeaking past Penn Wireless, saw six clubs that are new to the SS club competition enter for the first time. A hearty "well done" to all who turned out to compete for individual and club honors.

An ad hoc committee has been set up with members of the Contest Advisory Committee, the ARRL Awards Committee and interested vhfers to study some basic philosophical questions regarding ARRL vhf/uhf contests. A close look will be taken at the goals of both the ARRL and the contest community to see how well the present contest program meets them. Recommendations will be made after considerable study. Contact John Lindholm, W1XX, at ARRL Hq., and detail your views of what the goals for vhf/uhf contesting should be and how they should be implemented. Be sure to keep in close contact with your CAC representative after the ad hoc committee makes recommendations.

CU in the 1982 VHF Sweepstakes.

Club Competition

Club Name	*Score*	*No. of Entries*	*Club Winner*
Unlimited Class			
Mt. Airy VHF RC (DE/NJ/PA)	1,176,834	71	WA3AXV
Rochester VHF Group (NY)	958,975	197	WA2ZNC
Rochester ARC (MN)	83,218	58	WØRGU
Medium Class			
Ramapo Mountain ARC (NJ)	281,778	34	K2MLB
Hampden County Radio Assn. (MA)	213,746	45	AC1T
South Jersey Radio Assn.	175,700	19	WA2KOK
Potomac Area VHF Society (MD/VA)	154,640	22	K3DUA
West Jersey Radio Amateurs	110,074	18	WB2GEX
Warminster ARC (PA)	74,326	18	WB3KNU
Murphy's Marauders (CT)	69,908	6	WA1MAO
Yankee Clipper Contest Club	8706	3	K1SF
Elmwood Park ARC (IL)	762	3	WA9QHI
Local Class			
Gloucester County ARC (NJ)	51,518	10	K2JF
Penn Wireless	49,222	4	WA3YTI
Dutchess County VHF Society (NY)	44,084	4	WA2TIF
Wellesley ARC (MA)	39,184	6	KA1IU
M.I.T. Radio Society (MA)	37,242	4	W1GXT
A.W.A.R.E. (DE)	23,436	10	N3BHS
Six Meter Club of Chicago	22,572	9	WA9ASD
Mobile Sixers RC (PA)	20,478	9	W3ETB
Northern California Contest Club	18,742	3	K6KLY
Provin Mountain ARA	17,508	3	WA1PLS
Montgomery ARC (MD)	15,368	5	WB3CHS
Long Island Mobile ARC	14,582	5	N2BAR
Michigan City ARC (IN)	12,008	4	K9DZE
Bluegrass ARC (KY)	8030	8	KA4GBI
Mitre-Bedford ARC (MA)	5152	7	W1FM
Northrop RC (CA)	1766	3	WA6DCT

SOAPBOX

My wife came into the shack early on Sunday morning and asked me if I planned to stay in the shack all day. She returned a little later and asked if I were hungry. When I replied yes, she said, "*eat your radios, then.*" Looking forward to June (WD5IBM). 432 activity is

low up here this time of year. There are lots of points to be had if everyone was active on the band (VE7ASI). Fun contest, but wished that 6 meters would have opened up. Next contest, I think that I'll try *outside* antennas (WB8TGY). The family schedule seems to intrude more and more into the vhf contest weekends. I found myself building Cub Scout elastic-band rockets for the boys on Saturday. This was my 78th consecutive vhf contest, and I thoroughly enjoyed it . . . too bad that no E2 showed up on 50 MHz this year (W1EJ). [Thomas you've made us curious. Would you please send the plans for those Cub Scout elastic rockets? TNX — Ed.]. One by-product of the contest for me has been an increased desire to get on the bands above 6 meters (WA5RTV). . . . If it weren't for the 6-meter opening on Sunday, I'd have to say that conditions were pretty bad. Several times I thought that the rigs had died, but as it turned out, it was the bands that were dead (WA2YWP). My goal for 1982? Win the Jan. VHF SS. Will be building up for it (N4CD). One noncontestant actually asked me, "What's RST?" (KA9HXC/9). We must be in a "Black Hole" here in North Carolina. 146.52 is very inactive in this area — one hour's operation on 52 produced only one contact! (N4AJF). Thanks to VE2BBK for getting me started; had a great time in the SS (VE2BXF). My goal this time was to work a-m/ssb/cw/fm on 6 meters . . . and I made it, but those "lunchboxes and Gooneybirds" are getting harder to find each year (AB5L). Mild weather in the northwest produced some good tropo. Meteor scatter midday on Sunday was also good (N7DB). Contest activity was cut short as my wife, WB6QMB, went into labor on Jan. 18, 1981. Baby boy born on Jan. 19, 1981 — 8 lbs, 11 oz. Will administer the Novice test soon. Hi! (WA6CFO). Where is all that 220-MHz activity that is supposed to be on the upswing? Called CQ on 220 till I thought my fingers would cramp on the keyer paddle with nary a reply (W1AIM). QST

Scores

Scores are listed in order, single-operator stations first within each section. From left to right: call, score, number of QSOs, number of multipliers, bands operated (A-50 MHz, B-144 MHz, C-220 MHz, D-432 MHz, E-1296 MHz, F-2304 MHz, G-3300 MHz, H-5 GHz, I-10 GHz).

U.S.A.

1

Connecticut

WA1MAO 55,130-647-27-ABCD
K1FO 14,768-238-16-ABCD
WA1VUW 14,148-237-17-ABCDE
N1AFW 10,140-195-16-B
K1VMI 9152-176-16-B
W1FAJ 6090-115-11-ABCD
WA1CVN 5456-115-12-ABC
W9KDR 5184-102-14-ABD
K1EM 5106-108-13-ABD
K1ZZ 4560-104-10-ABCD
WA1ZNT 4508- 98-13-AB
KA1GT 4440- 71-10-ABDF
K1RT 2592- 72- 8-B
K1THP 2520- 60-11-B
WB1AAG 1344- 32-11-AB
W1XX 720- 24- 5-B
K1WVX 598- 23- 3-B
WB1FVS(+AK4L,KA1DZV) 54,096-551-32-ABCD
W1QK(+WA1s GSO KOX PMA WXV,WB1EZL,WB2THN, WB9LFD)20,250-350-15-ABCD
WA1GTP(+K1VYU) 8580-158-16-ABD
K1MUJ(K1GNW,WA1HYN, oprs) 2898- 69-11-B
WA1PLS 10,272-200-14-ABCD
W1KK 9072-154-17-ABCD
W1UPH 9024-188-14-B
N1PF 7872-152-14-ABD
W1JP 7680-160-14-AB
K1SF 7128-122-17-ABCD
WB1ETS 6072-138-12-AB
W1WLE 5852-133-12-AB
WB1ABF 5632-128-12-AB
WB1FIP 5368-122-12-AB
WA1VCU 5060-110-13-B
WB1APD 4884-111- 2-B
K1NWE 4004-143- 4-B
W1CJK 3686- 97- 9-B
WB1BZW 3296-103- 6-B
WB1EHS 3108- 74-11-B
K1GXU 2622- 69- 9-B
WA1YYW 2600-100- 3-B
WB1DLE 2600-100- 3-B
K1YOU 2176- 64- 7-B
K1MAL 2160- 90- 2-B
W1NLE 2132- 82- 3-B
WB1CXC 2054- 76- 3-BC
WA1POB 1608- 67- 2-AB
WA1VHU 1600- 50- 6-B
W1VNE 1560- 65- 2-B
WB1EMN 1536- 64- 2-B
WB1BPJ 1508- 58- 3-B
KA1BNN 1296- 54- 2-B
WA1YYK 1248- 52- 2-B
WB1DLH 1200- 50- 2-B
K1ZQB 1196- 46- 3-B
K1UR 1024- 32- 6-B
KA1BG 1008- 42- 2-B
WA1GZO 816- 34- 2-B
K1BXE 768- 30- 2-ABC
WA1WXS 728- 28- 3-B
K1BUB 720- 30- 2-B
K1IJU 588- 21- 4-B
N1CM 528- 22- 2-B
WA1UWX 476- 14- 7-A
K1JG 468- 13- 8-B
WA1DNB 456- 19- 2-B
K1IJV 432- 18- 2-B
WB1DTZ 352- 16- 1-B
K1TK 336- 12- 4-B
W1UWX 264- 11- 2-B
WA1PGT 216- 9- 2-B
K1GTE 88- 4- 1-B
WA1RWU(+AK1C,K1TOL, KA1s APR GFX,WA1s LPJ UQC,WB1CAC) 76,416-745-38-ABCD
W1YK(K1s OGF TK UR, N2AWG,WA1s PQY QNX UXA YHV,WB7TPY,oprs) 28,380-411-23-ABCD
K1BE(+KA1AUM,WA1s PUX YOG ZEV) 10,150-203-15-AB
K1IKN(+K1GOX,KA1s CDW CQQ,W2MCF,WA1TMZ) 9516-183-16-AB
W1UKR(+WB1EQS) 8250-165-15-AB
KA1V(+KA1EUY) 8100-155-15-ABD
W1NY(K1s BWB GTE,KA1s CAX DNK,WA1GZO,WB1GLZ, oprs) 6930-165-11-AB
WA1ZFK(+WA1s YWH ZAM, WB1HIH) 6000-111-15-ABCD
W1KUL(+WB1FIJ) 4884-111-12-AB

Eastern Massachusetts

WB1FUB 19,810-275-25-ABD
WB1FKF 13,068-214-17-ABCDE
W1GXT 11,664-199-14-ABCDE
N1AIS 9620-174-16-BD
WA1JOF 8252-158-17-B
AD1C 8216-111-16-ABCDE
W1FJH 7946-137-19-B
KA1IU 5014-109-13-B
K1DAT 2508- 57-12-A
N1HR 2400- 50-14-B
W1MX(WA2FYC,opr) 1428- 41- 7-ABD
W1FM 1248- 48- 3-B
K1CHY 1204- 37- 4-ABCD
N1AHC 1116- 31- 8-B
KA1CXC 1110- 37- 5-B
WB1FOD 1088- 32- 7-AB
N1AFQ 1056- 32- 6-ABD
K1NKR 992- 31- 6-AB
N1ABX 858- 33- 3-B
W1JOT 576- 12- 2-D
W1UI 416- 16- 3-B
W1AY 224- 8- 4-B
W1HRS 154- 7- 1-B
N1ADY 110- 5- 1-B
WA1MHF 22- 1- 1-A
W1XM(K1MK,W1XG,WA4LFG, oprs) 21,170-294-19-ABCDE
K1TR(+WA1s PBU QWF VFJ) 9950-199-15-AB
WA1AYS(+KA1CXC,K1IO) 5778-107-17-AB
W1TKZ/1(WA1s YOJ ZLQ,oprs) 4320-115- 8-ABC

Maine

K1WHS 25,612-300-28-ABCD

New Hampshire

WB1CIT 23,364-323-23-ABCD
AF1T 18,768-243-24-ABCDE
W1EJ 14,674-209-19-ABCDE
AC1J 6732-140-12-ABCD
W1JSM 1848- 44-11-B
WA1GDR 1440- 36-10-A
WA1TFH(+WA1s MYA NWD RCY) 7038-149-13-ABC

Rhode Island

WA4MMP/1 7722-143-17-AB
K1GNW 5888-128-13-B
K1DS 910- 27- 5-AB
W1BIM/1(K1s COW WGN, WB1DRW,oprs) 4840-119-10-ABC

Vermont

W1AIM 5520- 84-20-ABCD
K1LPS 1540- 32-12-ABD
WB1GQR 864- 27- 6-AB
W1EXZ 680- 20- 7-A
WA1MAG(+KA1CXD,WA1s JEX NBU TBV,WA2MJP) 9408-147-22-AB

Western Massachusetts

AC1T 13,716-247-17-ABC

2

Eastern New York

WA2TIF 19,880-355-18-B
K2SHB 10,752-168-18-ABD
K2DNR 7992-136-17-BCI
WB2EHE 7050-141-15-B
W2LW 5460-105-16-AB
WA2ANZ 4048- 85-13-ABC
W2IP 1960- 49-10-B
W2KHQ 1160- 29-10-B
WB2SHE 308- 11- 4-B
K2CBA(+AG2X,K2QE,KA2FCD, N2AIG,WA2FPF,WB2FPC) 22,400-276-25-ABDE

New York City - Long Island

WA2YWP 27,264-381-22-ABCD
K2RIW 16,764-127-23-D
KA2DTE 14,364-266-17-B
WA2SLY 13,920-240-19-AB
N2BFJ 12,524-200-21-ABC
KE2N 11,700-225-16-B
K2OVS 9408-150-18-ABD
WB2CMI 8468-146-19-AB
WA2TWO 7260-165-12-B
N2BAR 6440-140-13-AB
WA2FBB 3800- 86-10-BD
WB2PLT 2112- 48-12-B
WB2VEX 1728- 54- 6-B
WB2ALW 1520- 34-10-ABC
N2RQ 1014- 39- 3-B
WB2HJD 756- 27- 4-B
WA2FUZ(+WA2YJF) 24,222-289-23-ABCDE

Northern New Jersey

K2MLB 31,500-480-20-ABCD
WB2QOQ 29,946-429-21-ABCD
WB2WIH 15,964-247-16-ABCD
WB2CUT 14,560-280-16-B
WA2CWA 14,418-267-17-AB
KB2AH 14,280-253-18-ABD
N2CG 14,256-233-17-ABCD
WA2JSW 13,944-249-18-AB
KA2BTD 13,932-237-17-ABC
N2BMN 13,104-224-16-ABC
WB2ARS 12,950-259-15-B
KA2AYQ 10,464-213-14-ABD
WB2TBB 10,300-206-15-AB
WA2ZWH 10,244-171-16-ABD
KA2AVA 7360-160-13-B
WB2NCF 6000-140-10-BD
K4BNC 5670-135-11-AB
K3JNZ 5508-147- 7-ABD
WA2ALM 5290-115-13-B
KA2BZE 5280-120-12-B
WA2UDT 5250-105-15-AB
WB2IBC 5190-153- 5-BC
KB2DN 4692-102-13-B
WA2UPK 4488-124- 7-BC
K2ULR 4320-100-10-ABC
WB2IKL 4176- 87-14-B
W2FPY 3360- 80-11-B
WB2WLW 3332- 98- 7-B
K2VAC 3312- 72-13-B
WB2BJH 3200-100- 6-B
KA2ERI 3120- 78-10-B
WB2LAH 3080-110- 4-B
KA2FXA 2996-107- 4-B
WA2ZNT 2834-109- 3-B
K2KME 2790- 76- 5-BC
KA2HNQ 2550- 75- 7-B
WA2UEJ 2352- 84- 4-B
WA2PJV 1700- 42- 7-BCD
W2WCF 1586- 61- 3-B
W2TCA 1066- 41- 3-B
W2WCL 1066- 41- 3-B
K2RF 1064- 38- 4-B
K2LPG 840- 30- 4-B
W2BCC 456- 19- 2-B
K2XR(K2s JWE OWR,KC2X, WB2s OHV WIK,oprs) 76,000-904-28-ABCD
N2BOW(+N2s BMP CEI, WA2CRB)33,640-514-19-ABCD
N2AAZ(+KA2s EPL GMH, W2TFM,WD2s AAI ADH) 32,422-521-19-ABC
WA2JUO(+AG2N,W2JAO, WA2VZW,WB2s JUO YMW) 19,602-363-17-B
K2BJG(+WB2RFB) 13,600-212-15-BCDE
KA2COQ(+WB2WEX) 5640-141-10-B

Southern New Jersey

WA2DPU 60,480-729-25-ABCD
W2EIF 33,600-458-18-ABCDE
WA2KOK 29,220-417-20-ABCD
WA2EMB 24,240-357-20-ABD
WB2YEH 23,950-410-15-ABC
W2PAU 23,432-404-19-AB
AB2Y 19,872-345-17-ABD
WB2GEX 18,444-318-19-AB
W2BV 15,568-278-18-AB
WB2RVX 13,186-296- 9-ABCDE
N2FY 12,936-231-18-AB
K2JF 12,440-258-10-ABC
WB2VLA 12,420-244-13-ABC
K2SQS 11,802-281-11-AB
K1TQ 11,172-231-11-ABC
W2HRW 10,800-216-15-AB
WA2PFC 9744-289- 4-ABC
WA2RYE 8584-148-19-A
WB2ALQ 8000-200-10-AB
W2EKB 7668-213- 8-AB
WA2ZIJ 7584-158-14-B
WA2RHJ 7434-177-11-AB
W2GGB 7056-194- 4-BC
WB2QIU 7014-167-11-AB
K2EVW 6248-131-12-BD
W2FGY 6080-152-10-B
W2EA 5640-141-10-B
W2BN 5040-124-10-ABD
N2AQJ 4600-115-10-AB
WB2LNR 3780-105- 8-AB
KB2GI 3770-145- 3-B
WB2LCC 3724-133- 4-B
KA2BBW 3668-131- 4-B
N2CEN 3668-131- 4-B
N2CQ 3536-136- 3-B
WB2KKS 3528-126- 4-B
WB2JMK 3432-132- 3-B
KA2BEW 3136-122- 4-B
K2HJY 2904-121- 2-AB
WB2CIW 2652-102- 3-B
W2GSN 2626-101- 3-B
WA2SEA 2600- 80- 3-ABC
WA2ZHO 2548- 98- 3-B
KB2GL 2522- 97- 3-B
K2QWQ 2496- 96- 3-B
WB2SPJ 2432- 64- 9-AB
N2ALA 2418- 93- 3-B
WB2BUU 2314- 89- 3-B
WA2WMK 1872- 78- 2-B
W2GVD 1728- 72- 2-B
WB2LXA 1652- 59- 4-AB
N2HF 1368- 57- 2-B
WB2RXM 1344- 28- 2-C
W2BLV 920- 20-13-B
WA2VSL 840- 35- 2-B
W2SPV 840- 30- 4-A
KA2CDF 832- 16-16-B
KJ2PN/2 624- 26- 2-B
K2HPV 240- 10- 2-B
WA2ZMN 234- 8- 3-BC
WB2GEZ(+AA3B,WB3DJF) 25,230-435-19-AB
N2ME/2(+N2RM,WB2LCC) 24,072-354-24-AB
WB2CUD(+WB2HWF) 20,072-324-16-ABCD
KC2J(+KA2JMI,WA2WUL,WB2s AUJ DGJ)10,384-206-12-ABD
AE2V(+WB2AOL) 10,260-254- 9-ABC

Western New York

WA2ZNC 23,800-400-18-ABCD
K2YCO 22,516-371-16-ABCDE
N2JY 20,020-357-16-ABCD
WB2KIW 19,600-324-18-ABD
K2AN 17,836-311-16-ABD
WB2BGI 16,320-229-24-ABCD
K2MP 15,088-310-13-ABD
WB2JFL 13,728-286-14-AB
WA2YEK 13,356-318-11-AB
K2RHS 13,146-313-11-AB
DL7KX/W2 12,742-254-13-BD
K2OXT 12,560-301-10-ABD
WA2MCB 12,496-284-12-AB
K8ZES/2 11,200-200-18-B
WA2AWX 10,696-183-18-ABD
WA2ZHR 10,608-221-14-AB
W2UAD 9522-207-13-B
W2EBF 9376-293- 6-AB
W2CNS 9240-181-12-ABCD
W2FQW 8800-275- 6-AB
WB2RJB 8730-291- 5-AB
WA2ALW 8604-239- 8-AB
WB2FNF 8316-231- 8-AB
KD2K 7752-189- 9-BD
AF2K 7056-294- 2-AB
K2RJ 6744-269- 2-ABD
WB2DSR 6708-245- 3-ABCD
KF2D 5904-246- 2-AB
N2AUV 5880-200- 4-ABD
KB2SG 5448-227- 2-B
WB2EVD 5448-202- 2-ABD
WA2EKT 5232-218- 2-B
WA2ZPE 5174-186- 3-ABCD
WB2ZFS 5130-171- 5-AB
WA2MYG 5083-160- 3-BCD
N2BNE 4920-205- 2-AB
WA2MSA 4824-201- 2-B
N2BIR 4752-198- 2-AB
WB2IGO 4584-191- 2-B
KA2BHK 4560-175- 2-BD
WB2OZS 4536-189- 2-AB
K2KWK 4512-188- 2-B
WA2KUP 4440-185- 2-B
KA2HVQ 4416-184- 2-B
W2LLS 4416-184- 2-B
W2RQF 4352-129- 6-ABCD
WA2IJH 4296-179- 2-B
WA2ZQN 4272-178- 2-B
W2XG 4186-161- 3-AB
W2CXM(K2VD,opr) 4158- 99-11-B
KA2J 4152-173- 2-AB
K2EVJ 4114-104- 7-ADE
KA2ENE 4104-171- 2-B
WA2UBD 4056-153- 2-BD
WB2WWV 3936-164- 2-B
K2VI 3936-164- 2-AB
WA2TJS 3900-150- 3-AB
WA2HVT 3888-162- 2-AB
KA2CVN 3840-160- 2-B
K2GMZ 3808-136- 4-AB
N2BUB 3792-158- 2-B
WB2PYI 3780-135- 4-AB
WA2ECD 3768-157- 2-AB
WA2YPT 3744-156- 2-B
K2JA 3744-156- 2-B
KB2CM 3720-155- 2-B
WA2EKN 3706-109- 7-AB
W2AV 3696- 77-14-B
KA2CRH 3630-165- 1-AB
WB5IGD 3630-151- 1-ABD
K2EAW 3624-151- 2-B
WA2GLJ 3600-150- 2-B
KB2NU 3600-150- 2-B
WB2UTI 3600-150- 2-B
AI2I 3576-149- 2-AB
K2SPO 3564-162- 1-B
WB2UTM 3552-148- 2-B
KA2DBO 3432-143- 2-B
WB2YJH 3410-155- 1-AB
KA2BHD 3384-141- 2-B
WB2EKP 3322-151- 1-B
WB2MCP 3250-125- 3-AB
AG2A 3240-135- 2-AB
K2CEH 3230- 86- 7-ABD
N2AL 3124-142- 1-B
WA2ELC 3072-128- 2-B
WB2NOJ 3000-125- 2-B
N2AJK 3000-125- 2-B
K2UHA 2904-132- 1-B
KB2LH 2860-130- 1-AB
WB2QKO 2832-118- 2-B
WB2GVB 2772-126- 1-AB
WB2YHD 2760-115- 2-B
WA2EKS 2750-125- 1-B
WA2FTV 2736-114- 2-B
K2PPO 2712-113- 2-AB
KA2FGE 2678-103- 3-AB
WA2ZKI 2662-121- 1-B
KA2BGW 2640-120- 1-B
KB2SE 2640-110- 2-B
WA2FKU 2568-107- 2-AB
WA2SOK 2552-116- 1-AB
KA2BNL 2544-106- 2-B
K2AOQ 2544-106- 2-B
WA2JMH 2520- 90- 4-AB
KA2AFE 2442-111- 1-B
KB2BL 2400-100- 2-B
N2TW 2376- 99- 2-B
WA2AIV 2352- 98- 2-B
WB2WVW 2310-105- 1-B
N2BPC 2304- 96- 2-B
WA2GHQ 2256- 94- 2-B
N2BHL 2220- 74- 5-AB
WA2IEO 2200-100- 1-B
KB2KY 2090- 95- 1-B
W9KFQ/2 2002- 91- 1-B
WB2IJH 1980- 90- 1-B
WA2KDK 1936- 88- 1-B
WA2YTK 1896- 79- 2-B
WB2PLJ 1870- 85- 1-AB
WB2SUN 1826- 83- 1-B
KA2ECT 1824- 76- 2-B
WB2BWQ 1824- 76- 2-AB
K2JJT 1804- 82- 1-B
KA2EER 1800- 75- 2-B
WB4VMV 1800- 75- 2-B
KA2BHL 1760- 80- 1-B
KF2C 1694- 77- 1-AB
KB2KZ 1672- 76- 1-B
WB2LJG/M2 1672- 76- 1-AB
N2AFR 1562- 71- 1-B
WA2PHA 1536- 48- 6-AB
WA2ROW 1518- 69- 1-B
WB2HUL 1488- 62- 2-B
K2CTN 1464- 61- 2-B
WA2QNS 1452- 66- 1-B
WA2CRR 1440- 60- 2-B
WB2IFV 1430- 65- 1-B
WA2UAR 1364- 62- 1-B
KA2EFC 1298- 59- 1-B
KA2AIC 1276- 58- 1-B
WB2ZLU 1232- 56- 1-B
WB2UTX 1224- 51- 2-B
WA2LDQ(K2EAW,opr) 1200- 50- 2-B
N2BUL 1166- 53- 1-B
N2AMH 1166- 53- 1-B
W2DHV 1166- 53- 1-B
WA2NFY 1144- 52- 1-B
K2AED 1104- 46- 2-B
WA2YRL 1100- 50- 1-B
K2YMM 880- 40- 1-A
AB2F 836- 38- 1-B
N2AFY 770- 35- 1-B
WA2ITH 770- 35- 1-B
WA2EWU 748- 25- 1-ACD
N2APB 682- 31- 1-B
KA2HWN 660- 30- 1-B
KE2Y 660- 30- 1-B
WB2ETZ 572- 26- 1-B
WB2EWR 572- 26- 1-B
W2LC 552- 23- 2-AB
WA2RHW 506- 23- 1-B
W2KFU 418- 19- 1-B
WB2JSB 384- 16- 2-B
WB2MBO 374- 17- 1-B
WA2IZC 352- 16- 1-B
W2DYY 342- 9- 9-B
W2EOJ 330- 15- 1-A
WB2DYJ 264- 12- 1-A
KA2HJG 264- 11- 2-B
K2OUY 242- 11- 1-B
KA2HWO 220- 10- 1-B
KA2KDD 176- 8- 1-B
K2ANC 88- 4- 1-B
K2JFV(+WA2TMC) 26,274-412-19-ABCD
W2UTH(+KA2KLT,KB2s TT US,N2BUL,WA2s JMH RHW VUB,WB2GIP,WD2AKA) 23,496-356-23-AB
WA2WVL(+WB1GHG, WB2PLI) 20,160-377-14-ABCDE
WB2JLR(+K2OEQ) 18,624-349-14-ABCD
WA2GAI(+N2AGM,WA2s MCD TRI YKB) 15,568-278-18-AB
WA2KGM(+KA2s FNC FND) 15,498-344-11-ABD
W2DUC(+N2s AFR BXA,WB2s EMS FWZ RIP) 15,312-348-12-AB
K2VCZ(+KJ2E) 12,936-304-11-ABC
WA2ZHD(+WA2YUO,WB2s AQQ KAO) 12,388-317- 9-ABD
K2LDU(+WA2s FGE GHQ) 11,324-278- 9-ABCD
WB2HWO(+WB1GBY) 11,160-299- 8-ABCD
WA2MVF(+WB2PKO,WB9EAE) 10,760-245-10-ABDE
WA2AAZ(AB2F,K2MPE,KA2s BGI HCK HMK HWW ILH,WB2s AUW MBO TGU,oprs) 10,146-267- 9-AB
W2NES(+WB2LWM) 9618-216-11-ABD
WB2LEG(+WA2SHN) 8018-211- 9-AB
K2OS(+WB2s ODC ODH) 7152-149-14-B
WA2BSN(+N2HR) 6916-124-16-ABC
WD2AFH(+WD2AKA) 6900-150-13-AB
K2UW(+WA2ZLU) 6150-205- 5-AB
N2BEH(+KA2JRC,N2BZB) 5957-248- 2-AB
WA2ZJF(+K2s IJ JJI RKW, WA2RQC,WB2s MYZ NFB UIK) 5600- 95-15-ABCDE
WB2IEY(+KA2JVX,KA0ADV, WA2YTM,WB2RRE) 5270-152- 7-ABD
K2QR(multiop) 5200-100-16-B
KB2JN(+KA2s ECO KFG,KE2T, WA2s KTB NZO,WB2s NOJ SUN WCC) 4992-192- 3-AB
WA2EKK(+KA2CKR,KB2UW, WA2CQI) 4320-180- 2-AB
WA2EGL(KB2K,N2AFY,WB2IGO, oprs) 2886-111- 3-B
WB2OMY(+WB2EKP) 2706-123- 1-AB
KB2BY(+WA2TIJ) 2256- 93- 2-ABD
WA2YTM(+KA2JVX,KA0ADV, WB2s IEY RRE) 1512- 61- 2-ABD
WB2RRE/2(+KA2JVX,KA0ADV, WA2YTM,WB2IEY) 1272- 50- 2-ABD
KA0ADV/2(+WB2IEY) 884- 34- 3-B

3

Delaware

K4CHE/3 20,088-360-17-ABCD
W3BDP 5472-114-14-B
AC3T 3990-101- 9-BC
AE3J/3 2484- 61- 8-ABC
WB3DPJ 962- 28- 3-BC
N3AYE 420- 15- 4-B
KA3BAO 286- 11- 3-B

Eastern Pennsylvania

WA3AXV 80,770-768-31-ABCDE
W3HQT 55,860-603-25-ABCDE
WB3CDE 52,170-587-27-ABCD
WA3WA5 46,376-531-24-ABCD
W3ZD 37,056-505-22-ABC
K3MWV 33,988-492-19-ABCD
K3IUV 31,300-461-15-ABCDE
W3HFY 30,836-450-16-ABCDE
K3LUM 27,720-437-18-ABC
W3HMU 26,736-418-14-ABCDE
WA3AAJ 25,650-407-15-ABCD
W3IIT 25,532-430-16-ABC
N3MW 23,782-418-13-ABCD
W3CL 22,656-374-14-ABCD
K3ACR 22,568-371-16-ABC
WA3NUF 22,080-393-13-ABCD
WB3JYO 19,700-325-15-ABCD
WA3NFV 19,136-315-16-ABC
K3BPP 18,576-301-14-ABCDE
K3KTY 16,032-280-14-ABCD
K3MXM 15,640-280-13-ABC
K3IGX 15,224-290-12-ABC
K3NHX 14,564-270-12-ABCD
K3KVS 14,388-267-12-ABCD
K3GAS 14,288-322- 9-ABCDE
WA3JUF 14,212-223-12-ABCDE
K3VYG 13,692-262-11-ABC
K3DMA 13,156-250-12-ABC
WA3AQA 12,768-282- 9-ABC
W3ETB 12,054-259-11-ABC
N3EG 11,592-306- 8-ABC
WB3KNU 10,580-230-13-AB
WB3HTW 10,120-230-10-B
W3AJF 9600-188-10-ABC
W3CXU 9450-154-11-ABCDE
WB3KES 9156-178-11-ABC
WA3IWT 8946-162-11-BC
K3EPB 8388-198- 9-ABC
K3IWK 8372-150-16-ABD
W3NSI 8288-197- 6-BC
KA3FQT 7828-206- 9-B
K3HIN 7620-224- 5-ABC
WB3HHO 7280-210- 3-BC
W3IWU 7000-140-15-A
AE3T 6808-148-13-AB
N3BHS 6600-165-10-AB
WA3HIT 6496-179- 4-ABC
WA3TSE 6468-127-11-BC
K3CT 5460-175- 3-BC
WA3UGP 5376- 94-14-BCD
KA3EAQ 5264-188- 4-AB
WA3EHD 5226-201- 3-AB
W3YXF 4650-132- 5-ABC
W3HK 4410-112- 5-ABC
WA3TQJ 4264-164- 3-AB
WB3IND 4250-125- 7-AB
K3DG 4028-106- 9-AB
K3IQO 4020-134- 5-B
WA3JMM 3926-110- 3-ABC
K3EBZ 3510-135- 3-AB
K3LYB 3200- 80-10-A
WA3IMT 3382- 89- 9-A
K3PHY 3094- 84- 3-AC
K3ZIG 2990-102- 3-ABC
K3QQ 2976- 76- 2-BC
K2KRC/3 2784- 71- 2-BC
W3KM 2730- 65-11-B
WB3FPU 2600-100- 3-AB
WA3IFM 2592- 54- 2-C
VE3HOR/W3
2584- 68- 9-B
K3IJXC 2544-106- 2-B
W3AWA (WA3KPT,opr)
2490- 83- 5-AB
KA3BCA 2448-102- 2-B
WB3EFE 2424-101- 2-B
KA3CHB 2400-100- 2-B
K3WAJ 2400- 62- 6-BC
KB3JW 2232- 93- 2-AB
WA3FYF 2142- 82- 3-B
WB3CTU 1888- 59- 6-A
WA3NUG 1664- 52- 6-AB
W3HMR 1612- 62- 3-B
K3KMN 1404- 54- 3-AB
WA3QWO 1300- 50- 3-AB
W3ZAA 1196- 46- 3-AB
K3DLS/M3 1152- 35- 2-C
W3BRU 792- 33- 2-AB
WA3KSK 768- 32- 2-AB
KA3APT 702- 27- 3-B
K3VEQ 702- 27- 3-AB
WB3BOP 676- 26- 3-AB
N3BIK 600- 25- 2-B
KA3FBP 576- 24- 2-AB
WA3NDE 528- 11- 2-C
K3GZT 338- 10- 3-ABC
WA3HFJ 156- 6- 3-A
WA3YTI 198- 9- 1-B
WA3JNF 88- 4- 1-A
N3AHP 48- 2- 2-B
W3KKN(+K3KMN,W3CXU)
52,272-674-23-ABCD
WB3CZG(+AI3G,K3MKZ,
N3AVC,WA3NVS,WB3s CAI
ELY IWZ)41,748-454-32-ABCD
WA3YVE(+WA3FOF)
38,460-518-20-ABCD
WA2OMY/3(+AA2Z)
29,640-490-16-ABCD
K3JJZ(+WB3s DNH IHY)
21,792-374-14-ABCD
WB3LNZ(+KB3HE,N3ADC,
WB3FXJ) 17,458-301-19-AB
WA3OVH(+K3DLS KA3EVB)
16,240-344-10-ABC
WB3CPW(+WB3CTP)
12,628-240-12-ABC
W3GJC(+N3BBY)
7672-240- 4-BC
KB3HE(+KA3ETS,WB3LNZ)
6336-176- 8-AB

Maryland - D.C.

K3DUA 25,432-396-19-ABCD
W3XO 13,052-217-16-ABCD
K3AKR 10,950-190-15-ABCD
WA3RWP 10,948-248-13-B
WA3EOQ 10,320-177-14-ABCD
W4NVW/3
10,128-192-14-ABCD
WB3CHS 8060-155-16-B
WA3NZL 7560-110-18-ABCD
W3IPI 7224-161-11-ABD
W3HQX 4876-106-13-B
WA3NQJ 4680-117-10-B
W3TMZ 4608- 48-14-D
N3AFM 4200-100-11-A
WA3OYW 3744- 86- 8-ABCD
WA3DMF 3204- 86- 6-ABCD
KA1GD/3 3120- 78-10-B
N3API 2720- 80- 7-AB

WB3DPN 2130- 71- 5-B
W3MSN 1144- 39- 3-ABCD
W3UJG 980- 20- 4-ABCD
WA4VUG/3 480- 20- 2-B
KA3DOO 432- 18- 2-B
W3OZ 264- 11- 2-B
W3EXP 66- 3- 1-B
W3PGA(K3s PHH YZY,KA3CUW,
KB3s CV EL,N3s AID BGC,W3s
JDF VRD,WA3TUN,WB3s AXP
BIT,oprs) 9984-208-14-AB
WA3LOS(KA1GD,WA3ZAS,
oprs) 2788- 82- 7-AB

Western Pennsylvania

WA3FFC 10,868-203-16-ABDE
WB3CBB 5560-134-10-ABD
W3CSA 3240- 79-10-ABD
WA3FYJ 2156- 49-12-AB
KA3DFK 504- 18- 4-B
K3HKK(LA1SP,LA4LN,N3BBH,
WB3CXR,oprs)
1292- 35- 7-ABCD
KA3DEO(+WA3s JBV UKE)
768- 16-14-AB

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Alabama

WA4NPL 2688- 64-11-AB

Georgia

AK4T 416- 16- 3-AB
WA4NJP(+WB4NMA)
14,910-209-25-ABCD

Kentucky

WA4IPI 9350-143-15-BCD
KA4GBI 3444- 82-11-AB
WB4NXY/4
1056- 18- 6-BCD
KU4A 1040- 40- 3-AB
WD4HPL 832- 32- 3-B
WA4KKV 676- 25- 3-ABD
W4SMU 560- 19- 4-BD
W4AUZ 504- 11-11-BD
N4DIT 198- 9- 1-B
W4CN(KA4FJJ,KB4MN,KC4s
EF EG HB,N4DUH,NF4R,oprs)
8300-143-15-ABD
WA4YNV(+WD4HPL)
1064- 38- 4-B
K4KJQ(K4DHN,KA4s ADF
GWQ MMR,N4DPQ,WA4s OEB
ONE UIV,WD4s CRG HPC,oprs)
272- 8- 7-B

North Carolina

WA4ZJA 3762- 79- 9-ABCD
N4AJF 1196- 46- 3-AB
WD4ODS 992- 31- 6-AB
WA4WZQ/4(+KA4HKK,WD4GQU)
4572-127- 8-AB

Northern Florida

W4ODW 1560- 47- 5-ABCD

South Carolina

WA4LOU 3784- 80-12-ABD
N4DT 3570- 81-11-ABCD
K4GMJ 1080- 36- 5-AB
WB4FEV 980- 35- 4-AB

Southern Florida

K1FJM/4 676- 26- 3-AB
WB4YBG 468- 18- 3-A

Tennessee

WB4JGG 8176-135-18-ABD
WB4LHD 2961- 63-11-ABCD
WA4OYK 1472- 43- 6-ABD
N5AYO 1190- 35- 7-B
K4VPK(+KS4J)
4074- 91-11-ABC
N4VC(+WD4DGF)
2436- 58-11-AB

Virginia

W3IY/4 22,560-326-20-ABCD
WD4MUO
21,952-334-22-ABD
N4CD 15,378-219-23-ABD
WA4SBC 5236- 99-12-ABCD
K4LHB 4212-103- 8-ABC
W4DO 3744- 78-14-AB
KC4B 3672-102- 8-B
K4EVH 3168- 99- 6-B
NØKV/4 2904- 66-12-AB
W2KFC/4 2822- 78- 7-ABC
W4PSJ 2656- 68- 6-ABCD
K4TXD 2470- 65- 9-B
N4CWP 1536- 64- 2-B
K4GOK 1480- 37-10-A
N4MM 390- 15- 3-AB
K3ICH/4 336- 12- 2-ABC

West Indies

NP2AE 792- 22- 8-A
W1QXX/KP4
782- 23- 7-A
WP4ACV 300- 10- 5-A

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Arkansas

WB5JAR 1802- 53- 7-AB

Louisiana

WA5JWU 72- 3- 2-B

Mississippi

N4JS/5 928- 27- 6-ABD
W5UCY 728- 26- 4-AB

New Mexico

WB5AOX 2144- 67- 6-B
N5RR 1512- 54- 4-B
W5RKS 924- 33- 4-B

Northern Texas

WA5VJB 10,506-255- 7-ABCDG
WD5IBM 5338-138- 7-ABC
WA5RTV 1050- 35- 5-A
K5IS 480- 16- 5-ABD
KD5V 396- 16- 1-ABD
WB5KTC(+AD5I,WD5FZM)
9576-243- 8-ABD
WD5HDM(+KB5HP)
6574-157- 9-ABD

Oklahoma

W5NZS 360- 15- 2-AB
K5CM(+N5KW)
14,910-206-25-ABD
K5QNM(+KN5TTN)
704- 22- 6-B

Southern Texas

WD5ERG 6072-125-13-ABD
K5VVV 4200-100-11-AB
W5UWB 1620- 46- 5-ABD
K5RX 1272- 53- 2-B
WA5IYX 1040- 26-10-A
N5AF 510- 15- 7-A

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East Bay

N6AMG 5890-132- 9-ABCD
WA6LHD 3640- 91-10-B
WB6ZEP 3400- 82- 7-ABD
WA6BOB 2184- 81- 3-ABD

Los Angeles

K6LMN/6 7800-202- 5-BC
N6DBA 2002- 77- 3-B
N6CA 1792- 14- 6-E
WA6DCT 910- 25- 3-BC
W6CN 520- 16- 3-BC
W6PFE 476- 12- 4-ABCD
W6NXB 336- 7- 2-C
W6GGV(+WB6PKA)
21,736-343-12-ABCDE
WA6SFM(WA6s FSF PZL,WB6s
CIA JJE VRN,oprs)
17,556-353-11-ABC
WB6TAN(WA6HXD,WB6s KAJ
UCI,oprs) 9756-195- 8-BCD

Orange

KA6ARU 5248-150- 6-ABC
N6DBF 4186-161- 3-B
K6PVS 2448- 72- 7-B
KO6S 1988- 58- 4-ABC

Sacramento Valley

W6SYY 722- 19- 9-B
WA6KOD(+W6SFH)
2816- 64- 6-BDE

San Diego

K2UVG/6 1380- 46- 5-B
W6TIK 308- 11- 4-AB

San Francisco

WB6WML 750- 25- 5-AB
W9DHK(+WB6WML)
2822- 83- 7-AB
WB6KDF(+WA6RNF)
962- 34- 3-ABD

San Joaquin Valley

W6YKM 1800- 43- 8-ABD
K6JKQ 1440- 31- 8-ABCD
KA6EVN 928- 29- 6-B

Santa Barbara

KA6DVA 1092- 34- 4-ABC
K5MM/6 192- 8- 2-B
N6NB(+N6VI)
46,750-736-15-ABCDE
WA6OYS(+K6HXW,W6OAL,
WA6EJO,WB6s KMO UNH YQN)
16,040-256-10-ABCDEGI
K6MEP(K6s ELQ VMN,WA6s DJS
IJZ,oprs) 9396-169- 8-ABCDE
K6TZ(N6s AJA DQC,W6EMS,
WA6VNN,WB6HOZ,oprs)
8436-160- 9-ABCDE

Santa Clara Valley

K6KLY 10,668-207-11-ABCD
WA6MGZ 6840-138-10-ABD
WA6GYD 6536-141- 9-ABDE
W6XN 4356- 70- 8-BCDE
K6GSS/6 3348- 93- 8-AB
K1RZ/6 3298- 97- 7-B
W6PGH 22- 1- 1-B
WB6NMV(+WA6ZJF,WB6NAC,
WD6CHL,N7ANG)
14,028-258-11-ABCDE
WA6MZF(+AJ6T,KA6s EOT HBC
KCM,W6JQC,WA6OWF)
10,920-240-10-ABCD

7

Arizona

WA7EPU 2304- 59- 8-ABD
W7LUX 700- 19- 4-BD

Montana

W7KNT 1378- 53- 3-AB

Nevada

K7ZOK 1368- 36- 8-ABD

Oregon

N7DB 3654- 82-11-ABCD
W7TYR 1924- 63- 3-ABD
KA7ESE(+KA7DCQ,WB7WOE)
2132- 73- 3-BD

Utah

N7BHC 2002- 75- 3-ABD

Washington

WA7UQV 5820-179- 5-ABC
WB7UUP 4160-139- 3-ABCD
WB7DTI(+K7ND)
10,008-230- 8-ABCD
KB7GI(+N7AYF)
1428- 51- 4-AB

Wyoming

W7LFL 144- 6- 2-AB

8

Michigan

WA8SQL 15,562-227-21-ABD
KB8RK 2550- 75- 7-B
WD8KLU 2496- 62- 6-BD
WB8AAX 2448- 68- 8-B
WB8YFE 2368- 56- 6-ABD
KA8DDQ 1376- 43- 6-B
KA8HBD 1280- 40- 6-B
WB8TGY 816- 34- 2-AB
WA8ZCO 494- 12- 3-ABD
W8CAP 480- 20- 2-B
W8QOI 182- 7- 3-A
K8EQH/8 150- 5- 5-B
WD8MJQ(+WD8DSV)
12,650-253-15-AB
N8BET(+N8BIK)
2432- 76- 6-B

Ohio

WA8ONQ
38,548-393-36-ABD
WB8IGY 19,684-259-28-AB
WA3VJU/8
17,850-255-25-AB
W7EKI 17,028-219-23-ABCD
WD8CVH 11,040-200-13-ABCDE
K8DIO 10,450-172-15-BD
K8WW 10,192- 91-18-D
WA8TTS 9296- 83-18-D
AA8Q 9050-154-15-BD
KD8Z 7000-124-15-BD
WA8TXT 6762-122-11-ABCDE
WA8OGS 5616-104-17-A
WB8CJW 5000-101-10-BC
WA8NPR 4600-100-13-AB
WB8PAT 4472- 72-16-ABD
K8DW 4218- 93- 9-BCD
N8AXA 3706- 93- 7-ABCD
KA8DVD 3672-102- 8-AB
WA3OJX/8 3456-105- 6-ABCD
W8SMD 3232-101- 6-AB
WB8VSU 2656- 72- 6-BCD
WB8KPS 2520- 63-10-AB
W8LCY 2356- 62- 9-B
W8JRN 2158- 80- 3-ABC
WA8SVV 1248- 39- 6-AB
K1FI/8 930- 30- 5-BC
WD8JPP 450- 11- 5-ABCD
W8DJY(+W8ULC,WA8LXJ)
53,424-558-32-ABCDE

West Virginia

W8AEC 2304- 50- 8-ABD
W8TN 1734- 48- 7-ABD
W8UT 1088- 17- 6-D
KJ8J 918- 27- 7-B
K8SDG 736- 23- 6-AB

9

Illinois

K9MBX 12,160-269-10-BD
WB9SNR 11,560-230-10-BCDE
W9NLP 6574-163- 9-BD
WA9ASD 6450-189- 5-BCD
WB9WMM 5428-118-13-B
WA9FIH 4448-127- 6-ABC
KA9BTJ 3680- 86- 6-BC
W9IVI 3420- 90- 9-AB
K9BQL 2964- 78- 9-B
WD9COL 2948- 67-12-AB
K9GJU 2700- 82- 5-ABC
W9GWI 2142- 63- 7-B
WB9MXX 2080- 65- 6-AB
KA9BGE 1488- 50- 2-BC
AF9R 1428- 21- 7-D
KA9EFN 1368- 57- 2-B
WA9AHZ 1312- 41- 6-A
K9QYT 1248- 52- 2-B
WA9CIZ 1148- 41- 4-AB
K9ENZ 990- 33- 5-AB
WA9QHI 520- 20- 3-AB
WB9SPV 420- 14- 5-ABCD
WB9MII 312- 12- 3-B
KA5HXC/9 232- 11- 1-B
K9QXK 132- 6- 1-A
K9YHB(WB9OMM,opr)
110- 5- 1-B
K9HMB(+K9s GL RS PW,
WA7CJO,WB9s CAS QBU TIY)
72,424-747-34-ABCD
W9IP(+K9AKS,WA9YLB)
24,614-356-21-ABCD
AA9D(+KA9CKI)
3906- 81-11-ABC
WB9VDV(+KA9JYI)
3686- 82- 9-ABC

Indiana

W9OEH 26,122-353-27-AB
K9SLQ 17,400-268-20-ABD
K9WZB 11,880-270-12-B
WA9PKL 11,232-179-17-ABD
WB9NTL 8190-173-11-ABCDE
K9DZE 6440-161-10-AB
WD9EME 5358-124- 9-ABCD
N9AZC 4848-101-14-B
WD9INN 3232-101- 6-AB
WB9FNR 2788- 74- 7-ABD
KA9BSL 1920- 60- 6-B
WA9WNF 1888- 59- 6-B
W3EP/9 1122- 33- 7-B
W9TC 700- 25- 4-A
KB9C 448- 16- 4-B
WB9QPA 416- 16- 3-B
K9CMJ(+KA9CTF)
2632- 94- 4-B
W9YB(KA9s DBF JFD,WA2KDL,
oprs) 1820- 65- 4-AB

Wisconsin

WA9KGQ 4600- 93-13-ABCD
WD9ACY 4142-109- 9-B
WA9CUH 3752- 67-18-AB
N9TD 2508- 66- 9-B
KB9NM 1824- 48- 9-B
KCØP/9 1196- 46- 3-B

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Colorado

WØYK 2700- 75- 8-AB
WØICT 1568- 46- 6-BD
WDØDJU 1152- 43- 2-ABC
WB7VMQ 198- 9- 1-B
AAØL(+KAØs FOZ GJO,KBØNY,
WBØs SDW SSG)
3528- 89- 8-ABDE

Iowa

WBØZKG 16,776-224-26-ABD
WBØSWD 5650-113-15-B
AF8Z/Ø 2680- 59-10-ABCD
N9BD/Ø 2016- 56- 8-B
KØJQA 850- 25- 7-B
WBØRWM(+WBØNVB)
8128-123-22-ABD

Kansas

WØRT 4116- 93-11-BD
WBØISW 3960- 95- 8-ABCD
NØLL 2668- 58-13-AB
WØQOA 1410- 42- 5-BD
WBØNRV 850- 35- 7-ABDE

Minnesota

WØRGU 16,000-244-22-ABD
WØVB 7392-141-14-ABCD
WDØETA 3800-100- 9-B
KØIJU 3502-100- 7-BD
WØMN 2490- 83- 5-B
WØPN 2484- 69- 8-AB
WBØYEE 2366- 91- 3-B
WBØYMI 2314- 89- 3-B
WDØHEB 2132- 79- 3-BD
KØTS 2132- 79- 3-BD
KØSIR 2054- 79- 3-B
NØBSG 2028- 78- 3-B
WDØGBU 1976- 76- 3-B
NØAVB 1846- 71- 3-B
KBØS 1820- 70- 3-B
KBØLU 1794- 69- 3-B
NØAXU 1764- 63- 4-B
KØGJX 1750- 25-25-AB
WAØVEZ 1742- 67- 3-B
WØOHU 1536- 24- 6-D
KCØP 1300- 50- 3-AB
NØBOC 1248- 52- 2-B
KCØA 1248- 52- 2-B
KAØHMM 1176- 49- 2-B
KØKTY 1170- 45- 3-B
WAØULE 1128- 47- 2-B
WAØPUJ 1128- 47- 2-B
WBØHOX 1092- 42- 3-B
WAØEWJ 1040- 40- 3-B
WBØISF 1032- 40- 2-BD
NØBCB 1032- 43- 2-B
WDØGCP 984- 41- 2-B
WAØRRJ 936- 39- 2-B
KAØCRY 888- 37- 2-B
KAØGHU 858- 39- 1-B
KØTXT 836- 38- 1-B
KØWJK 806- 31- 3-B
WDØEOI 696- 29- 2-B
WBØGSY 594- 27- 1-B
KØXL 594- 27- 1-B
KØJCF 576- 24- 2-B
WDØGLS 506- 23- 1-B
WBØQIG 506- 23- 1-B
KØQJX 484- 22- 1-B
WAØEWK 462- 21- 1-B
KØSE 420- 15- 4-AB
WAØRLY 396- 11- 8-AB
NØBUY 330- 15- 1-B
KAØCRO 308- 14- 1-B
WØMQA 286- 13- 1-B
WAØWTV 264- 12- 1-B
WØUAA 254- 12- 1-B
KCØZ 264- 12- 1-B
NØBGA 242- 11- 1-B
WAØDCQ/M 216- 9- 2-B
WDØFFB 198- 9- 1-B
WØSA 176- 8- 1-B
WAØVEB 132- 6- 1-B
NØBJQ 132- 6- 1-B
KØAE 110- 5- 1-B
WBØQAO 22- 1- 1-B
KØEWA 22- 1- 1-B

Missouri

WBØPKN 9664-130-22-ABC
WAØNOK 7280-126-16-ABCD
AIØL 6850-137-15-B
WØRWH 4186- 91-13-B
KØCB 1404- 33- 8-ABCD
KØTLM(+WBØDRJ)
9620-169-16-ABCD

Nebraska

NØAJU(+WØEKB)
6120-102-20-AB

North Dakota

KCØW 384- 15- 2-ABC
WØHSC(WBØs OAJ YVX,WDØAJS,
oprs) 3116- 82- 9-AB

South Dakota

WBØYQS 4316- 82-16-ABD
WBØHHM 1184- 37- 6-B

VE

Maritimes - Newfoundland

VE1UT 600- 20- 5-B
VE1AVX 208- 8- 3-A

Quebec

VE2BBK 1976- 43- 9-ABCD
VE2BXF 1806- 43-11-AB
VE2CUA(VE2s DFH DUB,oprs)
390- 15- 3-B

Ontario

VE3CRU 13,440-218-14-ABCDEI
VE3FGU 10,962-203-17-AB
VE3BYO 5400-150- 8-AB
VE3FN 4450- 82-15-BD
VE3IQL 2788- 76- 7-ABD
VE3FDP 2774- 72- 9-ABD
VE3AQG 1500- 50- 5-B
VE3KQH 168- 6- 2-ABD
VE3LNX(+VE3s ADJ LIZ)
12,880-230-18-AB

Saskatchewan

VE5JQ 164- 5- 1-ABD

Alberta

VE6AFO 308- 11- 1-BD

British Columbia

VE7ASI 1300- 38- 3-ABCD

DX

Bahamas

C6ADV 120- 5- 2-A

Check Logs

K1CH,W2NRD,W4ISS,WA4AAV,
AB5L,KA5AAW(+W5REA),KD6GO,
WA6CFO,WD8CTX,KA9ERZ
(+WB9SPU),KØIHV,KØJCF/aero mobile

Disqualification: W3CJU

Results, 1981 ARRL Novice Roundup

Over 600 take part in initiation rites of contesting!

By Tom Frenaye,* K1KI

The 1981 Novice Roundup produced 615 entries (492 Novice/Technician) — up from last year and the biggest total since 1978. Average scores of the top stations were down slightly from last year. If you spent any time at all in the NR, you would have been surprised to hear the amount of activity. Hard to believe how much difference one week of Novice Roundup can make in someone's operating abilities, including code speeds. The same Novice heard struggling along at 4 or 5 wpm on the first day is often heard doing quite well at 10 or 12 wpm by the finish.

As usual, several Novice/Technicians reported upgrading during or shortly after the NR; the on-the-air experience often proved to be much more important than listening to code tapes.

With the renewable Novice license, some of the call signs don't appear to fit the Novice slot anymore. This year, as in past years, many people who have been licensed for several years finally got the chance to get on the air for the first time. You can be sure that after all that waiting, their Novice careers will soon be shortened after visiting the local FCC offices.

In checking through the entries from this year's NR, several things were very apparent. Everyone had something to say after the contest, and everyone seemed to send in a picture. Sorry we don't have room for more photos, but the extras sometimes do sneak into other ARRL publications. As for the logs themselves, nearly all were done with great care. There were a few, of course, scratched onto yellow legal-sized paper; but on the whole, it was a pleasure to go through the logs.

As for next year, most of you will (should) have upgraded, but don't forget to check back and give a few QSOs to those starting out. The first-timers may have a little trouble with the 2 × 1 and 2 × 2 call signs at first, but they sure do learn quickly. If you have a friend who is still a bit slow in the code-speed department, make sure you encourage him or her to get on the air in next year's NR. You should be able to provide all the answers to any questions.

*Assistant Communications Manager, ARRL

Top Ten Novices		Top Five Technicians	
WB5LVL	91,476	WP4BDS	50,138
WB1AVA	75,621	N8BCQ	38,556
KA9CHM	69,498	KAØIQR	34,710
KA7FPP	67,988	WD8OJD	34,200
KA5DGR	67,760	WB9TJY	29,600
WB1DEU	65,790		
WDØBWH	65,772		
KAØGFA	65,535		
KA5CIB	61,152		
KA8IYM	60,192		

The number one Novice score in the country was turned in by WB5LVL/N, who will probably have upgraded by the time you read this.

Third place among the Novices was earned by Linda, KA9CHM, entering a contest for only the second time.

SOAPBOX

I have had my license for five years now, but never had a rig until October 1980. Never thought I would work so many states! I'm looking forward to it next year as a General! (WB2FQE/N). My first and last NR — upgraded to General on February 5 (KA4JRY/MI). Amazing what operating NR does for your code speed! (KA6FMZ/N). This contest almost caused me a divorce, but what a way to go! (KA4OUN/N). I didn't do too bad considering my equipment is older than me (KA8kWB/N). Running up points is only half the work; checking after the contest is over is the "tuftist" (KA3ESU/N). After I contacted KL7KR, I yelled so loud that my mother thought I had electrocuted myself (KA2KPP/N). Provides best situation to learn band conditions on a time-of-day basis (KA6LDP/T). The single most difficult thing about planning for the NR is which 30 hours to operate. I guessed wrong by not operating more the first day (WH6AMR/N). After 400+ contest QSOs, I'm looking forward to a good old rag chew! (KA6JWZ/N).

Neil, KAØGWK/N, pounded out QSOs with a straight key giving an Iowa QSO to many.

Division Leaders	Novice	Technician
Atlantic	KA3DRR	KA2EXY
Central	KA9CHM	WB9TJY
Dakota	WDØBWH	KAØATM
Delta	WD5EAE	KA4INX
Great Lakes	KA8IYM	N8BCQ
Hudson	KA2BNF	—
Midwest	KAØANR	KAØIQR
New England	WB1AVA	WB1EIH
Northwestern	KA7FPP	KL7KE
Pacific	KA6HSM	KA6ING
Roanoke	KA8LJD	KA4PJQ
Rocky Mountain	KAØGFA	NØBRI
Southeastern	KA4OTP	WP4BDS
Southwestern	KA6LCI	WA6EEH
West Gulf	WB5LVL	KA5FBG

One of the newest Novices in the NR this year was Brian, KA2KWY. Licensed only two weeks, he took the top spot in Eastern New York.

Score listings indicate call sign, score, QSOs, ARRL sections plus DXCC countries and total hours (i.e., WB1AVA/N had 75,621 points, made 821 QSOs in 91 sections/countries in 28 hours).

U.S.A.

1

Connecticut

WB1AVA/N	75,621-821- 91-28
KA1DOI/N	52,020-568- 90-30
WB1DVE/N	30,134-479- 61-22
KA1DJI/N	19,266-323- 57-27
KA1DDB/N	17,745-258- 65-25
KA1CZF/N	17,219-257- 67-30
KA1CPI/N	11,685-190- 57-12
KA1FUQ/N	7761-199- 39-26
N1BDB/T	3913- 76- 43-20
KA1CXM/N	2592- 72- 36- 5

Eastern Massachusetts

KA1FIP/N	20,608-307- 64-23
KA1FCS/N	16,306-248- 62-20
KA1GHR/N	13,104-234- 56-29
KA1FCG/N	10,692-198- 54-19
KA1GEU/N	7546-144- 49-29
N1AJJ/T	7000-140- 50-25
KA1FVG/N	4961-121- 41-30
KA1GEC/N	3480- 87- 40-25
KA1EXJ/T	1357- 49- 23-16
KA1CZE/N	108- 12- 9- 6

Maine

KA1DOD/N	18,550-250- 70-22
KA1CNI/N	18,285-265- 69-17
KA1EAP/N	14,868-236- 63-30
WB1CBP/N	13,802-222- 65-26
KA1GGE/N	10,710-200- 51-24
KA1BGL/T	589- 31- 19-13
KA1DSY/N	4 2 2- 1

New Hampshire

WB1EIH/T	29,110-395- 71-30
K1FUB/N	19,719-293- 63-15
KA1BBI/N	13,098-197- 59-25
KA1DCB/N	11,918-202- 59-23
KA1EKB/N	16- 4- 4- 3

Rhode Island

WB1DEU/N	65,790-716- 90-30
KA1EHI/N	6279-151- 39-30
KA1DYC/N	720- 30- 18- 4

Vermont

KA1BSZ/N	22,630-365- 62-28
KA1FYF/N	13,824-256- 54-21

Western Massachusetts

KA1FBA/N	22,770-330- 66-29
KA1EJK/N	2754- 81- 34-21

2

Eastern New York

KA2KWY/N	29,100-378- 75-29
KA2CFX/N	22,287-308- 69-30
KA2FIF/N	19,740-267- 70-30
KA2FDY/N	15,142-216- 67-30
KA2HYM/N	9384-204- 46-13
KA2JHN/N	3190-100- 29-11

New York City - L.I.

KA2IOV/N	28,938-371- 78-23
KA2KGH/N	24,589-367- 67-27
WA2WYR/N	23,424-369- 61-29
KA2FKI/N	20,735-319- 65-22
KA2JZV/N	19,710-260- 73-30
KA2DIW/N	19,108-256- 68-27
KA2HDG/N	11,286-209- 54-24
KA2KLC/N	9447-201- 47-25
WA2RMN/N	5104-116- 44-24
KA2KPP/N	1380- 46- 30- 8
KA2JOP/N	238- 17- 14- 8
KA2KOZ/N	221- 17- 13- 6

Northern New Jersey

KA2BNF/N	54,033-611- 83-21
KA2FYH/N	46,788-557- 84-29
KA2KRA/N	32,550-434- 75-28
KA2HJH/N	16,456-242- 68-25
KA2HSF/N	14,300-210- 65-21
KA2JPZ/N	10,659-209- 51-30
WB1CPE/2N	9164-137- 52-13
KA2EGO/N	7800-130- 52-13
KA2IRQ/N	5984-172- 32-22
WD2AGY/N	5709-163- 33-29
KA2IPJ/N	4644- 98- 43-18
KA2IPI/N	1740- 48- 30- 8
WD2AGX/N	1342- 51- 22-23

Southern New Jersey

KA2HKN/N	33,418-434- 77-30
KA2IRM/N	17,568-273- 61-26
KA2KGD/N	16,415-245- 67-30
KA2JAR/N	13,601-203- 67-25
KA2IYY/N	2409- 73- 33- 6
WA2JXQ/N	544- 17- 17- 3

Western New York

KA2IML/N	26,676-351- 76-22
KA2EXY/T	22,365-315- 71-30
KA2KAG/N	17,424-264- 66-28
KA2FEK/N	15,399-251- 59-24
KA2IPT/N	14,160-225- 59-30
KA2ILH/N	12,100-205- 55-17
KA2KII/N	11,928-213- 56-15
KA2KGK/N	11,016-204- 54-30
WB2FQE/N	9333-183- 51-27
KA2KGM/N	9169-163- 53-30
KA2HUO/N	6786-107- 58-20
KA2JBE/N	6768-126- 48-16
KA2HFO/N	2556- 61- 36-25
WA2PSG/N	2275- 65- 35-10
KA2IMH/T	2077- 67- 31-13
KA2IQZ/N	861- 41- 21-10

3

Delaware

WN3RGP/N	16,549-247- 67-22
KA3DDB/N	2482- 63- 34-18

Eastern Pennsylvania

KA3CAN/N	35,298-477- 74-23
WA3WSS/N	21,720-352- 60-15
KA3DXR/N	15,210-234- 65-28
KA3CAA/N	13,230-210- 63-21
KA3FNA/N	12,852-204- 63-28
WB3GSO/N	7599-139- 51-24
KA3GJT/N	7008-209- 32-28
KA3AZV/N	7008-131- 48-30
KA8EFA/3N	6846-148- 42-27
KA3EHF/N	6533-139- 47-18
KA3DXQ/N	5292-108- 49-12
KA3FOK/N	5152-102- 46-22
KA3BMZ/N	3312- 92- 36-10
WB3IRB/T	3204- 89- 36-30
KA3FKL/T	1914- 51- 29-18
KA3DZD/T	693- 33- 21-12
KA3BMF/T	252- 18- 14-18
WB3KUZ/N(+KA3s CKI GWG)	528- 23- 16- 8

Maryland - D.C.

KA3CUB/N	50,402-613- 79-30
WB3FSB/N	50,391-489- 99-28
KA3CZC/N	16,900-245- 65-30
KA3EDM/N	16,368-248- 66-28
KA3ECZ/N	14,256-201- 66-20
KA3EFS/N	12,483-209- 57-22
KA3DOO/T	11,210-190- 59-20
KA3GWE/N	9045-201- 45-26
KA3BPR/N	2656- 83- 32-13
N3BLZ/T	1827- 53- 29-10

Western Pennsylvania

KA3DRR/N	55,675-655- 84-30
KA3ANJ/N	30,660-438- 70-27
KA3EOX/N	28,075-425- 67-24
KA3FJM/N	24,282-327- 71-30
WB3HDI/N	24,000-375- 64-28
KA3DPQ/N	22,750-350- 65-22
KA3FFD/N	13,275-215- 59-24
KA3GGH/N	12,604-264- 46-29
KA3ETC/N	12,100-220- 55-20
KA3DDG/N	10,353-203- 51-19
KA3FXJ/N	7560-216- 35-20
KA3GGP/N	3081- 79- 39-16
N3AEP/T	102- 7- 6-
KA3AUH/N	54- 9- 6- 2

4

Alabama

KA4PKB/N	30,170-421- 70-30
WA4QHI/N	26,136-396- 66-30
KA4IUS/N	17,052-284- 58-30
KA4MXN/N	13,365-243- 55-16
KA4RDW/N	1995- 57- 35-29
KA4PTD/N	9- 3- 3- 3
KA4JYH/N	4- 2- 2- 1

Georgia

KA4OTP/N	44,250-590- 75-30
KA4IOU/N	26,880-365- 71-27
KA4OLH/N	24,614-397- 62-30
KA4NNK/N	22,500-375- 60-28
KA4AXS/N	13,760-215- 64-18
KA4RLP/N	13,552-242- 56-27
KA4NLD/N	12,137-229- 53-28
KA4OIQ/N	10,045-205- 49-21
KA4PZQ/N	7290-152- 45-30

Kentucky

KA4IKH/N	49,200-575- 82-25
WD4KCW/N	42,160-471- 85-28
KA4MBF/N	23,392-329- 68-23
KA4SAA/N	17,829-268- 63-25
WA4RXX/N	13,824-216- 64-16
KA4FME/N	9522-207- 46-26

North Carolina

KA4ODX/N	20,075-365- 55-20
KA4MBZ/N	19,341-292- 63-30
WD4KNV/N	18,396-232- 73-25
KA4MLB/N	13,255-231- 55-28
KA5AKY/N	13,020-200- 62-25
KA4PJQ/T	9648-201- 48-18
KA4KJI/N	6644-141- 44-28
KA4RZJ/T	5117-119- 43-14
WD4CNZ/N	4800-100- 48-20
KA4LTC/N	3996-111- 36-27
KA4OVZ/N	2268- 81- 28- 9

Northern Florida

KA4OUN/N	25,146-381- 66-30
KA4RRN/N	13,440-240- 56-15
KA4MGR/N	11,480-205- 56-26
KA4MGQ/N	9128-153- 56-21
KA4KJE/N	4961-121- 41-27
KA4KNJ/T	3813- 93- 41-16

South Carolina

KA4AUR/N	42,427-531- 77-29
KA4LRM/N	17,400-270- 60-26
KA4LHV/N	12,760-232- 55-28
KA4LHG/N	11,340-210- 54-21
KA4ITQ/N	10,269-163- 63-19
WB4CVH/T	42- 7- 6- 3

Southern Florida

KA4IFF/N	37,368-494- 72-30
KA4JRY/N	17,880-298- 60-27
KA4GSK/T	15,906-206- 66-30
WD8BQV/4N	14,465-248- 55-14
KA4OEL/N	10,812-212- 51-30
KA4GQJ/N	1891- 61- 31- 8

Tennessee

WD4NMO/N	35,285-491- 84-24
KA4RXK/N	26,250-375- 70-30
KA4RWC/N	12,978-206- 63-30
KA4NPR/N	12,426-218- 57-30
KA4RLC/N	11,450-229- 53-16
KA4INX/T	4743- 93- 51-18

Virginia

KA4PQF/N	33,440-408- 80-30
KA4KOZ/N	27,566-343- 76-27
KA4NAU/N	17,019-279- 61-28
K4AF/N(WD4EEA,opr)	15,399-231- 59-18
KA4RLJ/N	13,786-211- 61-19
KA4NTP/N	12,626-204- 59-20
WD4ACG/N	12,510-202- 61-28
KA4MOR/N	11,480-195- 56-29
KA4SMY/N	9570-174- 55-29
KA4SPJ/N	7392-132- 56-24
KA4BLB/N	3486- 83- 42-12
KA4RRU/N	2640- 80- 33-12
KA4MHY/T	2304- 72- 32-13
KA4HIU/N	2040- 50- 34- 9
KA4REG/N	84- 12- 7- 4
KA4IHK/N	44- 2- 2- 2

West Indies

WP4BDS/T	50,138-583- 86-29
WP4BJC/N	10,400-200- 52-30

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Arkansas

KA5HWC/N	27,580-379- 70-29
KA5CKR/N	15,840-225- 66-27
KA5KDA/N	12,702-204- 58-22
KA5JAO/N	1148- 41- 28-10
KA5JZK/N	168- 14- 12- 5

Louisiana

WD5EAE/N	42,812-531- 77-30
KA5HHL/N	6258-149- 42-17

Mississippi

WD5JZL/N	39,812-538- 74-28
KA5BEE/N	29,008-392- 73-22
KA5IJP/N	19,296-288- 67-24
KA5IHK/N	14,868-236- 63-14
KA5CSU/N	6240-130- 48-10
KA5IUS/N	3724- 98- 38-14

New Mexico

KA5DIU/N	26,585-409- 65-28
KA5GME/N	23,004-324- 71-11

Northern Texas

KA5GFJ/N	33,990-515- 66-30
KA5GWI/N	23,374-403- 58-27
KA5HGE/N	19,215-290- 63-20
KA5JVO/N	2048- 72- 29-23
KA5FEQ/N	1908- 53- 36-12
KA5BVB/T	99- 11- 9- 8
KA5GSH/N	63- 9- 7- 2

Oklahoma

WD5FTZ/N	18,928-323- 56-20
KA5GMY/N	5934-129- 46-18
KA5FBG/T	1334- 43- 23-22

Southern Texas

WB5LVL/N	91,476-924- 99-30
KA5DGR/N	67,760-847- 80-25
KA5CIB/N	61,152-784- 78-29
WB5LUU/N	29,632-448- 64-30
WD5JNS/N	12,798-237- 54-30
KA5KPR/N	12,265-223- 55-27
KA5IQL/N	11,286-209- 54-24
KA9CPM/5N	4536- 98- 42- 8
N5CRR/T	1250- 50 25-19
KA5ILR/N	720- 60- 12- 6

6

East Bay

KA5GIS/6N	28,050-425- 66-29
KA6BPR/N	26,010-286- 85-24
WA6CIE/T	4455- 97- 45-19
KA6MXK/N	1700- 50- 34-28

Los Angeles

KA6LXD/N	15,555-235- 61-30
KA6CUU/N	13,237-217- 61-30
KA6KGU/N	12,152-207- 56-27
KA6NEG/N	10,424-167- 57-24
KA6AKL/N	8256-172- 48- 9

Orange

WD6CUT/N	38,398-526- 73-30
KA6NWV/N	17,052-289- 58-25
KA6FMZ/T	14,640-234- 60-30
WD6GXU/T	12,120-202- 60-29
KA6JUM/N	11,607-219- 56-18
KA6LDP/T	6000-120- 50-30
N6DBF/T	5612-122- 46-30

Pacific

WH6AMR/N	29,465-415- 71-30
KH6KR/T	567- 27- 21- 8

Sacramento Valley

KA6JWZ/N	29,638-406- 73-30
KA6FXF/N	28,490-392- 70-30

San Diego

KA6LCI/N	43,364-666- 74-29
WA6EEH/T	17,615-271- 67-27
KA6IDX/N	16- 4- 4- 9

San Francisco

KA6JHM/N	18,876-286- 66-30

San Joaquin Valley

KA6MSU/N	8910-165- 55-24
KA6EVN/T	1175- 37- 25-15

Santa Barbara

KA5EFC/N	27,064-398- 68-23
KA6GKU/N	23,598-342- 69-26

Santa Clara Valley

KA6HSM/N	52,360-601- 85-30
KA6LGX/N	42,254-543- 78-30
KA6LAF/N	38,556-567- 68-30
WD6CVP/N	18,876-276- 66-30
WD6DXH/N	14,442-249- 58-17
KA6ING/T	6215-113- 55-30

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Alaska

WL7AME/N	42,140-602- 70-30
WL7ALN/N	6720-140- 48-23
KL7KE/T	1298- 44- 22-25
KL7KD/T	49- 7- 7-16

Idaho

WB7PVL/N	39,712-559- 68-25
KA7GVY/N	3510- 90- 39-24
KA7FAH/T	667- 29- 23- 8

Montana

KA7HBK/N	40,587-464- 83-30
KA7HTC/N	828- 36- 23-16

Nevada

KA7GXO/N	37,989-469- 81-26

Oregon

KA7FPP/N	67,988-739- 92-28
WB7PVA/N	50,718-617- 79-30
KA7GXK/N	23,892-362- 66-27
WB7USJ/7N	22,780-320- 67-30
KA7FIP/N	18,546-281- 66-30
N7CEJ/T	15- 5- 3- 7

Utah

WA4PGM/7N	22,494-301- 69-25
KL7KR/7T	13,275-215- 59-29
WB4NVO/T	1512- 54- 28-11

Washington

KA7HOE/N	60,040-775- 76-30
KA7AWH/N	30,175-390- 71-30
KA7DEV/N	29,799-458- 63-21
KA7DWW/N	21,420-315- 68-18
KA7JHG/N	18,624-266- 64-30
KA7HJQ/N	15,399-261- 59-15
KA7CSE/N	12,726-202- 63-17
KA7EOV/N	4216- 98- 45-17
WB7VYC/N	1829- 59- 31-30
KA7FKY/N	1650- 50- 33-10
WB0UCJ/7N	864- 36- 24- 6

Wyoming

KA7AIT/N	16,698-253- 66-26
KA7FPD/N	15,372-242- 61-18
KA7HVS/N	12,255-215- 57-19
KA7FDL/N	6248-127- 44-28

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Michigan

KA8EBG/N	38,760-408- 95-30
KA8EGP/N	36,068-488- 71-30
WB8WTZ/N	35,234-446- 79-23
WD8QJD/T	34,200-475- 72-30
KA8LKE/N	27,975-363- 75-30
KA8JBK/N	25,432-374- 68-30
KA8JYL/N	20,100-253- 75-30
KA8EXJ/N	19,312-274- 68-26
KA8IIN/N	18,886-276- 66-30
KA4GTH/8N	17,160-260- 66-21
KA8FXT/N	16,124-298- 58-30
KA4GTH/8N	17,160-260- 66-21
KA8IZO/N	15,015-231- 65-22
KA8JZM/N	15,000-250- 60-28
KA8IBJ/N	14,160-221- 60-23
WD8BFH/N	12,780-203- 60-21
KA8ISG/N	12,540-194- 60-22
KA8GBB/N	12,432-212- 56-25
WD8LCD/N	12,291-241- 51-26
KA8HZO/N	12,122-209- 58-19
KA8JRY/N	10,400-208- 50-27
KA8JAT/T	10,140-195- 52-29
KA8KAH/N	9494-202- 47-30
KA8KCT/N	9006-143- 57-30
KA8KQO/N	8586-139- 54-26
KA8LDE/N	8211-161- 51-30
KA8JJK/N	7550-141- 50-23
WD8ODA/N	6630-130- 51-25
KA8KGT/N	4760-116- 35-28
KA8JRL/N	2940- 84- 35-13
KA8GCC/N	1392- 48- 29-20
KA8IOX/N	450- 25- 18- 6
KA8KRZ/N(+WB8TIE)	19,468-284- 62-30

Ohio

KA8IYM/N	60,192-588- 99-30
KA8GCD/N	40,271-523- 77-25
N8BCQ/T	38,556-459- 84-30
KA8IFC/N	28,900-425- 68-30
KA8ABU/N	28,795-443- 65-30
WD8IJP/N	27,216-336- 81-16
WD8JUO/N	26,722-431- 62-28
KA8HUZ/N	23,373-371- 63-20
KA8GEU/N	22,177-311- 67-27
KA8JZR/N	20,234-282- 67-30
KA8IPG/N	16,714-274- 61-24
KA8HXX/N	16,597-281- 57-17
KA8GWM/N	14,544-202- 72-30
KA8GQM/N	14,136-213- 62-30
KA3ESU/8N	13,608-243- 56-22
KA8FUZ/N	12,272-198- 59-30
WD8PPQ/T	12,087-227- 51-21
KA8JCB/N	11,988-207- 54-20
KA8KVW/N	9360-219- 40-23
KA8KWB/N	6727-217- 31-18
KA8ILT/N	6696-124- 54-30
KA8GVR/T	3382- 89- 38-20
KA8LKR/N	2700- 90- 30-24
WD8JUF/N	1752- 73- 24-10
KA8IHI/N	1271- 41- 31- 8
KA1AFJ/8N	697- 41- 17-11
KA8LFY/N	265- 19- 14- 3
KA8KSO/N	54- 9- 6-15

West Virginia

KA8LJD/N	42,840-504- 85-30
KA8KOI/N	17,995-295- 61-28
KA8HSR/N	14,980-214- 70-23
KA8KOH/N	12,660-211- 60-13
WD8NHN/N	5082-111- 42-10
WD8LOC/N	720- 25- 18- 6

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Illinois

WB9UIA/N	43,788-534- 82-28
WB9TJY/T	29,600-460- 80-29
K9JFN/T	27,936-388- 72-27
WB9RKY/N	24,375-375- 65-30
KA9IHG/N	22,839-321- 69-30
KA9CTM/N	22,764-256- 84-30
KA9GSS/N	22,032-301- 72-24
KA9FHL/N	21,240-354- 60-18
KA9IEY/N	15,833-213- 71-29
KA9FXT/N	14,850-260- 54-30
KA9JNP/N	12,586-203- 62-23
KA9GZM/N	12,488-223- 56-20
KA9GQQ/N	9585-213- 45-15
KA9BTA/T	6708-129- 52-30
KA9HRM/T	5264-102- 49-25
KA9JDZ/N	5106-111- 46-23
KA9DBO/N	3956- 92- 43-25
WD9JCB/N	3420- 95- 36-21
KA9IMZ/N	1980- 66- 30-15
KA9INA/N	1824- 57- 32- 9
KA9IKG/N	1500- 50- 30-10
KA9INB/N	725- 29- 25- 7
KA9IKK/N	578- 24- 17- 5
KA9DMW/N	312- 16- 12- 2
KA9JEJ/N	252- 21- 12- 5
KA9JZN/N	168- 14- 7- 6

Indiana

WD9DVO/N	42,042-546- 77-25
KA9IUV/N	40,108-527- 74-29
KA9JKV/N	18,056-296- 61-28
KA9CWN/N	14,672-247- 56-29
N9AMC/T	12,803-217- 59-29
KA9CZD/N	10,248-163- 56-27
WD9BDW/N	7290-120- 54-22
KA9HGP/N	7242-142- 51-17
KA9CPM/N	6768-131- 48- 8
WD9GQC/N	6258-149- 42-26
K9BRF/T	6120-143- 40-30
KA9JMR/N	4752-108- 44-26
WB9YHU/T	224- 16- 14- 7

Wisconsin

KA9CHM/N	69,498-702- 99-30
KA9CHP/N	54,201-623- 87-30
KA9FDL/N	28,275-435- 65-29
KA9EKG/N	20,988-318- 66-24
KA9IXM/N	16,764-254- 66-29
KA9IXL/N	16,146-234- 69-30
KA9EBM/N	13,978-241- 58-28
KA9AEH/N	8904-159- 56-27
KA9AWP/N	2448- 68- 36-12
N9ATQ/T	1749- 53- 33- 7
KA9HAQ/N	496- 31- 16- 4

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Colorado

KAØGFA/N	65,535-751- 85-30
KAØIQM/N	42,032-568- 74-30
KAØAIA/N	31,296-469- 64-23
KAØFBZ/N	27,484-371- 74-29
NØBRI/T	22,650-302- 75-28
KA7HFJ/ØN	22,035-329- 65-24
KAØDGN/N	14,101-239- 59-29
WD5DOB/ØN	12,803-207- 59-27
WDØGFA/N	7824-163- 48-14
KAØGWU/N	345- 23- 15- 4
NØBQH/T	330- 22- 15- 7
KAØEKY/N	9- 3- 3-11

Iowa

WDØBNO/N	38,556-444- 84-30
KAØJQG/N	28,424-403- 68-29
WD6FGT/ØN	14,592-236- 57-16
KAØBTD/N	13,200-220- 60-25
KAØBLE/N	6816-122- 48-22
KAØAMA/N	5593-119- 47-21
KAØGER/N	3496- 92- 38-16
WBØQAC/N	1972- 53- 29-18
KAØGWK/N	1960- 70- 28-17
KAØJVK/N	1914- 48- 33-17
KAØATP/N	1092- 42- 26-12

Kansas

KAØANR/N	39,524-467- 82-27
KAØIKD/N	38,240-468- 80-29
KAØECD/N	38,019-412- 87-29
KAØEGE/N	25,702-352- 71-23
WDØHQL/N	22,528-322- 64-30
WDØGSA/N	20,832-321- 62-27
KAØCUJ/N	16,005-291- 55-30
KAØHZF/N	14,760-246- 60-23
NØBIW/T	13,166-227- 58-15
WDØGLT/N	6255-139- 45-26

Minnesota

KAØBVK/N	16,384-256- 64-27
WDØGZE/N	14,994-223- 63-11
KAØATM/T	14,168-253- 56-27
KAØGMX/N	13,685-215- 59-13
KAØHML/N	13,662-207- 66-23
KAØGFV/N	13,298-218- 61-18
KAØGWO/N	12,789-203- 63-28
KA3DGO/ØN	11,700-234- 50-18
KAØIXE/T	10,600-200- 53-24
KAØARP/N	9396-174- 63-22
KAØHVO/N	5920-140- 37-20
KAØHJR/N	2358-114- 47-19
KAØJKQ/N	1690- 55- 26- 7
KAØJWC/N	63- 9- 7- 3

Missouri

KAØIQR/T	34,710-434- 80-28
WBØUFV/N	13,110-230- 57-26
KAØINR/T	12,627-207- 61-16
KAØHFE/N	11,350-217- 50-15
KAØHBR/N	4144-112- 37-22
KAØDLD/N	720- 36- 20-16
WDØBBP/N	456- 24- 19- 7

Nebraska

WDØHAR/N	29,932-481- 72-30
KAØFVE/N	14,300-220- 65-20
KAØJVF/N	4004- 91- 44-30
KAØJYZ/N	1596- 57- 28- 7

North Dakota

KAØJUD/N	15,281-239- 59-14
KAØJJR/N	416- 26- 16- 4

South Dakota

WDØBWH/N	65,772-741- 87-30
KAØJYF/N	4452-106- 42-30

Non-Novices

K1KI 23,725, KN5H 23,595, W1FM 22,387, WD9BQG 18,944, K9GDF 18,432, K5HM 17,640, WD5COV 17,442, WA5IPS 17,422, K2SX 17,136, WAØLIS/9 15,488, NG4E 15,128, KA2BNL 12,711, WB2QEU 12,390, K1ZZ 12,375, W1SE 12,243, KA1R 11,178, W4YOK 9964, K4OAQ 9552, N9BWE 8892, W1KX 8517, WB1DFV 8456, WB6DNN 8211, KG8J 8164, N6AED 7426, WA3UNX 7350, N6HC 6909, K4ZGB 6647, PY1VT 6528, N6HE 6432, K6CSL 5900, W9TP 5760, KA4MCM 5494, KE2K 4972, WD6BJK 4961, SM6BLE 4770, WA4OGV 4644, WA3LGG 4500, KB9W 4485, AD5F 4171, N1ADX 3960, WA2EYA 3744, W1AW (W1EH,opr) 3404, WB5HLB 2774, KAØBQZ(+WBØs WOM WOL) 2725, KA1MX 2590, AA9F 2100, KA8FHB 1924, KA9CDC 1820, N9CR 1050, NP2AE 1008, N2BZK 950, KH6CP 918, W1XX 520, HP1AC 486, W6PRI 370, WB9TCJ 368, WB9IPX 171, WB2FVT 161, K2RN 130, WB1HIH 110

Check Logs

5M2COR, SM6HCJ, VE1RH, VE3BAJ, VE7BWM, AD1Z, K1WJ, KA1BHI, KA1CLV, W1JEC, WA1WLU, WB1CPF, AK2H, KA2CGV, W2JEK, WB2HSG, WB3ION/2N, KB3MM, W3ARK, W3QEI, WA3ZMY, K4EJQ, KA4CDS, KC4LI, W4KFC, K5RF, KA5GWQ, KB5UL, N5GW, K2SCU/5, AC6H, K6XO, K6XT, KA6FBQ, KA6IYE, W6DDB, KB7N, W7LNE, W7LQD, WA7NXL, WA7TDU, WA7YUL, WB7TJI, KB8KW/7, K8CV, KD8O, W8VUV, WB8AYW, WB8RVM, KA9CQM, N9AUG, W9ALZ, W9CUN, W9FSD, W9LNQ, W9PNE, WD8RNQ/9, KAØDGU, KAØDGV/T, NØBFP, WØUBT, WBØWXJ

Club Corner

Conducted By Sally O'Dell,* KB1O

WALL TO WALL WALLPAPER

We all know of the many awards sponsored by the League and other organizations. Some of the more popular ARRL awards include Rag Chewers Club certificate, Worked All States, DXCC and code proficiency awards. If you are interested in starting to collect awards — to paper your walls with recognition of your operating achievements — the Rag Chewers Club (RCC) certificate is one of the simplest. The requirements are to converse with another amateur for a half hour or more and report the conversation to ARRL Headquarters. (Please include a business-sized s.a.s.e.) The RCC is a free service of ARRL to all amateur licensees. More information about this award and others is included in the "Awards Chasing" chapter in ARRL's new *Operating Manual*.

The awards mentioned above are offered to individuals. How do they relate to the affiliated clubs? Under its call sign, your club can participate in most of the awards programs mentioned in the *Operating Manual*. (If you are waiting for the FCC to issue a call sign specifically for your new club, you will have a long wait. Club calls were discontinued by the FCC in 1979. We recommend using the call of one individual in the club for all club efforts.) You can paper the club shack walls!!!

The real trick is *sponsoring* your own awards for your own group. This will stimulate activity that you didn't know existed. The Stu Rockafellow ARS (Plymouth, Michigan) sponsors a series of seven awards which are presented only to its members. One of these awards acknowledges the special efforts individual members put into their club, as the "Appreciation Award." It is issued to those persons presenting a program to a monthly club meeting. Are you having difficulty deciding on club programs each month? Try issuing an appreciation certificate and see how many more offers you receive. Another award recognizes member activity. "SRARS Repeater Award" is issued to any member working a total of 20 club members on the club repeater. These awards are earned by people who are excited about the program and are anxious to participate.

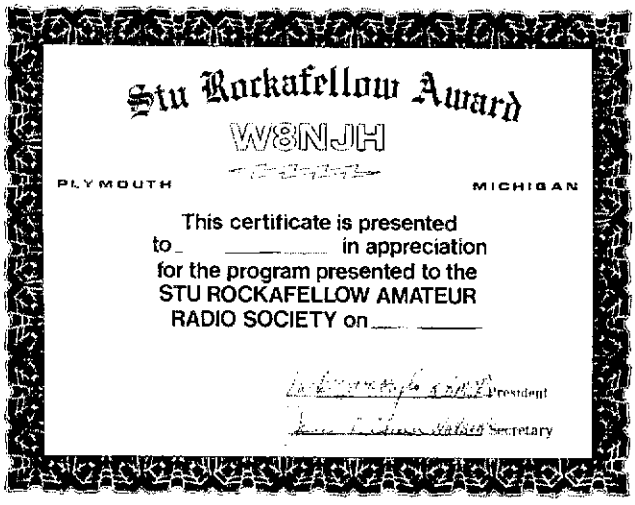
But there is also another direction to go. How about sponsoring an award for others to earn? Many clubs sponsor their own awards to generate more club activity. The Warren (Ohio) ARA sponsors a "Worked Trumbull County" award, which is designed to promote increased Amateur Radio activity among and with the club operators. Contact Awards Chairman, WARA, P. O. Box 809, Warren, OH for more information on their club award.

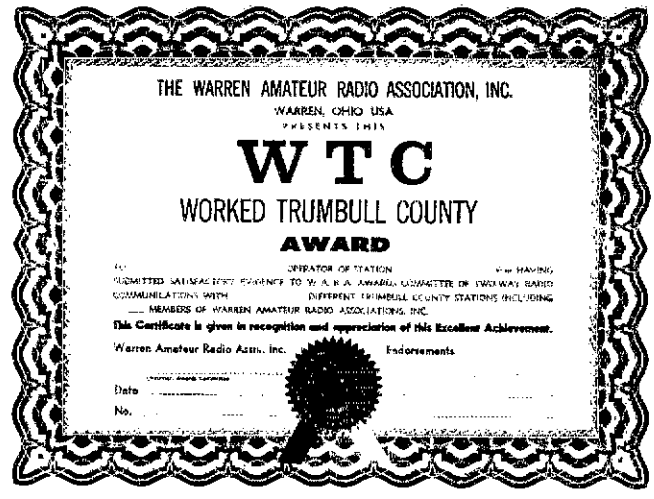
Of course, you should remember that there will be (or could be) related administrative problems. Before you begin, do some brainstorming and decide how this project should be handled. Who will be responsible for receiving mail, designing a certificate, arranging to have it printed, determining the criteria for application and the many other tasks that will crop up. Will your club foot the bill for stamps if someone forgets to include an s.a.s.e? Will the club purchase envelopes large enough to hold the certificates without folding? All of these jobs will cost both money and time. They are the Basic Decisions. Do you have the dedicated volunteers willing to handle these and other assignments? The responsibilities are great, but the rewards many. You will know that you are doing a good job on something important for your club. The choice is yours, but make it a wise and thoughtful one. There may be someone in the club who has ideas. Present your thought-out proposal to the whole club to see what kind of feedback you get.

Let us in Club and Training share news of your awards with others. We'd like to publish some in "Radio Club News," the newsletter written for affiliated clubs.

What do you do for your club? Do your members want to participate in club events? Are they excited about club meetings and other activities? Maybe a club award issued only to club members or even to others will stimulate the activity your group is looking for. QST

*Club Program Manager





50 Years Ago

June 1931

In "Putting the Pentode to Work," Associate Editor Ross Hull describes a compact receiver he built before leaving Australia "... and used to while away some hours of the five-week sea trip to this country." The pentode of the title is the new audio pentode that delivers more output than the usual triode. The 3-tube receiver (r.f., detector and audio) used coils plugged in through holes in the aluminum housing. In a separate article, Hull tells "About the Pentode" and its advantages (and disadvantages) for audio amplification.

Rounding out the emphasis on the new tube design, Richard Briggs, W1BVL, writes about "Using Pentode Tubes in the Low-Powered Transmitter." He describes a crystal-controlled rig with '27 triode oscillator, '47 pentode buffer/doubler and push-pull '47s output.

"A Self-Contained 200-Watt Transmitter" is the description by S. L. Seaton, W3BWL, of the transmitter to be used at the Huancayo (Peru) Magnetic Observatory. The 6-1/2-ft-high cabinet houses a 50-W triode crystal oscillator stage driving a buffer/multiplier string of '60 75-W tetrodes, and the output amplifier is two '60s in parallel. The 2000-V and other supplies plus their filters are included.

H. W. Kadell of the Radio Tube Division of National Carbon in "The Evolution of the Cathode" tells how the indirectly-heated cathode evolved from the directly-heated "filaments" of the earlier vacuum tubes. It's an interesting account of manufacturing problems and how they were solved.

"A High-Frequency Converter with Single-Dial Control" by Howard Chinn, W1AXV-W1XP, describes a gang-tuned converter that can work into any broadcast receiver to provide improved short-wave 'phone reception. The circuit uses '24 tetrodes for mixer and oscillator, with screen-grid injection of the mixer.

25 Years Ago

June 1956

Maurice Johnson, W3TRR, and Robert Hankey, W3OBC, describe "A 50-Mc. Transmitter-Receiver for Civil Defense Use." This compact unit includes a 5-tube crystal-controlled a.-m. transmitter, an 8-tube crystal-controlled superhet receiver and a power supply that works on either 110 V.a.c. or 6 V.d.c. The receiver includes noise-limiting and squelch circuitry.

"Some Hints on Relay Operation" by Laurence Stein, Jr., W1BIY, tells how to accelerate relay operation for keying and other high-speed applications. A very enlightening article.

"A Simple 14-Mc. Ground-Plane Antenna," by Karl Thurber, Jr., K2HKZ, is a well-written description and includes the use of a quarter wave of 50-ohm coax to match to the 75-ohm feed line. The editor confesses that he changed the original title ("The Twenty-Meter Miracle"), but admits that the use of "miracle" may have seemed appropriate to the 14-year-old author.

Higher in frequency, "The 10-10 Antenna" by Victor Damora, K2HKM, tells how the author built a 10-meter coaxial antenna for less than $10. K2HKM thinks that some of its good DX performance can be attributed to being mounted above a TV antenna, which may serve as a ground plane.

"The 'Simple V.F.O. For Mobile or Fixed Stations,'" by R. J. Gunderman, W8INO, is a compact (3 × 6 × 4-in.) two-tube unit with output on 7 Mc. Special consideration is given to mechanical and power-supply stability.

"Modern Design of a High-Power Final," by Lew McCoy, W1ICP, describes a fancy-Dan kilowatt using parallel 4-250As running Class C for plate-modulated a.m. or for c.w., or AB_1 for linear amplification.

"Correspondence From Members" carries quite a few letters backing up the April editorial that decried the growing trend toward 100% "store-bought" stations. One lonely voice, however, took the opposite stand and pointed out several reasons for the growing commercialism. And then there were the usual letters either taking *QST* to task for the April Rapp ("VFO") article or making additional "technical" suggestions and observations. — *Byron Goodman, W1DX* QST

Public Service

Conducted By Robert J. Halprin,* K1XA

NTS Trial Net Schedule Extended Until December 31

The method by which the present National Traffic System net schedule is judged has been a matter of great interest in the traffic-handling community. The specific evaluation criteria for NTS restructuring (as it is called) was addressed in detail by the three NTS area staffs in the course of their 1980 meetings. One staff recommendation advocated an extension of the net sequencing until an in-depth procedure for evaluation could be carried out.

Drawing upon this recommendation, the communications manager notified all NTS area staff members on March 26, 1981, that the restructured schedule would continue through September 30, 1981, for evaluation purposes, and through December 31, 1981, for practical reasons. This will permit the implementation of an agreed-upon NTS net format for a January 1, 1982, "curtain raiser." The communications manager's response was contained in a letter that served as the official response to the many recommendations submitted by the area staffs following their 1980 conferences.

There are three NTS areas — Eastern, Central and Pacific — and as such, there are three area staffs, comprised of the NTS region net managers, area net managers, TCC directors and members-at-large in the area concerned. The Eastern Area Staff (EAS) met May 3-4, 1980; a summary of that meeting appeared on pages 74-75 of August 1980 *QST*. The Central Area Staff (CAS) met on July 26, 1980; highlights of that meeting were run in December 1980 *QST*, pages 98-99. The Pacific Area Staff (PAS) held their meeting on September 26, 1980, and their minutes recently arrived at headquarters. PAS dealt with the restructuring matter in a comprehensive manner, which prompted an equally comprehensive reply by the communications manager.

With regard to the evaluation criteria, the communications manager's letter said: "As you will recall, the restructured NTS was adopted on a one-year trial basis upon the recommendation of your combined staffs which met in Newington on November 1979 [see April 1980 *QST*, pages 94-95 — Ed.]. The trial is scheduled to conclude on May 31.

"EAS recommended the following measurement criteria for evaluating the restructured NTS sequence: (1) rate, (2) % of net sessions held and reported, (3) % of liaison station functions successful, (4) number of different stations participating at each NTS level, (5) total traffic cleared, (6) average traffic delay, (7) traffic listed, not cleared. CAS approved items 1 through 5, while recommending deletion of 6 and 7. PAS addressed the evaluation of the restructured sequence from another direction, with the following motion:

> ". . . the Pacific Area Staff recommends to the communications manager that in the future, where any major changes in NTS involving all three areas are concerned, the following procedures be adopted: Each area staff will have one vote, which is determined by the majority of all members of that staff. Further, that unanimous agreement of all three area staffs' votes are required before further action towards implementation of any major changes is made. If the staffs agree unanimously, then a poll of active participants be made before implementation is finalized.

The response of the communications manager continues, "Further, in the report of the PAS Ad Hoc Committee, appended to the official PAS minutes you all have received, it states that the conclusion of the trial period should be *extended* unless or until the poll is completed.

"The conduct of the evaluation of the recommended one-year trial is of prime importance and concern to the NTS community. Ideally, an assessment should be based completely on objective data that would measure the relative effectiveness of the present restructuring. It was with this in mind that, when I accepted your recommendation for implementation, I stressed that objective measurement criteria must be implemented so that we can quantitatively measure the effect of the new plan. And this you have done primarily with the standard monthly yardsticks that are applied to NTS performance. Although such quantitative measurement is most important, it would be fool-hardy to think that a decision can be reduced to a pile of statistics *only*. The subjective human ingredient must be assessed also.

"In retrospect, if there was any failing in implementing the recommended restructured sequencing, it was in assuming that proper communication between manager and participant had indeed occurred. This was not so in all cases, and it was compounded by a change of managership in some vital positions. Implicit in your status as an NTS official is that you serve as a communications channel for your net participants concerning modifications of the NTS structure, as well as any other concerns.

"I stress here, in the strongest manner I can, that it is imperative that each manager and member-at-large touch base with his/her constituents. However, I repeat, dialogue between manager and net operator must be accomplished by the manager.

"This will obviate the need for any poll to be conducted by this office. It would be inappropriate for this office to circumvent the role of the NTS staffs and the reason for which they were created, i.e., to be representatives of the traffic-handling community in their 'jurisdictions,' so to speak. It may be well to remind those newer to the intimate workings of the area-staff concept that historically, NTS has functioned on a philosophy that its direction is derived from its participants. And this is in keeping with a philosophy that I particularly espouse, i.e., decentralized decision making.

"However, there are recommendations that the individual staffs make to the communications manager that affect the entire system. It is for that reason that the role of the staffs is *advisory* to the communications manager. Although unanimity is always the goal, the PAS Ad Hoc Committee's recommendation that a 3-0 staff vote be required on *any* matter concerning NTS would effectively shackle the whole organization. Democracy does not necessitate complete unanimity, for lacking it, only a crippling stall would result. Therefore, this single aspect of the Ad Hoc Committee's report cannot be accepted.

"The TCC aspect of NTS restructuring was clearly focused on by the PAS Ad Hoc Committee. In their critique, the Ad Hoc Committee stated that 'the TCC portion of restructuring expedites west-to-east traffic from the evening nets.' That is to say, that traffic from the Central and Pacific areas destined east, originating in the evening, is *expedited* by the TCC interface established by restructuring, into the daytime nets. This positive evaluation of restructuring by PAS, though encouraging, must be balanced against any proven negative aspects.

"This points out that there are various aspects of the restructuring plan that must be addressed by the three area staffs in their deliberations. Though PAS perceives this flow of traffic from the night time in the Pacific and/or Central to the daytime in the Central and/or the east as a positive feature of the restructuring program, each part of the plan must be evaluated.

"They go on to say that traffic destined east that is originated in the daytime is delayed by the restructured schedule. This statement is based on the notion that the earliest delivery would be accomplished following the 10 P.M. section nets: 'The restructured system . . . necessitates the routing of west-to-east traffic into the evening area net (8:30 P.M.) and to the 10 P.M. and next-day nets.' The PAS subcommittee expresses the idea that this presumed traffic delay 'is the most serious objection to the restructured plan.'

"This is a key issue in the evaluation. If such a delay is indeed occurring, then this negative factor must be weighed against any positive effects perceived by the staffs. This potential delay can be obviated by the TCC receiving stations in the Eastern and Central areas placing the received traffic into section nets *prior* to the area net at 8:30. TCC stations are, of course, authorized to do so.

"To gain the needed input to evaluate this critical question, I am requesting the following information from the two TCC directors concerned. For a six-month period, specifically April 1981, through September 1981, I am asking the directors to require station V, station Q and station O to report what nets they are clearing their Pacific/Central traffic into. (Typically, the Q/T and O/U skeds occur in 6-6:30 P.M. time frame, which permits direct section-net QNI for clearing most of the traffic well before the area net). This measurement is closely aligned with criterion 6, as recommended by EAS.

"This study will be hampered by the situation whereby traffic on the area net concerned is often routed in a circuitous manner, and is withheld from the appropriate TCC rep. A true evaluation would depend on this matter being rectified, and I so urge the area net managers involved.

"Furthermore, so as not to keep people

*Assistant Communications Manager, ARRL

guessing on this critical question for months on end; the results of this TCC study are to be submitted to headquarters on a monthly basis, and headquarters will disseminate the information to all area staff members on the same monthly basis. Please note, however, that such information is only *one* of several factors that you must evaluate. I urge you to reserve any final judgment until *all* information is evaluated and all interested parties heard from.

"As far as area and region managers are concerned, criteria 1 through 5 will be required, as recommended by both EAS and CAS, for the period from August 1980 (when NTS reports were decombined in *QST*) through August 1981, since no prior arrangements are necessary. Since criterion 7 was recommended by only one staff, it is optional, although many managers have been already compiling this information. Members-at-large will assist where appropriate.

"EAS had tentatively planned to hold their annual meeting in Rochester, New York, in May, while CAS was considering July in Oklahoma City. Unfortunately, the studies outlined here will obviously not be completed by then. Therefore, drawing conclusions based on insufficient or incomplete evidence would be precipitous. I thus agree with the call of the PAS Ad Hoc Committee not to draw conclusions until sufficient input has been gathered, both through statistics and participant input. Accordingly, I must reluctantly advise the two staffs at this time that no meetings will be approved on a reimburseable basis prior to the conclusion of the period of study.

"My recommendation is that each staff meet on either the first or second weekend of October 1981 (perhaps simultaneously), after the data have been compiled. The meetings will provide an opportunity for extensive face-to-face discussion of NTS restructuring, along with information sharing, culminating in a vote by each area staff with regard to a recommendation on restructuring. Since it won't be possible for a recommendation with proper input by the time of the nominal conclusion of the one-year trial on May 31, 1981, the present schedule is hereby extended through September 30, 1981, for evaluation-measurement purposes, and through December 31, 1981, for practical reasons, to enable action upon any recommendation made by the staffs by January 1, 1982, with no lapse of time.

"When the moment arrives for staff recommendations, it is important that each NTS official take the following into consideration: (1) That he/she has communicated and consulted with amateurs active in the region/area; (2) that statistical data have been compiled and studied; (3) that the future growth and long-range planning, and overall good of NTS has been addressed; (4) and most importantly, that the staffs be most precise in their recommendations. For example, 'the restructured plan' presently followed means different things to different people. It has various aspects. As was discussed at the Inter-Area staff meeting extensively, the philosophy of direct area net QNI vs. out-of-net TCC schedules, and related matters, is at the heart of the issue. The potential enhanced emergency/overload response accomplished by cycle repeatability in three-hour increments, with the potentially perceived constraints on region meeting times, is another. The clientele to whom the daytime segment is directed is an issue. The integrated flow of traffic from night to day and its associated integration of phone and cw operators is another. These and others are factors in the restructuring. The point is to be specific in your recommendations so that we are not mixing apples and oranges in our discussion of what we may like or dislike.

"This procedure will, I believe, be responsive to the CAS recommendation that more input should be solicited from NTS participants and more leadtime be allowed before net NTS policies are created or initiated. Soliciting input is a responsibility that must be *shared* equally by headquarters and the area staffs. Against this must be balanced the realization that 'entrenchment' must not be fostered by maintaining the status quo for an inordinately long period of time. The situation must be judged on its own merits, a decision made, and then implemented."

Other Matters

Among other issues addressed by PAS were the publishing of third-party agreements in *QST* (the latest list appeared in April 1981 *QST*, page 92), creation of the Central and Pacific Canada regions (PAS voted against), support of the region-level RTTY net concept area staff terms of reference (PAS provided additional input), nomination of honorary League officers and the petitioning of FCC to reestablish the sending test in the cw exam (both referred to appropriate directors on the ARRL Board).

ARRL SECTION EMERGENCY COORDINATOR REPORTS

For March, 37 SEC reports were received, denoting a total ARES membership of 21,748. Sections reporting were: Ala, Ariz, Colo, EBay, ENY, EPa, Ga, Ill, Ind, Kans, La, Me, Mich, Minn, NH, NLI, NNJ, NTex, Ohio, Ont, Org, SV, SDgo, SJV, SBar, SCV, Sask, SC, Stla, SNJ, Va, Wash, WVa, WMass, WPa and Wis.

REPEATER LOG

According to reports received between March 22 and April 21, 1981, the following repeaters and simplex frequencies were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Search and Rescue	Fire	Public Safety Events	Drills/Alerts	Power Failures		Total
K1HR							1				1
WR1ABP							1				1
K2OOD							1				1
W2ALS	2				1		1	4	1		9
W2VL				1	13	1					15
WB2NQV				4	5		1				10
WR2ADB	2						1				3
WR2ADJ					4		1				5
WR2AHD	2							2	1		5
WR2AIS					2		1				3
WR2ANF	2							4			6
K3JSZ					1			5			6
N3AIA					3	2	1	2			8
W3CWC	18	1			5	1	5	4			34
WA3ZXG								6			6
WR3AEU			2	4	2						8
K4VHF							1				1
W4HFH							1				1
W4VQA								1			1
WA4GIG							1	1			2
WA4GLG								1			1
WA4LZR							1				1
WA4SWF	1						2	2			5
WB4QES	2		6	6	47	1		9			71
WB4SLZ								1			1
WB4UFA								1			1
WR4ABN								1	1		2
WR4ACR									1		1
WR4ASY									1		1
WR4AZO						2		1			3
AE5C									1		1
K5JD									1		1
W5GIX						11			1	1	13
WB5PBZ	2								1		3
WB5RDD	1										1
WB5SUF	1										1
WB5TTO									1		1
WB5WRB	2								1		3
WR5ABY									1		1
WR5ACZ	1										1
WR5AKZ	2					1					3
WR5ASY						2					2
K6IS						6		1			7
KH6AH								1			1
N6AUB	1										1
W6AXZ	1										1
W6HIR						1		1			2
W6IYY						5		2	4	1	12
W6PVR						1		1	5		7
WA6EUZ			1			14	1				16
WB6PVS			1			2			4		7
WR6AEN	1					56		1			58
K7CC				2		12		4			18
W7JKO	1										1
W7LQT						1					1
W7WGW					1	1					2
WR7AJF			1								1
W8NXD					1		1				2
W8VKD								1			1
WA8ULB						2					2
WR8ADO					1				4		5
WR8AES									3		3
WR8AJL								2			2
WR8ARB						2		1	1		4
N9AHP									1		1
W9FUL									4		4
WB9TIB						1				1	2
WØCXH						1					1
WØEQU	1						1		2		4
WAØOKW									4		4
WBØCMC					1	2		5			8
WRØAFI	1										1
WRØAMX	50										50
Total	94		10	19	208	10	1	43	83	5	473

NATIONAL TRAFFIC SYSTEM

"I am very pleased with the condition of the net. QTC and rate are both up from last year for the first quarter, as is representation from the sections. Hope this continues as we approach QRN season." — *WA7GYQ, manager, TWN/c4.*

Appearing on the editorial page of the Spring 1981 issue of the *QCWA NEWS*, published by the Quarter Century Wireless Association, Inc., is an article that attempts to recruit QCWA members for NTS activities. Since many members of QCWA are retired, the QCWA publication provides an excellent forum for a promotional drive, particularly for Cycle Two nets. Our thanks to the editor of *QCWA NEWS*, W5EJF, for supporting efforts to enlist newcomers for those formerly active) into the world of organized traffic handling.

Welcome to W6IPL and WØEJD, new managers of RN6/c4 and TWN/c2, respectively.

March Reports

	1	2	3	4	5	6	7
Cycle Two							
Area Nets							
EAN	31	948	30.6	619	95.7		
CAN	31	607	19.6	356	100.0		
PAN	62	653	10.5	328	100.0		
Region Nets							
1RN	59	281	4.8	296	77.9	100.0	
2RN	58	280	4.8	303	81.3	100.0	
3RN	31	142	4.6	227	92.0	83.9	
4RN	61	739	12.1	516	85.5	100.0	
RN5	31	370	11.9	348	94.8	100.0	
RN6	86	336	3.9	188	67.4	100.0	
RN7	62	646	10.4	695	99.5	100.0	
8RN	62	318	5.1	316	82.2	100.0	
9RN	61	322	5.3	310	100.0	100.0	
TEN	62	231	3.7	150	63.1	100.0	
ECN							90.3
TWN	—	216	3.7	279	63.5	100.0	
TCC							
TCC Eastern	112[1]	624					
TCC Central	84[1]	337					
TCC Pacific	102[1]	301					

Cycle Four						
Area Nets						
EAN	31	1902	61.4	1.536	97.8	
CAN	31	1004	32.4	.973	99 5	
PAN	31	1100	35.5	1.136	98 4	
Region Nets						
1RN	62	729	11.8	.556	91.7	96.8
2RN	91	692	7.6	.555	95.9	96.8
3RN	62	400	6.5	602	99.5	93.5
4RN	60	822	13.7	519	93.3	100.0
RN5	62	629	10.1	.516	93.9	100.0
RN6	62	535	8.6	—	—	98.9
RN7	62	623	10.0	.786	99.8	98.4
8RN	59	488	8.3	.430	92.0	100.0
9RN	62	423	6.8	.366	—	96.8
TEN	62	457	7.4	.403	94.4	100.0
ECN						100.0
TWN	62	491	7.9	.433	98.4	98.4
TCC						
TCC Eastern	113[1]	411				
TCC Central	87[1]	422				
TCC Pacific	86[1]	691				
Sections[2]	7136	28,796	4.0			
Summary	8632	47,966	5.6			
Record	7907	54,333	18.1			

[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (228): APSN ATN (AB), ABN ASN ASSN (AK), AENN, AENB, AEND, AENJ, AENK AENM (AL), ATEN HARC (AZ), BCEN (BC), NCN NCTN SCN (CA), CN CPN NUTMEG RTN WESCON (CT), FAST FMSN FMTN FPON FPTN MEN PEN QFN QFNS SBEN SPARC SWFTN TPTN (FL), CGVHFN GCN GSN GSSBN GTFCN (GA), IA75MN ICN INPMN ITEN TLCN (IA), ILN (IL), ICN ITN QIN (IN), KPN KSBN QKS (KS), 4ARES 5ARES BARES KNTN KPON KRN KSN KTN KYN MKPN PAEWTN TSTMN (KY), LAN LRN LSN (LA), EM2MN EMRI EMRIPN EMRISS HHTN NEEPN WMFN WMN (MA/RI), HEPN MMN MTN WRIN (MB), AEN MPSN MSN PTN RACES SGN SPSN (ME), MACS MITN MNN QMN SEMTN UPN (MI), MNAMWXN MSN MSPN (MN), ACE NEMOE (MO), CMN CNCTN JFK NCSSBN PCTN RARS THEN TRN (NC), CN CNN (NC/SC), CCTMN MNE2N NCHN NE160 NE40 NE75 NMPN NP2 NPMN NSN PAW2 PV2 WNN (NE), GSFM GSPN NHN (NH), JSARS NJN NJPN NJVN NWNJVN OBTTN SOCTN UCETN (NJ), NSN (NV), CDN CNYTN EPN HVN NLIPN NLIVHF NYPON NYS OCTEN SDN STAR WDN (NY), ALERT BN BNR BRTN FRCN LCNWOA NOARC 06MN ONN OSN OSSBN TATN TSRAC VWCEN (OH), OFON OLZ OTWN (OK), KTN LN OLN OPN OSN (ON), BSN ORARES PKXARES WCN (OR), D1ØARES D3ARES EPAEPTN HARCTN NWPATMTN PFN WARGVTN WPA WPAPTN WPATMTN (PA), WQV/UHF (PQ), BR2MN LC2MN NCARES SCNTN SCSSBN TARC WSCEN YCARES (SC), PWXN RARA SATN SKTN2 SPN (SK), TN TNVHFN TPN TSN (TN), DFW TEX TSN TTN (TX), BUN UCN (UT), VLN VN VNTN VSBN VSN (VA), VTN (VT), IETN PSTS WSN (WA), WINC WINO WINS (WE/IN), BEN BWN NWTN WINE WINL WNN WSBN WSSN (WI), WVFN WVN WVNN WVRACES (WV).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

1	2	3	4	5
Cycle Two				
TCC Eastern	124	90.0	1247	624
TCC Central	93	90.3	530	337
TCC Pacific	124	82.2	597	301
Summary	341	87.5	2374	1262
Cycle Four				
TCC Eastern	125	90.4	1371	411
TCC Central	93	93.5	826	422
TCC Pacific	93	92.5	1332	691
Summary	311	92.1	3529	1524

1 — AHEA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (March) *Cycle Two* — Eastern Area (N2YL, Director) — K1XA, N1BHH, W1s QYY XX, N2YL, K2PL, W2s CQB RQ XD ZOJ, WB2IQJ, K3JSZ, WB3GZU, W4s JK SQO, WA4CCK, WB4PNY, AF8V, W8PMJ, WB8WDZ, VE3s ATU CWA GOL. Central Area (W9JUJ, Director) — W4OGG, WD4HIF, K4VM, W5KLV, KA5BSN, KB5UL, WA5s INJ RKU, WB5s NKC YDD, K5s BNH KJN PE, W9s JIJ JUJ NXG, WB9WGD, WBØCID. Pacific Area (WØHXB, Director) — W5JOV, KA5DDW, WB6EIG, KM6I, KT6A, W7s DZX GHT TGU VSE N7RG, WA7GYQ, WB7TQF, WØs EJD HXB RE, WBØs FFV LFR MTA, NØTU, WDØAIT, KØDJ, KDØM, NØBDE. *Cycle Four* — Eastern Area (W4SQG, Director) — W1s KX NJM, K1s BA EIR GN SSH XA, WA1ZAZ, W2s CS FR GKZ MTA RQ, K2NY, WA2s ICB SRL, W3s FAF PQ, K3KW, WB3GZU, W4s JK MEE SQQ UQ, K4s BKX KNP, KB4N, WB4PNY, N4s KB NK, W8PMJ, WB8WTS, K8KMQ, KC8C, VE3s ATU CWA GOL SB. Central Area (W5GHP, Director) — W4ZJY, W5s RB SBE TFB, N5s BB BT TC, K5TL, W9s CXY DND NXG, K9BVE, WB9UYU, WØs AM HI, KØs CW EVH EZ. Pacific Area (KØDJ, Director) — N5NG, W5KH, N6s GW PZ, W6s EOT OA VZT, WB6PVH, KN6C, KT6A, K7s HLR KSA, KB7JW. W7s DZX EP GHT LYA VSE, WA7GYQ, KØs BN DJ TER, WØHXB, WDØAIT, VE7ZK.

Independent Nets (March 1981)

1	2	3	4
Amateur Radio Telegraph Society	31	1361	356
Central Gulf Coast Hurricane	31	224	4022
Clearing House	31	138	337
Early Bird	31	786	359
Empire Slow Speed	31	51	479
Hit and Bounce	31	328	567
Hit and Bounce Slow	31	112	325
IMRA	26	498	1144
Mid-West RTTY	31	54	223
Mission Trail	31	215	1445
New England Novice	29	89	215
New England Teletype	12	15	57
North American SSB	25	15	121
Northeastern SSB	26	23	109
Piconet All Day Watch	165	232	2748
Southwest Traffic	31	87	1396
20-Meter ISSB	26	576	498
75-Meter ISSB	31	493	1116
7290 Traffic	48	518	3175

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll March 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.

810
KA9CPA
200
W7LRB
176
N1BHH
168
N4AZI
157
W7VSE
154
WD8LRT
148
WD4COL
145
N4EDH
143
K5CXP
135
WB3GZU
134
WD4HIF
133
W7LNE
N4ET
K4SCL
128
WB7TQF
126
W9JUJ
AF8V
125
WB2MCO
KB5TC
124
NG4J
123
WA4PFK
122
WØOYH
WB7WOW
120
W2AHV
119
WB2IQJ
WB4FVV
118
KZ4K
117
WB4YDD
115
AA2H
WA8PIM
114
WB2ZCM
WD4AWN
113
WB4WYG
111
AA4FG
WA5RVT
110
KB2HM
109
WA4JDH
108
WB1HIH
KY4K
KB5NX
107
KA1FE
W1TN
W2MTA
W2YJR
106
W1RWG
VE3GOL
WA2UWA
AD7G
AF2L
KA4LNA
105
N9AUG
K9YCV
K9BVE
104
W7BS
KB2KW
W3VA
WA3NAZ
103
AK1W
WD4CNR
AG2R
WA4STO
W4NWM
WA3PXA
102
KC1G
KB7JW
K2GCE
K8OZ
KA4ASZ
W4NFK
101
WA1TBY
KØPIZ
NJ4L
K4JST
100
W2ZOJ
99
N9BYK
W7GHT
N8CW
N2APB
N3AZT
98
KA1QN
KA4GFU
WB8JGW
WA4UTC
W2TCA
WA4YIU
KA8CPS
N8BTD
97
KA1DZV
96
K9AEI
KA7JEX/T
W6NTN
K2VX
K3JSZ
WA4CCK
95
W1EOF
KB1G
WB7OEX
W4ANK
WB1CPF
KI2D
WD4CNQ
WA4SRD
94
W4OGG
N7AKX
N1NH
AJ3R
AJ5F
WA4EIC
93
K7GXZ
WD6CSL
NP4D
W5HMR
92
VE3DPO
VE3HTL
N5RB
WD4ALY
WD5JYI
W4GPL
91
K1OSM
WØKJZ
KB2WI
WB8MTD
90
WA5RKU
KA8DJZ
K8AAZ
W2UEZ
KB5UL
N5CEK
89
WA7MEE
WDØCID
WS1ESJ
WØFT
W2BIW
88
W9IOH
KC4MW
KT6A
KBØMB
87
N6GW
WB2OWO
WB3CAI
W5CTZ
86
KA1BTU
W9DM
KA2CLQ
W7FJZ
WA2KOJ
WB8YDZ
85
KF4U
KA6A
WA2SPL
W2XD
KB3DT
WD8BHE
N5BT
84
W1JTH
W4JK
W5KLV
KB8MX
KA5CFP
83
W4CKS
WA2MFV
KA3BMU
82
N4BZH
KE7I
81
VE3KK
KB4OZ
K7JV
N6AWH
WA2ZJP
80
WA7LGN
KAØE
W4WXH
KA2GSL
WB4AID
79
WØOTF
K3ORW
W8GGZ
KE8X
78
AD9G
KA4MZY
W5VMY
K4EV
W4RNL
KF8L
W4FMN
W5VMP
77
KA2CTU
N4PL
76
K4DZM
AFØO
WD8KBW
WD8KFN
KU4W
75
VE5AE
N4AXN
WDØBQG
KB2GT
KF2T
N3BKV
WD8RNQ
W5TI
AE5I
74
K1BSO
73
WD9EVV
WB6QBZ
WB5NKC
N6RD
W8VPW
72
W1BJ
KB5EK
WB5NKD
K5TL
KØCY
K4IWW
71
WA6LVO
VE5HG
WB4TZR
N4UF
W1TM
KØDJ
WB2MVC
70
W8UPD
WA3VIL
69
K4ZN
WA2CUW
K6YD
AA4EI
WB2NAO
K4VHT
WB8SYA
68
WA4EYU
W8EK
WD8RHU
67
KA1DZT
WA1YNZ
WA2SEL
WB5UVX
WD5AAH
K3CR
WA5QFD
66
WB9JSR
WB4RUJ
WD8DYW
WD4JJK
WB4FDT
65
WAØTFC
WA8GMT
N2SU
64
VE5WM
WD9AJA
K4ZB
N6ANL
KA3T
N2BDW
WA3EHD
63
W4ZJY
KA4FDX
WA7GYQ
KA2GHM
WA3WOP
WB3HTW
W8UE
KA5AVQ
WD5IVD
62
KB6FC
KA9HPQ
VE3BVG
WD8PEI
WB8SIQ
WB2SON
K4EJ
KC5FX
61
VE5AAT
K7ZIG
WA7IHS
W9JIJ
WB6BZZ
WB2PKG
W7JMH
W4HON
KCØT
N2BNB
WB3JYZ
KP4EMX
KBDTG
WD8IBY
60
WB9OTX
WD9GXW
WØOUD
VE3LNN
WD8PMW/T
WD8QMP
WA1VRL
WA8DHB
52
WD4JTO/N
50
KA7CSP/T
49
WB2RMJ/T
48
KA2HNO/T
KA5IWF/T
47
WD5FAE/N
44
KA8DEZ
43
KA4SAA/N
42
KA4AUR/N
KA4ODX/N

Brass Pounders League March 1981

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: WB1EZT, W4EA1, W4SI2, WA4EQW/m, WA4LJI, W7LRB, W7LYA and VE7FB.

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	601	1011	1426	39	3077
NØBQP	36	1303	301	738	2378
KA9CPA	14	931	185	751	1891
WØWYX	51	810	454	360	1675
WAØHJZ	31	830	39	506	1406
WA4JDH	0	550	493	3	1046
W9JUJ	4	472	478	20	974
KØONK	1	679	156	14	850
W3VR	191	279	312	14	796
W7SQT	3	466	3	298	770
W7DZX	11	378	360	2	751
N1BHH	0	333	310	75	718
WD4HIF	3	332	345	33	713
N4PL	74	218	305	23	620
WB3GZU	35	274	276	34	619
K4SCL	2	322	262	17	608
K4TH	2	322	262	17	608
W7VSE	1	300	222	68	591
WB7TQF	76	182	285	36	579
WB7WOW	44	272	252	11	579
KT6A	17	126	275	11	564
NG4J	15	282	219	41	557
WB5YDD	3	273	225	63	544
WA2SPL	0	266	252	13	531
N4AZI	93	164	173	87	517
AF8V	53	198	239	20	510
WD4CNR	2	246	253	1	502

Multioperator station:

KL7AA	160	140	160	140	600

BPL for 100 or more originations plus deliveries:

WD4IIO	211
W4EAT	195
W7LRB	155
WB4EXA	134
N4EDH	111
VE4IX	110
WB8DMF	107
W7LRB (Jan.)	138
W2CC (Oct.)	104

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

What is Field Day?

Are you new to ham radio and wonder what Field Day is all about? Perhaps you're an old-timer who is still wondering. Wonder no more because you are about to learn how Field Day encompasses more aspects of ham radio than anything else you could do. No matter what your age, ability, experience, license class or interest, there is something for everyone. You don't even have to be licensed yet to participate! Field Day is the most popular Amateur Radio event of the year, with thousands of hams participating all over the United States and Canada. But, you say, I still haven't told you what Field Day is. Let me try.

Once a year, on the last weekend in June, hams across the U.S. and Canada pack up their portable and emergency gear and head for the field (or a mountaintop), set up stations, and try to contact as many other similar groups as possible over a 27-hour period. Most amateur frequencies and modes are used including the OSCAR satellite. Emergency power is typically coaxed from a reluctant generator, but more recently such sources as solar panels and windmills have been used.

Field Day is an emergency preparedness exercise that encourages maintenance of portable communications equipment and development of operating skills under difficult conditions. In the event of natural disasters, which seem to occur all too frequently (Mississippi and Ohio River floods, Grand Island and Wichita Falls tornadoes, Mount St. Helens Volcano, etc.) hams are usually the only source of immediate rescue and health/welfare communication. Hundreds of such incidents are recorded in the pages of *QST* every year. Commercial power is seldom available. Antennas and rigs must be set up quickly at the disaster scene with operating conditions usually uncomfortable and confused. Hey! I just described Field Day.

Got the picture yet? Field Day sounds like it has a great purpose, but what do you actually do? Although there is a serious side to Field Day, the actual fun (and funny) activities of setting up a communications camp sometimes turns into a battle with Murphy's Law. You cannot imagine the ingenuity required when the antenna part you need was left at home or the guy rope is 10 feet too short. Have you ever put an antenna 60 feet up only to discover that you forgot to solder the coax center conductor? Of course, you don't discover this until 3 A.M. in the middle of the contest.

Did I say contest? Yes, Field Day is also an ARRL contest with contest rules, points, bonus incentives — some of the most competitive operation you may ever experience. If you have never tried operating in a contest before, here is your chance. Don't feel shy. Almost everyone else on during Field Day weekend is not an experienced contester either. At least not at the beginning.

If you've always wanted to operate one of those rigs you see only in the ads, Field Day may let you try one in action. Are you a Novice or Technician dreaming of working hf ssb? Come to Field Day and fulfill your dream. Many groups will allow you to operate under a control operator of General class or higher. What about that 40-meter quad that won't fit in your back yard? Build it and try it in the great outdoors. Opportunities for experimentation are limitless on Field Day.

Although some go it alone, almost everyone goes on Field Day with a group. Sometimes it's a small group, but usually it is your local club members, families, friends or anyone who wants to tag along. Everyone is welcomed. Depending on the group's size, there are typically one to six stations set up and operated simultaneously. This creates a lot of operating and technical challenges that are solved only by team spirit and cooperation. The camaraderie that develops far outlasts the Field Day operating time.

I've only touched the highlights of Field Day. You must experience it yourself to get the complete definition. How about giving it a try this year? The dates are June 27 and 28 (the last weekend in June). If you're not sure where to start or what to do, or if you are a seasoned caller of CQ FD and not yet signed up, give the Field Day chairman in your local club a call. Check page 80 of May *QST* for all the rules and details. It's not too late to join the fun. You'll be glad you did! — *George Anderson, W7ON, Scottsdale, Arizona, and Arizona Desert Aire Waves*

SCM ELECTION RESULTS

In the Utah Section, Leonard M. Norman, W7PBV, was elected for a two-year term of office beginning July 1, 1981. The election was *uncontested*.

WIAW NOTE

The complete WIAW summer operating schedule appears in April *QST*, page 94. A WIAW schedule also is available on request from ARRL headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of WIAW Code Proficiency Runs.

MEET YOUR SCM

Recently the question came up as to who is the *senior* Section Communications Manager. We first thought it might be Robert C. Mitchell, W1NH/W1SWX, erstwhile SCM who first took office in 1964. But research reveals that Bob takes second place to veteran British Columbia SCM VE7LB (1961). But it's not too hard to figure out which section W1 New Hampshire manages! Employed by GENTEX of Derry as Quality Assurance Manager, Bob has also been assistant director of the New England Division since 1977. Holder of A-1 Operator, ORS, OO, WAC on 80 meters and 244 DXCC countries confirmed on 80-meters, it's no wonder W1NH is often heard lurking on the low end of 80 looking for new ones. Bob is a member of the famous Concord Brasspounders and has previously held office in the Nashua Mike and Key Club. Skiing and camping in the White Mountains occupy non-radio time, as Bob is fast becoming the "Old Man of the Mountain" (good grief, he isn't even 50 yet!).

*Communications Manager, ARRL

5-Band WAS

Awards issued September 1980 to April 10, 1981

808 KB3GX
809 WB5PBA

810

810 WB5UIH
811 WB7EEH
812 K7JJ
813 KA2K
814 WD5JYU
815 W8GWC
816 WB2SJQ
817 AK9J
818 WA4CNZ
819 PJ2FR

820

820 K1UO
821 KT4U
822 AF3R
823 W5IXQ
824 WD8LPP
825 WD9FKS
826 AK7T
827 KA1ID
828 W1CRL
829 N4TJ

830

830 W1BL
831 WB4OSS
832 W7JVG
833 K9DG
834 WB3DWH
835 WB3JGD
836 KA1BRD
837 CT4BD
838 NØBFP
839 K9EF/8R1

840

840 WB2DND
841 WB9UKS
842 K4MPE
843 AE5B
844 WA8VPU
845 WB7OTR
846 KØZZ
847 AA4AK
848 KB3GN
849 KØAL

850

850 WDØFSV
851 W5VJW
852 WA2JTX
853 WD9DID
854 WBØLXM
855 WB9ZHS
856 WD6EQP
857 W8GIO
858 KB7HM
859 KE2C

860

860 HB9AHL
861 N6AED
862 K1KI
863 WB3AKI
864 WDØFTC
865 NC4F
866 W9BM
867 KB8BN
868 KA7Q
869 KG8B

870

870 K2UVG
871 WA7MOK
872 KØRDJ
873 N4LL
874 WB2RAJ
875 K3ZUF
876 KK5P
877 WBØOMF
878 WB4RFZ
879 DL7HZ

880

880 KM4Q
881 K1KTB
882 K2GBH
883 W1TN

Veteran New Hampshire SCM Bob Mitchell, W1NH/W1SWX.

OSCAR Operating Schedule

Date (UTC)	OSCAR 7 Orbit No.	OSCAR 7 Time (UTC) Hr Mn	OSCAR 7 EQX W. Long. (Degrees)	OSCAR 8 Orbit No.	OSCAR 8 Mode	OSCAR 8 Time UTC Hr Mn	OSCAR 8 EQX W. Long. (Degrees)
1 June	29,933	0007	80.8	16,509	A	0054	74.2
2 June	29,946	0101	94.4	16,523	A + J	0059	75.4
3 June	29,958	0001	79.2	16,537	X	0104	76.6
4 June	29,971	0055	92.8	16,551	A	0108	77.8
5 June	29,984	0149	106.4	16,565	A + J	0113	79.0
6 June	29,996	0048	91.2	16,579	J	0118	80.2
7 June	30,009	0143	104.8	16,593	J	0122	81.5
8 June	30,021	0042	89.7	16,607	A	0127	82.7
9 June	30,034	0136	103.3	16,621	A + J	0132	83.9
10 June	30,046	0035	88.1	16,635	X	0136	85.1
11 June	30,059	0130	101.7	16,649	A	0141	86.3
12 June	30,071	0029	86.5	16,662	A + J	0003	61.7
13 June	30,084	0123	100.1	16,676	J	0007	62.9
14 June	30,096	0023	86.0	16,690	J	0012	64.1
15 June	30,109	0117	98.5	16,704	A	0017	65.3
16 June	30,121	0016	83.4	16,718	A + J	0021	66.5
17 June	30,134	0110	97.0	16,732	X	0026	67.7
18 June	30,146	0010	81.8	16,746	A	0031	69.0
19 June	30,159	0104	95.4	16,760	A + J	0035	70.2
20 June	30,171	0003	80.3	16,774	J	0040	71.4
21 June	30,184	0057	93.8	16,788	J	0045	72.6
22 June	30,197	0152	107.4	16,802	A	0049	73.8
23 June	30,209	0051	92.3	16,816	A + J	0054	75.0
24 June	30,222	0145	105.9	16,830	X	0059	76.2
25 June	30,234	0044	90.7	16,844	A	0103	77.4
26 June	30,247	0139	104.3	16,858	A + J	0108	78.6
***27 June**	30,259	0038	89.1	16,872	J	0113	79.8
***28 June**	30,272	0132	102.7	16,886	A	0117	81.0
29 June	30,284	0032	87.6	16,900	A	0122	82.3
30 June	30,297	0126	101.1	16,914	A + J	0127	83.5
1 July	30,309	0025	86.0	16,928	X	0131	84.7
2 July	30,322	0119	99.6	16,942	A	0136	85.9
3 July	30,334	0019	84.4	16,956	A + J	0141	87.1
4 July	30,347	0113	98.0	16,969	J	0002	62.5
5 July	30,359	0012	82.8	16,983	J	0007	63.7
6 July	30,372	0106	96.4	16,997	A	0012	64.9
7 July	30,384	0006	81.3	17,011	A + J	0016	66.1
8 July	30,397	0060	94.9	17,025	X	0021	67.3

***ARRL Field Day**

Orbit predictions by Project OSCAR, P. O. Box 1136, Los Altos, CA 94022. To keep abreast of the latest developments, tune in to the regular phone and cw bulletins over W1AW, AMSAT bulletins transmitted around 29.490 MHz on Mode A, 145.960 MHz on Mode B, and 435.160 Mode J, during O 7 and O 8 reference orbits, and AMSAT nets (East Coast at 0100 UTC Wednesdays; Mid States at 0200 UTC; West Coast at 0300 UTC, all on 3850 kHz lsb); (International net at 1800 UTC Sundays on 14,280 kHz usb and 1900 UTC Sundays on 21,280 kHz).

O 7 progresses an average of 28.7372° W. per orbit in a period of 114.9415 minutes.
O 8 progresses an average of 25.8006° W. in a period of 103.1911 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.

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.

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.[1]

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.

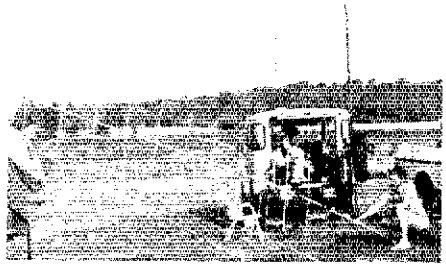
Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq.

Strays

OSCAR FIELD DAY INFORMATION

Setting up an OSCAR station for ARRL Field Day is getting more popular every year. During the last two Field Days, we have had to turn the OSCAR 8 transponders off because of excessive battery drain. This year, instead of running both transponders simultaneously, the operating days will be split with *Mode J for Saturday, June 27* and *Mode A on Sunday, June 28* as listed in the OSCAR Operating Schedule. Remember that times are listed in UTC. By splitting the days up like this, we hope to give everyone the chance to operate either mode and still keep OSCAR 8's battery within its operating range.

This year's Field Day rules allow 100 extra points for a successful OSCAR contact, just like last year. This bonus will be given for at least one two-way contact on either OSCAR 7 or 8; only cw and ssb contacts are allowed. OSCAR 7 has been operational recently in both modes A and B, but only when the spacecraft is in sunlight. OSCAR 7's exposure to sunlight is minimal during June, so plan your OSCAR 7 operation for periods when the satellite is in sunlight. Also, be prepared to switch from Mode A to Mode B or vice versa during this operating period, because operating demands may require that the command stations switch modes.



KA4DNL aims the OSCAR antenna, while WA4ZIA makes contacts in the communications van for the Stanly County (North Carolina) Amateur Radio Club, W4LZT. In this 1980 Field Day operation, the club earned 100 bonus points as well as additional QSO points for its OSCAR contacts.

ARRL Field Day is also a natural for publicity, and many groups organize live demonstrations for the local news media. Combining Amateur Radio and satellites during Field Day is a great way to impress the general public and create a lot of goodwill that Amateur Radio rightly deserves. Contact your local club and get involved; if no one is doing anything, start something. OSCAR will be operating during Field Day — will you? — *Bernie Glassmeyer, W9KDR, OSCAR Program Manager, ARRL*

FLASH - FLASH - FLASH

OSCAR PHASE III-A WAS LOST AT LAUNCH ON 23 MAY 1980. AMSAT NEEDS YOUR SUPPORT MORE THAN EVER. LET'S FLY AGAIN SOON!!! JOIN OR SEND DONATIONS TO:

LM-1068
MJC-86

AMSAT
850 SLIGO AVE. SUITE 201A
SILVER SPRINGS, MD. 20910 USA

W8BCF

BOB KEGGAN

2439 Banyan Drive
BEAVERCREEK, OH 45431

GREENE COUNTY

Bob Keggan, W8BCF, is one of the many OSCAR enthusiasts who took the failure of Phase III-A to heart — the right way! As his QSL card suggests, your support is needed by the amateur satellite program more than ever. You can help Phase III-B and other space projects in the works by donating to the ARRL Foundation Satellite Fund, 225 Main St., Newington, CT 06111. Your contribution will do double duty, matching funds from the ARRL and the Hoover Foundation.

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark Wilson,* AA2Z

JUNE

3

West Coast Qualifying Run, (W6OWP prime, W6ZRJ alternate), 10-35 wpm at 0400Z June 4 (9 P.M. PDT June 3). Frequencies are approximately 3590/7090 kHz. 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/endorsements.

6-7

New York State QSO Party, May *QST*, page 98.

9

W1AW Qualifying Run, 10-40 wpm at 0200Z on June 10 (10 P.M. EDT June 9). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See June 3 listing for more details. A complete W1AW schedule appears on page 94 of April *QST*, or is available for a self-addressed, stamped envelope to ARRL.

13-14

ARRL June VHF QSO Party, May *QST*, page 82.

20-21

All-Asian DX Contest phone, sponsored by the Japan Amateur Radio League, 48-hour period UTC (cw will take place August 22-23). All bands below 30 MHz may be used. Entry classifications: single-op, single band; single-op multiband; and multi-multi. Note: cw only on 160 meters. W/VEs call CQ AA. Exchange RST plus two figures denoting the age of the operator; YL operators use 00. No crossband contacts permitted. Only one signal per band regardless of category. Scoring: Non-Asians count one point for each complete contact with an Asian station, except two points on 3.5 MHz and three points on 1.9 MHz. The multiplier is the number of different Asian *prefixes* worked on each band. Note: Only JD1 stations on Ogasawara (Bonin & Volcano) count for Asia. Contacts with KA stations do not count. (They are considered military rather than amateur.) Scoring: Multiply the sum of contact points on each band by the sum of multipliers on each band. Log separately for each band and use a complete summary, note the first time a new prefix is worked on each band. U.S. call area leaders will each receive certificates. The JARL Asian Countries List: A4 A51 A6 A7 A9 AP BV BY CR9 EP HL/HM HS HZ/7Z JA/JE/JF/JG/JH/JI/JJ/JR JD1 (Ogasawara) JD1 (Okino Torishima) JT JY OD5 S2 TA UA/UK/UV/UW/9-0 UD6/UK6C-D-K UF6/UK6F-O-Q-V UG6/UK6G UH8/UK8H UI8/UK8A-G-I-L-O-T-Z UJ8/UK8J-R UL7/UK7 UM8/UK8M-N VS6 VS9M/8Q6 VU VU (Andamans) VU (Laccadives) XU XV XW8 XZ YA YI YK ZC4/5B4 IS (Spratly) 4S7 4W 4X/4Z 7O (Yemen) 7O (Kamaran) 8Z4 9K2 9M2 9N1 9V1 and Abu Ail. Contest results may be obtained by enclosing one IRC and an addressed envelope with your entry, which must arrive no later than September 30 (for phone) or November 30 (cw). Send to: JARL, Box 377, Tokyo Central, Japan.

*Assistant Communications Manager, ARRL.

Summer SMIRK Party Contest, sponsored by the Six-Meter International Radio Klub. Six-meter operation only, full 48-hour period, 0000Z June 20 to 2400Z June 21 (7 P.M. CDT June 19, to 7 P.M. CDT June 21. Exchange SMIRK number (if member) and state (province/prefecture) or country. No crossband QSOs or partial QSOs to be counted for contest credit. Single-operator stations only. Count 2 points for each QSO with a SMIRK member, 1 point for a QSO with a nonmember. Multiply QSO points by the number of different states (provinces/prefectures) and countries for final score. Entries *must* be submitted on official SMIRK log sheets and must be postmarked by August 1, 1981. There will be a trophy for the overall high score and certificates for the high score in each state (province/prefecture) or country with a minimum of three valid entries from each. Send log requests and entries to Don Abell, WB5SND, 6821 West Ave., San Antonio, TX 78213.

23

W1AW Qualifying Run, 10-35 wpm at 1300Z (9 A.M. EDT). See June 9 listing for more details.

27-28

ARRL Field Day, May *QST*, page 80.

30

West Coast Qualifying Run, 0400Z July 1 (9 P.M. PDT June 30). See June 3 listing for more details.

JULY

1

Canada Contest, sponsored by the Canadian Amateur Radio Federation, Inc., 0001-2359Z on July 1. Open to all amateurs, worldwide. Everyone works everyone else, 160- through 2-meter amateur bands. Phone and cw combined. Entry classes: single operator — all band; single operator — single band; and multi-operator, single transmitter — all band only. Each station may be worked twice on each band (once on phone and once on cw). No crossmode QSOs and no cw contacts in the phone bands. Exchange signal report and consecutive serial number starting with 001. VE1 stations will also send their province (NS, NB or PEI). Score 10 points for a contact with a Canadian station, 1 point for each contact with other stations. Count 10 bonus QSO points for each contact with any CARF official news station using the suffix TCA or VCA. Multipliers are the number of Canadian provinces/territories worked on each band and mode. There are 12 Canadian provinces/territories (VO1/VO2 VE1-NB VE1-NS VE1-PEI VE2 VE3 VE4 VE5 VE6 VE7 VE8 VY1) for a possible maximum of 192 multipliers for working each of these 12 on 8 bands and both modes (cw and phone). Score equals QSO points times multiplier total. Suggested frequencies: phone — 1810 3770 3900 7070 7230 14,150 14,300 21,200 21,400 28,500 50,100 146.52 kHz; cw — 1810 3525 7025 14,025 21,025 28,025 50,100 144,100 kHz. Suggest phone on the even hours UTC and cw on the odd hours UTC. A valid entry *must* include log sheets, dupe sheets and a summary that includes a list of the multipliers worked on each band/mode. Include score calculations, name, call and address along with usual declaration and mail promptly to: Canadian Amateur Radio Federation, 203-1946 York Ave., Vancouver, BC, Canada V6J 1E3. The CARF Canada Contest Trophy will be awarded to the top single operator, with certificates to the high scores in each entry class in each province/territory, U.S. call area and DX country. Special award to highest score from a Canadian non-Advanced amateur and other awards where participation warrants. Include s.a.s.e. or s.a.e./IRCs with your entry for a copy of the results.

8

W1AW Qualifying Run, 10-35 wpm at 0200Z July 9 (10 P.M. EDT July 8). See June 9 listing for details.

11-12

IARU Radiosport Championship, May *QST*, page 79.

17-23

SWOT QSO Party

18-19

Colombian Independence Day Contest
QRP Summer Contest
SEANET DX Contest, cw.

22

W1AW Qualifying Run

25-26

CW County Hunters Contest

AUGUST

8-9

ARRL UHF Contest

SEPTEMBER

12-13

ARRL September VHF QSO Party

Standard Contest Guidelines

1) Make sure your log details the date, time, band, call sign and complete exchange sent and received, for each QSO claimed for the contest credit.

2) Your summary sheet should indicate your score, including how you figured it, and a declaration that you followed FCC/DOC regulations and the contest rules. Your name, call sign and complete address should be typed or printed in block letters.

3) Crossband, crossmode and repeater contacts are usually not permitted. Contacts with the same station on different bands are usually permitted.

4) Your log should be checked carefully for duplicate QSOs and, if more than 200 QSOs are made, dupe sheets should be included with your entry.

5) Your log may be considered a checklog or disqualified if it is incomplete or if too many errors are detected by the contest committee.

6) Avoid standard net frequencies.

7) International contests generally offer awards to top scorers from each U.S. call area and each country; state QSO parties to each state/province.

8) Your summary sheet should include the following statement: "I have observed all competition rules as well as all regulations established for Amateur Radio in my country." The declaration should be signed and dated.

Strays

QST congratulates . . .

☐ Brian Dargel, KA1GKT, of East Lyme, Connecticut, eight-year-old third grader who recently received his Novice ticket.

I would like to get in touch with . . .

☐ anyone willing to sell, rent or lend me a Heath MiniScope (heart monitor). G. Samkofsky, N4ZB, 1420 Mount Vernon Dr., Holiday, FL 33590.

☐ amateurs needing confirmed North Dakota contacts. I will be there and available for QSOs July 8, 9 and 10, 1981, on 10, 15 and 20 meters. Lynn A. Nelson, WAØWBU, 409 San Jose, O'Fallon, MO 63366.

FIELD-DAY OPERATION — SHIPBOARD

☐ W1ACT will be the Field Day call of three New England clubs who are getting together for the June 27-28 event aboard three WW II memorial ships at Battleship Cove in Fall River, Massachusetts. A commemorative QSL will be sent to all who work and QSL with an s.a.s.e. to Fred Chew, WB1EJZ, Box 128, Raytheon Submarine Signal Division, W. Main Rd., Portsmouth, RI 01871.

Section Activities

A-1 OPR ≠ EC ≠ DXCC ≠ RCC ≠ WAS ≠ STM ≠ OES ≠ ORS ≠ NM ≠ SCM ≠ ARES ≠ OVS ≠ SEC ≠ OBS ≠ TCC ≠ OO ≠ NTS ≠ WAC ≠ CP ≠

CANADIAN DIVISION

ALBERTA: SCM, E. Roy Ellis, VE6XC — ASCM: VE6AMM, SEC: VE6XC. Congratulations to Roy on his reelection to SCM for two years. Unfortunately, he has been hospitalized for the past three weeks and is still confined. We all wish him a speedy recovery. Thirty four members of Northern Alta Radio Club just completed handling communications for the Old Timers Hockey Assn in the west. 76 teams from Manitoba to BC competed in 7 arenas. Congratulations on a job well done. VE6ABC from NARC has been doing a FB job with code practice every Sun., Wed and Fri. evenings on 3748 kHz. All two-meter rptrs operating. Traffic: VE6AHK 166, VE6BBL 58, VE6ASC 48, VE6HD 23, VE6QN 7, VE6YW 2.

BRITISH COLUMBIA: H. Ernie Savage, VE7FB — British Columbia Public Service Corp Phone Net. Net Manager, VE7QC check-ins High 185, Low 105, Average 150, Total 4,194. British Columbia Net CW reports QNI 395, QTC 106. NM VE7CSI hopes to get a lunch meeting of the BCEN members real soon. VE7BF is back home from hospital. Dogwood Chapter, QCWA GAM will be Salt Spring Island June 27. Traffic: VE7ZK 118, VE7FB 59, VE7CSI 37, VE7EDN 37, VE7BZI 17, VE7EWI 14, VE7BLO 25, VE7BNI 9.

MANITOBA: SCM, Peter Guenther, VE4PG — Asst SCM: VE4JP. SEC: VE4TR. Asst SEC: VE4HK. STM: VE4RO. NMs: VE4s AEJ NM TE VJ. A new repeater, VE4SMR, is now in operation near Altona and will serve those that go stateside to North Dakota. Our bulletin station, VE4QST, is still in great demand on contests and DX. Condx have been fair to good in March, but there is indication of poor condx in April. VE4AEJ has turned over MTN management to VE4ACX and we wish him well. Several new towers sprouting: VE4AEJ VE4PG VE4AEH. MTN QNI 217, QTC 120, sess 30. WRIN QNI 160, QTC 1, sess 5. MMN QNI 528, QTC 55, sess 31. MEPN QNI 1129, QTC 59, sess 31. Traffic: VE4IX 118, VE4PG 102, VE4RO 81, VE4AEJ 60, VE4TE 29, VE4ID 25, VE4AJE 22, VE4JA 19, VE3ACX 15, VE4ADD 12, VE4HA 12, VE4AAU 11, VE4NE 11, VE4LB 8, VE4FK 7, VE4AED 6, VE4NM 6, VE4AFO 4, VE4ADS 3, VE4CF 3, VE4CR 3, VE4JP 3, VE4LN 3, VE4AEE 2, VE4EN 2, VE4MG 2, VE4XN 2, VE4BE 1, VE4HH 1, VE4JF 1, VE4ST 1, VE4TT 1.

ONTARIO: SCM, Larry Thivierge, VE3GT — A/SCM: VE3GOL. SEC: VE3GV. STM: VE3QI. The ARES net meets the first Sun of each month on 7160 kHz and not every Sun as reported earlier. New League Life Members are VE3s AOJ CTO EHC EHK KO and MDL. VE3ATM replaces VE3AC as EC for Sudbury and, VE3FAM takes on the EC chores for Chatham. VE3KBX has repeater VE3WRR on 46.40/47.00 from Whitney. Congrats to VE3HC on the recent opening of his antique museum in Guelph. That's sure to be a popular spot during the upcoming RSO Convention in Kitchener on October 2, 3 and 4. Ottawa ARC and the Ottawa VMRC are sporting new bulletin cover designs, thanks to the artistic work of VE3s KIY and KLX respectively. The following are regretfully Silent Keys: VE3s AWI IKQ and KYI. Peterboro ARC will have a display station at that city's exhibition and fair featuring live demos of all modes during Aug 11 to 15. VE3s IXJ CVX and others are active on 10-meter fm and are building a repeater for operation in Toronto. All station appts and net certificates have been endorsed, if yours was missed, contact your NM or myself. XL3LON made 17,000 contacts in 130 countries and QSLed them all. VE3EQF did another excellent job as Westside ARC's auctioneer during their annual auction. VE3ISD was guest speaker at a recent Dunnville ARC meeting. VE3LGY is now VE3XL. New calls in the section are VE3s LYE MTF MWB. VE3s JUZ LWK and LWW have their Advanced. I say this every year, don't forget during Field Day, June 27 and 28, you can earn an easy bonus of 100 points by originating a message to me from the club president or other FD leader stating the club name (or non-club group) number of operators, field location and number of ARES members participating. Message to be included with your FD report — good luck to all. Traffic: VE3GOL 403, VE3HTL 353, VE3KK 225, VE3DPO 151, VE3HGJ 112, VE3GYR 97, VE3ISW 97, VE3JLL 95, VE3GNW 92, VE3GT 77, VE3GFN 66, VE3DVE 47, VE3KXB 47, VE3EWD 45, VE3BVG 41, VE3BZB 37, VE3FGU 29, VE3LNN 26, VE3AJN 24, VE3FGV 24, VE3WM 24, VE3AWE 23, VE3IFP 22, VE3AYZ 12, VE3DZH 2.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. NMs: VE2PJ VE2FSA. New appt: VE2AQU as EC. Many thanks to VE2FFE who had to resign as STM, but still an active ORS on the QSN. West Island ARC vhf/uhf group is planning 10 GHz input/146 MHz output remote base for Montreal. The QSN operates daily on 3643 MHz at 0030 UTC, check-ins are invited. Few clubs are getting ready for Field Day, we should have a good participation this year. FD fever, catch it! De Hull, VE2RA anime le reseau de la detente tous les soirs avec une antenne 'sloper' de son balcon au 8e etage a des lampadaires au sol et son signal est tres bon. VE2AGP a maintenant 250 pays confirmes, felicitations. VE2CAA est maintenant l'indicatif d'appel du Petit Train du Matin. Traffic: VE2PJ 153, VE2BP 51, VE2FFE 44, VE2EC 33, VE2EKC 18.

SASKATCHEWAN: SCM, W. C. Munday, VE5WM — STM: VE5XC. SEC: VE5II. NMs: VE5s DC HG SF TT WM. CRRL's President VE3OT, Vice Director VE6XX and Assistant Director VE5RP visited four SK ARCs during February, providing first hand information on CRRL activities. Congrats to the Wood River ARC on resuming activities again under president, VE5YI and secy/treasurer, VE5AAJ. A computer net has been formed with VE5AAY at the helm. The net meets every Sun at 1600 UTC on 3780 kHz. SK ARES is participating in Operation Red Cross Message Relay. The section relay coordinator is VE5AQ. OSCAR enthusiasts continue to grow, the latest to operate this mode is VE5AAD. Traffic: VE5HG 41, VE5WM 21, VE5AE 18, VE5XC 10, VE5UX 3, VE5AAT 2, VE5MP 2.

ATLANTIC DIVISION

DELAWARE: SCM, Roger E. Cole, W3DKX — SEC: W3PQ STM: WA3WIY. PSHR: WA3WIY 101, K3JL 100, N3AKC 69. At the time of this report, our SCM is in the hospital under observation. We all hope he will be out soon. N3AKC is the new net manager of the DSSN, effective April 1. Officers of the Sussex Amateur Radio Assn are: K3JL, pres.; WA3VDJ, v.p.; K3ZXP, secy/treas. DTN QNI 367, QTC 58. DEPN QNI 61, QTC 15. Traffic: W3QQ 120, WA3WIY 112, K3JL 73, N3AKC 62, WB3DUG 31, WB3FOC 18, W3DKX 15, WA3ZBI 13, K3ZXP 12, KA3DPR 9, AC3T 6, 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	439	258	56	AA3B
EPAEPTN	3917	6 P.M. Dy	532	137	31	AJ3R
PFN	3958	5 P.M. M-S	236	309	26	WA3WQP
PTTN	3610	6:30 P.M. Dy	227	62	28	AG3R

Local and vhf nets reporting: D3ARES D10ARES HARC TN Luzerne Co TN MTG Co ARES WARC VTN with a total QNI 428, QTC 46 in 32 sessions. OBS reports: W3CL W3VA and WB3JYZ. OO reports: W3KEK/K3TXG W3GVR W3FAF and K3RDT. OVS report W3GOA. PSHR reports: N3AIA W3GOA W3VA K3JSZ K3RHI WA3TKU AJ3R WB3FYT KA3EAQ WB3HTW K3QXC K3MWA WB3GAI WA3EHD WA3VIL WA3WQP W3ID N3BFL N3AZT and WB3JYZ. New appointments: WA3TKU to OES and WB3FKP to ORS. Congrats to both. PTTN welcomes N2BSS. Upgrades: WB3LPJ to big A, KA3DGI to Gen and WB3ICR to Tech. KA3GZG new Novice in Warminster area. EPAEPTN welcomes K3CAH and WB3LUJ. K3MWA reports Luzerne Co ARES net had unannounced emergency test with 17 stations taking part. New gear: N3AZT a TS7800. Congrats to W3PVY who received his 50 year award from QCWA. W3GVR continues to do a FB job as OO. W3YZW, EC Luzerene Co, built and completed ARES tone alert for ARES group. KA3DZD reports tone alert kits available from So Mt Rpt Club for activating all ARES nets in Dist 10. W3ADE and W3EEK attended recent convention in Orlando FL. W3ID is planning new antenna if wx cooperates. N3AZT reports HARC TN running well. New officers Holmsburg ARC: WA3AOP, pres.; WB3BDC, v.p.; K3HIN, secy.; WA3IFY, treas.; K3AIJ WB3ADN, trustee; and the club will have a new MICOR repeater on the air — oops gang, sorry for the error. K3YD spent month of January at Ft. Bragg. WB3JYZ announces that the annual EPA Section Picnic will be held July 25 at Tuscarora State Park. Plan now to attend and meet your fellow hams. Traffic: (Mar.) WA3WQP 382, K3JSZ 242, AJ3R 209, W3VA 144, W3IPX 143, N3AZT 84, WA3EHD 78, W3DP 60, AD3X 56, N3CD 55, W3FAF 49, WB3FKP 42, WB3HTW 40, WB3CAI 33, W3ID 33, K3EIP 27, WB3JYZ 22, KA3EAQ 20, N3BFL 17, W3ADE 14, K3ARR 14, WA3OFD 14, WA3VIL 14, W3YZW 14, WB3CUF 13, W3CL 12, AF3Z 11, WA3CKA 9, N3AIA 8, K3WPI 8, KA3FKD 7, K3QXC 7, K3YD 5, WA3YOE 5, K3MWA 4, K3RHI 4, KA3DZD 2, WB3FYT 2, K3KW 2. (Feb.) W3DP 216.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — The SEC is WA3TAI. Welcome to ZS1FE and ZS1KE to work on AMSAT OSCAR. W3CYQ DX's on 10, but with daily 2-meter operations too. KA3DXZ shows much RACES activity. WB3JRW likes the DX tests. WB3IVO keeps W3CUL busy. K3DI has Army MARS on frequency. W3ECV a ham for 50 years, and a scuba diver — congrats to a guy over 70. W3ZNW keeps Calvert County on the map. K3HPG made DXCC after all these years, congrats. WB3LTA is QRL RACES and OBS. W3JPT is into all kinds of Amateur Radio planning. WA3FYZ will cover the Shuttle for VOA. KS6X made a quickie return to 6-Land. KC3D fighting the flu bug, but still hamming. W3CDQ had another vacation in Fla. AK3X manages to say he is still busy at work. WB3EYS reports K3USC is new Extra. WB3ARB WA3SYF and N3AFB are also Extras and W3DFW says don't forget N3BJP newly Advanced. Congrats to all. W3CU keeps daily skeds with #1 son, WB9FLY. WB3BFK is a busy substitute NCS. W3AKO claims to be the ancient mariner. K3CRW is a multi-mode man. W3LDD is full bore as 3RND lisison. KA3CDQ is the new MEPN secretary, WB3LTA the new director and WB3JRW the director past. WA3ECP made 6 points category 1 PSHR a good show. KA3T has two phone lines. KB3NL plans a 40-meter horizontal dipole. W3FZV is into educational movies. WB3GZU does it again. K3KMC is 100% emergency powered using a battery. W3DQI is pleased with the first ever Laurel ARC Novice and General classes. Everyone stuck to it! K3LDE was main instructor. N4DR/3 finds NTS liaison increases his traffic count. K8SYH makes an OO report. W3OYY tapes all his net sessions. Gaithersburg Super 81 Hanfest Sept 13. MDD/MEPN Picnic Elk Neck State Park Sunday July 26. With the nets: Net/Manager Sessions/TFC/QNI avg. Wash County 2-Meter/WB3GEJ 4/10/21. WR PON/W3DFW 22/22/21.8. MDC PON/W3CYY 4/10/26.8. MEPN/WB3GZU 28/116/29.0. Toppers WB3BFK KA3CDQ K3ONU K3DRW and others W3ADQ KA3ARH W3HTB WA3IHW K3CMN and WA2YFM. Traffic: (Mar.) WB3GZU 619, WB3IVO 253, W3FA 151, KA3CDQ 115, N4DR/3 85, WB3BFK 57, K3KMO 56, W3FZV 52, K3ORW 52, KA3T 52, KS6X/3 45, W3DQI 10, KC3D 6, W3LDD 6, WA3CEP 5, KA3DXZ 4, K3HPG 4, AK3X 4, W3ZNW 3, WB3JRW 2. (Feb.) WB3IVO 241, AK3X 45.

SOUTHERN NEW JERSEY: SCM, Bill Luebkemann, WB2LCC — STM: WB2LCC. SEC: W2HOB. April 4 marked an important date, as it was when the new Southern New Jersey Teletype repeater was put back on the air. After months of hard work and fund raising, the new duplexer and station-master were finally procured and installed at a height of 500 feet on the 900 foot Channel 23 Waterford Works tower. The repeater presently runs about 10 watts of power, and the loss of 500 feet of 7/8 inch line, combined with the loss of about 75 feet of RG-8, adds up to one weak signal at the antenna. However, the signal is strong enough to be heard just about everywhere in the section. Operating on 147.945/.345, it is for teletype use only and will not repeat voice. It is keyed only upon the presence of MARK tone on its input. Now is a perfect time to get your old teletype running and join the ever-increasing crowd who monitor on 24 hour auto-start. This is a great way to send traffic anytime you choose, and the areas where the machine has the most participation seem to be those areas that are hardest to get to be other means. For further info, please contact me directly, or talk to W2HOB or W2KP. See you on auto-start??? Traffic: WB2IQJ 305, KA2GSI 157, KC2A 132, AA2H 116, W2ZQ 114, WA2CUW 59, K2YBN 58, WB2PKG 56, KA2GTE 55, N2CEQ 30, WA2HEB 30, WA2TWK 27, WB2LCC 25, WA2WUL 25, KB2OE 10, WB2GFM 7, WA2GTJ 4.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: N2APB. ASCM: W2GLH. DECs: WA2AIV (Niagara) WA2DHZ (Southern) WB2NAC (Northern). Appts: (ORS) KA2BHR WB2SGI, (OES) WB2NAO, (OO) N6IN, (NM-OCTEN) WA2MFV, (EC) K2LKH - Ontario, WA2MFU - Lewis, KB2XI - Wayne.

Net	Freq.	Time/Day	QNI	QSP	QND	Mgr.
NYSCN	3677	1000 Sun	49	9	5	W2MTA
THIN	3913	1600 Sun	43	—	4	N2APB
NYPON*	3913	1700 Dy	620	214	31	K2KQC
NYSPTEN	3925	1800 Dy	826	110	31	AA2Y
ESS	3590	1800 Dy	479	51	31	W2WSS
OCTEN*	34/94	1815 Dy	429	100	31	WA2MFV
STAR/E*	325/925	1830 Dy	227	44	31	WB2AZW
Q NET	31/91	1830 Dy	496	5	31	KA2CMQ
BSN	93/33	1900 Dy	269	11	29	WA2DMK
NYS/E*	3677	1900 Dy	619	346	31	W2ZOJ
SLVARES	31/91	1930 Sun	49	1	5	WB2NAO
JCARCN	10/70	2000 Dy	251	1	27	WA2WAX
WNYECN	3955	2000 3rd Sun. EC Coord.				W2BCH
OARCN	25/85	2015 Wed	71	0	4	K2VTT
CNYTN*	90/30	2115 Dy	457	80	31	WA2PUU
WDN*	04/64	2130 Dy	836	147	31	N2APB
NYS/L*	3677	2200 Dy	455	352	31	W2ZOJ
STAR/L*	325/925	2215 Dy	140	26	29	WB2AZW

*Part of NTS. NYS ran 5 other SSNs to support ENY PD#4; QNI 72, QSP 55. Congrats W2ZOJ and N2APB, efforts/results NYS training program. NYPON roster 100, 71 WNY, ENY 19, 10 others; NYS roster 121, 68 WNY, ENY 52, no others; interesting ratios for pair of multi-section nets. Could statewide nets operation improve public service? New Yorkers let SCMs hear your views. New callsign EC Wayne County, KB2XI. PSHR: N2APB KA2CTU KI2D KA2GHM KB2GT. WA2KOJ WA2MFV WB2MVC WB2NAO WB2OWO WA2ZJP W2ZOJ W2MTA. OVS: K2QR "Aurora"; W2SEU scanner QRM 144 MHz. OBS: K2KWK emits Sun 2045 on 146.88 and 146.79; Mon 1230 on 147.18; W2GLH does same on BSN, JCARCN, QNET and NYSPTEN. Rome Ham Family Day June 7 at Blossvale, NY. Batavia Hamfest July 12 at Alexander. National Sports Festival Syracuse July 23-29, you can help; contact W2BCH KA2HGB WA2PUU WA2FLX N2AGF KB2XI KA2AFF or WB2QFE. 2M HTs high need; 147.90/30; mail-in requests to Box 144, Syracuse 13215. Welcome back to ham radio KA2KMH (x-8AOZ). What is RAGS doing with the 12 balls; unsound solutions tell in Onondango Lake. K2AOL of Endicott and W2JVD of Pennellville went Silent Key, will be missed by us all. ARATS officers: WB2JOK WB2WUB K2QB. Traffic: (Mar.) W2ZOJ 337, W2MTA 295, WA2MFV 266, W2GLH 180, N2APB 168, KA2CTU 133, WB2OWO 117, WB2LDS 95, KA2CLT 91, W2FR 70, KG2D 62, KI2D 62, KB2GT 58, WA2KOJ 57, KA2GHM 39, WB2MVC 38, WA2ZJP 38, KA2BHR 31, WA2PUU 31, AF2A 24, WA2MFU 22, W2PPS 21, KA2GOH 13, WB2LJK 13, WA2RXO 12, WB2NAO 11, WB2SGI 11, WA2ANU 10, W2GJ 10, WB2QIX 10, AF2K 9, K2RN 6, N2ARD 5, KA2DBD 5, KA2FYF 5, WA2AIV 4, K2VR 4, KA2HCB 1. (Feb.) K2GWN 121, WA2ANU 28, KA2BHR 14.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3EE. SEC: AB3Q. DECs WB3JDI WB3EFQ. NMs N3FM W3NEM W3MML WA3PXA.

Net	Sess.	QNI	QTC	kHz	Time/Day
WPACW	31	486	170	3585	7:00 Dy
WPAPTN	31	711	160	3983	6:15 Dy
WPA2MTN	31	593	117	146.28/88	8:00 P.M. Dy
NWPA2MTN	31	463	21	146.04/64	9:00 P.M. Dy

I regret to announce that W3RFT is a Silent Key. WB3EFQ is the DEC for the Southeastern quarter of the WPA section. W3YQ is now EC for Mercer County, KA3FTW EC for Somerset Cty and KN3ZAN EC for Armstrong County. The WPA has an ARES Net, it will meet on the second and last Mondays of the month immediately after the WPA PTN. Crawford ARS officers for 1981 are WA3ZSC pres., WB3JDI, v.p.; KA3DQH, secy/treas.; WA3BZY N3BLI directors. New Novices are KA3GWO and XYL KA3GWP, KA3XZ and XYL KA3GYA and KA3GXB. New Generals are N3AEP and W3LFY's XYL (need her call). Congrats to all. ECs are asked to check into the new ARES net and if they cannot, please appoint an Asst EC to take their place. The traffic nets are doing an excellent job, but more stations are needed especially in areas that are not blessed with many amateurs. The NWPA is making excellent progress with the Skywarn Net and the rest of the section should be set up soon. Traffic: WA3PXA 216, W3EGJ 210, N3EE 147, KB3DT 133, K3CR 130, AC3N 121, N3WS 114, N3FM 107, N3RKV 87, WB3GXG 82, W3AS 54, W3MML 52, K3SMB 51, KA3BMU 45, N3ADU 43, W3YQ 40, WB3JDI 37, W3SMV 36, WA3QNT 32, N3KB 31, WA3UNX 29, W3RUL 28, W3KMZ 26, KA3DEH 24, KA3BGC 22, W3NGO 21, K3HCT 20, W3KYN 19, W3TTN 18, WB3JGD 16, AB3Q 15, W3KUN 14, K3VQV 14, AF3B 12, N3ASJ 10, W3EXC 10, W3SN 9, WB3KJG 8, WA8PAV/3 8, AB3X 8, WB3EFQ 7, WB3IAB 7, W3LOD 1.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP — SEC: W9QBH. STM: WB9JSR. Asst SCM: W9RYU

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2330/0300 Dy	217	62
Ill Phone	3915	2130 Dy	136	1
NCPN	3915	1200/1700 Dy	56	49
IEN	3940	1400 Su	8	5
W9VEY	146.82	mem sta.	8	5

CAND reports DRN9 100% with WD9FDB WB9WGD W9JIJ W9HOT and QTC of 607 and 31 sessions. Congratulations go to W9QLZ the new Central Division Asst Director. At the March QCWA dinner meeting at Elpaso, 9AUO (now W9AUO) was presented with a certificate for 56 years with the same call. For information on emergency preparedness, in Lake Co. contact KA9JMG,

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ICOM

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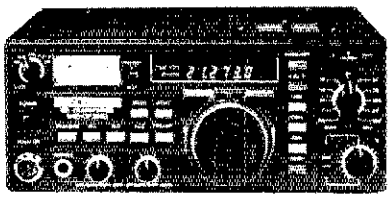

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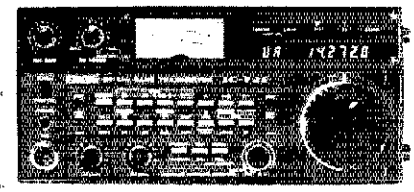
All 9 HF bands! • All solid state • Broad band tuned • Digitally synthesized w/10Hz resolution • Two VFO's • *General coverage receiver*, 0.1 to 30MHz (no transmit on general coverage) • Simplex, Duplex • RIT • 100W pep out SSB, 100W, CW & RTTY, 40W, AM • Digital readout • pass-band tuning • Dozens of desirable features. Operating voltage: 13.8VDC @20A.



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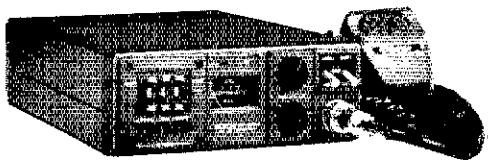

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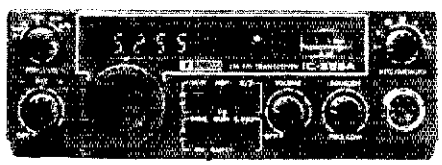
WITH HM-8 TOUCH TONE® MIC.



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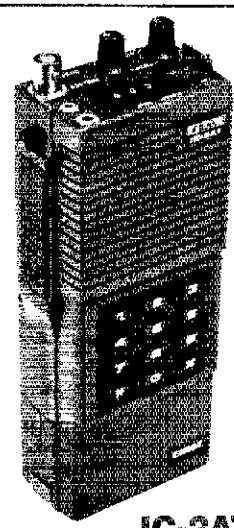

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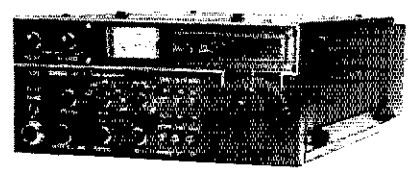

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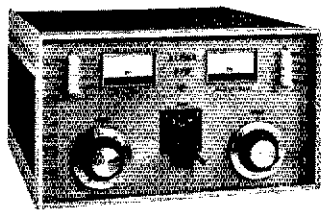

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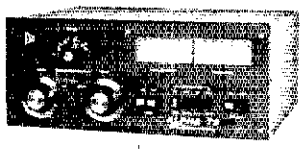

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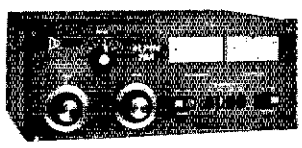

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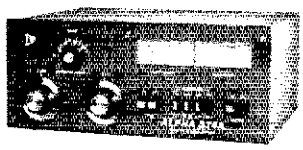

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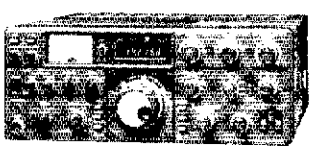

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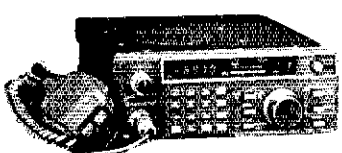

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EC: in Dewitt Co. contact W9KXN. EC. AA9R presented manuals dealing with radiological contamination to members of the Starved Rock Radio Club at the April meeting. The material was made available thru the La Salle/Peru ESDA office and is also at each county's ESDA office, for those that are interested. A class on radiological monitoring was held in Sterling-Rock Falls at the ESDA office on March 28th. The National Weather Service offices in all parts of the state have conducted weather spotting training seminars, for further information contct your EC. On March 11th, the Chicago Suburban Radio Association showed films on the technology of antennas and solar panels and the evolution of communications satellites. W89YJF reports a new open 449.1/444.1 repeater in Champaign. The following amateurs have upgraded: to Advanced, KB9UM, WB9VRB KB9TT; to General, KA9GEL N9BJNJ N9BXK N9BXJ; to Technician, KA9JYW WD9GAK KA9JUT. Silent Key: W9WR, former SCM for Illinois (around 1928-32 era) printer by trade, member ARRL, QCWA, OOTC, CHC. Members of the CRTA and QCWA will miss him very much. Field Day preparations are being reported from all parts of the state. Tents, travel trailers and vans are being requisitioned from members. Robin Hood has been recruited by one group to use his bow and arrow to shoot a long wire over a tall tree. Armstrong rotors and ladder towers are forming the ground work for a good representation from the Illinois Section. W9ZEN presented procedures of correct message handling to the members of the Starved Rock Radio Club at the April meeting. Traffic: (Mar.) K9BVE 224, W9HOT 197, W9TLU 195, W9JIJ 144, W9OYL 122, WB9JSR 121, K9PNG 106, W9OK 100, WØRJW 56, WB9WGD 48, WD9EVV 45, W9LNQ 38, W9OBH 21, W9HBI 20, WB9QFO 20, N9TN 20, N9BJO 18, KN9BAM 16, W9SSP 8, W9KSU 8, WD9EBQ 4, W9HPG 4, W9LDU 4, K9ZTV 4, WD9EED 3, WD9HZF 1. (Feb.) WB9WGD 136, WD9DMV 116.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN W9QYY, QIN WD9GXW, ICN N9AEI, VHF W9PMT, IWN K9DCX, IPN W9DLF.

Net	Freq.	Time/UTC/Daily	QNI	QTC	Sess.
ITN	3910	1330/2300	2507	344	62
QIN	3656	1430/0100/0400	864	423	93
ICN	3708	0014	194	37	31
IPN	3910	2130	1034	154	31
IWN	3910	1315	1085		31

Hoosier vhf nets report: QNI 4569, QTC 244, Bulletins 47, Time 6318 minutes for 20 nets. D9RN Indiana stations 100% W9JUJ W9QLW K9CGS W9DLF. 9RN 100% W9JUJ W9QLW K9WWJ WD9GXW W9XD W9EI N9HZ WB9UYU N9AEI WA9OCF. CAND 100% QTC 607 W9OLW W9DLF K9CGS W9JUJ. Appts: OBS — W9EPT. Silent Keys: WB9JMJ W9Y8J K9DQE W9MDC K9VFW. Congrats to WD9IRO and K9AHX for their help with downed power lines in Tippecanoe County. Indiana Radio Clubs by counties: Adams County: Adams County ARC — W9KPZ pres.; Allen County: Fort Wayne ARC pres. WB9RUS, Allen County Amateur Radio Technical Society pres. WA9YOS, HAMS Inc. pres. K9LSB, Fort Wayne QCWA, W9JOQ pres., Fort Wayne DX Assn. K9UWA pres., Fort Wayne Repeater Assn. K9KI pres.; Murphys Beer Drinkers and Clam Chowder Group W9JBD pres. Old Fort 10-10 International W9BYR pres.; Brtholomiw County: Columbus ARC WD9HTN pres. Congrats to K9LME WD9BKA K9KTH K9BCP and KA9FJS for their help to the Owen County Sheriff during the fire in downtown Spencer, In. W9TIZ made a fine speech on lightning at the Indianapolis Repeater Assn meeting. I enjoyed the Winchester Hamfest and the Lake County Banquet this month. HAMS Inc. still does not have their tower up. The Clark County ARC has a new Kenwood TS-180S thanks to Civil Defense. The new calendar in Hamsplatter is a great idea. The plans for the INDY Hamfest are well underway, see you July 12th. W9IJ's Weather Watch map is a great idea. W9EP1 and the St. Joseph County RACES are geared up for the Skywarn program this spring. Getting W9MJI out of bed at 2:30 A.M. is tough, but the situation could have been much worse than it was. Tnx to WA9LGO, Indianapolis ARC, for the message relay. Traffic: W9JIJ 974, W9FC 190, WD9GXW 155, W9QYY 94, W9EI 91, N9AEI 85, K9SFQ 84, W9IOH 72, W9WKM 68, W9PMT 64, K9DCX 58, KA9EJT 57, WA9OKK 54, WA9QCF 50, W9QLW 49, WB9EBI 38, W9URQ 38, K9WWJ 35, W9XD 34, KB9UU 30, N9PS 21, W9RTH 21, KB9VD 19, K9TKE 17, WD9JAB 16, W9ZGC 15, WA9OHX 14, WA9KWH 13, W9UPI 13, WB9AWI 12, WD9EXI 12, W9ZW 12, WD9JAA 11, WB9KQT 9, K9DIY 8, W9IRT 8, WB9QTX 8, W9EUP 7, K9OUP 6, WB9YAY 6, N9AST 5, WD9DRM 5, N9ACG 4, WB9AJY 4, N9BLK 4, W9DLF 4, WA9JNC 4, W9BDP 3, WD9DWD 3, W9BUQ 3, KC9C 2, WD9CIV 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3985 1230Z QNI 923, QTC 986, WB9YPY. BEN 3985 1800Z QNI 805, QTC 172, WB9ESM. WSBN 3985 2300Z QNI 1124, QTC 276, WD9ESZ. WNN 3723 0000Z QNI 263, QTC 50, N9AUG. WSSN 3662 0030Z QNI 136, QTC 34, N9BYK. WIN-E 3662 0100Z QNI 381, QTC 131, W9YCV. WIN-L 3662 0400Z QNI 246, QTC 79, K9LGU. XPO 3925 1801Z QNI 510, QTC 43, WA9NIX. NWTN 34/94 0030Z QNI 427, QTC 42, WB9YPY. Gr. Bay 72/.12 0230Z Wed. QNI 23, QTC 0, WB9NRK. KA9JRN, a blind ham from Altoona, has General, congrats. Thanks to those who participate in 9RND, CAND. I appreciate your activity. New Novices Fort Atkinson area: KA9KEC KA9KEB KA9KED KA9KFC KA9IEV and KA9JZK are in General/Advanced class Fort Atkinson. New EC Buffalo County, W9KTG, XYL, WD9CQA also active. Very sorry to report K9CPM a Silent Key, our deepest sympathy to his XYL. New Novice Stevens Point area, KA9KDV. WD9HLG has General. Sorry to report W9WSV a Silent Key. WNA picnic July 12 at Kiwanis Park in Waupaca, mark your calendar, we need all of you in attendance, PLEASE. Does your county have an EC? We need more — support the ECs we do have. Are your section net certificates up to date? WD9FRI has General. Traffic: (Mar.) KA9CPA 1891, N9AUG 335, WD9ESZ 250, W9YCV 231, WB9YPY 197, N9AZI 187, W9CXY 163, K9FHI 133, W9DND 120, K9AKG 107, W9UCL 107, K9GDF 91, N9BYK 85, WB9ESM 60, W9DM 50, W9LDO 46, K9LGU 44, AG9G 41, K9AQ 40, WB9NRK 39, KB9NG 37, W9UW 33, N9BCX 32, WB9JSW 32, WA9ZTY 32, W9CJE 31, WB9ABF 29, WD9AJA 29, WD9BKT 28, W9SO 28, W9IEM 27, WB9WHQ 27, KB9CV 26, KA9HPQ 26, K9HDF 25, WA9DXW 24, KA9EMF 24, WA9GGH 24, WA9WYS 24, KB9NF 23, WB9YPZ 23, WB9WNA 21, WB9ICH 20, W9KTG 16, K9ANV 15, K9JPS 12, KE9C 8, W9FDY 7, KA9IHR 6, W9IHW 4. (Feb.) K9JPS 38.

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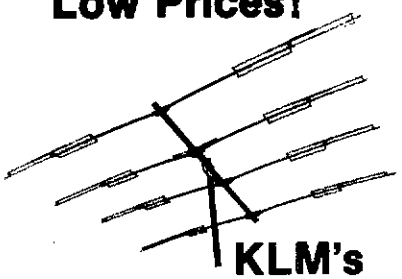

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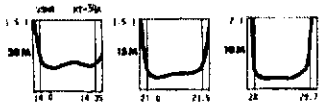

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153BA	3-El. 15 mtr. Beam	$ 69
103BA	3-El. 10 mtr. Beam	$ 59
DB1015A	3-El. 10/15 mtr. Beam	$129
64B	4-El. 6-mtr. Beam	$ 49
66B	6-El. 6-mtr. Beam	$ 89
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AV5	80-10 mtr. Trap Vertical	$ 89
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20-4CD	4-El. 20-mtr. Monoband	$239
15-3CD	3-El. 15-mtr. Monoband	$ 82
15-4CD	4-El. 15-mtr. Monoband	$ 98
10-3CD	3-El. 10-mtr. Monoband	$ 69
10-4CD	4-El. 10-mtr. Monoband	$ 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
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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
HG70HD	70 Ft. Heavy Duty Self Supporting	$2499
HG50MT2	50 Ft. Side Support	$659

TRISTAO-PRATT CRANK-UP TOWERS

TX-438	38 Ft. Self Supporting	$699
TX-455	55 Ft. Self Supporting	$1049
TX-472	72 Ft. self Supporting	$1899
HDX-555	55 Ft. Self Supporting Extra Heavy	$1699
HDX-572	72 Ft. Self Supporting-Extra Heavy	$2799

ROHN TOWERS

20G $29.50 25G $38.50 45G $83.60

HDBx40	Free-standing 40' (18 sq. ft)	$249
HDBx48	Free-standing 48' (18 sq. ft)	$305
HBX-56	Free-standing 56' (10 sq. ft)	$335
FK2548	48' 25G Foldover Tower	$699
FK2558	58' 25G Foldover Tower	$779
FK2568	68' 25G Foldover Tower	$849
FK4544	44' 45 G Foldover Tower	$979
FK4554	54' 45 G Foldover Tower	$1089
FK4564	64' 45G Foldover Tower	$1179

(Freight paid on all foldover towers. Prices 10% higher west of Rocky Mountain states).

ALL ROHN ACCESSORIES IN STOCK – CALL!

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 x 7 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 TH 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	$1.65
1/4" Preformed guy deadend	$1.85
6"-dia. 4-ft. long earth screw anchor	$12.50
2"-dia. 10-ft. long heavy duty mast	$39.00
500 D Guy insulator (5/32" or 3/16" cable)	$0.95
502 Guy insulator (1/4" cable)	$1.95

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.)	$169
CDE TAILTWISTER (30 sq. ft.)	$239
8 Conductor Rotor Cable	$0.18/ft.
Heavy Duty 8 Conductor Rotor Cable	$0.36/ft.

COAXIAL CABLE AND CONNECTORS

RG-213/U (Mill spec. RG-8/U)	$0.29/ft.
RG-8X (Mill spec.)	$0.15/ft.
Amphenol Silver Plate PL259	$1.25
OTHER AMPHENOL CONNECTORS IN STOCK – CALL!	
1/2" Copper H. L. Conn. (Type N or UHF)	$22.00
1/2" Alum. H. L. Conn (Type N or UFH)	$15.00
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.
1/2" Alum. Hardline Connectors	$15.00

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HF MOBILES DELIVER FIXED STATION PERFORMANCE

Hustler HF antennas deliver outstanding signal reports — wherever you're mobile!

Design your own HF mobile from a full selection of top-quality; U.S.-made stainless steel ball mounts, quick disconnects, masts, springs, and resonators. You can cover any 6-to-80-meter band. Choose from medium or high power resonators with broadest bandwidth and lowest SWR for optimum performance on any band. Easy band change and garaging with Hustler's fold-over mast, too.

Ask any ham — the best HF mobiles on the road come from: Hustler — still the standard of performance.

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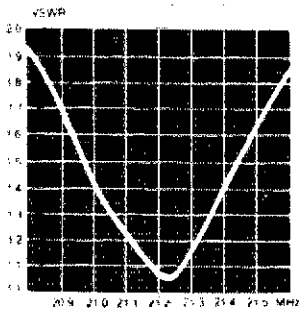
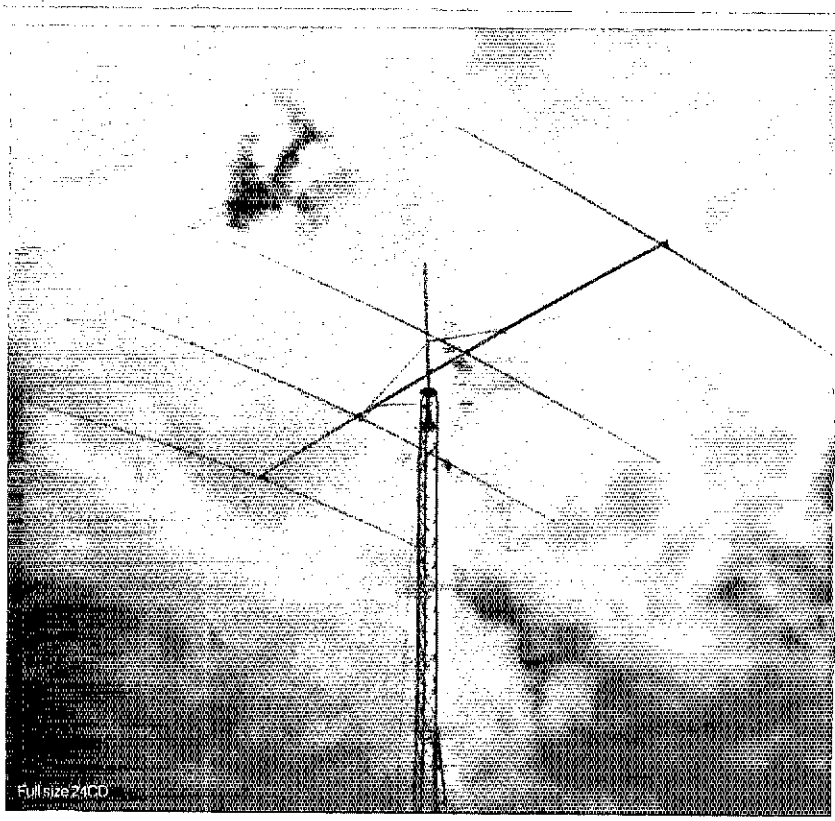


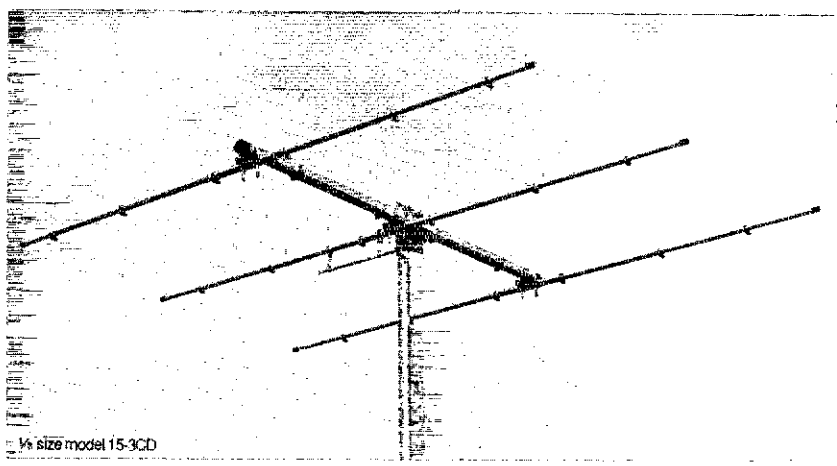
Skywalker

3 and 4 Element Single Band HF Yagis

More contacts, less waiting, less interference, and a better signal at the other end are yours with the Skywalker series of single band Yagis. The forward gain of the 4 element models will put you first in line. See the chart for all the details.

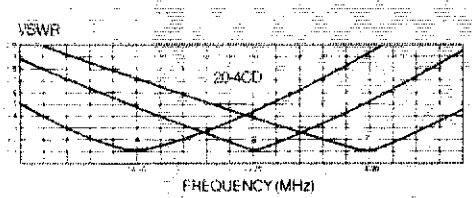
Heavy wall heat treated 6063-T832 aluminum tubing, ruggedly plated steel fasteners, and carefully formed aluminum brackets. Assembly is simple with the new Cushcraft Boom Assembly Marking System. The rugged yet light construction will result in easier assembly and installation and long life. Join the thousands that are moving up to Cushcraft Skywalkers now.

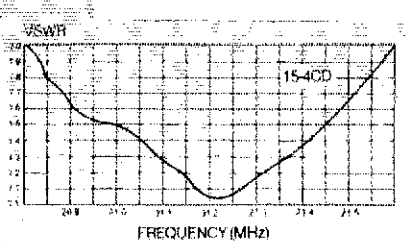

Full size 24CD

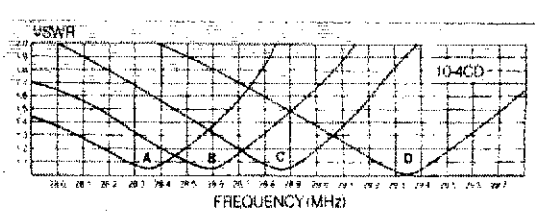

½ size model 15-3CD

Specifications

Model number	20-4CD	20-3CD	15-4CD	15-3CD	10-4CD	10-3CD
Frequency range (MHz)	14.0 – 14.35	14.0 – 14.35	21.0 – 21.45	21.0 – 21.45	28.0 – 29.7	28.0 – 29.7
Forward gain (dBd)						
Front to back ratio (dB)						
Boom length (ft) (m)	32 9.75	18 5.49	20 6.10	14 4.27	17 5.18	12 3.66
Boom dia (in) (cm)	2½"-1¾" 5.4-4.8	2½"-1⅜" 5.4-4.8	2"-1¾" 5.1-4.1	1¾"-1⅜" 4.8-4.1	1¾"-1½" 4.4-3.8	1⅜"-1½" 4.1-3.8
Longest element (ft-in) (m)	35-10 10.92	35-8 10.87	23-4 7.11	23-2 7.06	17-10 5.43	17-8 5.38
Element dia (in) (cm)	1¼"-½" 3.1-1.3	1¼"-½" 3.1-1.3	1"-⅝" 2.5-1.6	1"-⅝" 2.5-1.6	⅞"-⅝" 2.2-1.6	⅞"-⅝" 2.2-1.6
E-plane B/width (deg)	60	56	57	56	57	56
Side lobe attenuation (dB)	40	40	40	40	40	40
1.5-1 VSWR Bandwidth	300 KHz	800 KHz	500 KHz	500 KHz	600 KHz	700 KHz
Turning radius (ft-in) (m)	20 6.10	23 7.01	15-4 4.67	13-6 4.11	14 4.27	10 3.05
Weight (lbs) (kg)	55 24.95	30 13.61	25 11.34	20 9.07	18 8.16	11 5.00
Windload (sq ft) (sq m)	8.1 0.75	5.5 0.51	4.5 0.42	3.4 0.32	3.1 0.29	2.3 0.21







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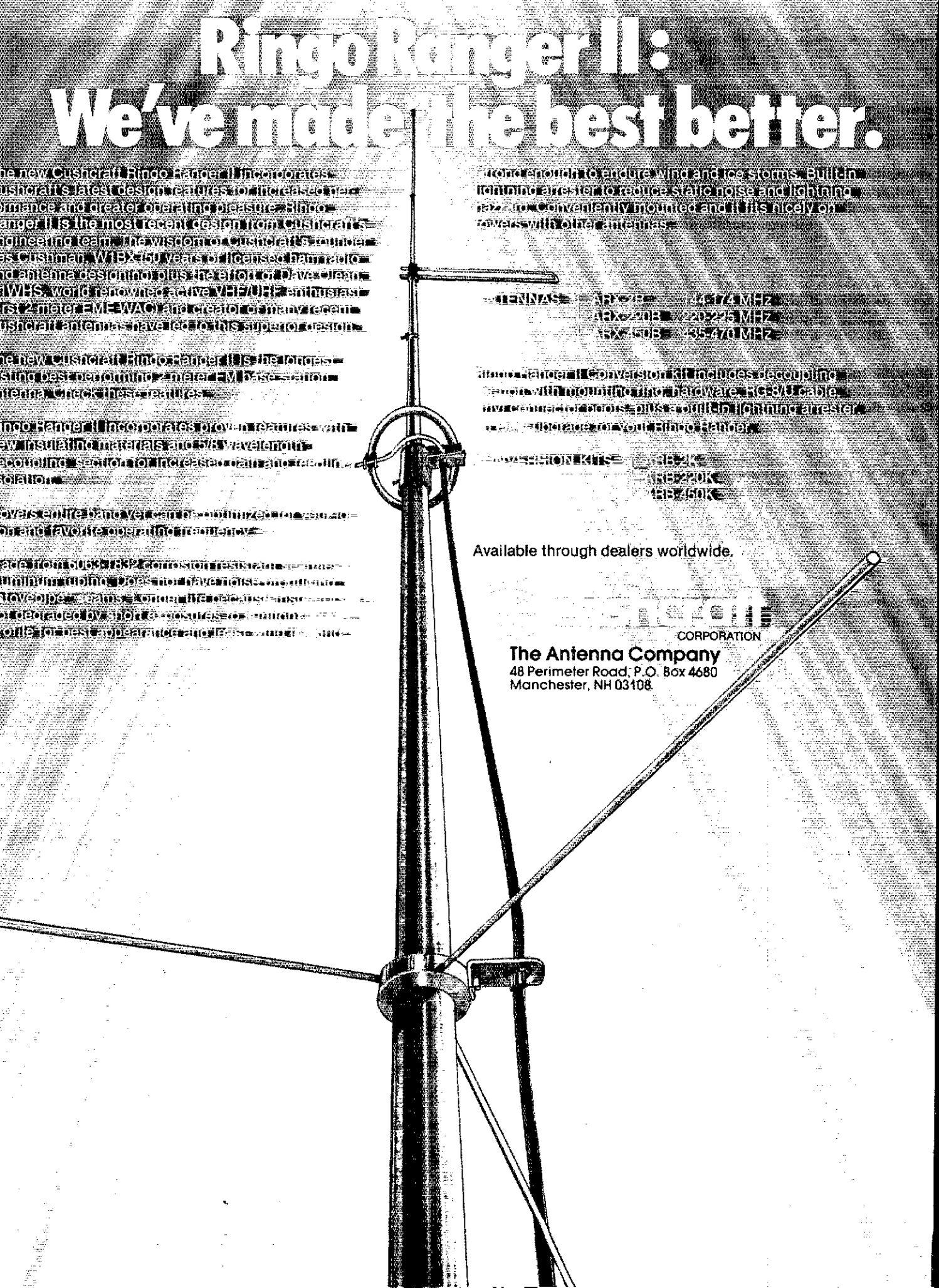
Ringo Ranger II:
We've made the best better.



Available through dealers worldwide.

CORPORATION

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

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WBØHOX — SEC: WAØOIT. STM: AFØO. Net reports:

Net	Time	Freq.	QNI	QTC	Mgr.
MSN/1	0030Z	3685 kHz	232	105	AFØO
MSN/2	0400Z	3685 kHz	183	37	KØJCF
MSPN/N	1810Z	3945 kHz	543	40	WAØAIN
MSPN/E	2345Z	3929 kHz	989	193	KCØT
MNAMWXN	0015Z	3929 kHz	476	420/34	WDØCGM
MSSN	2315Z	3710			

The Rochester ARC and the Rochester Repeater Society were presented with a "one of a kind" special service award by the National Weather Service in recognition of their contribution to the public safety and welfare of SE Minnesota residents. A second award was presented to both clubs by the Rochester-Olmstead County Office of Emergency Services on behalf of the Mayor and County Board Chairman. The section proudly congratulates both for outstanding jobs well-done. Our list of new Novices is growing by leaps and bounds. Congrats to the following new Novices: KAØJMX KAØJZT KAØJZU KAØKAO KAØKAR KAØKAS KAØKAT KAØKAU KAØKAV KAØKAW KAØKAX. Upgrades: Novice (KAØEFN) to Gen. (NØCGH). To Advanced: WDØBGS and WDØDEH. We welcome K3WT of Burnsville. He is employed by Westinghouse and comes from PA. Also welcome to NØBUY of Hayfield. He is active on the traffic nets and comes from IA. We extend our sincerest sympathies to the family of KAØDUQ, Zim, MN, who became a Silent Key on March 1. He was active in the Mesabi Wireless Club. Belated recognition to the hams who handled the communications for the All-American Sled Dog Races in Ely, MN in January. Organized by WBØTDV WBØJRH and WDØCGM, the races involved several radio operators, who's individual calls have been forwarded to the Public Service division. Plans for the Dakota Division convention, to be held in Rochester in Sept. are moving along well under the command of chairman, WDØEGI. Traffic: WAØTFC 340, KBØMB 172, AFØO 150, NØBUY 138, WØDFX 120, WDØCGM 119, WAØONE 109, KØPIZ 90, KCØT 59, WBØNZB 57, WAØAIN 46, KØCSE 35, KAØEPY 30, WBØHOX 30, WBØTHZ 29, WØGRW 25, NØBRC 24, WBØUKI 19, KBØN 14, KNØKCW 10, AFØO 8, NØBSG 4.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WAØRWM — Congrats to Novice KAØKIO and those who upgraded to Tech — WDØDAW KAØHRF; General — KAØHNZ KAØJJR WDØDAI WDØEMY; Adv — WDØCHC WBØEHC now KBØVO; Ex. — WDØCLD and NØCFV. Hettinger ARC has changed the name to State Line ARC. officers are: KAØBAW, pres.; KAØBOA, v.p.; NØBDR, secy/treas. New officers of Williston ARC are WØBMB, pres.; KAØGUV, v.p.; KAØIIW, secy/treas. WBØNFX is EC for Cass Co. WAØRWM attended Hamboree 5 to participate in the SCM/SEC Forum. WAØVGJ WBØSJG and WBØOFW also attended, good turnout. Hawknest ARC had their annual appreciation meeting with good response. Activities for the summer are June 7 Mayville Hamfest, June 27 & 28 Field Day, July 11 & 12 Peace Garden, Aug. 2 Corn-feed, Sept 18-20 Dak Division Convention. Traffic: WAØRWM 219, KPØIP 90.

SOUTH DAKOTA: SCM, Erwin Heimbuck, KØOTZ — It is with great regret that I report the passing of one of the great pioneers of vhf and uhf, WØENG passed away in a Denver hospital after a lengthy illness. He was a pioneer in the vhf and uhf fields long before the rest of us had discovered the bands. He had written articles several of which were published in *QST*. He designed a 432 transverter that is still enjoying popularity today. He will be greatly missed by all of us. The Rapid City crew of WØPUF AAØF and several others who had lesser parts, put together an EME array for 432. They managed to rack up a bunch of points in the contest. Traffic: KØAIE 139, KØFRE 116, WØKJZ 84.

DELTA DIVISION

ARKANSAS: SCM, S. M. Pokorny, W5UAH — SEC: K5TML. MNs: WA5IGN W5MYZ W5POH WA5ZWZ. Nets: SCARC 28.765 0130/M & F 79 22 K5HZ; OZK 3.760 0000/dy 217 32 W5MYZ. APN 3.937 1100/M-S 833 44 W5POH. M-Bird 3.923/M-F 782 16 WA5ZWZ. ARN 3.995 2330/dy 1032 52 WA5LGN. MARC 2-mtr Net Mon at 0001 on 146.07/67. MARC Slow Speed CW Net Sun at 0200 on 21.150 AD5M NC. New repeater on top Children's Hospital, Little Rock, 146.25/85. This is my last report and I wish to thank all who in any way assisted me during my six years plus as SCM for Arkansas. Anl reports, comments and etc., should now go to W5RXU, the new SCM. Will be active on the nets and give whatever assistance I can. OBs K5DW 10, W5UAU 2. Traffic: W5OFU 75, WB5GQH 20, N5EL 18, W5UAU 15, K5DW 10, W5KL 10.

LOUISIANA: SCM, Jim Giammanco, N5IB — Many thanks to N5RB, who is stepping down as manager of LAN. He will retain his duties as LRN manager for a while longer. The new LAN manager is K5TL, who was most recently SCM for LA. There was a fine turnout for the Lafayette Hamfest, with lots of interest in the DX and ARRL forums. Malicious interference was a major topic at the ARRL Forum with Division Director K5DPG fielding several questions on the subject. The consensus was that, while the FCC can help, it is a problem that hams will have to address themselves if it is to be solved. It's almost June and that means Field Day is almost here. Be sure to send a message to your SCM describing your Field Day operations. The GNOARC helped celebrate the Red Cross Centennial with a display and exhibit. They even gave a real demonstration by helping to locate some lost children during the exhibit. The MTA ARC is sponsoring a slow-speed cw net on 3703 kHz each Tues at 9 P.M. Stay tuned for an update on the LA Emergency Net. We hope to have it back in regular operation soon.

Net	Freq.	Time	QNI	QTC	Mgr.
LAN	3615 kHz	7 & 10 P.M. Dy	246	89	K5TL
LSN	3703 kHz	7:30 P.M. Dy	256	175	WD5EAE
LRN	3587.5 kHz	6:30 P.M. Su 8:00 P.M. W	21	8	N5RB

Traffic: (Mar.) W5GHP 201, K5TL 184, WD5EAE 170, N5RB 156, WB5QDJ 58, WD5FLM 55, WB5UVX 45, K5WOD 38, N5IB 27, WD5CWK 21, W5VMY 18, KA3BER/5 15, WD5GJB 12, K5TTC 11, KA5DLV 10, WB5IKT 5, WD5DHY 4, KAØCSM 2. (Feb.) W5GHP 239, KA5DLV 16. (Jan.) W5GHP 218, KA5DLV 18.

MISSISSIPPI: SCM, Paul Kemp, WB5SNB — SEC: WB5FXA. Will be looking forward to my term as SCM. Tnx to W5XT for FB job as SCM. Need volunteers for all appts or your desires to renew your present appt. Congrats to Advanced upgrades WD5EYM WB5SQL N5ACX did fine job as NCS for simulated emerg. test sess of MSBN during tornado awareness exercise. GSEN in

3 recent additions to the DRAKE family

Model 1554

Drake L75

160-15* Meters

1.2kW Linear Amplifier

1.2kW PEP, ssb continuous, 1kW cw 50% duty cycle.

160-15* meter amateur band coverage, plus expanded ranges for any future hf band expansions or additions within FCC rules. These ranges also include increased coverage for MARS, embassy, government, or other such services.

The Drake L75 utilizes an Eimac 3-500 Z triode for rugged use, and lower replacement cost compared to equivalent ceramic types.

Built-in relative power reading for output indication.

Temperature controlled two speed fan is a high volume low noise type and offers optimum cooling.

Adjustable exciter agc feedback circuitry permits drive power to be automatically controlled at proper levels to prevent peak clipping and cw overdrive. Front panel control.

By-pass switching is included for straight through, low power operation without having to turn off amplifier.

Bandpass tuned input circuitry for low distortion and 50 ohm input impedance.

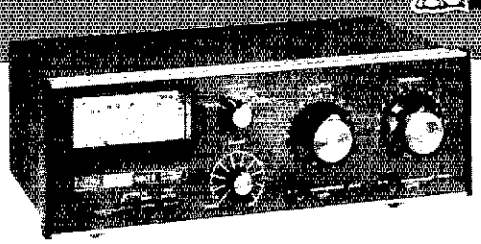
Built-in power supply.

Operates from 120/240 V-ac, 50/60 Hz primary line voltage.

Drake L75 Specifications:

• **Frequency Coverage***: Ham bands 160 through 15 meters*. Non-amateur frequencies between 6.5 and 21.5 MHz may be covered with some modification of the input circuit. • **Plate Power Input:** 1200 watts PEP on ssb and a-m. 1000 watts dc on cw. • **Drive Power Requirements:** 60 watts PEP on ssb and 50 watts on cw, a-m, RTTY, and SSTV. • **Input Impedance:** 50 ohms. (Bandpass tuned input) • **Output Impedance:** Adjustable pi-network matches 50 ohm line with SWR not to exceed 2:1. • **Intermodulation Distortion Products:** In excess of −33 dB. • **Power Requirements:** 240 volts 50-60 hertz 10 amperes, or 120 volts 50-60 hertz 20 amperes. • **Tube Complement:** One 3-500Z. • **Dimensions: Amplifier** 13.69"W x 6.75"H x 14.25"D (34.8 x 17.1 x 36.2 cm). • **Weight:** Amplifier 42.2 lbs (19.2 kg), Power Supply 42.5 lbs (19.3 kg).

*Export model includes coverage of the 10-meter Ham Band.



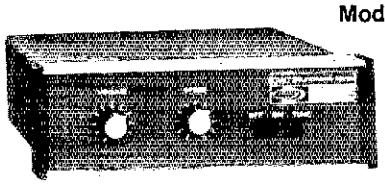
Model 1540

Drake MN75 Matching Network

- **Frequency Coverage:** 1.8 - 30 MHz
- **Antenna Choice:** Matches antennas fed with coax, balanced line, or random wire. (For balanced line use optional B-1000 Balun.)
- **Antenna/By-Pass Switching:** Allows matching unit by-pass regardless of antenna in use, and selects various antennas.
- **Extra Harmonic Reduction:** Employs "pi-network" low pass filter type circuitry for maximum harmonic rejection.
- **Built-in Metering:** Accurate Rf Wattmeter and VSWR Reading, pushbutton controlled from front panel.
- **Input Impedance:** 50 ohms (resistive).
- **Power Capability:** 200 watts average continuous duty (0-300W scale).
- **Dimensions:** 13.1"W x 4.53"H x 8.5"D excluding knobs and connectors (33.26 x 11.5 x 21.6 cm).
- **Weight:** 8 lbs (3.6 kg).

Drake MN75 Specifications:

• **Frequency Coverage:** 1.8 to 30 MHz. • **Input Impedance:** 50 ohms (resistive). • **Load Impedance:** 50 ohm coaxial with VSWR of 5:1 or less at any phase angle to 23 MHz, 4:1 at 23 to 26 MHz, 3:1 at 26 to 30 MHz. 75 ohm coaxial at a lower VSWR can be used. • **Balanced Feedlines:** With the Drake B-1000 accessory balun, which mounts on rear panel, tunes feed point impedances of 40 to 1000 ohms, or 5:1 VSWR referenced to 200 ohms (3:1 on 10 meters). • **Long-Wire Antennas:** Feed point impedances up to 5:1 VSWR referenced to 50 ohms. Also, 5:1 referenced to 200 ohms with the Drake B-1000 accessory balun (3:1 on 10 meters) • **Meter:** Reads VSWR or forward power. • **Wattmeter Accuracy:** ±5% of reading ± 1% of full scale. • **Front Panel Controls:** Provide for the adjustment of resistive and reactive tuning, antenna switching, range switching, VSWR calibration, and selection of watts or VSWR calibration, and selection of watts or VSWR functions of the meter. • **Rear Panel Connectors:** The rear panel has four type SO-239 connectors (one for input and 3 for outputs), three screw terminal connections (for long-wire and open-wire feeder systems), and a ground post.



Model 1507 **CW75 Keyer**

• Iambic keying. • Built-in side tone. • Optically coupled keyline for grid block or direct keying. • Speed and volume control. • Self completing dots and dashes. • Operates from external 7-14 volt supply or 9 volt battery (internal optional). • 5-50 WPM. • Squeeze keyer, semi-automatic "bug" or straight key operation • **Size:** 6.25"W x 2.25"H x 7.0"D (15.9 x 5.4 x 17.3 cm). • **Weight:** 1.4 lbs (.63 kg).

Specifications, availability and prices subject to change without notice or obligation

R.L. DRAKE COMPANY

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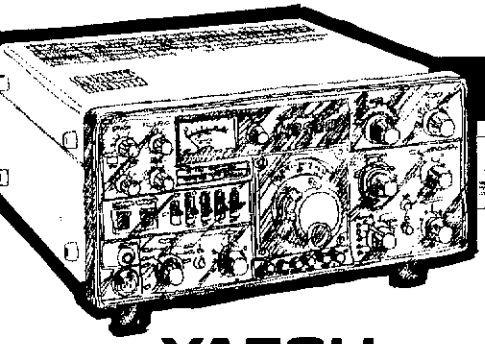
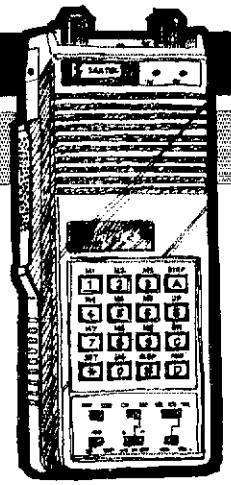


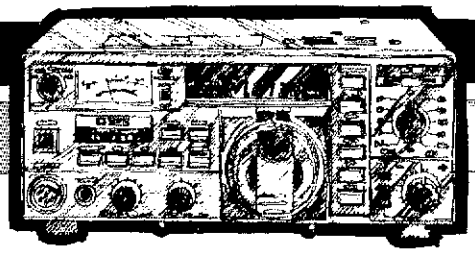
YAESU FT-101ZD

Top Performance from a full-feature, budget-minded transmitter



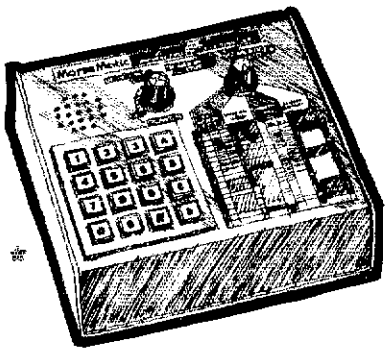
SANTEC HT-1200

4W power, 4-modes scanning, Keyboard input with 10 memories



ICOM IC-730

Full feature HF transceiver, 200W PEP input, Dual VFO standard



AEA CK-1

Contestor's Delight, 10 memories, automatic serial number generation

TEN-TEC OMNI Series C

Special Price: $1085.00

$1057.00 for cash in advance
(money order or guaranteed check only ... no personal checks or credit cards!)

NOW! TELREX ANTENNAS IN STOCK

20M546	call for price
20M646	call for price
TB6EM	call for price
TB4EC	call for price
40M346	call for price
40M329	call for price
20M436	call for price
20M536	call for price
15M532	call for price
10M523	call for price
10M636	call for price

CUBIC 103

Dual VFO, Solid State, High Dynamic Range, and WE HAVE IT.

ROHN TOWER

25G	$37.50	45G	$83.75
FK-2548	$ 661	48 ft Foldover	
FK-4554	$ 1029	48 ft Foldover	
FK-4564	$ 1119	68 ft Foldover	
HDBX-48	$ 305	Self-Supporting 48 ft	
HBX-56	$ 335	Self-Supporting 56 ft	

TEN-TEC

580 Delta	$ 781.00
546 Omni "C"	$1085.00
280 Standard P.S.	$ 156.00
255 Deluxe P.S. with speaker	$ 170.98

CUSHCRAFT

ATV-5	$85.00
32-19	$74.00
214B	$58.00
ARX-2B	$38.00

HY-GAIN

TH6DXX	$244.00
TH5DX	$201.00
TH3MK3	$180.00
TH2MK3	$118.84
TH3JR	$137.00
105BA	$ 98.00
155BA	$150.00
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sess for 15 hours during forest fire emerg in Gautier. Remember this is your column, keep me informed on happenings. CAND (W5KLV) sess 31, QTC 607. DRN5 rep 100 percent by MS station W5EDT. DRN5 (WB5NKD) 31 sess, QTC 370. MS rep 100 percent by N5AMK W5EDT WD5EYM WB5HAS W5HKW WD5JUW K5TFD KB5W Races (N5AMK) sess 5 ANI 194, QTC 0. CAEN (KA5AGD) sess 5, QNI 109, QTC 4. GSEN (KB5W) sess reg 22, emerg 1, QNI 513, QTC 31. QNC 9. MSBN (WD5EYM) QNI 2041, QTC 51, sess 31. Traffic: KB5W 200, K5OAF 130, W5EDT 116, N5AMK 52, WD5EYM 34, WB5SNB 27, W5RIM 12, KA5AFT 8.

TENNESSEE: SCM, Earl Leonard, KB4G — STM: WB4PRF. SEC: W4NZW. Calling all Tennessee radio amateurs. Be advised that the Tennessee Slow Net (TSN) is now meeting seven nights a week. The frequency is 3710 kHz plus or minus the interference and the speed is just fine for all. About ten words per minute or so. There is a lot of room for everyone, so come on down the band and join in on the fun. Thanks to NG4J, TSN manager and to N4EAM assistant mgr. There has been introduced a fine business newsletter that comes out once a month and it is quite a newsletter. Nice going, you guys and gals. Phone nets: LF, 92 sessions, 5071 QNI, 238 QTC; VHF, 93 sessions, 2015 QNI, 612 QTC; Cw nets, 62 sessions, 1226 QNI, 352 QTC. CW Net Honor Roll: (N, W4WXH W4DDK WB4ZSZ NG4J. TSN: WD4KCW WA4LXP KC4UH KA4BSG WA4IDN KA4OVC KA4RJC K4APWV W5LVC KC4MW NG4J N4EAM N4DZW WB4YSN N4EFB and W4ZJY. Very special congratulations to KC4UH who had a perfect QNI to TSN, 31 out of 31. CAND reports 100% Tennessee by W4OGG K4VM and W4ZJY. DRN5 reports Tennessee 93.5% by WD4EIU KA4GSS NG4J KC4MW W4OGG WA4UCE K4VM K4WWG W4ZJY and WB4ZSZ. Once again thanks for all the fine help with these nets. Traffic: NC4J 557, W4OGG 408, WB4BKF 198, W4WXH 188, W4ZJY 179, W4MRD 136, WD4SIG 136, W4DDK 111, K4JGW 43, K4WOP 38, WD4NJR 33, KY4L 32, KC4MW 27, W4PFP 26, K4YOI 26, W4RJW 15, K4AMC 14, WA4CGK 13, KA4GSS 12, KA4BSG 10, W4PSN 8, W4DPO 6, WB4ZSZ 6, W4EWR 3.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — NMs: W4BEJ WA4JTE KC4XM KB4OZ K4JLX KS4V. Nets reporting:

Net	QNI	QTC	Net	QNI	QTC
KRN	590	28	TSTMN	539	97
MKPN	1312	84	5-ARES	66	3
KNTN	447	132	8ARES	115	12
KYN	561	114	D-9RN	100%	322
KSN	199	51	D-CAN	100%	607
KPON	65	7	4-ARES	37	2

PSHR: KA4GFU KB4OZ KA4MZY K4DZM WD4JTO KA4SAA KA4GFU. Ann Sloan is new STM for Kentucky. KA4MZY QNI 100% D-CAN this month. AB4Y is state coordinator for AMSAT. Paducah and Ashland area have several new Novices. Ky. Emer. Net meets Wed after KTN. KU4A received OSCAR Communication Award. K2ILC has 3 new Novices at his house. K4TXJ is running patches daily from Antarctica. Traffic: KA4MZY 132, K4JLX 110, K4DZM 105, KS4V 101, KA4GFU 100, K4YZU 82, KB4OZ 79, KC4XM 77, WD4IYI 63, KC4WN 52, WB4ZDU 52, KZ4G 42, WA4AVV 41, WA4JTO 39, WD4JTP 30, WA4SWF 30, KA4SAA 29, KC4VB 29, WA4AGH 25, WA4WSM 25, WD4BSC 21, K4MHL 19, K4HOE 18, W4PKX 18, WA4OMH 17, WA4YPO 17, WB4AIJN 16, WA4EBN 15, KA4IKH 15, WB4APC 14, KA4MBF 14, WD4CJA 12, WA4NOG 11, K4ZWB 9, WD4CQF 8, K4AVX 6, W4CDA 5, N4EEL 4, KU4A 1.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: WB8FLK K8RCT W8VWY. NMs: WD8BHE WA8DHB K8LNF K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WA8RNB WD8RNQ WB8YDZ K8ZJU.

Net	Freq	Time/Day	QNI	Tic	Sess.	Mgr.
OMN*	3683	1800 Dy**	1405	481	93	WA8PIM
MITN*	3953	1900 Dy	936	418	31	WD8LRT
GLETN	3932	2100 Dy	1194	172	31	K8DTG
UPN*	3922	1700 Dy	794	149	36	WA8DHB
MAQS*	3953	1100 Dy	616	105	31	K8LNE
MNN*	3722	1730 Dy**	535	103	62	WD8BHE
SEMTN*	146.64	2045 Dy	260	55	29	WA8RNB
UP ARES	3922	1800 Th	44	54	4	WA8DHB
BR	3930	1730 M/S	407	18	26	W8HIN
MEN	3930	0900 Su	199	11	5	W8HIN
VHF Nets 15 rpts			1024	50	82	WD8NKT

*NTS Nets. Times local. **OMN 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. New ORS: KA8AID W8TW. New ECs: WD8DKP (Dickenson); WD8NXV (Muskegon); WD9JHW (Iron). OO reports: K8JH K8NKB W8MVR W8QG KE8X AC8Y. OBS reports: W8MPD K8NKB WA8RNB. Silent Keys, with deep regret: W8AGT W8BDS W8HOL WD8NJO. Upgrades: to General, WD8ACF KA8AID KA8LNP; to Advanced, WD8ODP; to Extra, N8RLZ WD8ECT K8NKB. A new call in the KE8X family is KA8MYU, daughter Karen. New multi-op station forming in September: KA8MIX and WB8WTF both of MCRC. KC8K did good service running phone patches for crew aboard USCG cutter "Polar Sea," stranded off the Alaska North Slope. He also garnered some good PR for ham radio via Detroit's WJR. N8AG reports all QSLs for his 2F2AG operation have been answered. I enjoyed meeting many of you at Muskegon. I had the honor of presenting the Ladies Amateur of the Year award to K8ZJU, and the Olinghouse Field Day award (for MCRC) to the MI QRP club. New officers for the Repeater Council: W8LSS, chairman; W8QOI, vice chairman; WB8VWK, secy/treas. Warmest thanks to WB8UPM, retiring after three years of outstanding service as chairman of the Council. A new vhf net in the Bay Area meets Thursdays at 2100 local time on 147.96/.36, in cooperation with the Bay Area ARC. Nineteen PSHR reports this month. BPL: AF8V. Traffic: (Mar) AF8V 510, WA8PIM 387, WD8LRT 363, KA8CPS 346, WB8MTD 312, KB8MX 229, WB8YDZ 164, WD8BHE 154, K8KMQ 146, WA8DHB 113, W8UE 107, WD8RNQ 106, WA8TAO 73, WB8SYA 63, K8DTG 61, WD8NKT 58, K8GXV 57, WD8LSV 57, AD8X 57, WB8HPZ 55, W8SCW 52, KE8X 52, WD8MJB 50, WB8YWA 50, N8BJD 48, WD8EIB 48, K8LNE 41, W8YIO 41, KA8HFS 40, W8VIZ 40, K8UPE 39, W8CUP 38, K8BZ 34, KB8GT 32, WD8IXZ 31, WD8OSE 31, W8EOI 30, WB8ITT 30, WD8RWR 30; WB8ITA 28, WD8BSE 27, WD8RHU 27, WD8ROK 26, KA8DEZ 24, K8LUY 24, WD8PRI 22, W8VPW 19, KA8AID 18, N8BNC 18, W8HIN 18, WD8DRI 16, W8JXJ 16, WB8YRY 15, WD8IBY 14, WB8DJA 12, K8OCP 12, W8LDS 11, W8QG 10, WA8AXF 9, W8JUP 9, WA8YBP 9, WA8LKC 8, KI8O 8, K8ZJU 8, WB8HSN 7, KA8IPI 7, W8TBP 7, WA8VBF 7, W8CBH 5, W8MOF 5, WA8OAF 5,

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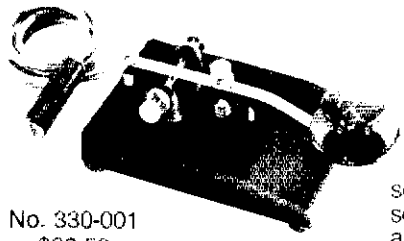

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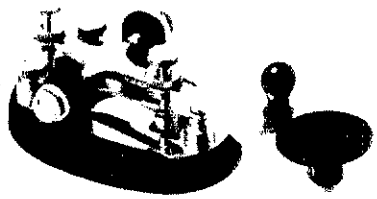

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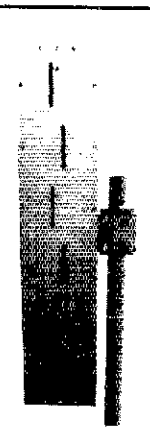
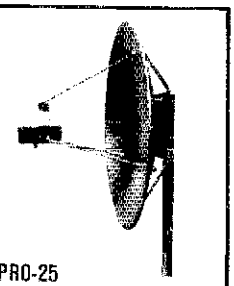
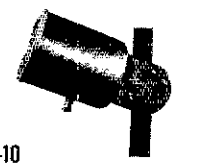


SA-16



PRO-25



CA-10

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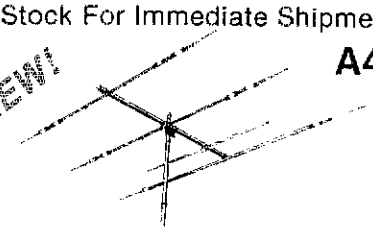

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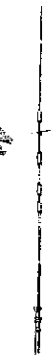

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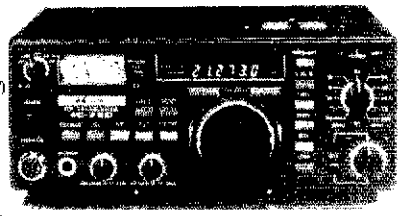

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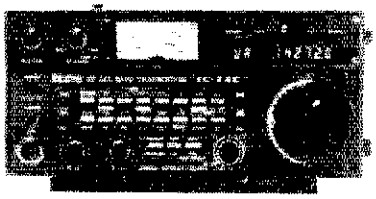

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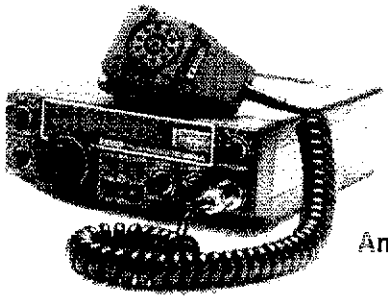

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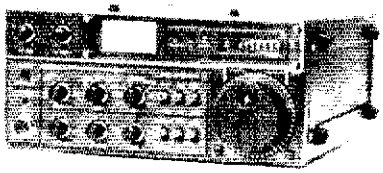

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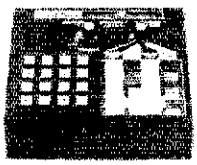

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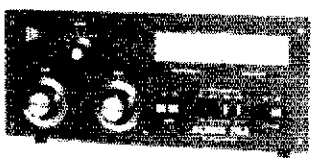

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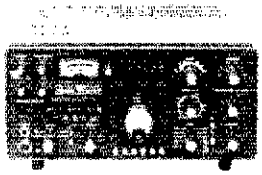

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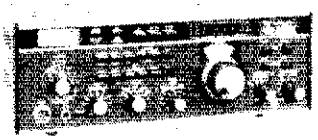

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OHIO: SCM, Allan L. Severson, AB8P — Asst SCM: W8MOK. SEC: K8AN STM: K8OZ. NMs: K8AAZ WD8KBW K8OZ WD8QMP WB8YGW W8EK. Net reports:

Net	QNI	QTC	Sess	Time (local)	Freq
BN	554	367	59	6:45/10 P.M.	3.577
BNR	135	21	25	6 P.M.	3.605
ONN	196	48	27	6:30 P.M.	3.708
OSN	293	185	31	6:10 P.M.	3.577
OSSBN	2916	1312	92	10:30 A.M., 4:15 & 6:45 P.M.	3.9725
O6MN	331	62	31	9:00 P.M.	50.160

Still time to make arrangements for the Ohio ARRL Convention, to be held in the Cincinnati area June 12 & 13. I'm sure you don't want to miss the wide range of forums, meetings and demonstrations, ranging from DX to TV to computers to the ARRL Forum, chaired by our director, W8PG. Hope by now many of you have received your "Tin Plate" QSL card (it's really tin), courtesy of the Steelworkers ARA of Weirton, WVA and the Steubenville Area ARC, working with National Steel. A most unique QSL card, I assure you. W8ADW advises of a continuing need for volunteers to assist with preparations for the QCWA National Convention, to be held in Cleveland Sept. 25 & 26. Call him if you can help. 30 members of N. KY Amateur Radio CLub & the Queen City Emergency Net aided the Red Cross after a Newport, KY explosion. Watch for a full report on this operation.

Local Nets	QNI	QTC	Sess.
BRTN	438	234	31
COARES	98	4	3
CCOMF	93	2	9
Firelands Red Cr.	59	7	4
Huron Co. ARC	71	7	5
LCNWARES	1032	206	49
RARA	50		4
TSATN	628	302	31
TSRAC	949	120	33
VWCEN	64	8	5

Traffic: (Mar.) WB8DMF 388, K8OZ 357, K8AAZ 333, WB8KKI 252, AB8P 270. WD8KFN 204, N8CW 200, WB8JGW 188, WD8KBW 188, WD8DYW 166, WA8HGH 163, K8BYS 161, W8UPD 146, K8BYR 137, WD8PMW 135, WB8UBR 135, W0FVD 122, W8MOK 114, WD9HDZ 112, WB8MEK 112, KA8DJZ 106, K8DL 102, WA8SSI 101, WD8QAC 97, KF8J 94, K8AN 92, WD8DDE 88, K8JE 88, WB8QHU 88, WA8GMT 83, KK8L 83, W8GGX 82, WD8RIB 82, N8AKS 74, N8JR 73, W8TP 65, W8JMD 63, WA8OYJ 59, K8PYT 56, WB8YYS 56, W8QZK 54, W8BHI 52, WB8TKU 52, N8CGM 51, WB8IGL 51, WB8SGL 51, WB8SIQ 50, W8WEG 50, WA1QAA 48, K8CKY 45, WB8YGW 45, K8JDI 42, WA8WCU 42, WB8WTS 42, N8AUH 41, WD8JAM 41, W8EK 40, WB8TTQ 39, WB8AWM 38, WA8BUW 38, K8GET 38, WB8CJU 35, WA8JNQ 32, WD8PEI 32, KA8HGH 30, WD8IAJ 30, K8DEV 26, W8HVA 26, WD8MIO 26, WD8NEC 26, N8CDO 24, WA8MHO 24, KA8CDE 23, WA8SED 23, WD8OYO 22, WB8OHV 22, WD8OMP 22, KA8GVZ 21, WB8PIY 21, WB8TRK 20, KA8KFW 19, W8MGA 19, KA8IUK 18, WA8MAZ 18, WB8MRL 18, W8WAV 17, WB8WHF 17, NR0JS 16, KA8EZU 16, WB8KOJ 16, WD8EKI 15, W8OOL 15, WA8ZID 15, W8RG 14, WB8SRC 14, W8ZM 13, WA8HED 12, WB8IJU 12, W8LZE 11, WD8OYK 11, WA8TSX 11, W8IM 10, K8NJO 10, WD8HHP 9, WB8SJE 9, N8AHK 8, K8NQW 8, WB8VLR 8, K8ND 7, KF8O 7, WA8VEC 7, WD8NEB 6, N8CGA 5, W8EDU 5, WD8PXI 5, WB8WRO 5, WB8YTO 5, N8AJU 4, WD8YFF 4, WB8NHV 3, KA8KCR 2, W8VND 2, WB8YUS 2. (Feb.) WD8QMP 62, WB8QHV 21, WD8YFF 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2TM. STM: WA2SPL. ASCM: KB2KW W2IT K2AV. NM: W2WSS WB2IXR N2BDW WB2ZCM WA2SPL WB2HDU W2ZOJ.

Net	Time/Day	Freq
EPN	2300Z	3902
ESS	2300Z	3690
NYPON	2200Z	3913
NYSPTEN	2300Z	3925
NYS	0000/0300Z	3677
CDN (Troy)	2330Z	146.34/94
HVN (Beacon)	0030Z M-F	146.37/97
HVN (Pearl)	0030Z S-S	144.535/135
SDN (Wht Pins)	0230Z	147.66/06
SCRN (Catskill)	0100Z	146.135/735

Hope all get involved in the many public service activities which are going on throughout Eastern New York during the spring, summer and fall months! Many 2-meter groups are involved. One more time — please send your monthly reports directly to me! Sorry about PD4 results, but it is taking much longer than we expected to correct. From what we have so far, all did fairly well. On messages, say what is written down, X is initial X-ray not just X-ray. PSHR: (Mar.) N2BDW W2BIW KB2KW WB2MCO WB2SON WA2SPL W2YJR WB2ZCM. (Feb.) W2BIW WB2FAG WA2SPL WB2ZCM. (Jan.) WB2ZCM. Traffic: (Mar.) WA2SPL 251, WB2MCO 158, WA2WCO 130, WB2ZCM 129, W2BIW 123, W2YJR 117, KB2KW 98, WB2SON 96, N2BDW 66, K2MI 41, AA2Y 36, WA2CJY 28, W2EFU 28, W2DW 10, K2HNW 7. (Feb.) WA2SPL 531, WB2EAG 299, W2BIW 178, WB2ZCM 169, W2EFU 58, AA2Y 21. (Jan.) WB2ZCM 154.

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 MWSun 2100 WA2SOE mgr; BIG APPLE VHF 147.915/315 2030 M-F KA2DBW mgr; SUFFOLK VHF 144.74/145.37 M-F 2030 N2BKK mgr; LIMARC W2VL 146.25/85 Fri WA2SOE 2045. All times are local, please try and help out by checking in once in a while. It is with deep regret that we list WA2MMY and WB2GNZ as Silent Keys. If you want to know more about Metro Plex, contact WB2MGB. Congratulations to W2LZX who recently received his 5 Band DXCC award. W2GKZ is back after a trip to FL and the ARRL National Convention. WA2HQB won the Gt South Bay ARC competition for WAS. Congratulations to WA2PHB who passed his Extra and after holding his call for 19 years is now awaiting his new one. WA2GBS is in Egypt. New officers for Middle Country ARC are: W2WW, pres.; WA2ARS, v.p.; WB2RXU, secy.; WB2ADF, treas. W2JTP reports that there is renewed activity on six meters am, besides W2JTP, there is WB2CAU and W2WAS, with activity being centered around 50.6 MHz using vertical antennas. Officers for Kings County ARC are WA2NDA, pres.; WB2AFD, v.p.; W2YHX, secy.,

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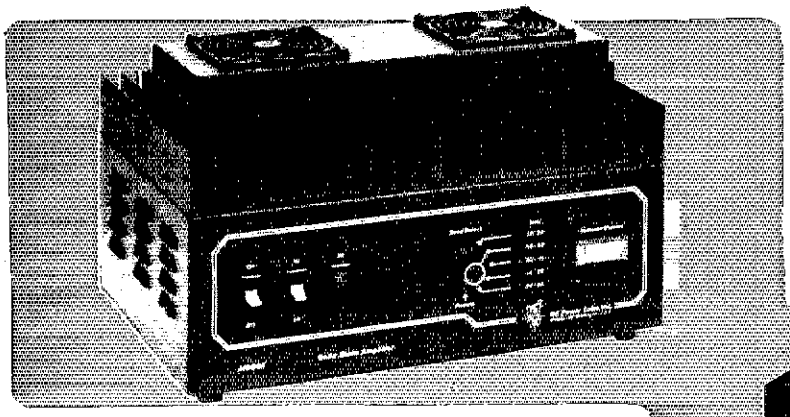

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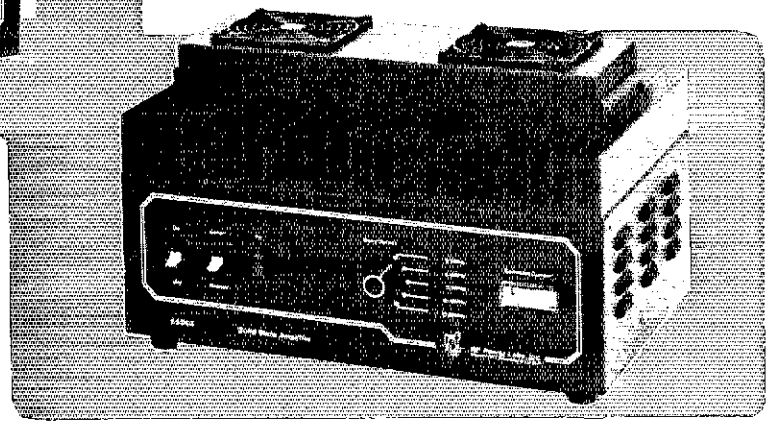
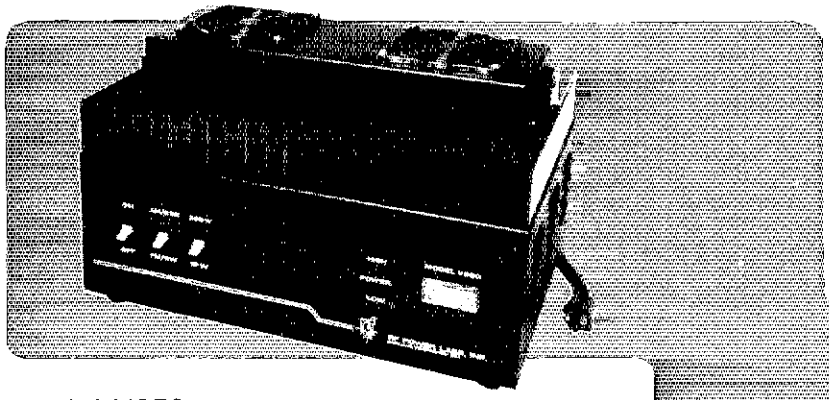


Model C500X



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350 Watts Output
144 - 148MHz

Model V180

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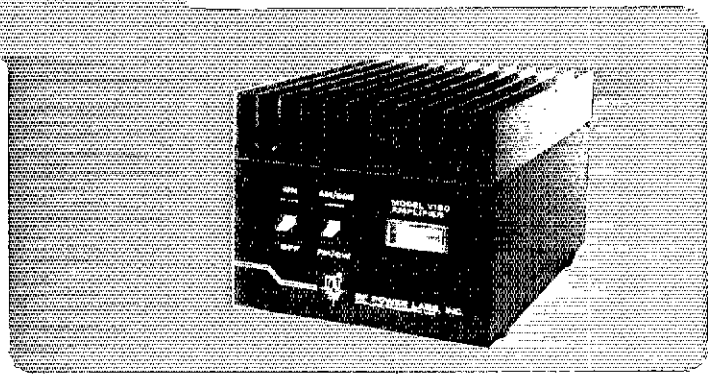
144 - 148 MHz



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WA2DDB, treas., WB2PTV, membership chmn.; W2XY, editor. AC2P is recovering from burns received as the result of an electrical explosion. Rich says the rumors that he lost his mustache are untrue, also WA2UWF and her daughter are also recovering. The Suffolk County ARC is in the process of sponsoring a Boy Scout Explorer Post. LILCO has a weekly net on 145.37 at 2000 local. If you don't see your figures in the traffic totals one month, please resubmit, the amount of stuff that never arrives is amazing. WB6OEX is putting up an ant. system at his Smithtown QTH. WA2SEL has won the 1980 Writers Guild of America award for "Outstanding Achievement in Radio Documentaries." WA2PMW reports a new RTTY Net on 144.27 nightly. Traffic: (Mar.) WA2UWA 238, W2AHV 215, WB2EUF 168, W2MLC 82, KA2CNN 64, WB2KCT 61, K2GCE 59, W2GKZ 48, KA2CLQ 34, KA1NH 34, KA2ELB 25, W2DBQ 24, K2IZ 24, WB2IDP 17, WA2SEL 12, WA2PMW 10, K2YQK 8. (Jan.) KA2CLQ 45, WA2SEL 24.

NORTHERN NEW JERSEY: SCM, Robert E. Neukomm, KB2WI — SEC: WB2VUF. STM: W2XD. NMs: N2CR N2BOP W2PSU KA2GQQ W2TCA W2UEZ WB2IOJ & N2BNB.

Net	Freq.	Time/Days	Sess.	QNI	QSP
NJN/E	3695	7 P.M. Dy	31	466	141
NJN/L	3695	10 P.M. Dy	31	285	96
NJSN	3735	6:30 P.M. Dy	31		
NJPN	3950	6 P.M. Dy	36	632	231
NJVN	49/49	10:30 P.M. Dy	31	298	142
OBTTN	72/12	8 P.M. Dy	31	588	140
UCETTN	085/685	7:30 P.M. Dy	31	289	77
NWNJVN	90/30	8:30 P.M. Wed	4	20	2
NJRTTY	147.51	Autostart	31	72	8

Sussex County ARC reports 13 students in their Novice class which has only one more week to go. Their April meeting will feature W2JIO who is famous for devising audio-tuning devices for the sightless. Metroplex reports a total of 646 members and that WA2RHQ has upgraded to Extra. Bayonne ARC reports the following new officers: W2KB, station mgr.; WA2FPO, asst. station mg.; KJ2K chief eng.; N2CGA, secy/treas. Ramapo Mountain ARC reports 2 community projects: April 5, 25 km mini-marathon by Passaic County Community College and April 26th a 30 km walkathon around both Pequannock & Garrett Mountains by March of Dimes. Upgrades: KA2GZE to Advanced and now KB2WH, KA2LGO to Tech, WA2STO to General, KB2IJP to Extra and now KF2J. On Armed Forces Day, May 16, N2BMN will operate aboard the USS Ling, a sub docked in Hackensack. WA2KBI upgraded to Advanced. The following officers have been elected by the Electronic Society of NJ: K2IH, pres.; W2NR, v.p.; W2AU, secy.; W2KOG, treas. The KaChunker of JSARS reports the following upgrades: WB2HUV to Advanced, KA2HLG, Tech.; KA2HLL and KA2EKR General and K4RN/2 to Extra. TCRA reports its annual flea market to be held May 3. They have a Swap and Shop every Tuesday at 8 P.M. on 147.855/.255 MHz. Upgrades: WA2SGI to Extra, N2AVI to Advanced. BARA reports following upgrades: KA2KYM to General and N2CGF to Tech. Our director, K2SJO, spoke on his last trip to Peru ITAU meeting and had an excellent slide show. WA2EWG was named "Ham of the year." FLASH: recent upgrades — N2CGF and WA2PIR to General and WB2VNF to Tech. OO report from WA2QZD. W2XD made a traffic talk at New Providence Radio Club and also reports getting a new TS830S. Old Bridge Radio Association election: KB2TX, pres.; KB2TY, v.p.; AF2L secy. WB2JHN, treas. KA2AXY to Advanced and KA2KWG to General and active on 2RN-D. N2SU reports getting a new R4. WB2QPD to Advanced. Traffic: W2RQ 326, W2UEZ 224, W2XD 176, AG2R 157, W2TCA 149, N2BOP 136, K2VX 126, KB2HM 134, KF2T 118, AF2L 101, KB2WI 68, WB2RMJ/T 61, KA2GQQ 59, KA2CYZ 42, WB2KLF 42, N2SU 33, N2BNB 32, N2CR 25, KA2HNQ/T 23, KA2GSX 21, N2BC 18, W2CC 18, N2AYJ 14, W2NKD 12, KA2JMH 9, WB2AIU 4.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, KØCY — SEC: WØRPK. STM: KAØX. NM: WBØAVW WDØHND WØYLS. The first major storm showed that the Iowa ARES was generally ready with Skywarn. Hats off to those who participated on April 3. New OBS are KBØOZ KØCNM. WDØHUJ now has new Tempo 2020. CPR program and training planned for Iowa City, a good idea. NØBKB can be heard on OSCAR Mode A. The CIDXA held its first contest. Congrats to KØGVB for making DXCC Honor Roll. K9AYK proves DXCC obtainable with vertical and barefoot. KAØJAA now a Tech. NØCBR to Advanced, with RTTY equipment. New RTTY machine in DM ready to go on 10/70, due to WBØMBZ KBØVI. KAØBBY cited in Mason City as outstanding ham. ICN still growing, support it. CAND/DTRN 100 percent with WAØAUX, KAØX. TEN 100 percent with WØYLS WØSS KAØX KØGP WBØUPF AEØR KFØD NØSM. Let's all send one message this month through an Iowa Net. Good Intersection meeting in Sioux City, thanks for the support and input.

Net	Freq.	UTC	QNI	QTC	Sess.	Days
75M Phone	3970	1830-0000	2408	86	56	M-S
TLCN	3560	0030-0400	455	114	62	Dy
ICN	3713	0100	77	22	13	ThS

Keep the reports and newsletters coming. Let me know of your activity. Support the ITEN on Sun as all the leadership people are available. Traffic: WAØAUX 223, WØYLS 102, WØSS 90, KAØX 79, KØGP 73, AEØR 68, KØCY 46, WØBW 41, WBØUPF 34, WBØAVW 28, WDØHUJ 20, KFØD 16, WDØHND 15, KAØJOG 12, WBØOAM 12, WDØCON 6, KFØF 2.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. NMs: phone WØOYH, cw WØFT and vhf WAØSZS. Only 14 stations reporting any traffic totals for the month. I know that there are more of you out there. What say that you each try and drop some info with reference to your station operation to your SCM at least once a quarter, if not more often. Net activity reports: KWN QNI 993, QTC 619. QKS QNI 368, QTC 148. KPN QNI 403, QTC 20. KSBN QNI 1153, QTC 107. Kansas frequencies are 3920 phone and 3610 for cw. WBØYLP reports that he now has confirmation on his DXCC. WØPB did attend to a public relations job ham radio wise recently with a 30 minute presentation to the Hiawatha Kiwanis Club. Many thanks to the cw gang for representing Kansas 100 percent on the Tenth region net in March. Those deserving the credit are ACØE WBØYLP WDØACG WØFT WØHI WØAM KØEQH and KØEZ. WØHI also is to be congratulated on receiving his 50 year pin-plaque as he retired from Boeing Mar. 31. Traffic: WØQMT 187, WØOYH 141, WØHI 89, WØFFR 86, WØAM 83, WDØACG 77, WØFT 73, ACØE 66, WØPB 48, WØCHJ 40, WØASY 24, KØBXF 22, WØKL 5, WØOAG 3.

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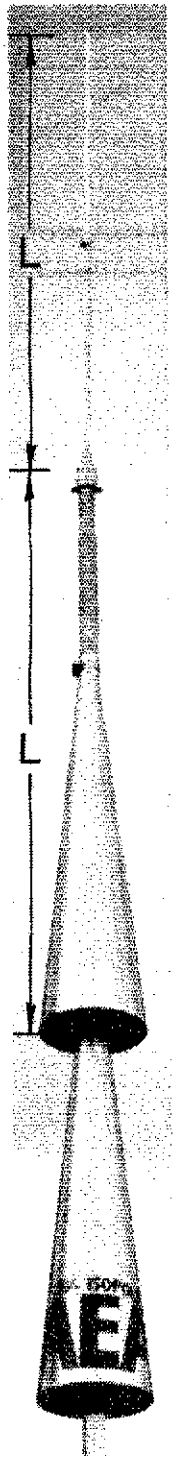

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The IsoPole is building a strong reputation for quality in design and superior performance. The IsoPole's acceptance has already compelled another large antenna producer to make a major design modification to his most popular VHF Base Station antenna. Innovative IsoPole conical sleeve decouplers (pat. pend.) offer many **new** design advantages.

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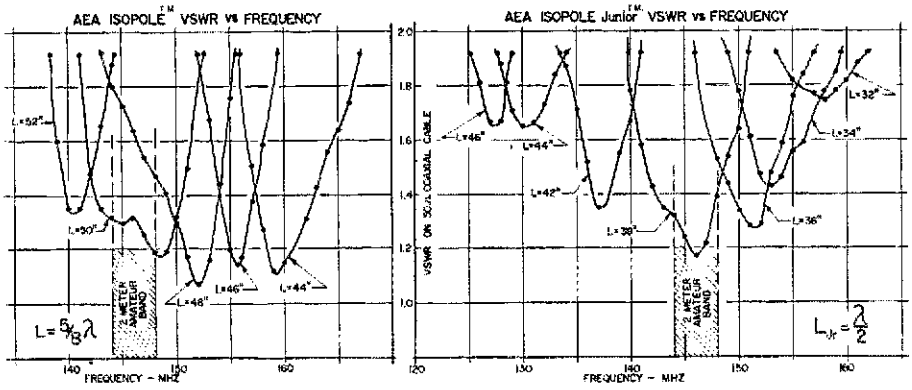

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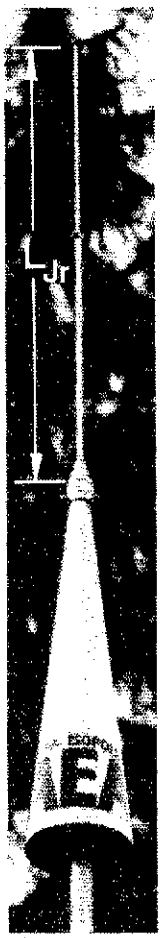

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MISSOURI: SCM, L. G. Wilson, KØBWL — Asst SCM: Joe Flowers, WØOTF. The Emerson Electric Radio Club is a newly formed club in the area and it appears they will be a very active club. It is noted that the club has several experts in the field of electrical interference. Its officers are: WAØBYR, pres., NØCFZ, vice pres.; W5PNU, secy.; KAØAYO, treas. We have a new SEC — NØAJI has volunteered. He is very active in emergency operations and would appreciate all the help you can give him. A special word here about NØAJI. The Special Olympics were fortunate to have him at the helm this year. Operations went like clock-work. Congratulations on a job well-done and a thank you to all amateurs who gave so much of themselves to make the Special Olympics a really special day in the lives of some very special people. There was a real good turn-out at the Columbia Hamfest and though it turned a little cool, a good time was had by all. Those of you who missed it this year should really try to attend next year.

Net	QNI	QTC
CMOEN	134	6
MEOW	247	7
NEMOE	144	1
ACE	46	0
MOSSBN	731	45

Best wishes to WBØWLU who recently underwent surgery in Columbia. The Eastern Ozark ARC is taking part in severe weather training. It appears Callaway Amateur Radio League is planning some type of excursion — maybe a DXpedition to Boone or Cole County, HI. Traffic: KØONK 850, WØBMA 320, WØOLID 208, WØOTF 122, KØSI 88, KØBM 77, KIØK 38, KAØE 23, KØPCK 21, WBØLFY 18, KØRWL 10, WBØNIE 6.

NEBRASKA: SCM, Shirley M. Rice, KAØBCB — SEC: NØAIH. STM: WDØBOG. We traveled across NE & attended Hamboree #5, So. Sioux City & Midwest Spring Ham Conv., Kearney. Hats off to the 3900 Club & Kearney Club — JOBS WELL DONE! We visited North Platte, Grand Island, Taylor Club meetings, & 'Shacks' of WBØSXM NØAIH Omaha Red Cross HQ WØOON & DX QSL Bureau WØFQB WAØPCC WAØWRI WØERW. Appreciate NØAIH NØAZF & KØPOR bringing RC Van to Kearney. Congrats to WBØTED & W7DMW winning HTs, KAØJSN youngest ham, WØFCT — 58 yrs, NØABN receiving keyer for 35 wpm cw contest. Central NE ARC celebrated 20 yrs as one club & all plans GO for hamfest July 25 & 26, Victoria Springs. WØERW promised to stay home & feed the calves. Helpers can volunteer when U arrive. Traffic: WBØSXM 118, WDØBOG 74, ADØAHV 38, KØBRS 31, WØZNI 21, WBØSXN 19, WAØQEX 13, WØNIK 12, KAØBCB 8, WBØGWR 8, WBØGMQ 5, WAØPCC 3, KØODF 2, WØWZR 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Stan Horzepa, WA1LOU — SEC: W1SY. STM: KA1KD. Asst SCM: WB1AIU.

Net	Freq.	EST	Sess.	QTC	QNI	NM
CN	3640	1900 + 2200				K1EIR
CPN	915/315	1800/1000 Su	28	76	259	WB2PJU
NENN	3720	1815	29	89	215	WB1CPF
NVTN	28/88	2130	31	71	313	WA1ELA
RTN	13/73	2100 M-Sa	26	92	258	WB1CPF
WCN	78/18	2030	31	106	412	W1DPR

High QNI CPN: K1EUW KA1KD WA1LOU. High QTC Nutmeg: W1EFW. WB1CPF has been inducted into TCC-Eastern. Meriden ARC issuing certificates to hams contacting MARC members during their 35th anniversary celebration. Eastern Conn ARA provided communications for Quinebaug Valley Assn for Retarded Children walkathon and Killingly Springtime Festival band competition and road race. Fairfield's Board of Selectmen approved a permanent home for the greater Fairfield ARA and its club station, WB1CQO, in the basement of the old Town Hall. Tri-City ARC treasurer is new Novice KA1GQU. Another new Novice, KA1GPG, has 40 states and 15 countries worked in less than a month. KA1KD, who has instructed a contingent of new Novices, says good, low priced, Novice-type gear is urgently needed by new hams all over the state ... if you have gear meeting those requirements, be sure to advertise in your club's newsletter or contact a local school ham club; donations are always welcomed by civic, educational and rehabilitative ham groups. WA1LOU, after looking over the Bosox roster, decided to look at the brighter side of things and reminds you to start planning for Field Day now because it's right around the corner. Traffic: WB1CPF 325, W1EFW 311, K1GF 239, WB1CRH 107, WB1GXZ 92, WB1ESJ 75, K1AQE 58, KA1BHT 55, KA1DZV 55, W1DPR 54, W1BDN 52, KA1CMF 50, K1EUW 42, K1OQG 41, K1UQE 37, WA1WQG 31, KA1KD 28, W1XX 25, WA1LOU 22, W1CUH 7, W1FAI 5, W1KV 5, W1ICF 4.

EASTERN MASSACHUSETTS: SCM, Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: WAØNEW.

Net	Mgr.	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	N1GQ	3.658	1900/2200/Dy	426	327
EMRIPN	KA1BJY	3.898	1730/Dy	—	—
EM2MN	KA1CGP	90/30	2000/Dy	228	56
NEEPN	K1BZD	3.945	0830/Sn	81	19
HHTN	K1BSO	04/64	2230/Dy	403	127
EMRISS	N1BHH	3.715	2030/Dy	140	54

Your SCM attended the ARRL Board meeting in Fla. The dues increase was a hot topic and the initial vote was 10 to 6 against so a lot of people had to be convinced that it was absolutely necessary. Senior citizens finally got a break with 20% off the new rate. The Board has not made up its mind on what they want the Hall of Fame to be. Only one person (Tuska) was elected and the rules will be reviewed by the Membership Affairs Committee again. Massasoit members had nominated W1ALP on the basis of his long service as SCM for East Mass. House Bill 4198 to reduce license plate fees is still in committee. Quannapowitt newsletter reports at least one member getting charged the $30 vanity plate fee for the already too high $20 call letter plates. The 19/79 repeater has "agreed to relinquish the frequency to Civil Defense" in times of emergencies. Massasoit members welcomed back W1DW after a stay in the hospital. Capeway Club reports the passing of K1AEF who founded the club over 20 years ago. Wellesley Club had K1IK and K1UR talk about the new microprocessor controller on the repeater. Greater Lawrence Club set up an Amateur Radio display at the Methuen Mall. Algonquin Club members recently had a zoning bylaw problem which fortunately was taken care of by having the word "commercial" inserted. Middlesex members N1AWG has and WA1AYS will soon be married. Billerica club had K1CE talk on the plain language rules proposed by the FCC. K1AZE has found through contact with some of the founding members that the club was started in 1933 and affiliated with the League that same year. As

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Cable

RG8/U Foam 95% shield	24c/ft.
RG213 Mil Spic	28c/ft.
Mini-8	12c/ft.
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B & W

370-15 Allband Dipole	119.95
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PD-8010 10-80 wire dipole	28.80
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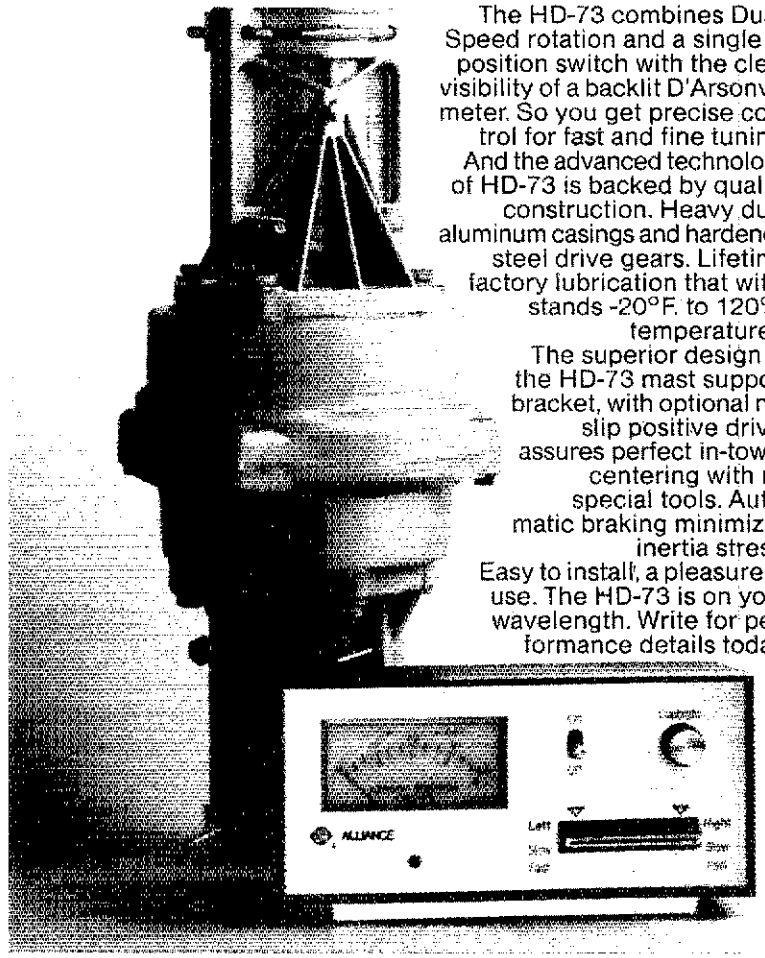
A precision instrument built to last.



The HD-73 combines Dual-Speed rotation and a single 5-position switch with the clear visibility of a backlit D'Arsonval meter. So you get precise control for fast and fine tuning. And the advanced technology of HD-73 is backed by quality construction. Heavy duty aluminum casings and hardened steel drive gears. Lifetime factory lubrication that withstands -20°F. to 120°F. temperatures.

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Vice Director I, K1PAD, am handling the ARRL movies for NE. Contact me for a showing at your club etc. Traffic: (Mar.) N1BHH 718, WA1TBY 153, K1GN 138, KA1ON 122, K1BSO 115, W1DMH 74, WB1EZT 64, WB1GQO 64, K4YX 57, N8TM 34, K1BZD 31, WB7TPY 27, W1CE 22, W1SR 22, AK1J 20, KA1MI 19, W1ATX 18, KA1EMQ 18, WA1FNM 15, K1LWI 11, K1RB 6, W1IPZ 4, KA1R 2, WB1DXT 1. (Feb.) W1DMH 50, KA1R 4.

MAINE: SCM, Cliff Laverty, W1RWG — STM: W1BJ. SEC: KL7IJG. All Red Cross chapters contacted and support promised. Yankee RC will sponsor Hamfest '81 at Oxford Fairgrounds, June 20. Augusta RC to provide comm for Superwalk, booth at Country Fair, comm for Spec Olympics. Section hams working closely with weather bureau in tracking weather around state. PSHR: W1RWG 106, AK1W 103, W1JTH 84, W1BJ 72, WA1YNZ 67. Sessions/ONS/OTC: SPSN 14/139/11; AEN 5/70/4; SGN 26/1161/143; MSN 12/82/14; RACES 5/78/14; CMEN 9/153/8; PTN 31/359/128; BN 26/923/1. Traffic: W1KX 160, W1RWG 142, W1BJ 112, AK1W 105, WB1BYR 83, AF1L 53, W1HDC 48, W1JTH 46, KA1EKT 43, W1BMX 36, W1ISO 28, W1AHM 24, K1GUP 22, K1TVT 22, N5YX 22, KA1AIF 17, W1CTR 13, WA1YNZ 13, N1BCE 12, KA1ENL 12, N1AZA 11, KA1EIW 11, K1NAN 11, WA1ZJL 11, W1GCB 7, KA1CFU 5, KA1CNG 5, W1GKJ 3, KL7IJG 2, W1OTQ 2.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — SEC: AK1E. STM: WITN. NMs: N1NH & K1OSM. Don't forget the 16/76 Hamfest at King Ridge on Sept 27 from 9 to 5. Congrats to W1AM on DXCC Honor Roll. KA1BBG on RTTY with Model 32. K1AGL WA1PEL & WB1ALO visited the Great Bay Radio Assn. Congrats to Nashua Area club on its 5th anniversary. The Interstate Repeater Society held another successful auction-test. K1NBN keeps Maine represented on 160 meters. W1GUX is in Florida. Seen on byways and byways: W1YHI WA1PSI W1AOO & W1RGC. VP9GE continues to be gracious host to Bermuda visitors. The Century Kids, K4RO & W1MPP should be migrating North soon. KB1A KA1FMU & KA1FWO have been checking into the cw net. Just received word that I am to be your SCM for another term. Summer is almost here. See you all at the numerous activities. Traffic: (Mar.) W1TN 210, KA1CXP 185, NINH 163, K1OSM 135, KA1BJ 126, W1MHX 83, AK1E 67, KB1A 55, W1VTP 46, N1ALM 38, KA1FMU 26, WB1DKX 25, W1ALE 16, W1CUE 16, KA1CJI 15, KA1BBI 13, W1FYR 12, KA1FWO 10, W1JB 8, W1NH 7, WA1PEL 2. (Feb.) W1FYR 23.

RHODE ISLAND: SCM, J. Titterington, W1EOF — KA1FE is new Section Tfc Mgr replacing N1RI who resigned to make a 2-month bicycle tour to West Coast. Sorry to report — K1UNA and W1AWG are Silent Keys. KA1FBR is now KC1G — congrats. On July 1st, W1YNE will be your new SCM and all reports AFTER that date will go to him. Congrats to Gordon. Two big events coming up — Warwick will celebrate its 50th anniversary as a city in Sept. Ember and Special Olympics will be held at URI in August. WA1OSL reports RILM 2-Mtr Tfc Net had 22 sessions, QNI 215 and TFC 43. Even though you will see 2 more of my reports, thank you for your cooperation of the last four years. Traffic: W1EOF 310, KC1G 186, KA1BTU 166, KA1FE 128, KB1G 85, KA1DZT 59, W1YNE 33, N1RI 21, AE1S 12.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. Silent Key: W1TAG at Daytona Beach 3/30. KA1EYB now Gen., Adv — KA1EAN & KA1APJ; KH6KD/1 Extra — congrats to all. W1HHF on a Sun. morn, I-89, found family in auto distress; called thru W1KOO 2-mtr rptr to WA1YEH & AE1J who contacted VT State Police for the people. Grn Mt N 26/518/48; VTSSB 31/505/119; Carrier 26/393/38; VPN 5/85/7; VTN 29/116/51. ARRL mbrs busy getting county Red Cross chairpersons lined up for the relay for RC 100 year celebration in VA. WA1YEH was named as the person to contact for info, and is now being assisted by the new SEC. We are receiving a few (vy) more ttc rpts. One not now reporting would be appreciated. Hw abt it? Traffic: N1ARI 124, K1BQB 105, WB1ABQ 64, W1RNA 31, WB1CZF 26, AF1T 17.

WESTERN MASSACHUSETTES: SCM, Art Zavarella, W1KK — ASCM: K1BE. STM: W1TM. SEC: W1JP. NMs: WA1ITL W1UPH W1UD WB1DBN WB1HIH, and KA1APR managing the new Hampden County 2M sideband net on 144.160 Mon 8 P.M. W1JP reports 3200 QSOs by J87s BL BM BN BO foursome in spite of very poor QTH. WMEN and its repeater satellites had 598 QNI, 5 Sun sess in Mar. WMN brass pounding with vigor, 1265 QTC, listed below. Congrats to WB1HIH — almost full-page spread in Berkshire Transcript had his stn and that of W1GKK, complete with fascinations and public service. K1SF advises EL2A still QSOing on 6M. Hampden County to celebrate 15th yr of QSL Bureau with special W1NY QSL FD contacts. PSHR: WB1HIH 108, W1TM 71. Traffic: K1SSH 267, W1TM 203, W1UD 194, WB1HIH 175, W1KK 91, W1YL 68, WB1FXJ 44, WA1OPN 38, WA1ITL 36, W1EFC 35, W1JP 21, W1UPH 20, K1JHC 14, W1BVR 12, WA1YYW 8, W1ZPB 6, WB1HKN 4, WA1MJE 2.

NORTHWESTERN DIVISION

ALASKA: SCM, Fred S. Wegner, KL7HFM — ASCMs: AL7AC KL7IBG. STM: AL7O. SEC: KL7EWQ. Many kudos to KL7FD for a job well done on Iditarod 81, and he's already planning for Iditarod 82. And for the 10-meter fans, the Alaskan effort towards the TEN-TEN is called the Iditarod Chapter. Their net meets each Sat at 2000Z on 28,049 MHz. KL7IEN is the "Big Gun," so catch some favorable 10M propagation and swing your beam on Alaska. The Juneau ARC has a new slate of officers: KL7FT, pres.; KL7TV, v.p.; KL7CXJ, sec/treas. Alaska hams are praying for nice wx for this year's Field Day. Alaska DX Assn meets on 3895 kHz at 0600Z (Sun local) Mon., so check in with AL7O and meet the gang. Some ideas are emerging for an Alaska QSO Party, better throw in your ideas before it's too late. Traffic: KL7AA 600, KL6JFT 36, AL7O 20.

IDAHO: SCM, Lem Allen, W7JMH — Mt. Home Club active in March of Dimes Walk, transmitter hunts, Bike-a-thon, Field Day planning, QRP DX, etc. Boise Club had KF7F talk on DXpeditions. Congrats to W7LBK and W7PSX with new IMN net certificates! KA7EKR has new 2-m beam, WB7OXN has new rotor, W7HZL has new Omni C, WB7RHL new 2M HT, KA7JIE to New York, WB7NSW to Boise, KA7JOV new Novice, N7APC to Phoenix, K7TQM to Billings, N7DH new Squeele keyer, W7LKB new bride and job in Moscow, ID. IMN has 30 members on calling list. New Farm NM is WB7WNZ.

Net	Freq.	Time	Sess.	QNI	QTC
FARM	3935 ssb	7 P.M. Dy	31	1704	28
CD	3990 ssb	8:10 A.M. M-F	22	690	15
IMN	3635 cw	8 P.M. M-F	22	250	96

Traffic: W7GHT 263, AC7P 95, K7JV 80, W7JMH 73, W7KDB 36.

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IF shift, digital displa

TS-530S

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TS-530S FEATURES:

- **160-10 meter coverage, including three new bands**
  Transmits and receives (LSB, USB, and CW) on all Amateur frequencies between 1.8 and 29.7 MHz, including the new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- **Built-in digital display**
  Large, six-digit, fluorescent-tube display shows actual receive and transmit frequencies on all modes. Backed up by analog subdial.
- **Narrow/wide filter combinations**
  Any one or two of three optional filters . . . YK-88SN (1.8 kHz) SSB, YK-88C (500 Hz) CW, YK-88CN (270 Hz) CW . . . may be installed for selecting (with "N-W" switch) wide and narrow bandwidths on CW and/or SSB.
- **IF shift**
  Moves IF passband around received signal and away from interfering signals and sideband splatter.
- **Built-in speech processor**
  Combines an audio compression amplifier with change of ALC time constant for extra audio punch and increased average SSB output power, with suppressed sideband splatter.
- **Wide receiver dynamic range**
  Greater immunity to strong-signal overload, with MOSFET RF amplif operating at low level for improve IMD characteristics, junction FETs balanced mixer with low noise figu and dual resonator for each band.
- **Two 6146B's in final**
  Runs 220 W PEP/180 W DC input all bands.
- **Advanced single-conversion PLL system**
  Improved overall stability and improved transmit and receive spurious characteristics.
- **Adjustable noise-blanker level**
  Pulse-type (such as ignition) noise eliminated by built-in noise blank with front-panel threshold level control.
- **RF attenuator**
  The 20-dB RF attenuator may be switched in for rejecting IMD from extremely strong signals.

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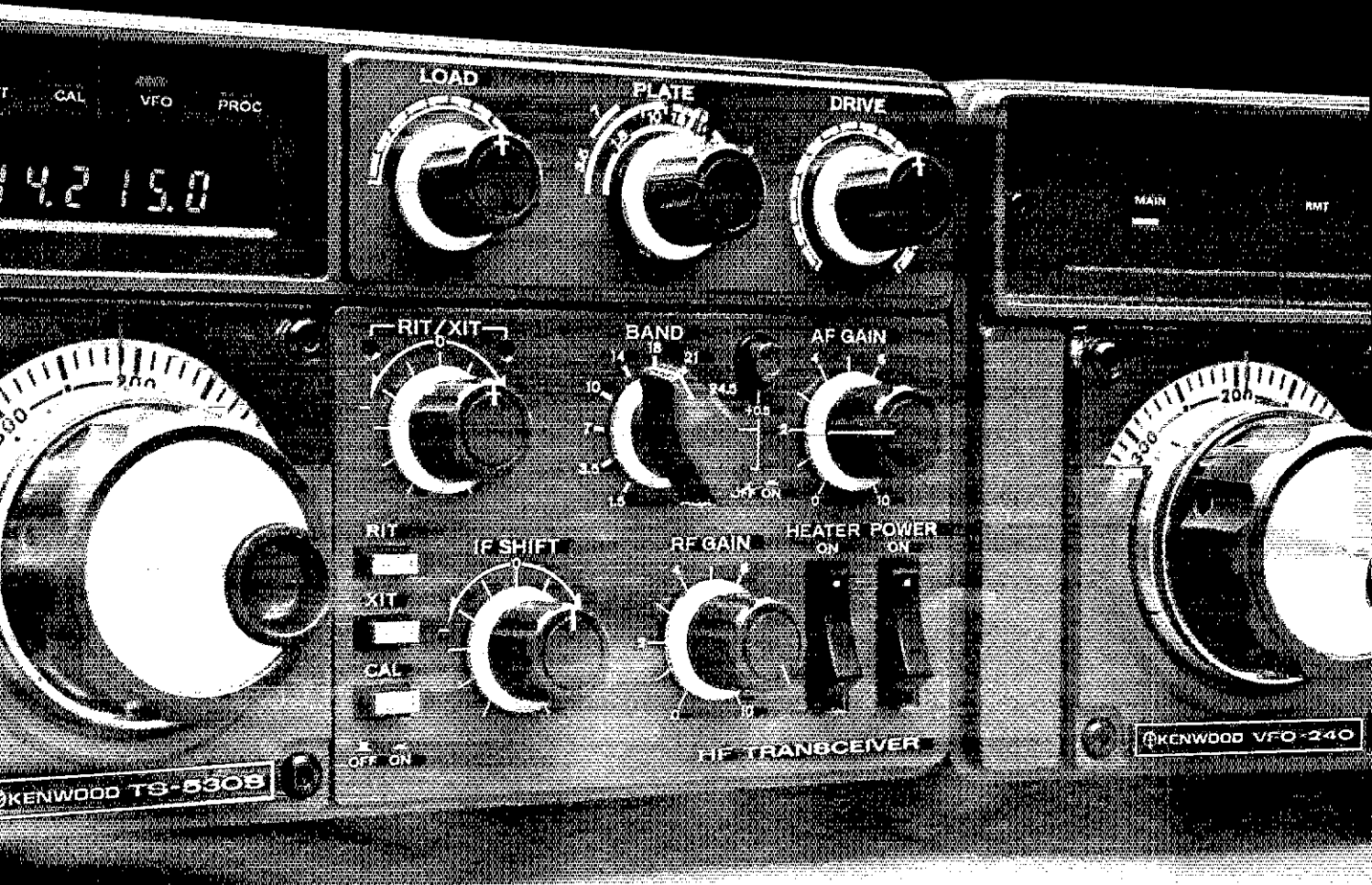

arrow-wide filter switch

Optional VFOs for flexibility
FO-240 allows split-frequency peration and other applications. FO-230 digital VFO operates in 0-Hz steps and includes five emories and a digital display.

RIT/XIT
ront-panel RIT (receiver incremental uning) shifts only the receiver fre- uency, for tuning in stations slightly ff frequency. XIT (transmitter ncremental tuning) shifts only the ransmitter frequency, for calling DX station listening off frequency.

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Matching accessories for fixed-station operation:

- SP-230 external speaker with selectable audio filters
- VFO-240 remote VFO
- AT-230 antenna tuner/SWR and power meter
- MC-50 desk microphone

Other accessories not shown:

- TL-922A linear amplifier
- SM-220 Station Monitor

- VFO-230 remote digital VFO with 20-Hz steps, five memories, digital display
- KB-1 deluxe VFO knob
- PC-1 phone patch
- HS-5 and HS-4 headphones
- HC-10 digital world clock
- YK-88C (500 Hz) and YK-88CN (270 Hz) CW filters and YK-88SN (1.8 kHz) SSB narrow filter
- MC-30S and MC-35S noise-canceling hand microphones

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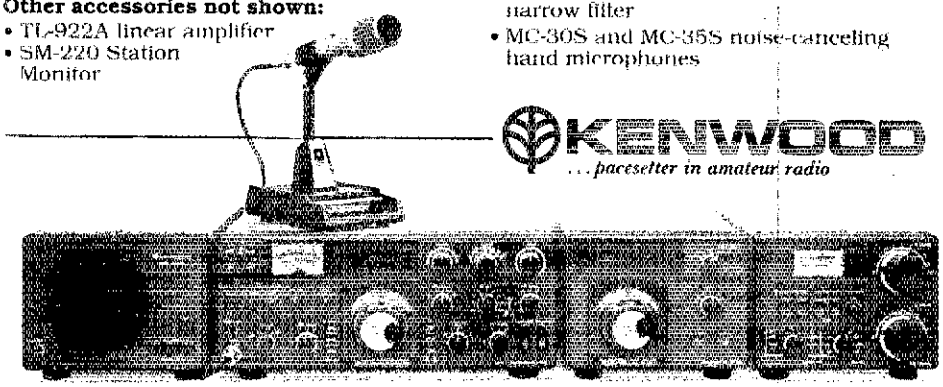

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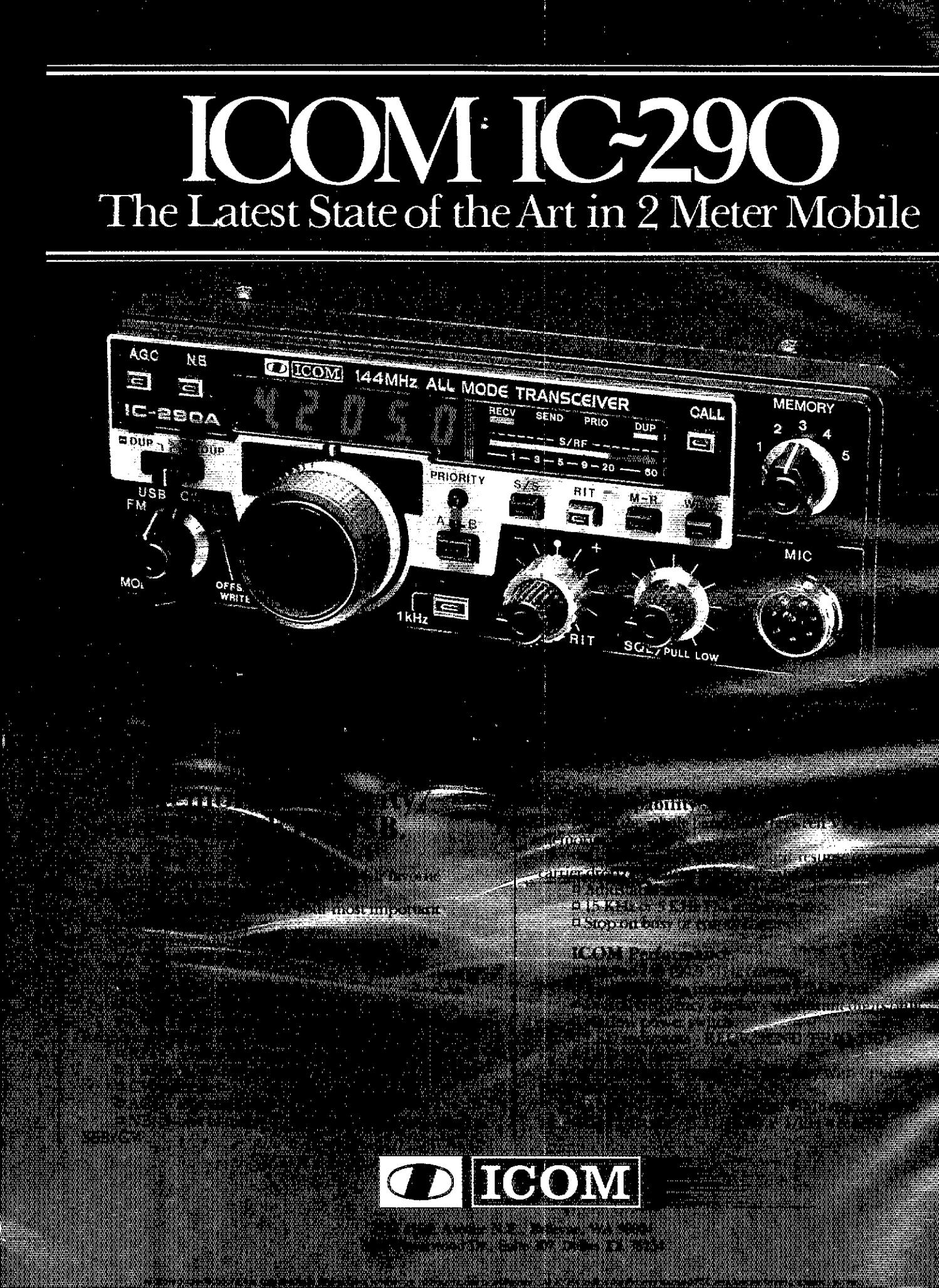

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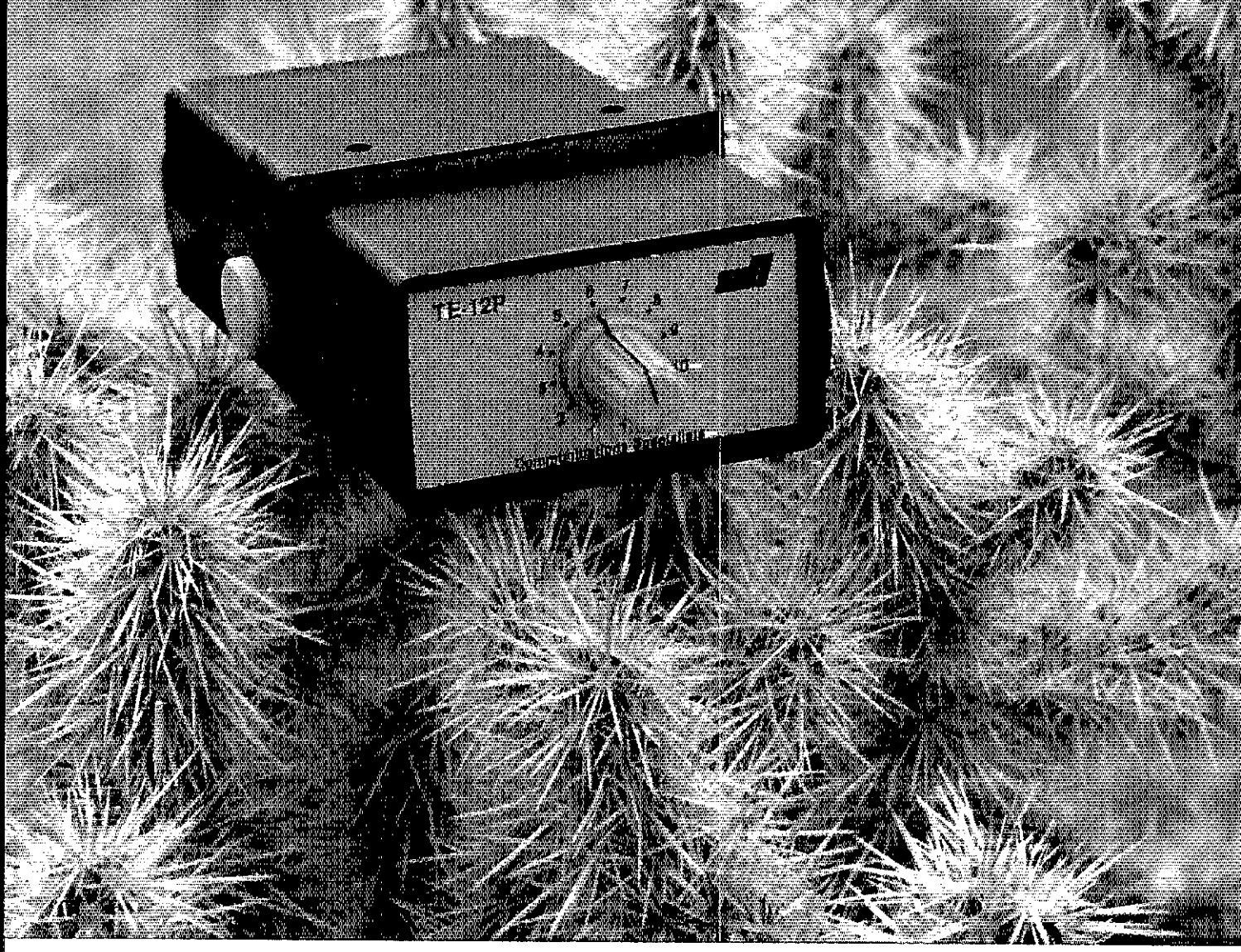

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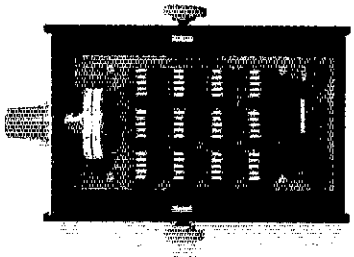

TE-12PA

67.0 XZ	85.4 YA	103.5 1A	127.3 3A	156.7 5A	192.8 7A
71.9 XA	88.5 YB	107.2 1B	131.8 3B	162.2 5B	203.5 M1
74.4 WA	91.5 ZZ	110.9 2Z	136.5 4Z	167.9 6Z	
77.0 XB	94.8 ZA	114.8 2A	141.3 4A	173.8 6A	
79.7 SP	97.4 ZB	118.8 2B	146.2 4B	179.9 6B	
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2805			1800	2100	2350	

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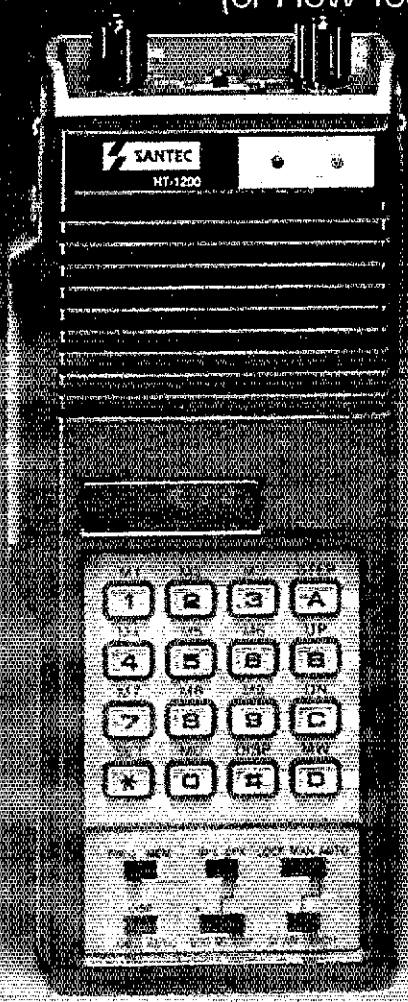

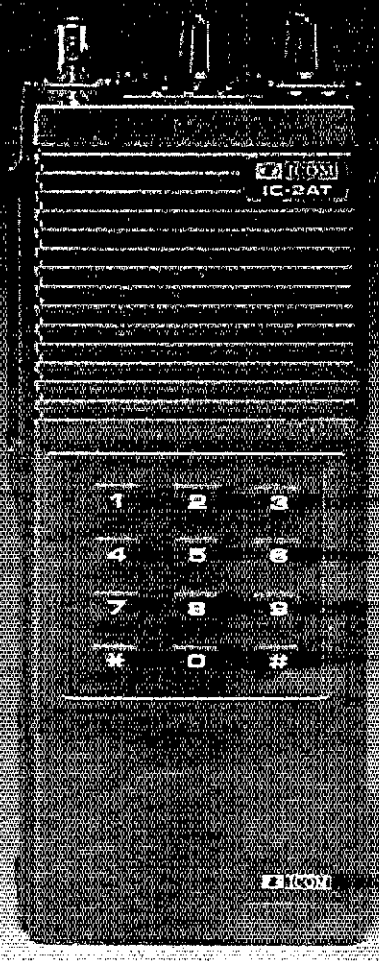

It's a little unfair to compare the features of the ICOM IC-2AT to those of the SANTEC HT-1200: the ICOM doesn't even claim to offer the big rig features that are packed into the SANTEC. This is really like comparing apples and oranges, but a quick match-up of features may surprise you if your biggest 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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	SANTEC HT-1200	ICOM IC-2AT
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SCAN	no charge	not available
SEARCH	no charge	not available
10 MEMORIES	no charge	not available
HIGH POWER 3.5W OUTPUT	no charge	$ 47.95*
CHARGER	no charge	$ 69.95**
TOTAL COST	$ 379.00	$ 387.85

* The IC-2AT requires a larger battery for 3.5W output

** The IC-2AT requires a special charger for the larger battery

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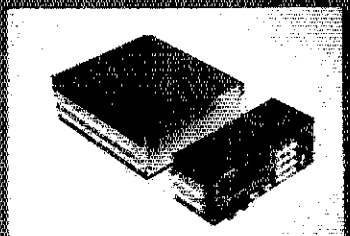

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- PROGRAMMABLE BAND SCAN: Any section of the band may be scanned in steps of 5 or 10 kHz. Scan limits are easily reprogrammed.
- DISCRIMINATOR SCAN CONTROL (AZDEN EXCLUSIVE PATENT): The scanner stops by sensing the channel center, so the unit always lands on the correct frequency. COMPARE this with other units that claim to scan in 5-kHz steps!
- THREE SCAN MODES WITH AUTO RESUME: "Sampling" mode pauses at busy channels, then resumes. "Busy mode stops at a busy channel, then resumes shortly after frequency clears. "Vacant" mode stops at a vacant channel and resumes when signal appears. If desired, auto resume may be prevented by pressing one button. COMPARE!
- REMOTABLE HEAD: The control head may be located as much as 15 feet away from the main unit using the optional connecting cable. COMPARE!
- PL TONE OSCILLATOR BUILT IN: Frequency is adjustable to access PL repeaters.
- MICROPHONE VOLUME/FREQ. CONTROL: Both functions may be adjusted from either the microphone or front panel.
- NON-STANDARD OFFSETS: Three accessory offsets can be obtained for CAP/MARS or unusual repeater splits. CAP and Air Force MARS splits are BUILT IN! COMPARE!
- 25 WATTS OUTPUT: Also 5 watts low power to conserve batteries in portable use.
- GREEN FREQUENCY DISPLAY: Frequency numerals are green LEDs for superior visibility.
- RECEIVER OFFSET: A channel lock switch allows monitoring of the repeater input frequency. COMPARE!
- SUPERIOR RECEIVER: Sensitivity is better than 0.28 uV for 20-dB quieting and 0.19 uV for 12-dB SINAD. The squelch sensitivity is superb, requiring less than 0.1 uV to open. The receiver audio circuits are designed for maximum intelligibility and fidelity. COMPARE!
- ILLUMINATED KEYBOARD: Keyboard backlighting allows it to be seen at night.
- TRUE FM, NOT PHASE MODULATION: Transmitted audio quality is optimized by the same high standard of design and construction as is found in the receiver. The microphone amplifier and compression circuits offer intelligibility second to none.
- OTHER FEATURES: Dynamic microphone, built-in speaker, mobile mounting bracket, external remote speaker jack (head and radio) and much, much more. All cords, plugs, fuses, microphone hanger etc. included. Weight: 6 lbs.
- ACCESSORIES: CS-ECK 15-foot remote cable . . . **$39.95**, CS-6R 6-amp ac power supply . . . $59.95, CS-AS remote speaker . . . $18.00, CS-TTK touch-tone* microphone kit (wired and tested) . . . **$45.00**.

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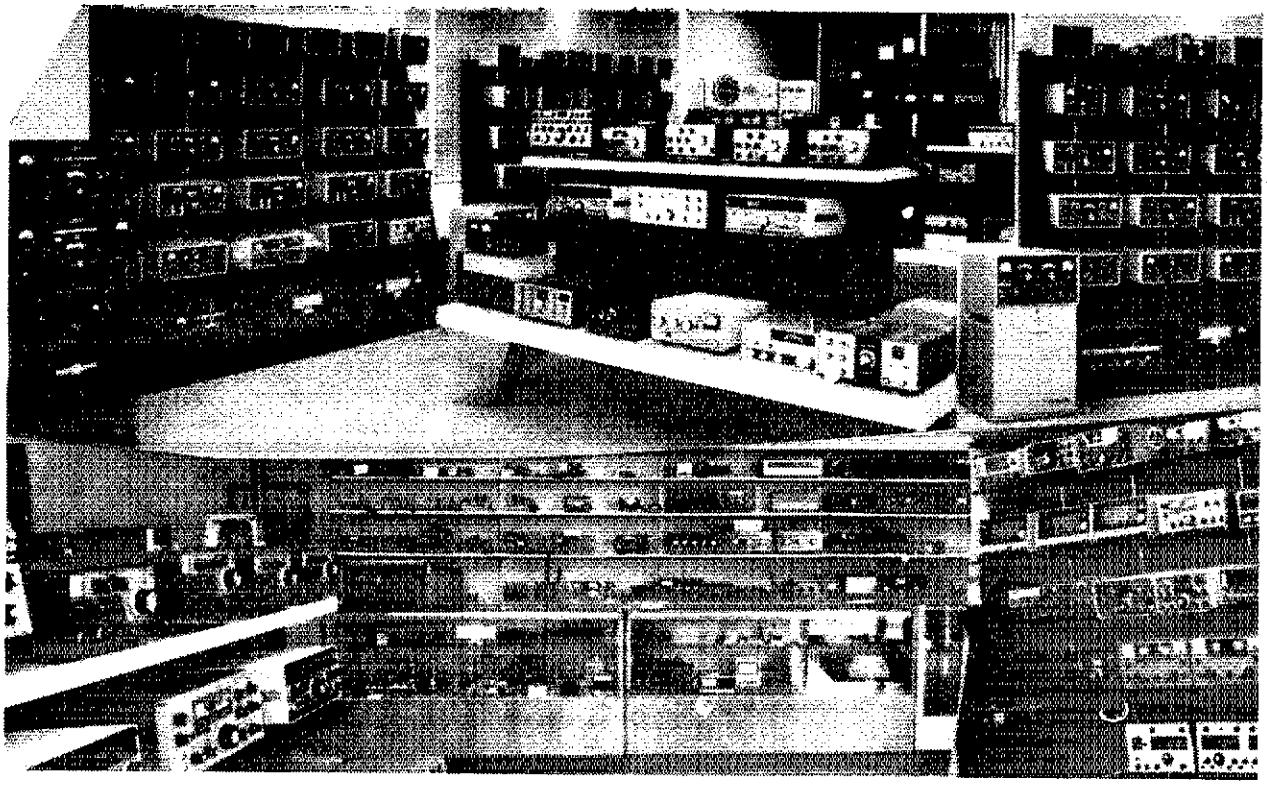

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The 2ATouch

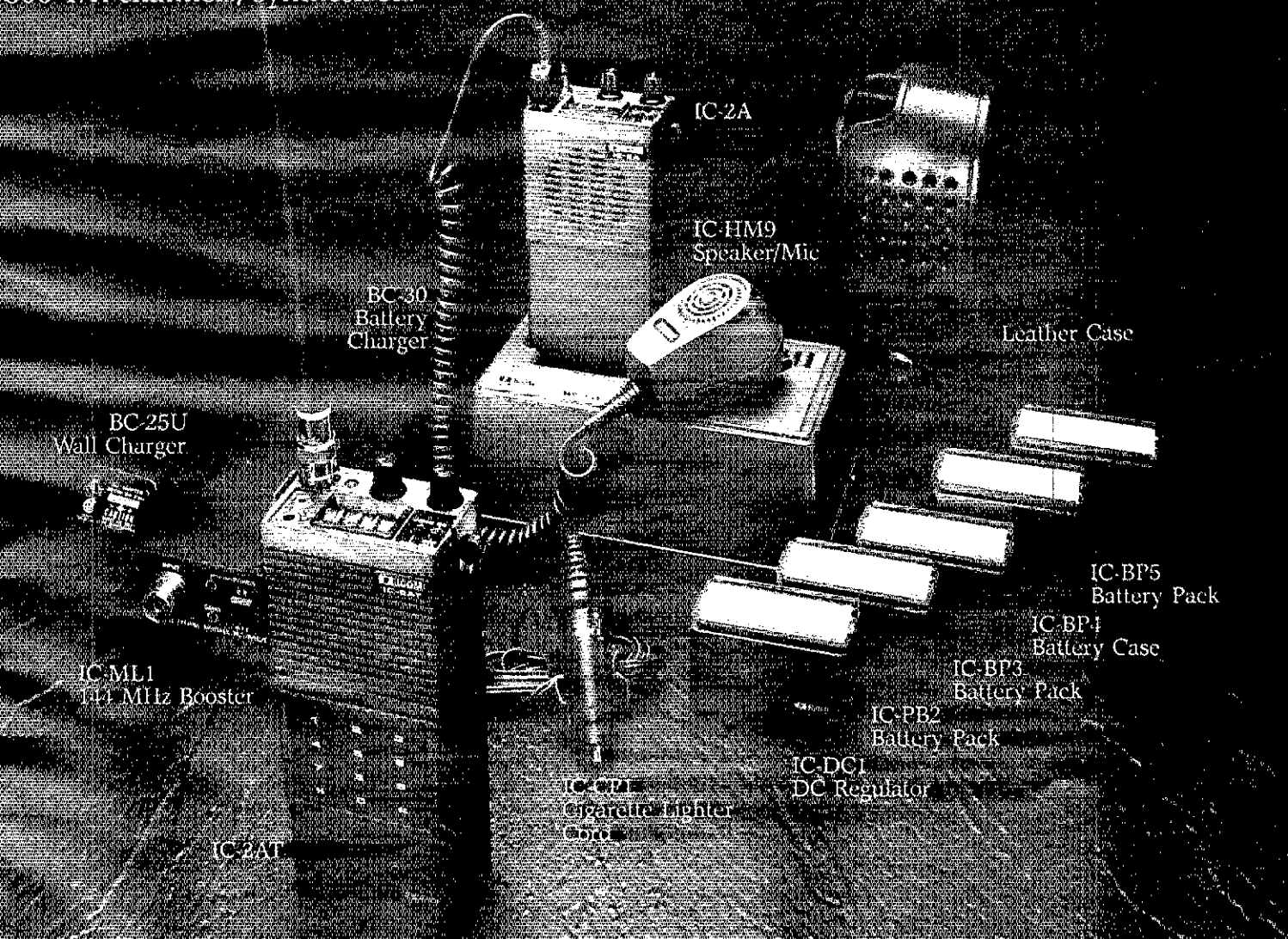
ICOM's Extremely Popular Hand-Held System

ICOM's reliable, field-proven IC-2A/2AT series has become the most successful hand-held on the market. Here are a few reasons why:

High versatility: 3 sizes of battery packs easily slide on and off (providing other power outputs and operating cycles). Extremely compact. Fits in the palm of your hand . . . only 2.6 in x 1.4 in x 6.5 in. 800 T/R channels, synthesized.

Excellent audio quality: Separate speaker and mic built in. Output power: 1.5 watts high (with BP3), .15 watt (battery-saving) low. Touch Tone® Pad (2AT only).

Each IC-2A and IC2AT comes complete with BP3 NiCd pak, AC wall charger, flexible antenna, earphone, wrist strap, and belt clip . . . all standard, at no extra cost.



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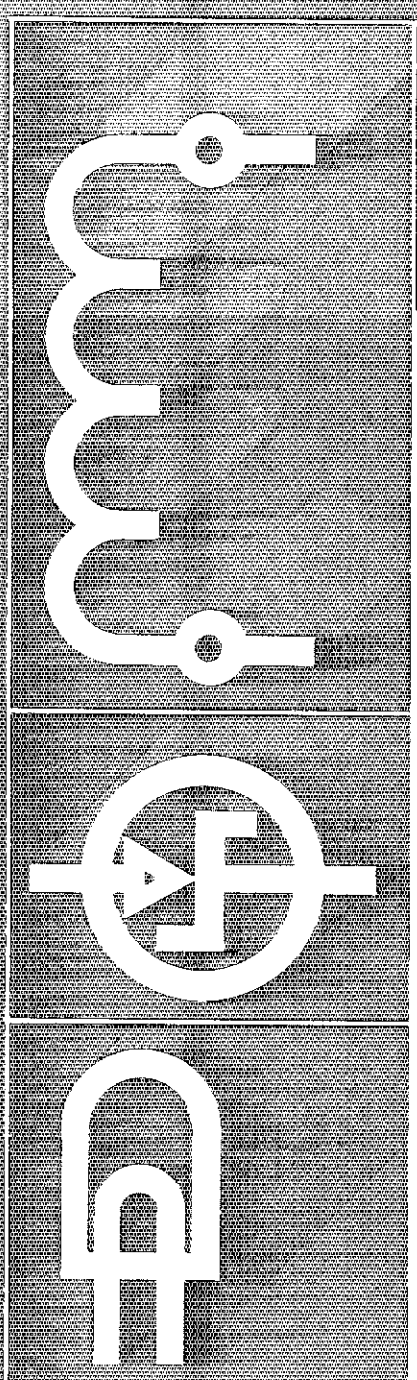
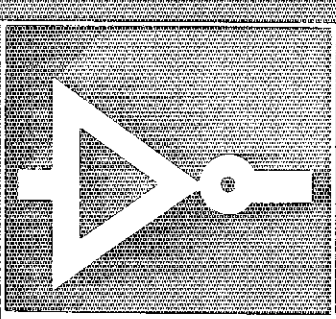
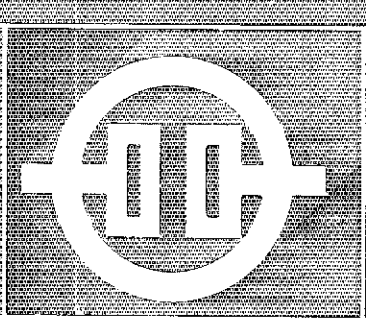
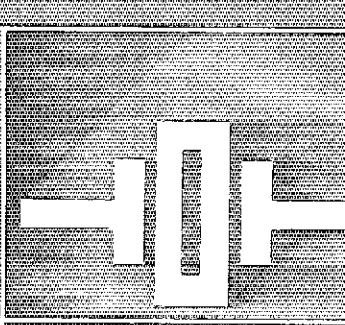
UNDERSTANDING AMATEUR RADIO

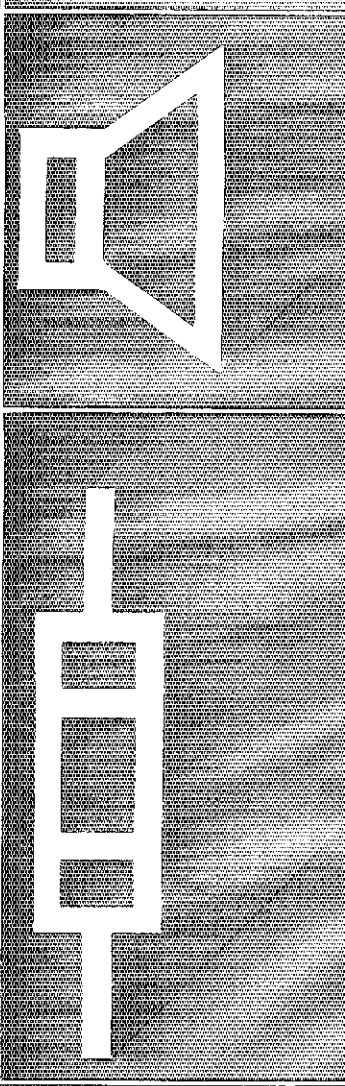
Principles Construction











If you're a relative newcomer to Amateur Radio, then this book is just what you need. Some of the topics of interest to the beginner are:

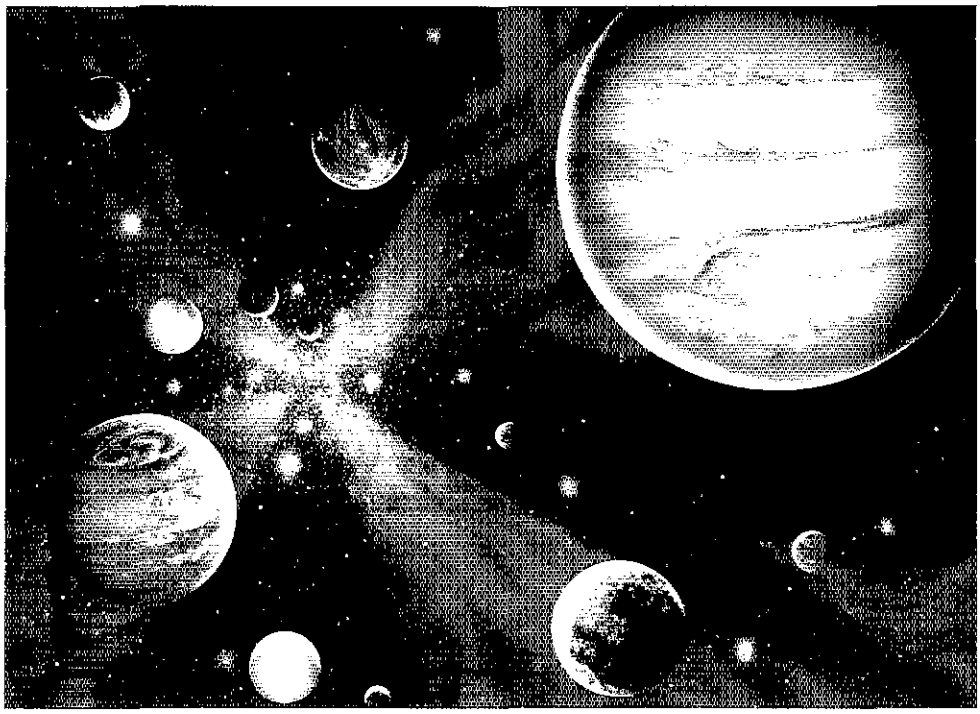
- HOW TO SOLDER
- HOW TO USE A VOM
- THEORY NEEDED FOR THE TECHNICIAN/GENERAL FCC EXAM
- HOW TO USE A TRANSMATCH
- HOW TRANSMITTERS AND RECEIVERS WORK

The more experienced amateur will find:

- HOW TO TROUBLESHOOT YOUR EQUIPMENT
- WHERE TO BUY COMPONENTS
- HOW TO BUILD USEFUL ACCESSORIES
- REVIEW OF ELECTRONIC BASICS

This book has 217 pages of text. It is available at your dealer or directly from ARRL. (Use the handy order form elsewhere in this issue.) Price is $5.00 in the U.S. and $5.50 elsewhere in U.S. funds.

PUBLISHED BY THE AMERICAN RADIO RELAY LEAGUE



Rickerson Returns

A print by a famous American space-age artist offers you a chance to help launch the AMSAT satellite.

The response was great. A few months ago JS&A offered a limited edition print by American artist, Mark Rickerson, in a similar style to the print shown above.

THE SUCCESS

There were only 300 prints available. Although we expected to get more orders than we had prints, we did not expect the several thousand responses we eventually received.

THE FAILURE

Another famous program, however, was not successful. A satellite, built by world amateur radio operators in 1980 and placed on a European rocket, crashed into the ocean almost immediately after take-off. The AMSAT satellite and the rocket were lost, along with the hopes of amateurs who had worked for years building their satellite.

The JS&A program was a success. But JS&A's program and the AMSAT failure have something in common—a great opportunity for the public. Let us explain.

AMSAT was a private venture based strictly on donations. No government money was used. In addition to the thousands of man hours contributed by amateurs world-wide, there was a total of $250,000 raised to buy materials.

Why do amateurs even need a satellite? Amateurs or ham radio operators (not to be confused with citizen band operators) are always the first on a scene in a major disaster. During the Italian earthquake, for example, amateurs were first to direct relief efforts.

But occasionally a disturbance in the ionosphere will interrupt this communication and render all radio communications inoperative, as was the case in the Alaskan earthquake. That's only one of the many reasons for AMSAT—positive communications in times of emergencies and not dependent on the ionosphere. JS&A thinks the venture deserves the support of all Americans, and we are providing our full financial and creative support to a program to help raise funds to build and launch a new AMSAT satellite.

THE PROGRAM

JS&A commissioned Mark Rickerson to paint "AMSAT"—a painting to be used exclusively for this space effort. From this painting, JS&A has arranged with Rickerson to produce limited edition prints signed by the artist. JS&A will contribute all prints and the full costs to produce these prints to the program. Only the cost to run the advertisement in a magazine will be covered by the initial proceeds.

Each print has a 26" x 35" image size on a 34" x 42" piece of museum-quality PH balanced 100% rag content paper. The print will be shipped in a well-protected circular cardboard double container. Your contribution of $300 will also entitle you to a handsome certificate suitable for framing to acknowledge your active participation in the new AMSAT launch. A certificate of authenticity will also accompany the print should you wish to sell or donate it to someone in the future.

Each color of this multi-colored painting will be faithfully reproduced in a special collotype process utilizing a continuous tone printing process, several printing plates and the artist's supervision and approval to provide an almost three dimensional reproduction.

Dr. Tom Clark, a NASA scientist and president of the AMSAT organization, says, "We need the cooperation of the American citizen to make this program a success. I urge all Americans to participate. Not only is the reproduction a beautiful piece of art, but the contribution is to a very worthwhile cause. In addition to its use during emergencies, we will be using AMSAT for educational purposes to train many of the potential young scientists in our country."

The edition will be limited to those who subscribe before the deadline date of June 30, 1981. The publication you are reading has helped us in this program by giving us a good position in their magazine and allowing us every available discount to keep the expense of this program low.

To order, send your check or money order for **$300** made payable to AMSAT to Dept.QT, JS&A Group, Inc., One JS&A Plaza, Northbrook, Illinois 60062. If for any reason you are not satisfied with your print, you may return it anytime this year for a prompt and courteous refund.

JS&A had a success with its limited edition print program earlier this year. The AMSAT program suffered a failure. Why not join with us to make their launch a huge success? Order your Rickerson AMSAT print, today.

JS&A

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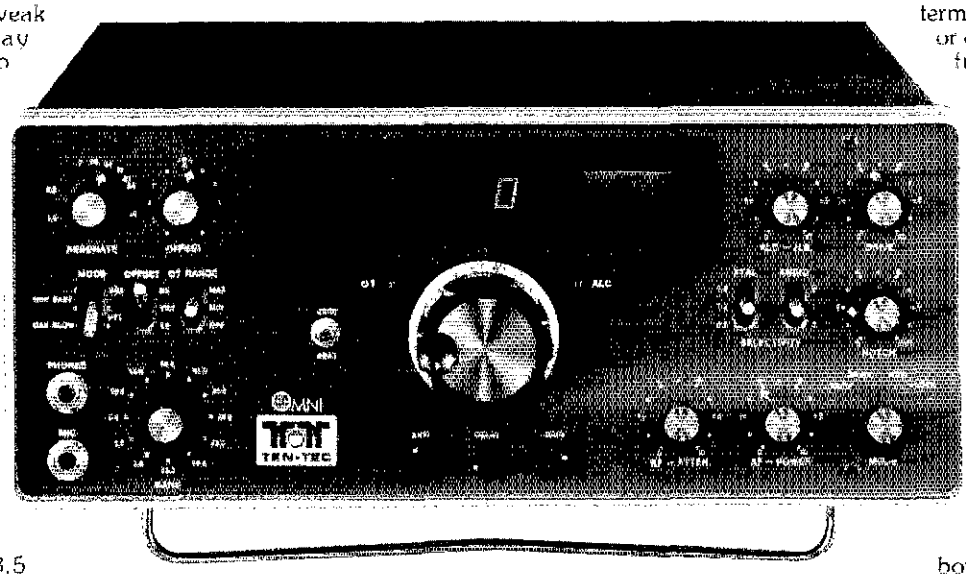
Northbrook, Ill. 60062 (312) 564-7000

The Rig That Filters The Crowd



TEN-TEC OMNI-C

OMNI-C has what it takes to filter the crowds. To narrow the Amateur Radio world right down to the particular signal you want. The selectivity, sensitivity, dynamic range and operational features you need to cut any crowd down to size.

Tailored i-f response. OMNI is equipped with the potential for ***seven*** response curves to handle any listening situation.

Standard filters include an excellent 8-pole 2.4 kHz crystal ladder filter and, in addition, a 150 Hz active audio cw filter with three ranges (450, 300, 150 Hz).

Optional filters include 1.8 kHz 8-pole crystal ladder ssb filter, 500 Hz 8-pole cw filter, and 250 Hz 6-pole cw filter.

Front panel switches put any optional filter in series with the standard filter for up to ***16 poles of filtering*** for near ultimate skirt selectivity.

Four i-f response curves for ssb and three for cw. That's response tailoring, that's crowd control.

Optimized sensitivity and dynamic range. The OMNI sensitivity range of 0.3 μV typical (slightly less on 160 & 80M) combines with a 90 dB dynamic range to provide an ideal balance that will handle any situation from copying a weak signal half way 'round the world to keeping the next-door kilowatt from muscling in. And a PIN diode switched 18 dB attenuator is included for extra insurance against overload.

More crowd-handling features—and all standard equipment.

Built-in notch filter. To drop out unwanted signals or carriers. Tunable from 200 Hz to 3.5 kHz, with a 50 dB notch depth.

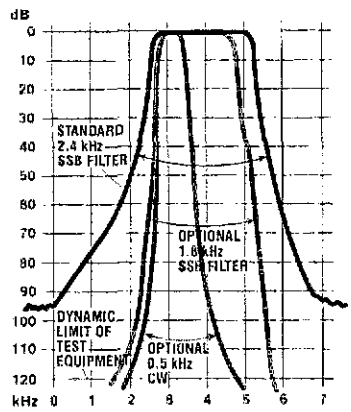
3-mode, 2-range offset tuning. To put you where the others aren't and where the elusive DX is. Move just the OMNI receiver, or just the transmitter section, or the entire transceiver, +500 Hz or ±4 kHz. For complete freedom of frequency movement to get away from the crowds.

Built-in noise blanker for those times when your noise-generating neighbor is crowding your receiver. Filtered to handle the big signals easily.

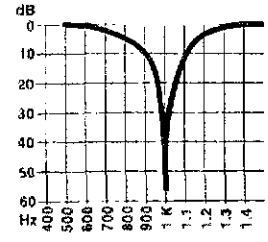
2-speed break-in. When QRM or QRN is heavy, switch to "Slow." Use "Fast" for instant, full break-in for enjoyable rag-chews or stalking DX.

OMNI-C features stand out in any crowd.

All solid-state—from the pioneer, Ten-Tec.



OMNI/SERIES C I-F RESPONSES WITH STANDARD AND OPTIONAL FILTERS.



NOTCH FILTER PERFORMANCE ADJUSTED TO 1 kHz POINT.

All 9 hf bands—only crystals are needed for 18 and 24.5 MHz bands.

Broadband design for instant band change without tune-up or danger of damage to the final amplifier. Another Ten-Tec *onginal*.

"Hang" AGC for smoother action.

WWV reception on the 10 MHz band.

Digital readout in two colors, red for the 5 significant places, green for the 6th digit (100 Hz). Instant recognition.

Separate receiving antenna capability. Switch receiver to a common antenna for transceive or separate receive-only antenna; the system also acts as receiving antenna by-pass with an instant break-in linear amplifier or transverter.

"S"/SWR meter, electronically switched.

200 watts input, all bands, with 50-ohm load. 5 year pro-rata warranty.

100% duty cycle on all bands up to 20 minutes. Full RTTY and SSTV power.

Built-in VOX and PTT with front panel controls.

Built-in phone patch jacks for easy interface.

Built-in zero-beat switch for spotting the exact frequency of a DX station.

Built-in adjustable sidetone volume and pitch.

Adjustable threshold ALC, optimum power for driving a linear. Provides means of working into a high SWR.

Front panel control of linear or antenna. The rear panel bandswitch terminals control relays or circuits in step with front panel bandswitch.

Automatic sideband selection plus reverse.

Low distortion audio, less than 2%; a Ten-Tec trademark.

Clean signal, exceeding FCC requirements.

High stability over wide temperature and voltage excursions.

Built-in speaker, compression-loaded; in bottom of cabinet.

Plug-in circuit boards for fast easy service.

12-14V dc power for easy mobile use.

Full complement of accessories:

Model 280 Dual Primary AC Power Supply, $169; Model 255 Deluxe Power Supply/Speaker Combo, $199; Model 243 Remote VFO, $189; Model 215 PC Microphone, $29.50; Model 214/234 Microphone/Speech processor, $39/$139; Model 645 Dual Paddle Keyer, $85; Model 670 Single Paddle Keyer, $39; Model 227 Antenna Tuner, $79; Filters $55 ea.

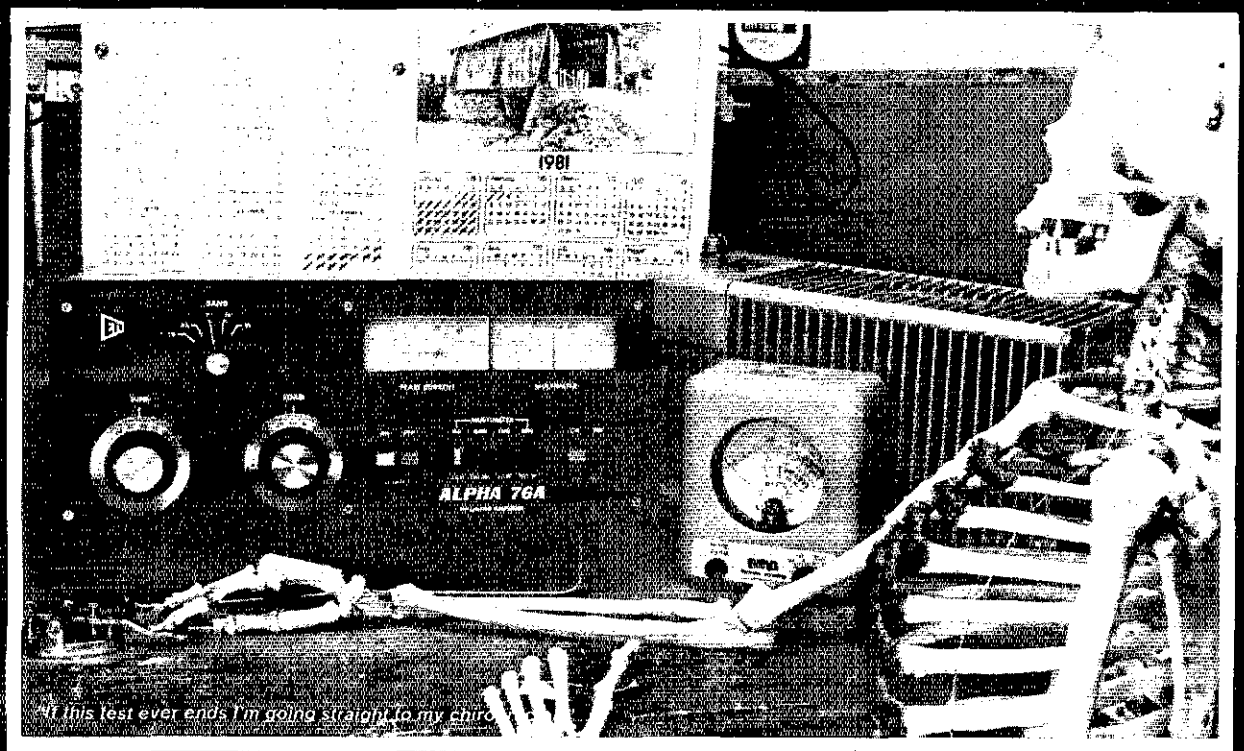
Made in the U.S.A.

Model 546 OMNI-C transceiver $1289

Get out of the crowds with OMNI-C. See your TEN-TEC dealer or write for details.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

Key Down # How Long?



Nine Hundred Consecutive Hours At A Full Kilowatt!

It couldn't be anything but...

Back in 1977 we ran an ***ALPHA 76*** for eighteen days with a brick on the key at a full kilowatt. To emphasize that ***ALPHAs*** keep getting even better, we recently fired up a new ***ALPHA 76A*** at maximum legal power ***and let it operate twice as long*** —more than 37 days—900-plus hours!

WHAT MAKES AN ***ALPHA*** SO GOOD THAT WE DARE WARRANT IT FOR EIGHT TIMES AS LONG AS OTHER LINEARS, SPECIFY "NO TIME LIMIT" AT FULL RATED POWER, AND CONFIDENTLY PUT A "BRICK ON THE KEY" FOR HUNDREDS OF HOURS? Above all, such spectacular durability depends upon a truly rugged transformer and excellent cooling.

ALPHA TRANSFORMERS ARE LEGENDARY. Every one is designed and built to handle full rated power ***CCS*** - in practical effect, forever. As ETO's remarkable two year factory (limited) warranty suggests, they virtually ***never*** fail.

Alpha!

A FIVE YEAR TRANSFORMER WARRANTY? Yep. The Hipersil® transformer design used in ***ALPHA*** models ***76CA, 78,*** and ***77Dx*** is so tough that we've extended the warranty on transformers in those specific models to five years!

SUPERB COOLING DESIGN IS ANOTHER ***ALPHA*** TRADITION. ***AMATEUR RADIO PROFILES,*** the new "Consumer Reports" type publication, says, "... the ***(ALPHA)*** 76A possess(es) perhaps the best cooling system yet encountered. After prolonged use, the amplifier is barely warm to the touch ... ambient noise is barely audible."

ARP adds, "Service is spectacular ... Alpha gives a full 24 months (warranty) ... evidence that they really stand behind their product!!" And the editor of a prominent DX newsletter recently cited ***ALPHA*** amplifiers as notable examples of equipment ***designed by experienced operators for real-world use.***

It's been said that forethought is the only sure cure for buyer's remorse. We couldn't put it better. Every ***ALPHA*** linear amplifier is meticulously engineered and built to handle continuous operation in any mode, at maximum legal power, with no time limit. The factory warranty protects you for years, not months. Isn't that food for forethought?

Ehrhorn Technological Operations, Inc.
Box 708/Canon City, CO 81212
(303) 275-1613

MONTANA: SCM, Les Belvea, N7AIK — I would like to give many thanks to Bob Leo, W7LR, for serving as SCM for the past five years. He has consented to remain as SEC, so, all ECs, please report to him. We seem to be lacking an EC for the Flathead and Madison County areas, care to step forward? With fine efforts of WB7TWG and WB7TYN, there are five new Novices in and around Billings — KA7JMV KA7JMW KA7JON KA7JOO and KA7JMU — four of these are YLs. New calls from Butte, WA7LSF now KB7SE, WB7UKK now KB7SF, congrats. KB7Q reports that his 6-meter rig is kaput, so he and KB7BJ are constructing an EME station and hope to have the antennas built by contest time. WA7JXN going strong on EME bounce from Frenchtown. KA7DLC and WA7IZR going great guns on OSCAR. The Treasure State Chapter No. 104 of QCWA held spring meeting in Missoula, March 22nd, with 33 in attendance. K7ECF very active on 2 meters. Net reports: MTN QNI 12, INM 2, DRN7 8, BSN 247. Traffic: WB7UTJ 9, WB7AZJ 6, W7LBK 5, W7JMX 4.

OREGON: SCM, William R. Shrader, W7QMU — SEC: K7WWG. STM: W7VSE. Section nets:

Net	Time/Day	Freq.	QNI	QTC	NM
BSN	0145Z Dy	3908	869	37	K7WPC
OSN	0230/0600 Dy	3587	494	447	KB7JW
OARES	0115Z Dy	3993.5	442	174	W7HLF
OARES	0230Z Dy	3993.5	252	33	W7HLF
WCN	0300Z Dy	3706	347	161	K7ZIG
PTTN	0300Z Dy	147.76	623	150	W7LRB
PdxARES	0330Z Dy	147.32	1011	37	K7WWR
LBLARES	0330Z Dy	146.79	874	14	WB7QQH
SOARES	0315Z Thur/Sat	146.94	205	59	KA7DBS
SOFM	0230Z Tues	146.64	126	5	W7FDU
MPARES	0300Z Tue/Thur	147.02	No rpt.		WA7ZAF

Congratulations to KA7CPP on upgrade to Gen. K7OOZ put on superb astronomy program for OTVARC Mar. meeting. Those interested in astronomy should check net on 3930 MHz Sunday nite at 10 P.M. PST or Wed. nite at 8 P.M. PST. Grants Pass ARES members actively building about 20 tone alert modules for use in emergency call-ups. Columbia Co. ARES active with 23 members. New DXCC for KB7MP. BSN picnic 15 August at Armitage State Park. Traffic: W7VSE 591, KB7JW 410, W7LRB 382, K7NTS 194, W7LNE 189, WB7OEX 188, WA7LGN 145, W7TC 101, WA7IHS 70, WA7WBE 67, W7QMU 64, K7IWD 50, KA7CZG 39, W7HLF 28, W7DAN 18, W7FDU 18, KA7DBS 15, K7WWR 15, K7IFG 14, W7LT 6. (Feb.) W7DAN 22.

WASHINGTON: SCM, Bob Klepper, W7IEU — SEC: WA7RWK. STM: W7DZX.

Net	Time(z)	Freq.	QNI	QTC	Mgr.
NTN	1830	3970	1007	72	K7AJT
WARTS	0100	3970	3154	196	W7EQY
NWSSBN	0130	3945	685	52	W7ZPK
WSN	0145/0445	3590	524	228	77GB
EWTN	0030/0430	146.64	165	80	WA7CBN
IETN	0030/0200	147.30	224	83	KA7CSP
PSTS	0030/0530	145.33	175	129	W7IEU
SCARES/NE	0230 Tues	147.18	64	5	W7ERH

Sorry to report that W7KS and WA7FKK have become SKs. WSN Mgr. W7GB, says to dust off those keys and mark Labor Day, Sept. 7, on your calendar for the start of PTN (Pacific Coast Training Net) on 3720 kHz at 6:15-6:45 PDT, Mon, at 8 wpm, Wed. at 10 wpm and Fri. at 13 wpm. I will help Don with this project and we hope we can get some of you interested in cw traffic handling along with the Novices and Technicians we hope to pick up. KA7ELX rcvd his WAS award. KA7ELT is new activity chairman for Chehalis Valley ARS. LCARA has 20 students in Novice class taught by WB7PEI and KA7HWE. KA7CRO has upgraded. W7ZXM discussed problems of radio communications in emergencies at North Seattle ARC meeting. WWDX Club secy, W7FCB, has suggested the club promote ham radio by setting up demo stns in shopping centers. How about FD out in the open where the people can see us? HAMS Club will operate club stn, WA7LAW, in Marysville City Park during FD with 2 QRP rigs. WB7VSZ and Spokane ARES members provided communications for 5 mile run sponsored by Spokane Chapter Red Cross. N7AEP W7GOF and WB7SEV are handling traffic between the still ice bound Polar Sea crew and their families, K76CGO is the op aboard the ice breaker. WA7TWB reports KA7BSS KA7GBJ WB7WNL KA7AVC and KA7AXF have upgraded. KA7IVQ back from trip should be active after putting up new antenna system. KB7G reports 80-meter antenna down. Want to know more about Intruder Watch? Contact W7JIE about a program for your club. New editor of Skagit Static is W7JGM assisted by KA7ACY. KA7DSB reports George Washington birthday celebration a success in the Mt Vernon area. WA7RCR busy building a shop and greenhouse. WB7FGC has new Clipperton L for cutting through the QRM Traffic: (Mar.) W7DZX 751, WB7TQF 579, WB7WOW 579, W7FJZ 268, K7GXZ 239, K7CTP 154, AD7G 137, W7IEU 111, N7AFZ 100 WA7BDD 100 KE7I 84, W7GB 78, KA7CSP 54, N7AFY 44, W7BUN 36, WA7RCR 22, WA7OJI 21, W7LG 8, W7APS 7, W7ERH 7, N6?CT 4, KA7AWH 2, K7RBT 2. (Feb.) KA7IVQ 4.

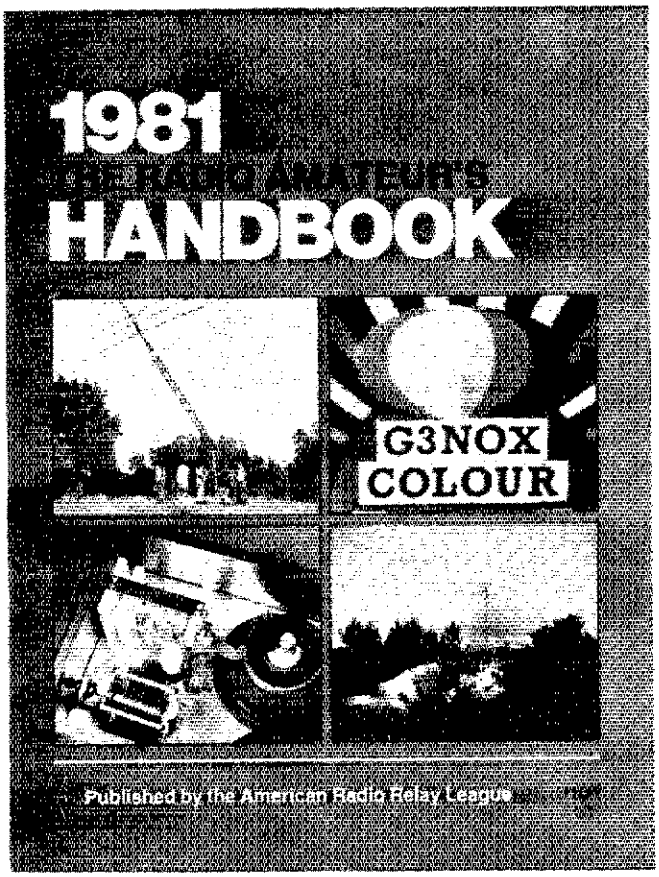
PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — Asst SCMs: W6ZF VE2AQV/W6. SEC: WB6KQU. N6RO & KN6M big NCCC multi-multi stations in the section during DX tests. N6NE has his 4-1000 on the air. WA6JVZ cleaned his shack and found his gear still there! Alameda County RACES welcomed new members N6BDR N6BEW & KA6DYQ. They meet 1st & 3rd Mon, 2700 Fairmont Dr., San Leandro, 7:30 P.M.; 147.84/.24 for info. OOs K6ARE N6NE & N6OP active. EBARC installed 2-meter and ht vertical antennas at their Salvation Army Hq station. LARK members meeting at the Valley Memorial Hospital. AD6D/RPT now up on 145.43 at Sandia Labs, dedicated to RACES use. MDARC mourns the loss of member W6APP to cancer. WB6TEE has replaced departing WA6TXM as vp. SBARA reminds one and all that their net still exists on 28.700 at 7:30 P.M. Sun. KA6OIX recently obtained Novice license. I wish to apologize to the many friends of W6JXK for the misprint of his call which appeared in my Jan. column. Traffic: (Mar.) W6OA 29, WA6JVZ 6, KA6ERF 3. (Feb.) N6RO 2.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. WD8OUL welcomed to Las Vegas. LVRAC had good support to provide comms for the March of Dimes Super Walk. WN6LJG was chairman. K7SN and KB7OX are chairmen for LVRAC Field Day '81. AD7K gave a fine presentation on contesting at the April meeting. Looking to the north, WADG's 63/03 machine is now high level on Genoa Peak. WA7EGV now active on 2-meter fm. Congrats to W7XZ for completion of 160-meter WAS. Correction to previous column in that KA7Q has completed 5BWAS. Sorry for error. Many thanks to W7UIZ for

1981 EDITION

NOW IN ITS SECOND PRINTING



We underestimated the demand for the 1981 *Radio Amateur's Handbook*, and we are back on press for a second printing. You won't find any changes between the first and second printings, but you will notice *big* changes in comparing the 1981 edition with the 1980 *Handbook*. Here is a partial list of additions to the 1981 *Handbook*:

- 600 MHz Frequency Counter
- Link-Coupled Transmatch
- Modulated RX Noise Bridge
- 50-75 ohm broadband transformer
- Foldover tower
- 12-volt, 30 amp regulated supply
- Economy 1.2-15 volt 5 amp Bench Supply
- NBS design charts for 50-432 MHz Yagi Antennas
- Table of optimum guy-wire lengths
- Amateur ASCII and Baudot technical standards and definitions
- Noise figure/temperature definitions and conversions
- New inductance formulas (for strip lines, etc.)
- Transmitting tube cooling specifications and blower information
- Table of phasing line lengths for vhf/uhf arrays
- Updated propagation information
- IC op amp and TV sweep tube charts
- Ferrite toroid electrical and mechanical cross reference
- Digital logic family compatibility chart and interface circuits
- PIN diode QSK system
- Modern Band-Edge Marker
- Buffered Morse Keyboard
- Antenna/Preamp system for EME
- 50 and 432 MHz Yagis
- 50 MHz kw linear amplifier
- Lightweight portable HF Antennas

There are also more template drawings for a variety of circuit boards, plus revised chapters on Solid State Fundamentals; Power Supplies; VHF and UHF Transmitting; Mobile, Portable and Emergency Equipment; Code Transmission; Specialized Communications Techniques; Test Equipment and Measurements; HF Antennas; and Vacuum Tubes and Semiconductors.

The price of the paper edition is $10 in the U.S. and possessions, $11 in Canada, and $12.50 elsewhere. The clothbound edition is $15.75 in the U.S. and Possessions and $18 elsewhere.

The 1981 *Handbook* is available at your radio store or from:

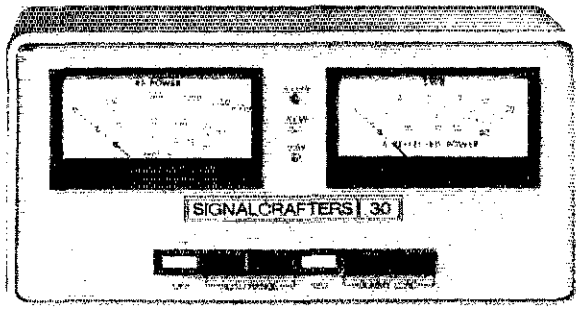
The American Radio Relay League, Inc.
225 Main Street
Newington, CT 06111

If You Use An Antenna Tuner—You Need A

SIGNALCRAFTERS®
Automatic Computing Power Meter

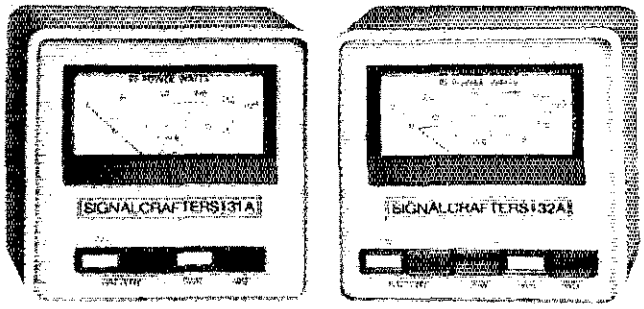
• Automatic SWR Reading • Precision Power Measurement

We all know that antenna tuners can be "tricky." You need the Signalcrafters Automatic Computing Power Meter for fast and accurate tune-up. No other system of SWR measurement will provide the accurate and direct readout of SWR that you need when adjusting your tuner for optimum match to the transmitter and antenna—without the necessity of "sensitivity control" adjustments. And you obtain highly accurate forward power measurements too, both peak and average.



The Model 30 SWR/POWER METER dual display unit. Both Power and SWR are handled automatically. Auto-ranging automatically selects the proper power range according to the level detected on the transmission line and indicates the range on front panel LED's. Operator can override this feature if desired by selecting any of the three basic ranges manually. Two large taut-band meters indicate forward power and SWR. Complete hands-off operation! And there is more! Self-indicating front panel push-buttons allow antenna selection as well. Full scale accuracy is ±6% at 1 to 1 SWR. Selection of three antennas and a dummy load is possible. Accessory jack on rear panel provides 12 volts 60 Hz AC for any remote antenna relays. (Operates from 110 volts 60 Hz AC.) Width: 8½", Height: 4¼", Depth: 6".

Model 30 (less coupler) **$250.00**



The Models 31 and 32 are both single meter units — each in a class by itself. They are portable battery operated micro power instruments. A single meter displays either SWR or POWER as desired. The Model 31 has a single power range. The Model 32 features dual power ranges and both have an instant battery check feature. Both models perform with the same accuracy and precision as the Model 30 and an advanced low current design provides battery life that is truly outstanding. The units operate from a standard, easily available, 9-volt battery which is included or can be operated from a standard 110 volts 60 Hz AC to 9 volts DC adapter (available as an optional unit). Width: 4½", Height: 4½", Depth: 5".

Model 31 (31A—0 to 200W) (less coupler) **$175.00**

Model 32 (32A—0 to 200W, 0 to 2000W) (less coupler)
(32B—0 to 20W, 0 to 200W) (less coupler) **$200.00**

SIGNALCRAFTER DIRECTIONAL COUPLERS

MODEL HF 231 (1.8 to 30 mHz) for use with 50 ohm coaxial cable. Less than 1.05 dB insertion SWR (max.) Equipped with two SO-239 UHF connectors (1 input-1 output) which plugs directly into rear of Models 30, 31, and 32, or can be remote mounted.
Model HF 231 ..... **$66.00**

MODEL HF 231A (1.8 to 30 mHz) for use with 75 ohm coaxial cable, otherwise same as HF 231
Model HF 231A **$66.00**

MODEL UV900 (50 to 900 mHz) for use with 50 ohm coaxial cable. Less than 1.1 dB insertion SWR. Response: ±.5 dB over complete range of 50 to 550 MHz, ±1.0 dB from 30 to 1000 MHz. Equipped with type "N" connectors. Plugs into Models 30, 31 or 32 by using any length remote cable. RCA phono-type receptacles used (2).
Model UV900 ..... **$90.00**

OTHER COUPLERS AND ACCESSORIES AVAILABLE — contact factory.

SIGNALCRAFTERS INC.

5460 BUENA VISTA DRIVE, SHAWNEE MISSION, KANSAS 66205
913/236-7300; TELEX: 42-4171

Prices include shipment to all U.S.A. Kansas residents add 3½ percent
VISA and MasterCard accepted

gratis preparation of over 9,000 flyers for Sierra Hamfest to be held Aug 22 in Reno. Contact W7BS for details. Field Day '81 chairman for NARA is WA7UEC. Carson City group having a fine get together each month. Contact W7HOP for details. Nevada Sage Brush Net M/F 7:30 P.M. Pacific time on 3906 kHz. Traffic: N7AKX 291, W7BS 74, W7SK 5.

PACIFIC: SCM, Pat Corrigan, KH6DD — KH6ILR has resigned as EC-Honolulu County due to personal commitments. SEC, KH6CKJ, is seeking a replacement. Anyone interested, please contact him. ZS1TZ and OM, ZS1TP, visited KH6. She is old friend whom I first contacted in 1964 when I was in Okinawa. Also passing thru was YJ8JG another long time Kiwi friend. Congrats to WH6AMR for his recent upgrade. KH6H, OBS-Maui and EC-Maui, broadcasts ARRL Bulletins for Maui folks on Mon at 7:00 P.M. on .16/.76 repeater. Mel's ARES group got good PR for their tremendous efforts for the Maui Marathon. KH6IPQ got her antenna fixed and is working the world. Several people running hi-speed RTTY on .19/.79 repeater with the agreement of EARC. Bill Baisley from Kauai also in there. Six meters still showing activity. KH6IJ KH6IAA W6HTH all active. Traffic: KA6HIJ 31, KH6DD 12, KH6H 6.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB, ASCM: KI6T. The Golden Empire ARS provided communications for the Bidwell Classic Marathon and the Yuba/Sutter ARC helped out at the local Bok-Kai Parade. Congratulations to K6HVM on making Advanced and KA6LHS on his Tech. W6SX is doing teletype work. The Pioneer RC's 450 MHz repeater went off the air due to its proximity to Beale AFB. The FCC lost their application for a waiver. The Yuba/Sutter ARC is holding a General class. While operating the rig in a horizontal position after back surgery, N6JV was visited by Channel 3 TV crew. Hams in the Live Oak area have started a cw net to improve their code proficiency. Traffic: W6DEF 14, W6SX 1.

SAN FRANCISCO: SCM, Art Samuelson, W6VV — SEC: WB6ZRK. STM: K6TP. Congrats to newly affiliated club, Redwood Empire DX Association. K6GWE/R held fine brunch, with an informative talk on packet radio by KA9M. San Francisco RC transmitter hunt was won by team of W6BIP WA6GQC. Sonoma County Radio Amateurs are continuing their valuable sponsorship of Explorer Post 599. Humboldt ARC/Far West Repeater Association active in public service communications. W6EAJ is preparing equipment for his OO activities. W6MWL is sporting new TS520SE. I hope to visit with many of the clubs in the section during Field Day. PSHR: W6RNL. Traffic: W6IPL 248, W6RNL 179, K6TWJ 79, K6TP 61, W6GGR 28.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. ASCMs: W6TRP WA6YAK WA6HIN. WA6UOR is the new EC for Fresno County. KB6CC is the new EC for Tulare County. New officers of CCAC are WD6EQS, pres., WD6FIP, v.p.; WB6JIT, secy.; WA6JII, treas. K9YBM has a code class going in Oakdale. WB6HIG has WAC. W6MEY and WB6IWQ are Silent Keys. WD6AQJ is KD6QA. WB6SZG is N8ECH, KA6GAF is N6EAE. WB6TTP is KV6W. KA6ONN and KA6LGK are Novices. KA6TTP is KV6W. KA6ITG is Tech. N6CDD KA6OIH and KA6KCO are Generals. WD6BJK is Advanced. WA6BUH WB6NON and W6DOF have PCS 3000s. N6BBO W0PJD W6ZFN and W6DPD have TR 7800s. W6WPV has a TR 9000. WB6JQC has a Clegg 22er FM. WB6RGU has a IC 22A. WA6NCA is chasing DX. K6MGX is still observing radio silence. K6QOK helps keep 146.52 alive in Central California. Traffic: N6AWH 65, WA6YAB 22, KV6W 12, K9YBM 12, WD6FRS 10, W6DPD 9, WA6JDB 5.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. IZF reports SCV ARES net going strong on W1PW/R at 7 P.M. Wed. All are welcome. A Project OSCAR general meeting was held in Palo Alto. SPARK is looking into emergency power for their repeater. W6TWW spoke before FARS on High-Efficiency HF Mobile Antennas. New members of FARS are AC6F and WA6SWD. Among those attending the National Weather Service conference were W6FFS AA6SL WD6ATJ WD6GKN and WD6AIA from SBARA. N6DRW is holding Novice classes at his home and is looking for teaching help. SCVRS participated in the "Superwalk '81" and "Run For Life", with many participants. W6ZRJ has repaired his equipment and getting organized to run code proficiency run when W6OWP is away, and hopes to have bulletins back on soon. San Mateo RC holds a monthly breakfast meeting, check with WA6FXC for time & date. The Livermore FCC office gave talk and demo to SCCARA. Memorex ARC should have their club station on the air by now, and they had an excellent write-up in the company paper. PAARA heard a talk on "A New Look at Power Line Noise, Random Noise, Amateur Jamming" given by W6PUX. KD6ID is now an Extra class. KA6NAN is a General. PAARA welcomed new members W6CB KA6KYA and K6JK. NPSARC reports WB6MHF as a Silent Key. K6IYD gave a talk on Radio Direction Finding to the Gabilan ARC. SLVARC signed up the following new members: KA6MLX KA6MBU and N6BFC. Official appointments are available to all ARRL members. Contact W6RFF for an application. Address/phone on page 6 of QST. Traffic: W6YBV 154, W6KZU 120, W6RFF 28, W6PRI 22, W6ZRJ 6.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ed Stephenson, AB4S — ASCM: N4UE. STM: NJ4L. SEC: WA4BFT. NMs: CN AB4V, CMN NJ4L, THEN WD4CNR, JFK WD4CNQ, NCSSB WB4CES, CNN WD4JJK. N4UE reports 13 passed code test in spring semester sponsored by Cary ARC. Ex-WD8NYN now NJ4L. Congrats to WD4JJK now Advanced. Ex-KA4ESR now N4EHM. Ex-KA4FQC now KC4YL. Worked any DX lately? If yes, then you need the services of the ARRL Incoming QSL Bureaus. For NC there are two: for prefixes W/K/N4, Mecklenburg ARS, P.O. Box DX, Charlotte, NC 28220; for double letter prefixes (i.e., WA4I, Sterling Park ARC, P.O. Box 599, Sterling Park, VA 22170. You must keep stamped 6x9" self-addressed envelopes on file with them. They send the envelopes when the weight of the cards meets the postage you applied. This service is provided by other radio amateurs on a voluntary basis. We owe them all our thanks for many hours spent on our behalf. Good turnout at early 1981 NC Hamfests so far. Look for you all at Durhamfest May 16-17. Traffic: (Mar.) WD4CNR 502, NJ4L 331, WD4CNO 329, W4EAT 195, WB4WII 194, AB4S 187, AB4V 166, W4PCN 106, WD4JJK 99, K4VHT 98, WA4UTC 97, WA4SRD 94, K4FTB 76, K4NLK 72, W4HKB 67, W4FMN 63, KA4ODX 63, KU4W 63, KZ4A 51, K4DHX 50, W4RVE 48, K4IWW 47, W8PJS 46, KF4R 36, WB4UJH

36, NE4J 32, KC4AM 31, WA4OBR 30, N4BEX 26, WB4CYN 26, W4ACY 22, NB4L 21, WD4AIF 16, K4XE 16, N4CJJ 15, WA4CUD 12, WA4OJU 9, N4UE 8, W4EHF 7, WA4PID 7, WA4IHG 6, KA4KJI 6, N4ARY 4, WB4HRR 4, W4WXZ 4. (Feb.) WD4RDT 70, NE4J 39.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — Asst SCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NMs: K4PFC W4ODE. Spartanburg Club had excellent demonstration at West Gate Mall. K4LNJ active with union communications for Amer. Red Cross. NC4F has 5 BWAS, congrat. WA4JWS working on new stn set-up. Columbia ARC getting new club jackets. Check-ins/traffic SC SSBN 1486/149, Blue Ridge 2-M Net 1752/60, SCNTN 334/60, Lancaster County 2-M Net 208/15, Western SC Emergency Net 174/15, Newberry County ARES Net 64/6, CN 625/350, CNN 248/64 Trident ARC ARES Net 196/0, York County ARES Net 223/14, Dixie 6-Meter SSBN 12/0, SC 2-Meter SSBN 57/0, Islander ARA 2-Meter Net 32/0. Traffic: (Mar.) K4ZN 355, W4ODE 178, K4ZB 160, W4ANK 84, W4NTO 84, KA4AUR 53, W4FMZ 49, K4FRX 38, NC4Y 34, W4MTK 31, WA4MIY 28, WB4UDK 27, K4LYU 16, WA4JWS 10, WB8TCT/4 10, WD4NMF 9, W4DRF 8, NC4F 8, WA4MCG 8, WB4QHF 2, WB4NBK 1. (Feb.) WA4JWS 49, NC4Y 19.

VIRGINIA: SCM, Luck Hurder, WA4STO — SEC: N4AZI. STM: KY4K. Chief OO: W4HU. Chief OBS: K3RZR. Chief OVS: N4CD. Net stats:

Net	Time	QNI	QTC	NM
VSBN	6:00	539	332	KZ4K
VSN	6:30	447	222	WB4KSG
VN	7/10	691	397	W4SUS
VLN	10:15	57	213	WD4ALY
VNTN	NOON	345	164	WD4FTK
WARC	8:30 A.M. Sn	56	5	K4JST

Congrats to new DEC of South Tidewater District, N4BFI; and to W4YE for tying for 1st place for best list in S.KN! KB4WT participated in Shamrock marathon with Va. Beach ARES. WA4ZBP W4XD WA4UML and others enjoying RTTY on new 146.85 repeater between Harrisonburg and Staunton. Official Observers WB4CGI W4MLC KI4W KB4WT and W4HU report sending numerous OO notices during March, with W4HU topping off the list with 14. Interested in the OO program? Contact W4HU or your SCM for details. One of the tougher jobs of being SCM involves badgering appointees for reports and finally cancelling those no longer interested in supporting ARRL efforts. This month was particularly rough on our ARES teams with 3 DEC and NINE (!) EC cancellations! Many areas now need leadership people — contact KZ4K for details. W4KX sez his 75A-2 is on strike and requires surgery. W4PVA working hard in Prince William County with an emergency test using two available two-meter repeaters. K4DHB teaching Novice/Tech class in Alexandria. KØJH has been at sea but will be back full time after May. STM KY4K notes that 2615 total Virginia QNI into NTS nets for a month pretty good! WA4CCK ready for RTTY as soon as he gets rid of some rf. KZ4K and WA4STO enjoyed mobile cw operation in VA QSO party. Interested in showing AR movies to local groups? Write to Vice Director N4MM in Boyce several months in advance for booking. Traffic: N4AZI 517, W3ATO 432, W4JK 404, WA4STO 384, WB4PNY 363, W4SUQ 356, WA4CCK 306, KZ4K 223, K4JST 194, KY4K 163, WD4FTK 161, W4SUS 160, WB4FLT 156, K4KNP 133, W4NWM 130, WA4LJI 120, WD4ALY 100, K4JM 97, K4KDJ 88, N4YE 82, WB4FDT 76, W4YVG 72, K4EJ 61, KA4IUM 60, WB4KSG 60, WA3LVC 60, K4DHB 58, KA3DTE 56, K3RZR 56, W4UQ 51, WA4YIU 50, K4MTX 49, KB4WT 49, WB4UHC 42, WA4FGJ 41, KB4PW 36, WA4QWC 35, N4BJX 32, WB4ZTJ 29, WA1VRL 28, WB4KIT 26, N4NK 26, KA4ERP 25, KB8TA 21, WB4MAE 20, KA4ETG 19, K8LGA 19, KØJH 18, W4NFA 18, WB4ODZ 14, N4YO 13, W4CFV 12, KC4HN 12, W4OKN 10, WD4DUU 9, W4LXB 9, WB4RWY 9, N4CIR 8, W4WWO 8, WD4EUV 7, WB4ZNB 7, WB4DQZ 5, W4KXE 5, W4PVA 5, WD4RDF 5, N4DW 4, W4KX 4, W4SVG 4, WD4KQJ 3, N3RC 3, W4YE 3, KB4QG 2, KI4W 2, WA4EQW 1, W4TZC 1. (Feb.) KØJH 7, N4DCL 1. (Jan.) KØJH 15, KA4HLI 1.

WEST VIRGINIA: SCM, Karl Thompson, K8KT — SEC: K8QEW. STM: KD8G. NMs: K8MHR W8FZP KD8G WD8LDY. WA8YTM has been appointed a PIA for WV. New Novice in Fayetteville is KA8LXD. Auto accident was reported by WB8WEZ using autopatch facilities on W8MOP/R. WV hams won battle to keep their call sign license plates at $5.00/yr. Thanks to all hams in WV who helped. WD8PSL and WB8ZMH new pres & v. pres of Wyo. Co. ARC.

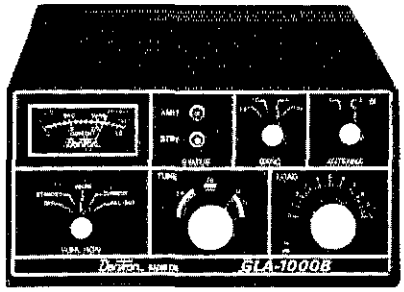
Net	Freq.	Time(Z)	QNI	QTC	Sess.
Hillbilly	14290	1600 Su	219	56	5
WV Phone	3990	2200 Dy	700	109	31
Phone-MD	7235	1600 Dy	250	27	31
WVN	3567	2300 Dy	250	55	31
Novice	3730	2215 Dy	107	30	26

Traffic: KD8G 182, WD9POG 46, NBAJC 41, W8HZA 39, K8MHR 35, WD8DHC 29, WD8LDY 27, W8CKX 21, WB8WEZ 20, KA8HAL 19, W8CAL 18, WD8DIN 16, KA8FEU 15, K8OEW 15, KB8XM 12, K8JQ 11, N8CFX 10, WD8AXY 9, W8YP 9, WB8UDY 8.

ROCKY MOUNTAIN DIVISION

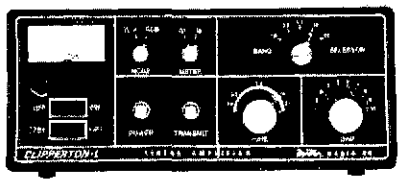
COLORADO: SCM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WBØMCL. NM: WØAIT WØEJD NØAXQ KBØZ. In 1955, WØIA, now a Silent Key, recognized a need by the National Weather Bureau, for weather information in addition to that received from their Official Reporting Stations. From this observation on 21 Sept. 1955, he formed a weather net to later be known as the Colorado Amateur Radio Weather Net. It took place on 3.945 MHz six mornings a week, covering from the Mid-West to the Pacific Coast. Later it was realized that there was weather every day. On 10 Sept. 1972, WØWYX started the Sunday Net, then as time went on another net was started on 146.34/.94 to cover the east slope from north to south of Colo. One of the original members, WØACH, is still active with 8000 weather observations to his credit. Others include WØWYX 6500, KØIEU 3000, WAØHJZ 2000 WDØAUN 1000,WØPGX WØDAP WØCYG KØMA and many others, as there is an average of 70 check-ins daily. Much of the credit goes to Net Manager WØZSO and WBØIBS NØBQP WØWYX and WAØHJZ as net controls for the long life of the net. Nets: HNN 31, sess, QNI 1782, QTC 117, Int. 306, QNF 1258. Traffic: NØBQP 2378, WØWYX 1675, WAØHJZ 1406, KØDJ 442, WØEJD 230, KBØZ 128, WØNFW 78, WØGO 46.

UTAH: SCM, Royce Henningson, K7QEQ — W7PBV elected new SCM and will begin on July 1. WA7MEL reports that the Utah ARC is holding Novice classes and reports a good turn out. The Salt Lake Tribune had a very good article on a ham repeater. Utah VHF Society Net had 1230 checkins and was terminated on April 3, until next winter. Membership at 318. Join if you use a



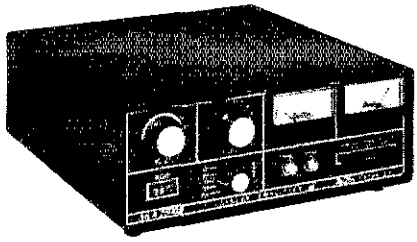
DenTron **GLA-1000B** Linear. 160-15m with some MARS. 1200w PEP SSB, 700w DC CW. (4) D-50A's, tuned input compatible with Solid-State rigs. 125w maximum drive. Size: 5¾"h×11"w×11"d, 24 lbs.

Regular $399 - ***Sale Price $349.95***



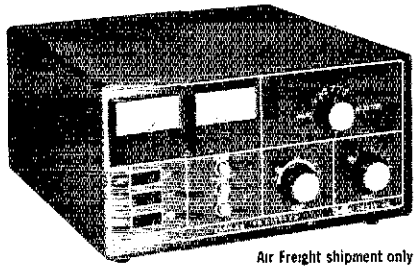
DenTron **Clipperton-L** Linear. 160-15m. 2KW PEP SSB, 1KW DC CW. RTTY/SSTV. (4) 572B's with tuned input. 65-150w drive. 6"h×14½"w×14½"d, 42 lb.

Regular $699 - ***Sale Price $599.95***



DenTron **MLA-2500B** Linear. 160-15m with some MARS. 2KW PEP SSB, 1KW DC CW. RTTY/SSTV. (2) 8875's, 60-135w drive. 5½"×14"d×14"d, 47 lbs.

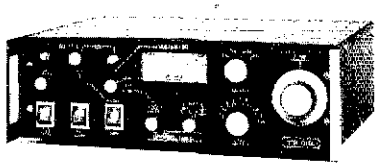
Regular $999 - ***Sale Price $799.95***



Air Freight shipment only

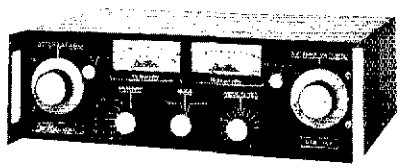
DenTron **DTR-2000L** Linear. 160-15m with some MARS. Legal power limit on SSB, CW, RTTY/SSTV. (1) 8877, 65-125w drive. 7¼"h×14½"w×14½"d, 54 lbs.

Regular $1300 - ***Sale Price $999.95***



DenTron **DTR-1200L** Linear. 80-15m with some MARS. 1200w PEP SSB, 1000w CW. (2) 572B's, 65-150w drive, tuned input compatible with Solid-State rigs. 5¼"h×17"w (19" w/rack bkts.) × 13"d, 46 lbs.

Regular $665 - ***Sale Price $455.95***

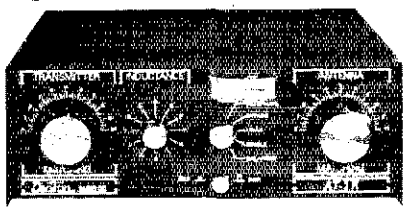


DenTron **DTR-3KA** antenna tuner. 3 KW PEP, 1.8-30 MHz. Tunes coax, balanced line or long wires. Size and style match DTR-1200L linear above, 15 lbs.

Regular $499 - ***Sale Price $349.95***

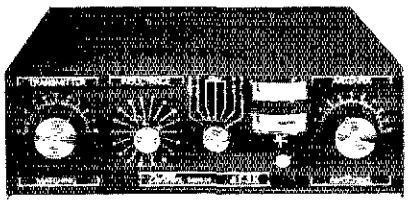
DenTron **RT-3000** Roller inductor tuner. 3 KW PEP, 1.8-30 MHz continuous tunes coax and wire antennas or balanced line with optional BL-1 balun. Vernier dial, wattmeter. Size: 4"h×12"w×13"d, 10 lbs.

Regular $299 - ***Sale Price $249.95***



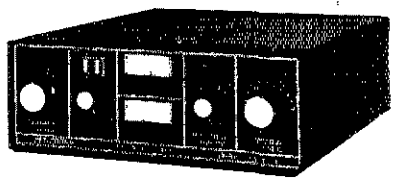
DenTron **AT-1K** 1200w PEP antenna tuner. 1.8-30 MHz will tune coax, wires and balanced line with optional BL-1 balun. Size: 3¾"h×10"w×9½"d, 7 lbs.

Regular $149 - ***Sale Price $129.95***



DenTron **AT-3K** 3 KW PEP antenna tuner. 1.8-30 Mhz - tunes coax, wires or balanced line with optional BL-1 balun. Size: 4"h×12"w×13½"d, 12 lbs.

Regular $259 - ***Sale Price $219.95***



DenTron **MT-3000A** 3 KW PEP tuner. 1.8-30 MHz. Built-in balun & dummy load. Tunes coax, wires and balanced line. Size: 5¼"h×14"w×14"d, 18 lbs.

Regular $399 - ***Sale Price $349.95***

DenTron **Jr. Monitor** tuner. 1.8-30 Mhz. 200w. Balun built-in; tunes coax, wire & balanced line. Mobile bracket supplied.

Available in August

Regular $79 - ***Sale Price $69.95***

ACCESSORIES:

BL-1 balun for AT-1K, AT-1K	$49.50
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3 KW 4:1 chassis mount balun	39.50
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100' 2 KW 470 ohm ladder line	12.00
100' 2 KW 300 ohm transmission line	19.50
SWL flat top (kit)	19.50
Big Dummy 1 KW dummy load w/oil	39.50
Tuned input kit for GLA-1000 (not B)	39.25
CM-1 Tuned input unit for Clipperton-L	59.95
CM-2 Tuned input unit for MLA-2500B	59.95
W-2 Wattmeter (Reg. $129.50) ..... Sale Price	99.00
SWR-1A SWR/Power meter, dual meters	49.50
MC-1 Mobile microphone	29.95

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Regular $599 - ***Sale Price $539.95***

DenTron **HF-200D** HF transceiver; a refined version of the earlier HF-200A; features a digital readout a redecorated front panel and much more.

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HF-ACS AC supply *(Reg. $129.50)* ..... ***Sale 119.50***

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repeater, and give better 2-mtr. coverage throughout the state. K7LKH received a net cert. from the Beehive Utah Net. Traffic: K7HLR 308, WA7KHE 135, WA7TEH 112, WA7MEL 81, W7OCX 29, WA7JRC 20.

WYOMING: SCM, Dick Wunder, WA7WFC — I am looking forward to a challenging term as your SCM, and I hope to meet many of you in my travels around the state. I am pleased to announce that WB7EIN has accepted another term as SEC. KB7SX has been appointed the state RACES officer. The three of us are launching an intensive drive to improve the emergency preparedness of our section. Anyone interested can obtain additional information from WB7EIN KB7SX or myself. Recent upgrades include KA7IIP & KA7JPP to Technician and WB7WVN & N7BXY to Advanced. Cowboy Net held 22 sessions with 697 QNI & 17 QTC. Jackalope Net held 27 sessions with 469 QNI & 2 QTC. Traffic: W7SQT 770, WB7NHR 133, WA7GYQ 222.

SOUTHEASTERN DIVISION

ALABAMA: SCM, James M. Bonner, K4UMD — SEC: W4IBU. The severe weather has been upon us, at this writing more could come. Hurtsboro, AL was hit with a tornado and severe thunderstorms on April 1, almost destroying the city. There were at least two killed, scores hurt. It happened early in the morning hours. K4JNL reported the Nets were on, all amateurs helped from 2 A.M. until 6 P.M. Some hams from Phoenix City and surrounding areas gave of their support. All telephone and power was out. The amateur operators were the vital link to rescue services. We all thank those who participated — a job well done. AENM net: 2034 check-ins, 139 messages in 36 sessions. AENN net: 110 check-ins, 7 messages. AEND: 214 check-ins, 69 messages in 29 sessions. AL reported into CAND 100 percent by W4CKS. DRN5 was represented 100 percent by W4CKS W4IBU and WA4JDH. Keep up the good work guys. AENV is a new net for Tallapoosa and Coosa County. We will be hearing from them later. Enterprise ARC reports W4REK upgraded to Advanced, KA4IEA and WD4RME to Technician, congrats. New officers of Muscle Shoals ARC (MSARC): K4JXS, pres.; K4OXU, v.p.; WA4ZDW, secy./treas. Have you heard of SCARES? It's Shelby County Amateur Radio Emergency Service. Contact N4DMA. He invites everyone to their meetings. The group has things going in the area. Everyone remember Field Day, June 27 & 28, rain or not. This is our time to prove our worth in emergency operations, everyone get involved. Traffic: WA4JDH 1046, W4CKS 168, WA4PIZ 81, K4JIE 61, WD4DHI 50, K4AOZ 38, W4LXP 26, K4UMD 26, KC4GS 24, WB4TVY 14, AA4J 13, KC4MT 12, K4HJM 4.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM/SEC: K4VHC. ASEC: WA4PUP. STM: W4WXA. Chief OBS: W4BIA. After a very well attended and successful hamfest in Columbus, Amateur Radio showed its emergency capabilities during the aftermath of the disastrous Hurtsboro, AL tornado. All communications were out and the 76 hams involved did what was necessary to help the citizens and other services who needed communications. Complete details are being forwarded to the ARRL & should appear in a future issue of QST. In situations such as these, a well organized ARES program is of vital importance. I might also mention that if your club or group gets involved in any public service function, please inform me or K7VHC so that we can get you the proper form so that you can report it to the League. There are still some isolated areas in the section that the SEC still needs EC's for. Please get involved and check into the ever growing ARES administrative net on Sunday afternoons at 1700 local time. I am also making a request for volunteers for the Official Observer program. As you well know our hobby is self policing and an OO might help somebody from getting a pink ticket. As of January 1st, the FCC office in Atlanta conducts amateur tests only on Tuesdays. For the code tests you must be there prior to 0800, for the written only by 1200. The Atlanta RC is planning on purchasing an RV for use as an emergency communictions van. Tnx to the many cw ops who keep GSN going. K4EV, NM, invites you to join them on 3595 at 1900 or 2200 local daily. The Georgia Training Net on 7118 on Mon., Wed. & Fri., offers you Novices & Techs an opportunity to get that code speed up. They meet at 1815. It was good to see old friends at Columbus & meet new ones. Hope to c.u. at one of the forthcoming hamfests. Traffic: WA3NAZ/4 285, W4WXA 258, KA4ATM 93, K4EV 87, W4PIM 87, W4ELO 78, K4AZM 52, WB4LBM 52, WD4ADV 36, W4GH 36, K4JNL 25, N4UZ 21, W4LCB 20, WB4RUJ 20, AA4EI 17, W4HON 13, W4BIA 9, K4PIK 6, K4BAI 1.

NORTHERN FLORIDA: SCM, Billy Williams, N4UF — SEC: WA2GIN. STM: N4WA. ASCM: N4EDH WD4ASW WB4QBB W4BSP WA4OEM. NM: N4BZH WD4DNC KF4U. Spring public service events plentiful. TARS assisted with March of Dimes Superwalk with 20 hams active. RANGE helped with River Run. GCARC furnished comm. for CHASCO Parade in NPR. PARC & WD4JZG active at Scoutarama and WB4EXA operated publicity booth at fair. In Orlando, OARC chose W4UJL as 1980 Ham of the Year. WD4LIM also cited for community activities. KA4RVI & WD4BEG along with WD4HSA produce club paper "Listening Post." W5IJU publishing "Awards Directory." New calls: WD4MNU now KC4WE KA4FYD now N4EBH; WD4MDR now KC4UF; WB7FAL now N4EDG; KA4KNJ now N4ECO. N7SD finishing teaching Novice group for Hambone College. In Panama City, the ELT transponder system being considered for club project. Okaloosa EC, WB4PGQ, sent first message for ARC message relay thru WD4HIF. Phil very active on 5RN representing NFL 100 percent in March. OPARC having nice turnouts at Sat. A.M. club breakfasts at Ravines Country Club. Jax hams provided comm during evacuation due to wildfires. Enjoyed FWB Swapfest. Nice turnout and all had a good time. K4CB working on revised telephone tree for SHARC emergency plan. GARS supplied local cable TV system with ARRL films to show during breaks. Gator ARC W4DFU moving to new QTH in Dental Science Bldg. N4EDH working for new WAS under new call. WB4OWX has new TR7800 and WA4AAD planning Palm Coast repeater. Antenna party got N4PLs antennas reworked. KB4GW active as NCS on Volusia Co. RACES Net. GCARC has 131 members already this year. HCARA approved new club constitution. W4SIZ is new EC for Sumter Co. and also ORS. Traffic: WD4HIF 713, N4PL 620, W4SIZ 474, WD4IIO 422, N4EDH 406, WB4EXA 278, KF4U 194, N4EC 142, WA4EYU 130, W4MGO 109, W4BSP 78, W4JL 70, WB4TZR 64, AA4FG 63, W4KIX 61, N4BZH 60, WB4FJ 54, N4AXN 53, W3IDO 37, WB4ADL 33, N4UF 33, WD4DI 30, WA4STZ 18, WB4DTS 11, N4BOY 6, WA4NMH 6.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — Asst SCM: W4KGJ. SEC: AA4WJ. STM: K4TH. March was a light month for traffic with only 9633 QT

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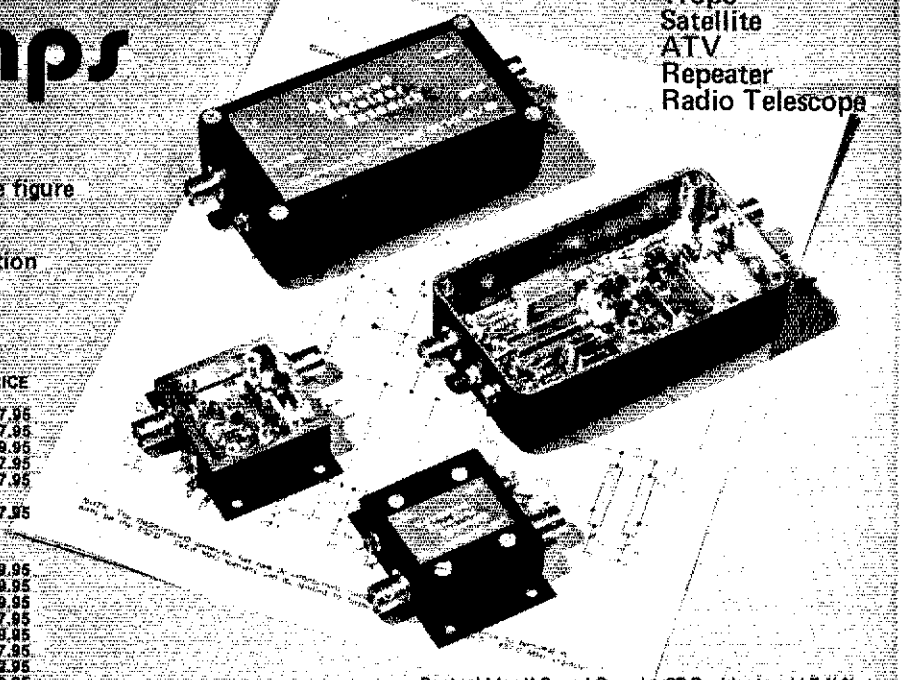

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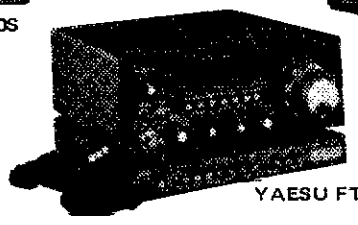

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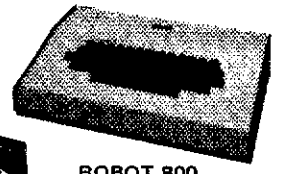

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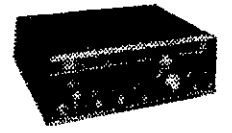

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reported and only 4 BPLs issued, these being to W3CUL W3VR K4SCL and K4TH. However, the PSHR program remains healthy, with 12 stations reporting totals of 80 to 133. It seemed to be the month for public service events such as walkathons, parades, races, etc. However, the Harbour Cay Condominium Disaster, Cocoa Beach, FL, March 27, eclipses all other public service actions of the month. Emergency nets were in session for 59 hours and on the scene 20 minutes after the building collapsed about 3 P.M. March 27. Hams helped Red Cross, Civil Defense, Law Enforcement Agencies and rescue workers. North and South Brevard ARES cooperated using 2 repeaters plus many simplex channels. Stations active (76) were: Platinum Coast ARS: N7AET W4AYR N2BF K4BNL W4BWS N4COY K4CXX WD4DZI KA4EQM W4GJB W2HAE WB4HJF K4HXW KA4JRY W4LVA WD4NMZ W4NWE W4NOA WB8NSI WB5NXG WD5NMZ W4NWE KB4OW WB4POL WB4POT WD4PTY WA4RGK WA4VME W4VQQ K4YWC AF4Z WB4ZUW. Brevard Rptr Assn/Indian River ARC: N4ADA K4ADB WD4AHP WA4AIY WB4AXB K4BAL WA3BSH WA4FKE K4FXP W4GJO K4GXR WB4HDX KB4HQ W4IFW K4ILX W4LJB AA4MI WA4MMD W4MPZ WD4NQK K4OHE W4PMH W4PRK KA4RMH K4SGC W4STZ WB4WYG W4YWA W4ZER. Titusville ARC: K4BZJ K4CWG KA4LTK W4OPZ. In St. Petersburg the Festival of States parades came off on schedule March 31 and April 4 with 61 radio amateurs active as follows: WB4AIZ W4APV N4APZ N4AXN K4BR N4BGS KA4BPO K9BSL W4BUB WA1BXU AA0C W4CF WD4COL WB4DWU K4EPH W4EGM N4ECH WA4FEN WB4FVN WA4GCH W4GPL K5IHH WA4IIT K4ISS KO4J ND4K K4KE WD4KGY KA4KKI WB4KSJ K4KXC KA4LDB WB4LLN WD4NHH WB4OAT WB4PNV WD4PUV WA4QGV K4RBJ WD4RQK K4RXO WD4SCD WD4SJO K4SCL K4SO WA4SSR KA4SHH WB4TEJ K4TH WA4TJG WA4TZY W1UEF WB4UFO KC4UU W4VIP WA4WGO WA4WOU KC4WJ K4WYN WB4ZPU. The Mutt Derby, St. Pete., saw another 11 active as follows: N4APZ K4BR WD4COL WN4ECH W4GPL W4IRA WA4NCY WD4PUV K4RBJ KA4SHH WA4WOU. April is the month of the Red Cross Message Relay during which we expect to send a message from each Red Cross chapter — more than 3000 of them — to the ARC Convention in Fairfax VA. Let's be sure they all get through in fine shape. K4ZK advises he will be vacationing Apr. 9 thru June 9. N4KB reports W1NJM taking over his TCC skeds for summer. Oh, yes, we did have a National Convention in Orlando where crowds were so thick you couldn't move. W4IYT reports big exercise "Operation Everglades" April 4th simulating 2-plane crash and 45 amateurs involved in rescue training. Congrats to W4JM on receiving QCWA 50-year pin. Traffic: W3CUL 3077, W3VR 796, K4SCL 608, K4TH 504, WA4PFK 469, WB4FVV 414, K4ZK 388, WB4PIB 246, NC4H 242, WA4EIC 230, W4GPL 206, WD4AWN 202, WB4WYG 194, W4LX 193, N4ET 187, WB4AID 156, KA4ASZ 144, KA4FZI 137, W4DVO 132, VE3BSY 119, KE4O 115, W4IRA 97, WA4HXU 96, K4EUK 82, KA4LNA 79, W4UIO 62, W4SMK 54, W3TLV 53, N4KB 45, W4ESH 43, WD4APM 41, WB4GCK 38, W4KMN 29, W1NJM 28, W4IYT 24, WB4SNX 19, WD4LWT 17, W4WYR 15, N4BU 14, AA4WJ 14, W4MML 8, WA4BYT 6, WB5KYE 5, K4IEK 2, W4JM 2, WB4GSV 1.

WEST INDIES: SCM, Julio Negroni, KP4CV — The Radio Club of Electrical Engineering Department at the Mayaguez campus of the Univ. of P. R. is the latest ARRL affiliated club in this section. Congrats to officers KP4FBT, pres.; KP4EFZ, v.p.; WP4BAM, treas.; KP4EMY, secy.; KP4RC, trustee. DWINS (day WINS) is slated to start soon in Cycle 2 Saturdays & Sundays. A new phone traffic net is in operation. WINO (West Indies Net Oeste) operates on 146.22/82 daily at 1730Z. Traffic: NP4D 293, WP4AWF 203, KP4DJ 160, KP4U 154, KP4FBT 111, WP4ADG 55, WP4BBM 18, WP4BBN 18, WP4AOK 8, KP4EFZ 7.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. Thanks to all who participated in the ARC Message Relay. Sounds like the ARCA swapfest was a success. Members of the OPRC operated W7GV from DMAFB during Aerospace Days. New club: Green Valley ARC: KA7EVH, pres.; WB7CFY, v. pres.; KB0KP, secy/treas. Shrine Circus Comm. provided by K7RIS WA7RKI KA7BRI WB7TWM KA7DAC AF7M WB7VFL WB7CGQ W8BID N7EH K7KYW WB7TLS WB7DIW WB7VUU K7PQI K7SEC WA6ZKH WB7PZJ KA7FRY K7KNP. Numerous RACES and ARES members participated in statewide Crisis Alert March 27. All cw 160M "Top Band" WAS to AC7D. I regret to report that N7AQL became a Silent Key, White Mtn. ARC holding Hamfest June 6-7. Ft. Tuthill Hamfest to be held July 31, Aug 1 & 2. I hope to hear from all AZ participants in Field Day 81. I would like to expand the ARRL field organization within the section. Are you interested in an appointment? Let me hear from you. Plans for SW Division Convention to be held in Scotsdale are coming along. ATEN: QNI 1087, QTC 173. SWN: QNI 280, QTC 173. Traffic: W7EP 100, KB7HA 96, AF5Z 64, W7LVB 61, K7KVV 52, W7OIF 45, K7MC 38, K7NMQ 38, W7LBW 36, K7NTG 34, K7JKM 30, AC7D 25, WA7WEB 13, N7EH 10, K7GLA 6, WA7NXL 4, W7DOS 2.

LOS ANGELES: SCM, Stan Broki, N2YQ — ASCM: N6UK. STM: W6INH. SEC: WB6FAK. Appointment-KB6FC ORS Welcome aboard. Ex-W6BRO had received his new call N6DZO. Due to an unfortunate oversight he did not renew in time to keep his old call. He should be back in the traffic system with his new call now. WB6LCO reports that KNX has a 40 kW gasoline driven emergency generator to give away. For details call Erik J. Disen, WB6LCO, 213-460-3000. OO reports K6CL 3, K4WGW 12, K6KA 30, W6TOG 48. Congrats to K6KA for a job well done during 1980. As OO, he earned himself a complete set of Callbooks for his efforts. Traffic: (March) K6QWA 103, W6INH 81, WA6OCM 68, WA6LVO 51, KB5FC 50, K6INK 49, N6PZ 40, W6BWG 25, KT6D 25, W6NKE 19, K6CL 17. (Feb.) WA6LVO 74.

ORANGE: SCM, Fred Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ. STM: KA6A. NMs: WB6AKR (cw), W6CPB (ssb), K6JT (RTTY), WA6QCA (fm), WA6WZO (ASCII). The new ARES Orange Section Officials Net meets the 1st Tuesday on 146.385/.985 WB6FUB/R (Keller Pk) at 7 P.M. The SW ARES Division Net still meets on 1818 kHz Sundays 11 A.M. while the SW Division League Officials Net will move back to Mondays at 9 P.M. (3907 kHz). Although W6RE will continue as EC, it is with regret that I announce his resignation as OBS after doing an outstanding job for over 10 years; accordingly, Asst. STM WD6CSL has been appointed OBS. Past SEC AE6N was appointed EC to assist the SEC with ARES plans and programs. AEC N6AEY appointed OES. All TASMA officers re-elected: WA6GEV, chmn.; WA6KOS, vice chmn.; N6BVU, secy.; WB6JPI, treas. OC DX Century Club new officers: N6BFQ, pres.; AA6DP, vice pres.; W6LEN, secy/treas.

Leisure World (Laguna Hills) ARC new officers: WB6SDB, pres.; WB6PDA, secy/treas. K6ZFO new pres. of Autonetics/Rockwell ARC. RATS (Coachella Valley) new officers: KA6IYS, pres.; KA6GXO, vice pres.; WD6AXZ, secy.; KA6KZS, treas. Sierra ARC new officers: N6KE, pres.; WB6SON, 1st v.p.; WD6FPZ, 2nd v.p.; WA6CAY, secy.; K6IDP, treas. Beach City Wireless Society new officers: W6FQX, pres.; WA6TFS, v.p.; WD6HBR, secy.; K6WO, treas. New W6RMJ/R freq 146.325/.925. We tnx WA6TEY for his promotion of HR 2203; the ARRL Board supports the bill — HOW ABOUT YOU??

Net	Freq.	Time-Dy	QNI	QTC	NM
SCN/1	3598 kHz	6:00 P.M.	408	244	K6FI
SCN/2	3598 kHz	7:15 P.M.	337	108	K6PHV
SCN/VHF	147.045/645	9:00 P.M.	468	188	WA6QCA
SCN/RTTY	3637.5 kHz	7:00 P.M.	—	—	WB5EKU

(K5DY SCN Net Manager — KA6A Asst. NM) Traffic: (Mar.) N6ANL 322, KN6C 265, KA6A 197, WB6QBZ 144, W6NTN 73, WB6BZZ 56, K6ZCE 48, WA6QCA 39, WD6CSL 38, W6CPB 24, WB6AKR 16, KA4FDX 10, WA6WZO 7, WB6LGL 6, WA6WZN 4, KA6HJK 2. WB6SEL 2. (Feb.) K6ZCE 88.

SAN DIEGO: SCM, Arthur R. Smith, W6INN — STM: N6GW (222-5575). SEC: W6INI (273-1120). Asst SEC: N6RD (224-1574). Field Day planning should be in the final stages now. Clubs are requested to let me know your Field Day locations. New ARES members are: N6CXU W6DJZ KA6LKM N6DYU KA6NRK. Poway ARS is drawing up plans for emergency communications support of their newly incorporated city. Palomar ARC sponsors a flea-mart on third Saturday, 0800, at Valley Drive-in on Mission Ave., Oceanside. San Diego Repeater Assn's swap meet is first Saturday, 0700, at Santee Drive-in on Woodside Ave. Monthly breakfasts/meetings are held by the ARES on second Saturday at Normal Heights United Methodist Church, 4650 Mansfield Ave. Breakfast 0800-0830, meeting 0900. All are welcome. ARC of El Cajon is raising money by recycling aluminum cans and newspapers. Call sign changes: WA6DWR to KD6QB, WA6OUA to KD6PZ. SANDRA held a successful luncheon-meeting with its Imperial County and Yuma members in El Centro on March 28. Traffic: KT6A 564, N6GW 188, KM6I 123, W6HUJ 120, N6RD 69, K6HAP 64, KB6AI 47, W6DEY 27, K2UVG 27, N6AT 19, WA6UFY 4.

SANTA BARBARA: SCM, Robert N. Dyruff, W6POU — FCC "Plain Language Rewrite" produces growing concern in Ventura, SBAR So. County. Thousand Oaks tower ordinance concluded favorably after Conejo Valley ARC action incl. WA6ZAX, KQ6I. Simi Settlers now 88 strong, Secy WD6BZN earns DXCC. AVERT Council directory of agencies/services updated by KA6NHG now upgraded to N6DZH. SLO EC K6DZT lists Asst. ECs: N6BDE K6FI WB6IIY W6JTA W6MSG WB6SYB (Rptr. Coord.). Annual Santa Maria Radio Swapfest will be held June 14 by Satellite ARC. Ventura Co. Large scale earthquake disaster exercise May 8 to involve cities, county, state, federal, private agencies. ARES played key roles linking Golden Gate Univ. planners plus tactical comms including RTTY/computer terminals and ATV. "West Coast VHFer" Bulletin published by WA6IJZ, 560 W. Yucca, Oxnard, 93033 — reports

432 MHz "club" activity by WB6ITZ K6JA W6WBY. Sec. Tfc. Mgr. post open for qualified candidate. Traffic: WDØDEX 174, K6YD 97, WB6TRP 52, W6JGS 13, K6DZT 2.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — Asst. SCM: WA5QFD. STM: W5VMP. SEC: W5GPO. NMs: N5BT AE5I AA5J KA5IWF. District Emergency Coordinators (DEC): WB5DUQ W5CBT WD5AFP WA5DTC N5OX K5SQA WD5EPC WA5KZA WB5LAT WB5WYI K5HSZ WB5UZS WB5SVS K5MWC KD5Z and WA5UTA. Emergency Coordinators: (EC) K5REJ KB5WY W5NGX W5CBT KA5CVQ WD5AFP WB5WDL WA5DTC W5TAH WB5OTF KB5CM KL7AHB KA5JJS AE5B K5ZVZ KC5BG N5BUW WB5GGJ AJ5K WB5SBO KB5TM K5SQA WD5EPC K5IID W5BCB WB5MTU K5KXG WA5TZB WA5DFP KK5B W5GY AK5C WB5OXE N5CAN WA5QFD WA5MBK WB5TTO WB5LAT K5HKN WB5WYI W5YK KA5BQJ N5AEQ WA5RWW K5HSZ WB5MEX WD5EYW WD5GFP K5ERJ N5AE WA5HWI WB5UZS WA5WYI WB5TXR KB5UL KC5DL WB5SVS K5MWC WB5QZB N5ADA KD5Z WB5GPJ and WA5UTA. Official Bulletin Stations: (OBS) K5QKM, K5KQG, N5WB WA5KHE KK5B W5GN W5PBN WB5LAT W5YK and W5RYA. Official Observer Stations: (OO) W5TI K5PC WA5QPW K2SCU WA5UBK and W5ARV. Official Relay Stations: (ORS) W5VMP N5BT WD5IVD W5HMR KK5B AA5J AJ5F WA5QFD WB5LAT W5YK WD5JYI KB5UL AE5I. Official VHF Stations: (OVS) K5IS WB5LAT KA5JRZ. Official Emergency Stations: (OES) K5HGX and WD5JYI. This is the official list of appointees as I begin my second term as your SCM. It is this fine "grass roots" leadership that makes our section second-to-none in public service and emergency preparedness. As they say on TV; "Thanks to ALL of you, it works for all of us!! If you are not involved in League activities, make 1981 the year you do make a commitment in the area of your own personal interest. My address is in the SCM column of this issue; page #8. Please feel free to volunteer your services. D/FW Metro TFC. Net for March: QNI: (Total check-ins) 758. QTC: (Traffic listed/Traffic passed) 93/88; in 31 sessions. Public Service Honor Roll (PSHR) for March: W5CTZ KA5CFP N5CEK KA5AVQ AJ5F KA5IWF WD5JYI WD5IVD KC5FX N5BT W5VMP WA5QFD W5TI KB5UL AE5I and W5HMR. Traffic: W5TI 437, N5BT 240, W5CTZ 175, KB5UL 145, KA5AZK 128, AA5J 99, KC5FX 81, K5BNH 72, N5CEK 53, K5QKM 38, AJ5F 36, KA5IWF 35, WD5JYI 35, AE5I 33, WA5QFD 31, W5ERT 30, WA5INJ 29, W5HMR 26, KA5CFP 25, W5GPO 20, K5PC 18, WB5SDD 18, WD5IVD 17, AC5Z 17, W5VMP 16, KA5AVQ 10, K5SOR 9, WB5YYK 7, WB5OTF 6, K5HGX 4, WA5KZA 4.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — Asst SCM, W5REC. Spring weather playing some tricks on us. Have several reports of antenna damage. On the other hand, KB5EK having fun with 75-mtr. DX. OO reports are showing many 'out-of-band' violations, mostly from getting too close to edges. Received 26 ORS reports, 2 OOs; 5 OBS, NO OVS reports. W5UYH sends a graph of OLZ participation past 8 months, January and March best for QNI, December best for QTC. A quick check of statewide totals shows December best for QTC reports, September best for QNIs. K5MGD recovering from heart surgery, FB. Plans well under way for West Gulf Convention Ham Holiday 81 in Oklahoma City, July 24-26. Had excellent response to Red Cross traffic. Oklahoma City and Lawton have new stations in Red Cross. Traffic: WB5NKC 276, W5RB 184, K5CXP 156, WB5NKD 131, WA5RKU 114, KF5A 100, WD5IRB 99, WD5DYI 94, KB5EK 94, W5REC 92, W5AS 79, WA5OUV 75, WA5FSN 63, W5UYH 54, WB5ELG 45, W5VXU 41, W5SUG 37, WA5JGU 36, K5CAY 32, WD5IFB 28, W5VOR 28, WB5EAY 27, W5VLW 27, KC5FM 12, W5FKL 10, NØIN 10, W5JJ 1.

SOUTHERN TEXAS: SCM, Roger Coday, N5FN — ASCM/STM: N5TC. SEC: AK5N. I am pleased to report the appointment of W5SG as an OO. K5DG reports that 22 operators worked the Confederate AF winter show. Also, a group of 26 ops worked the Valley Livestock show at Mercedes putting in a combined 80 hours of operation in the two events. The antenna on the 37/97 repeater at Harlingen has been raised to 400 feet. W5TFB has completed the QSK on his SB 104A. K5RG reports an on-the-air meeting of the Central area staff on Mar. 8. K5RVF says that he and XYL, K5INE and XYL, W5APX and XYL, WA5ZFQ and XYL, and W7MAI all attended the National Conv. in Orlando. Brenham ARC supplied communications for the Bluebonnet 10 K meter run Mar. 28. Washington Cty. Emergency Net conducted a drill and test alert. KD5O is moving to Ohio. Call sign change: WB5YRV now N5DAA. WD5FRB held a Novice class at the Houston Yacht Club and graduated 28 Novices. Sounds like an excellent group. N5AFA reporting the Lufkin 87/27 machine has a new Spectrum repeater with emergency power. W5QJM and others are promoting QRP activity in the state. For further information write QRP, PO Box 12072, Capitol Station, Austin, Texas. 78711. WB5PIZ now KD5K. Traffic: WB5YDD 544, W5SHN 326, W5KLV 313, KB5TC 186, W5TFB 152, KB5NX 118, N5TC 86, K5HZR 84, WA5RVT 72, KA5GYJ 65, WB5YRV 64, WD5GKH 45, W5BGE 36, N5FN 35, K5OWK 33, WD5AAH 30, KM5J 28, N5CRR 27, WB5EFJ 25, AK5M 24, K5RG 23, WD5DRB 12, KAØCSM 11, KA5BSN 10, KB5KZ 8, WB5UYV 6, K5DG 4, KD5O 3, WD5DQR 2.

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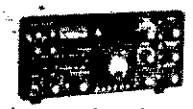

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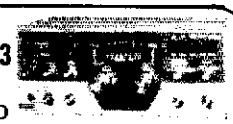

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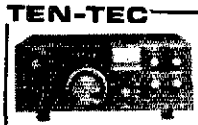

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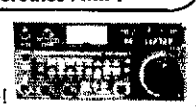

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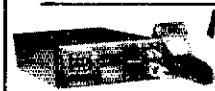

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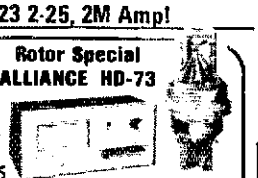

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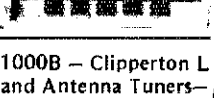

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Prices quoted good until June 30, 1981 & supplies limited to manufacturers availability.

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Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

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 now $8 per year US, $9 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.

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.

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (W2AN) and commercial station exhibits, 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, NY 14469.

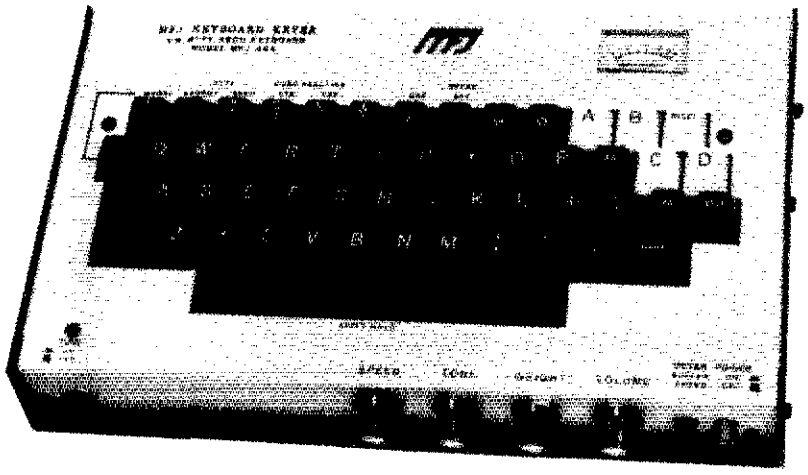
THE HALL of Science ARC fifth annual hamfest will be held on June 7, 1981 from 9 to 4 at the municiple parking garage one block from Queens Blvd., 80-25 126 St., Queens. Sellers $3 Buyers $1 Free parking, refreshments. Talk-in on .52 For further information contact Tom Doyle, KA2DTB at 212-738-8887 or 212-641-1700.

STARVED ROCK Hamfest — June 7, 1981 See May calendar in QST Long s.a.s.e. for information to W9MKS.

FREE FLEA market! Elmira, New York International Hamfest at the Chemung County Fairgrounds. Dealers, Tech talks, great food (cheap), and even more awards than last year. Tickets and info from John Breese, WA3FJM, 340 West Avenue, Horseheads, NY 14845.

SOUTHERN ILLINOIS — Shawnee Amateur Radio Association's 25th anniversary Silver Jubilee Hamfest will be August 30 at John A. Logan College in Carterville, Illinois. Offerings include air conditioned flea market — awards, forums, computers, food, refreshments, contests. For details QSL Bill May KB9QY, 800 Hilldale, Herrin, ILL 62948 or 618-942-2511 days.

MFJ Super Keyboards



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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.

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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.

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Automatic incrementing serial number from 0 to 999 can be inserted into buffer or message memory for contests.

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Two key lockout operation prevents lost characters during typing speed bursts.

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Set CW sending speed before or while sending.

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PTT (push-to-talk) output keys transmitter for Baudot and ASCII modes.

Reliable solid state keying for CW: grid block, cathode, solid state transmitters (-300V, 10 ma Max, +300V, 100 ma Max). TTL and open collector outputs for RTTY and ASCII.

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9-12 VDC or 110 VAC with optional adapter.

MFJ-494 is like MFJ-496 less sequencial numbering, repeat/delay functions. Has 50 character buffer, 30 character message memory. Clock option not available for MFJ-494.

Every single unit is tested for performance and inspected for quality. Solid American construction.

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MFJ-53 AFSK PLUG-IN MODULE. 170 and 850 Hz shift. Output plugs into mic or phone patch jack for FSK with SSB rigs and AFSK with FM or AM rigs. $39.95 (+$3).

MFJ-54 LOOP KEYING PLUG-IN MODULE. 300V, 60 ma loop keying circuit drives your RTTY printer. Opto-isolated. TTL input for your computer to drive your printer. $29.95 (+$3).

MFJ-61 CLOCK MODULE (MFJ-496 only). Press key to send time in CW, Baudot or ASCII. 24 hour format. $29.95 (+$3).

110 VAC ADAPTER. $7.95 (+$3).

BENCHER IAMBIC PADDLE. $42.95 (+$4).

A PERSONAL TEST

Give the MFJ-496 or MFJ-494 Super Keyboard a personal test right in your own ham shack.

Order one from MFJ and try it — no obligation. See how easy it is to operate and how much more enjoyable CW and RTTY can be. If not delighted, return it within 30 days for refund (less shipping). One year unconditional guarantee.

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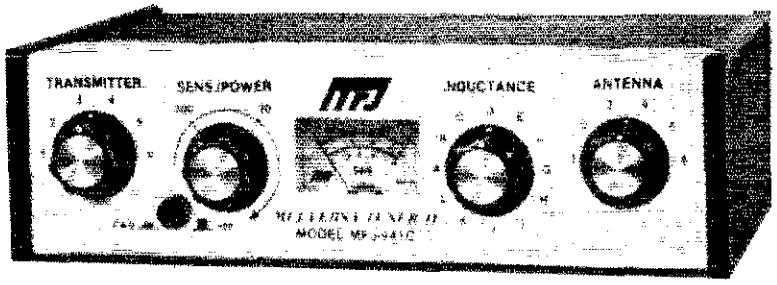
MFJ ENTERPRISES, INCORPORATED
Box 494, Mississippi State, MS 39762

MFJ ANTENNA TUNERS 16 MODELS

MFJ-941C 300 Watt Versa Tuner II

Has SWR/Wattmeter, Antenna Switch, Balun. Matches everything 1.8-30 MHz: dipoles, vees, random wires, verticals, mobile whips, beams, balanced lines, coax lines.



Ham Radio's most popular antenna tuner. Improved, too.

$89.95

Fastest selling MFJ tuner . . . because it has the most wanted features at the best price.

Matches everything from 1.8-30MHz: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

Run up to 300 watts RF power output.

SWR and dual range wattmeter (300 & 30 watts full scale, forward/reflected power). Sensitive meter measures SWR to 5 watts.

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.

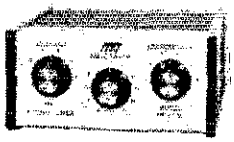
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

Works with all solid state or tube rigs.

Easy to use, anywhere. Measures 8x2x6", has SO-239 connectors, 5-way binding posts, finished in eggshell white with walnut-grained sides.

4 Other 300W Models: MFJ-940B, $79.95 (+$4), like 941C less balun. **MFJ-945, $79.95** (+$4), like 941C less antenna switch. **MFJ-944, $79.95** (+$4), like 945, less SWR/Wattmeter. **MFJ-943, $69.95** (+$4), like 944, less antenna switch. Optional mobile bracket for 941C, 940B, 945, 944, $3.00.

MFJ-900 VERSA TUNER



MFJ-900

$44.95 (+$4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient airwound inductor gives more watts out. 5x2x6".

Use any transceiver, solid-state or tube.

Operate all bands with one antenna.

2 OTHER 200W MODELS:

MFJ-901, $54.95 (+$4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $34.95 (+$4), for random wires only. Great for apartment, motel, camping, operation. Tunes 1.8-30 MHz.

MFJ-949B VERSA TUNER II

MFJ-949B

$139.95 (+$4)

MFJ's best 300 watt Versa Tuner II.

Matches everything from 1.8-30 MHz, coax, randoms, balanced lines, up to 300W output, solid-state or tubes.

Tunes out SWR on dipoles, vees, long wires, verticals, whips, beams, quads.

Built-in 4:1 balun. 300W. 50-ohm dummy load. SWR meter and 2-range wattmeter (300W & 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case 10x3x7".

MFJ-962 VERSA TUNER III

MFJ-962

$199.95 (+$4)

Run up to 1.5 KW PEP, match any feed line from 1.8-30 MHz.

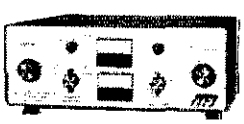
Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected.

6 position antenna switch handles 2 coax lines, direct or through tuner, plus wire and balanced lines.

4:1 balun. 250 pf 6KV cap. 12 pos. inductor. Ceramic switches. Black cabinet, panel.

ANOTHER 1.5 KW MODEL: MFJ-961, $179.95 (+$10), similar but less SWR/Wattmeter.

MFJ-984 VERSA TUNER IV



MFJ-984

$299.95 (+$10)

Up to 3 KW PEP and it matches any feedline, 1.8-30 MHz, coax, balanced or random.

10 amp RF ammeter assures max. power at min. SWR. SWR/Wattmeter, for./ref., 2000/200W.

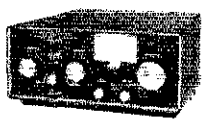
18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $209.95 (+$10), like 984 less ant. switch, ammeter. **MFJ-982, $209.95** (+$10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $179.95** (+$10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

$319.95 (+$10)

New smaller size matches new smaller rigs — only 10-3/4Wx4-1/2Hx14-7/8D".

3 KW PEP. 250 pf-6KV caps. Matches coax, balanced lines, random wires 1.8-30 MHz.

Roller inductor, 3-digit turns counter plus spinner knob for precise inductance control to get that SWR down.

Built-in 300 watt, 50 ohm dummy load.

Built-in 4:1 ferrite balun.

Built-in lighted 2% meter reads SWR plus forward/reflected power. 2 ranges (200 & 2000W).

6 position ant. switch. Al. cabinet. Tilt bail.

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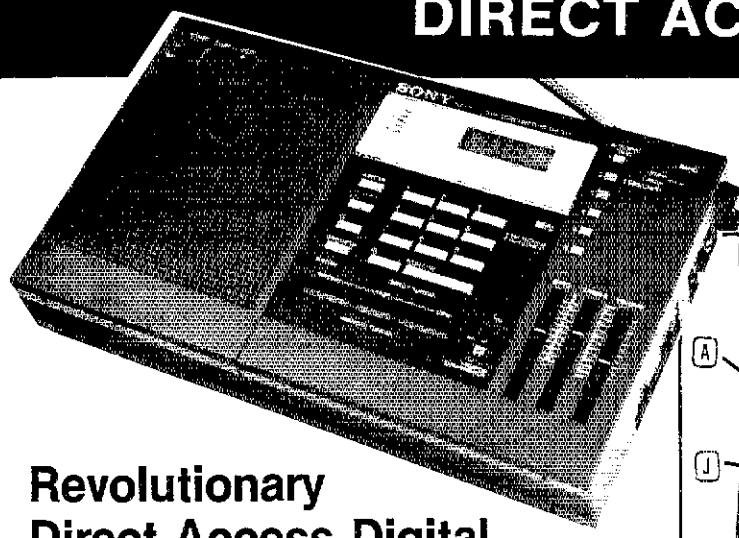
Box 494, Mississippi State, MS 39762

INTRODUCING SONY'S NEW DIGITAL DIRECT ACCESS RECEIVER!



only **$299.95** plus $5.00 shipping

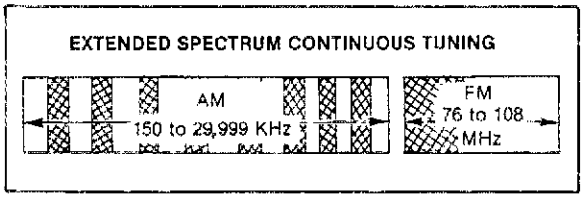
Revolutionary Direct Access Digital Shortwave Scanner

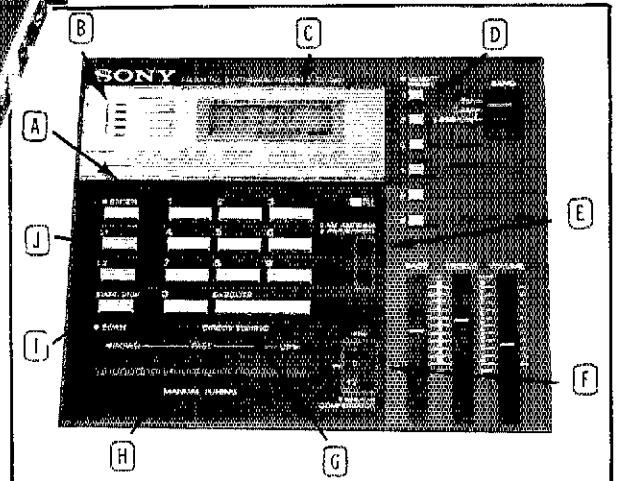
- **Continuous Scanning of LW, MW, SW, & FM Bands**
- **Instant Fingertip Tuning—No More Knobs!**
- **6 Memories for Any Mode (AM,SSB/CW, & FM)**
- **Dual PLL Frequency Synthesized—No Drift!**

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 rejection characteristics. The 10.7 MHz IF of the FM band is utilized as the 2nd IF of the AM band. A new type of crystal filter made especially for this purpose realizes clearer reception than commonly used ceramic filters. **ALL FET FRONT END** for high sensitivity and interference rejection. Intermodulation, cross modulation, and spurious interference are effectively rejected. **FET RF AMP** contributes to superior image rejection, high sensitivity, and good signal to noise ratio. Both strong and weak stations are received with minimal distortion.





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)

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SIXTH ANNUAL Tri-State Hamfest June 13 and 14. Set *up Saturday morning, Hamfest begins at 1:00 P.M.* Banquet Saturday night (RSVP). Location is Hernando, Mississippi at the National Guard Armory. Contact KA5GMU, 601-368-7034 (Charlie). Write C.A.R.A., P. O. Box 2, Hernando, MS 38632.

SEVENTH ANNUAL Hall of Fame Hamfest, July 19, 1981 at the Nimishillen Grange, 6461 Easton St., Louisville, OH. Flea Market opens at 9:00 A.M. $2.50 advanced, $3 gate, under 16 free. Tables for rent on a reserved basis. Flea market, awards, forums, food, XYL activities. Contact WA8SHP 10877 Hazelview Ave., Alliance, OH. 44601. 216-821-8794 for reservations or information.

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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.

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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 appreciated. Stu, K2RPZ, Box 412, Rocky Point, NY 11778 516-744-6260.

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QSLs Samples 30c (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

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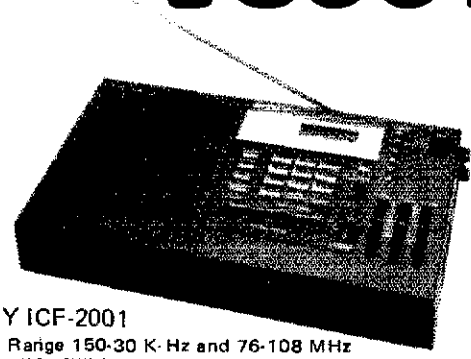

SONY ICF-2001

Freq. Range 150-30 K-Hz and 76-108 MHz

• FM/AM/SSB/CW/wide spectrum coverage • Dual-conversion superheterodyne circuitry of AM assures high sensitivity and interference rejection • Quartz-crystal, phase-locked-loop frequency synthesis for all bands assures the utmost tuning stability, without a trace of tuning drift • Direct-access, digital tuning keyboard and LCD digital frequency readout for quick, key-touch station selection—maximum accuracy and ease of use • Manual tuning and automatic scanning for effortless signal searching, easy DXing • 5-station presets, plus 2 auxiliary presets, for instant reception of memorized stations on any band-plus LDC memory indication • 5-step LED signal-strength indicator • Local/Normal/DX sensitivity selector for AM • SSB/CW compensator for low-distortion reception • Telescopic antenna, plus external antenna included • 4" speaker for full, rich sound • Slide-bar bass and treble controls • Sleep timer—with LCD readout—can be set in 10-minute increments for up to 90 minutes of play before automatic radio shut-off • Shoulder strap included • Integral stand allows tilt-up desk-top placement • Tape recorder jack allows off-the-air recording • Night-light for LCD illumination **CALL FOR OUR NEW LOW PRICE**

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Exceptional gain over ½ wave dipole • Omnidirectional radiation pattern, low angle • 50 ohm feed impedance • Field adjustable: 144-148 MHz • SWR at resonance: less than 1.1:1 measured at antenna • Bandwidth: 6 MHz for 2:1 or better SWR • Power: One kilowatt FM • Feed: Shunt with dc grounding • Radiator: collinear shunt-fed. Triple 5/8-wave elements in series, separated by 2 phasing coils to produce maximum gain and extremely low angle of radiation.

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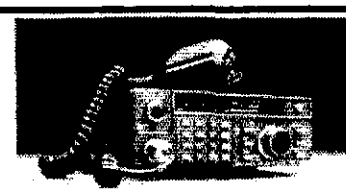
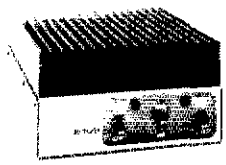


KENWOOD 7850

KENWOOD'S TR-7850 2 meter FM mobile transceiver has the most features for maximum operating versatility, the TR-7850 has a 40W output. Frequency selection is easier than ever, and the transceiver incorporates advanced memory developments for storage and recall of repeater offsets, priority, and scan. The front-panel pad also functions as an autopatch DTMF encoder on transmit.

CALL FOR DISCOUNT PRICE

MIRAGE B-108 Two Meter Amplifier



Features: 10W in—80W out or 2 Watts in 50 Watts output for Handie-Talkies. Built-in Receive Preamp, Adjustable Delay for SSB. Automatic Internal or External Relay Switching, Frequency Range 144 to 148 MHz. Works for SSB, CW or FM Modes, Receive Preamp Provides 10db Gain Min., 5 year Warranty (1 Year on Power Trans.).

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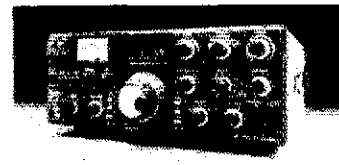

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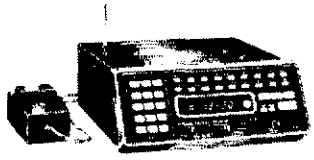

16 Channels. 30-54 MHz; 140-180 MHz; 410-514 MHz. Digital Clock. Date Display. 110 V. AC or 12-16 V. DC.
Seek Rate: Fast 10ch/sec
Slow 5ch/sec
Bright Green 9 Digit Frequency Display. Ext. Antenna Jack. Ext. Speaker Jack. Large Top Mounting Bracket. Scan Rate: Fast 8ch/sec.
Slow 4ch/sec
Scan Delay Time Variable 0-4 sec.

***NAV $399.00**

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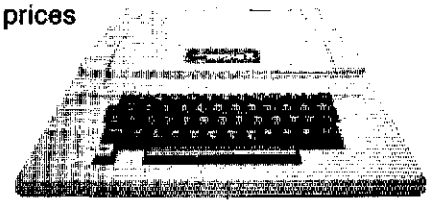

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Wilson M29 2mtr. 9 element	$24.95	Bearcat 211 Scanner	$249.95	Hustler G-7-144	$99.95
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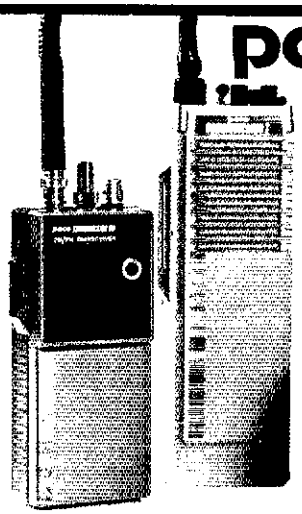
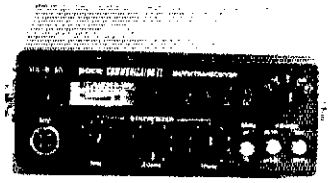


CLOSEOUT

PACE Communicator MX (left)
Compact, 2m hand-held FM Transceiver, 144-148 Mhz, 1 watt, 6 channels with 18 channel capability (6 simplex, 6 at +600 KHz, 6 at -600 KHz), 1 channel installed (146.52 simplex). Only one crystal per channel. Complete with flexible rubber antenna, nicad battery & charger. Size: 2¼"w×6⅛"h×1¼"d. Wt. 16 oz ... **CLOSEOUT $129.95**
Crystal Certificates ..... each 5.00

PACE Communicator I (right)
Hand-held 2m FM Transceiver, 144-148 Mhz, 3 watts with 6 channel capability, 1 channel installed (146.52 simplex). Complete with flexible rubber antenna and battery tray. Nicads and charger not included. Size: 8½"h×2⅛"w×1¾"d, Wt. 1.8 lbs ..... **CLOSEOUT $129.95**
Accessories for Communicator I:
B-1 Nicad Battery Pack (10 AA batteries)..... **$24.95**
C-1 Desk top AC Charger..... **39.95**
Crystal Certificates ..... each 5.00



PACE Communicator II
25 watt, 800 channel 2m FM Transceiver for 144-147.995 Mhz. Simplex, ± 600 KHz & + 1 MHz offsets. Requires 13.8VDC @ 5 AMPS. Complete with hand microphone, mobile bracket, base stand & power cables. Size: 2.8"h×6.4"w×11.2"d, Wt. 6.6 lbs ..... **CLOSEOUT $249.95**

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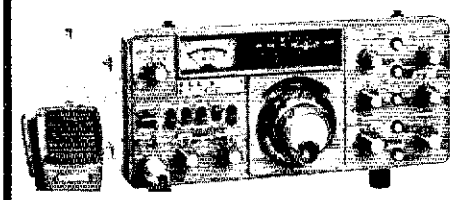
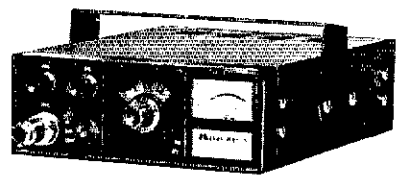


YAESU FT-625RD All-Mode 6 meter Transceiver. 1-25w output (variable), 50-54 Mhz; SSB, CW, FM & AM (8w). Digital plus analog readout. Built-in ±1 mHz offset, noise blanker & AC-DC supplies. Size: 11¼"w×5"h×12¾"d, Wt. 20 lbs. (Regular $895)..... **CLOSEOUT $599**



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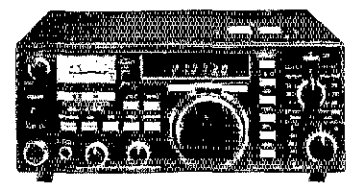

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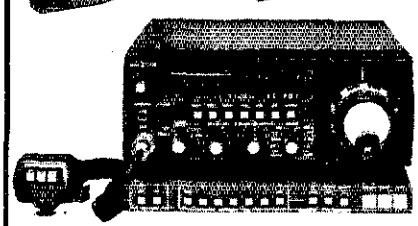

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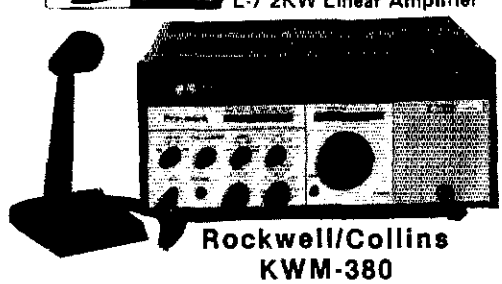

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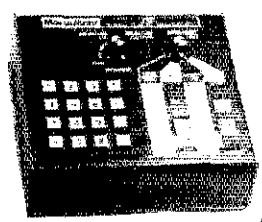
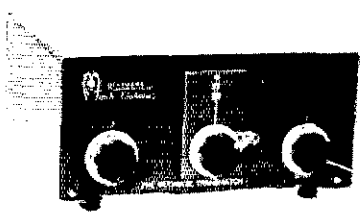
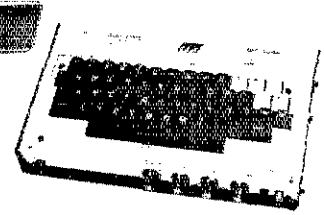


AEA Morse Matic

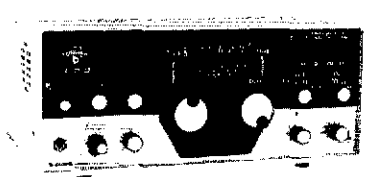


Murch Model UT2000B

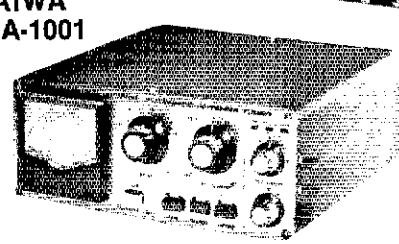


MFJ Keyboard 496, 494

DAIWA CNA-1001



CUBIC 103 Cubic 102, & 100MX



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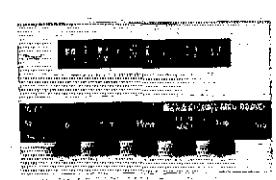

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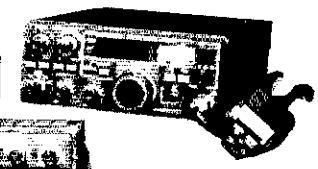

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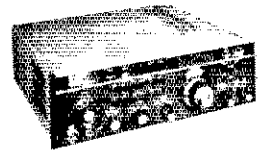

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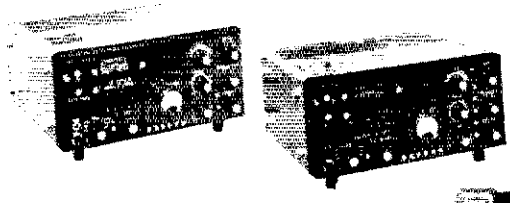

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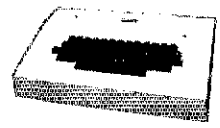

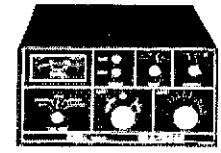

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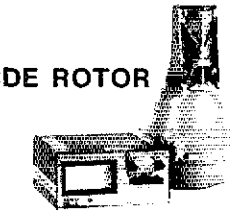

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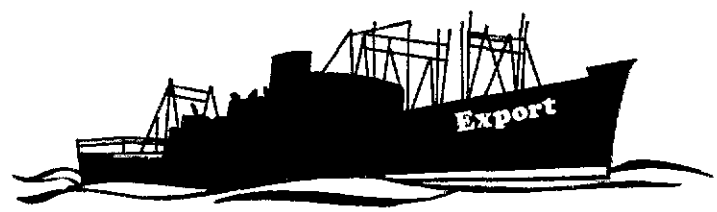

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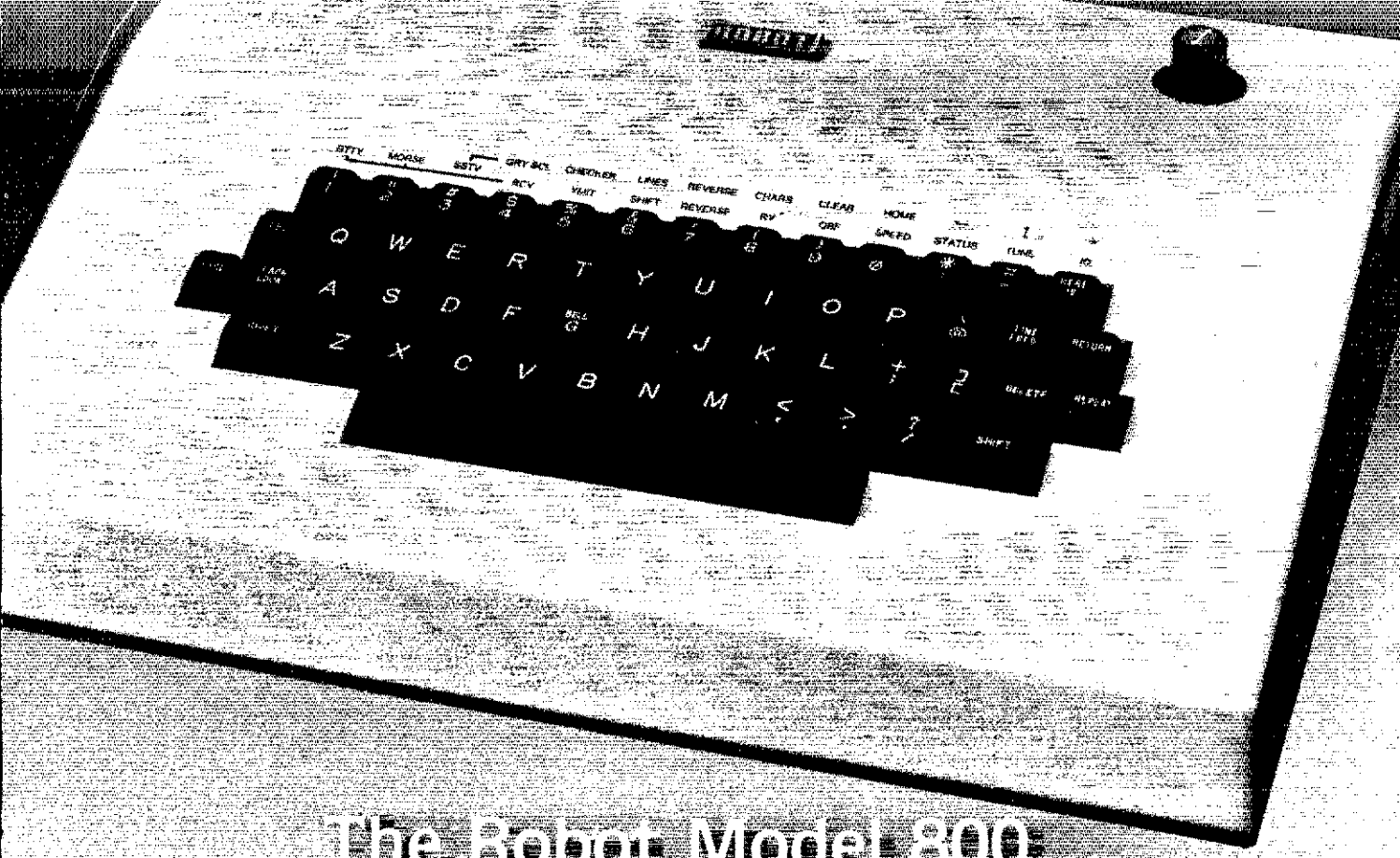

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Not just a keyboard, but the first integrated specialty mode terminal.

The Model 800 Super Terminal offers a complete list of features and capabilities, including our built-in demodulator, all in one package that connects directly with your amateur station's transmitting and receiving equipment. All that's needed to have a complete operating system is the addition of a standard TV monitor.

BAUDOT/ASCII OPERATING FEATURES

DISPLAY: Full 24 line by 72 character standard TTY display.

AUTO START: The Model 800 writes characters on the screen only after detecting the presence of an incoming RTTY or ASCII data signal. This prevents printing of unwanted random characters on the screen while tuning or during gaps in reception.

PROGRAMMABLE WRU (WHO ARE YOU) AND SELCAL FEATURES: Upon receiving a user programmed 8 character code, the Model 800 will automatically key the transmitter and transmit one of its 64 character (HERE IS) messages. Upon receipt of the user programmed 8 character SELCAL code, the Model 800 will automatically go into receive mode and store up to a full page of received information in its display memory.

HERE IS: The Model 800 has two 64 character programmable HERE IS messages.

ON SCREEN STATUS INDICATOR: A status line at the top of the screen tells the operator exactly which combination of operating modes have been selected.

ON SCREEN TUNING INDICATOR: Accurate tuning is an absolute requirement for accurate trouble-free reception during poor signal conditions. The best results are obtained when the output of the mark and space discriminator filters are equal in amplitude. The on screen tuning indicator in the Model 800 is the "plus-plus" type, which provides this information.

NEW FEATURES!

The 800 is now capable of split-screen operation! This enables you to type your response in the bottom half of the screen area while receiving. Receive copy is displayed in the upper half of the screen. This feature can be disabled for full screen display.

The transmit text buffer has been increased to 511 characters. In addition, a transmit cursor has been added which will show you which character is currently being transmitted at any given time.

CURRENT LOOP KEYER FOR HARD COPY

PROGRAMMABLE NARROW SHIFT ID

DEMODULATOR: The demodulator built into the Model 800 is superior in quality to any RTTY demodulator offered on the market. The key feature which makes this claim possible is the use of separate two tone active discriminator filters for demodulation of the RTTY signal.

ADDITIONAL ASCII OPERATING FEATURES: The Model 800 will send and receive ASCII at 110 baud. It has all of the transmission and editing features of the RTTY mode.

SIMPLE TO OPERATE

One of the most important features to keep in mind with the Model 800 is that all functions that are used frequently are easily accessed by the user. Many competitive units boast elaborate features which are either not used in amateur operation or that require complicated access procedures which make them inconvenient. All of the frequently used control functions in the Model 800 are either associated with a key which is labeled with the function, or have silkscreening above the key which describes the function.

MORSE CODE OPERATING FEATURES

OPERATION: The Model 800 has all of the transmission and editing modes of RTTY during Morse code operation.

MORSE AUTOTRACK: The Model 800 automatically tracks incoming code without manual speed adjustment. The speed range for transmission and reception is 3 to 99 words per minute.

SIDE TONE OSCILLATOR: The Model 800 has a built-in side tone oscillator so that the operator can listen to incoming code as it is interpreted by the computer.

MORSE CODE TRAINER: The Model 800 can be set to generate random five letter groups of characters at any preset speed for Morse code training purposes.

SPEED INDICATOR: In addition to all of the other functions, the status line in the Morse code mode indicates the speed of the incoming code.

SSTV GRAPHICS OPERATING FEATURES

The ROBOT Model 800 allows alphanumeric characters to be typed in an SSTV format, displayed on a TV monitor, and transmitted as a normal SSTV picture. This eliminates the need for "menu board" or hand-lettered SSTV pictures, thereby freeing up the slow scan camera or scan converter for other operations.

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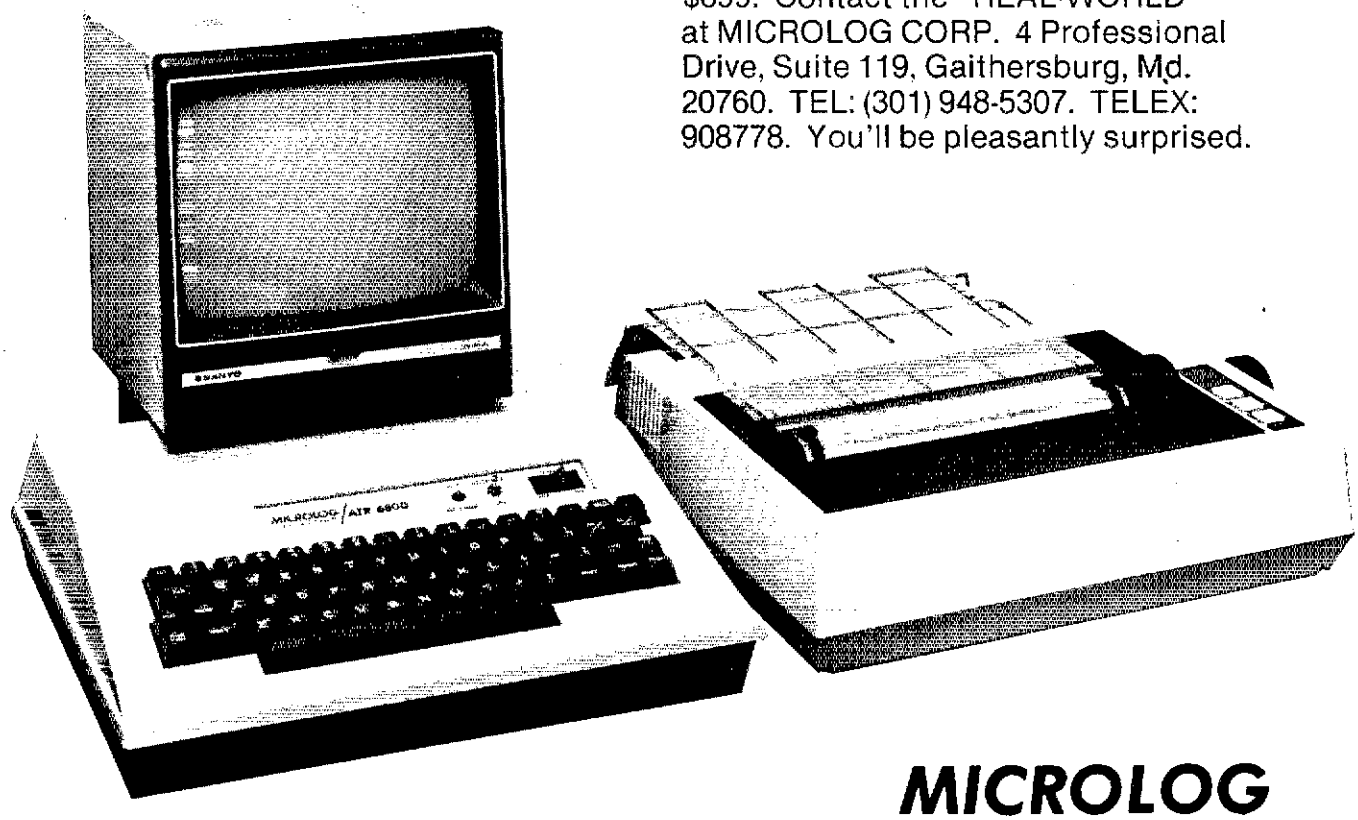

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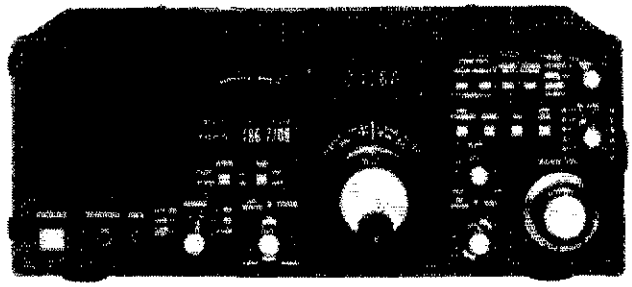

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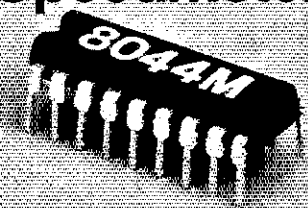

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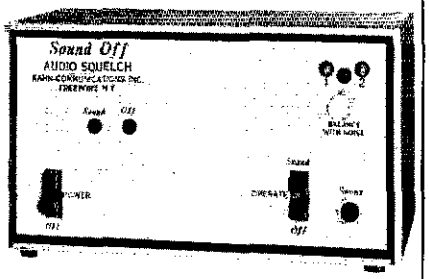

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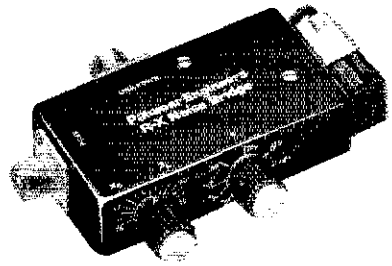

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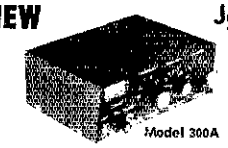

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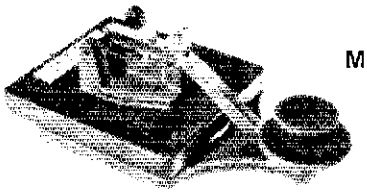

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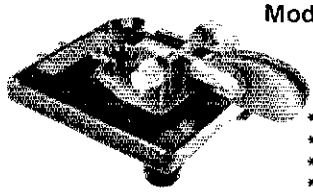

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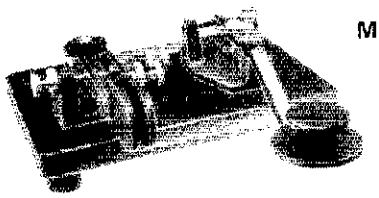

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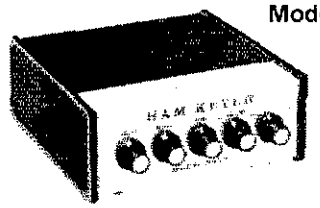

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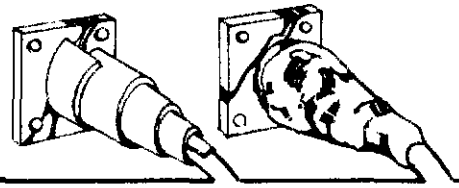

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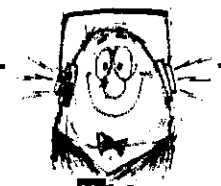

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DRAKE R-4B, T 4XB, AC-4, MS-4, 7075 Mic, manuals, dustcovers, excellent $600. Also, Telex "Tri-Band, Model TB2E, 10-15-20, $65. Hy-Gain 14 AVQ/WB, 10 thru 40 vertical trap, $30. Bill, WB3IDE, 207 N. 38th Street, Harrisburg, PA 17109 717-657-3059.

HW-8 MODS: RIT, wattmeter, audio filter, 15-m rx improvement, test report. Reprints of articles in May, August and October 1977 CQ by Ade Weiss, K8EEG. $7 to Ade Weiss, 83 Suburban Estates, Vermillion, SD 57069. Proceeds intended to support The Milliwatt DX-CC and FD awards program.

KENWOOD TS-820S cw filter, VFO-820 mint condition like new, used few hours complete $895, Shure 444D microphone $35 — N4TR 502-451-5916.

KENWOOD TS-180S with DFC, YK-88C cw filter, and YK-88S second ssb filter — $900. Mosley CL-33 Tri-band beam — $150. CD Ham III/CD-44 rotator $100. Rohn 25G 50 ft. tower — $100. Package for $1200. Moving into apartment, must sell. Will deliver New York and New England. Gene, W2INO, 518-756-2698 evenings.

TV sets built before 1956 and old TV Guides. W3CRH, Box 90-Q, Rockville, MD 20850 301-654-1876.

TRS-80 OWNERS Super-Log — Ultimate logkeeper. Lightning search and sort. Free bonus program included $16.95; Pass the FCC exam! 87% of our customers have. 10 theory programs per license class. Specify General, Advanced, or Extra $19.95 or 3/$39.95 MICRO-80 S-2665-T, Busby, Oak Harbor, WA 98277.

WANTED: Drake L-4B or Kenwood TL-922, Kenwood SP-820 and VFO-820. Top dollar if mint. W6WTL, 4027 Maple Tree Drive, Anaheim, CA 92807. 714-637-7934.

WANTED: Used radios and equipment. Reply, Ornie Smith Jr., Rte 2 Box 416-F Daphne, AL 36526.

ICOM TRIO/KENWOOD owners, very informative separate newsletters. Details, s.a.s.e. U.I.R.C. 364 Kilpatrick Ave., Port St. Lucie, FL 33452.

RTTY Closeout — 50Δ off of all RTTY equipment listed on my January, 1981 list. Send s.a.s.e. for six-page list of Model 14, 15, 28, 33 and 35 Teletype equipment, parts and supplies. Lawrence R. Pfleger, K9WJB, 2600 S. 14th Street, St. Cloud, MN 56301. Phone 612-255-9794.

YAESU FT 901 DM, cw and ssb filters, FV901 DM synthesized 40 memory VFO, speaker SP901P with phone patch. Used only 6 months. Jim Cooper, WB4SLV, 12442 Merlin Ave., Baton Rouge, LA 70816. 504-293-6943.

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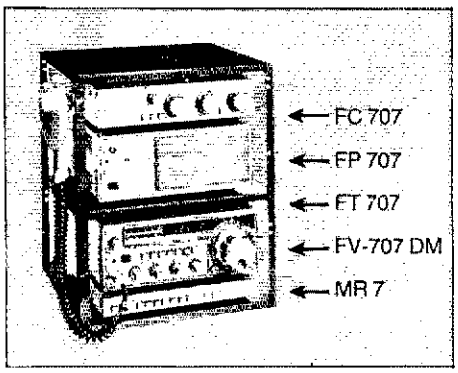

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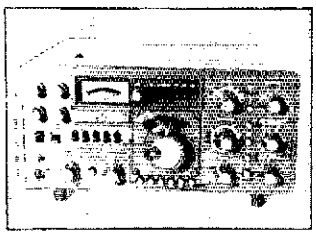

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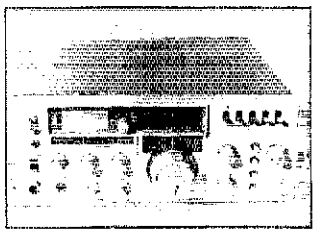

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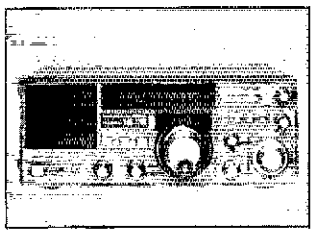

FRG 7700
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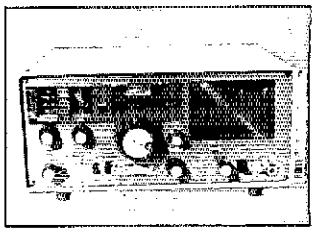

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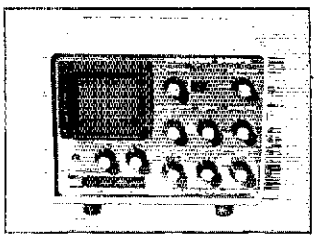

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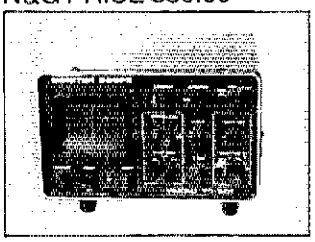

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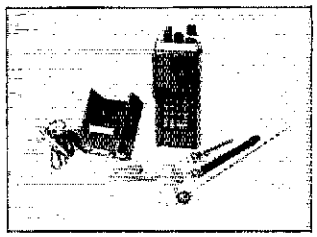

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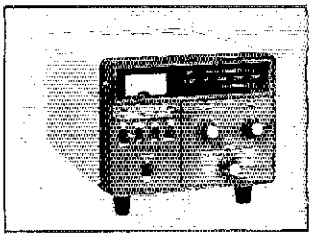

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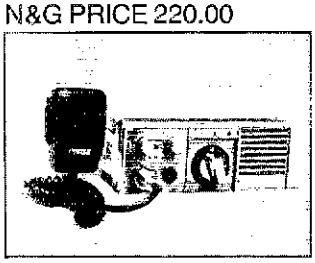

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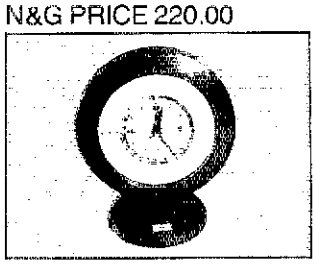

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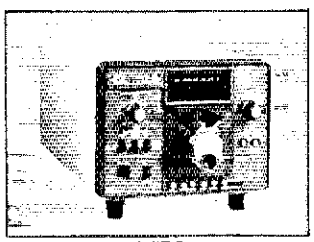

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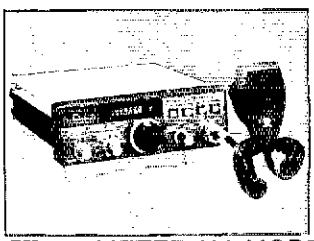

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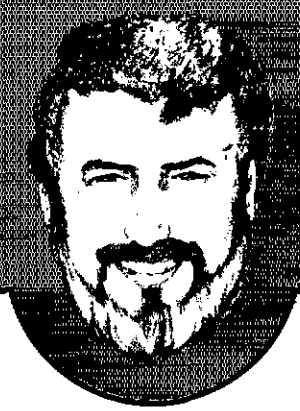

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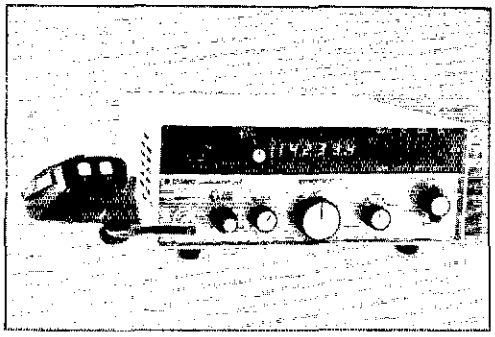

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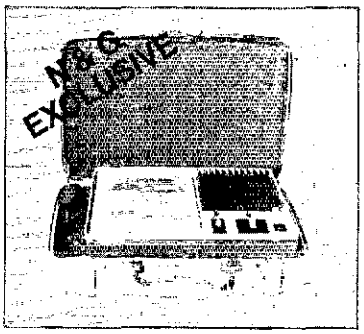

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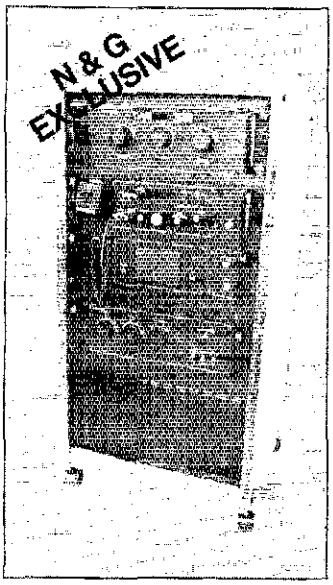

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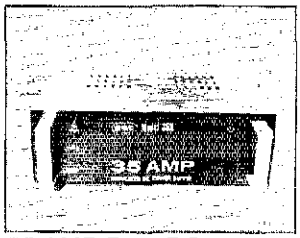

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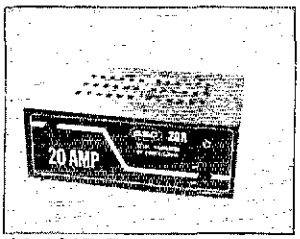

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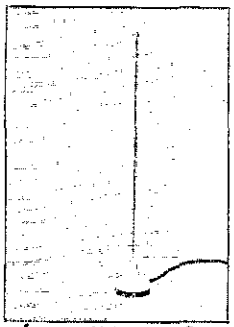

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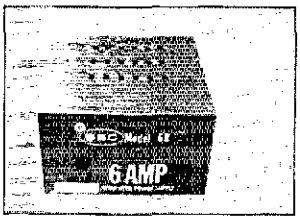

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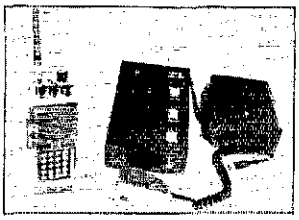

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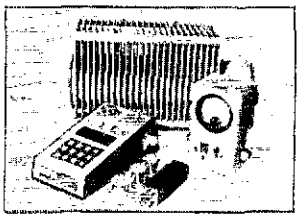

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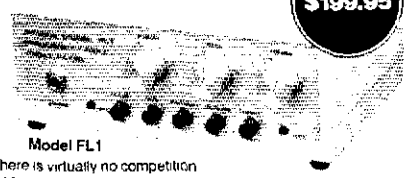

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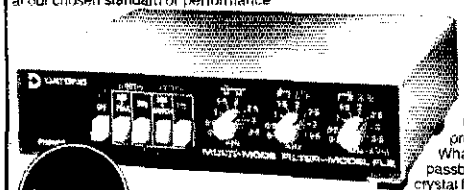
Model FL1



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To answer our question then, an "audio filter" can be almost anything. On the other hand, the phrase "Datong Audio Filter" is a lot more precise. It stands for state-of-the-art filtering backed by extra capability, extra thorough design and extra quality. If you need confirmation, ask a user!

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Just as our two audio filters set new standards for innovation and invention, our other products demand serious consideration for the same reasons. Each offers a unique combination of features which you will not find anywhere else. We don't have space here for the full story but our data sheets are available free on request. Some brief details follow:

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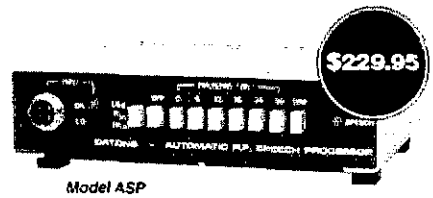

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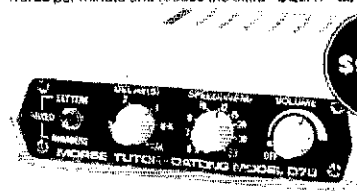

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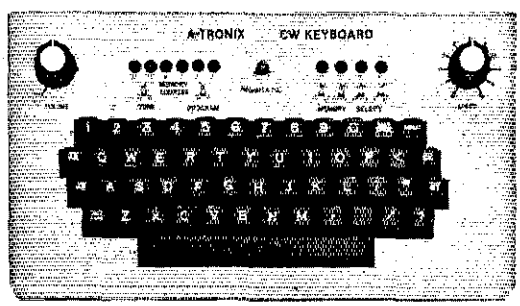

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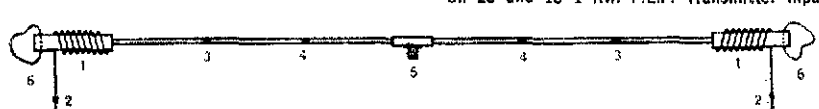

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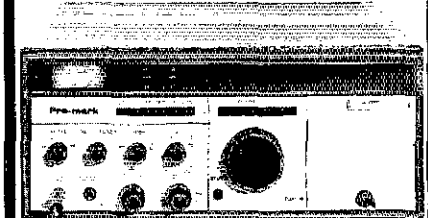

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SELL make offer, Millen solid state dipper, Swan 2 meter FM-1210A plus power supply, QST, CQ and 73 magazines — total 650 issues since 1945. Bill Mulligan WB4VAP, 150 Coral Circle South Daytona, FL 32019.

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MAIL AUCTION QST Magazines 1916 thru 1932. Send large s.a.s.e. and 50c for bid list and full description. Thomas H. Broome, RR-1 Box 1760 Felton, PA 17322. 1-717-993-6817.

HW8, HW7A pwr supply, fones, key, $100, Doug Frick, 6W 9th, Pottstown, PA 19464 Phone 215-323-1520.

WANTED 160 Meter mobile antenna. Patrick O'Bryan, WB6USZ, 1728 Townley, Simi Valley, CA 93063. 213-615-0311, extension 1651 or 800-421-2086, extension 1651.

HYGAIN 18HT 80 thru 10, pickup $195. Bank check W8CUT 1776 Walnut Coshocton, OH 43812.

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SWAN 500CX transceiver, 117CX power supply both like new with VOX, crystal oscillator, more. $475. or offer. Bob Reitz, 218 N. Fourth St., Sunbury, PA 17801.

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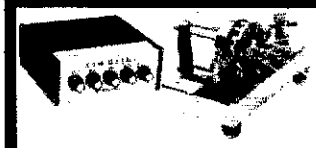

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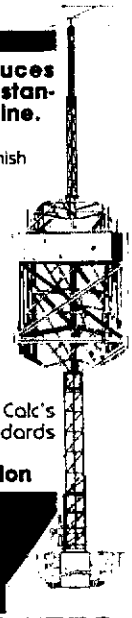

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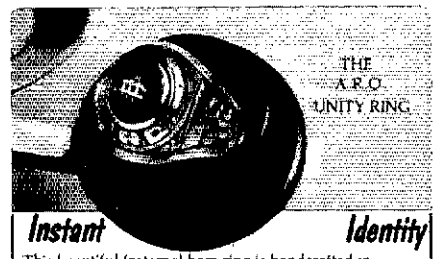

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Specifications:
COMPRESSOR:
Current Drain ..... Less than 4mA
Input Impedance ..... 600 ohms
Frequency Characteristics ..... 100 — 10,000Hz, ± 0.2 dB
Distortion ..... Within 0.4% at 300 — 3,000Hz
Dynamic Range ..... More than 46 dB

LINEAR AMPLIFIER
Input/Output Impedance . 600 ohm (High Imp. Mike avail.)
Frequency Characteristics ..... 300 — 10,000Hz, ± 0.5 dB
Gain ..... 25 dB (12V)
Power Source ..... DC9V (006P or ext.)
Accessories Included ..... * 4-pin mike plug, *3ft. long power cable
Dimensions ..... 8"(W) x 4"(H) x 5½"(D)
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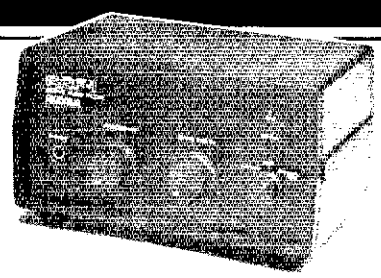

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Center Frequency Shift Width ... Between 200 and 2,500Hz
Variable Bandwidth Range . B.P.F: 100 — 10,000Hz (-12 db)
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Input Impedance ..... 8 — 600 ohms
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Semi-Conductor Used ..... 5 ICs, 1 Tr., 7 Diodes, 1 LED
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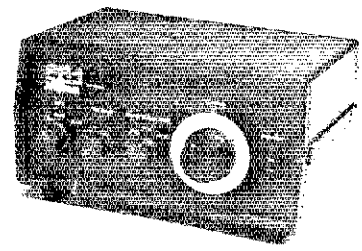

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Input/Output Impedance ..... 50-75 ohms
Relay Rated ..... 200W CW continuous
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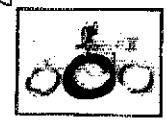

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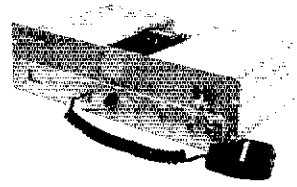

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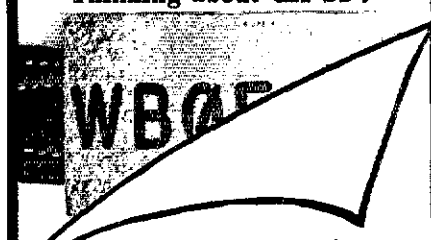

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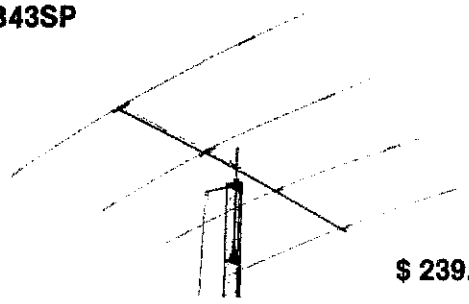

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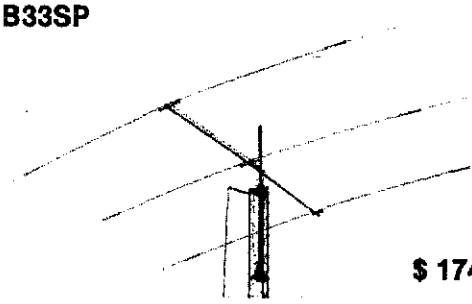

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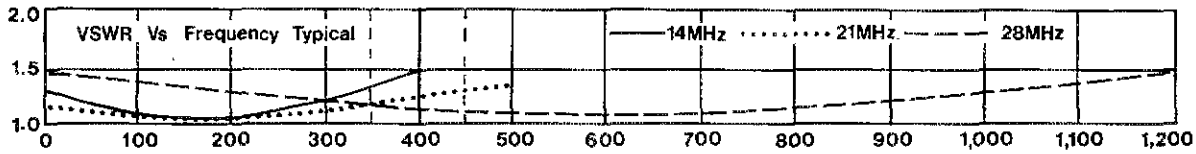
HB43SP	14/21/28	4	4	2KW	BELOW 1.5	50 Ohm	27'	19'8"	16'9"	6.62 s.f.	131.3 lbs.	2"	1½-2"	38 lbs.
HB33SP	14/21/28	3	3	2KW	BELOW 1.5	50 Ohm	27'	13'2"	15'0"	4.73 s.f.	102.0 lbs.	1-9/16"	1½-2"	27 lbs.



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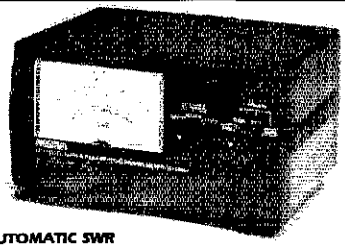

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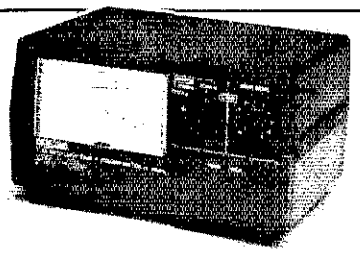

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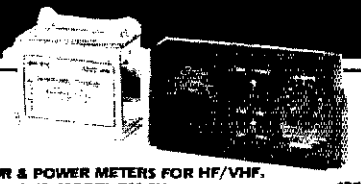

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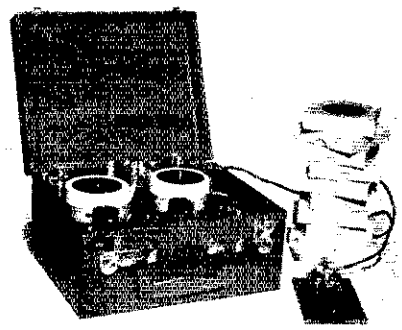

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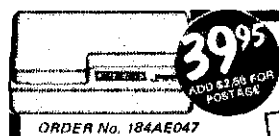

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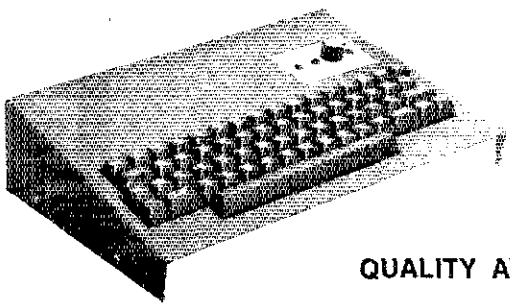

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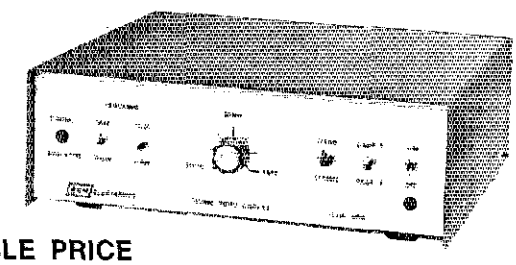

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YAESU VF301 VFO $100, plus shipping. Mint, phone 1-717-383-1060 KA3DPG Joe.

FOR SALE: Drake R7/DR7 receiver, mint condition, with 2.3, 4 kHz crystals and manuals, $1150. Tim Tillson, 2712 Adobe Dr., Fort Collins, CO 80525. 303-223-7364.

HEATHKIT SB401 with crystals and matching microphone $235. Galaxy R530 communications receiver $300. Paul Adler 25 Northfield Gate Pittsford NY 14534 716-381-8408.

MIRAGE B-108, exc. $130 KT4D 904-242-6844.

ELECTRON TUBES: Current and hard to find types special purpose, transmitting, receiving and cathode ray tubes. Send addressed stamped envelope for our free list. Tannenbaum, 202 Miriam Parkway, Elmont, NY 11003.

SELL: Kenwood TR-2400, leather case, rapid charger; little used-mint condition, E. Leviton, AB3B, 11708 Caplinger Road, Silver Spring, MD 20904.

QUAD KITS $18-$33. S.a.s.e. for information. WAC, 404 Sanders Rd., Huntsville, AL 35802.

WANTED COLLINS plug-in crystal bank part 522/0879/00 for KWM-1 w/wo crystals. W7LNX, 3207 West Mandalay Lane, Phoenix, AZ 85023 602-942-5670.

HELP. Who makes QSL cards that bleeds multi-colors from left to right across cards rainbow affect? WA4WME, 2308 Zinnia Court, Killeen, TX 76541.

COLLINS 75A4 serial #5199. 7360 mixers per QST July 1964. Good condition. $375 FOB. Jerry Vanaskey N8BM. 66 Randolph, Rochester, MI 48063. 313-375-9020.

WANTED Antenna Engineering Handbook by Jasik. AK9S, 15929 Hauley Road Rockton, IL 61072.

SELL: Digital Decwriter II LA36, perfect condition, pick up only $700 N2BJX DePew NY 716-683-5703.

TEN-TEC OMNI-D, factory mod, ps, mic, phone patch. $600 AC1W 203-729-0863.

SIGNALONE repairs. K6BE. 505-523-2897.

HEATH HW8/HWA7-1, $125. EES3201 digital techniques & trainer & IM5284 meter. $135. Amprobe RS-3/cased, $60. Simpson 260/cased, $70. BC221AC freq. meter, $60. All mint or excellent WB8COF. Fuller, Rte. 2, Delton, MI 49046 616-623-2569.

FOR SALE: Collins S Line 1973 vintage round, 75S3-B, 32S3, 312B4, 516F2, DX Engineering processor. $1850. PM2 $50. KLM 5 element 20 $300. 6 element 15 new $250. 5 element 10 new $125. Shipping extra. Paul W1CKA, 203-582-4885.

10 METERS: converted Cobra 138 ssb/am covers 28.5 to 29 MHz, continuous. No CB leakthrough, clean audio, eight watts P.E.P. $100 ppd. to 48. Steve Mottola, WB3GUS, 662 7th Ave., Swarthmore, PA, 19081.

QST advertising policy requires that its advertisers (1) be responsive to League members in handling complaints, and (2) stand by and support all claims and specifications mentioned in the ads.

FOR SALE: Ten-Tec 509 Argonaut, 206A xtal cal, 208 cw fltr, 210 power supply, KR5-A keyer, $375, firm. Autek QF-1 active fltr $25. ERC SL-56 (converted SL-55) active fltr $40. Skytec spkr $10. Microcraft cw reader (Morse a word) $185. All items mint condx. Will ship UPS. Certified check or MO only. R.S. Crowell 640 Stonehenge Dr., Mary Esther, FL 32569. 904-244-0307.

BUILD antenna tuner from brand-new ARC-5 transmitters. Conversion data included $18.95. Send for Gov't. surplus catalogue 50c. G&G Radio 45-57 Warren Street, New York, NY 10007, 212-267-4605.

SELLING Hallicrafters SR-42A 2-meter am transceiver with xtals and VFO, $50; Lafayette HA-650 6-meter portable am transceiver, $30; Regency HRT-2 2-meter fm handset with xtals and charger, $60; Hy-Gain WVG-MK2 hf vertical antenna, $15; all plus shipping. Willard Prentice W3VBM, 2419 Chetwood Circle, Timonium, MD 21093 phone 301-252-6287.

FOR SALE: Kenwood TS-820 transceiver, excellent condition. Call 517-773-7120, Ernest Lloyd.

WANTED: Salvageable Ten-Tec Triton IV's, 540s or 544's and accessories. Dropped, struck, etc., state condition, all replies answered. Duane Grotophorst, KA9HKL, RR1, Sauk City, WI 53583.

YAESU FL-2100-F linear, used very little $395 — Yaesu 75B mobile and base crystal transceivr $150 Autek QF-1 audio filter $15 — Skytec cw speaker $10 Micronta power/modulation/SWR tester $10 — "HAMKEY" dual key $20 — two Archer nicad chargers $8 each — You pay shipping. KB4PQ, fone 305-574-2496.

HEATH HW-101 transceiver, HP-23B power supply, speaker $275 or best offer. HW-16 transceiver, HG-10B VFO $100; DX-60B transmitter $60. You ship. WA2HWO 201-239-8235.

TEN-TEC ARGONAUT 509 with KR50 keyer-208 cw filter-210 power supply — 405 linear-250 power supply 206A crystal calibrator $450. No separate sale. You pay shipping. KB4PQ fone 305-574-2496.

GOING Overseas must lighten load! SB-301, SB-401, SB-620 (Scanalyzer), SB-630 (Monitor Scope), SB-650 (digital dial), SB-600 (Speaker) $695, for all. SBE-34 $235. All top shape. With cables manuals. You pay shipping. 408-385-5723/WA8ZLJ, 111 Division St. #19, King City, Calif. 93930.

TEST Equipment: two HP618B signal generators 3.8 to 7.6 GHz $180 each. One HP340B noise figure meter $160 K3GHS. Bill Schlosser 902 Atherton St. Clarks Summit, PA 18411. 717-587-5758.

SALE: Johnson Viking I with Hallicrafter HT-18 VFO. 1.8 to 30 MHz. am and cw. $100 W3AP 215-678-4310 evenings.

COLLINS KWS-1, mint, with shipping crates, $695, or best offer. WB8IPG, 26316 Falmouth; Warren, MI 48089 313-759-4539.

YAESU YO-100 scope, mint, $175. Microlog AVR-1, cw, RTTY, ASCII, 12" monitor, $350. WDØCYL. 303-245-8866.

GUY WIRE, non conducting solid nylon 200lb. Test #14 on 720 foot rolls. $12. each plus $2. shipping. Porcelain insulators, 2-1/2" long by 1" thick, 7/32" holes $1. each plus 20c shipping. New Yorkers add tax. Jug Wire Company, 2234-36th Street, Woolsey, NY 11105.

SONY ICF-2001, $250, Panasonic RF-2900 $220. Mint. K8CV, 1-313-549-1846.

FT-101 MKII, cw filter, fan, FV101, SP101, mic, extras, $575. Steve, WB6RSE 213-648-0756.

CRYSTALS: Build something! Experiment. FT-243's general, novice, any frequency, .01%, 7000-8700 kilocycles $1.75, minimum five $1.25 each. 3500-4000 $2.95, five $2.50. 160M $3.45, five $2.95. Sockets 50c. Airmail 25c per crystal. "Crystals Since 1933" WØLPS, Stamp for 1700-60000 Kilocycles — listings-circuits. C-W Crystals, Marshfield, MO 65706.

MINT IC-551D with IC-PS 20, $589. W7AVD.

WANTED: Drake MS-4 speaker, Drake SW-4A manual, crystals for Drake SW-4A and R-4 receiver. R. Lotthouse 4858 Via Colina, Los Angeles, CA 90042 213-255-6177.

ARRL Collectors: Limited supply of dealer posters available in full color: "It's Here!" (1981 Handbook) 24" × 36"; "Available Here" (Tune In The World With Ham Radio) 25" × 31". Either for $4.00 plus $1.50 shipping. ARRL, Dept. "C", 225 Main Street, Newington, CT 06111.

COAXIAL Cable sale — free catalog — RG-8X (Mini-8) low loss foam 95% shield, blue jacket — 22c/ft; Belden RG-8/U 80% shield — $20./100'; RG-213/U noncontaminating, milspec, 95% shield — 36c/ft; RG-58A/U stranded, 80% shield — 11c/ft; RG-59/U 75 ohm — 10c/ft; 8-conductor rotor cable — 19c/ft; shipping $2.50/100' NEMAL 5685 S.W. 80th Street, Miami, FL 33143 305-661-5534.

KENWOOD TS-520SE with cw filter, $475. AT-200, $95 SP-520, $20 All mint, with manuals, WB7VOO, 602-298-4820.

MFJ-949 Versa Tuner, 300W with dummy load, $90. Heath HD-1410 keyer, $40. N7BFN 13209 SE 336th Place, Auburn, WA 98002.

FOR SALE: Galaxy GT-550 xcvr. 80-10 meters; 250 watts. New finals, recently overhauled. Excellent condx. With VOX, a.c.p.s. Asking $275 Dave Halpern 1891 Plymouth Dr., Westbury, N.Y. 11590 Tel. 516-334-7520.

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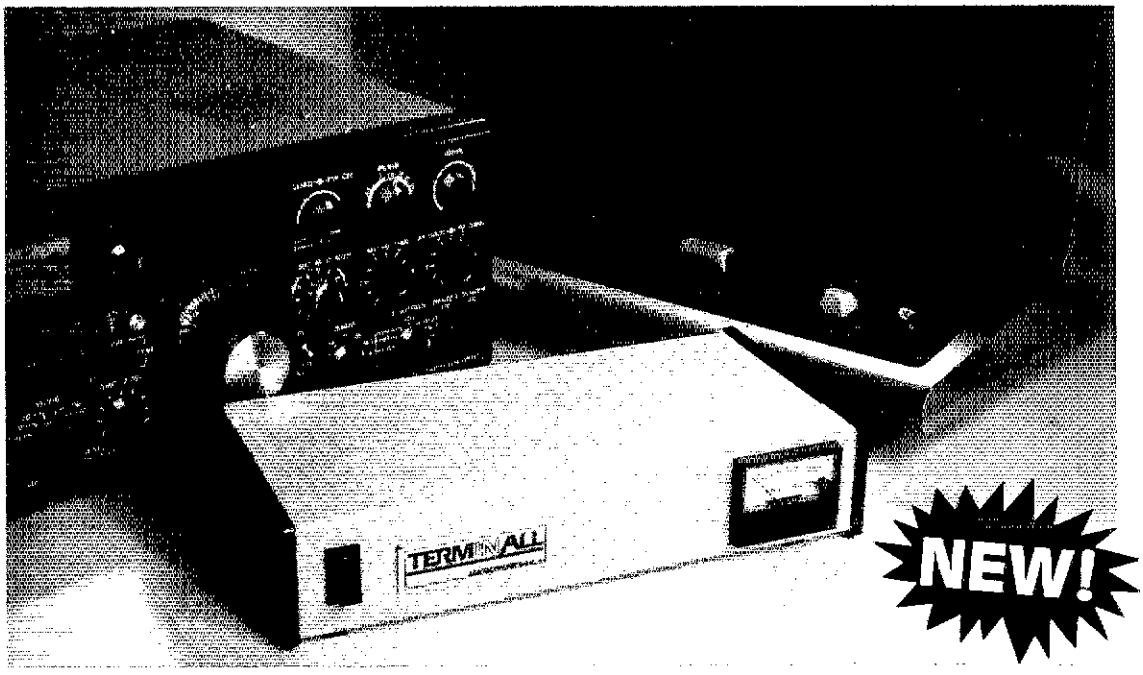

TERMINALL is a hardware and software system which converts your TRS-80 (Model I or III) into a state of the art communications terminal. TERMINALL is simple to use. TERMINALL has superior performance. TERMINALL works with a general purpose computer and is expandable. TERMINALL has it all!

Simplicity

TERMINALL was designed from the outset to be easy to connect to your radio and easy to use. Plug into your receiver headphone jack and copy Morse code, Baudot or ASCII. Plug into your CW key jack and send Morse code. Attach a microphone connector and send Baudot or ASCII using audio tones (AFSK). That's all there is to hooking it up.

The software may be loaded into your computer from cassette or disk. Enter your callsign and the time and you will start receiving immediately. No settings or adjustments are necessary to receive Morse code—it's fully automatic—and it works! You may type your message while receiving or transmitting.

You will be on the air, receiving and transmitting any mode in minutes. As we said, TERMINALL is simple.

Superior Performance

TERMINALL can do so much that it's simply not possible to list all the features in this limited space. Here are just some of the highlights:

■ **Multi-Level Displays:** Edit window on top to enter transmit text or program messages. Status window displays mode, operating parameters, prompts and error messages. Dialogue window displays received and transmitted text in chronological order. Review window allows examining and editing historical text while receiving or transmitting.

■ **Fantastic Morse reception:** Six stage active filter demodulator copies the weak ones. Auto adaptive Morse algorithm copies the sloppy ones. Keyboard selectable noise threshold. Received code speed displayed on status line.

■ **Hardware clock:** Maintains correct time during all operations, including cassette I/O. User programmable time/date format.

■ **Full ASCII capabilities:** Upper and Lower case, control codes, even/odd/or no parity, 6, 7 or 8 data bits, 75 or 110 baud.

■ **Multiple user-defined WRU:** For each of four WRU functions, you can select any combination of (1) Initiate sequence, (2) Terminate sequence (including none or timeout), (3) What to transmit back (if anything—including ID in any mode, message, serial number, time/date), and (4) Whether to save on tape or not. WRU functions work in all modes (Morse, Baudot, ASCII).

■ **Buffered ASCII** parallel printer output: Select: edited historic text; all text, or WRU activated ("AUTO START") text.

■ **Word wrapping,** word mode editing, diddle, ignore carriage returns, user programmable end of line sequence, adjustable carriage width, Transmit delay (fixed, none, or auto adaptive), Break mode, Keyboard selectable: baud rate, shift, CW ID keying, unshift-on-space, signal invert.

■ **Flexible interfacing:** Builtin: Separate CW and RTTY demodulators, AFSK, CW and PTT keying, 20/60 mil loop interconnect, RS232 IN and OUT, hand-key input, sidetone output, and jumper selectable 110/220 volt AC power supply.

General Purpose vs Dedicated

TERMINALL has capabilities far surpassing other "dedicated terminal" systems. And yet, since it works on a general purpose computer, the majority of your investment (the TRS-80) is spread out over many different applications—not just radio communications. And your system is expandable. For example, Disk based mailbox software may be added at any time.

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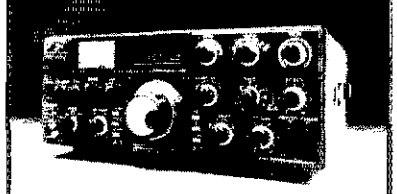

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DONS CORNER

Best new buy in HF AC Transceivers-Kenwood TS830S. Reports are great, failures low, deliveries steady.

Best used buy—Collins KWM2. Excellent backup rig or primary station at cheap prices if you look hard. Suggestion: buy Round Emblem if possible, they were built in the 70's.

Try the new Mint RG-8 from Belden or other quality brands. Good for a KW to 30MHZ. RG-59 outer diameter. Flexible and clearer than RG-8. 95% braid, foam, easy to put connectors on.

Be sure to try Coax-Seal. New product on market for wrapping coax connectors. Works great on air leaks on my truck!

New items/ideas. Watch for radios with more features at cheaper prices to come along. Example: TS820S replaced by TS830S which is a better set.

One notable exception, the Rockwell KWM 380, the quality is there regardless of price.

Come see your favorite manufacturer/dealer in Houston, August 2-4, 1981.

See you next month!

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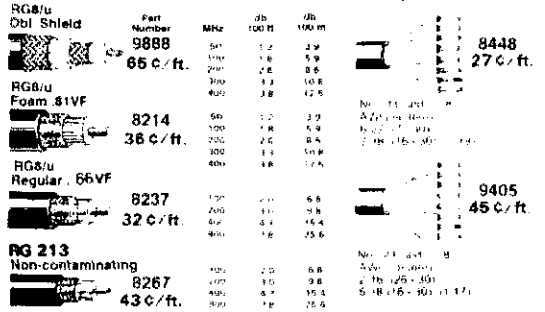

Belden Mini RG-8 (9258)-19¢/ft.

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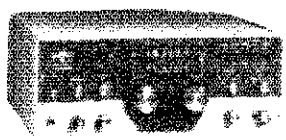

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AZDEN PCS-2000, TT mike, mint, $200. Thurber, 317 Poplar, Millbrook, AL 36054.

PRINTER — Heath H-14-ptt cond, calibtd at Heath center $490. Neal, WD9IWG, RR 1, Onalaska, WI. evenings 608-783-7767.

SALE: De luxe Cubex 3 element quad — $150. Heath model IM-30 transistor tester $35. 140 watt 2 meter amplifier $125. K3SLJ 717-622-2398.

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IRCs — 30c each, over twenty postpaid. B. Carling, 5131 Raywood Lane, Nashville, TN 37211.

PROG-LINE 2-meter range, $75 pick up KB2TN. 212-543-8349.

BUY-SELL-TRADE your ham computer, electronic equipment in Computer Trader. Send s.a.s.e. for details. Chet Lambert, W4WDR, 1704 Sam Drive, Birmingham, AL 35235.

YAESU FT-101E w/cw filter and spare tubes, digital display, FL-2100B linear, SP-101B spkr/patch, Dentron MT-2000 tuner, MFJ-751 filter. All mint, like new, immaculate. $999/best offer. You ship. WH6ACM, Box 1791, Kahului, HI 96732.

FANTASTIC SALE!! Cleaning shack!! Accepting any reasonable offers for HW-16 (2) antenna tuners (2) — RS3 meter, antenna switch, Hw-7 QRP — complete two meter HW-202 mobile station with 40W amplifier — cb/am old messenger two Johnson with D-104 QF1A filter, s.a.s.e. for details Jim Howell, Route 9, Box 251, Salisbury, NC 28144.

GENTURY 21 cw transceiver w/keyer $250. Yaesu FT-202R 2m H.T. with charger, 12V adapter, extension mike/speaker, leather case, $160. Drake TR-33C 2m $90 All excellent UPS extra K4JCX, 121 Maple, Oak Ridge, TN 37830.

HEATH SB-301/401, cables, manuals, recent align, good condx $450. K1WF, 617-945-3682.

COLLINS 200 cycle filter; X-455KO-Q20D $125. Fred Maas, Rt-3 Box 86-H, Santa Fe, NM 87501.

FOR SALE: HEath HR-10B receiver, DX-60B transmitter, HG-10B VFO $175 KA5LAN 701 Woodvale Avenue, Lafayette, LA 70503.

WANTED: Manual for oscilloscope LA265A 6625993 0282 AF 36(600)17409. K5019 0010 MFG 35225. Peter O'Dell, KB1N, 7 Brian Rd. South Windsor CT 06074 203-666-1541 days.

SELL: KDK-FM-144 synthesized 2 meter rig, 15-W. Excellent condition. No mods! Xmtr tuned to 146-147, $180. Motorola TAD-6170A never opened. $25 Peter O'Dell, KB1N, 7 Brian Rd., South Windsor, CT 06074. 203-666-1541 days, 203-644-3543 weekends

AZDEN PCS-3000 and PCS-300 talkie. You can't buy a better rig, and we'll beat any price in this issue! LCC Engineering 116 Country Farms Road, Box 140, Marlton NJ 08053 609-983-8844 6P.M. till midnight.

YAESU FT-301 transceiver, FP-301 p.s., mic., mint condition, shipped in factory cartons. $550. K5EFW, 505-877-2731.

HARDLINE 1/2" 50Ω, 59c/ft. Business s.a.s.e. JRS Electronics, (WA8OGS), 6381 Mullen Road, Cincinnati, Ohio 45239

KENWOOD R1000 rcvr, new, factory sealed $400. Kermit Frye, KA5KEW, 12133 Genoa NE, Albuquerque, NM, 87111, 505-298-2803.

SELL Drake TR4, Homebrew p.s., 212-NE9-8863. Write WA2HBE.

FOR SALE: complete Yaesu station, FT 301D, latest model; FV 301D external VFO; power supply FP 301 D with combined speaker-clock and ID; monitor scope Y 0301; Landliner LL 301 phone patch and relay box for FT 301. Mint condition, all original manuals, cords and connectors. Will ship UPS. $1000, Firm. WB5RNC, P. O. Box 5566, Corpus Christi, TX 78405. 512-883-8511 daytime only please.

FOR SALE: Heath SB-500 2-meter transverter. Factory wired. Excellent condition. $100. Gary Hitchner, WA2OMY 215-539-6409.

FOR SALE: Heath HX-1681, HR-1680, HW-101, HM-102, ac pwr supply for HX-1881 & HW101. Call: 915-694-4581. KA5GUC.

SALE: Microlog AKB-1, AVR-2 these units have about all factory options; also a Sanyo VM 4209 9" Monitor. Total list is over $1900, all with manuals, will ship for certified check for $900. Offered as a unit only. WB2RLI Duane, Endwell, NY 607-748-0833.

WANTED: Kenwood T-599D transmitter. Gary Hitchner, WA2OMY 215-539-6409.

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Regency HR T2
Regency HR-2, A
Regency HR-212
Regency HR-2B
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Regency HR-2MS
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6.61R	
6.04T	6.52R
6.64R	6.55T
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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
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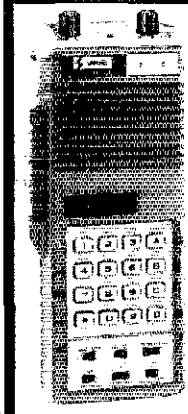

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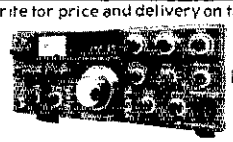

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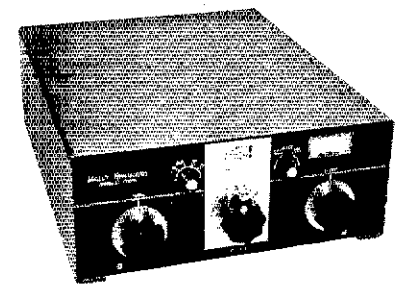

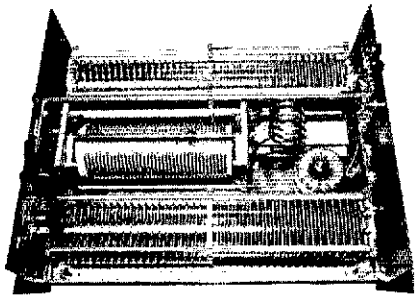

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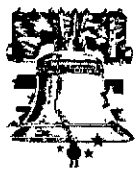

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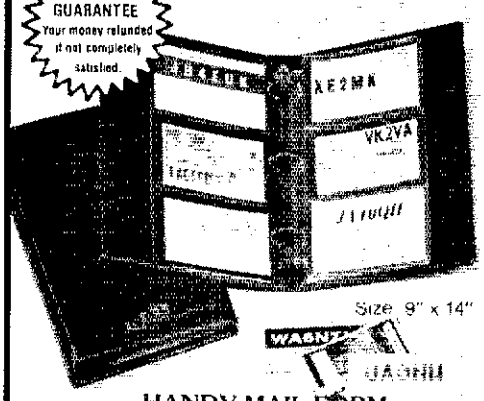

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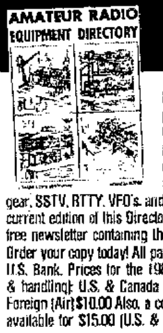

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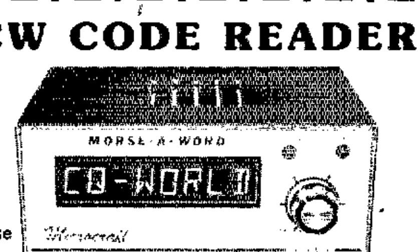

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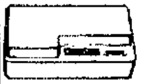

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Converts cable channels to a common IF frequency. Experimenters – build cable converters, decoders, etc. With schematic. No. 348VA342 — **19.95** ($17.50 ea./10)

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YK-88SSB	SSB filter	59.95	save	call
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HS-5	Deluxe headset	34.95	save	call
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MC-35S	n/c mob mic	29.00	save	call
MC-45	TTN mic	44.95	save	call
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YAESU

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SOLID STATE HF TRANSCEIVERS

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VHF TRANSCEIVERS

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DC-902	DC-DC conv	60.00	save	call
SP-902	Speaker	35.00	save	call
SP-902P	Speaker/patch	76.00	save	call
FTV-902R	Transv w/2M	389.00	save	call
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YO-902P	Monitor w/scope	515.00	save	75.00
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FV-902	Antenna tuner	199.00	save	call
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ZD-1	digital readout	150.00	save	call
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FRG-7700	Gen cov dig	549.00	save	call
FV-707DM	Dig scan/mem	279.00	save	call
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FC 707	Antenna tuner	110.00	save	call

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FT-720RU	440-450 FM	499.00	save	73.00

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FP-4	4amp P/S	50.00	save	call
FP-12	12amp P/S spkr	135.00	save	call

ACCESSORIES FOR 207R

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NC-2	3hr charger	90.00	save	call
NBP-9	Battery pack	23.00	save	call
FBA-1	Battery sleeve	8.00	save	call
LCC-7	Leather case	35.00	save	call
TA-2	Telesc. antenna	9.40	save	call
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		List Price		
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551	6M, ssb, cw	479.00	save	call
551D	6M,80W,12V with ex107,ex108	699.00	save	call
551D/PS	6M,80W,w/AC p/s 20	928.00	save	104.00
720A/PS	9 band HFxcvr AC & 12Vsup/mic	1498.00	save	call
730	10-80M HFxcvr 12V w/mic	829.00	save	call

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260A	2M,ssb,fm,cw,mem	499.00	save	call

PORTABLE TRANSCEIVERS

2AT	2M, ttpad,nicad	269.50	save	call
202S	2M,ssb,portable	279.00	save	call
402	430MHz,ssb,port	389.00	save	call
502A	6M,ssb port	239.00	save	call

POWER SUPPLIES

3PE	AC to 12V 3A/spkr	95.00	save	call
PS-15	12V p/s - 720	149.00	save	call
PS-20	20A p/s - 551D	229.00	save	call

ACCESSORIES

EX-106	FM option	125.00	save	call
EX-107	VOX option	55.00	save	call
EX-108	PBT	105.00	save	call
BC-20	nicad supply	57.50	save	call
BC-30	rapid chgr	69.00	save	call
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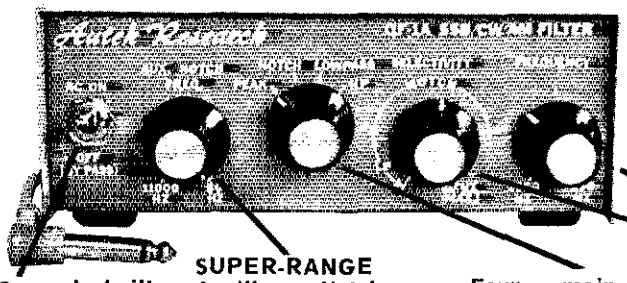

115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

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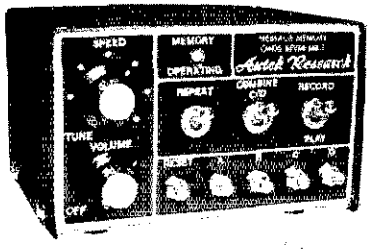
Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio 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!

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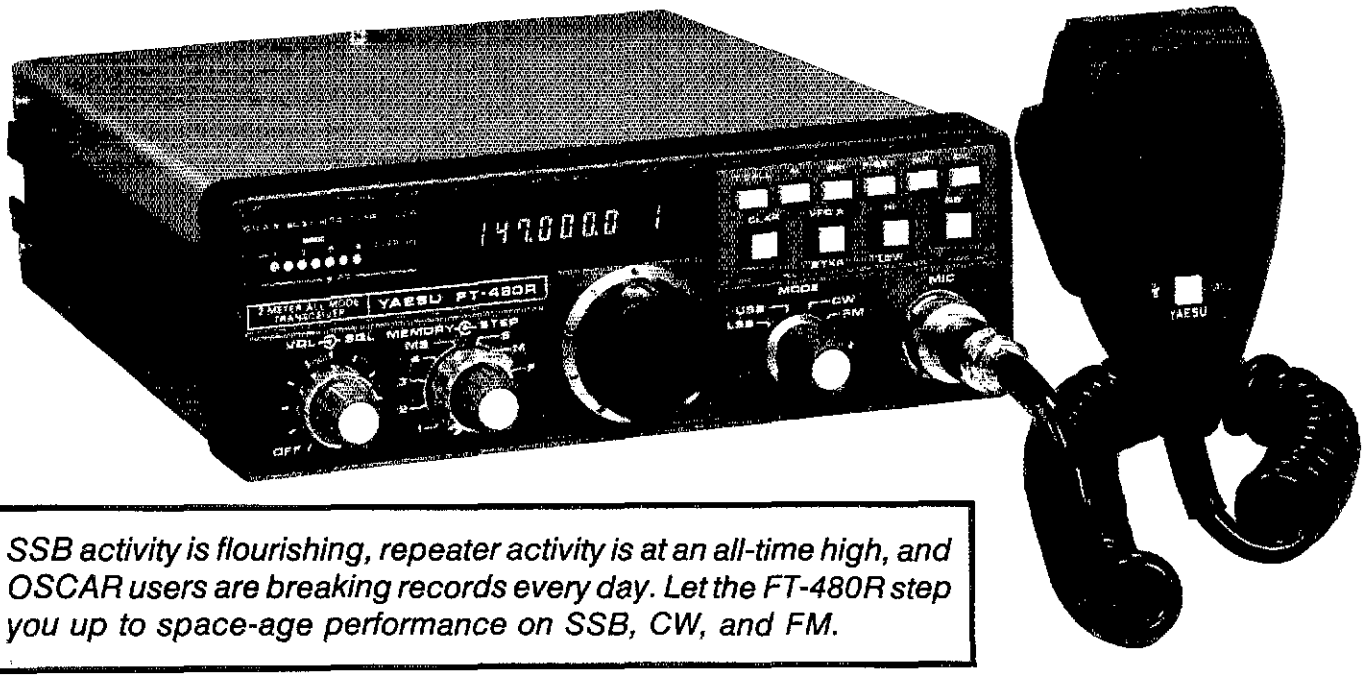
With the Yaesu FT-480R . . .

TWO METERS COMES ALIVE!



SSB activity is flourishing, repeater activity is at an all-time high, and OSCAR users are breaking records every day. Let the FT-480R step you up to space-age performance on SSB, CW, and FM.

Features

- Coverage of 143.5 - 148.5 MHz (good news for you MARS operators)
- USB, LSB, CW and FM operation are all built-in
- Four channels of memory, with priority channel
- Two VFOs for unusual repeater splits
- Convenient synthesizer steps: 10 Hz, 100 Hz, or 1 kHz per step on SSB/CW, 1 kHz, 20 kHz, or 100 kHz per step on FM
- Scanning control from microphone
- Highly effective noise blanker
- Receiver offset tuning for following Doppler-shifted signals
- SAT switch allows shifting of transmit frequency during OSCAR operation (many rigs cannot QSY on TX)
- 30 watts DC input on FM/CW, 30 watts PEP input on SSB, HI/LOW power selection on FM and CW
- Built-in tone burst generator
- Bright LED signal strength/relative power output level meter
- Easy-to-read fluorescent display of operating frequency and memory channel
- Front panel switch for zeroing synthesizer to convenient step when changing modes from SSB/CW to FM
- Requires 13.8 VDC, negative ground

Available Options:

FP-80 AC Power Supply
FTS-64E Synthesized CTCSS/Burst Encoder

Price and specifications subject to change without notice or obligation

Did You Know . . .
Yaesu now has a crystal-controlled 220 MHz FM rig — The FT-127

FLASH!
Also Now Available
NEW FT-680R USB/CW/AM/FM
6 Meter Transceiver

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1080

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Dyna-"mite."

Miniaturized, 5 memories, memory/band scan

TR-7730

The TR-7730 is an incredibly compact, reasonably priced, 25-watt, 2-meter FM mobile transceiver with five memories, memory scan, automatic band scan, UP/DOWN manual scan from the microphone, and other convenient operating features.

TR-7730 FEATURES:

- **Smallest ever Kenwood mobile**
  Measures only 5-3/4 inches wide, 2 inches high, and 7-3/4 inches deep, and weighs only 3.3 pounds. Mounts even in the smallest subcompact car, and is an ideal combination with the equally compact TR-8400 synthesized 70-cm FM mobile transceiver.
- **25 watts RF output power**
  Even though the TR-7730 is so compact, it still produces 25 watts output for reliable mobile communications. HI/LOW power switch selects 25-W or 5-W output.
- **Five memories**
  May be operated in simplex mode or repeater mode with the transmit frequency offset ±600 kHz. The fifth memory stores both receive and transmit frequency independently, to allow operation on repeaters with nonstandard splits. Memory backup terminal on rear panel.
- **Memory scan**
  Automatically locks on busy memory channel and resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.
- **Extended frequency coverage**
  Covers 143.900-148.995 MHz in switchable 5-kHz or 10-kHz steps, allowing simplex and repeater operation on some MARS and CAP frequencies.
- **Automatic band scan**
  Scans entire band in 5-kHz or 10-kHz steps and locks on busy channel. Scan resumes when signal disappears or when SCAN switch is pushed. Scan HOLD or microphone PTT switch cancels scan.
- **UP/DOWN manual scan**
  With UP/DOWN microphone provided, manually scans entire band in 5-kHz or 10-kHz steps.
- **Offset switch**
  Allows VFO and four of five memory frequencies to be offset ±600 kHz for repeater access (or to be operated simplex) during transmit mode.
- **Four-digit LED frequency display**
  Indicates receive and transmit frequency during simplex or repeater-offset operation.
- **S/RF bar meter and LED indicators**
  Bar meter of multicolor LEDs shows relative receive and transmit signal levels. Other LEDs indicate BUSY, ON AIR, and REPEATER offset.
- **Tone switch**
  Activates internal subaudible tone encoder (not Kenwood-supplied).

Optional accessories:

- **MC-46** 16-button autopatch (DTMF) UP/DOWN microphone
- **SP-40** compact mobile speaker
- **KPS-7** fixed-station power supply

More information on the TR-7730 and TR-8400 is available from all authorized dealers of Trio-Kenwood Communications, Inc., 1111 West Walnut Street, Compton, California 90220.

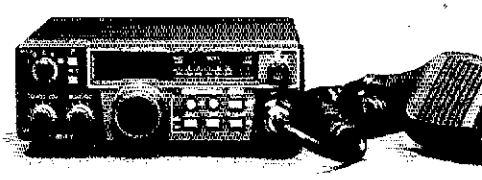
TR-7730 is subject to FCC approval.

KENWOOD
...pacesetter in amateur radio

Synthesized 70-cm FM mobile rig

TR-8400

- **Synthesized coverage of 440-450 MHz**
  Covers upper 10 MHz of 70-cm band in 25-kHz steps, with two VFOs.
- **Offset switch**
  For ±5 MHz transmit offset on both VFOs and four of five memories, as well as simplex operation. Fifth memory allows any other offset by memorizing receive and transmit frequencies independently.
- **HI/LOW RF output power switch**
  Selects 10 watts or 1 watt output.
- **DTMF autopatch terminal**
  On rear panel, for connecting DTMF (dual-tone multifrequency) touch pad (for accessing autopatches) or other tone-signaling device.
- **Virtually same size as TR-7730**
  Perfect companion for TR-7730 in a compact mobile arrangement.
- **Other features similar to TR-7730**
  Five memories, memory scan, automatic band scan (in 25-kHz steps), UP/DOWN manual scan, four-digit LED receive frequency display (also shows transmit frequency in memory 5), S/RF bar meter and LED indicators, tone switch, DTMF autopatch terminal, and same optional accessories.



Specifications and prices are subject t change without notice or obligatio