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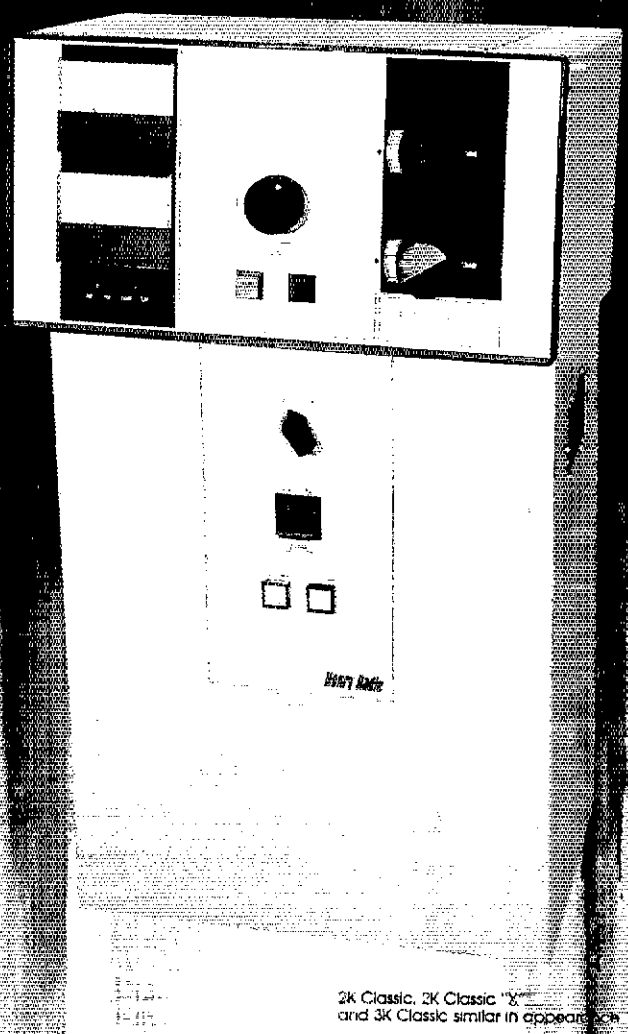

2K Classic, 2K Classic "X" and 3K Classic similar in appearance

Now you have a choice of ten superb amplifiers spanning the spectrum from 3.5 mHz to 450 mHz. The most dazzling display of value and performance the amateur world has ever known.

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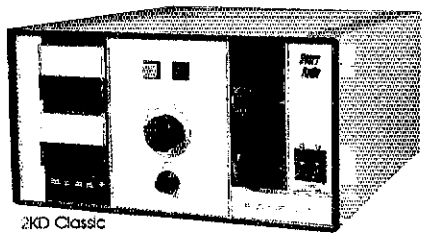

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HF amplifiers..80 through 15 meters (10 meters included on export models)

The 1KD-5...1200 watt desk model $695

New!
The 2KD CLASSIC..2000 watt desk model. We challenge you to find a better desk model for even a thousand dollars more. $980

The 2K CLASSIC The latest and best version of the console that made the name "2-K" famous around the world. $1295

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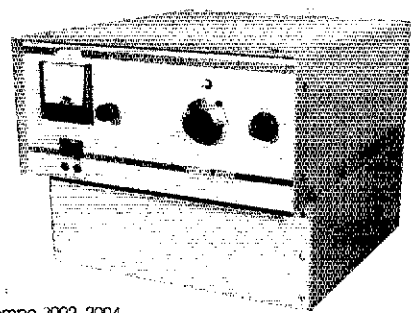
The 3K CLASSIC "X" version available for export and military customers only. $2895

The 4K ULTRA A general coverage, general purpose amplifier for commercial, military, scientific and export customers. Not for sale to amateurs in the U.S.A. $4500



Tempo 2002, 2004
2006 similar in appearance

For VHF and UHF:

The TEMPO 2002 for 144-148 mHz. The 2000 watt workhorse of the 2 meter band. $995

New!
The new TEMPO 2004 offers 2000 watts input at 440 mHz. Few amateurs have ever seen an amplifier capable of full powered UHF. $1095

New!
The TEMPO 2006. The same reliable design for 50-54 mHz. (For export only) $995

All three models: 2002, 2004 and 2006 are also available on frequencies outside the amateur bands and are part of a unique line of high power commercial, industrial and scientific amplifiers and transmitters for communications, plasma-generation; nuclear magnetic resonance, heating and other special applications. Let us know what your requirements are. We're here to help both in the U.S.A. and throughout the world.

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- **Printers available for hard-copy of all 3 codes**
- **On-screen RTTY tuning bar plus LED indicators**
- **ALL ASCII control characters; half or full duplex**
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- **Two programmable HERE IS messages**

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Extensive Versatility for the Serious Operator

The IC-740 from ICOM contains all of the most asked-for features, in the most advanced solidstate HF base station on the amateur market...performing to the delight of the most discerning operator.

Study the front panel controls of the ICOM IC-740. You will see that it has all of the functions to give maximum versatility to tailor the receiver and transmitter performance to each individual operator's requirements.

Features of the IC-740 receiver include variable width and continuously adjustable noise blanker, continuous, adjustable speed AGC, adjustable IF shift and variable passband tuning built in. In addition, an adjustable notch filter for maximum receiver performance, along with switchable receiver preamp, and a selection of SSB and CW filters. Squelch on SSB Receive and all mode capability, including optional FM mode. Split frequency operation with two built-in VFOs for the serious DX'er.

The IC-740 allows maximum transmit flexiblility with front panel adjustment of VOX gain and VOX delay along with ICOM's unique synthesized three speed tuning system and rock solid stability with electronic frequency lock. Maximum versatility with 2 VFO's built in as standard, plus 9 memories of frequency selection, one per band, including the new WARC bands.

With 10 independent receiver and 6 transmitter front panel adjustments, the IC-740 operator has full control of his station's operating requirements.

See and operate the versatile and full featured IC-740 at your authorized ICOM dealer.

Options include:
- FM Module
- Marker Module
- Electronic Keyer
- 2 - 9MHz IF Filters for CW
- 3 - 455 kHz Filters for CW
- Internal AC Power Supply

Accessories.
- SM5 Desk Microphone
- UP/DWN Microphone
- Linear Amplifier
- Autobandswitching Mobile Antenna
- Headphones
- External Speaker
- Memory Backup Supply
- Automatic Antenna Tuner

ICOM

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June 1982 *Volume LXVI Number 6*

QST (ISSN: 0033-4812) is published monthly as its official journal by the American Radio Relay League, Newington, CT USA. Official organ of the International Amateur Radio Union and the Canadian Radio Relay League.

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Second-class postage paid at Hartford, CT and at additional mailing offices. Postmaster: Form 3579 requested.

QST is available to blind and physically handicapped individuals on flexible discs from the Library of Congress, National Library Service for the Blind & Physically Handicapped, Washington, DC 20542.

Indexed by Applied Science and Technology Index, Library of Congress Catalog Card No. 21-9421. Microform editions available from Xerox University Microfilms, Ann Arbor, MI 48106.

THE COVER

VE3CJ got these samples of the attractive BY1PK QSL cards during an April visit to the station in Beijing. Want one? Look for BY1PK on 14 and 21 MHz cw!

Contents

Technical

Beginner's Bench

General

Operating

Organizational and Regulatory

Departments

It's Time To SANTEC uP

It's time for you to get the best of the excitement of full-feature synthesized handheld operations, and SANTEC/nology hands you the uP-to-the-minute radio whose time has come. Here are just four great reasons why you should SANTEC uP.

■ **Memory channels store standard repeater offsets or simplex.** Easily programmed and instantly recalled, each memory frequency comes uP with its own offset (plus or minus 600 kHz) or in the simplex mode as originally entered.

■ **Less than 10 ma drain in receive** means more standby time for SANTEC owners. The ST-144/μP saves its power.

■ **High power output when you need it.** You can choose to transmit at 0.1W, 1.0W, or even 3.5W (all nominal), and your SANTEC can reach out through all types of operating conditions.

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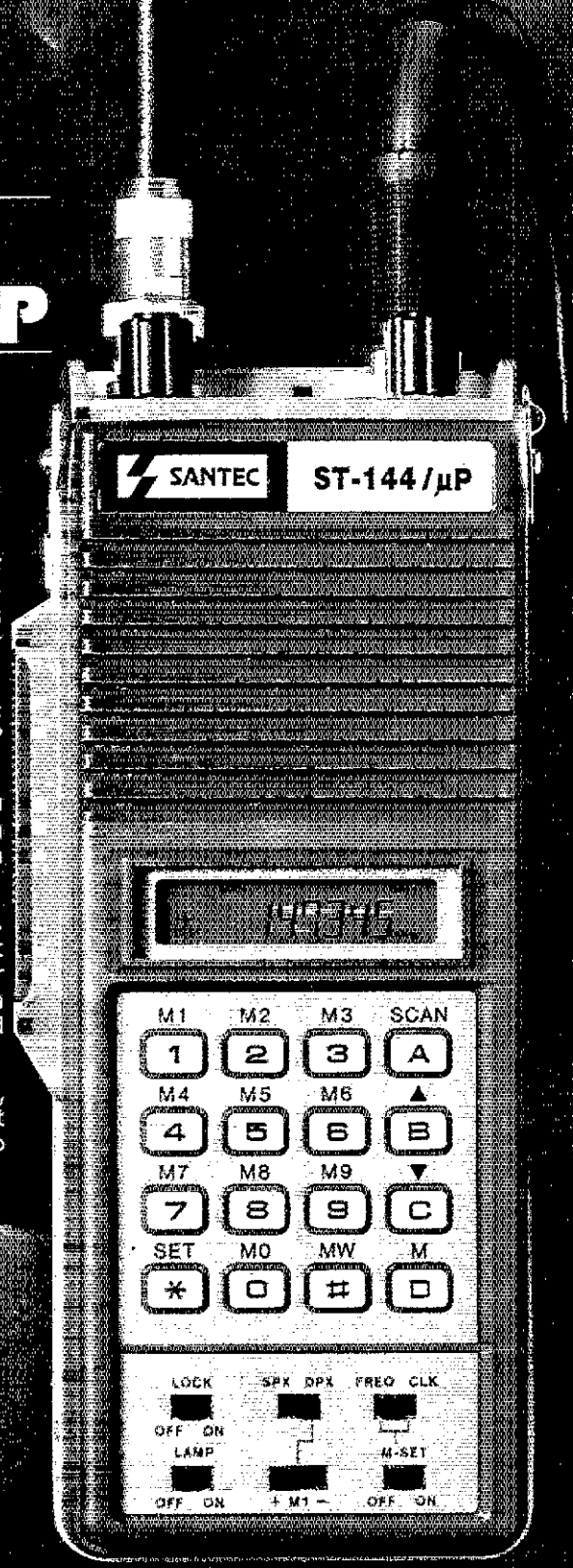
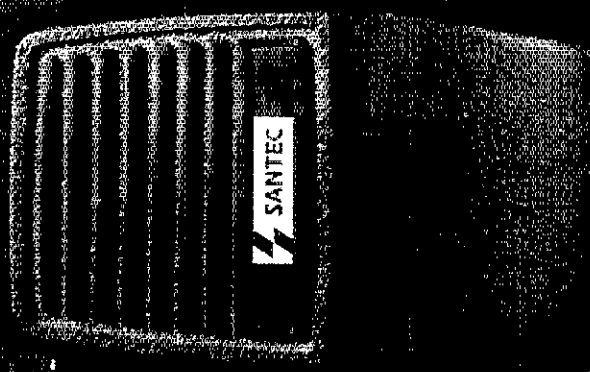
When it's time to compare features and value, nothing else stands uP with SANTEC. Now that it's time for you to get the best, it's time to SANTEC uP.





Shown with optional SM-1 speaker microphone

Accessories for SANTEC Handheld Radios
clockwise from upper left:
- Leather Case (ST-LC)
- Base Charger & Power Supply (ST-5BC)
- Remote Speaker (MS-505)
- Mobile Charger (ST-MC)
- Speaker Microphone (SM-1)

The ST-144 μP is approved under FCC Part 15

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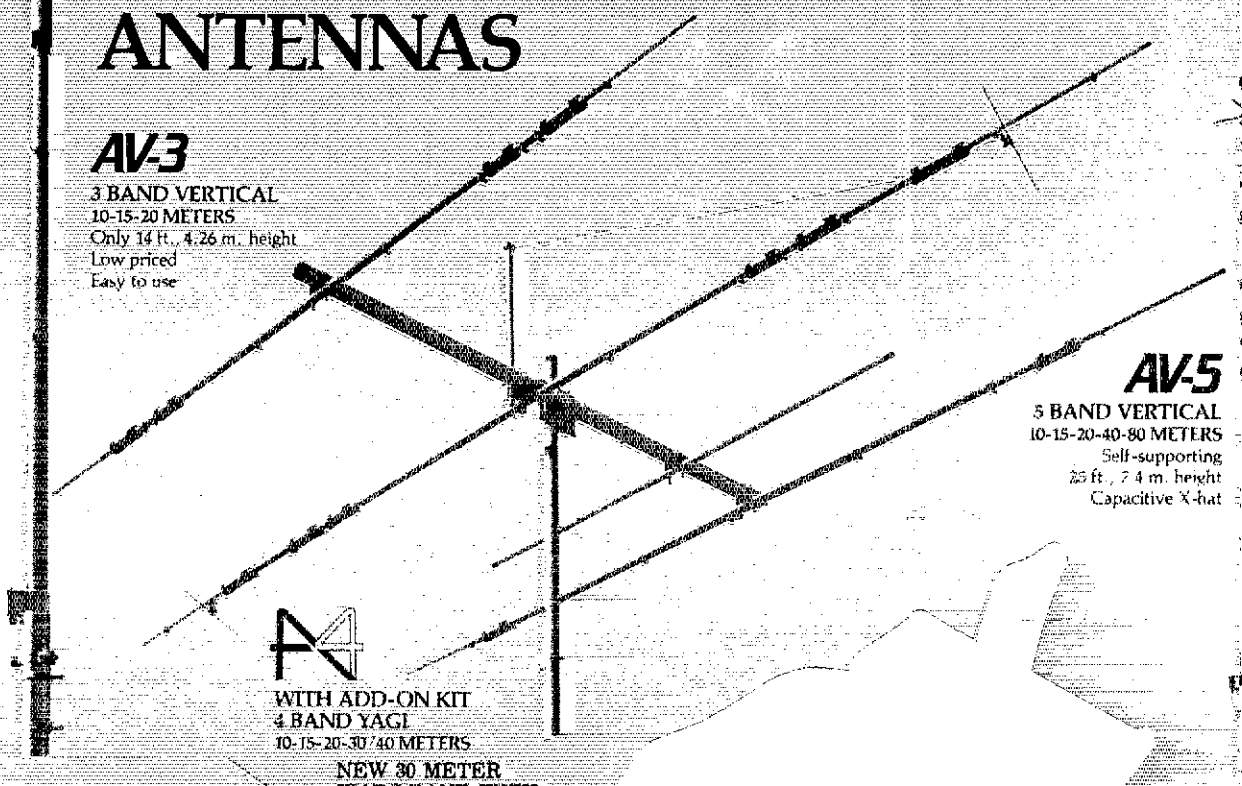

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10-15-20 METERS
Only 14 ft., 4.26 m. height
Low priced
Easy to use

AV-5

5 BAND VERTICAL
10-15-20-40-80 METERS
Self-supporting
25 ft., 7.4 m. height
Capacitive X-hat

A4

WITH ADD-ON KIT
4 BAND YAGI
10-15-20-30/40 METERS
NEW 30 METER WARC BAND WITH A3 OR A4

R3

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10-15-20 METERS
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Better than average performance
22 ft., 6.7 m. height

A3

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The world renowned Cushcraft HF Multiband antennas are chosen time after time for DX-peditions to far corners of the globe. Their excellent gain, outstanding radiation pattern, 2kw power rating, easy assembly, and high strength-clean profile aluminum construction enable the adventurous DX-er to travel further and make more contacts.
For your home QTH, DX-pedition, field day, or contest select a high performance Cushcraft antenna available through dealers worldwide.

A3
Broadband, excellent gain and f/b ratio, 2 kw power rating direct 50 Ω feed, Boom 14 ft., 4.26 m., longest element 28 ft., 8.5 m. weight 27 lbs., 12.9 kg., turn radius 15.5 ft., 4.7 m., mast dia. 1¼ in. to 2 in., 3.18 cm. to 5.08 cm., material 6063-T832 seamless aluminum.

A4
Broadband, excellent gain and f/b ratio, 2 kw power rating, direct 50 Ω feed, boom 18 ft., 5.48 m., longest element 32 ft., 9.7m., weight 37 lbs., 16.8 kg., turn radius 18 ft., 5.48 m., mast dia. 1¼" to 2 in., 3.18 to 5.08 cm., material 6063-T832 seamless aluminum.

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THE ANTENNA COMPANY
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TELEX 953050

Dyna-"mite."

Photo shown is TR-7730 in 16-key autopatch UP/DOWN microphone version.

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, and other convenient operating features. The TR-7730 is available in two variations: a 16-key autopatch UP/DOWN microphone (MC-46) version, and a basic UP/DOWN microphone version.

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**
  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.
- **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.
- **Extended frequency coverage**
  Covers 143.900-148.995 MHz in switchable 5-kHz or 10-kHz steps.
- **UP/DOWN frequency control from microphone**
  Manual UP/DOWN scan of entire band in 5 kHz or 10 kHz steps is possible when using either autopatch or basic UP/DOWN microphone versions.
- **Offset switch**
  Allows VFO and four of five memory frequencies to be offset ±600 kHz for repeater access or simplex.
- **Four-digit LED frequency display**
  Indicates receive and transmit frequency.
- **S/RF bar meter and LED indicators**
  Bar meter of multicolor LEDs shows S/RF levels. Other LEDs indicate BUSY, ON AIR, and REPEATER offset.
- **Tone switch**

Optional accessories:

MC-46 16-key autopatch 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
1111 West Walnut Street
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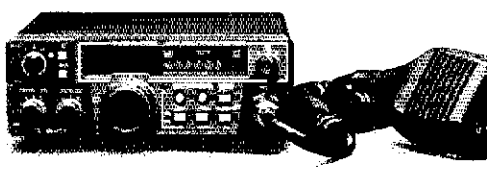
KENWOOD
...pacesetter in amateur radio

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.
- **DTMF autopatch terminal**
  On rear panel, for connecting DTMF (dual-tone multifrequency) touch pad (for accessing autopatches) or other tone-signaling device.
- **HI/LOW RF output power switch**
  Selects 10 watts or 1 watt output.
- **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, and same optional accessories.



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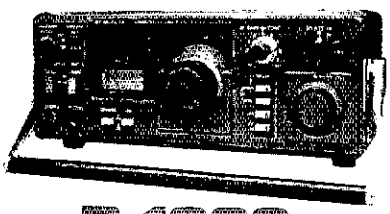

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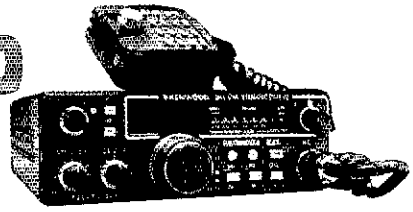

R-1000
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ASK YOUR DEALER FOR DETAILS

TR-7730
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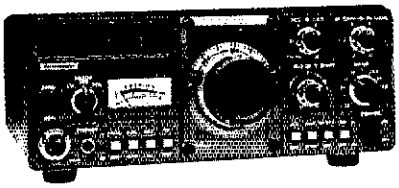
WITH OR WITHOUT
MC-46



TS-130SE or TS-130S
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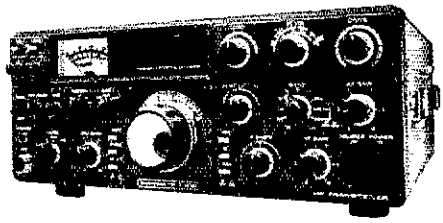
TR-8400
$30.00 OFF



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THE AMERICAN RADIO RELAY LEAGUE, INC.

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

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

"Of, by and for the amateur," it numbers within its ranks the vast majority of active amateurs in the nation and has a proud history of achievement as the standard-bearer in amateur affairs.

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

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

"It Seems to Us . . ."

ARRL Opens Channels with Cable Industry

". . . it is the responsibility of every one of us to do our part to ensure that state-of-the-art cable systems are maintained in a manner that does not give rise to these kinds of petitions being filed before the FCC."

These words, penned by Society of Cable Television Engineers President Tom Polis in a recent industry bulletin editorial, express what many hold to be the solution to cable television interference (CATVI): state-of-the-art cable system maintenance. Polis refers to the League's petition requesting that CATV systems be prohibited from using amateur frequencies for distribution of their signals. The problem is particularly serious in cable channels E and K, which correspond to the amateur 144- and 220-MHz bands, respectively. Filed in January, the League's request was assigned number RM-4040 by the Commission.

The ARRL petition was filed because harmful interference is being caused to amateur operation by "closed" cable plants leaking rf in excess of federal standards, and because amateurs are being unfairly accused of causing CATVI when the fault lies in the cable systems themselves. In theory, cable and over-the-air systems should be able to coexist side-by-side; in practice, a cable plant that is truly "closed" to outside signals is rare indeed. Because amateur stations and cable systems must coexist along side one another, the situation is especially acute in residential areas. When a problem arises, the operator of the cable system is required to fix it; lack of responsiveness on the part of some in the industry forced the League to seek FCC intervention.

Subsequent to this action, ARRL representatives were invited to meet with officials of the National Cable Television Association to discuss the implications of the filing. NCTA empathized with the amateurs' plight and offered assistance, but requested immediate withdrawal of the petition. NCTA stated its reluctance to negotiate with a "pistol to its head." ARRL declined to withdraw its petition, but an accord was reached. The League would seek from the Commission an extension of the comment deadlines to allow the industry an opportunity "to assist the League to the extent it is able in resolving individual complaints of cable interference during the pendency of the extended comment period."

The request was issued, and granted by the Commission. Thus, the door opened to technical cooperation between industry reps and ARRL to explore solutions that may possibly obviate the present need for the relief sought in the League's petition. The next few months will show whether or not the problem of CATVI can be contained without further FCC rulemaking.

This action is a step forward. It transmits a further message to the industry that the amateur service will not tolerate CATVI, but that it will cooperate to assist in dealing with its "growing pains." And, it is in the best interests of all concerned to exhaust the available avenues of recourse to solve the problem prior to federal regulatory intervention.

The process has begun. Several meetings have been held among cable operators, industry reps and League officals to thrash out means of effecting solutions at the local level. More are planned. A comprehensive list of amateurs in the cable industry will be compiled to serve in an advisory capacity to both groups. Communication and education within the walls of the industry is critical. Cable operators in the field must understand and acknowledge the necessity for "tight" systems.

Cooperation on the part of the amateur is also an important objective. We hold an interest in the development and installation of state-of-the-art cable systems. In the general case, TVI from amateur stations is more severe where TV signal levels are low. When a high-quality cable plant is present, the shielding, combined with greater signal levels at subscriber terminals, should *reduce*, rather than increase, TVI problems. The potential benefits are profound to an amateur community weary of its long-standing RFI battle.

Are you having difficulties with an uncooperative cable operator? Please let us know about it. Have you had successful encounters? We want to know about these, too. Your comments and experiences will help your ARRL determine the proper tack as the comment period in RM-4040 draws to a close (the timetable is August 1 for comments; August 15 for replies to comments).

The philosophy expressed in Tom Polis's words above holds the key to CATV's future. It is significant for the amateur community, too, as we anxiously watch words turn into deeds. — *Richard Palm, K1CE*

League Lines...

Another important step toward RFI susceptibility standards for receive-only devices! The Telecommunications Subcommittee of the U.S. House of Representatives on May 5 adopted an amendment proposed by Representative Al Swift of Washington State to include radio frequency interference provisions in the Amateur Radio legislation, H.R. 5008. Legislation containing similar provisions was approved without dissent by the Senate earlier, as S. 929. The House bill now will be considered by the House Committee on Energy and Commerce. ARRL members in districts served by Committee members should communicate their views on retention of the RFI provisions of H.R. 5008 to their representatives as soon as possible. ARRL regards retention of the RFI provisions as an important step in the continuing battle against RF interference and supports the bill as adopted by the subcommittee. Committee members are: Representatives Dingell (MI), Scheuer (NY), Ottinger (NY), Waxman (CA), Wirth (CO), Sharp (IN), Florio (NJ), Moffett (CT), Santini (NV), Markey (MA), Luken (OH), Walgren (PA), Gore (TN), Mikulski (MD), Mottl (OH), Gramm (TX), Swift (WA), Leland (TX), Collins (IL), Synar (OK), Tauzin (LA), Wyden (OR), Hall (TX), Broyhill (NC), Brown (OH), Collins (TX), Lent (NY), Madigan (IL), Moorhead (CA), Rinaldo (NJ), Marks (PA), Corcoran (IL), Lee (NY), Dannemeyer (CA), Whittaker (KS), Tauke (IA), Ritter (PA), Rogers (KY), Benedict (WV), Coats (IN), Shelby (AL), and Bliley (VA). Once the bill is passed by the full House, there will likely be a conference committee session to iron out the remaining differences between H.R. 5008 and the Senate bill to amend the Communications Act, S. 929. If H.R. 5008 is still stalled when you read this, additional contacts by ARRL members with representatives will be necessary. W1AW will report further developments.

Radio amateurs have been given more time to discuss proposals for wider phone bands and possible changes in operating privileges corresponding to license class. The FCC has extended the deadline for comments in Docket 82-83 to August 16. Replies to comments will be due September 16. The Notice of Proposed Rulemaking (NPRM) in the docket would expand the (20-meter) phone band to the segment 14.150-14.350 MHz. There is also a Notice of Inquiry (NOI) in Docket 82-83 asking the amateur community for its views on expanding other phone bands and perhaps altering the incentives to upgrade. ARRL members are urged to read the text of Docket 82-83 and the editorial in the May issue of QST and then to convey their views to the ARRL Plans and Programs Committee and their ARRL division director.

The FCC has extended the Novice examination return time from 30 days to 60 days, effective May 6, 1982. A volunteer examiner now has 60 days in which to administer the written part of the Novice exam and return it to the FCC.

New television public-service announcements about Amateur Radio! ARRL has available for distribution a new public-service announcement starring Pernell Roberts and Gregory Harrison of the show Trapper John, M.D. This 30-second color optical sound spot is available from League Hq. to anyone who is able to place it with a TV station.

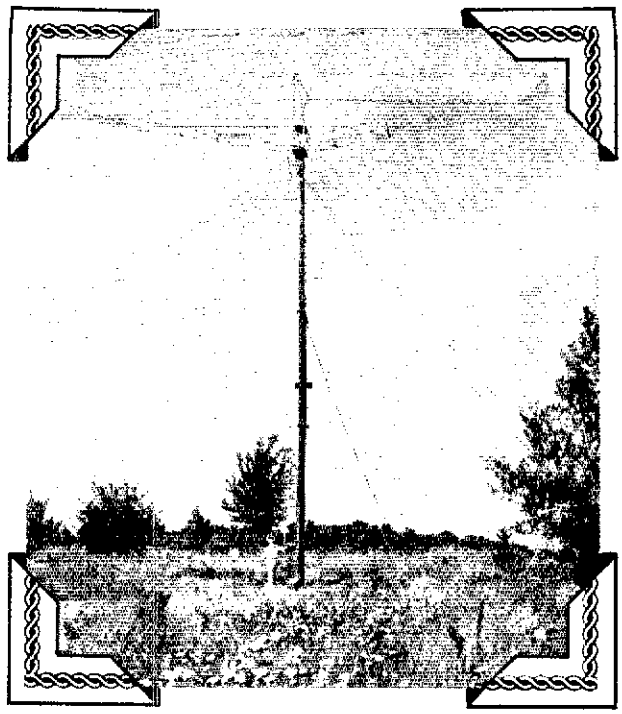
Help Wanted! The ARRL Hq. Membership Services Department is looking for a person to fill the position of Membership Services Assistant. If you have a basic knowledge of FCC regulations and nontechnical facets of Amateur Radio, have a General class or higher license, have excellent oral and written communications skills, and want to work at ARRL Hq., contact Hal Steinman, K1FHN, Manager of the Membership Services Department.

A bill to amend NJS 2A: 127-4, permitting radio amateurs in New Jersey to install receivers capable of receiving police and fire frequencies in their vehicles without having to obtain a permit from the local chief of police, has been reintroduced into the state legislature. The bill, S-1135, has been assigned to the Transportation and Communications Committee of the Senate. Any resident of New Jersey can ask his or her state legislator for the most recent status of S-1135.

ARRL Hq. has received an unconfirmed report that effective at 1430 UTC on April 29, 1982, Amateur Radio operation has been suspended in Argentina. This action is apparently a result of the escalating hostilities between that country and the United Kingdom.

New packet repeater on the air! The Radio Amateur Telecommunications Society of northern New Jersey is operating a packet repeater on 146.535 MHz (single frequency). Software and "emotional" support available for those wishing to get involved. S.A.S.E. to J. Gordon Beattie, Jr., WB2CAM, 45 Union Ave., Little Falls, NJ 07424.

The W8JK Antenna: Recap and Update



John Kraus with the first rotary W8JK antenna in August 1937. The barely visible horizontal wires spanning 60 feet are supported by a gondola-like structure of bamboo.

The famous and effective "8JK" DX antenna remains a favorite with many amateurs. For those who haven't tried it, here's the design rundown.

By John Kraus,* W8JK

Less than 100 years ago, in 1888, Heinrich Hertz built the first radio transmitter and receiver. His transmitting antenna was a half-wavelength dipole and his receiving antenna a one-turn loop. Operating at 5 meters, he was able to demonstrate radio transmission over a distance of a few paces.

Hertz's experiments remained a laboratory curiosity until Guglielmo Marconi repeated and extended them. He added tuning, large antenna and ground systems and, at longer wavelengths, was able to communicate across the Atlantic in 1901. He also demonstrated radio communication with ships. Prior to radio, or "wireless" as it was then called, complete isolation enshrouded a ship at sea. Disaster could strike without anyone on the shore or aboard nearby ships being aware that anything had happened. Marconi changed all that.

Commercial radio focused on wavelengths of 1000s of meters, especially for long-distance communication. Following World War I, with continuous-wave tube transmitters replacing "King Spark," amateurs pioneered in demonstrating that wavelengths of less than 100 meters were useful for long distances. At these shorter wavelengths, dipoles could be conveniently arrayed to produce directional antennas. A simple directional antenna then consisted of a half-wavelength dipole, with a similar dipole placed parallel to and one-quarter wavelength from it as a reflector. One-quarter wavelength spacing was regarded appropriate until George H. Brown of RCA showed in his classic January 1937 paper in the *Proceedings of the Institute of Radio Engineers* that smaller spacings might be better. The key to Brown's discovery was that instead of considering antenna current to be constant, he calculated the antenna gain for a *constant power input.*

When Brown's paper appeared I was intrigued with some of the possibilities it suggested and, in spite of freezing temperatures, lost no time in designing and erecting the first W8JK beam antenna with two parallel dipoles driven in opposite phase and separated by the unprecedentedly small spacing of one-eighth wavelength. It was the first practical, popular antenna to use such closely spaced elements.

As I relate in my book, *Big Ear,* I was elated to find that the antenna provided the gain Brown had predicted mathematically. I wrote a series of articles on the antenna for *RADIO*, starting in the March 1937 issue and, subsequently, articles for *QST, Short-Wave World,* the *Proceedings of the IRE,* and a section for my book, *Antennas* (McGraw-Hill, 1950). Then, in July 1970, I published another article on the antenna in *QST.*

Now, in this article, I wish to introduce some new thoughts, while describing in some detail a rotary beam (W8JK) of the simplest, most versatile type. Some of its characteristics are that:

1) It can operate at any wavelength over a continuous frequency range of more than 3 to 1,

2) It needs no traps or loading coils in the antenna,

3) No antenna dimensions are critical, since the antenna and feed system is resonated,

4) It can be operated horizontally or vertically to obtain optimum elevation angle of radiation (or reception),

5) It is ideal for finding open round-the-world communication paths,

6) It has theoretically zero radiation off the ends of the elements and perpendicular to the plane of the elements,

7) It can be fed with low-loss, inexpensive twin-line,

8) It is compact, a 6-band (20, 17, 15, 12, 10 and 6-meter) design being only 7.3 m[1] long.

The Basic Arrangement

In simplest terms, the W8JK consists of two parallel linear conductors or elements with equal oppositely phased currents, as

*The Ohio State University Radio Observatory, 1854 Home Rd., Delaware, OH 43015

[1]Notes appear on page 14.

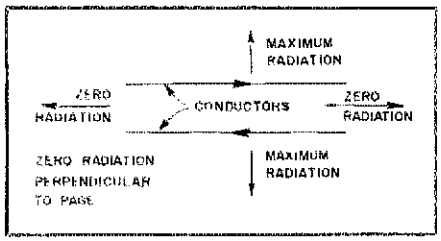


Fig. 1 — Basic W8JK antenna. The conductors carry equal out-of-phase currents.

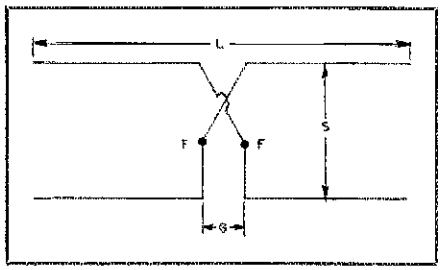


Fig. 2 — Center-fed W8JK antenna. Two-wire feed line connects at FF.

suggested in Fig. 1. The elements may be center fed or end fed. The center-fed arrangement is shown in Fig. 2. Typically, the spacing (S) is about one-eighth wavelength on the lowest frequency used. The length (L) can range from less than one half wavelength to more than three half wavelengths.

If L is somewhat less than one-half wavelength for the 20-meter band, the same antenna can be used also on 6 meters and on all wavelengths in between, including the amateur 17, 15, 12 and 10-meter bands. The center cross-over gap (G) can be any convenient value, such as 250 mm.

Feeding and Matching

The antenna elements can be fed with a resonant twin-line connected to points FF, with tuning done at the station end by means of a balance-to-unbalance, inductor-capacitor tuner. This has the disadvantage that high-voltage points on the twin-line are brought into the station.

An alternative is to short the twin-line at a current maximum and couple a coaxial line at that point. To do this, I have used a section of open twin-line made of aluminum tubing, with a sliding section, or "trombone," as illustrated in Fig. 3. For a given tap distance (T), the trombone is moved up or down to resonate the antenna transmission-line combination and to give a minimum VSWR on the coaxial line to the transmitter. The tap distance can then be adjusted to reduce the VSWR further if necessary. Since the twin-lines above the shorting strap constitute a resonant system with the antenna, it is not necessary that all twin-line sections be of the same impedance. Thus, I have used an aluminum-tubing section with about 300 ohms impedance, while the flexible twin-line between it and the antenna was anywhere between 200 and 400 ohms impedance.

The distance (D) from the antenna feed points (FF) to the shorting strap on the trombone will vary, depending on the frequency band being used. As an example, for operation on 20 and 6 meters and all bands in between, the overall element length (L), including the center gap (G), can be 7.3 m, with the spacing S equal to 2.6 m, as shown in Fig. 4. For these dimensions, the distance (D) to the shorting strap on the trombone unit will be approximately as indicated in Table 1.[2] Note that, in addition to the closest short

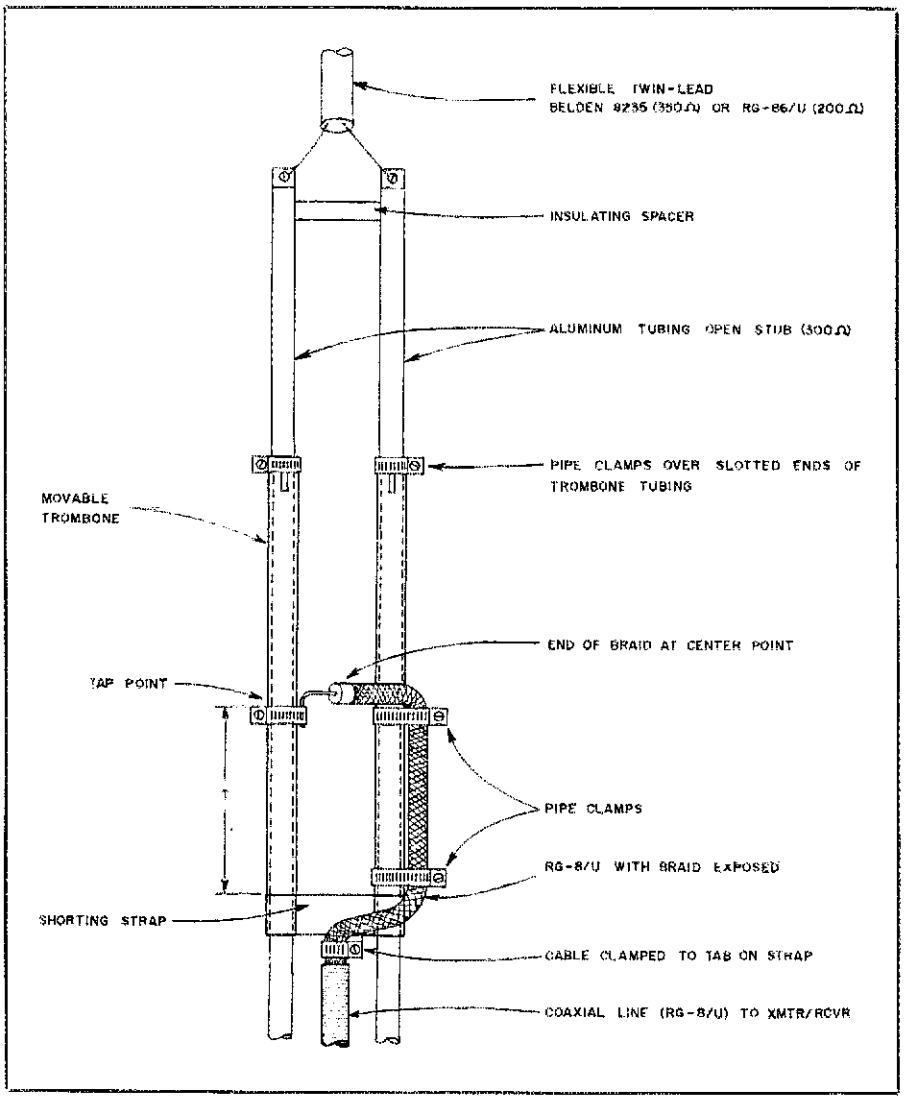


Fig. 3 — Balance-to-unbalance matching unit.

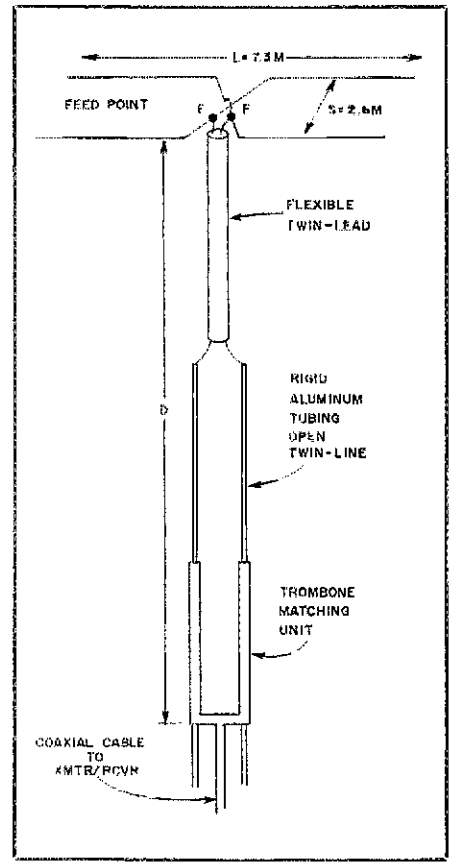


Fig. 4 — Feed-line arrangement for W8JK antenna.

position indicated in the second column, the short can also be a half wavelength farther, as indicated in the third column. In fact, the short can be at any multiple of one-half wavelength.

The distances in Table 1 assume all open conductor twin-line between the antenna and the short, with wave velocity equal to or nearly that in free space. Since the velocity on flexible twin-line is less than this (typically 80%), D will be less by an amount depending on the length of flexible twin-line. For example, at this velocity value (80%), a 4-m section of flexible twin-line will be equivalent to a 5-m length of open line.

Table 1

Characteristics for W8JK Antenna

	Distance D (approx.)		Gain	Half-power beamwidth	
Band	1st short	2nd short	dBi	Horiz.	Vert.
20m	10.8m	21.2m	5.7	62°	90°
15	5.5	12.6	6.7	60	93
10	2.8	8.1	7.7	56	96
6	9.0	12.0	8.2	30	105

L = 7.3 m and S = 2.6 m, as in Fig. 4.
Values for the new 12- and 17-meter bands can be interpolated.

Gain and Beamwidths

The gain in dBi of the antenna over an isotropic radiator, and the half-power beamwidths, are given in Table 1. Although the antenna could be operated at wavelengths longer than 20 meters, the gain tends to decrease and the matching adjustments tend to become more critical. At wavelengths shorter than 6 meters, the gain drops sharply and the side-lobes become larger.

The Antenna Environment

Any antenna performance is highly dependent on its environment; that is, its siting and surroundings. What I wish to say in this section about environment applies to all antennas, including the W8JK.

There are two extreme cases. One is with the antenna all alone in free space, a never-realized ideal, even on a satellite. The other is with the antenna situated above a flat, perfectly conducting ground. The latter case is of particular interest because it permits a ground reflection, which at best can double the field strength, giving the equivalent of a four-fold increase in power (6dB gain). At the worst, it can result in a complete cancellation of the signal. Ordinarily, the ground is not flat or perfectly conducting, and there may be trees and buildings, which absorb or scatter the radiation. Nevertheless, let us consider some of the implications of the ideal ground reflection case.

Vertical Angle Control

Consider an antenna at a height (H) above a perfectly conducting flat ground, as in Fig. 5. If the distance (R-D) is an odd number of half wavelengths (1, 3, 5 . . .), then the direct and reflected waves will reinforce for a horizontally polarized antenna, but will cancel for a vertically polarized antenna. However, if (R-D) is an even number of half wavelengths (0, 2, 4 . . .), the reverse is true.

Although such an ideal situation is rarely realized in practice, it is noteworthy that a transmitted (or received) signal might be quadrupled in power, or reduced to zero, depending on the height (H) of the antenna, the wavelength and the vertical or elevation angle (θ). If there is imperfect ground reflection, there will be only partial reinforcement and cancellation, resulting in less than a 6-dB reflection gain and significant radiation at the zero radiation angles of the ideal case.

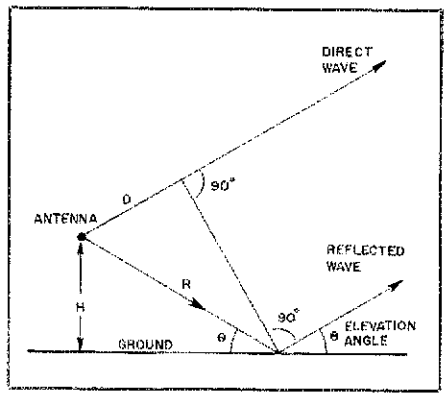


Fig. 5 — Effect of ground reflection.

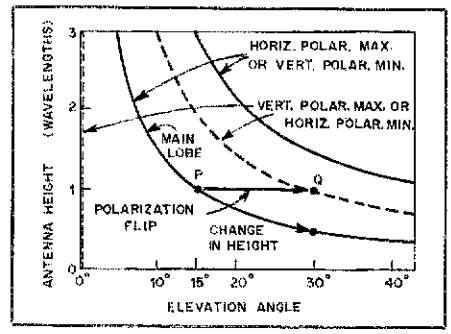


Fig. 6 — Elevation angles of maximum and minimum radiation from horizontally and vertically polarized antennas over a perfectly conducting flat gound.

The ideal situation is shown graphically in Fig. 6. With the antenna one wavelength above ground, there is a maximum signal at an elevation angle of 15° if the antenna is horizontally polarized (point P), but zero signal if it is vertically polarized. At this same height, a vertically polarized antenna will have maximum radiation at a 30° elevation angle, while a horizontally polarized antenna has zero radiation at this angle (point Q). To produce maximum radiation at 30°, the horizontally polarized antenna can be lowered in height to one-half wavelength, or the antenna could be flipped to vertical polarization.

Owing to Faraday rotation of the polarization, a horizontally polarized wave transmitted via the ionosphere may arrive at any polarization, and the polarization may fluctuate continuously. Thus, if 15° is the optimum elevation angle for the transmission path in use, it does not mean that a horizontally polarized antenna one wavelength above ground will be effective at all times. But the polarization and height are at least necessary conditions, because a vertically polarized antenna at that height will have a null at 15°.

The curves of Fig. 6 were calculated for an isotropic radiator, so they do not correspond exactly to those for directional antennas. But at the lower elevation angles shown, the differences are small.

To flip a W8JK antenna between horizontal and vertical polarization, the central boom can be constructed as suggested in Fig. 7. The W8JK antenna is small and light enough to make this polarization change practical. Alternatively, a vertical W8JK antenna, identical to the horizontal one, could be mounted on the same boom and a relay used to switch either antenna to the twin-line. Vertical-angle control can be just as important as the horizontal-angle control afforded by an antenna rotator.

Round-the-World Paths

A bi-directional antenna, such as the W8JK, is ideal for finding open round-the-world communication paths. A simple technique I have used is to tap out an occasional dot while slowly rotating the antenna. When I hear an echo, it means that my signal has found an open path around the world. The time delay is about one-seventh of a second, and most receivers recover from a transmitted signal in less time than this. In my experience, 15 meters was the most productive of open round-the-world paths. Once I found one, I listened for a while or sent a "CQ," and was frequently rewarded by DX contacts all along the path. The question of long

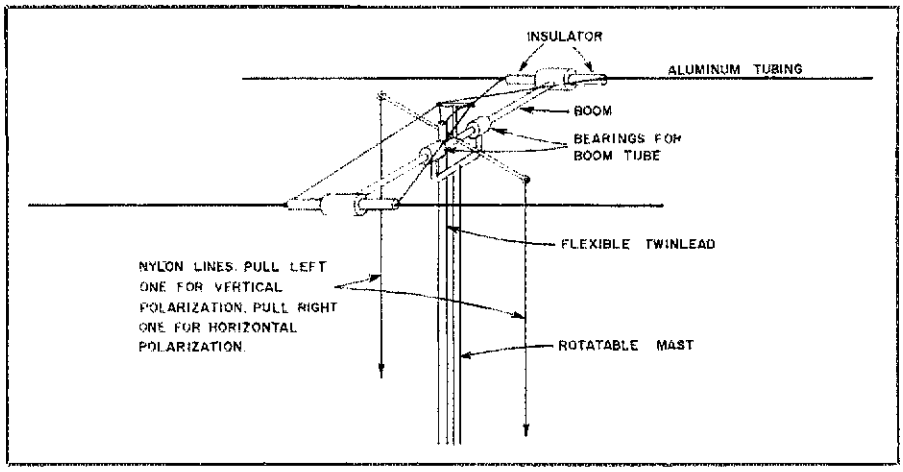


Fig. 7 — Central boom construction for flipping between horizontal and vertical polarizations.

path versus short path does not arise.

Summary

The characteristics of W8JK antennas are reviewed, and a simple 6-band (20, 17, 15, 12, 10, 6-meter) version is described in some detail. Feeding, siting, polarization and vertical-angle control are discussed. I hope the information will make the advantages of the W8JK better understood, and may even encourage some enterprising amateurs to build one. QST

John Kraus, W8JK, is McDougal Professor Emeritus of Electrical Engineering and Astronomy at the Ohio State University, where he has been on the faculty since 1946. He is also Director of the Ohio State-Ohio Wesleyan Radio Observatory and is visiting Stocker Chair Professor at Ohio University. He received his PhD degree in physics from the University of Michigan in 1933. He is author of hundreds of technical articles and of the books Antennas *(McGraw-Hill, 1950),* Electromagnetics *(McGraw-Hill, 1953),* Radio Astronomy *(McGraw-Hill, 1966),* Electromagnetics *2nd edition with K. R. Carver (1973),* Big Ear *(Cygnus-Quasar, 1976), and* Our Cosmic Universe *(Cygnus-Quasar, 1980). Dr. Kraus is the inventor of the helical beam antenna, the corner reflector antenna, the backward-angle-fire grid antenna, the W8JK and other close-spaced arrays, multi-wire doublets and additional antenna types. Dr. Kraus is a Fellow of the IEEE and a Member of the National Academy of Engineering. He has been a licensed amateur since 1926.*

Notes

[1]inches = mm × 0.03937; feet = meters × 3.281.
[2]When properly adjusted, a given T and D usually provides less than a 2:1 VSWR over all or most of any amateur band. The tap distance (T) is typically 0.5 m.

New Books

☐ *Interference Handbook* by W. R. Nelson, WA6FQG. Published by Radio Publications, Inc., Box 149, Wilton, CT 06897. Soft cover, 5-3/8 × 8-1/8 inches, 241 pages plus index, $8.95.

William Nelson worked 33 years for the Southern California Edison Company. He spent two years as a groundsman and then moved up to lineman. After five years as a lineman he was promoted to estimator. His work included distribution design, power facilities and load management. In 1964 he was appointed Amateur Radio Representative and RFI Investigator for the company. He held that position until his retirement in 1980. As an investigator, Nelson was both RFI sleuth and speaker at club meetings and conventions. He helped change construction practices in the electrical utilities. These changes have reduced the potential for RFI.

Nelson is past chairman of the Los Angeles Council of Radio Clubs TVI Committee. Today he is a consultant to power utilities on RFI problems, including investigation and training.

RFI is a growing problem, the kind of problem that finds the Amateur Radio operator the victim more often than the culprit. Most of us need help in developing the art and understanding the science of RFI identification and elimination. This book should help you toward that end.

Interference Handbook contains 13 chapters and 173 illustrations. Chapter 1 consists of introductory material. In Chapter 2, spark discharge interference and noise suppression are discussed. Other items covered in this interesting and useful chapter include: the means by which RFI can be transmitted, and some helpful hints on tracking down interference. Did you know that RFI carries farther on lower frequencies? By listening to the highest frequency that the interference can be heard on and moving higher as you "zero" in on it, an RFI source can be tracked down. Nelson describes how to use your car radio, hf mobile rig and a vhf receiver to track down troublesome RFI sources.

Electrostatic discharge is the subject of Chapter 3. This is a potential troublemaker that most of us don't think about very often. When you get through reading this one you'll want to go out and check your station grounding, or, perhaps, install a better ground system.

Chapters 4 through 6 cover the RFI investigator and power company practices. We may not be able to climb the power pole to correct a fault, but most of us will find power line construction and how it can generate RFI fascinating. Every power utility employee in the country should be required to read Chapters 5 and 6.

Noise-reducing bridges for your receiver is the subject of Chapter 7. Chapters 8 through 10 cover nonlinear devices, transmitters, TV sets and audio equipment. Chapter 11 is on grounds and grounding; it concludes: "A combination of multiple ground rods and bypass plugs will be a great help in difficult cases of RFI when transmitter and receiver are located in the same building."

Vehicle noise suppression is the topic of Chapter 12. Mobile Amateur Radio operators, and even more so, RFI investigators, dislike those annoying noises that are sometimes generated by vehicular electric systems. Nelson gives some good pointers on locating and reducing noise sources in your car, truck or boat.

The book concludes with an RFI roundup. This includes a variety of miscellaneous items that did not fit handily into any of the earlier chapters. The final item is the *Consumer Products RFI Assistance List* compiled by Harold Richman, W4CIZ, of the ARRL RFI Task Group.

The easy-to-read style and the many anecdotes found throughout make this book fun to read and easy to understand. The perspective and insights into power utility practices are of interest to any ham who has had a noise or power-line interference problem. — *Chuck Hutchinson, K8CH* QST

A Compatible Slow-Scan Color-Television System

New techniques, plus SSTV technology, equals color pictures for the radio amateur.

By Don C. Miller,* W9NTP

The SSTV system described here will permit the transmission of color images in the same bandwidth and transmission time as that being currently used for sending black-and-white images. It is patterned after U.S. and Canadian color television (NTSC) standards.

To understand the system, let us consider the image storage and transmission method that is used. A digital memory, limited in resolution by 128 × 128 × 4 MOS memory elements, is utilized. There are 128 pixels in each horizontal line (a pixel is a sampling point) and 128 lines in each field. The gray-scale (luminance) resolution is 4 binary bits and, therefore, is capable of representing 16 shades of gray.

The required bandwidth for this video system can be determined easily by calculating the amount of data that is necessary to be transmitted in a given period of time. Eq. 1 is used universally to give an estimate of required bandwidth. (Since the image will be sent using Amateur Radio equipment, the maximum bandwidth that may be used is less than 3 kHz.)

$$\text{Bandwidth (Hz)} = (\text{pixels/line} \div 2) \times \text{lines/field} \times \text{fields/sec} \quad \text{(Eq. 1)}$$

By entering the resolution data for our system into Eq. 1, we find that the bandwidth and field rate are related by:

$$\text{Bandwidth (Hz)} = 8192 \times \text{fields/sec} \quad \text{(Eq. 2)}$$

Most Amateur Radio transmitters cannot handle subaudible frequencies. This means that if low-frequency field rates are to be employed, it will be necessary to place the video information on a subcarrier so that it will pass through the transmitter as medium-frequency audio signals. Many years ago, it was agreed that the SSTV system should operate as an fm system. (The noise immunity properties of fm made it preferable to a-m.) Standards for the fm system are shown in Table 1.

Base video bandwidth chosen is 960 Hz. Entering this value into Eq. 2 to determine the time required to transmit a single picture, we get:

960 Hz = 8192 × fields/sec
fields/sec = 960 ÷ 8192 = 0.1172
sec/field = 8.53

The frequency spectrum of a typical SSTV signal is shown in Fig. 1. Most of the signal is above 1200 Hz. Spectrum analysis and observation prove that there is little energy in the low end of the audio range.

Compatible color television is possible, in part, because less resolution is required by the eye for color pictures than for black and white. The NTSC and other color TV systems utilize overlapping frequency spectrums. The same techniques may be used to modify the standards of slow-scan television to permit the transmission and recording of a color SSTV image in the same bandwidth and transmission time as required for a black-and-white image.

Three color signals, Y (luminance), R − Y (red minus Y) and B − Y (blue minus Y) are recovered from a color camera, TV monitor or a specially built decoder (see Fig. 2). It will be necessary to bandwidth-limit all three signals before they are converted to digital information and stored in memory. The bandwidth of the two color-difference signals should be half that of the luminance signal; i.e., 500 Hz. The three video signals, after bandwidth filtering, are fed to separate analog-to-digital (A/D) converters. The digital signals are then stored in memory. Since the color-difference signals are handled as narrow-bandwidth signals, it is possible to use much less memory for them than would otherwise be required.

Once the three signals are placed in memory, they can be read out simultaneously at the same rate as that used for normal black-and-white SSTV pictures. The output of each memory is fed through a digital-to-analog (D/A) converter, producing three analog SSTV signals.

The Y signal is connected to an fm oscillator, as in the present system, and

Table 1
SSTV Standards

Sync subcarrier frequency	1200 Hz
Black video frequency	1500 Hz
White video frequency	2300 Hz
Sync pulse width	5 ms (horizontal), 66 ms (vertical)
Line frequency	15 Hz (U.S. standard)

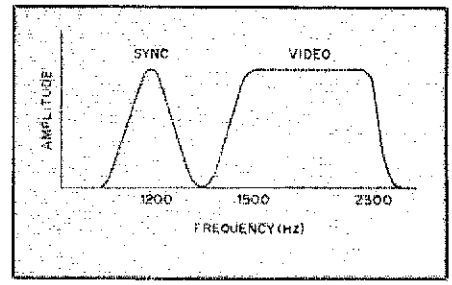


Fig. 1 — Frequency spectrum of a typical black-and-white SSTV signal. Black level is 1500 Hz; white is 2300 Hz.

*Box 95, RR 1, Waldron, IN 46182

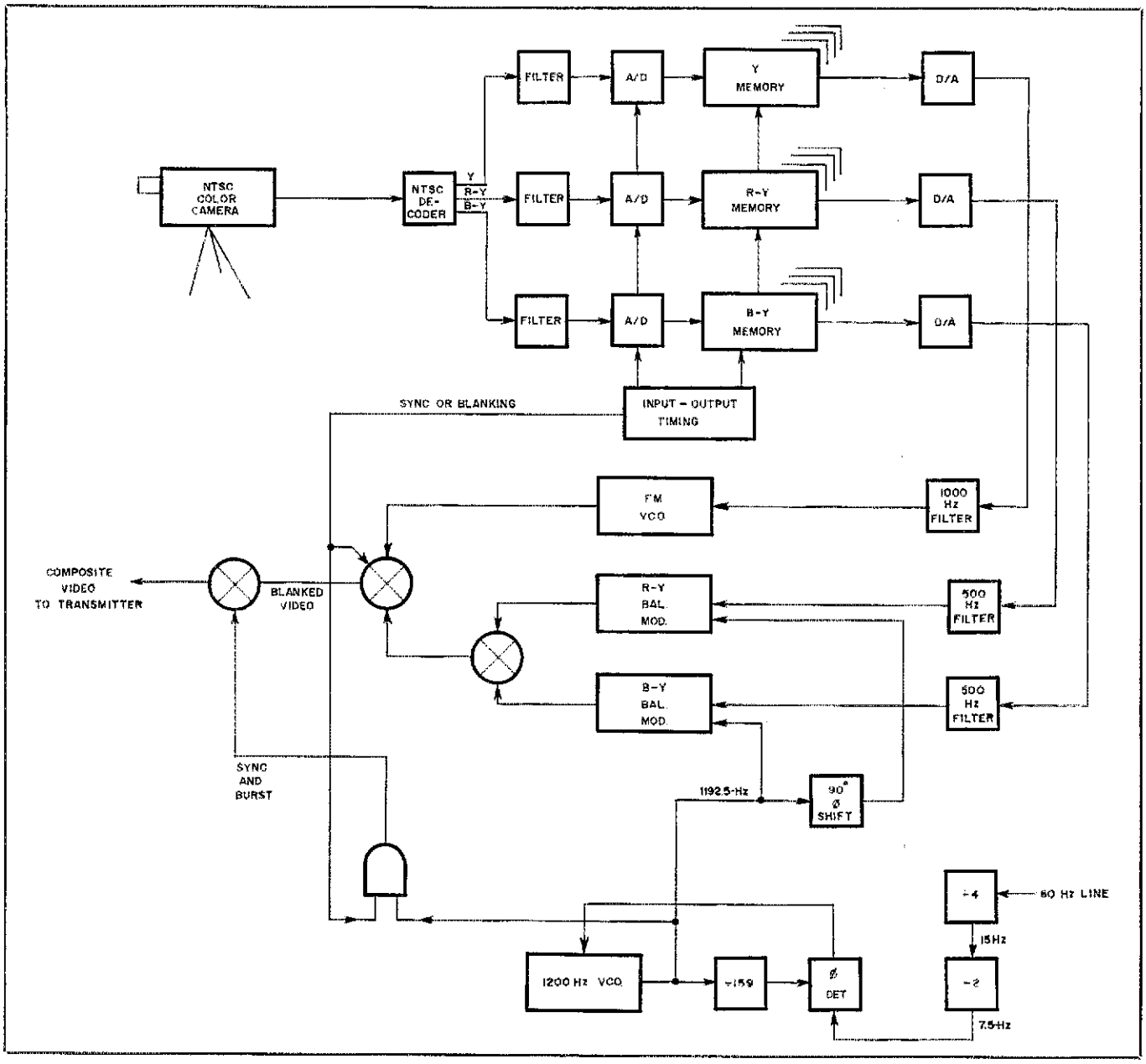


Fig. 2 — Color SSTV transmitting system.

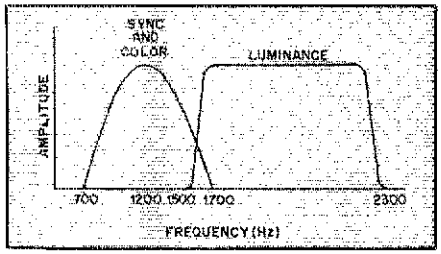


Fig. 3 — Spectrum of a typical color SSTV signal.

swings the frequency between 1500 and 2300 Hz. The sync signal (1200 Hz) is not produced in the normal way. It is generated by making it an odd multiple of one half the 15-Hz horizontal line rate. Horizontal sync is usually derived from the 60-Hz power line. The sync subcarrier (1192.5 Hz) is gated by the normal SSTV sync signal and appears at the output as before.

As in the case of NTSC color TV, the 1192.5-Hz carrier is 90 degree phase-shifted and, together with the zero-degree signal, is fed to a pair of balanced modulators. Each of the two color-difference signals will also feed the respective balanced modulators. This produces a pair of dsb spectrums, centered on the 1200-Hz signal; they occupy approximately 700 Hz to 1700 Hz. This also produces a slight overlap with the luminance spectrum between 1500 Hz and 1700 Hz (see Fig. 3). It is important that the dsb spectrums have symmetrical sidebands. Some sideband filters in Amateur Radio transceivers may give trouble with low-frequency roll off. In that case, equalization must take place before the three color signals are detected.

It may not be necessary to make the sync frequency an odd multiple of one half the horizontal line frequency. Under normal operation, it is very probable that the overlapping energy will not cause much picture degradation.

Fig. 4 is a block diagram of the receiving system. It functions in much the same manner as the transmitting system, only in reverse. Of course, further refinements to the receiving system are possible. Recently developed comb filters could be used to completely remove the crosstalk between the luminance and color-information channels.

This system produces completely compatible color-TV signals. It can be used with the popular multiple-memory, color-scan converters. Transmission time and bandwidth is the same as for black-and-white transmissions.

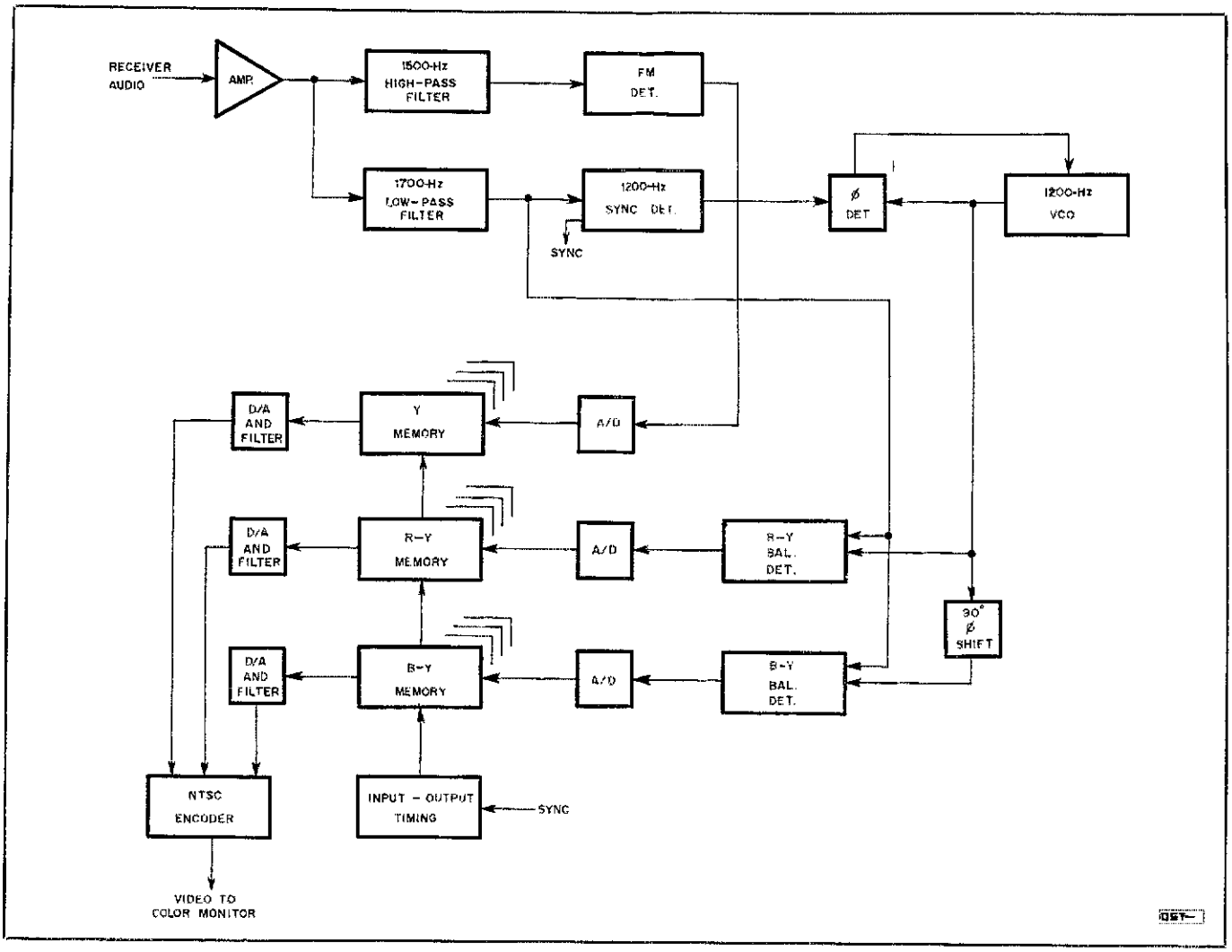


Fig. 4 — Color SSTV receiving system.

Strays

JOHN DiBLASI, W2FX, CO-FOUNDER OF QCWA

On January 13, 1982, John DiBlasi, W2FX, of Great Neck, New York, became a Silent Key. First licensed way back in 1912 or 1914, W2FX spent his entire life in electronics, both as a business and as a hobby. He remained active on the air until about eight years ago, when he was left paralyzed and bedridden by a stroke.

John was one of the founders of the Quarter Century Wireless Association in 1947, and was QCWA's first president, a position he held for 17 years. A member of ARRL and an avid collector of *QST*, W2FX was especially active on 20-meter ssb in his later years. He maintained regular schedules with many hams, including a group in Italy, which he called the "spaghetti net."

W2FX is survived by his wife, Anna, two sons and a daughter, and numerous grandchildren. — *John Facella, K9FJ/G5CYM, Bracknell, Berks, England*

CALL FOR PAPERS ON VEHICULAR TECHNOLOGY

☐ Papers are invited for the 1983 IEEE International Conference on Vehicular Technology to be held in Toronto, Ontario, on May 25-27, 1983. Topics in vehicular communication include trunking, cellular systems, ssb and packet switching. Abstracts of 500 words should be submitted by September 15, 1982 to N. J. Haslett, Telecom & Electronics Unit, Metropolitan Toronto Police, 2050 Jane St., Weston, ON M9N 2V3, Canada.

ARRL Foundation President Robert York Chapman, W1QV (right) presents a Satellite Booster plaque to ARRL President Vic Clark, W4KFC, in recognition of Vic's outstanding support of the Foundation's Twentieth Anniversary Satellite Fund Drive. The presentation was made in March at the Board of Directors meeting at Hartford, Connecticut.

Try the "TJ"

Whether TJ makes you think of Cameroon or Tokyo, Japan, the "DXpertise" of this antenna could help you snag the rare ones.

By R. R. Schellenbach,* W1JF

City dwellers and small-lot owners frequently complain, "No room for a good DX antenna." Can you work DX on 160, 80 and 40 meters from that restricted bit of real estate? The answer is yes. Let me tell you about a compact antenna that is useful for working DX.

The TJ is a five-band, vertically polarized antenna system. In the 160-meter band the TJ is essentially a 1/4-wavelength (λ) T (see Fig. 1). It becomes a 1/2-λ T on 80 meters and a 5/8-λ T on 40 meters. For 20 and 15 the configuration becomes a 1/2-λ inverted J. It is from this combination of T and J that the antenna gets its name.

High performance is realized with the TJ on 80 through 15 meters because the maximum current point is elevated above ground. On 160 meters, the performance approaches that of a full-size, 1/4-λ vertical antenna. The horizontal section of the TJ does not radiate appreciably. The current on each side is of equal magnitude and opposite phase, thus canceling radiation.

The three lower frequency bands employ a combination of top-loading techniques to physically shorten the antenna. The end sections act as capacitance hats on 80 and 160 meters. On those two bands there is an almost 2/3 size reduction in the TJ. Because top loading is employed, bandwidth is not reduced as drastically as it would be if other methods were used. On 160 meters, top loading means a more desirable current distribution and a more favorable feed point impedance (30 to 40 Ω compared with 8 to 10 Ω for a base-loaded vertical). If the ground system has a resistance of 5 Ω, the TJ should be about 85% efficient on 160 meters. A base-loaded vertical would exhibit only half that efficiency. Better efficiency means more effective radiated power — exactly what we all want.

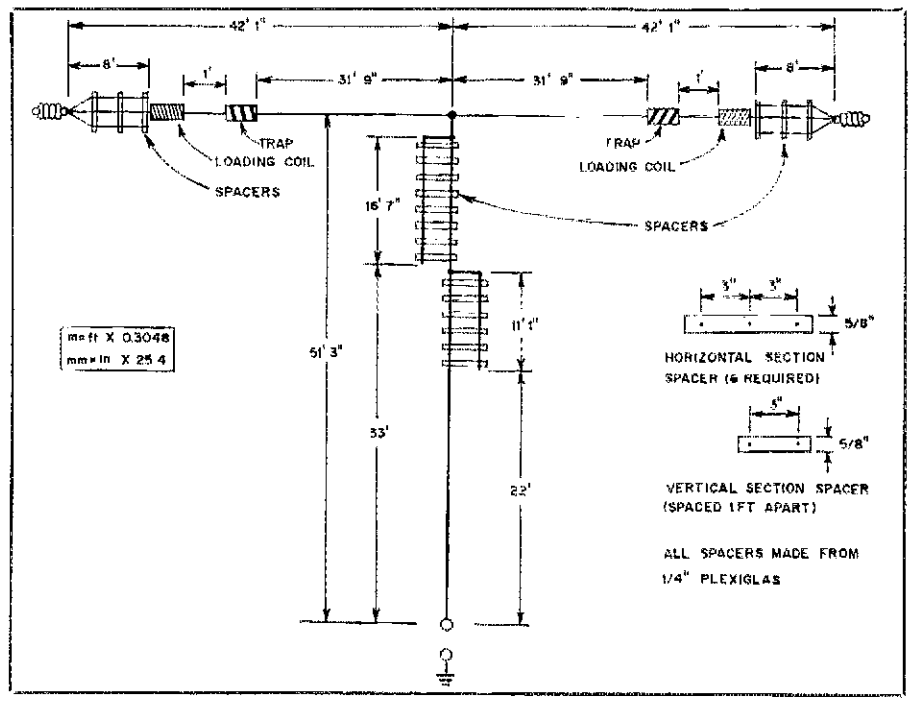


Fig. 1 — The TJ antenna.

Construction Details

The loading coils are wound on 8-inch lengths of 1-1/2 in. PVC tubing.[1] Use 120 turns of close-wound, no. 14 enam. copper wire. I installed a pair of egg insulators inside each coil for support.

The 40-meter traps employ the same type of tubing and support scheme. They were constructed after a *QST* article by Johns.[2] I used RG-59/U coaxial cable and found resonance at 7.05 MHz, using 11 turns.

The dimensions shown in Fig. 1 were derived empirically. You can copy the measurements or modify them for operation in your favorite parts of the bands. I find resonance in my antenna at 1.815, 3.6, 7.05, 14.1 and 21.1 MHz.

Install the TJ in the clear, as far from surrounding objects as is possible. High quality glass or ceramic insulators should be used at the antenna ends. Nylon rope can be used to support the antenna. The feed point should be no more than 2 feet above the ground.

A good ground is required for efficient operation on 160 and 40 meters. My ground system covers 2 acres and employs a buried network of over 5000 feet of solid copper ribbon. You may not want to duplicate that, but you should install an effective ground system. Stanley described several possible configurations in *QST*.[3]

Tuning the TJ

An antenna-matching network is essential to proper operation of the TJ. The network should be installed at the antenna feed point, using the shortest leads possible. Adjustments can be set for the

*12 Whitehall La., Reading, MA 01867

[1]Notes appear on page 19.

Table 1
Antenna Feed-Point Impedance

Band	*Impedance (approx.)*
160	35 Ω
80	>1000 Ω
40	100 Ω
20	>1000 Ω
15	>1000 Ω

favorite band of operation, or you can do it by remote control.[4, 5, 6]

Feed-point impedances are given in Table 1. These impedances can be matched with the three configurations shown in Fig. 2. The exact values for these networks should be determined experimentally for each installation. Components for the matching networks should be mounted in a weatherproof housing.

Start with a quarter wavelength of coaxial cable for the 40-meter matching stub. To find the length in feet, divide 234 by the frequency in megahertz and multiply by the velocity factor of the cable. (Velocity factor is 0.66 for polyethelyene dielectric and approximately 0.80 for foam.) Short the free end of the stub and observe the SWR. Now shorten the stub, short the end and check SWR. Continue this process until a satisfactory match is found. The stub can now be rolled into a coil and the end taped.

One nice feature of stub matching is bandwidth. As you move away from resonance, the reactance of the antenna and stub move in opposite directions. The reactances tend to cancel, thus providing greater bandwidth.

The matching circuit for 80, 20 and 15 meters is a simple L network. On 160 meters I employ a modified L network. I found that the best match and highest antenna current was obtained with the tap a little more than half way toward the variable capacitor. The TJ covers the entire cw portion of any of the five bands, with one setting of the antenna-matching unit.

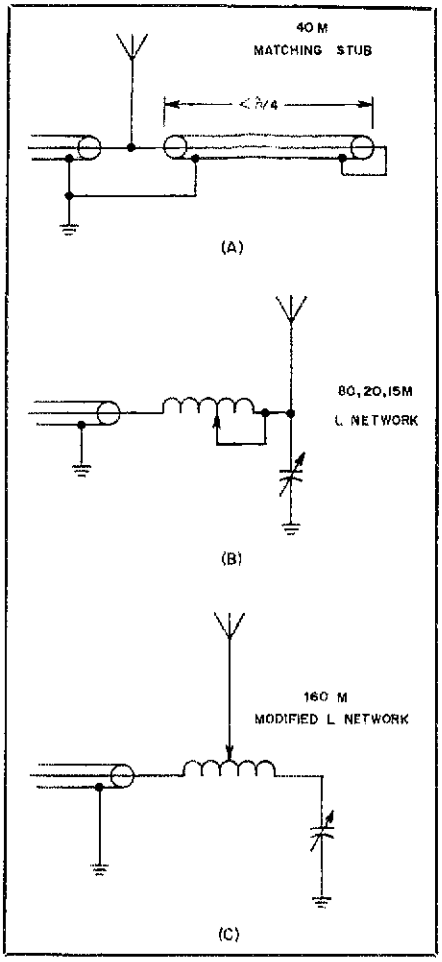


Fig. 2 — Matching networks for the TJ. Capacitance and inductance values should be determined experimentally for each band.

Performance

Short-skip performance is not as effective as it is with a low horizontal antenna. Lack of high-angle radiation explains that characteristic. Ground-wave coverage is very good, thanks to vertical polarization and a low angle of radiation. Best of all, that low angle accounts for the excellent DX results I have obtained while using the TJ.

I found it satisfying and a lot of fun to build my own antenna. You would, too. Why not construct your own TJ? Good luck and good DX! QST

Notes

[1]mm = in. × 25.4, m = ft × 0.3048.
[2]R. H. Johns, "Coaxial Cable Antenna Traps," *QST*, May 1981, p. 15.
[3]J. O. Stanley, "Optimum Ground Systems for Vertical Antennas," *QST*, December 1976, p. 13.
[4]H. Drake, Jr., "A Remotely Controlled Antenna Matching Network," *QST*, January 1980, p. 32.
[5]B. K. Imamura, "A T-Network Semi-Automatic Antenna Tuner," *QST*, April 1980, p. 26.
[6]W. H. Sanford, Jr., "A Modest 45-Foot DX Vertical for 160, 80, 40 and 30 Meters," *QST*, September 1981, p. 27.

Strays

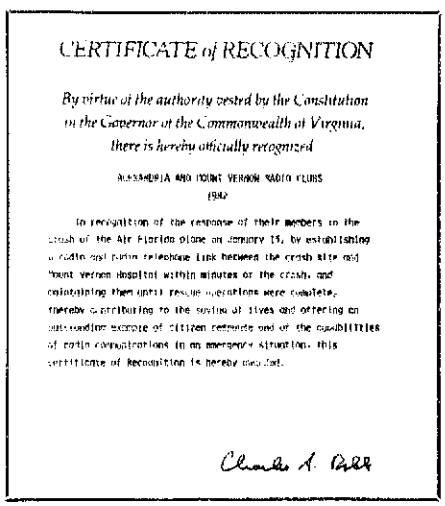
Last December, four members of the Sam Houston Amateur Radio Klub went to jail — just for a day — as part of the club's Christmas Project on behalf of the inmates at the Huntsville (Texas) State Prison. Using stations operating on 2-meter fm and ssb, the amateurs braved bone-chilling temperatures to relay seasons greetings to the families of more than 450 inmates. Seated, l-r, are N5CDN, WA4AOG, KA5DQP and KA5FPV. Two inmates look on. *(photo by Jim Bacon)*

FIELD DAY SATELLITE INFORMATION

☐ Field Day rules in May *QST* allow 100 points for a satellite QSO. This year, with the addition of the Soviet Amateur Radio satellites, operating activity can be spread out to make your operation more enjoyable. AMSAT-OSCAR 8 will remain in the mode listed in the operating schedule (page 93) for June 26 and 27, UTC. The Soviet RADIO satellites will operate Mode A, and a QSO with one of them will count for the 100 points; just list the QSO number (for the ROBOT), date and time. See the schedule for operating times and frequencies. — *Bernie Glassmeyer, W9KDR, OSCAR Program Manager, ARRL*

I would like to get in touch with . . .

☐ amateurs who are interested in volunteering two hours a week to record textbooks for blind and handicapped students. Dorothy Dorben, Reading for the Blind, Inc., 5022 Hollywood Blvd., Los Angeles, CA 90027.



CERTIFICATE of RECOGNITION

By virtue of the authority vested by the Constitution of the Governor of the Commonwealth of Virginia, there is hereby officially recognized

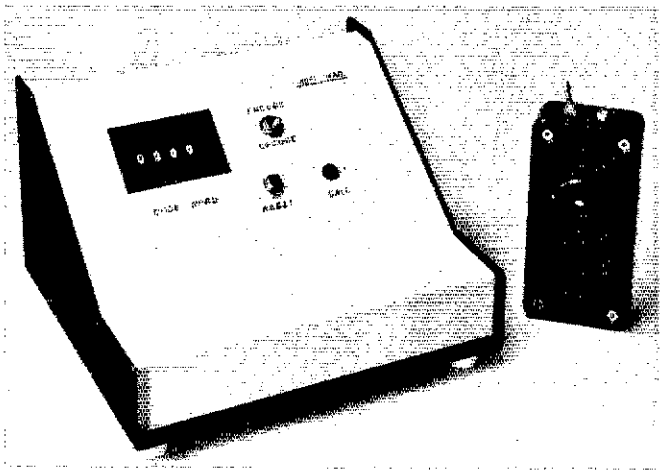
ALEXANDRIA AND MOUNT VERNON RADIO CLUBS
1982

In recognition of the response of their members to the crash of the Air Florida plane on January 13, by establishing a radio and voice telephone link between the crash site and Mount Vernon Hospital within minutes of the crash, and maintaining them until rescue operations were complete, thereby contributing to the saving of lives and offering an outstanding example of citizen response and of the capabilities of radio communications in an emergency situation. This certificate of Recognition is hereby awarded.

Charles S. Robb

In the wake of the crash of an Air Florida jetliner in Washington, DC, on January 13, 1982, Virginia Governor Charles Robb issued this proclamation, commending the members of the Alexandria and Mount Vernon ARCs for establishing and maintaining a communications link between the crash site and a local hospital until rescue operations were complete.

Not just Another Decoder



Do you monitor the local repeater "just in case" someone might call you? Would you like a 2-meter paging system for your club? NAD will keep your receiver quiet until there's a message for you!

By Paul Newland,* AD7I

This is a description of NAD, Not just Another Decoder. Ideally suited for fm operation, NAD provides selective calling of other NAD-equipped amateurs. NAD is simple to build, low cost, and easy to operate. It is battery powered and features standby current so low that no on/off switch is needed. All parts may be purchased at Radio Shack, except the MM53200 and the MM74C14 integrated circuits.

The heart of this circuit is the National Semiconductor MM53200, a digital-code encoder/decoder IC. The chip was designed as a garage-door-opener device, but we will use it as a pager transceiver.

The 1980 MOS Data Book by National outlines the MM53200 features. It comes in an 18-pin dual-in-line package, contains its own oscillator circuit for internal timing, and has all the necessary circuitry to generate or decode digital code words. The MM53200 has two modes of operation: The ENCODER mode is used for generating 12-bit code words and the DECODER mode is used for detecting 12-bit code words. In either mode the code word is selected by setting the Data Select Leads (DSLs) to either logic one or zero.

Fig. 1 is a representation of the digital signal that is generated by the encoder. The MM53200 first sends the synchronization signal (12 bit times of logic low), followed by the code word (12 bit times of data 1 or 0, depending on the level of the DSLs). This pattern is repeated as long as the chip is in the ENCODER mode.

If this encoder signal is applied to the input of an MM53200 in the DECODER mode, and the clock frequency of the encoder and decoder are within a factor of 2 of each other, the output of the decoder will go low when it detects four repetitions of the code word, provided both are set to the same code. If the words don't match, the decoder output is inactive.

Extending the MM53200 to Radio

Some form of modulation is needed since the digital signals generated by the MM53200 cannot be sent directly over the radio channel. The encoder amplitude modulates a 1900-Hz audio pilot tone; logic 1 turns the tone off, logic 0 turns it on. The tone is fed into the transmitter microphone jack for encoder operation; audio from the earphone jack is connected to NAD for decoder operation. This method is simple and easy to implement. It suffers from poor noise immunity, but providing better noise immunity would complicate the circuit.

Circuit Description

A schematic diagram of NAD is given in Fig. 2. I have defined, for the Data Select Leads only, that logic 1 will be a connection to ground; logic 0 will be a floating DSL. This corresponds to the closing and opening of the switch that connects each DSL to ground.

ENCODER Mode

In the ENCODER mode, switch S1 is set to the ENCODE position, causing U2A to go low and U1 MODE to go high (U1 MODE is the mode input — high is encode). With U2A low, both D2 and D3 are conducting; The input to U1 is low and to U2B is high, turning Q1 on. Q1 controls the power down function. In the ENCODER mode, NAD is always fully powered because Q1 is always on. R3 and C2 control the timing parameters for the internal clock. The code word is placed on the DSLs by switch S2. While in the ENCODER mode, the U1 output sends the digital data pattern that is shown in Fig. 1. Q2 amplitude modulates, or on/off keys U3 — a 1900-Hz LM555 oscillator that is coupled to the bidirectional audio jack via C7, R9, and T1. This modulated pilot tone may be observed by listening to the audio output of the piezo element,[1] Y1.

DECODER Mode

In the DECODER mode, S1 is set to DECODE; U2A is high and Q1 is off, placing NAD in the power-down condition. (When Q1 is off, there is no ground connection for U1). In this condition, the current drain should be less than several microamperes. You can measure this current by inserting a 100-kΩ resistor in series with the 9-volt battery. Place a high-impedance voltmeter across the resistor, then short out the resistor and voltmeter for about two seconds. Remove the short and measure the voltage across the resistor. Every volt indicates 10 microamperes of current through the resistor; you should read less than several

*P.O. Box 205, Holmdel, NJ 07733-0205

[1]Notes appear on page 23.

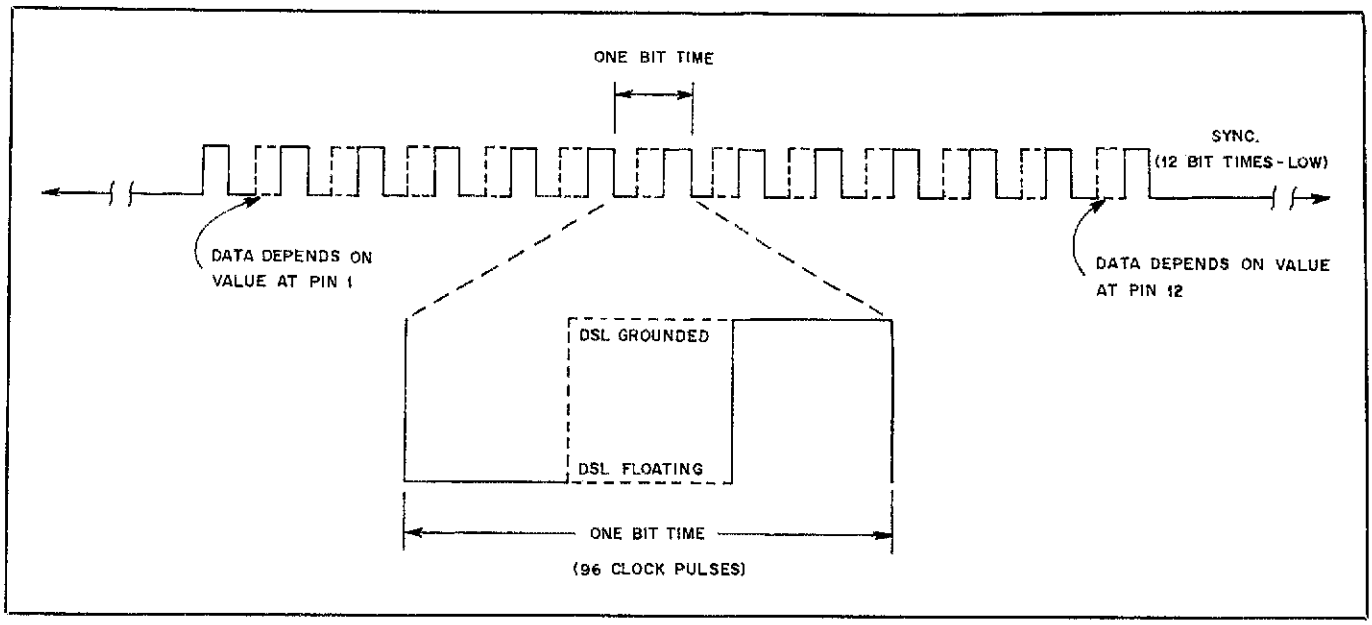


Fig. 1 — Diagram of the encoder/decoder-data waveform.

hundred millivolts. If your reading is greater than this, make sure any unused inputs on U2 are connected to either ground or +9 volts.

Received audio is applied to T1, which steps up the audio voltage, biasing U2A on and off in step with the negative audio peaks. When U2A goes low, both D2 and D3 conduct. R4 and C3 form a retriggerable, one-shot timer with a time constant of about one second. The output of this timer controls Q1 and the power-down feature. Thus, NAD stays powered up for about one second following the last audio signal. When the tones are received, the longest tone-off period is about 15 ms, much less than the one-second time.

R2 and C1 form an integrator to demodulate the original digital data from the amplitude envelope of the received audio. This digital data is "squared-up" within U1 by a Schmitt-trigger input. The desired code word is programmed into U1 via the DSLs. When the signal from the radio matches this code word, the U1 output goes low. When this happens, Q2 will conduct, causing U3 to oscillate. The piezo-electric element, Y1, will emit an alerting signal that can easily be heard. Additionally, D4 and D5 will conduct. U2C, a 25-second, one-shot timer will energize K1, the speaker-control relay, allowing the operator to monitor the channel for 25 seconds following a decode. D5 conducting causes the flip-flop formed by U2D and U2E to set with U2E low. This enables U2F, a low duty cycle, 1-Hz oscillator that flashes D9 until the reset button is pressed.

Construction Techniques

Simple low-frequency circuits can be constructed in many ways. Some may find either pc boards or point-to-point wiring with perforated board (perf board) most suitable; I happen to like wire-wrap. When many circuit changes are likely (such as during circuit development), wire-wrap proves to be flexible; changes are quick and simple to make. The result is a circuit that is sturdy and reliable, with no need to transfer the bread-board circuit to another form. You should use whatever method is most comfortable for you.

I used wire-wrap IC sockets for the chips and Vector T44 pins for the discrete components. IC sockets were held to the board with the wires wrapped to their posts. The shoulders of the T44 pins were forced into the board by placing a soldering iron on top of the pin and pushing downward to melt the plastic perf board, seating the pins. The discrete components were then soldered to the T44 pins. All interconnections were made using no. 30 wire-wrap wire (Fig. 3).

Adjustments

Before you can use NAD, the clock circuit needs to be trimmed to frequency. Either of two methods can be used: One requires an ear and a stopwatch; the other requires a scope or frequency counter.

Ear Method

Temporarily connect a 47-kΩ resistor for RV3 (the code word setting is not important), and set NAD to ENCODE. You should now hear tones coming from the piezo element. If you listen closely, you should hear a distinct cadence or rhythm with about two beats per second (or 20 beats per 10 seconds). The value of RV3 needs to be adjusted to provide 18 to 22 beats per 10 seconds. Standard-value resistors should provide enough resolution to meet the 18- to 22-beats requirements.

Scope Method

Connect a scope or frequency counter to TP1 with a high-impedance probe, and connect the probe ground clip to a convenient signal ground point. Set NAD to ENCODE (the code word is unimportant), and adjust the value of RV3 (starting with 47-kΩ) using standard values to provide a 4600-Hz frequency. Don't get carried away with accuracy; standard values should provide enough resolution to get the clock to within 10% of 4600 Hz.

Operation

To transmit, set the code-word switches to the desired values and connect the audio signal from NAD to a low-impedance point in the transmitter microphone circuit. Set the NAD mode switch to ENCODE then key the transmitter for several seconds. This will cause any NAD decoders monitoring the channel to generate the alerting signal when they hear the matching code word.

To receive, set the code-word switches to provide the desired code word on the DSLs. Adjust the audio for a loud but comfortable listening level. It may take some experimentation to determine the proper audio setting for your radio. Connect the speaker audio (the external earphone or external speaker jack is ideal) to NAD audio input (be sure the radio has a capacitor in its audio-output circuit). Set the mode switch to DECODE (when not transmitting NAD codes, NAD should always be in the DECODE mode). Your NAD will sound its alerting signal whenever any NAD signal is received

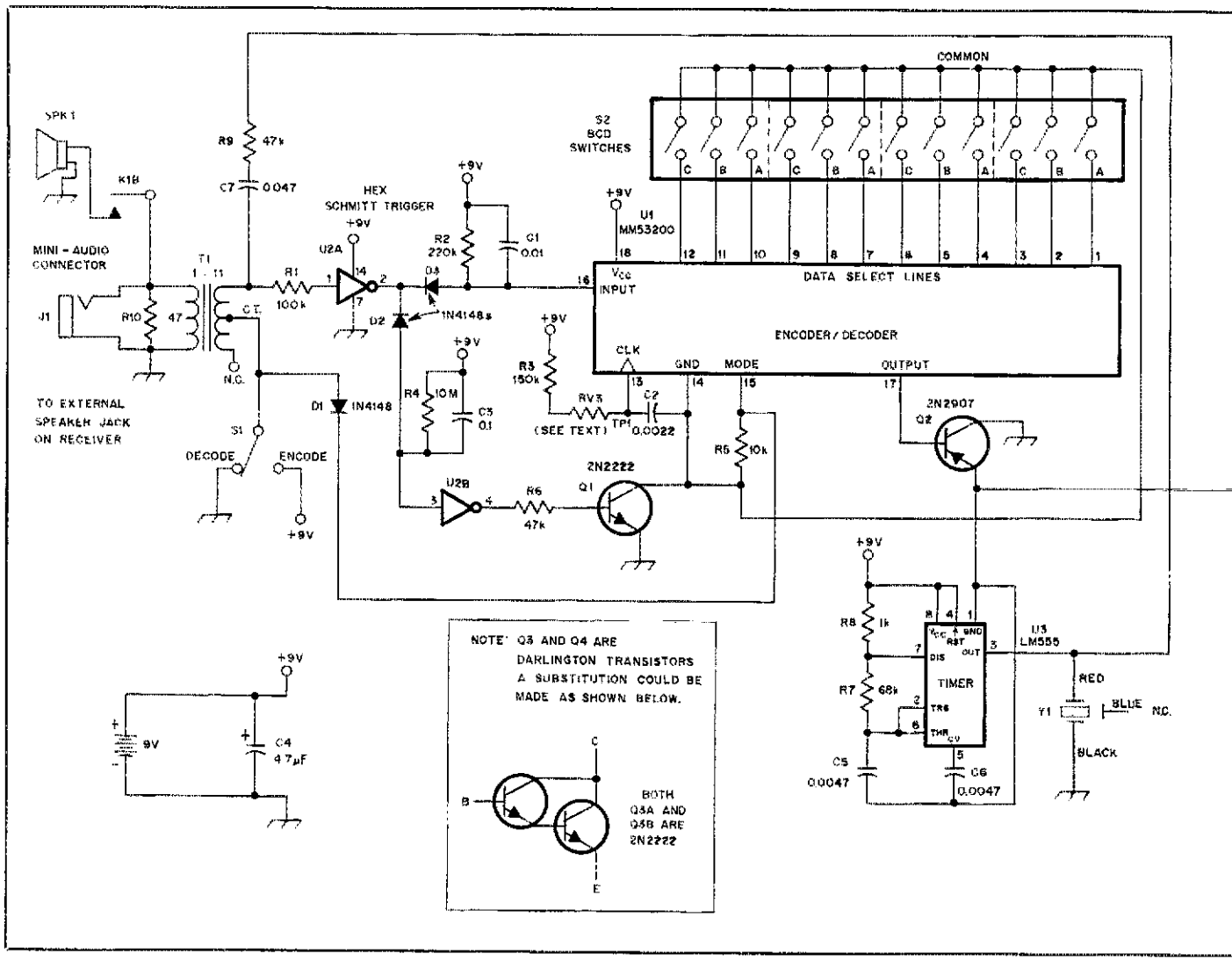


Fig. 2 — Schematic diagram of the NAD circuit. All resistors are 1/4-watt, 10% carbon-composition types.

C1 — 0.01-µF Mylar capacitor, 12 V.
C2 — 0.0022-µF Mylar capacitor, 12 V.
C3 — 0.10-µF disc capacitor.
C4 — 4.7-µF electrolytic or tantalum capacitor, 12 V.
C5 — 0.0047-µF Mylar capacitor, 12 V.
C6 — 0.0047-µF disc capacitor.
C7 — 0.047-µF disc capacitor.
C8 — 2.2-µF electrolytic or tantalum capacitor, 12 V.
C9 — 0.22-µF disc capacitor.
D1-D7 — 1N4148.
D8 — 1N4002.
DS1 — General-purpose LED.
K1 — 9-V spst relay (RS275-004).
Q1 — 2N2222 or equiv.
Q2 — 2N2907 or equiv.
Q3, Q4 — 2N6725 Darlington transistor or equiv.
R1, R12, R13 — 100 kΩ.
R2, R14 — 220 kΩ.
R3 — 150 kΩ.
R4, R11, R15 — 10 MΩ.
R5 — 10 kΩ.

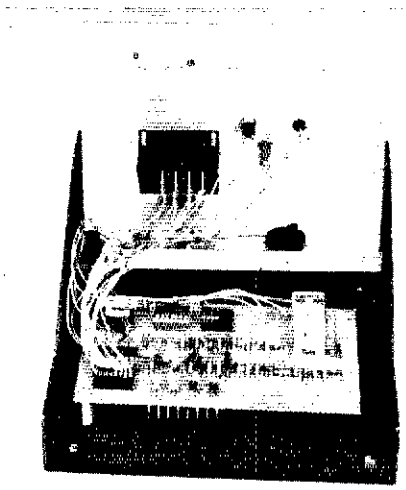


Fig. 3 — The simple construction and few components can be seen in this view of NAD.

using the code word to which your decoder is set.

Conclusion

This article describes how to build a pager transceiver based on the MM53200 IC. I hope that this information proves useful for those interested in the convenience that NAD can provide. I will be glad to answer any questions that readers may have, but please include an s.a.s.e.

If there is enough interest, I will offer a design of a unit that could be used at a repeater to convert the BCD (Binary Coded Decimal) data from a Touch-Tone[2] decoder to NAD signals so that only one NAD encoder would be needed for a repeater system. I would like to thank Philip Thompson, WB2EWB, for his help in reviewing and correcting this manuscript.

APPENDIX

Description of Code Words

Let the code word be partitioned into four groups of three bits each. Now the code word can easily be described as a four-digit octal number. The Most Significant Digit (MSD) would be composed of DSLs 10, 11 and 12, with DSL12 being the Most Significant Bit (MSB).

For example, assume the following code word:

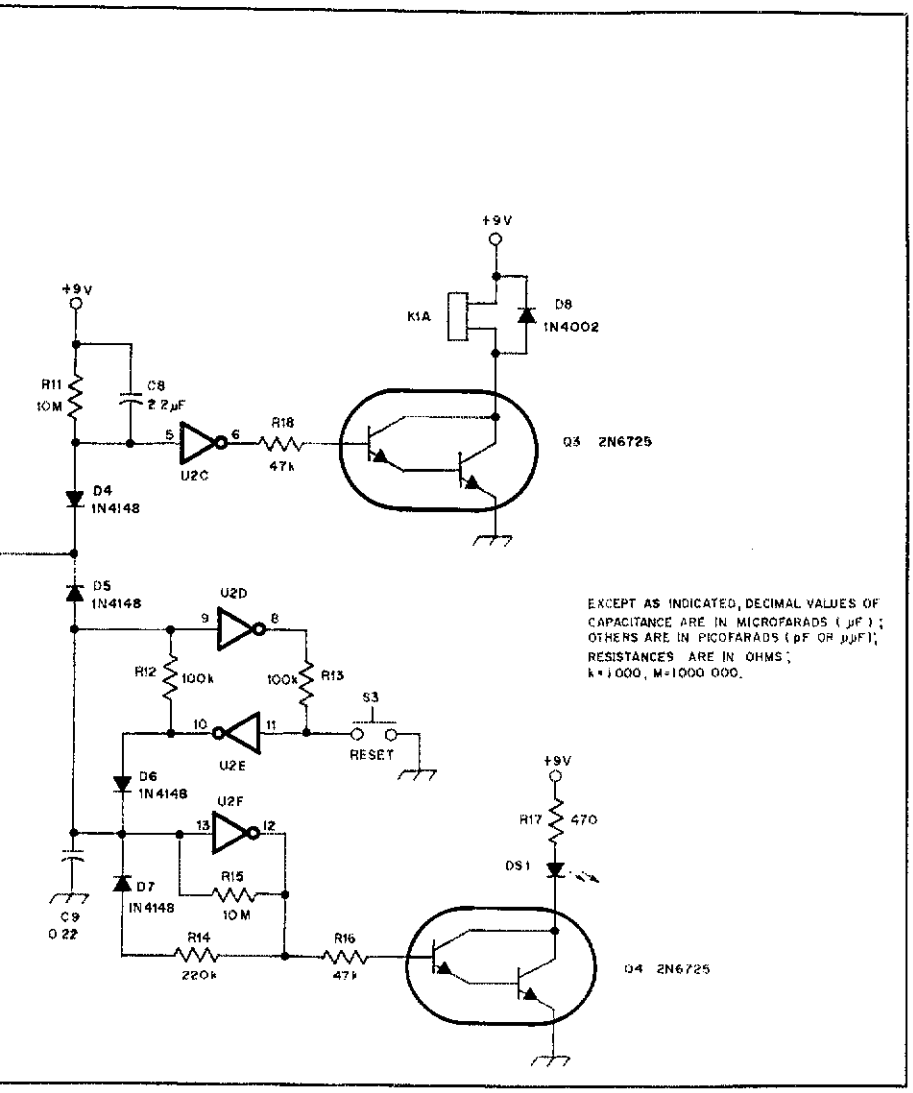
0 1 1 1 1 1 1 0 1 0 1 bits
12 11 10 9 8 7 6 5 4 3 2 1 DSLs

where, in the first row, 1 means DSL grounded and 0 means DSL floating.

To convert this to octal, partition the bits into groups of three. For example,

011 111 110 101

Within each group, assign the left bit the weight value, 4, the middle bit, 2, and the right bit, 1. Within a group, wherever a 1 occurs, add the corresponding weights together to



R6, R9, R16, R18 — 47 kΩ.
R7 — 68 kΩ.
R8 — 1 kΩ.
R10 — 47 Ω.
R17 — 470 Ω.
RV3 — 47 kΩ to start.
S1 — Spdt toggle switch.
S2 — 4-digit BCD switch, such as Jameco® SF21, (4) SF-EP (1 pair).
SPK1 — General-purpose speaker.
T1 — Transformer, 8-ohm primary, 1000-ohm ct secondary (RS 273-1380).
U1 — MM53200, National Semiconductor.
U2 — MM74C14, National Semiconductor.
U3 — LM555 timer.
Y1 — Piezo element (RS 273-064).

determine the value of that group. For example,

011 111 110 101

2+1=3 4+2+1=7 4+2=6 4+1=5

octal number is 3765

Selecting a Code Word

To determine which code word to use as your own, the following method is offered. Those who don't like this method are certainly free to select arbitrary code words.

To select an octal code word for your own call sign, you will need a calculator, but not necessarily a fancy one. Simply follow this procedure:

1) Write out your call as it appears on your license (no /7 or /RPT stuff!). Assign a position number above each character (increasing from left to right) and a value number below each character. Position starts with 1 and increments with each movement to the right. For values use 1-26 for A-Z and 30-39 for 0-9. For example,

position:	1	2	3	4
call sign:	A	D	7	I
value:	1	4	37	9

2) Multiply the value number by the position digit appended with the next three counting digits. Following these multiplications, underline only the *last* four digits of each calculation. For example,

character	*value*		*position*		*result*
A	1	×	1234	=	1234
D	2	×	2345	=	9380
7	37	×	3456	=	127872
I	9	×	4567	=	41103

3) Add each of these underlined values to create a new number. Again, underline the *last* four digits. For example,

1234 + 9380 + 7872 + 1103 = 19589

4) If the underlined part of the result is greater than 4031 (that includes 4032), subtract 4032 and continue doing so until the result is less than 4032 (zero is perfectly acceptable). This result is a code word, but it is expressed in base 10, not base 8 (octal). For example,

9589 − 4032 = 5557
5557 − 4032 = 1525

5) To convert to octal, divide the result by 512 and note (write down) the digit to the left of the decimal point. Next, subtract that digit from the displayed value, then multiply by 8. Again, note the digit to the left of the decimal point and subtract that digit from the display. Then multiply by 8. Note the digit, subtract and multiply by 8. The remaining number on the display should be rounded to the nearest whole number, and be written down. This sequence of four digits is the octal representation of the code word. For example, to convert 1525 to octal,

1525/512 = 2.9785156
−2.
0.9785156
×8.
7.8281248
−7.
0.8281248
×8.
6.6249984
−6.
0.6249984
×8.
4.9999872

Therefore, 2765 base 8 is equal to 1525 base 10. The octal code word is 2765. This is the number to be entered on the BCD thumb-wheel switches to set your code word.

An alternative to the BCD switches would be to use 12 spst switches (such as DIP switches). In this case the code word would have to be converted to the binary system, and the code entered by closing the appropriate switches.

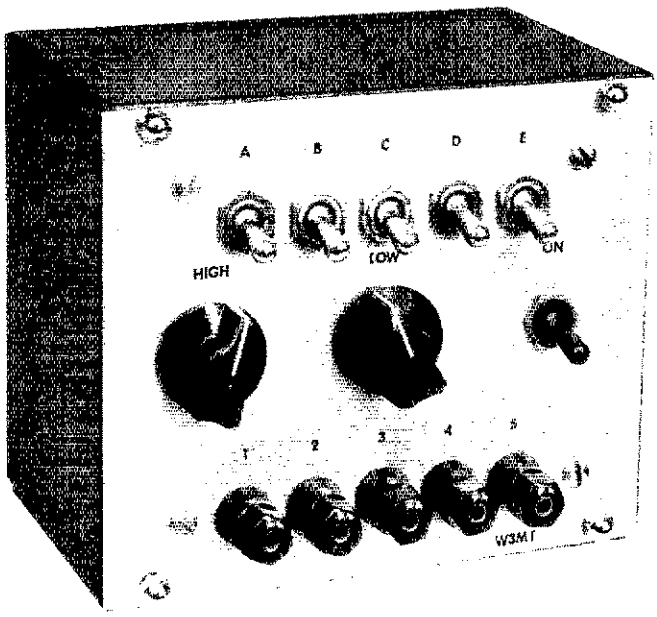
There are many call signs that will be mapped to the same code word. This is unavoidable. If you find that a code word is overused in your area, just pick another. This method of mapping call signs to code words only allocates those codes between octal 0 and octal 7677. Octal 7700 to octal 7777 are unused. This was done intentionally. The unassigned code words are available for repeater-system managers to assign as group calling functions. Some examples of these functions might be to call a regular net to session (some people are forgetful), or to begin an announcement of a serious weather alert, and so on.

A decoder that will respond to either of two (or more) code words can be constructed by paralleling the $+V_{cc}$, ground, input, output, and mode leads of another MM53200 to the present one. A second R-C network will be needed for the clock. Separate switches are required for the DSLs.

Notes

[1]Piezo element is the name Radio Shack gives to their piezo-electric transducer. NAD uses it to convert the electrical signals from U3 to an audio signal that the operator can hear.
[2]Touch-Tone is a trademark of American Telephone and Telegraph Co.

Construct a Simple L-C Audio Oscillator



"Turned off" by the high prices of test equipment? Spend an afternoon and a few dollars on parts, and build this oscillator. Make it the tone of your life!

By Frank Noble,* W3MT

For most amateur work an audio oscillator should have good waveform, a number of known and stable frequencies between 500 and 3000 Hz, low output impedance and continuously variable output voltage. Other desirable features are ground-isolated output, push-pull output, small size, battery operation, simplicity and low cost. It sounds like a lot to ask of a simple circuit, doesn't it?

The Circuit

This oscillator (Fig. 1) produces 32 frequencies by switching five capacitors across a 44-mH telephone toroid. Largely because of the coil quality, the waveform and stability are superb. The circuit has a grounded single-ended output of 9 V pk-pk or more, with a source impedance of less than 20 kΩ, and a ground-isolated push-pull output of at least 400 mV pk-pk per side, with a source impedance of less than 135 Ω per side. Both outputs are continuously variable, and the low impedance output uses a dual potentiometer to maintain balance-to-common in the push-pull mode. The circuit uses one JFET that draws less than 3 mA from two 9-V transistor batteries contained within the case.

The circuit, a modified Hartley oscillator, is self-biased by the dc restorer action of D1 and the coupling capacitor. Although the effects of D1 in reducing distortion and capacitance variation are probably not important here, it also reduces power consumption, and that *is* important! I included the 1-kΩ resistor in series with the gate as a precaution. It slows down the transistor so that high-frequency resonances in the long connecting wires will not see enough gain to cause trouble. The gate return is to the source, making the initial transconductance large, ensuring dependable starting. Should oscillation fail for any reason, the transistor dissipation at zero bias is within rating. Experimentally, I found that a resistor in the coil center-tap-to-source circuit improves the waveform. It also tends to maximize the output voltage, but I did not pursue the reasons for it functioning in this manner.

Since the impedance of the resonant circuit increases with the product of the frequency and the Q, and since the Q increases with frequency in this range, the impedance tends to increase with the square of the frequency, roughly, from 4 kΩ to about 200 kΩ. Our transistor would react to this by making the output increase markedly with frequency. Substituting a 5-kΩ potentiometer for the 50-kΩ unit will reduce the level variation, but the output voltage will be lower and the waveform at high frequencies will suffer.

The low-impedance output could be made even lower by substituting a dual, 100-Ω potentiometer, if available. Should the oscillator fail to start, increase the value of the 50-kΩ potentiometer a bit. Or, you can try reducing the 150-Ω resistor in the coil center-tap circuit.

The Functions

Thirty-two frequencies are available. Table 1 gives the switch settings and the corresponding frequencies produced. Although I used toggle switches, you can use the less expensive slide switches without degrading performance.

The 44-mH toroid acts as a step-down transformer to produce the balanced, low-impedance output. From Wetherhold's data[1] I deduced that the coil has a total of 536 turns. If we wish to obtain a line-to-line impedance 125 times less than the main coil impedance, we must wind 48 turns on the secondary, tapped in the center. I used no. 30 double-cotton insulated wire. Any small-gauge, insulated wire should work equally well. If care is taken while winding, the toroid will accept two uniform windings of 24 turns, one on each half-torus.

Start with 6 feet of wire, weight the far end with a solder loop, stand on a chair and guide the wire through the hole, keeping the turns closely spaced at the inside of the hole and as near radial as possible. (In theory, it does not matter how messy the winding is, but it is mechanically easier to handle a neat coil.) Be sure to continue the second winding in the same direction, so the adjacent ends may be joined to form

*10004 Belhaven Rd., Bethesda, MD 20817

[1]Notes appear on page 25.

the common output. Cement hose washers to the finished coil with 5-minute epoxy; this provides a stable pad so the coil may be mounted between a pair of washers by means of a bolt with an insulating sleeve. Alternatively, you can use double-sided tape to affix the coil.

The enclosure I used is steel, measuring 4 × 5 × 6 inches[2] (Bud CU-729 BR). A metal cabinet is desirable only for mechanical protection, since the toroid is self-shielding and the impedances are low. I used superior posts, because they were on hand. You can use an ordinary screw-terminal strip, which will work as well, even though it will be less convenient.

I mounted all parts (including the batteries) either on the panel or on a circuit board spaced off the panel. Using a pair of homemade aluminum brackets, I secured the batteries on opposite sides of the circuit board. Although I used Vector board with push-in, 0.042-inch round terminals, you can employ any convenient construction technique. Attach the capacitors to the circuit board by passing the leads through appropriate holes and bending them over. Pass connecting wires beneath these leads and solder. Make the panel easily removable by tapping the four holes in the box with 8-32 threads. Drive 3/8-inch screws in from the back. Slip the panel onto these studs and secure with knurled nuts. I replaced the steel panel with 1/16-inch aluminum, performed the metal work, labeled the panel with rub-on transfers, and spray-lacquered the labels down before assembling parts to the panel.

I glued a chart containing output connections and frequency vs switch-position information to the back panel. You can cut out Table 1 and use it. If any frequency less than 5.117 kHz is desired and not available by switching the internal capacitors, you may obtain it anyway. Set the high-impedance potentiometer full up and shunt the high output terminals with capacitance, such that the sum of the capacitors shunting the coil satisfies the relation

$$C = \frac{0.5761}{f^2} \qquad \text{(Eq. 1)}$$

where C is in μF and f is in kHz.

If adjustable phase is needed, the phase shifter[3] of Fig. 2 may be made from two parts. It shifts phase continuously throughout the shaded regions on the vector diagram, leaving two blank regions of about 5 degrees each. For frequencies other than 759 Hz, select C to satisfy the relation

$$C = \frac{0.759}{f} \qquad \text{(Eq. 2)}$$

where C is in μF and f is in kHz.

If you need a two-tone signal, the ground-isolated output of this oscillator allows it to be series-connected with another signal source. This provides the simplest possible arrangement for combining the tones.

All this performance from such a simple circuit may be a lot to ask. This oscillator meets all requirements — and more! Can you afford to be without it? QST

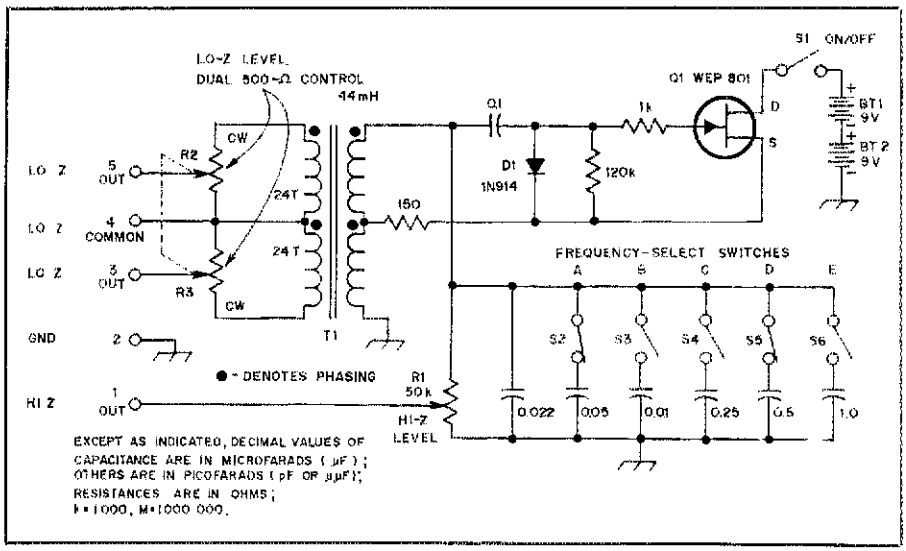


Fig. 1 — Schematic diagram of the tone oscillator. All capacitors can be any nonpolarized type, such as paper or Mylar.

BT1, BT2 — 9-V transistor battery.
D1 — Silicon, small signal, 10 mA, 75 PIV, 1N914 or equiv.
Q1 — JFET, small-signal vhf mixer and amplifier, 330 mW. WEP-801, 2N3821 or equiv.
R1 — Potentiometer, 50-kΩ (see text).
R2, R3 — Potentiometer, dual section, ganged, 500 Ω per section (see text).
T1 — Primary 44-mH toroid, secondary 48 turns, center-tapped, wound over primary (see text).

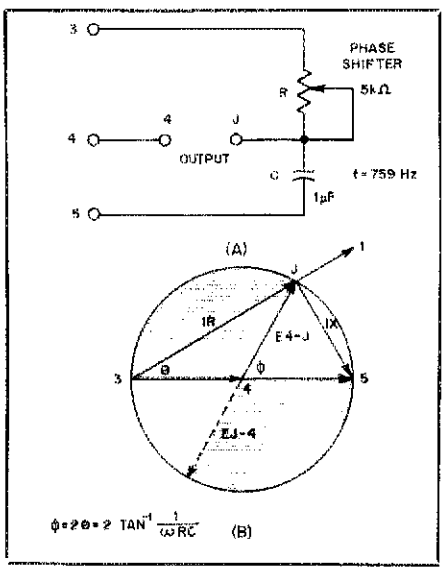


Fig. 2 — At A, schematic diagram of phase shifter. The 5-kΩ potentiometer can be any convenient style. The capacitor is any nonpolarized type (see text for value). The numbers refer to output terminals of the oscillator. At B, vector diagram of the phase shifter (see text for discussion).

Table 1
Switch Setting vs Output Frequency

Switches			Switches		
Freq.	On	C (μF)	Freq.	On	C (μF)
547	ABCDE	1.922	790	ABCD	0.922
555	BCDE	1.872	813	BCD	0.872
562	ACDE	1.822	837	ACD	0.822
570	CDE	1.772	864	CD	0.772
587	ABDE	1.672	926	ABD	0.672
596	BDE	1.622	962	BD	0.622
605	ADE	1.572	1004	AD	0.572
615	DE	1.522	1051	D	0.522
636	ABCE	1.422	1168	ABC	0.422
648	BCE	1.372	1244	BC	0.372
660	ACE	1.322	1338	AC	0.322
673	CE	1.272	1455	C	0.272
701	ABE	1.172	1830	AB	0.172
717	BE	1.122	2173	B	0.122
733	AE	1.072	2829	A	0.072
751	E	1.022	5117	—	0.022

1 HI Z
2 GND
3 LO Z Line 1
4 LO Z Common
5 LO Z Line 2

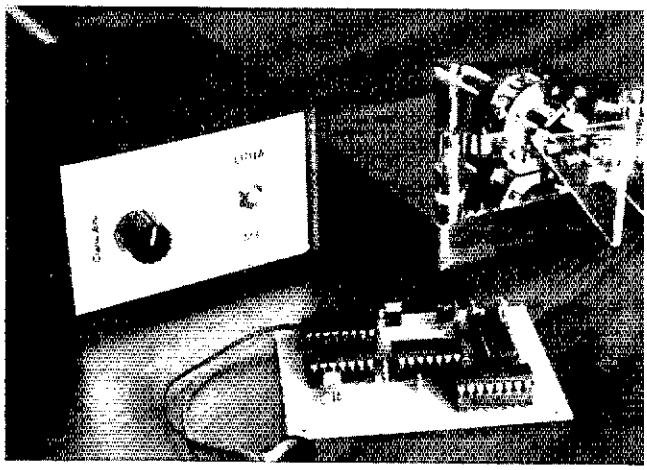
$$f = \frac{759}{\sqrt{C}}$$

f is in Hz;
C is in μF

Notes

[1]E. Wetherhold, "Inductance and Q of Modified Surplus Toroidal Inductors," *QST*, September 1968, p. 36. The extrapolation assumes that the inductance of a toroid is proportional to the square of the number of turns. Within the range of Wetherhold's data, this assumption is borne out. Also, the voltage transformation of this oscillator provides further confirmation.
[2]mm = inches × 25.4.
[3]Chance, et al, *Waveforms* (MIT Radio Lab. Series: McGraw-Hill, 1949), p. 137.

A Digital CMOS Iambic Keyer



After reading the theory on this keyer circuit you may exclaim, "Why didn't *I* think of that!" Simple CMOS circuitry provides expensive performance at low cost.

By Ted Theroux,* N9BQ

This CMOS keyer contains only five ICs and still has features such as iambic and electronic bug operation, dot and dash memories, perfect weighting, 9-volt battery operation, solid-state positive and negative output keying, no ON/OFF switch and low cost. It can be built in one evening.

Theory of Operation

The heart of this keyer is a two-bit binary counter. This counter has four possible output values or states: 0, 1, 2 and 3. The state of the counter is decoded to determine if the transmitter is to be on or off. During state 0, the transmitter will be off. When sending a dot, the counter will go to state 1 and then return to state 0; during a dash it will go through states 1, 2 and 3 before returning to state 0 (see Fig. 1). These state loops establish a perfect dot/dash/space ratio of 1:3:1. Each state is entered for one time unit, and the length of the time unit is determined by the setting of the SPEED control.

To make the following explanation easier to follow, the keyer has been broken down into 10 sections (see Fig. 2). The input filter consists of bypass capacitors C1 and C2, and pull-up resistors R1 and R2. An iambic paddle is connected to it at points labeled INDOT and INDASH. Paddle closure will pull these inputs to ground.

Dot and dash memories are made up of U1, a quad dual-input NAND gate. These gates make two flip-flops, whose outputs are DOTM for the dot memory and DASHM for the dash memory. Grounding inputs INDOT or INDASH will set the dot and dash flip-flops, respectively. Each memory will be cleared by the memory-clear gate after its respective cycle is completed.

U2B is the sequence control flip-flop. This flip-flop is clocked on the transition from state 0 to state 1. The J and K inputs are connected to DOTM and DASHM, the dot/dash memory outputs. The output SEQ will be clocked high if DOTM is active, low if DASHM is active, and alternate high and low if both are active. The sequence control flip-flop will determine if a dot or dash cycle will be entered. If SEQ is high, a dot cycle will be made — if low, a dash cycle. Outputs SEQ and $\overline{\text{SEQ}}$ enable memory-clear gates U3A and U3D, respectively.

The memory-clear gates, U3A and U3D, will gate the memory-clear pulses (CLP) from U2A pin 1 to clear the dot and dash memories. If SEQ is high, the dot memory will be cleared; if $\overline{\text{SEQ}}$ is high, the dash memory will be cleared.

U4A is the clock-control gate. The input pins are connected to the output of the dot and dash memories. If either input DOTM or DASHM is high, the output will go low, removing the STOP signal from the clock and the counter.

The clock circuit consists of U4B and U4C, capacitor C3, resistor R3 and potentiometer R7. The clock output is forced low when the STOP signal is high.

Memory-clear pulses are generated by U2A and U3C. Pulses will only be generated when the keyer is in state 0 and the clock is on its rising edge. During state 0, S$\emptyset$ will be low, causing U3C pin 10 to go high. With U2A pin 6 high, the rising edge of the clock at U2A pin 3 will cause pin 1 of U2A to go high. Since pin 1 is connected to the clear input of U2A, the flip-flop will clear itself once it is set. Therefore, CLP will be a very short positive pulse.

The state counter consists of U5 and U4D. Pin 1 of U5A carries the most significant bit (MSB) of the two-bit binary counter, and pin 15 of U5B carries the least significant bit (LSB) of the counter. These signals are labeled M and L, respectively. The state of the counter will change on the rising edge of the clock. The counter state is determined by the input to U4D pin 13. If this input is high, the count will be 1, 0; if it is low, the count will be 1, 2, 3, 0.

An output decoder, U3B, decodes the value of the counter. Its output is low during state 0 and high during state 1, 2 and 3. The output driver is used to convert the CMOS logic level of the state decoder to an output capable of switching a positive or negative voltage to ground.

An Example

Operation of the keyer will be explained by using the letter "A" as an example. Use the schematic diagram in Fig. 3 and the timing diagram in Fig. 4 as references. A "1" will indicate a high logic level, and a "0" will indicate a low level.

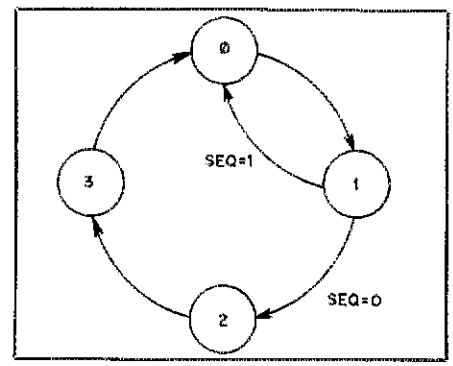


Fig. 1 — Logic state diagram for the keyer. Sequence 1 represents dot generation, and sequence 0 represents dash generation.

*26148 W. Mary Anne Rd., Antioch, IL 60002

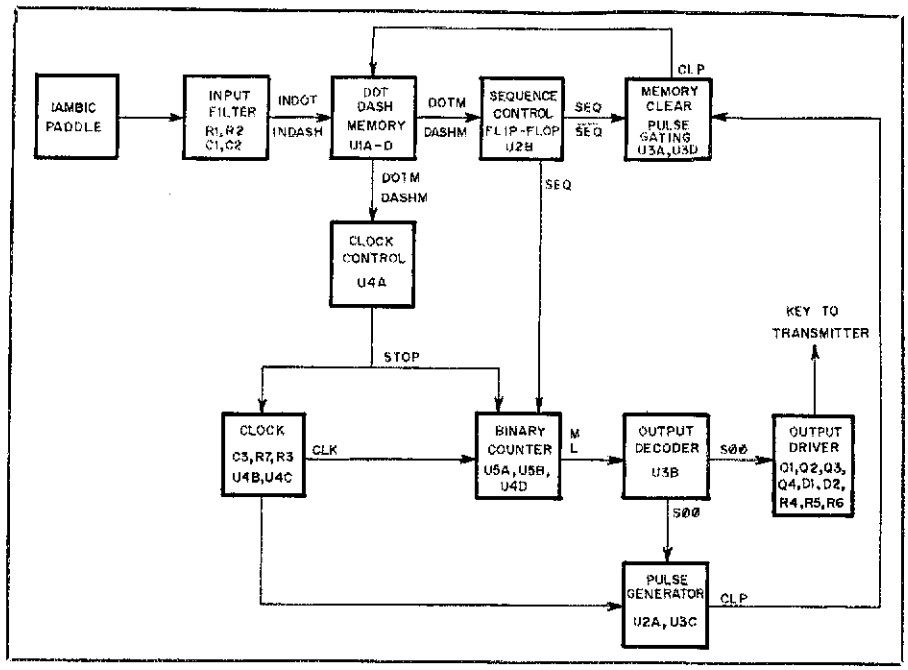


Fig. 2 — A binary counter forms the "heart" of the keyer design. See text for details.

When the keyer is in the idle state, it will be in state 0, with M = 0 and L = 0. The STOP signal is high since both the outputs of the dot and dash memories are low. The STOP signal forces the clock to a low level and enables the clear inputs to the counter — U5 pins 4 and 12.

For the letter "A," the dot paddle is activated, followed by the dash paddle, and then both are released. Let's begin by examining the operation of the keyer from the moment the dot paddle is initially depressed. The paddle pulls the INDOT signal low, which causes the dot memory to be set. DOTM will go high. With DOTM high, STOP will go low and the CLK will go high. The first rising edge of the clock will increment the counter to a count of one; therefore, L = 1 and $\overline{L}$ = 0. With U3B pin 6 low, SØØ will go high, turning on the output driver and keying the transmitter. The U2B clock input is clocked on the low to high transition of the SØØ signal. With DOTM = 1 and DASHM = 0, SEQ will go high, thus enabling the next clear pulse to be gated to the dot memory through U3D.

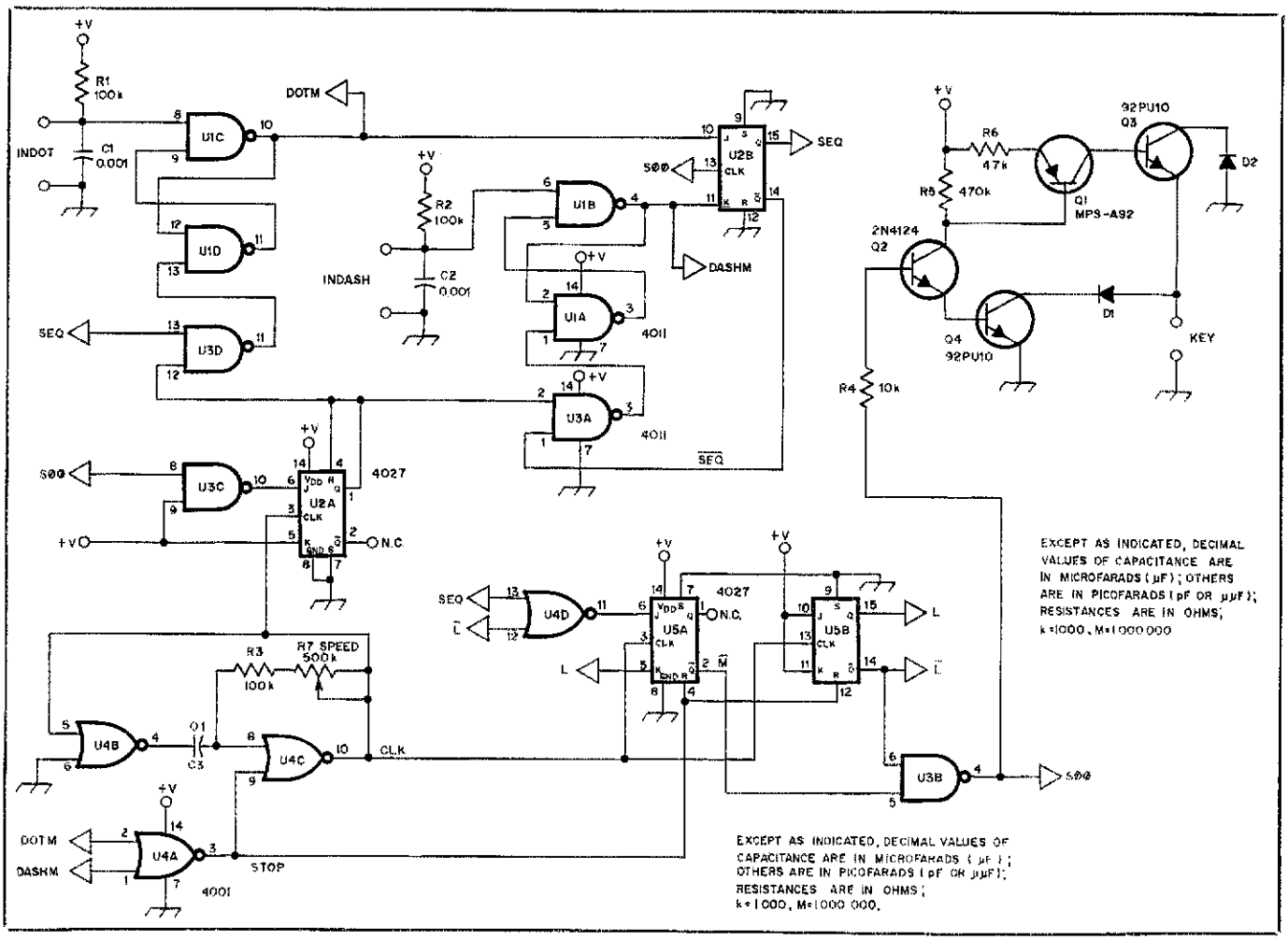


Fig. 3 — Digital CMOS keyer schematic diagram. All resistors are 1/4-watt, carbon-composition types. Capacitors are disc-ceramic 50-volt units, unless otherwise specified.

C1, C2 — 0.001 μF.
C3 — 0.1 μF.
D1, D2 — 1N4004 silicon diode.
Q1 — MPSA92.
Q2 — 2N4124.
Q3, Q4 — 92PU10 npn silicon medium-power. V_{ceo} = 300 V, IC = 30 mA and V_{cb} = 300 V.
U1, 3 — 4011 CMOS quad two-input NAND gate.
U2, 5 — 4027 CMOS dual J-K flip-flop.
U4 — 4001 CMOS quad two-input NOR gate.

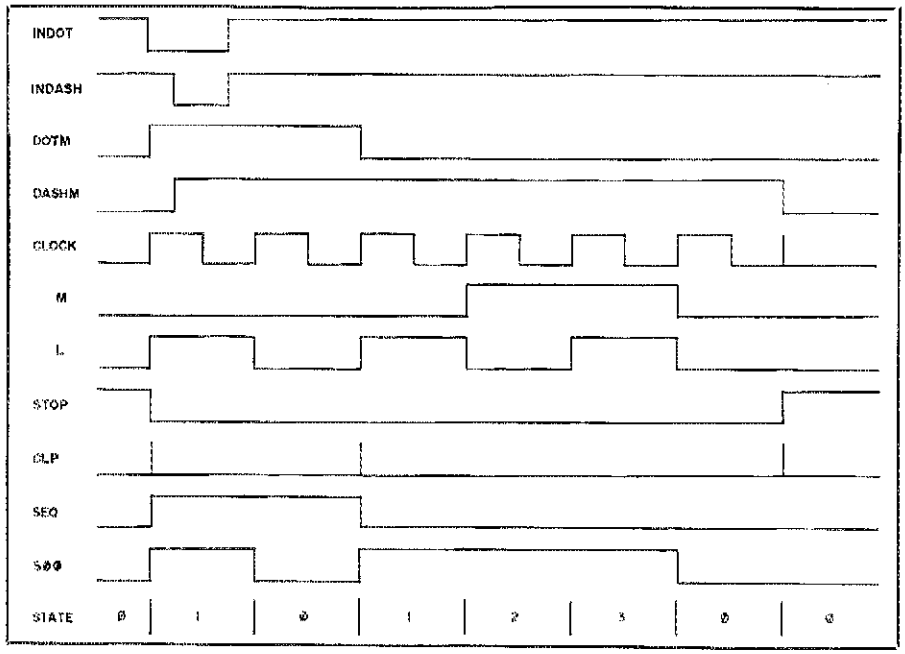


Fig. 4 — Timing diagram for the letter A. See text for details.

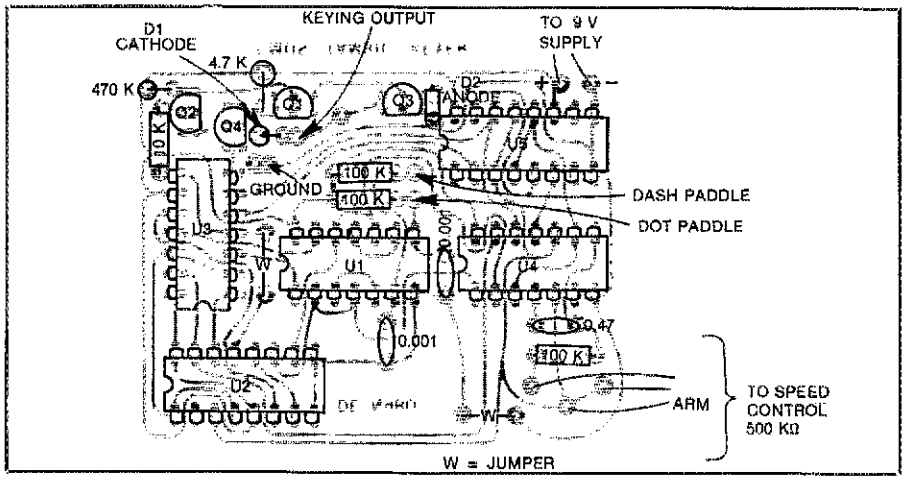


Fig. 5 — Parts-placement guide for the CMOS keyer. Parts are located on the nonfoil side of the board. The shaded area represents an X-ray view of the copper pattern.

With SEQ = 1, the J input to U5A pin 6 will be low. Therefore, on the second clock pulse, the counter will return to state 0 and the transmitter will be "unkeyed." Since the dash paddle was also depressed, DASHM = 1, which continues to disable the STOP signal and keeps the clock running. On the third clock pulse, a clear pulse generated by U2A (pin 1) is gated by U3D to clear the dot memory. The third clock pulse will also increment the counter to state 1, and again the transmitter will be keyed. On this second transition from state 0 to state 1, U2B will be clocked once again at pin 13. This time, since DOTM = 0 and DASHM = 1, the flip-flop will be reset and SEQ = 0. Now that SEQ = 0, the state counter will be enabled to go to state 2 on the fourth clock pulse, state 3 on the fifth clock pulse, and back to state 0 on the sixth clock pulse. Since the seventh clock pulse occurs during state 0, another clear pulse will be generated and, since $\overline{SEQ}$ = 1, the dash memory will be cleared through U3A. Now that DOTM = 0 and DASHM = 0, the STOP signal is enabled, the clock will be disabled, and the clear inputs to the state counter will be enabled.

Construction

All parts are mounted on a single printed-circuit board.[1] Other construction techniques such as point to point or wire wrapping can also be used. The keyer can be installed inside a small chassis box, or you may want to install it inside your rig. Power is supplied by a 9-volt battery or any dc source from + 7 to + 15 volts. The current drain in the key-down position is 2.5 mA at 9 volts. The output of the keyer is capable of switching voltages of + 300 V to − 300 V to ground with a maximum current of 55 mA.

For electronic bug operation, connect the dash side of the iambic paddle to the output of the keyer instead of to the DASHIN input. Do not connect the dash side of the paddle to both the DASHIN input and the output of the keyer at the same time. A switch could be added so you can select between iambic or bug operation. No rf shielding was used on the prototype, and no RFI problems have been encountered in the shack or in the field. QST

[1]Etched and drilled printed-circuit boards and complete parts kits are available for $12 and $25.95, respectively, postage paid from the author. The ARRL and *QST* do not warrant this offer in any way.

Strays

PALDEN THONDUP NAMGYAL, AC3PT

Palden Thondup Namgyal, AC3PT, the deposed King of Sikkim, died in New York in February 1982, following a prolonged illness. He was 58. The last Chogyal (maharaja) of Sikkim, Namgyal ruled that mountain kingdom on the southern slopes of the eastern Himalayas from 1964 to 1975, when he was forced to relinquish power and his kingdom was annexed by India.

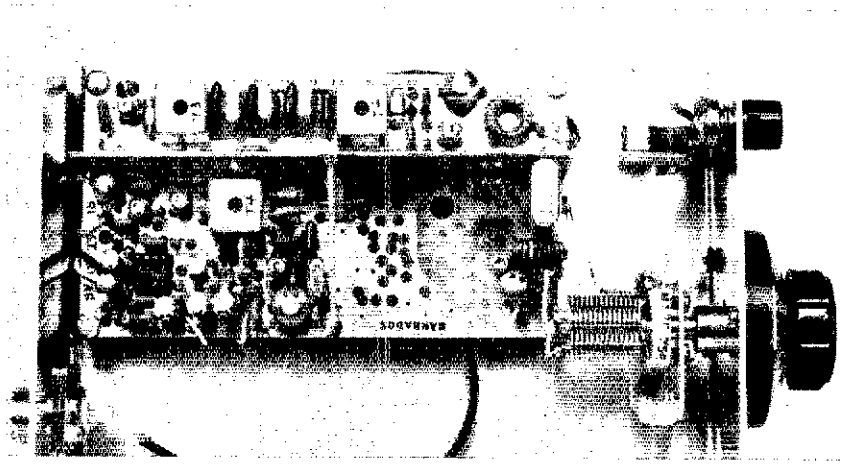
SILENT SIDE OF MAXIM

☐ There is an interesting article about H. P. Maxim in the February issue of *The American Rifleman*. Although Maxim's Amateur Radio pursuits are largely ignored, the article describes his work in developing the Maxim Silencer. There are lots of photos of Hiram and his son, H. H. Maxim, who played an important role in the early days of ARRL and Amateur Radio.

I would like to get in touch with . . .

☐ someone who can provide a schematic for a Code-A-Phone model 1400 phone recorder. Lee Allen, WB4DOR, P.O. Box 444, Madison, TN 37115.

Build a Bare-Bones CW "Superhet"



Low cost, minimum stage count and excellent cw selectivity are yours for 20-meter portable or QRP operation with the simple receiver in this article. Eliminate the frills and save $!

By Doug DeMaw,* W1FB

Tired of working with D-C (direct conversion) receivers because they do not provide single-signal reception? Because they are prone to common-mode hum? And how about problems with microphonics? If these are familiar laments, perhaps it's time to consider building a *superheterodyne* cw receiver for use in your portable setup. The foregoing maladies will no longer confront you with the circuit described here. It can be used on 40, 15 or 10 meters by changing the local-oscillator frequency and modifying the mixer input tuned circuit. No other changes are required. If the bare-bones format doesn't appeal to you, consider the circuit as a foundation to which you may add all manner of goodies, such as a speaker amplifier, rf amplifier, tunable L-C local oscillator or even agc.

Design Rationale

My objective at the drawing board was to develop a simple circuit that contained the minimum number of stages to yield acceptable performance in terms of sensitivity, dynamic range and overall gain for use with headphones. Other goals were good oscillator stability, easy availability of components and low current drain. These aims were realized with the circuit of Fig. 1. Cw selectivity is 260 Hz at the −6 dB points on the response curve, current drain is only 12 mA when using a 12-volt dc supply and there are but seven stages in the receiver. Overall gain is approximately 100 dB — more than ample for good headphone volume, even when copying weak signals. Finally, I wanted the receiver module to be relatively small. Bob Shriner, WAØUZO, made this possible with his pc-board layout, which was developed from my circuit diagram. He even included extra holes to accommodate an L-C type of local oscillator in place of the specified VXO.

Circuit Information

There is no rf preamplifier in the circuit of Fig. 1. If the receiver is to be used on 15 meters, I recommend adding the rf amplifier of Fig. 2 to improve the noise figure. This amplifier is not necessary for 40- or 20-meter operation, although some builders may want to include it for 20-meter reception if they operate in very quiet locations (low levels of man-made and atmospheric noise).

Signals from the antenna are fed directly to the mixer, Q1, through a simple front-end resonator (T1 and C1). The Q of the circuit is high enough to provide good selectivity, but not so high as to limit the desired response within any 50-kHz tuning range of 14 or 21 MHz. The trimmer (C1) is set for peak signal response in the center of the desired tuning range. A panel-mounted miniature air variable capacitor can be substituted at C1 for 40-meter operation. This is suggested because of the greater tuning range of the receiver with the L-C oscillator (200 kHz), and because the bandwidth of the input circuit will be half of that for 20-meter operation (assuming an identical value of Q for the resonator in each case).

The mixer and product-detector stages were chosen to provide gain; hence passive devices were not used at Q1 and Q3 of Fig. 1. This aids in minimizing the number of stages required for good overall gain.

A VXO (variable crystal oscillator) was my choice for the local oscillator in order to simplify the circuit and ensure high stability. Q4 of Fig. 1 operates as a series-tuned Colpitts oscillator, which provides a tuning range of roughly 30 kHz when using 17-MHz fundamental crystals.

*QST Senior Technical Editor

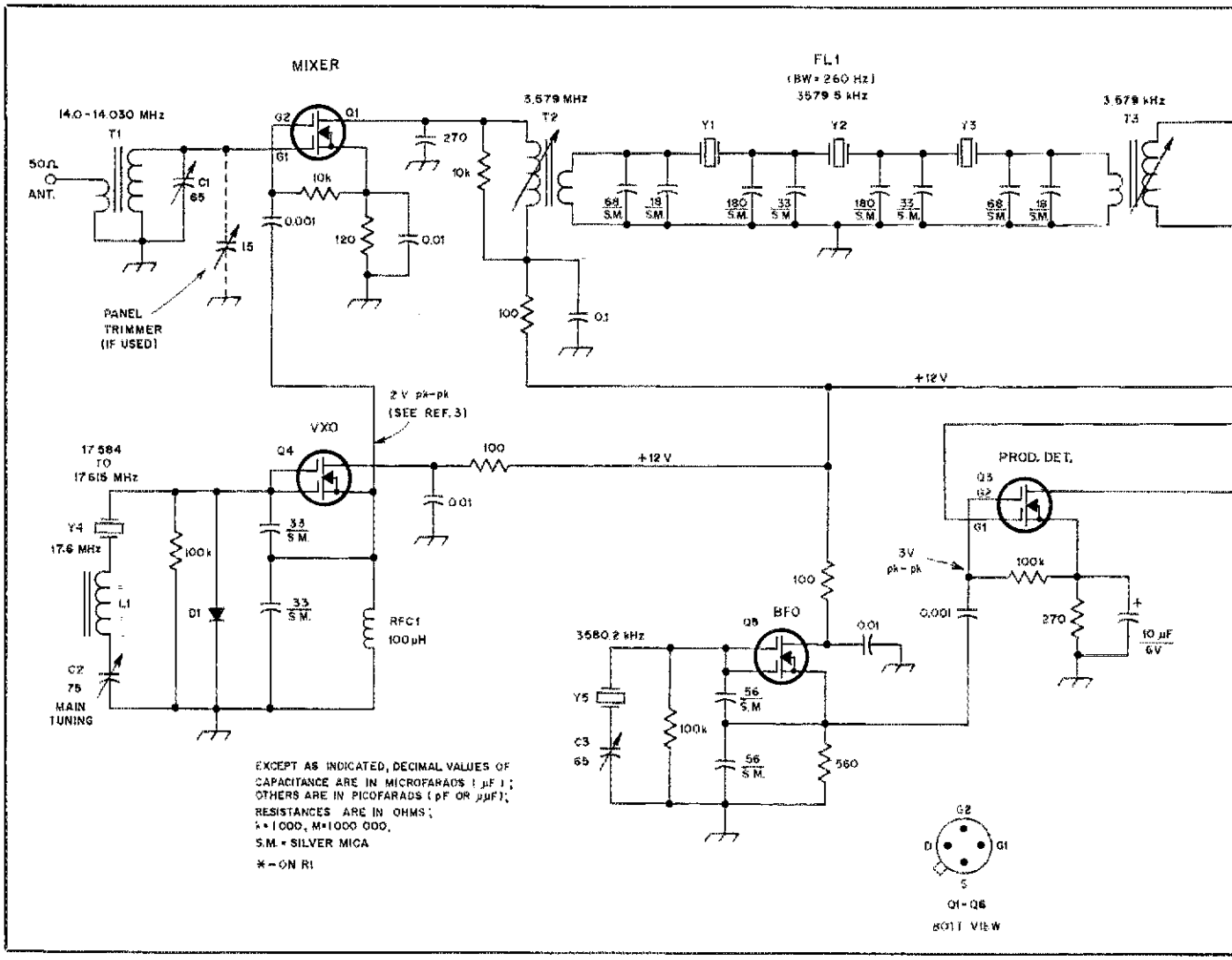
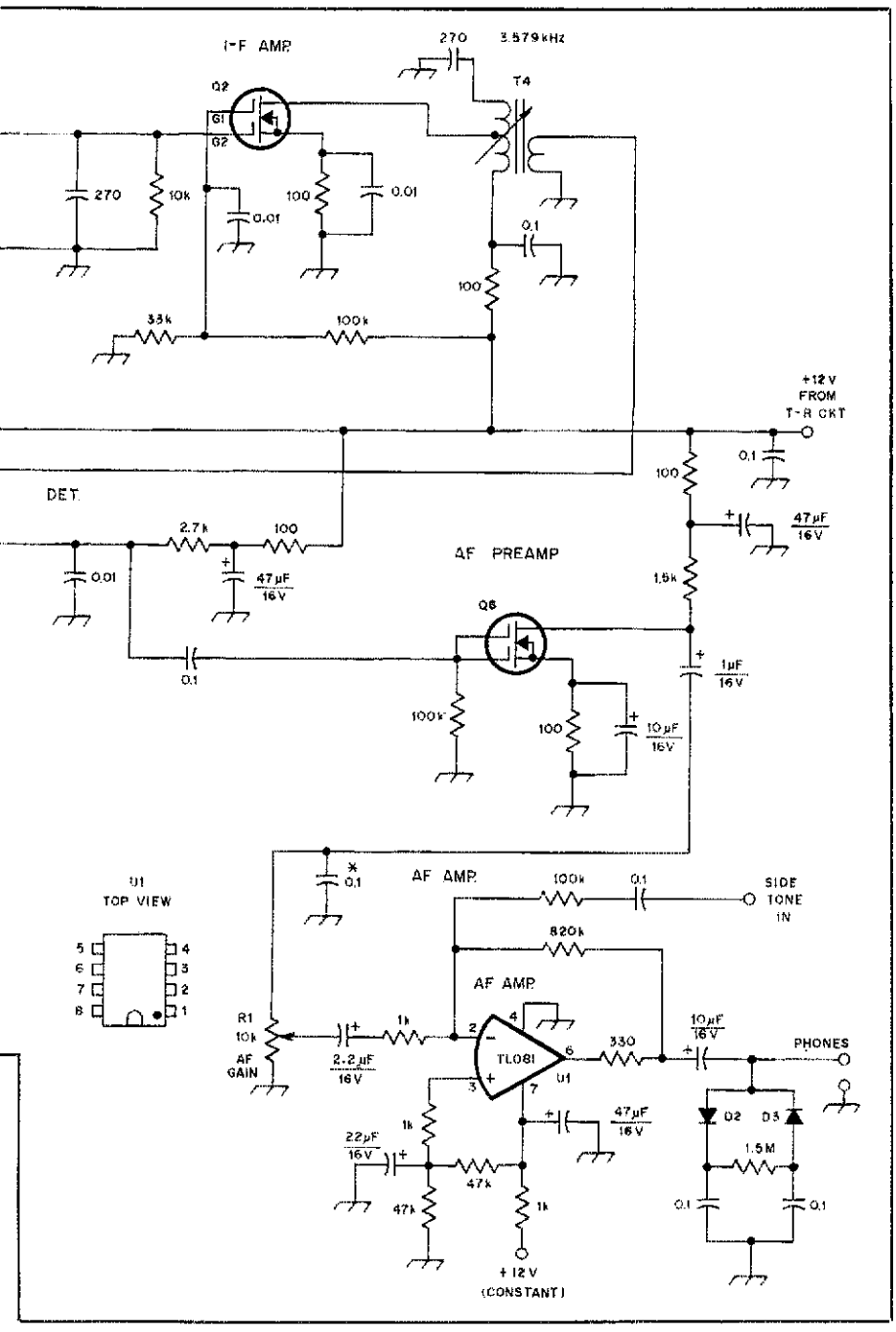


Fig. 1 — Schematic diagram of the simple superheterodyne receiver. Fixed-value capacitors are disc ceramic. Polarized capacitors are electrolytic or tantalum. Fixed-value resistors are 1/4- or 1/2-watt composition. S.M. indicates silver mica. NPO ceramic or polystyrene capacitors may be substituted for those with S.M. indicated.

C1 — PC-mount trimmer, except for 40 meters. Use panel-mounted air variable for 40 meters.
C2 — Miniature 75-pF air variable. Main tuning, use vernier drive.
C3 — Same as C1 for all bands.
D1 — Silicon diode, 1N914 or equivalent.
D2, D3 — Radio Shack Schottky diode, or equivalent.
FL1 — Ladder filter, 260-Hz bandwidth (see text).
L1 — 6-µH toroidal inductor. 36 turns no. 26 enam. wire on Amidon T50-6 toroid core. A_L = 47, powdered iron.
Q1-Q6, incl. — Dual-gate MOSFET, 40673 or 3N211. MPF102 or 2N4416 suitable for Q4, Q5 and Q6.
R1 — 10-kΩ, audio-taper, composition control.
RFC1 — Miniature rf choke, 100 µH. Value not critical.
T1 — Input transformer, toroidal. For 15 meters, 1.9 µH (20 turns no. 26 enam. wire over entire T50-6 core, link = 2 turns). For 20 meters, 3.2 µH (26 turns no. 26 enam. wire on T50-6 core, link has 2 turns). For 40 meters, 13 µH (51 turns no. 28 enam. wire on T50-2 core, link 5 turns).
T2, T3 — Miniature transformer, 4.7:1 turns ratio, 6.5 µH. (27 turns no. 28 enam. wire on bobbin of an Amidon [Micrometals] L57-2 transformer assembly. Use 6 turns for the link.)
T4 — Same as T2 and T3, but with the primary center tapped.
U1 — Op amp, 741 or Radio Shack TL081.
Y1, Y2, Y3, Y5 — Radio Shack TV color-burst crystal, 3.5795 MHz. Do not substitute without redesigning FL1 in accordance with Note 2.
Y4 — Fundamental crystal in HC-6/U-style holder. Same general range for 20 and 15 meters. Select for portion of the bands to be tuned. International Crystal Co. type 434110, 30 pF load capacitance, recommended (10 N. Lee St., Oklahoma City, OK 73102).

Overtone crystals (52.8 or 88 MHz) that have fundamental frequencies on or near 17.6 MHz can be used, but they will yield less tuning range. Also, they will commence oscillation somewhat lower in frequency than will the fundamental types. A 30-pF load capacitance should be specified when ordering Y4, and it should be in an HC-6/U style of holder. The tuning characteristic for C2 is nonlinear. That is, the rate of frequency change is much faster near the minimum-capacitance setting of C2, and the rate decreases as maximum capacitance is achieved.

The VXO can be used for 40-meter operation if the builder is willing to accept a limited tuning range — generally 5 to 10 kHz maximum. The amount of frequency shift varies with the crystal used, and is unpredictable, even when seemingly identical crystals are supplied by a given manufacturer. Large frequency spreads are possible by increasing the inductance of L1 (Fig. 1), but the circuit no longer functions as a true VXO. The oscillator degenerates to a conventional L-C type of device, and the frequency stability declines accordingly. You may want to experiment along these lines when building a 40-meter version of the unit. If ambient temperature changes aren't too severe, stability may be entirely acceptable. I did



not investigate this matter while testing the circuit.

I-F Filter

A major expense when building a narrow-bandwidth receiver is the i-f filter (FL1 of Fig. 1). In order to indulge my miserly ways, I chose a 3-pole ladder filter, designed for a 250-Hz bandwidth. Color-TV burst crystals are easy to obtain and are inexpensive, so I used them as filter elements. This provides an i-f of 3.5795 MHz, which of course rules out operation of the receiver on 80 meters. With the help of my colleague, Wes Hayward, W7ZOI, the four Radio Shack crystals (Y1, Y2, Y3 and Y5) I purchased were checked for unloaded Q and series resistance. These parameters must be known before calculating the values of the end and center capacitors in the filter. The correct terminal impedance is also derived from that information. W7ZOI has developed a computer program that "whistles" out the answers when the Q and series resistance of the crystal are known.[1] His program provided the values specified in this article. The Q of the Radio Shack crystals is 105-kΩ, and the series resistance is 38.6 ohms. To ensure minimum band-pass ripple, it is important to provide the computed terminal resistance for FL1 — 450 ohms. The end and center capacitors are nonstandard values. This requires using standard values in parallel at each point in the filter, thereby achieving the desired end result (85 and 212 pF). The primary of T2 and the secondary of T3 are bridged by 10-kΩ resistors to force a 450-ohm termination at each end of FL1. The required transformer turns ratio is 4.7:1, but a 5:1 ratio is acceptable from a practical point of view. FL1 should be in the $12 to $15 price range at current market rates.

Ladder filters yield an asymmetrical response, with the steepest skirt occuring on the high-frequency side of the curve. Best cw results will be had when the BFO is placed on the *high* side of center frequency — at 3580.2 kHz in this example, for a 700-Hz offset.

Y1, Y2 and Y3 should be very close in frequency to prevent excessive bandwidth and unwanted band-pass ripple (dips and peaks). My set of crystals were within 50 Hz of one another, which turned out to be acceptable. A simple crystal oscillator and a frequency counter can be used to check the crystal frequencies beforehand.

I-F Amplifier and Product Detector

A single i-f stage (Q2) is used. It has no agc applied, and operates at full gain all of the time. To aid stability of the amplifier, the drain is tapped down on the primary of T4. Output from T4 is coupled to an active detector, Q3.

The fourth color-burst crystal, Y5, is used in the BFO (Q5). C3 was included to permit "rubbering" the crystal to 3580.2 MHz, thereby ensuring the 700-Hz offset discussed earlier. Tune C3 for a 700-Hz audio note peak.

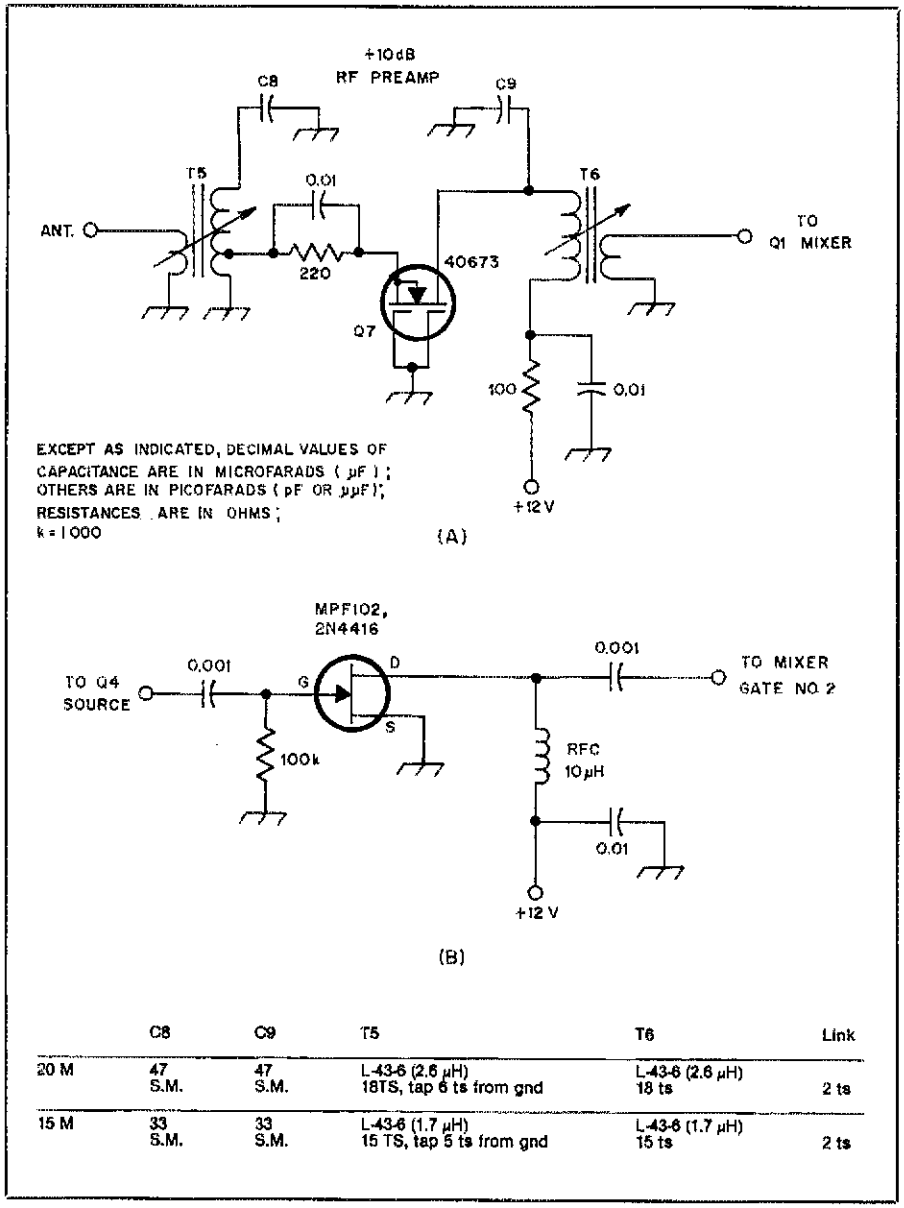
Audio-Amplifier Section

A dual-gate MOSFET is used as the af preamplifier (Q6) to help establish a low noise figure in that part of the circuit. A 0.1-µF bypass capacitor at the high side of control R1 is used to roll off some of the high-frequency hiss in the receiver. This aids the overall noise figure of the receiver. Larger values of capacitance will further reduce the noise, but will cause some attenuation of the output signal.

A 40-dB-gain op amp (U1) serves as the headphone amplifier. A 1-kΩ resistor has been placed between R1 and pin 2 of the amplifier to prevent self-oscillation when R1 is at the extreme ends of its range. Oscillation will otherwise occur when using low-impedance phones with the receiver (8-ohm hi-fi phones in particular). The resistor prevents significant changes in the op-amp feedback when R1 is set for maximum or minimum audio gain. The 330-ohm resistor at pin 6 of U1 also aids the stability.

A self-adjusting audio limiter (D2, D3) helps to prevent very loud signals from "shattering" one's ears while tuning the

[1]Notes appear on page 33.



	C8	C9	T5	T6	Link
20 M	47 S.M.	47 S.M.	L-43-6 (2.6 μH) 18TS, tap 6 ts from gnd	L-43-6 (2.6 μH) 18 ts	2 ts
15 M	33 S.M.	33 S.M.	L-43-6 (1.7 μH) 15 TS, tap 5 ts from gnd	L-43-6 (1.7 μH) 15 ts	2 ts

Fig. 2 — Schematic diagram of the 15/20-meter optional preamplifier (A). See Note 3 for performance details of Circuit B. Capacitors are disc ceramic if not numbered. See table for other types. Resistors are 1/4- or 1/2-watt composition. S. M. indicates silver mica.

C4, C5 — See inset table.
Q7 — Dual-gate MOSFET, 40673 or 3N211. JFET may be substituted.
T5 — See table. Transformer assembly is an Amidon (Micrometals) L56-6 (yellow core). Use no. 26 enam. wire for the windings. Ground shield cans to pc-board ground.

receiver. Schottky diodes should be used to take advantage of the low barrier voltage (0.3 V). These can be purchased at Radio Shack stores. Silicon diodes, such as the 1N914 type, start to clip at 0.7 volt, which is too high for listening comfort. The limiter circuit can be regarded as poor man's agc. However, large signals will cause considerable audio distortion in U1 unless the gain control, R1, is used to reduce the gain to normal headphone level. This is the major trade-off for not including agc in the receiver circuit.

Construction

Circuit boards and complete parts kits for the receiver of Fig. 1 are available.[2] A scale pc-board pattern appears in the Hints and Kinks section of this issue of *QST*.

My version of the receiver will eventually become part of a 10-watt, 20-meter trans-receiver for portable use and camping. To that end I included an input line to pin 2 of U1 (Fig. 1), intended for introducing sidetone for cw monitoring. Also, the 12-volt line to U1 is separate from that which feeds the remainder of the receiver. This allows U1 to remain operational at all times (necessary for sidetone monitoring). The main 12-volt line can then be turned on and off via a T-R (transmit-receive) switching circuit in the mating transmitter. The antenna will be switched in a like manner.

Packaging can be tailored to your needs. If the lead from the antenna jack to T1 is more than 2 or 3 inches long, use miniature coaxial cable for the connection and ground the shield braid at both ends of the line.

Performance

This receiver is not intended as a high-performance or state-of-the-art example. Rather, the design was done to meet the objectives of simplicity, low cost and small size. The dynamic range is approximately what one would expect at 20 meters when a dual-gate MOSFET is used as a mixer (single-ended) and is not preceded by a low-noise rf amplifier. The MDS (noise floor) measured −117 dBm. Blocking commenced at 96 dB, and the IMD number was 67 dB — not spectacular, but entirely adequate for the intended application.[3] This is still as good as or better than the numbers obtained when testing some pieces of commercial receiving gear in the ARRL lab.

Various segments of the band of interest can be tuned by changing crystals at Y4. In my case, I'm interested primarily in the range from 14,000 to 14,030 kHz. One crystal provides that coverage. The crystals will oscillate (C2 unmeshed) approximately 12 to 15 kHz higher than the marked value. This must be taken into account when ordering your crystal. This may not be true if other VXO circuits are used. Make certain that the rotor lug on C2 has a short lead between it and the ground foil of the pc board. If not, the VXO may perform poorly, and the tuning range may be restricted. The rotor should be grounded also to the receiver case or chassis.

Operation on 15 meters can be realized by using a crystal (Y4) in the same general range as for 20 meters. However, the receiver tuning will be backward from that on 20 meters.

A parts-placement guide is shown in Fig. 3. Information is given for a VFO that is suggested for 40-meter operation. The VFO circuit is presented in Fig. 4.

Although 10-meter operation is possible with all but the VXO, the limiting factor is the unavailability of fundamental crystals for the local-oscillator at the required 24,450 kHz frequency. The alternative would be to use a VXO crystal at half that frequency, then route the output through a doubler (push-push type preferred).

The receiver could be set up for 160 meters by changing the input tuned circuit and using a VFO in the 5.5 MHz range. By selecting the proper VXO crystal frequency and modifying T1, it would be practical also to employ the receiver on the WARC bands (10, 18 or 24 MHz).

Whatever your preference, the simple superhet can serve your portable needs in

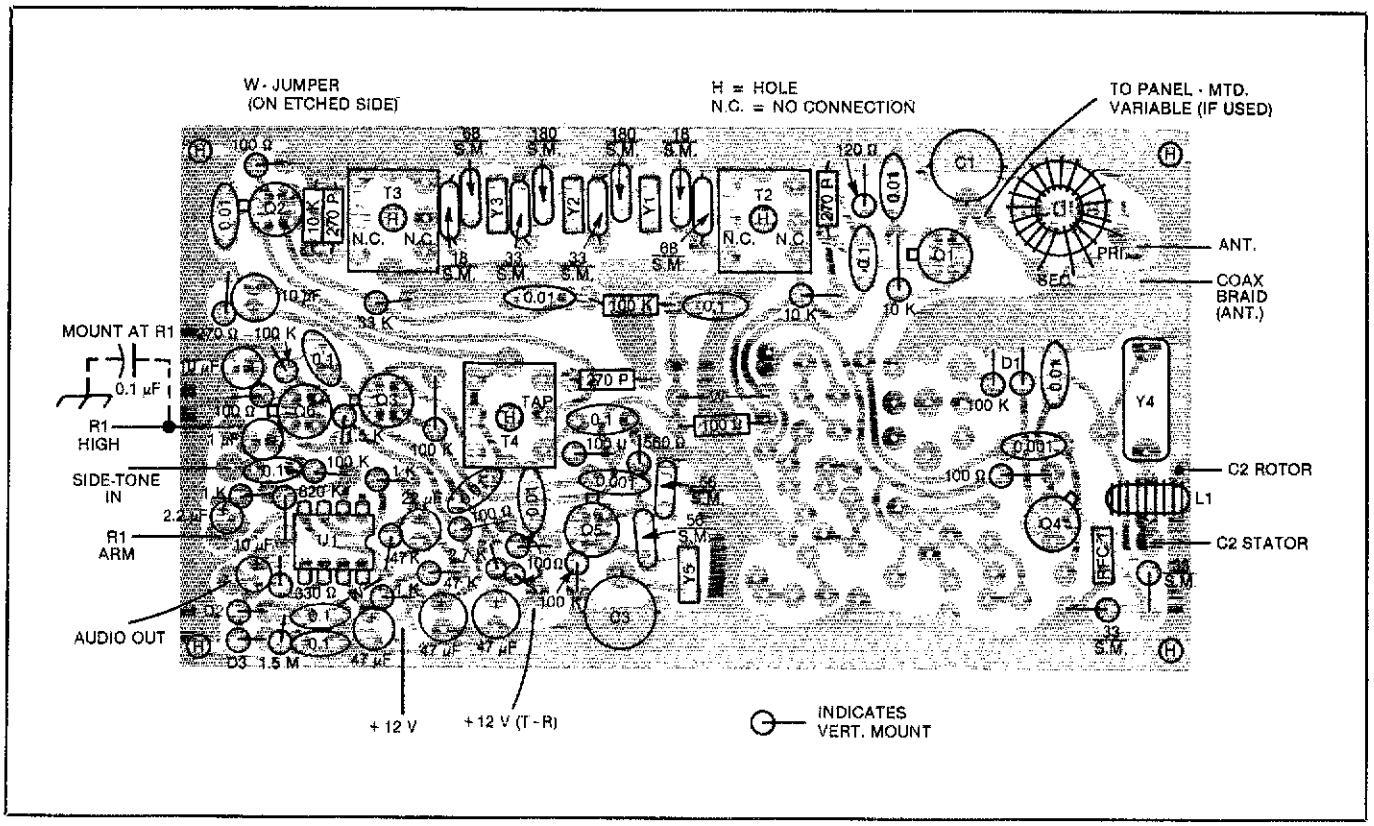


Fig. 3 — Parts-placement guide for the simple receiver. View is from component side of board. The LO section will accommodate the VXO of Fig. 1 or the suggested VFO of Fig. 4.

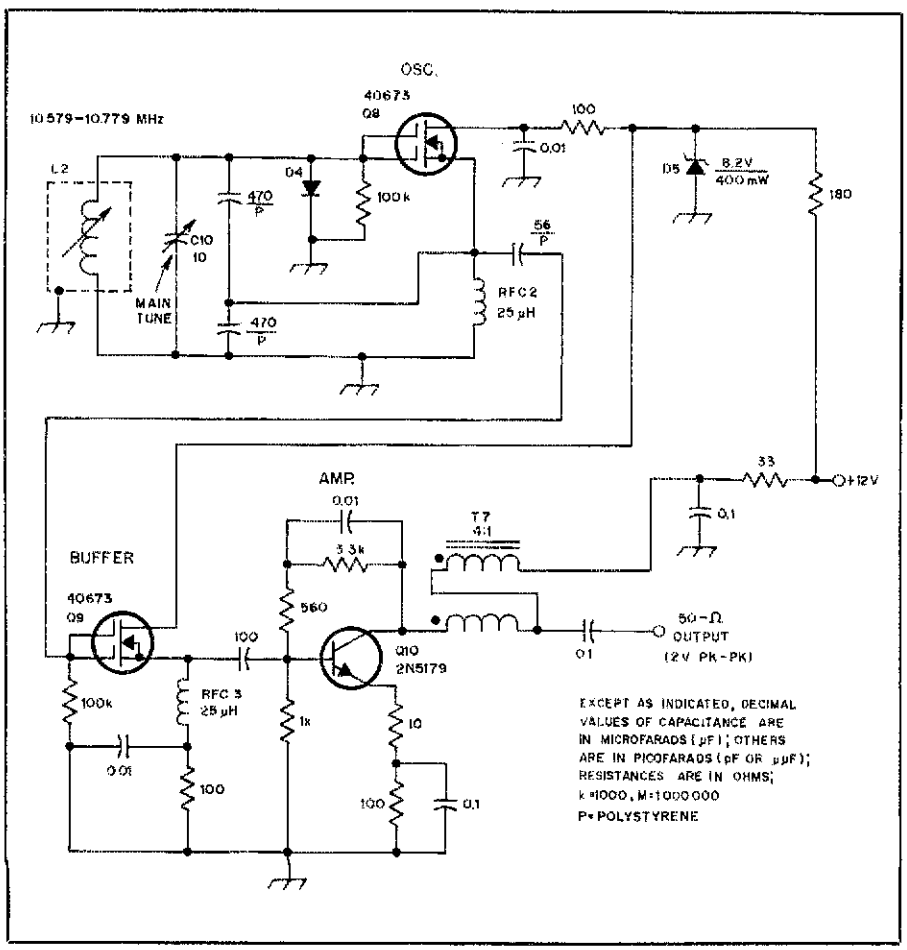


Fig. 4 — VFO circuit for use on 40 meters. With specified tuning range of Q8, coverage on 40 meters will be 7.0 to 7.2 MHz. Fixed-value capacitors are disc ceramic unless otherwise noted. Resistors are 1/4- or 1/2-watt composition.

C10 — Miniature 10-pF air variable, double-bearing type recommended for best mechanical stability.
D4 — Silicon diode, type 1N914.
D5 — Zener diode.
L2 — Inductor, 0.9 µH. Use 10 turns no. 24 enam. wire on bobbin of an Amidon L57-6 transformer assembly.
Q8, Q9 — Dual-gate MOSFET or 2N4416-family JFET.
RFC2, RFC3 — Miniature rf choke, approximately 27 µH.
T1 — Broadband, bifilar transformer, 4:1 impedance ratio. Use 10 bifilar turns of no. 24 enam. wire on Amidon (Fair-Rite) FT50-61 ferrite toroid core. Observe phasing dots when connecting to circuit.

fine style. Not only that, it provides a simple short-term workshop project for those who enjoy building homemade equipment.

Notes

[1]W. Hayward, "A Unified Approach to the Design of Crystal Ladder Filters," *QST*, May 1982, pp. 21-27.

[2]Negatives, pc boards and parts kits for this receiver are available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002.

[3]The dynamic range can be improved by increasing the LO injection of the mixer from 2 volts pk-pk to 5 volts pk-pk. The latter is the prescribed level for optimum performance of the 40673 mixer. See Fig. 2B for circuit details.

An End-Fed Extended Double Zepp for 2 Meters

Add a bit of "Zepp" to your 2-meter signal. Build this inexpensive gain antenna that'll provide the coverage you need.

By Jim McDonald,* WBØJQH

The Zepp, double Zepp and extended double Zepp have been a part of the amateur's antenna repertoire for many years. The extended double Zepp offers some advantages over other antennas of simple construction, such as the dipole or ground plane vertical. It has approximately 3 dB of gain over a half-wavelength dipole[1,2] when center or stub fed,[3] is easy to feed with common transmission lines and is fairly broadband. An extended double Zepp is composed of two approximate 5/8 wavelength elements driven (usually) through a phasing section. The antenna exhibits gain over a half-wavelength dipole because of the addition of another element and the greater current-lobe spacing than would occur in a one-wavelength dipole (Fig. 1). In practical use, the conventional construction method has some disadvantages: no dc ground, and transmission line interaction with the lower radiating element, when the antenna is polarized vertically.

The end-fed version described here eliminates these problems. This feed method (Fig. 2) lends itself nicely to vertical operation. The transmission line is tapped along a shorted quarter wavelength matching section, or J-feed. This permits antenna and transmission line impedance matching and removes the feed line from the radiating plane. It also provides a dc grounding point for lightning protection.

The "Why"

This antenna was designed for accessing 2-meter repeaters in a 60-mile[4] radius, and occasionally a distant one about 100 miles away. These repeaters are scattered along the Front Range of the Rocky Mountains from above the Wyoming/Colorado border to south of Colorado Springs. No coverage to the east, the open plains, was needed. To obtain this pattern, I decided to ensure a little gain by properly spacing the antenna alongside the tower, using the tower as a reflector.

Construction

Assembling an antenna of this type is simple and inexpensive. Construction details are provided in Figs. 3, 4 and 5. Aluminum tubing or EMT (electrical metallic tubing) can be used. Check your local building supply store or junkyard for economical antenna materials.

A PVC center insulator is satisfactory with transmitter power inputs of up to 100 watts. If high power operation is anticipated, a better insulating material, such as Plexiglas, Lucite or ceramic should be substituted.

The completed antenna is spaced 16.25 inches (about 0.2 wavelength) from the

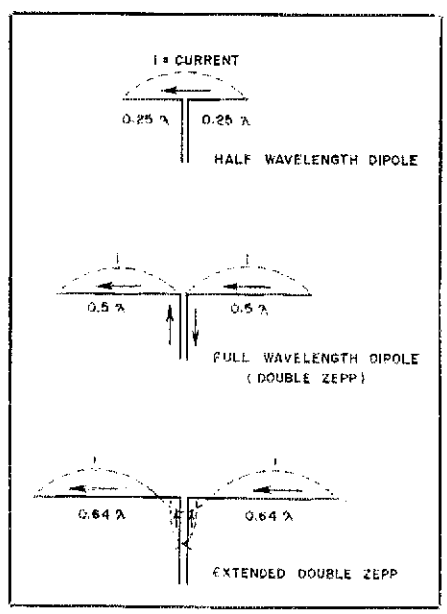


Fig. 1 — Current distribution for the various antennas discussed in the text.

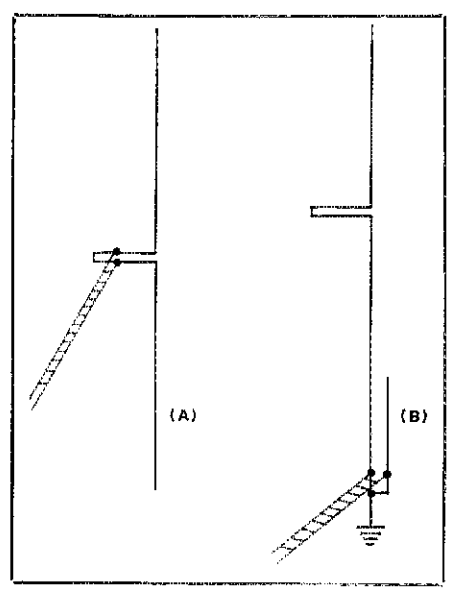


Fig. 2 — At A, the conventional arrangement for feeding the extended double Zepp. The end-fed or J-fed method is shown at B.

[1]Notes appear on page 35.
*P.O. Box 251, East Derry, NH 03041

tower on two brackets. These brackets are made of the same materials used for the antenna. The upper bracket has PVC tubing as an insulating sleeve and attaches to the upper element about 20 inches above the center. The lower bracket has no insulator and provides the dc ground through contact with the tower leg. Mounting details are shown in Fig. 6.

Feed Methods

I have used two methods of coupling the coaxial feed line to the quarter wavelength matching section: direct, unbalanced, coaxial feed, and balanced input using a bazooka or 1:1 coaxial balun.[5] There seems to be little difference in the performance of the antenna with either feed method, although the balanced input seems to "feel good" to me. Another amateur in the area has reported success using a 4:1 coaxial balun.

An SWR indicator is inserted in the feed line and observed while the transmission line is moved along the matching section rods. When the best match is obtained, the line is permanently attached to the rods with sheet-metal screws or compression clamps. In my installation these points are between 4 and 4.5 inches above the shorting strap at the end of the section. If the 4:1 balun is used, these dimensions will probably vary.

How Well Does It Work?

Now that the antenna is up, how does it fare against the competition? A wire version of this antenna was built and compared to a vertically polarized half-wave dipole. The antennas were connected to an antenna switch through equal lengths of RG-58/U coaxial cable. An rf step attenuator, similar to those described in *The Radio Amateur's Handbook*,[6] was inserted in the transmission line from the extended double Zepp. Signals were monitored using a 2-meter transceiver while I switched between the antennas. The attenuator was adjusted until the extended double Zepp showed the same S-meter reading as the dipole. With the Zepp in the clear (using no reflector) it showed approximately 3 dB gain over the dipole. This would correspond roughly to 4.5 dB over a ground plane. A slight reduction from the 3-dB figure was expected because of the end-fed system causing slight differences in the magnitude of the currents in the two radiating elements, but none was detected with the equipment used. When mounted on a mast and spaced 0.2 wavelength from it, the wire antenna showed the expected cardioid pattern and an additional 1 to 1.5 dB forward gain.

This antenna has proven to be quite effective. The desired repeaters can be accessed and good signal reports are received. Simplex operation is improved dramatically compared with similar operations using a J-pole antenna at the same height. Try the extended double Zepp. An antenna design that is almost as old as Amateur Radio itself, it's inexpensive and performs well. QST

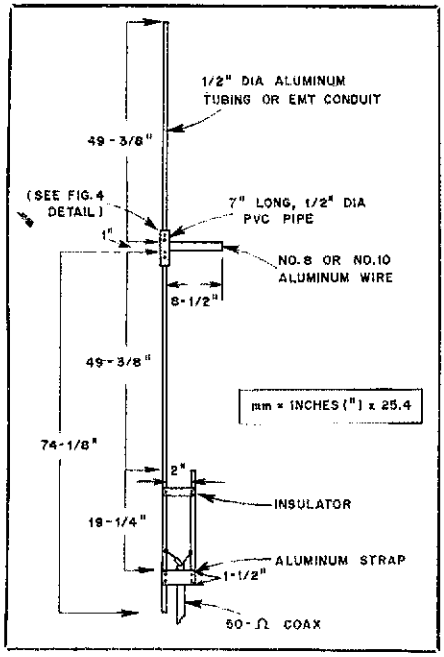


Fig. 3 — Construction of the end-fed extended double Zepp for 2 meters.

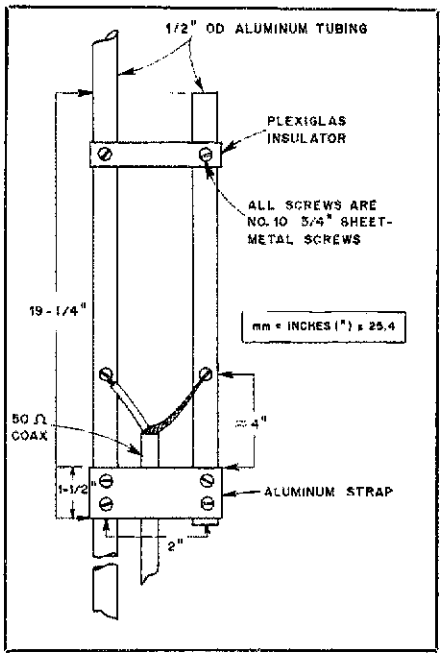


Fig. 5 — Quarter-wave matching section details.

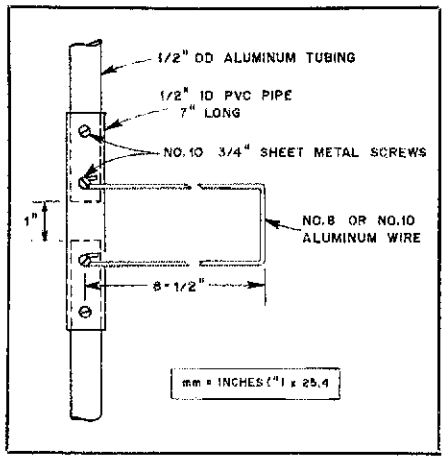


Fig. 4 — Center phasing section construction details.

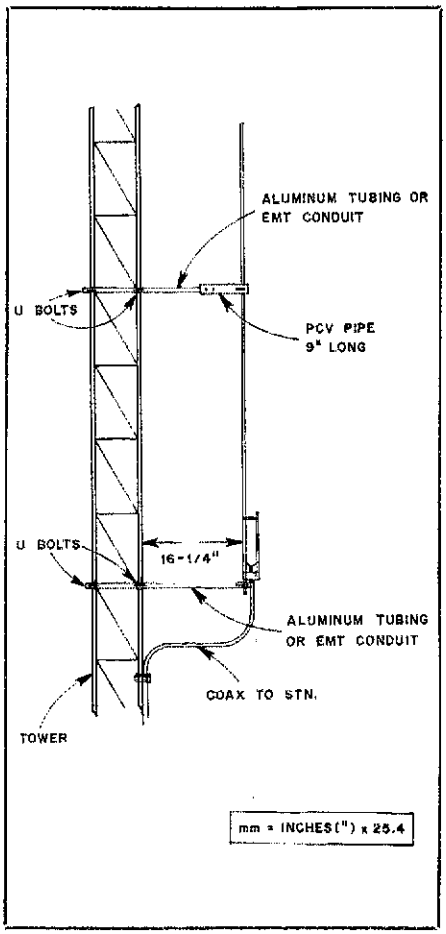


Fig. 6 — The method used in securing the extended double Zepp to the side of a tower. A section of PVC pipe is used to insulate the upper support from the antenna proper. The lower support provides a dc ground for the antenna (through the tower).

Notes

[1] *The ARRL Antenna Book*, twelfth edition (Newington: American Radio Relay League, 1970), p. 141.
[2] W. Orr, *The Radio Handbook*, twenty-first edition (Indianapolis: Editors and Engineers, 1978), p. 28.11.
[3] *The Radio Amateur's VHF Manual* (Newington: American Radio Relay League, 1965), p. 173.
[4] km = mi. x 1.609, mm = in. x 25.4
[5] See note 1.
[6] *The Radio Amateur's Handbook*, fifty-eighth edition (Newington: American Radio Relay League, 1981), p. 16-38.

Low-Noise Preamplifiers for 1296 MHz

Plagued by poor "hearing"? Having trouble making the cost/performance trade-off? Here are some answers for 1296-MHz ops.

By Geoffrey H. Krauss,* WA2GFP

In many areas of the world, *all* the amateur bands below 1 GHz are relatively crowded. Many amateurs, seeking a new band to explore, are turning to the 23-cm band (1215 to 1300 MHz). Becoming active on this band is now fairly easy; antennas, transmitting equipment and receiving converters can all be purchased commercially. Equipment for the weak-signal portion of the band, centered around 1296 MHz, is particularly plentiful. One problem that has impeded the growth of activity on this band is the higher-than-desirable noise figures (poor "sensitivity") of the commonly available receiving converters. This can be a serious handicap because, as is often stated, "If you can't hear them, you can't work them!"

Most receiving converters fall into one of two types: the mixer-only converters, having a mixer and an i-f amplifier (possibly preceded by an image-rejection filter); and the single-rf-amplifier type of converter, having one preamplifier stage preceding the mixer. This type may have a post-mixer i-f amplifier, and often may not have an image-rejection filter between the preamplifier and the mixer. The mixer-only converters typically have noise figures of 6 to 15 dB, while single-amplifier types rarely have less than 3 dB noise figures. Therefore, the effective noise temperatures,[1] T_e, of such converters range between approximately 290 K and 9000 K. Generally, this is considerably greater than the external noise temperatures available at these frequencies. Only in the last few years, as relatively inexpensive devices for low-noise preamplifiers have become available, have noise figures below even 6 dB been obtainable at this frequency. An easy-to-build, low-noise preamplifier is often the most needed item in a 1296-MHz station.

[1]Notes appear on page 39.

*16 Riviera Dr., Latham, NY 12110

Required Preamplifier Characteristics

The total noise figure of a receiving system (Fig. 1), looking into the input of the added preamplifier, is given by

$$NF_s = 10 \log F_s \qquad \text{(Eq. 1)}$$

F_s, the system noise *factor*, is given by

$$F_s = F_p + \frac{(F_c - 1)}{G_p} \qquad \text{(Eq. 2)}$$

where F_p is the preamplifier noise factor, F_c is the converter noise factor and G_p is the numerical gain of the preamplifier.

Since gain is typically measured in decibels, and noise figure is always measured in decibels, the appropriate conversion formulas are

$$F_p = \log^{-1}(NF_p/10) \qquad \text{(Eq. 3)}$$

$$F_c = \log^{-1}(NF_c/10) \qquad \text{(Eq. 4)}$$

$$G_p = \log^{-1}(G_a/10) \qquad \text{(Eq. 5)}$$

Table 1 shows the system noise figure (NF_s) that results when a preamplifier with a gain of G_a and a stage noise figure of NF_p is used in front of a converter having an NF_c of 8 dB.

In addition to having a relatively low stage noise figure (no greater than 3 dB) and a high stage gain (typically, 10 dB plus the converter noise figure), the 1296-MHz preamplifier should also be easy to build. Other electrical characteristics, such as resistance to overload and IMD, need not be nearly as stringent as they are, for instance, on the 2-meter band. A relatively small bandwidth is often desirable, however, so that no additional filtering is needed prior to the preamplifier. Any insertion loss in front of the preamplifier, such as that of a band-pass filter (or feed line), will add directly to the system noise figure (and effective noise temperature). It is extremely desirable to mount the preamplifier, along with the T-R and receiver-protection relays, as close to the antenna as possible.

Results

Over a period of three years, I have built 47 individual 1296-MHz preamplifiers, using 25 different devices or combinations of devices. The results obtained with both microstrip and π-network preamplifiers are listed in Table 2, while the noise figure versus gain characteristics for the various devices and device combinations are plotted in Fig. 2.

The device column of Table 2 lists the

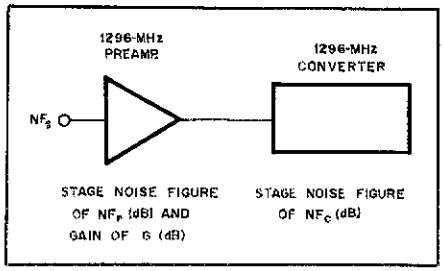


Fig. 1 — Receiving system block diagram.

Table 1
Total System Noise Figures

Preamp. Noise Figure, NF_p (dB)	*Preamp. Gain, G_a (dB)*	*System Noise Figure, NF_s (dB)*
3	12	4.2
2	12	3.5
1	12	2.8
3	15	3.6
2	15	2.8
1	15	2.0
3	18	3.3
2	18	2.4
1	18	1.5

manufacturer's full device designation; where a pair of devices was used, the input device is listed first. The next two columns list the approximate cost, as best as could be ascertained, and the manufacturer of the particular device, or combination of devices. Almost all of the tested devices, with the exception of the BFR series, are types unique to a single manufacturer.

The preamp noise figures (NF_p) have been calculated from the measured system noise figures (NF_s), using Eqs. 1 and 2. Noise-figure measurement accuracy is believed to be $-0.1/+0.3$ dB for the particular test setup used. The associated gain, G_a, is the gain measured (with an accuracy of ± 0.2 dB) after the stage had been tuned for best noise figure (as listed in the previous column). Tuning a particular preamplifier for maximum gain will typically provide from 1 to 6 dB of additional gain, but at the expense of a deterioration in noise figure. The reverse gain, G_r, is the gain from preamplifier output to input, when tuned for best noise figure. This parameter is occasionally important when a preamplifier is inserted in front of a mixer-only type of converter, as it is used in determining the attenuation of local oscillator feed-through from the local-oscillator chain to the station antenna. G_r is also used to calculate the gain margin,[2] G_m, which is a measure of preamplifier stability, and should be as large as possible. The preamplifier noise measure, M, is an indication of the lowest system noise figure that is obtainable with several identical preamplifiers connected in series. As the lowest noise-figure preamplifier is almost always used as the first stage, noise measure M yields a lowest practical noise figure for a system having that particular preamplifier as the first stage.

The cost factor (X) is the product of the preamplifier noise measure (M) and the cost (C) of the device and may be used as a guide to device selection. For example, both the MGF1400 and the NE24483 have approximately the same stage noise figure (NF) and noise measure (M) but have different cost factors (X) due to the lower price of the MGF1400. The cost factor (X) and the associated forward gain (G_a) are approximately the same for a single MGF1400 stage and a dual NE02135 stage, yet the latter has a noise figure over 2 dB higher. The bandwidth (BW) for the

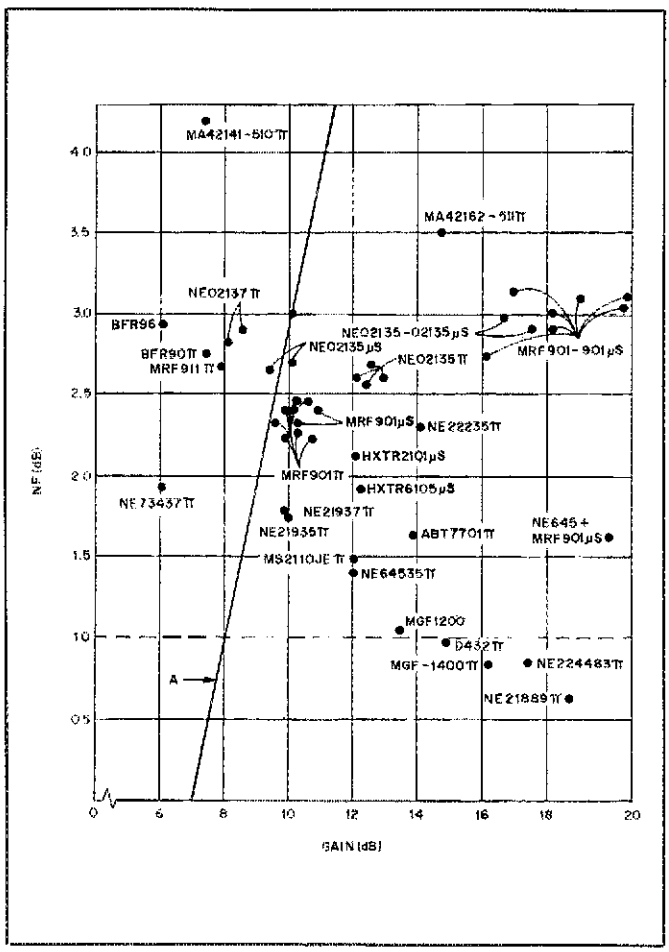


Fig. 2 — Graph of noise figure versus forward associated gain of each device tested. Line A establishes the minimum gain, at each noise figure, required to overcome the effect of a subsequent stage with a 6-dB input noise figure.

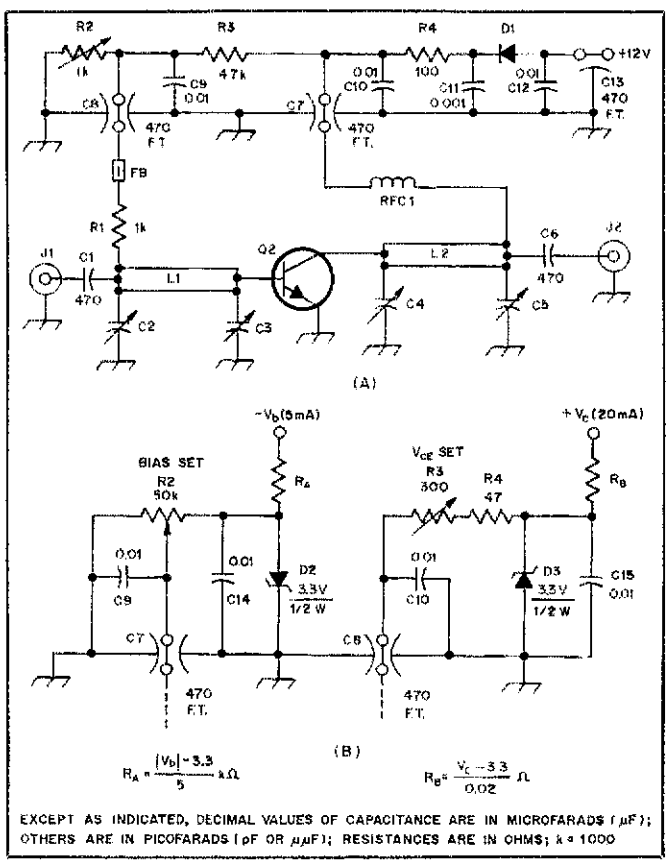


Fig. 3 — Schematic diagram of the Universal 1296-MHz Preamplifier. This circuit can be used with any of the devices discussed in this article. The bias circuit for bipolar transistors is shown at A, while the circuit for use with GaAs FETs is shown at B. All resistors are 1/4-W, 5%-tolerance carbon types.

C1, C6 — Chip or leadless disc type (see text).
C2-C5, incl. — 0.8- to 10-pF microwave-type piston trimmers.
RFC — 8t. no. 28 enameled wire, 0.1-inch ID.

Table 2
1296-Preamplifier Data

Device(s)	Cost ($)	Mfr.†	NF (dB)	G_a (dB)	$-G_f$ (dB)	G_m (dB)	M (dB)	X (M × C)	BW (MHz)	Ckt.	Remarks
NE21889	75.00	NEC	0.62	18.7	27.0	8.3	0.63	47.09	40	pi	GaAs FET
MGF1400	23.50	MIT	0.82	16.2	23.0	6.8	0.84	19.74	45	pi	GaAs FET
NE24483	35.00	NEC	0.83	17.4	27.0	9.6	0.84	29.40	50	pi	GaAS FET
D432	25.00	DXL	0.97	14.9	22.0	7.1	1.00	24.97	90	pi	GaAs FET
MGF1200	13.00	MIT	1.03	13.6	21.0	7.4	1.07	13.91	60	pi	GaAs FET
NE64535	7.50	NEC	1.40	12.0	16.0	4.0	1.48	11.10	60	pi	Cer., 2 emit.
MS2110JE	15.00	TI	1.49	12.0	18.0	6.0	1.57	23.55	140	pi	Cer., 2 emit.
NE64535 + MRF901	10.05	NEC – MOT	1.61	19.9	37.0	11.1	1.62	16.28	160	μS	WA2AAU design
ABT7701	25.00	A	1.63	13.8	27.0	13.2	1.69	42.65	120	pi	Cer., 2 emit. (NLA)
NE21935††	4.50	NEC	1.74	9.9	19.2	9.3	1.90	8.55	180	pi	Cer., 2 emit.
NE21937††	4.00	NEC	1.79	9.8	13.0	3.2	1.96	7.84	100	pi	Pl., 2 emit.
HXTR-6105	28.00	HP	1.81	12.2	24.0	11.8	1.96	53.20	50	μS	Cer., 2 emit., note 3
NE73437	3.30	NEC	1.92	6.0	12.0	6.0	2.41	7.95	>200	pi	Pl., 2 emit.
HXTR-2101	18.00	HP	2.11	12.0	21.0	9.0	2.39	43.02	50	μS	Cer., 2 emit., note 3
MRF901	1.55	MOT	2.23 – 2.47	9.5 – 10.7	16.3 – 16.8	5.6 – 6.8	2.49 – 2.59	3.94 – 3.98	120 – 130	pi	Pl., 2 emit., 8 samples
MRF901	1.55	MOT	2.32 – 2.40	10.2 – 10.8	16.8 – 16.5	6.6 – 5.5	2.51 – 2.56	3.88 – 3.97	>200	μS	Pl., 2 emit., 2 samples, note 7
NE22235	11.00	NEC	2.30	14.0	26.0	12.0	2.37	20.07	115	pi	Cer., 2 emit. (NLA)
BFR-91	3.00	AMP	2.49	7.6	14.0	6.4	2.87	8.61	100	pi	Pl., 1 emit.
NE02135††	3.50	NEC	2.56 – 2.68	12.1 – 12.9	20.0 – 24.0	7.9 – 12.2	2.72 – 2.76	9.52 – 9.66	100 – 130	pi	Cer., 2 emit., 5 samples
NE02135	3.50	NEC	2.65 – 2.70	9.3 – 10.0	19.5 – 22.0	10.2 – 12.0	2.91 – 2.92	10.17 – 10.21	>200	μS	Cer., 2 emit., 2 samples, note 8
MRF911	2.00	MOT	2.67	7.8	17.4	9.6	3.05	6.10	150	pi	Pl., 2 emit.
BFR-90	2.70	AMP	2.75	7.3	17.3	10.0	3.19	8.62	100	pi	Pl., 1 emit.
MRF901 + MRF901	3.10	MOT	2.72 – 3.10	16.0 – 20.5	32.0 – 40.0	14.9 – 23.2	2.77 – 3.22	8.59 – 9.98	>200	μS	WA2AAU design, 7 samples
NE02137††	3.00	NEC	2.82 – 2.89	8.0 – 8.5	12.5 – 12.9	4.5 – 4.4	3.19 – 3.22	9.58 – 9.67	100 – 105	pi	Pl., 2 emit., 2 samples
NE02135 + NE02135	7.00	NEC	2.97	16.6	40.0	23.4	3.02	21.14	>200	μS	note 8
BFR-96	4.30	AMP	2.93	6.0	16.5	10.5	3.60	13.44	120	pi	Pl., 1 emit.
MA42162-511	18.00	MA	3.50	14.7	18.0	3.30	3.60	64.50	140	pi	Cer., 2 emit.
MA42141-510	15.00	MA	4.22	7.3	14.0	6.70	4.8	71.96	140	pi	Cer., 2 emit.

†Device manufacturers are:

A — Aertech Industries, 825 Stewart Dr., Sunnyvale, CA 94085.
AMP — Amperex Electronic Corp., Slatersville Div., Slatersville, RI 02876.
DXL — Dexcel, Inc., 2285-C Martin Ave., Santa Clara, CA 95050.
HP — Hewlett-Packard Co., 1507 Page Mill Rd., Palo Alto, CA 94304.
MOT — Motorola Semiconductor Products, Inc., P.O. Box 20912, Phoenix, AZ 85036.
MA — Microwave Associates, Inc., Bldg. 4, South Ave., N.W. Industrial Park, Burlington, MA 01803.
MIT — Mitsubishi. Small quantity orders to Applied Invention, RD 2, Rte. 21, Hillsdale, NY 12529.
NEC — NEC, c/o California Eastern Labs, 3005 Democracy Way, Santa Clara, CA 95050.
TI — Texas Instruments, Microwave Semiconductors, P.O. Box 5012, Dallas, TX 75222.

††NE21935 and NE21937 are the same device in different packages. The same is true of NE02135 and NE02137.

particular stage is also listed, as is the type of design used (π-network or a microstrip). Note that most, but not all, microstrip designs yield a much greater bandwidth. The microstrip design for the HXTR-6105 and HXTR-2101, a Microcomm Amplifilter,[3] utilizes a two-pole band-pass filter in the preamplifier output circuit to obtain the relatively narrow bandwidth listed.

Finally, a remarks column indicates which are GaAs FET devices, whether the package is ceramic or plastic (for the bipolar units), the number of emitter electrodes and some additional information. Two of the devices, available when this program began, have been superseded by better and less costly semiconductors and are no longer available (NLA). Where appropriate, references to the microstrip circuits appearing in other articles, and used for particular preamps, are indicated.

Some Notes About Device and Circuit Selection

The better microwave devices generally have a ceramic package; units having identical transistor chips in different packages (ceramic and plastic) are indicated in Table 2 for comparison. In general, the use of the π-network design will provide slightly lower noise figure than a microstrip design, because of lower insertion loss in the air-dielectric π-input circuit.

The use of a transistor having a pair of emitter (or source) leads is desirable at this frequency; all of the GaAs FET units have dual, opposed source leads. A recent article[4] describes a 1300-MHz preamplifier, using an NE138 GaAs FET device (in the $130 price class) that achieves a less than 0.5-dB noise figure (and about 0.2 dB noise figure when cryogenically cooled) by using additional source lead inductance to help obtain noise match. It is relatively difficult in home-built preamplifiers to solder the source/emitter leads of any transistor to ground without lead inductance at this frequency. Because of this, all the preamplifiers shown here have some small source/emitter inductance present. No attempt was made to optimize this inductance.

A "Universal" Preamplifier

The initial preamplifiers were built using microstrip techniques for input noise matching, output gain-matching and bias circuitry. However, it became apparent to me that modern transistors, particularly the GaAs FET devices, did not benefit from the additional loss in the input noise-matching circuit. This is a result of the dissipation in the microstrip dielectric. A "universal" preamplifier structure, utilizing input and output π networks, was designed, fabricated and used for most of the preamplifiers built during the last year of my program. A schematic diagram of the preamplifier is shown in Fig. 3, while Figs. 4 and 5 illustrate the construction of this preamplifier.

Similar dual π-network designs have been utilized by others.[5] It is used here because of the relative ease of construction and also because every unit tested could be optimally noise- (and power-)

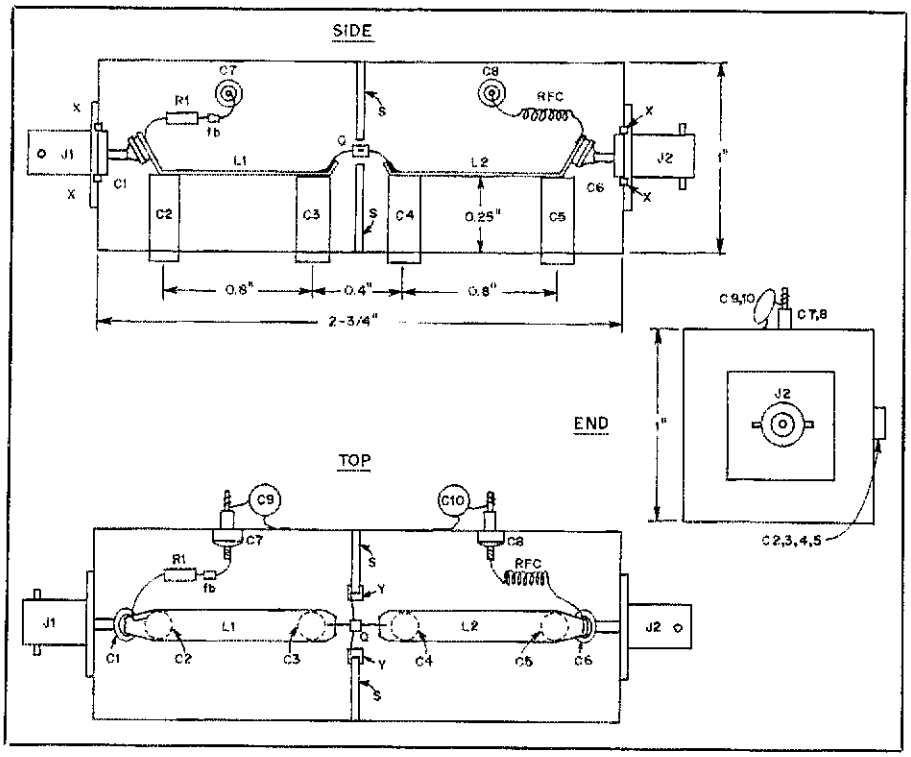


Fig. 4 — Physical layout of the preamplifer. mm = inches (") × 25.4.

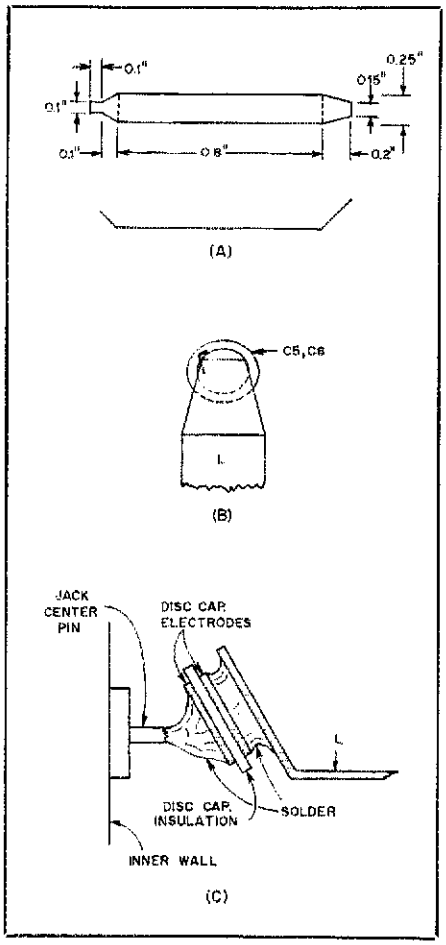


Fig. 5 — The strip-line inductors are formed as shown at A. The attachment of the inductors to the leadless disc capacitors is shown at B (end view) and C (side view). mm = inches (") × 25.4.

matched with the component values shown. It should be noted that, if capacitors C2 and C5 were increased to a maximum value of about 20 pF, a 50-Ω source/load impedance match to almost any real transistor input/output impedance can be obtained. The use of an additional 10-pF chip capacitor (shunting C2 or C5) was not, however, found necessary in any preamplifier tested thus far.

Construction Procedure and Hints

A five-sided box was initially built of double-sided pc board. Holes were formed in the end pieces for the connectors, J1 and J2; in one side piece for the feed-through capacitors, C7 and C8; and in the bottom piece for mounting the π-network capacitors, C2 through C5. A number of copper-foil strips were passed through the connector openings (X in Fig. 4) and soldered to the inside and outside copper to maintain ground continuity. The connectors were soldered to the outside copper cladding of the box and the π-network capacitors were then placed in position and soldered to the inside and outside ground planes. The shield, S, is fitted to the inside of the box, and the location for a hole is marked between capacitors C3 and C4, at a height such that the transistor, having its collector lead passing through the hole, will lie slightly above the free ends of the trimmer capacitors. A pair of copper-foil strips (Y in Fig. 4) are passed through the hole and soldered on both sides. Of course, if you make your shield of copper sheet the foil strips are not necessary. The shield is soldered in place, midway between capacitors C3 and C4. The feed-through capacitors, C7 and C8, are then soldered to both the inner and outer ground planes. All of this soldering requires a relatively high-wattage (greater than 100-watt) iron, and some softening of the solder seals on the trimmer capacitors may occur. It would be preferable to enlarge the box so that the width is about 2 inches, while the 1-inch height and 2-3/4-inch length remain the same. The added width would allow more room to maneuver a high-wattage soldering iron without destroying expensive piston capacitors. The effect of the wider wall spacing upon inductances L1 and L2 is minimal; the dimensions of the inductance strips and the 1/4-inch height above the ground plane are much more critical.

Strip inductors L1 and L2 are formed as shown in Fig. 4 and then soldered to the top of the associated piston capacitors. The strips can be silverplated, although I did not do so. The input and output coupling capacitors, C1 and C6, *must* be microwave types. I used 470-pF leadless discs, because I had a large stock of them on hand. Microwave chip capacitors of at least 100 pF would be preferable, particularly for the input coupling capacitor, C1.

Always install the transistor last, with the source/emitter leads soldered to the input-compartment side of the shield. Tune-up of the preamplifiers is done in the normal manner.[6] Best results appear to be obtained by initially adjusting the capacitors for minimum capacitance, then repeatedly tuning first the output, and then the input capacitors. This is necessary because of interaction between the circuits.

Conclusion

Low-noise preamplifiers for 1296 MHz, having characteristics hitherto unobtainable, can be built with relative ease by amateur operators. I would like to thank all of the manufacturers who have made samples available for this program. I particularly want to thank Dick Frey, WA2AAU, for providing several microstrip designs and invaluable help during this construction/test effort, including a contest operation at W2SZ/1. I would be happy to discuss with readers any information relating to this article, if an s.a.s.e. is provided for my reply. QST

Notes

[1]Effective noise temperature; $T_e = 290 (F - 1)$ K.
[2]Gain margin; $G_m = -(G_a + G_t)$.
[3]Amplifilter RF-1200, Microcomm, 14098 Sandy La., San Jose, CA 95098. (P. Shuch, N6TX; be sure to include an s.a.s.e. with all inquiries.)
[4]A. Katz, ed., *432 And Up EME News*, Jan. 1981.
[5]B. Atkins, ed., "The New Frontier," *QST*, Jan. 1981, p. 12. This is a design by WB5LUA.
[6]G. H. Krauss, "VHF Preamplifiers," *Ham Radio*, Dec. 1979, pp. 50-60.
[7]P. Shuch, "Low-Cost 1296-MHz Preamplifier," *Ham Radio*, Oct. 1975, pp. 42-46.
[8]P. Shuch, "Microstripline Preamplifiers for 1296 MHz," *Ham Radio*, April 1975, pp. 12-27.

A 40-Meter Quad, the EZ Way†

Are you a "little pistol" on 40? Hankering to compete with the "big guns"? This quad may be the answer. Build it for less than $20!

By Anthony W. (Tony) DePrato,* WA4JQS

When I decided to try my hand at 40-meter DXing, I soon found that the inverted-V antenna just did not compete. Using a kilowatt amplifier, I could do a fair job of holding my own, until I found myself in a pile-up with the "big guns."

Enter the Quad

What I needed was an antenna with gain and directivity, but it had to be inexpensive and present low wind loading. A standard Yagi beam was out of the question! I decided on a fixed-direction quad. Since I have two towers, on the east and west end of my lot, I chose to string the quad between these supports.

My first try was a driven element only. In addition to improving the signal to the north and south, it decreased the QRM from European broadcast stations. Even though I was impressed with the results, I wanted something better. I wanted to add a reflector element, but I had trouble imagining how to do it, since I had only two supports.

Then I had an inspiration! Since the 1/8-wavelength element spacing of a 40-meter quad is approximately 17 feet,[1] why not use horizontally mounted lengths of wood two-by-fours? Shortly thereafter, I made a trip to the lumber yard and procured two 20-ft-long two-by-fours.

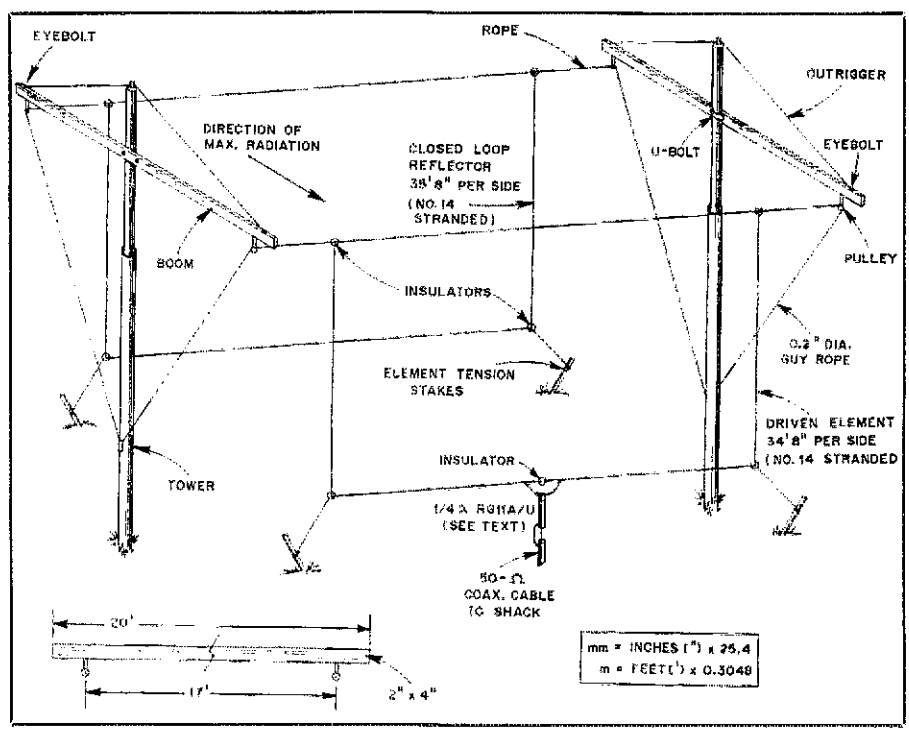


Fig. 1 — Construction details for the 40-meter quad. The quad could be erected in a diamond configuration, but this would require some structural alterations.

Construction

My design is shown in Fig. 1. The length of the driven element can be found with the formula

$$L = \frac{1005}{f} \qquad \text{(Eq. 1)}$$

where L is the length in feet, and f is the frequency in MHz. The reflector should be cut approximately 5% longer. For resonance at 7.2 MHz, the length of the driven element is 139 feet, 5 inches, or 34 feet, 8 inches, per side.

After cutting the wire for the driven element and reflector, I installed four insulators on the reflector so that each side was of equal length (35 feet, 8 inches). I used five insulators on the driven element — one at each corner and a fifth one at the feed point.

[1] m = feet × 0.3048; mm = inches × 25.4.

† Adapted from an article of the same title appearing in September 1981 *Radio ZS* (South African Radio League).

* 205 Cherokee Tr., Somerset, KY 42501

Before mounting the two-by-fours to the tower with U bolts, I drilled holes 17 feet apart in each. After installing eye bolts with pulleys in each hole, I weatherproofed the wood with spar varnish. With an adequate supply of rope in each pulley, I hoisted the two-by-fours to the tops of the towers and attached them with U bolts. The outrigger system, which had been attached previously to the wood with eye bolts, was then secured and pulled taut. Finally, I raised the elements into place and tied off the bottom insulators with rope to stakes.

The feed-point impedance of a 2-element quad will vary somewhat with element spacing, but will usually be in the vicinity of 100 ohms, so the mismatch to 75-ohm coaxial cable should not be prohibitive. The impedance can be matched more closely by means of a gamma-matching section or, more simply, by using a quarter-wavelength transformer. For a feed-line impedance of 50 ohms, this transformer may consist of a section of RG-11/U (75 ohms) cut to the formula

$$L = \frac{246\ V}{f} \qquad \text{(Eq. 2)}$$

where

L = length in feet of the matching section,
V = velocity factor of the cable used as the transformer, and
f = frequency in MHz

Using coaxial cable with a velocity factor of 0.66, the length of the matching section for my quad is 22 feet, 5-1/2 inches.

After I had installed the antenna and pruned it while using a noise bridge, I conducted SWR and bandwidth checks. Running full legal amateur power, I had 1 watt of reflected power at 7.200 MHz and less than 3-watts reflected at the band edges. Nice! On-the-air tests have proven that the antenna performs excellently. The quad is fixed to the south-southwest; my reports from VK and ZL stations have consistently been S9 plus. I've received S9-plus-40-dB reports from Antarctica and S9 from Japan (long path). Can you beat that for less than $20?

References

Hall, J., ed., *The ARRL Antenna Book*, 13th ed. (Newington, CT: ARRL, 1978).

Orr, W., *Radio Handbook*, 21st ed. (Indianapolis, IN: Editors and Engineers, 1978), p. 29-12.

Orr, W. and S. Cowan, *All About Cubical Quad Antennas*, seventh printing (Wilton, CT: Radio Publications, Inc.).

New Books

☐ *Secrets of Ham Radio DXing*, by Dave Ingram, K4TWJ. Published by TAB Books Inc., Blue Ridge Summit, PA 17214. Softbound, 8-1/4 inches, 176 pages (including title pages and index), $7.95.

The DXer, whether he or she is one country from the coveted DXCC Honor Roll or having just made that first transatlantic QSO, is one who is willing to take the time to study the "science" of DXing and learn all that can be learned in order to snag that next elusive country. It's on that premise that author Dave Ingram has chosen to pass on his *Secrets of Ham Radio DXing*.

Ingram does his best to make interesting reading from what could be "dull, instructional text." Once you've read the book, you'll have to admit that he carries out his task with enthusiasm and style. The writing is clear and concise — easy to read and to enjoy.

After the obligatory definition of terms and goals, the reader is treated to a dandy, if all too short, six-page history of DXing from 1915 through the present. Shades of jumping sparks and scents of ozone!

Although specialty and exotic modes such as uhf/vhf, SSTV, and satellite DXing are briefly touched upon, the main thrust of the book is aimed at the low-band (160- through 10-meter) DXer. There are excellent sections on strategy for working DX and on setting up your station, as well as ways of dealing with such distractions as line noise and rf feedback — FB! The reader will also find useful parts of the book that offer "tips" on antennas and propagation, QSLing, DXC contesting as a way to run up the old country totals, DX aids, and descriptions of several of the major awards of interest to DXers.

Because of the ever-changing world situation — new countries emerging from old, new call-sign allocations, etc., the prefix/country/beam-heading charts in this book are a little out of date. DXers would be well advised to check the latest ARRL DXCC Countries List before turning their beams to work a 7G1 in the Republic of Guinea (now 3X) or waiting to work a KZ5, Canal Zone (now a "deleted country") as their last country on 40 meters for the 5 Band DXCC Award.

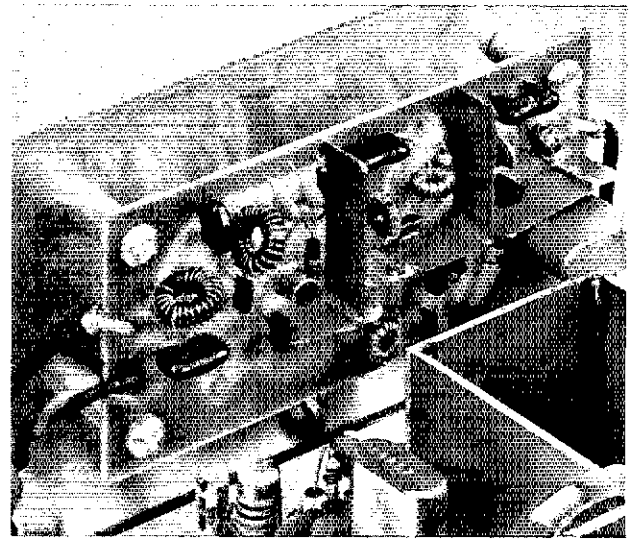
As icing on the cake, there is an entire chapter on DXpeditioning. Ingram presents some thoughts on the absolute basics of planning a simple DXpediton and a short discussion of some effective operating techniques. This chapter really comes in to its own with brief descriptions of a couple of major DXpeditions and DXpeditioneers of the past. What amateur who claims to be a DXer could not imagine being halfway around the world mashing giant cockroaches and working the pile-ups with Gus Browning, W4BPD? What DXer does not share that twinge of excitement of taking hostile gunfire with K1MM and the gang of IS1DX while looking for an operating spot in the Spratly Island Group?

The only disappointment with *Secrets* comes not with the editorial content, but with the graphics in the book. Photograpic quality throughout the book is generally poor, while the figures (drawings) are unlabelled and practically worthless. Most of the photos are reproduced in such a way that they are dark, "grainy" and not pleasant to look at. Antenna diagrams have arrows and markings on the major components, but no labels. Photo captions are generally well done and explain the photos better than the photos themselves. (Perhaps one picture is *not* worth a thousand words, but rather one picture is worthless without a thousand words.) Hopefully, this situation will be corrected in subsequent printings of this otherwise useful book.

If you've got an extra $7.95 in the kitty and an evening of free time, *Secrets of Ham Radio DXing* might prove an entertaining diversion as well as providing a little help for your trip up the DXCC standings. — *Bill Jennings, K1WJ*

BEGINNER'S BENCH

Getting Started on VHF: A 6-Meter Receiving Converter



Part 3: Building this simple converter will complete your 6-meter station and let you join the fun on 50 MHz.

By George Collins,* KC1V

Last month, Beginner's Bench presented the foundation for a vhf receiving system — a tunable 10-MHz i-f receiver.[1] This installment completes the 6-meter station with an easy-to-build receiving converter. Containing only three transistors, on an etched-circuit board measuring just 3-3/4 × 1-3/4 inches,[2] this converter is a great candidate for your next weekend project.

In order to take advantage of a readily available circuit board, the design chosen for this converter is a modification of the Rochester VHF Group converter.[3] Originally, the circuit was designed to operate at an i-f of 28 to 30 MHz. For use with our 10-MHz i-f unit, the local-oscillator (LO) and mixer-output circuits have been modified. The same circuit board can be used at either i-f.

How It Works

The heart of any receiving converter is the mixer. In this circuit (see Fig. 1), that function is served by Q2, a dual-gate MOSFET (metal-oxide semiconductor field-effect transistor). By combining the 50-MHz input and the 40-MHz LO signals in Q2, output signals are produced at frequencies equal to the sum and the difference of the two input frequencies

$$50\ \text{MHz} + 40\ \text{MHz} = 90\ \text{MHz} \quad \text{(Eq. 1)}$$
$$50\ \text{MHz} - 40\ \text{MHz} = 10\ \text{MHz} \quad \text{(Eq. 2)}$$

In this case, the desired output, at 10 MHz, is the difference between the two inputs. The sum, 90 MHz, is rejected by the circuits following the mixer and by the i-f receiver.

Any signal present at the mixer input (even at frequencies other than 50 MHz) will combine with the LO signal, forming sum and difference output signals. Most of these signals are rejected easily by the i-f receiver, but there is a special case of which we must be aware. If a 30-MHz signal is applied to the mixer input, the output signals will be

$$40\ \text{MHz} + 30\ \text{MHz} = 70\ \text{MHz} \quad \text{(Eq. 3)}$$
$$40\ \text{MHz} - 30\ \text{MHz} = 10\ \text{MHz} \quad \text{(Eq. 4)}$$

The sum at 70 MHz is rejected by the i-f receiver, but the difference is exactly the same as our desired output! This unwanted response to 30-MHz signals is called the *image* response. It can be avoided only by preventing the image signals from reaching the mixer. Fortunately, the 30-MHz image is sufficiently removed from the 6-meter band to allow it to be suppressed relatively easily.

Q2 is followed by a band-pass filter. This helps reject signals outside the 10- to 10.25-MHz tuning range. By tapping the output down on L5, the mixer output impedance is matched to the i-f receiver input (50 Ω).

Local oscillator injection to the mixer is provided by means of a crystal-controlled JFET (junction field-effect transistor) oscillator, Q3. Output from the oscillator is taken from a tap on the tank-circuit inductor, L6. The tap position and the value of coupling capacitor C7 are selected to provide the correct LO voltage at the mixer.

A JFET (Q1), in the common-gate configuration, is used as the rf amplifier stage. The 50-MHz input signals are fed to the source of Q1 from a tuned circuit comprised of L1 and C1. This circuit provides front-end selectivity and impedance matching between the antenna and the amplifier. Additional rf selectivity is provided by a band-pass filter between the amplifier output and the mixer stage. This selectivity is important for two reasons: First, without adequate selectivity, strong out-of-band signals may overload the rf amplifier or the mixer. This can cause cross modulation and a loss of sensitivity. Second, the image response is determined by the degree of selectivity ahead of the mixer.

[1]Notes appear on page 44.
*Assistant Technical Editor

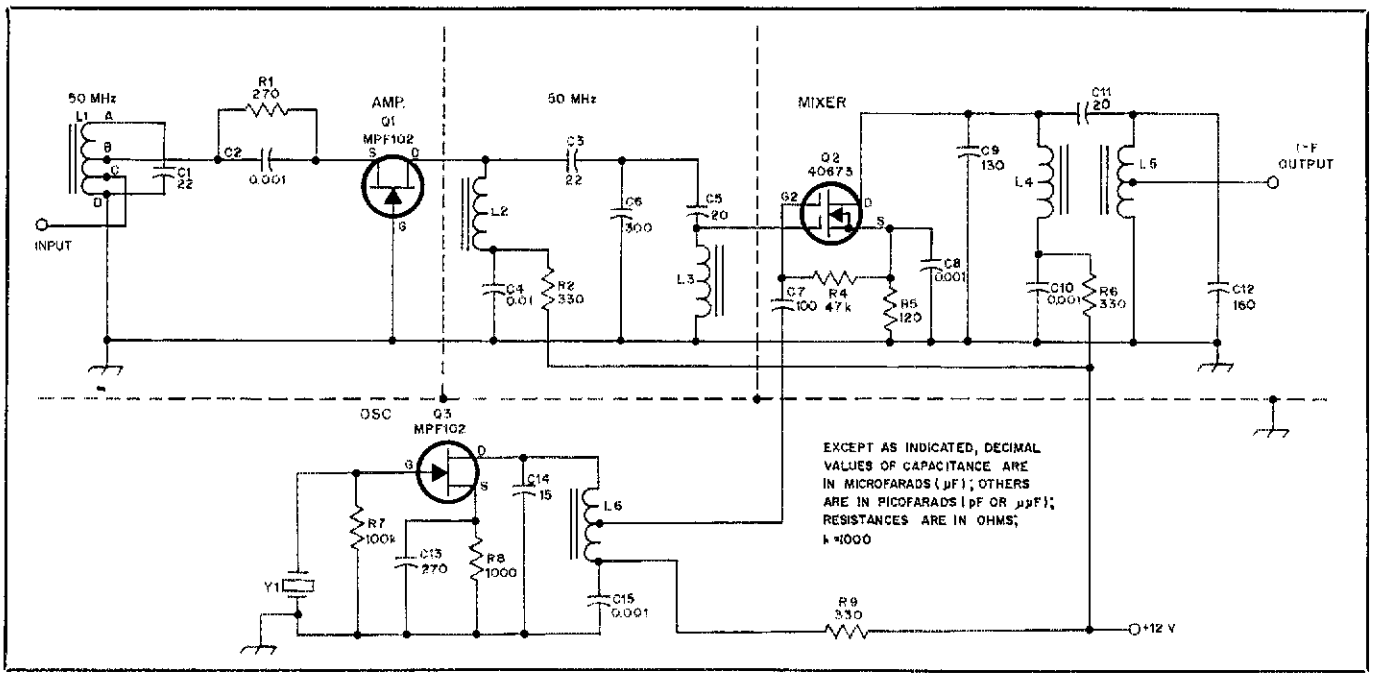


Fig. 1 — Schematic diagram of the 6-meter converter. The dashed line represents the shield used to isolate the stages. All resistors are 1/4-W, 5% carbon types. Decimal-value capacitors are 16-V disc ceramic types; others are 5% silver-mica units. All inductors are wound with no. 28 enameled wire.

L1 — 14 t., tapped at 4 turns (point C) and 6 turns (point B) from ground, on a T25-6 core.[1]
L2 — 13 t. on a T25-6 core.
L3 — 12 t. on a T25-6 core.
L4, L5 — 21 t. on a T37-6 core. L5 is tapped at 5 turns from ground.
L6 — 18 t., tapped at 4 turns from ground, on a T25-6 core.
Y1 — 40.000-MHz crystal. ICM[3] type 471150 (specify frequency when ordering).

Resistor R1 determines the gate-to-source bias voltage for Q1. This sets the bias current at the correct value. To provide a low impedance path for the rf signal, R1 is bypassed with a 0.001-μF capacitor (C2).

Construction

Asembling the converter is simply a matter of placing the components in the proper locations (see Fig. 2) on the circuit board.[4] The most difficult step in the construction (and it isn't really difficult) is winding the tapped inductors. One way to make the taps is to remove approximately 2 inches of insulation from the center section of a length of enameled wire. Now fold the wire at the center of the stripped portion. Twist the stripped portion, forming a single lead; this will be the tap lead. Place the wire on the core and wind the required number of turns, first on one side and then on the other side of the tap.

When winding L1 (which has two taps), use this method to form the tap closest to the center of the winding. After placing all the turns on the core, scrape the insulation from the wire at the point of connection for the second tap. Use a length of the same wire used to wind the coil for making connection to this point. Be sure to wind the coils carefully, spacing the turns evenly around the toroid. Leave a gap of approximately 30° between the first and last turns. Pay attention to the location of the taps on L1, L5 and L6; it is important that they are placed correctly.

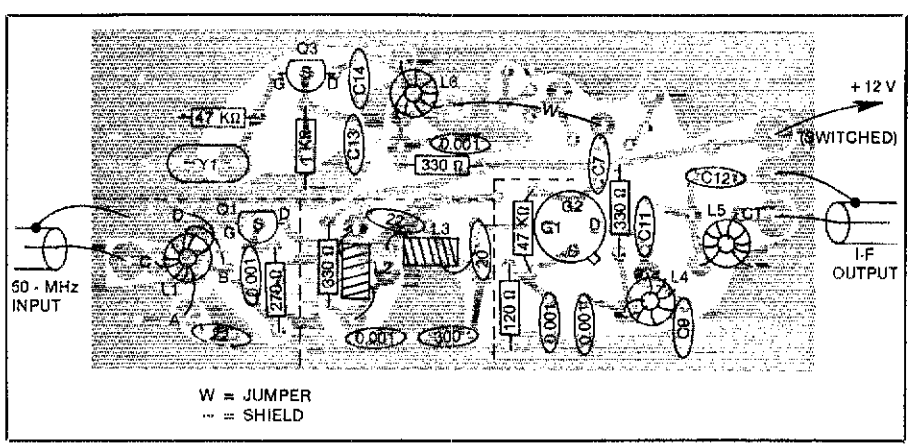


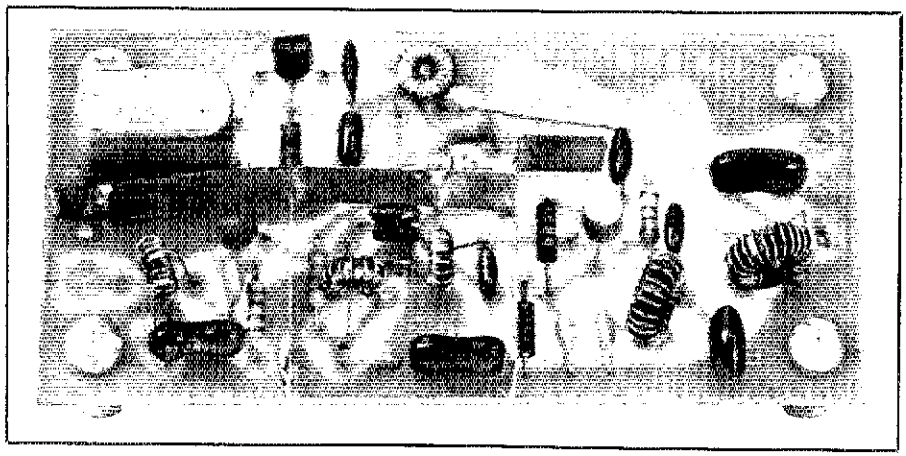
Fig. 2 — Parts-placement diagram for the 6-meter converter. The board is shown from the component side, with gray areas representing an X-ray view of the unetched copper. This board was designed for use on several bands, and a number of holes are not used for the 6-meter version.

A 3/8-inch high shield, made from thin flashing copper or brass shim stock, is used to separate the various converter stages. The shield is held in place by soldering it to 1/2-inch lengths of no. 16 bus wire placed through holes in the circuit board and soldered to the ground foil. After the shield is in place, trim the bus wire on both sides of the board. Install the shield after all the components have been soldered in place.

Provisions have been made on the circuit board for the use of two sizes of crystal holders. An HC-32/U-style crystal is recommended, but the larger HC-6/U style can be used if one is on hand.

Alignment

To reduce the cost of the converter, variable capacitors have not been used in the tuned circuits. Peaking of these circuits is done by compressing or spreading the turns of wire on the inductors. Pushing the turns together will increase the coil inductance. The range of adjustment using this method is limited, but it is sufficient if the correct value of



As shown here, the coils in the band-pass filters should be positioned at approximately 90° to each other. Use of an HC-6/U-style crystal in this unit required that the shield partition be bent slightly to provide clearance. The input circuit is at the left, while the mixer stage is at the right of the photo.

capacitance is used. For this reason, 5%-tolerance mica capacitors are recommended.

The input circuit (L1 and C1) is relatively broadbanded, making adjustment of this stage noncritical. Simply peak L1 for maximum response to a signal in the center of the tuning range. The interstage network, between the rf amplifier and the mixer, and the mixer output network should be stagger-tuned for uniform response across the tuning range. Do this by first applying a signal at the low end of the band (near 50.01 MHz, for example). Adjust L2 and L4 for maximum response at that frequency. Now inject a signal near the high end of the band and adjust L3 and L5 for maximum response.

If you are using a crystal- or VXO-(variable crystal oscillator) controlled transmitter as an alignment-signal source, you may not be able to obtain signals at both ends of the tuning range. In that case, you can make the adjustments using whatever frequency spread is available. Any loss in sensitivity at the band edges will be be reasonably small.

During operation, the converter should be enclosed in a metal case to prevent 10-MHz signals from "leaking" into the i-f receiver. Placing the converter in the receiver case will provide adequate shielding, in most cases. If you are going to use this converter with the transmitter and i-f receiver described in Parts 1 and 2 of this series,[5,6] you will need to change the transmitter relay wiring. All that is necessary is to move the wire between the RCVR MUTE jack (J4) and K1C from the normally open relay contact to the normally closed position. This will mute the receiver during transmit. With this converter completing your 6-meter station, you are ready to begin enjoying the interesting world at 50 MHz.

Notes

[1]G. Collins, "Getting Started on VHF: A Tunable I-F for VHF Converters," Part 2, *QST*, May 1982, pp. 33-35.

[2]mm = inches × 25.4.

[3]G. Woodward and G. Collins, eds., *The Radio Amateur's Handbook*, 59th ed. (Newington, CT: ARRL, Inc., 1982), pp. 9-18 to 9-21.

[4]Circuit boards, negatives and parts kits for this project are available from Circuit Board Specialists, P.O. Box 969, Pueblo, CO 81002. Circuit boards are also available from Dynaclad Industries, P.O. Box 296, Meadow Lands, PA 15347.

[5]G. Collins, "Getting Started on VHF: A 6-Meter Transmitter You can Build," Part 1, *QST*, April 1982, pp. 37-42.

[6]See note 1.

[7]Toroidal cores are available from Amidon Associates, Inc., 12033 Otsego St., North Hollywood, CA 91607 and Palomar Engineers, 1924-F W. Mission Rd., Escondido, CA 92025.

[8]International Crystal Manufacturing Co., Inc., 10 North Lee, Oklahoma City, OK 73102.

Strays

When hams provide a public service, they often do it in other ways than through the airwaves. Bill Welsh, W6DDB (r), recently presented fellow ham (and fellow long-time blood donor) Arthur Godfrey, K4LIB, with an award at the Los Angeles Chapter of the American Red Cross. The occasion was the 40th anniversary of the first pint of blood collected by the Red Cross in Los Angeles.

When John, W2AAF, ran into Harry, W2HD, while they both were on jury duty, John invited Harry to visit the electronics shop at Ward Melville High School, where W2AAF is an instructor. While there, then ARRL President Dannals (without the beard) spoke to a junior high school science class via the school 2-meter repeater and 10-meter remote base. John tells us he will provide demonstrations at the school, in Setaucket, New York, for anyone interested. *(photo by Chuck Muether)*

FAST-SCAN TV NET

☐ Attention Midwestern video experimenters: A net to discuss fast-scan television topics meets Saturdays at 1700Z on 7.290 MHz. This net is followed at 1800Z by a new facsimile group, conducted by Robert Roehrig, K9EUI. If you're interested, tune in!

QST congratulates . . .

☐ Ann Harrison (daughter of Duke, K2MZ) and Todd Wolin (son of Sid, K2LJH), winners of the First Annual Helen Reed, K2AIU, Memorial Scholarship Fund Awards. Sponsored by LIMARC, the Long Island (New York) Mobile ARC, the Fund was created in memory of K2AIU, who served her family and her community via Amateur Radio despite an incurable illness.

I would like to get in touch with . . .

☐ other club presidents who are interested in establishing a net to discuss club activities and exchange ideas. Ronald D. Brooks, KA1AFN, 213 E. Pearl St., Torrington, CT 06790.

Hints and Kinks

Conducted By Larry D. Wolfgang,* WA3VIL

CHECKING 117-V GROUNDED POWER OUTLETS

☐ Grounded outlets are sometimes wired incorrectly. With the ground terminal at the top, the neutral wire should be on the right and the hot wire on the left.

Fig. 1A shows a device that will indicate whether the outlet is wired properly. I make no claims to originality, but offer this to help those who have never seen such a device. Only lamps 1 and 2 should light if everything is okay. If lamps 1 and 3 light, you will know that the white and black wires are reversed, and if 2 and 3 light, the black and green wires are reversed. When lamp 1 lights by itself, green is open, and if only lamp 2 lights, then white is open. If all lamps light, you may be connected to a 3-wire, 234-V system. If no lamps light, black may be open, or the outlet is turned off at the fuse box. Note that no indication is given about white and green being reversed.

This device can be wired inside of a large grounding plug, with the bulbs visible through the top, or the circuit can be built in a small box. If the bulbs are mounted on one panel of the box, the markings shown at Fig 1B can be used for quick reference. — *Dave Geiser, WA2ANU, New Hartford, New York*

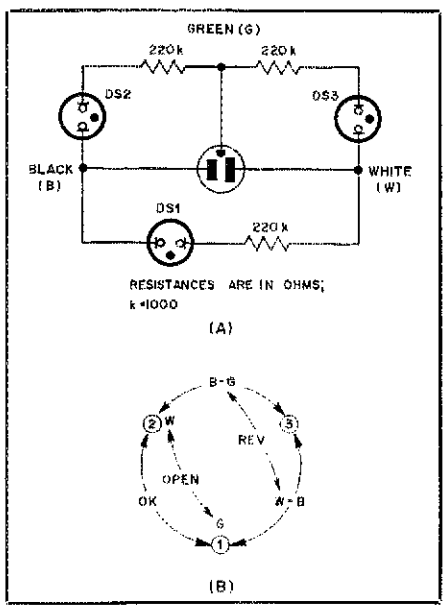


Fig. 1 — Circuit diagram for a grounded-outlet checker is shown at A. Neon bulbs are type NE-2. Resistors are 1/8 W or more. At B, a panel marking for quick reference to the condition of the outlet under test.

MEASURING IN-CIRCUIT BATTERY CURRENT

☐ Sometimes it is desirable to measure the battery current to a piece of equipment. Here is a simple idea I use to break the circuit and insert my ammeter. Two strips of aluminum foil are taped to either side of a piece of note paper. The note paper should be slightly larger than the foil to insulate the strips.

The test strip is inserted between the batteries, or between the battery and holder, and alligator clips on the meter leads connect to each strip of foil. The device is quick and easy to build, is disposable, and makes good electrical connection because the strip is thin enough for the positive battery cap to force the other side against the negative end of the battery. — *James W. Milburn, WB5BYK, Hollywood, California*

MEASURING AC CURRENT

☐ Most inexpensive VOMs have an ac-voltage scale. They do not have an ac-current scale, however. Here is a method to make an approximate measurement of the ac current.

I insert a 1-ohm, 50-watt resistor in series with the source and load. Using the ac-voltage scales, I measure the voltage across the resistor. The scale is read directly in amperes. A suggested test circuit is shown at Fig. 2. Tip jacks mounted on the electrical box will make connection to the VOM easy.

Low-value, high-wattage resistors are common at flea markets. Other resistance values will work, if you would like to do some Ohm's law calculations. — *Edwin Walker, WA4OFS, Mountain City, Tennessee*

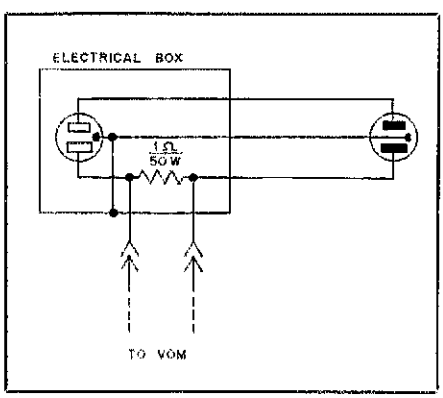


Fig. 2 — Test circuit for measuring ac current. The device can be plugged into the test circuit, the plug connected to an outlet, and the meter connected. Ac current is read directly from the appropriate ac-voltage scale.

TS-830 RIT/XIT MODIFICATION

☐ Ed Sanders, W4XC, sends this welcome change to the Kenwood TS-830. Extending the RIT/XIT control tuning range to approximately ± 8 kHz may be done easily. Two 1/4-watt, carbon-composition resistors are needed. A 160-Ω resistor is placed in parallel with R17 (6.8 kΩ), which is located at the rear of the RIT/XIT control potentiometer. R87 (10 kΩ) is paralleled with a 2.7-kΩ resistor. This can be done without removing the af board by connecting the resistor between the right side of VR2 and the terminal marked TPG. Recalibration of the RIT control is accomplished by centering the control knob and noting the frequency displayed on the readout. Turn the RIT on and adjust VR2 until the frequency noted previously is displayed. That's it!

Ed also mentioned that the addition of a 0.001-μF capacitor in series with the hot lead of both his MC-50 and Shure 444 microphones decreased the bass response markedly. This results in increased intelligibility, especially when DXing. Use the MONITOR function of the '830 to select the capacitor value that suits your needs. — *Paul K. Pagel, N1FB, ARRL Hq.*

DIRT IN METER MOVEMENTS

☐ The magnet in a meter movement can pick up tiny bits of iron filings. These filings can work their way into the gap between the magnet and the armature, interfering with the meter coil movement. It is best to use care to prevent such contamination, but when it does occur the meter is ruined unless the dirt can be cleaned out.

I have successfully repaired meters by carefully removing the armature from the magnet. Any particles that cling to the armature can be brushed away. Next, direct a narrow flame from a propane torch through the gap in the magnet. The tiny bits of iron are heated to incandescence, and are blown away as tiny sparks long before the magnet itself is heated enough to cause damage. A temperature of 200° to 300° F should not harm the magnet, but you could hold it in a wet rag to keep it cool.

Carefully reassemble the meter in a place *free* of iron chips. The movement should be free, and the meter will be as good as new. — *I. Dean Elkins, K4ADJ, Henderson, Kentucky*

TRY AN HOUR METER

☐ Most ham shacks are equipped with a variety of electrical meters, but few include an hour meter. This accessory is useful in evaluating equipment performance and planning purchases of replacement tubes and lamps. It also creates an interesting record of station activity.

An hour meter is an elapsed-time recorder. Good sources of these meters would be hamfests and any company that deals in surplus electronics equipment, such as Fair Radio Sales[1] or Herbach and Rademan, Inc.[2] A surplus meter costs just a few dollars and can be built attractively into a small cabinet with a pilot light, fuse and power cord.

My meter is wired to the station main-power switch. I keep a meter log with readings taken at the following times: (1) On the first of each month, (2) when a tube or other component is replaced, (3) when new equipment is added or an old piece is returned to service, and (4) when a piece of equipment fails or is otherwise removed from service. — *Neil Friedman, N3DF, Washington, DC*

*Assistant Technical Editor

[1]Fair Radio Sales, Box 1105, Lima, OH 45802.
[2]Herbach and Rademan, Inc., 401 Erie Ave., Philadelphia, PA 19134.

RTTY AND THE APPLE II COMPUTER

☐ A few months after my son purchased an Apple II computer, I wanted to try it on SSTV and RTTY. After making inquiries at the local computer shops, the answer began to look expensive and complicated. Al Mierau, VE5WZ, a local computer and RTTY enthusiast, showed me how he interfaced his Apple computer with his Drake equipment. By adapting his circuit to my TS-180S, I began receiving RTTY on the Apple computer, using the Galfo program — but it was upside down! (Mark and space tones reversed.)

I tried using an opto-isolator in the local loop circuit for transmit, but that didn't work. There just isn't enough current available at the Apple Game I/O to drive the isolator. Glen Waldner, a co-worker, suggested that I try a hex inverter. This worked! The 7404 provided the necessary current for the opto-isolator. I used a couple of the inverters to get the transmitted signal right side up and to cure the receiving problem.

Fig. 3 shows a schematic diagram of the circuit, and Fig. 4 gives a pc-board pattern and parts overlay. The received signal is picked up from the base of the keying transistor on my Flesher DM-170. Operating RTTY using a computer is turning out to be another fascinating branch of Amateur Radio. — *Bruce Rattray, VE5RC, Saskatoon, Saskatchewan*

TS-180S POWER CONNECTOR

☐ I recently discovered that it is possible to insert the power plug for the TS-180S into the chassis connector in a misaligned position. The result is 117-V ac applied to the 12-V dc line on the transceiver. Even with the power switch off, the final transistors can be destroyed. At $40 apiece for new transistors, this can be a disastrous mistake.

The plug appears to be nonreversible, and most owners probably have that impression. This led me to a false sense of security, as I reached over my station shelf to insert the power plug. Careful inspection of the plug and connector will show that if the plug is inverted and misaligned on the vertical axis, pins 6 and 4 from the plug will mate with pins 4 and 6. Pin 6 carries 117-V ac for switching. This is an unfused line, and it can be hot or neutral, depending on the orientation of the wall plug.

If the line is hot, the ac is applied directly to the final-amplifier collectors. If it is neutral, no damage will occur until the transceiver power switch is turned on. Then the ac voltage is applied to the 12-V dc line throughout the rig.

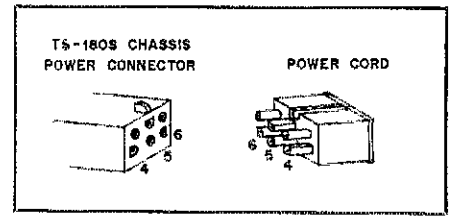


Fig. 5 — Drawing of the shape and orientation of the power-connector pins for the TS-180S. Note that by inverting the power-cord connector, the top three pins will mate with the bottom three pins on the chassis connector.

One remedy is to glue a strip of plastic about 1/8-inch thick along the bottom edge of the chassis connector. I used Super Glue for this, and now the connector really *is* foolproof. My thanks to Lou Potter, K6VT, for suggesting this simple cure. I believe this same problem exists for the TS-120. — *Bob Foreman, AG6M, Sacramento, California.*

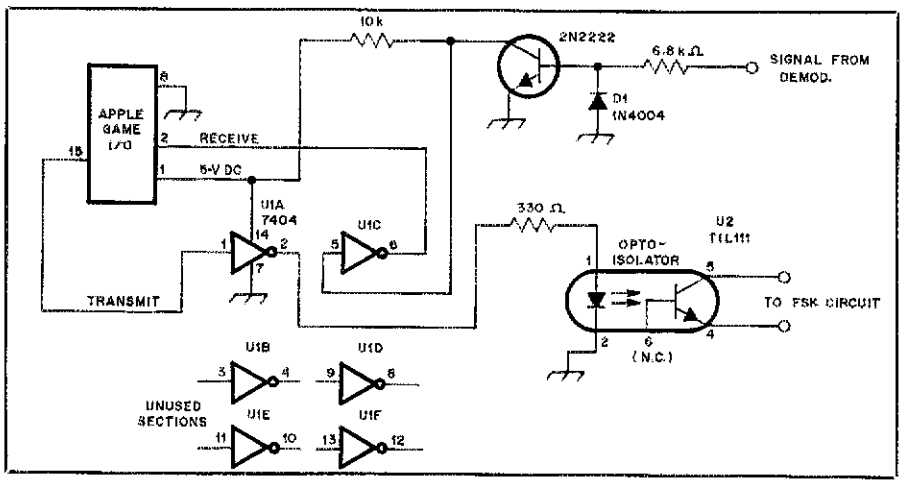


Fig. 3 — Schematic diagram of a computer/transceiver interface for RTTY operation.

ANOTHER USE FOR THE SWR INDICATOR

☐ An SWR indicator can be made to double as a field-strength meter simply by disconnecting it from the transmission line and plugging a length of wire into the TRANSMITTER input. Relative field strength can be read with the meter set in the forward position.

I used mine to tune a 2-meter mobile amplifier for maximum output. With a 19-inch piece of stiff wire in the coaxial jack, and the meter sitting on the car hood, I was able to adjust the amplifier quickly and easily. — *Jesse "Bill" Tillett, K5CVK, Slidell, Louisiana.*

AZDEN PCS-2000 UPDATE

☐ Two articles in the March 1982 Hints and Kinks column prompted several readers to write with their suggestions for solving the memory back-up battery problem. Various

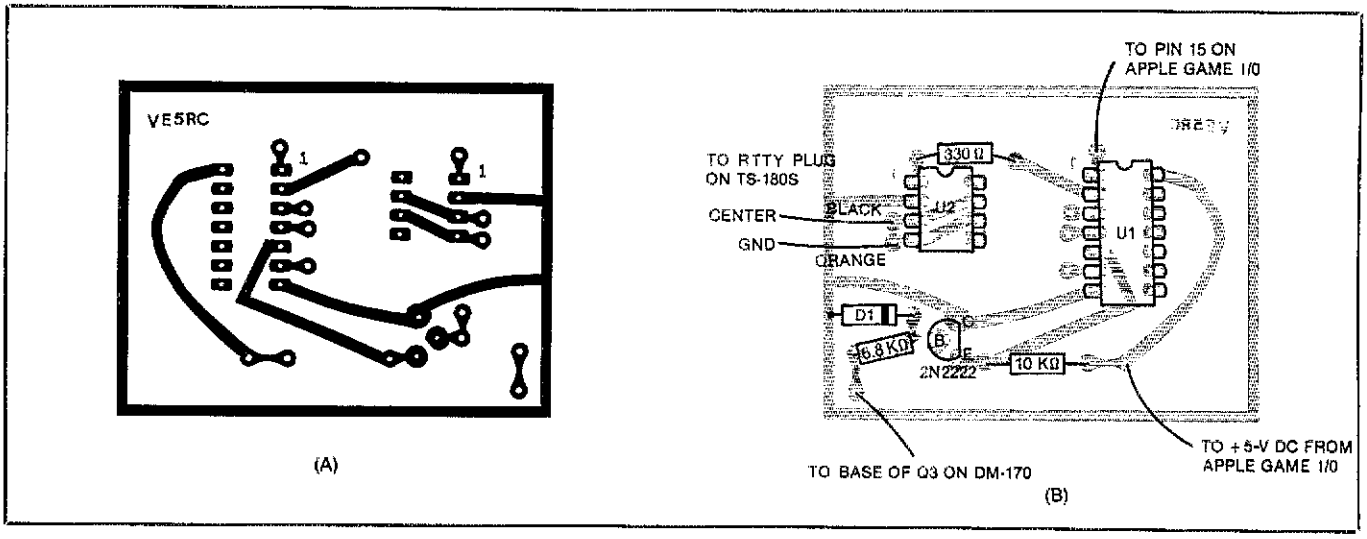


Fig. 4 — An etching pattern for the interface circuit is shown in A. The pattern is shown full size, from the foil side of the board. Black represents copper. A parts-placement guide is given at B. Components are placed on the non-foil side of the board; the shaded area represents an X-ray view of the copper.

battery types and mounting methods have been suggested.

One alternative worth mentioning is the battery pack used for the Azden PCS-3000. This 4.8-V nickel-cadmium battery will fit conveniently in the control head. It is available from Amateur-Wholesale Electronics.[1] — *Larry Wolfgang, WA3VIL, ARRL Hq.*

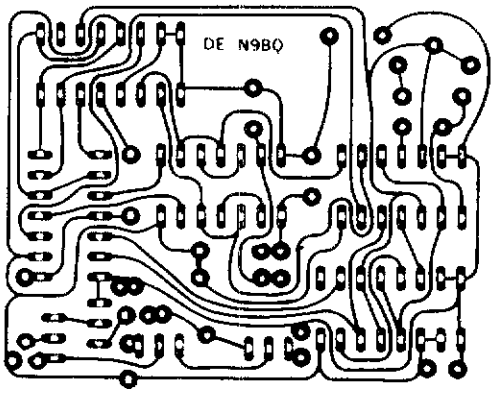
ICOM IC-730 CW FILTERS

☐ When I purchased an ICOM-IC-730, I also ordered the IC-EX203 cw audio filter. After installing the filter, according to the manufacturer's instructions, I was disappointed to find that the filter was actuated in both the cw and CW-N positions. I find that having a 150-Hz filter in the circuit at all times during cw operation is inconvenient. With minor circuit modifications, my audio filter is now active only when the MODE switch is in the CW-N position.

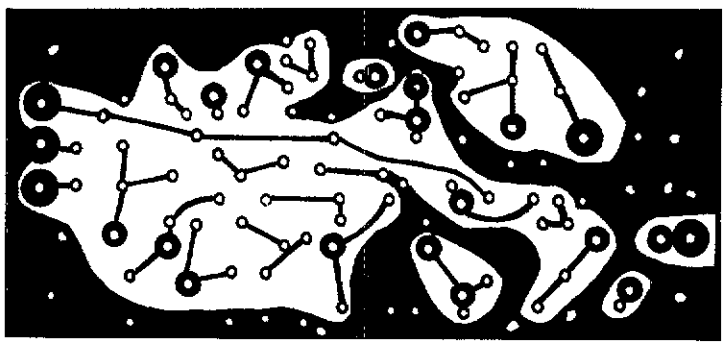
The first step is to fabricate a 5-inch length of wire with a flat pin on each end. The pins I used were removed from an IC socket found in my junkbox. Remove the green wire and the connector from P1, which plugs into J3 on the detector board. This wire goes to pin 1. Now install the filter board. One end of the wire fabricated earlier is plugged into the connector on the green wire removed from P1. The other end of this wire is soldered to the point on P6 that goes to J4 pin 2. I used a piece of plastic electrical tape to insulate these connections.

With the mode switch in the CW-N position, 8-V dc is supplied to the audio filter, turning it on. Now I have two bandwidth choices on cw, and operating is much easier. — *Robert Putnam, K7ACP, Roseburg, Oregon* QST

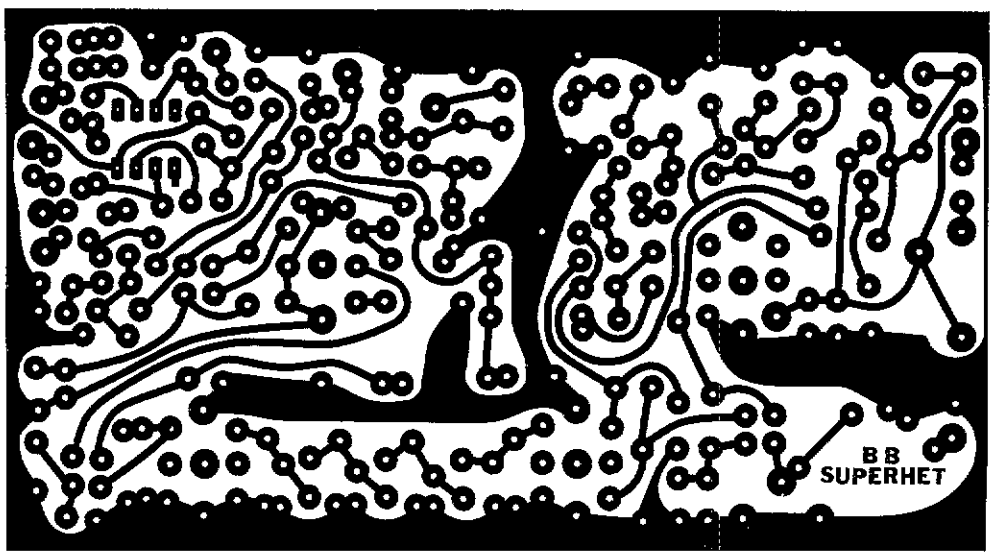
[1]Amateur-Wholesale Electronics, 8817 S.W. 129th Terr., Miami, FL 33176. The cost is $5.70, plus shipping. AWE will also supply a modification sheet, with details of how to install this battery, on request.



Circuit-board etching pattern for the CMOS keyer. Pattern is shown at actual size from the foil side of the board, with black representing copper. Copper is on one side only. The parts-placement diagram appears on page 28.



Etching pattern for the 6-meter receiving converter. Black areas represent unetched copper, viewed from the etched side of the board. Parts-placement diagram appears on page 43.



Scale etching pattern (foil side) of the Bare-Bones Receiver circuit board.

Product Review

Conducted By Paul K. Pagel,* N1FB

Heathkit Model VL-2280 2-Meter Base Station Amplifier

Have you ever tried to operate your 2-meter mobile rig from home, using an external power amplifier and associated heavy-duty power supply? Unless you do this often, what results from such a setup is a disastrous mess of coaxial cable and power cables. Heathkit has provided a solution to this problem, and in the process has designed a fine base station amplifier — the VL-2280, a 75-watt linear amplifier and a heavy-duty, regulated supply in one cabinet.

The front panel of the '2280 is simple, yet functional. A back-lighted panel meter reads switch-selected relative power or supply voltage. Three other switches select amplifier bypass (EXC/AMP), transmit-receive delay (SSB/FM), and ac POWER. Two green LEDs indicate when the dc supply is on, and when the amplifier is on. The rear panel has connections for rf in and out, fuses for primary power and supply output, the ac line cord and an accessory socket with connections for T-R control. There is provision for a 13.8-V, 4-A output for powering external equipment.

Construction and Circuit Details

Because the VL-1180 mobile amplifier and the VL-2280 are basically the same, the information will not be repeated here. The reader is requested to refer to the earlier review.[1] Construction time did vary; it took 13 hours to complete the VL-2280.

Testing and Operation

During the initial testing of the amplifier, the MRF247 failed — cause unknown. Heath promptly supplied a replacement device, and it has provided trouble-free service ever since.

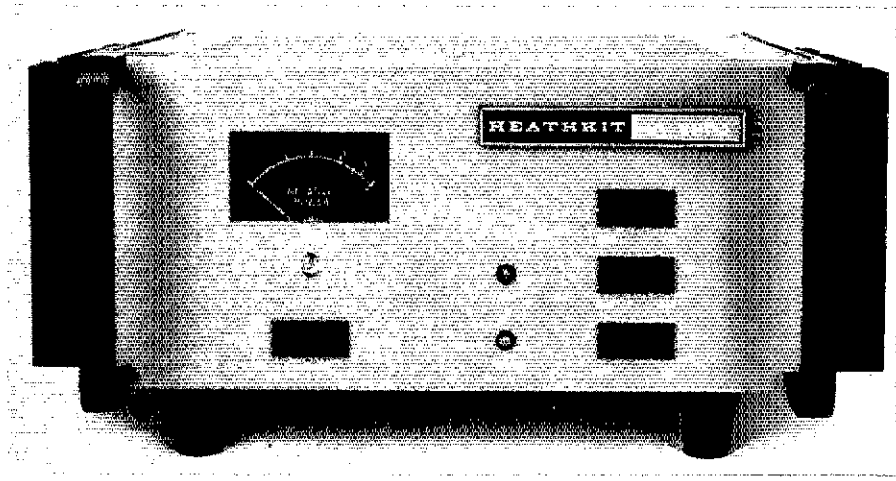
Because of some constructional errors caused by yours truly (the over-anxious builder), the '2280 failed to meet the manufacturer's published specifications. Once the errors were corrected, the '2280 passed with flying colors.

The VL-2280 was used during a mountain-topping contest effort, on a very hot day. During 24 hours of operation, the power output remained constant. Two anomalies appeared during the contest. Rf energy from other transmitters in the area caused the T-R relay to chatter, and the T-R switching delay on ssb was much too long for rapid-fire communications. Each of these problems was corrected, the former by placing the amplifier in the bypass mode when not in use, and the latter by using T-R control from the exciter.

I'm very happy with the amplifier. Operating my mobile rig from inside the house is a simple task, and the amplifier delivers an outstanding signal. Since I enjoy operating linear modes, I'm glad Heath made the '2280 a linear amplifier — not one just for fm (Class C)! Price class for the VL-2280 is $275. For more information, contact Heath Company, Benton Harbor, MI 49022 — *Gerry Hull, AK4L*

[1]Product Review, *QST*, May 1982.

*Assistant Technical Editor



Heathkit VL-2280 2-Meter Amplifier

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency range: 144-148 MHz.	As specified.
Power output: 75 W nominal with 10 W drive.	80 W at 10 W drive.
Spurious and harmonics: 60 dB down.	Greater than 70 dB.
Third-order distortion: −30 dB below PEP.	Exceeds −24 dB measurement ability of test equipment.
Power requirements: 120 V ac at 4 A, 240 V ac at 2 A or 12 V dc at 11 A.	As specified.
Modes of operation: Ssb, cw, RTTY and fm.	As specified.
Duty Cycle: 50%; 10 min on, 10 min off.	Not measured.
Size (HWD): 5-1/2 × 13-1/2 × 12-3/4 in.†	
Color: Gray and Black.	
Net Weight: 27 lb.	

†mm = in. × 25.4.; g = oz × 28.35; kg = lb × 0.454.

MACROTRONICS TERMINALL

☐ I've used a number of RTTY/cw "interfaces" with my TRS-80® (Model I) computer and, in my opinion, the Macrotronics Terminall is the best. It is easy to install and use. Also, there are many options that make it versatile.

Installation

All radio connections are made by means of a 24-pin edge connector on the rear panel. Three cables, two with standard quarter-inch phone connectors, are already soldered to the edge connector. These are used to interconnect the terminal to the transmitter cw key jack and the receiver headphone jack. The third cable is wired to the transmitter microphone connector.

A small interface board mounts directly on the expansion port of the TRS-80® keyboard or expansion interface. A 2-foot long ribbon cable connects this interface to the main unit. The final connection is to an ac power source (117 or 234 volts, selectable).

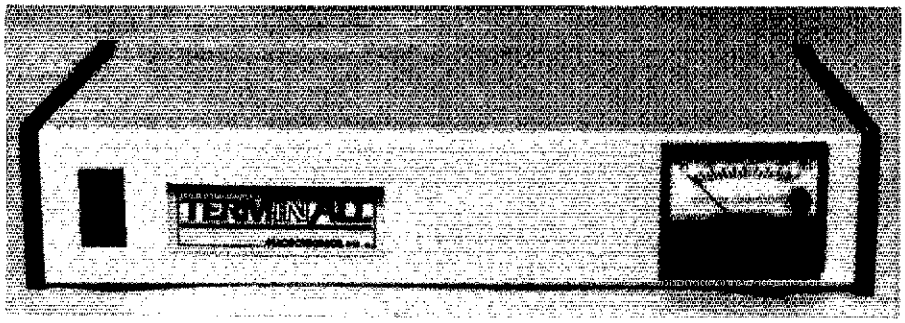
Software

Terminall software is provided in cassette and diskette formats. Cassette software requires 16k of RAM and Level II or Model III BASIC; the diskette software calls for 32k of RAM and a disk system.

The most-wanted cw and RTTY operating options are included in the software. You can create and save preprogrammed messages, such as equipment description, name, location, etc. These messages may be mixed with control functions that permit automatic station identification, time announcements, mode changes, etc., during message transmission. For RTTY, you can choose fast, slow or no "diddle," UT4-type delay, wide or narrow shift (170 or 850 Hz), automatic cw identification, ignore carriage returns/line feeds, and automatic unshift-on-space. WRU functions are also provided.

In the cw mode you can transmit and receive at speeds from 1 to 135 wpm (the Terminall automatically adapts to whatever cw speed is received). In the RTTY mode, the standard Baudot speeds are included (60, 66, 75 and 100 wpm). ASCII at 75 and 110 baud, with 6- 7- or 8-bit word lengths and odd, even or no parity, is also provided.

Once you set up the software options to your liking, you can save that option configuration



on cassette or diskette for loading at future operating sessions. You can save as many configurations as you need: one for cw contests, another for RTTY traffic handling, for example.

Hardware

Terminall hardware consists of a complete RTTY/cw terminal unit. The RTTY demodulator, employing active filters, is quite sensitive and selective. Signals that are barely audible are printed perfectly, and, unless another signal zero-beats the one being received, QRM is no problem. A front panel tuning meter is used during RTTY reception.

The cw demodulator uses band-pass filtering tuned for an overall bandwidth of 100 Hz centered at 1 kHz. Sensitivity and selectivity are comparable to that of the RTTY demodulator. The algorithm used to decode cw is as successful with sloppy fists as it is with good fists. A front panel LED is used when zeroing in on the desired cw signal.

The hardware also includes a crystal-controlled afsk generator, a loop keyer and receiver, RS-232-C input/output, a sidetone generator and a "real-time (time of day) clock." This clock is used for transmitting real-time information on the air, and is the source of the time continually displayed on the video screen during operation. It is independent of the computer; therefore, disk I/O operations do not disrupt the clock function.

A separate interface board is used to latch the control signals from the computer and to buffer input into the computer. It also limits the radiation of rf from the address and data bus to reduce interference to radio equipment.

Evaluation

All Terminall software and hardware performed faultlessly.

After an hour or so on the air, one should become an expert with the major operating controls. The Terminall is available for either the TRS-80® Model I or the Model III from Macrotronics, Inc., 1125 N. Golden State Blvd., Turlock, CA 95380. Price class: $500. — *Stan Horzepa, WA1LOU*

EGBERT RTTY PROGRAM

☐ I remember RTTY — that's the mode that uses those noisy mechanical nightmares . . . Gladys almost divorced me the last time I tried RTTY . . . I'd *love* to try RTTY, but I can't justify the expense of the required equipment.

If the thought of RTTY brings one of the above lines to mind, the Egbert RTTY Program could be for you. Noisy mechanical teleprinters and most of the expensive interfacing hardware are no longer necessary to get started in RTTY operation.

This program is designed for use with the Apple II Plus® personal computer, or an Apple II® with an Applesoft BASIC language card. With either system, 48k of Random Access Memory (RAM) and one disk drive are required. The diskette will work with either of the Apple II® Disk Operating Systems (DOS), so there is no need to run a "loader" or "format" program ahead of this one. This makes the program compatible with all Apple II® computers, old and new alike.

Features

Egbert RTTY has several capabilities that make it a pleasure to use: (1) Transmission and reception of 170-Hz shift Baudot at 60, 67, 75 and 100 wpm and 110-baud ASCII make the package compatible with almost every station on the RTTY airwaves. (2) Receiver tuning is accomplished via the Apple® high-resolution graphics mode. (3) End-of line indication is provided to alert the operator when a carriage return must be inserted. (4) This program has provisions for sending any one of the nine operator-stored "canned" messages with two keystrokes. This is a handy feature for station description or traffic handling. (5) The program features an "n-key rollover," which allows the user to type ahead of the transmitted text. This system allows formulation of a reply *even while receiving*. (6) Cw identification is generated automatically at the end of each transmission.

The most outstanding feature of this package is that no terminal unit (TU) or frequency-shift keyer (fsk) is necessary for initial operation — the Apple II® decodes the incoming signal and generates the afsk tones internally. The only connections that need be made are between the receiver audio output and the Apple® CASSETTE IN jack (for reception), and between the CASSETTE OUT jack of the Apple® to the MIC INPUT connector of the ssb transmitter. After setting the audio levels (instructions included), you're on the air.

How well does the system work? For a bare-bones system, results are very gratifying. After several months of use, with no additional filtering than that offered by my transceiver, I worked 25 states and the same number of countries. For the casual operator, the system will "play" well as is. For the serious RTTYer, I'd recommend using an audio filtering device or terminal unit.

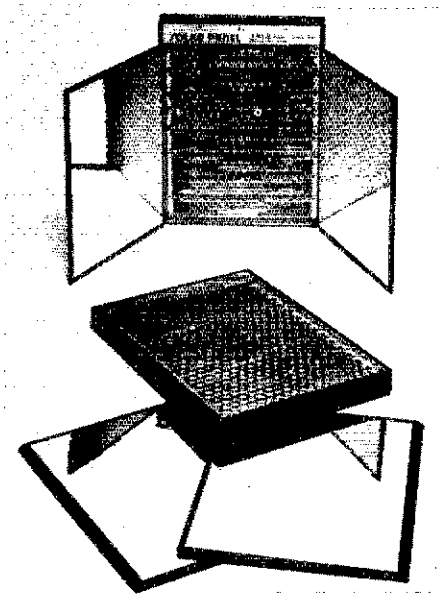
All factors considered, the Egbert RTTY Program is a great way for the Apple II® owner to get involved in RTTY with a modest initial investment. The package is available through the W. H. Nail Co., 275 Lodgeview Dr., Oroville, CA 95965. Price class: $25. — *Michael B. Kaczynski, W1OD*

EDMUND SCIENTIFIC MINI SOLAR PANELS

☐ Edmund Scientific is selling two small, lightweight, low-voltage, low-current solar panels that are ideal for use with QRP equipment. Both panels produce approximately 50 mA at the rated voltage when exposed to bright sunlight. One panel is designed for 12-V output, while the other has taps for 3, 6 or 9 volts. Output is through subminiature phone jacks. Each panel is equipped with a set of folding mirrors that reflect extra light onto the 24 crescent-shaped solar cells.

Tests conducted at ARRL Hq. indicated that the panels are useful for recharging battery packs. On a slightly overcast winter day, I was able to achieve a charge rate of 35 mA into two nickel-cadmium cells while using the 6-V tap. The charge rate dropped to approximately 18 mA from the 3-V tap. We can extrapolate that the 12-V panel will provide a moderate charge rate into 7- to 9-V battery packs.

Each panel measures 5-3/4 × 4-1/4 × 1/2 inches (HWD) (without the mirrors) and weighs approximately 4 ounces. Price class is $20 for the multivoltage version and $15 for the 12-V version. For more information contact Edmund Scientific Co., 101 East Gloucester Pike, Barrington, NJ 08007 — *Peter O'Dell, KBIN*



AEA ISOPOLE-220 220-MHz VERTICAL GAIN ANTENNAS

☐ The IsoPole-220 is similar in construction and design to the IsoPole-144.[2] It is a 5/8-λ antenna designed with decoupling in mind. What effect does decoupling have on the performance of a vertical radiator? Plenty! Decoupling keeps current from flowing on the outside of the coaxial cable that feeds the antenna. If current is permitted to flow it generates additional fields that interact with the antenna radiation field. This results in a distortion of the radiation pattern. The distortion will vary with the particulars of each antenna and installation. In some cases, a quarter-wavelength ground-plane radiator may outperform a *gain* antenna, because the combined fields of the antenna and the transmis-

[2]L. Aurick, Product Review, *QST*, April 1980, p. 51.

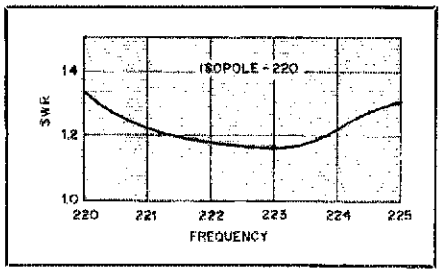


Fig. 1 — SWR curve of the AEA IsoPole-220

sion line result in a major lobe elevated several degrees above the horizon.

So much for the theory. How well does the IsoPole-220 perform? Because of an intermittent problem with a commercially manufactured gain antenna at W1AW/R, a quarter-wavelength ground-plane antenna built in the ARRL lab was installed. With the ground-plane antenna in service, I had difficulty accessing the repeater from my home (about 15 miles away) with 10 watts feeding an outside antenna. Things changed when we installed the IsoPole-220. Now I am able to key the repeater from inside my house while using a 1-watt portable rig with a "rubber ducky." I don't know what this means in terms of decibels, but I do know what it means with regard to performance.

A "junior" version of the antenna is also available. It is a 1/2-λ antenna with one decoupling cone. Price class for the IsoPole-220 is $40. Additional information may be obtained from Advanced Electronics Applications, Inc., P.O. Box 2160, Lynnwood, WA 98036 — *Peter O'Dell, KB1N*

M & M ELECTRONICS MODEL MSB-1 AUDIO FILTER

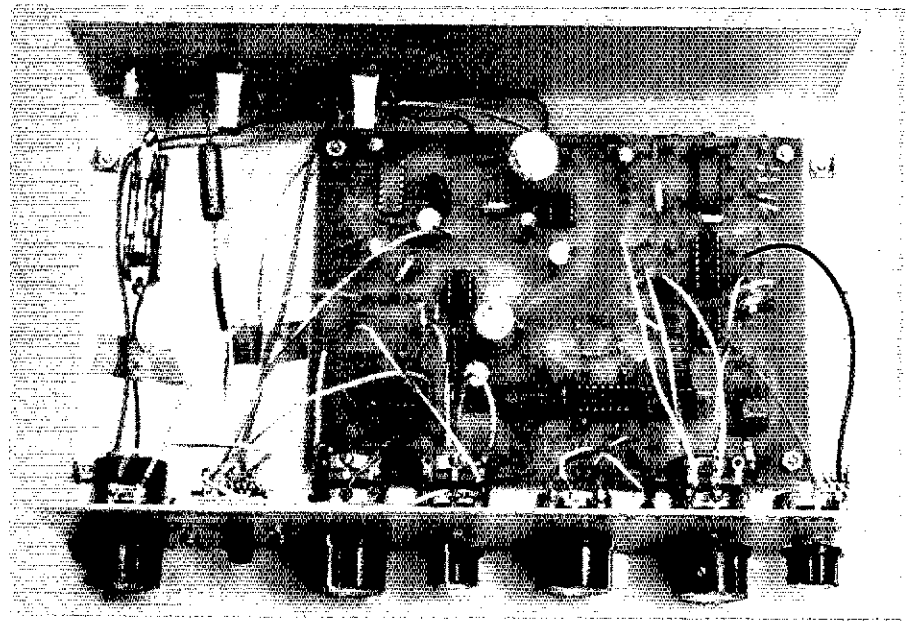
☐ With the influx of new operators to the amateur ranks, the hf bands seem more crowded than ever. This overcrowding and the state of the art have spurred several equipment manufacturers to hunt for different means of interference reduction in their new products. Variable bandwidth, tunable passbands and notch filters are definitely here to stay, along with large price tags for new gear with these features. In these tough economic times, many amateurs are opting for relatively inexpensive audio filters rather than springing for an expensive "state-of-the-art" transceiver.

If your late-model rig is still working like new, but lacks some of the modern i-f "goodies," an audio filter could be the answer. A wide variety of audio filters is available today, ranging from single-element cw to complex multistage units. The M & M Electronics MSB-1 falls into the latter category.

Features

The MSB-1 contains four separate filter sections, all designed to achieve optimum signal intelligibility. A brief description of each follows.

In ssb operation, very little intelligence is contained in the frequency spectrum below 300 Hz. The designers at M & M incorporated a high-pass section with a low-frequency cutoff of 300 Hz. This thoughtful inclusion eliminates both ac hum and off-frequency "rumble," while not reducing the intelligence of the desired signal. Most other audio filters rely on the selectivity of other stages to reduce low-frequency interference, while the MSB-1 eliminates this interference before processing the signal. This is a definite plus — less interference reaches the filter to begin with, so it can do a better job of signal handling.



If the i-f bandwidth of a rig is too wide, unwanted off-frequency (adjacent channel) signals will be heard. The band-pass and low-pass filter sections of the MSB-1 are designed to reduce this interference.

The adjustable band-pass filter allows the user to select the optimum band-pass center frequency and width for reception. Many other units offer only adjustable bandwidth while making no provision for adjustment of the center frequency. For true versatility, both should be adjustable, and in the MSB-1, they are.

After the passband is optimized, an adjustable low-pass section is available to eliminate any remaining "hiss" from off-frequency cw and ssb signals. This section is an 8-pole device, variable over the 300- to 3000-Hz range. During ssb and RTTY operation, this can be used to eliminate splatter.

Last, but definitely *not* least is the adjustable notch section. If you have ever listened to the 40-meter band in the evening, you have undoubtedly noticed the presence of broadcast carrier "whistle." The MSB-1 rounds out its filtering capabilities with a notch filter designed to eliminate almost any single-tone signal that will be encountered in normal operation. Like the band-pass-filter section described previously, both the frequency and selectivity are completely variable over the 300-to 3000-Hz range. This is handy during RTTY operation. The notch depth is approximately 50 dB, which is more than adequate even under the most severe conditions.

Performance

Initial operation of the filter was attempted using a 9-V power supply. At this voltage level, the audio output of the filter was quite weak and distorted. These problems were cured immediately when the supply voltage was raised to 12. I used the MSB-1 for several months under widely varying conditions, from casual ragchewing and low-band DXing to contesting. The improvement in reception was quite surprising. Signals buried "in the noise" jumped to Q-5 copy almost every time with the filter in line. The four filter sections help to increase the signal-to-noise ratio while offering little or no additional noise.

During RTTY operation, the separate band-pass, low-pass and notch sections were quite useful in elimination of unwanted information contained in the ssb passband. This produced almost error-free copy while using the Apple II® microcomputer with no terminal unit. The notch is set between the mark and space tones, with band-pass and low-pass sections adjusted for a "double-hump" response.

The manufacturer offers an ac adapter as an accessory, but I would have preferred a built-in supply. Price class of the MSB-1 is $84.95; ac adapter, $8.95. Both units are available from M & M Electronics, P.O. Box 1206, Brewton, AL 36427. — *Michael B. Kaczynski, W1OD*

M & M Electronics MSB-1

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Notch filter: Adjustable from 300 to 3000 Hz, notch depth 50 dB.	As specified.
Band-pass filter: Tunable center frequency, 300 to 3000 Hz; variable bandwidth, from 75 to 1500 Hz.	As specified.
Low-pass filter: Tunable, from 300 to 3000 Hz.	As specified.
Power requirement: 9 to 12 V dc at 300 mA.	12 V required at 300 mA.
Size (HWD): 2-3/4 × 10 × 5-1/2 in.	As specified.

Technical Correspondence

Conducted By
Dennis J. Lusis,* W1LJ

PHASING SSB REVISITED

☐ The December 1981 *QST* article, "An Introduction to the Bilateral Transverter," brought to mind the old phasing method of ssb generation. With proper choice of components, the phasing type of sideband generator can be made bilateral, and used for both generating and receiving signals. This idea is, of course, not new. Several articles in various magazines have detailed, for example, how to achieve "single-signal" selectivity with direct-conversion receivers using a phasing-type detector.

Recent ARRL Handbooks have gone into some detail on phasing methods and circuits for generating ssb signals. It is now more practical to generate a good ssb signal in this way than it was in the past. Inexpensive, high-quality parts and computer-generated networks have increased the accuracy of phasing networks to the point where it may be cheaper to make a phasing type of transceiver than one using expensive i-f filters. Combine this with stable, low-noise synthesized oscillators and low-distortion amplifiers, and you come up with a basic rig that could be reduced to one or two circuit boards. The majority of critical electronics could be integrated into one or two ICs. I have prepared a diagram of a "bare bones" transceiver incorporating these ideas (Fig. 1). It puts all of the audio phasing and switching on one chip, and the rf synthesizer and phasing on the other. While this may be a bit optimistic right now, it should eventually be possible; if it is not, it is certain that only a few components in the phasing networks would have to be discrete.

Whoever is able to produce ICs such as these would have the potential to reduce drastically the cost of radio equipment. Volume production of sophisticated ICs is one area in which the rest of the world has not yet surpassed the United States. Experimental proof of the concept would certainly make manufacturers less nervous about entering a "new" field. It would be nice to see a U.S.-built transceiver selling for hundreds of dollars less than the nearest foreign competition! — *Cortland E. Richmond, KA5S/DA1GI, APO NY*

MORE NOTES ON THE HALF-SLOPER ANTENNA

☐ I needed an easy-to-construct antenna for 80 and 40 meters, and was tired of dipoles, inverted Vs, radials and tree climbing. I investigated half-slopers, and they seemed ideally suited for my QTH. I have a 64-foot[1] aluminum tower, a 4-foot mast, a Mosley CL33 beam and plenty of yard for experimenting.

W1CF[2] and W1FB[3] wrote articles that made half-slopers look promising. VE2CV's[4] article confused and discouraged me, for how could the thing possibly work at all? But other people had made the half-sloper work, so I decided to pursue it. I also wanted 40 and 80 meters on the same feed line, to simplify construction and conserve coaxial cable. So why not use a 7-MHz trap? Then I read the article by K9CZB[5] and got more confused and discouraged. But like a good amateur, I decided to persist.

I tried a different approach: Why not fan the radiator like a fan dipole? It should work just the same, right? Wrong! I put up a 40-meter half-sloper, and it worked perfectly after a small amount of trimming (very near the formula). Then I put them both on the same transmission line and attachment clamp, and fanned them one above the other. The 40-meter antenna was completely detuned, and the SWR was high. The 80-meter antenna also changed, but not so significantly.

I then experimented by spreading the two antennas apart rather than fanning them. What I found was that if the two antennas were spread at least 30° apart, the 40-meter antenna worked just fine. The farther they were spread, the lower the SWR would go until I reached about 60°. Also the resonant frequency would change with the different angles. Hence, any specific angle would require its own special trimming. The closer the antenna, the more trimming necessary for a change in angles.

An interesting thing happened to the 80-meter antenna: The fanning or spreading didn't seem to affect it much. However, after it was trimmed in an emperic manner, I found it was very broadband and had an unusual SWR curve (Fig. 2), completely different from the usual hyperbola of the isolated 80-meter anten-

*Assistant Technical Editor

[1] m = feet × 0.3048.
[2] D. Atchley, "Putting the Quarter-Wave Sloper to Work on 160," *QST*, July 1979, p. 19.
[3] D. DeMaw, "Additional Notes on the Half-Sloper," *QST*, July 1979, p. 20.
D. DeMaw, "More Thoughts on the Confounded Half-Sloper," *QST*, October 1981, p. 31.
[4] J. Belrose, "The Half Sloper — Successful Deployment is an Enigma," *QST*, May 1980, p. 31.
[5] G. Myers, "A Two-Band Half-Sloper Antenna," *QST*, June 1980, p. 32.

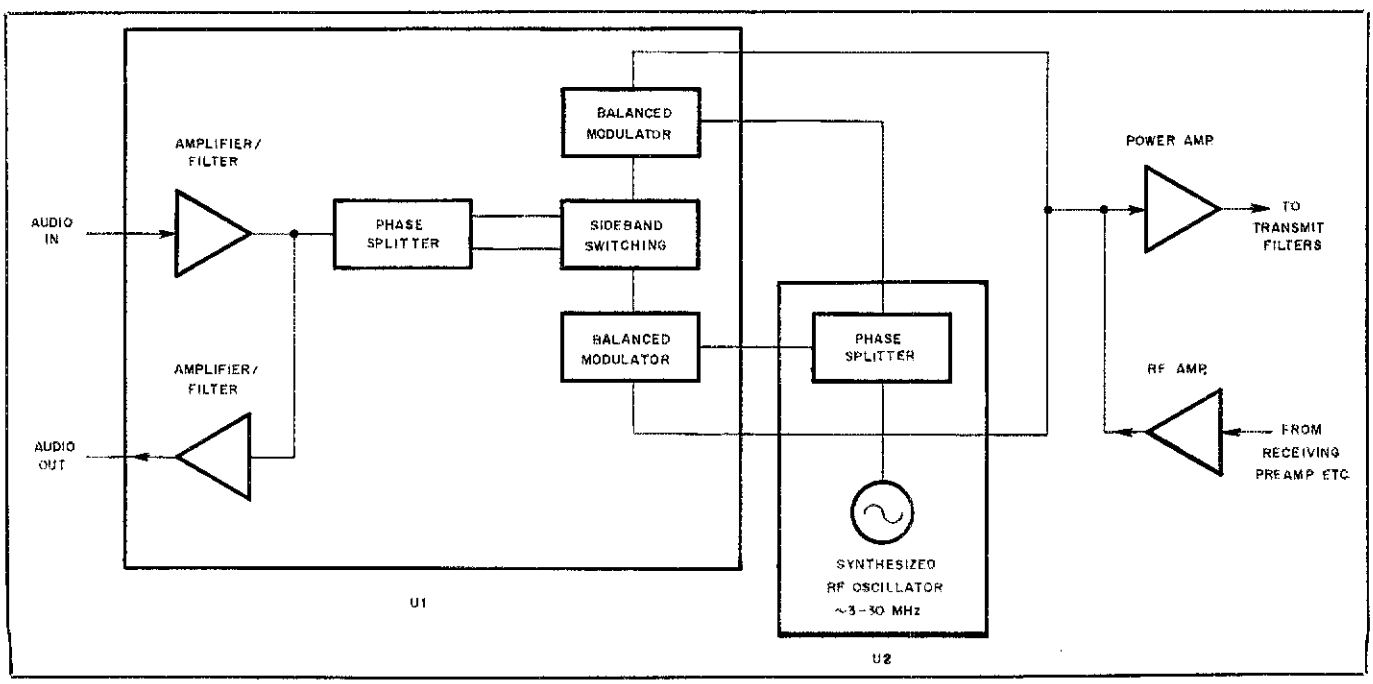


Fig. 1 — Diagram of a "bare-bones" transceiver utilizing large-scale integration and phasing-method of ssb generation.

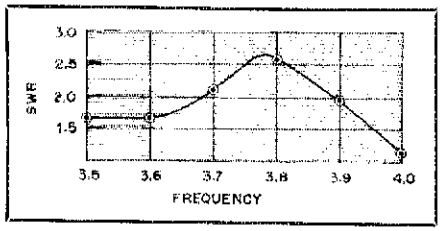


Fig. 2 — VSWR curve for the 80-meter half-sloper antenna.

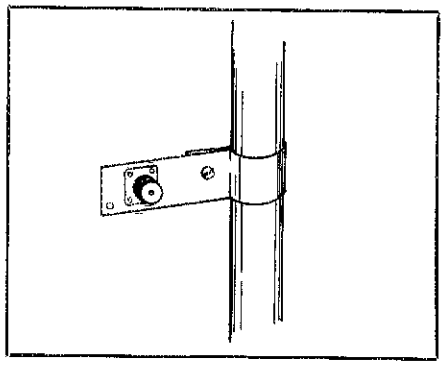


Fig. 3 — Mounting clamp for providing a feed point on one of the tower legs.

na. I now had my goal accomplished: 80 and 40 meters on the same transmission line.

I decided to try some traps anyway. I concluded they must work, despite K9CZB's failure. I cut the 80-meter antenna from the transmission line and experimented with the proximity of the single 40-meter half-sloper to a second antenna with a separate transmission line. This was a half-sloper for 4.550 MHz, which we use for our fixed-service church radio. I found that the close proximity of the two slopers indeed detuned the 40-meter antenna, but not as much as when they were on the same transmission line. I again noticed that, as the antennas got closer, the resonant frequency changed and the SWR went up. I found that the angle between the two antennas was less critical than when fed off the same transmission line, and that even when fanned one above the other the 40-meter antenna still worked.

I then spread the two antennas so that they caused no interaction (about 60°) and put a Reyco® KW-40 7-MHz trap at the end of the 40-meter antenna. Then I ran a piece of wire beyond the trap to an insulator. After minimal cut and trim the antenna performed perfectly with an SWR of 1.1:1 on 40 meters (less than 1.8:1 over 100 kHz) and 1.6:1 on 80 meters (less than 2.5:1 over 300 kHz). The SWR graph was the expected hyperbola. In short it worked just as expected. The 40-meter antenna must be tuned first.

Performance on the air is good. I am not a big low-band man, so my experience is limited for making expert comparisons. I can say that I am very pleased. I have as good a signal as anyone, and better than many on the West Africa Net (7060 kHz). It is also notably directional with significant gain in the direction of the slope, as previously described. 6W8IC gave me an S6 report on the sloper to the northwest, but an S3 report on the sloper to the east. XT2AU gave me a similar report, but favoring the sloper to the east over the one to the northwest.

So why all the controversy? I have come to the conclusion that VE2CV must be right with regard to 200 MHz, but not at 7 MHz. There must be things happening at these low frequencies that don't happen at 200 MHz. That is why antenna construction practices are quite different on vhf compared with hf. This makes studying this antenna more difficult, because there isn't a nice model to use. I'll leave the rest to the engineers.

Why all the varying reports on length, tuning, etc.? Well, I think it's clear that this antenna is very sensitive to nearby antennas and no doubt also to power lines, telephone lines and buildings. My theory is that this makes up all the individual variation. I bet if two hams in Iowa put up the same tower in the middle of their respective 80-acre cornfields, they would end up with the same antenna length — very close to the formula. I'll leave that experiment for some KØs to perform, however.

Why didn't K9CZB's trap work? I can't explain that one. I can only postulate a problem with the trap or some specific site object that was detuning the antenna.

Some additional comments: The angle from the tower also seems to affect the tuning of the antenna. I made a modification to W1FB's tower clamp by incorporating an SO-239 jack into the clamp (Fig. 3). Be sure to tape and cement the connection to protect your feed line. I took no other special precautions with the coaxial cable, and simply taped it to the side of the tower with the other lines. It also seems that the higher above ground the low end of your antenna is, the lower the SWR. I suggest that anyone wanting to get on 160 meters, but who isn't as lucky as W1CF to have a 92-foot tower, could easily put an inductor in the middle of the antenna to make an off-center-loaded* half-sloper. This would shorten the antenna to fit a more average tower at the expense of bandwidth. — *Mark H. Monson, EL5G/KB8NO, Box 1046, Monrovia, Liberia*

*G. Hall, "Off-Center-Loaded Dipole Antennas," *QST*, Sept. 1974, p. 28.

Feedback

☐ Greg McIntire, author of "Designing a Microprocessor Based RTTY Speed and Code Converter" (Jan. and Feb. 1982 *QST*), informs us of an error in the ASCII version of the software listing. The statement,

```
IF MODE = 03H THEN
  CALL CASCBDT; ELSE
```

at the beginning of the TXCNTRL routine should read,

```
IF MODE <> 03H THEN
  CALL CASCBDT; ELSE.
```

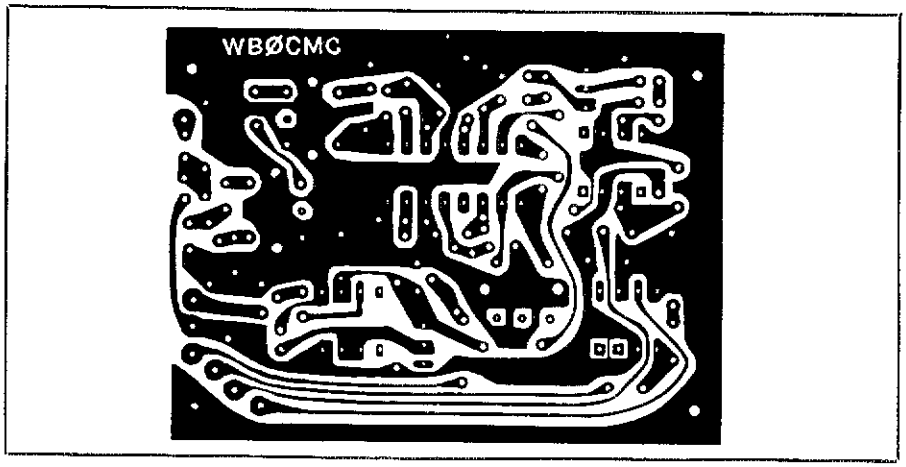
The object code at location 0493H should be changed from C2H to CAH.

☐ David Wiley, W7WYG, called our attention to two errors on the schematic diagram of the 6-Meter "Mini-Lini," April 1982 *QST*, p. 25. The plate voltage should be shown as 800- to 1200-V dc. Also, C3, a 220-μF electrolytic capacitor in the bias circuit, is shown connected backwards. The positive side of this capacitor should be wired to ground.

☐ In Fig. 2 of "Concept and Construction of a CW Filter and Enhancer," April 1982 *QST*, the 100-kΩ pot connected to U3D pin 13 should be labeled R4. The 100-kΩ resistor from U3D pin 14 should be labeled R5; the other end of R5 connects to U4 pin 5.

☐ In "Build an FM-Receiver Clone," March 1982 *QST*, the capacitor between T1 and T2 is incorrectly labeled as 0.001 μF. The correct value is 5 pF. Also, the pc-board etching pattern in Fig. 4B is missing a few traces. The entire pattern is again printed here.

☐ A sidebar ("Getting Involved") on page 13 of the April 1982 article, "A Happy Marriage: Amateur Radio and the National Weather Service," has an incorrect reference. Suggestions for organizing a weather or spotter group appear in an April 1979 *QST* article by Brian Peters.



Revised etching pattern for the FM-Receiver Clone. View is from foil side of the board; black areas represent unetched copper.

New Life for ARRL Sections

Starting next year, ARRL volunteers will have new opportunities and responsibilities. Here's what this important change means to *you!*

By David Sumner,* K1ZZ

Last year, in a series of three *QST* articles,[1] we traced the history of volunteer involvement in the American Radio Relay League. We also described the opportunities that exist today for members to contribute their time and talent to the important work of their national association: the protection, promotion and advancement of the Amateur Radio Service.

Now, we are on the threshold of great changes in the structure of the League's volunteer organization. Three years of work by the ARRL Long Range Planning Committee culminated in recommendations for new approaches on several fronts. One of the most important, already adopted in principle by the ARRL Board of Directors, is a reorganization of the volunteers in the League's 73 sections.[2] The reorganization, which will take two years to implement completely, will begin January 1, 1983. That date will mark the most important change in the League's section-level structure in more than 50 years. Amateur Radio history is being made — and you can be a part of it!

The traditional responsibilities of the League's section-level organization have concerned on-the-air operating activities, particularly traffic-handling and emergency communications. The main objective of the reorganization is to expand these responsibilities into such areas as public relations, state government liaison, the resolving of interference problems and the coordination of technical activities. Improved liaison between the section organization and the League's local affiliated clubs also is expected. The traditional elected post of Section Communications Manager will be replaced by a new one, Section Manager, with greater authority to delegate responsibility to other volunteers and with a direct input to the League's policymaking processes.

The ARRL Board of Directors adopted the new approach in principle at its September 1981 meeting. A further, more detailed, report was prepared for Board consideration and acceptance at its March 1982 meeting. The acceptance of that report leaves a number of details still to be resolved. Now the membership has one last opportunity to comment on the details of the new approach before the final go-ahead is given by the Board at its July meeting.

Creation of the Post of Section Manager

The proposed position description for the post of Section Manager is given at the right. Implementation of the new position will be accomplished on a section-by-section basis as the terms of the incumbent Section Communications Managers expire. (See "Schedule for Elections," p. 54) However, should an SCM who is enthusiastic about the new program wish to do so, he or she may implement the new organizational structure on January 1, 1983 and may assume the title of Section Manager at that time. In the event an SCM does not wish to assume the broader responsibilities of Section Manager, and there are no candidates for Section Manager at the time of the next scheduled election, the office will be declared vacant and a suitable appointee found.

It should be recognized that the offices of SCM and Section Manager are quite different, with the latter involving greater delegation and broader responsibilities. Some SCMs may be more comfortable with the position of either Section Traffic Manager or Section Emergency Coordinator (since the authority of those two positions will be enhanced under the new structure), or perhaps with some other post.

The reimbursable expenses of the Section Manager will be similar to those of the SCM. The total cost of reimbursing ARRL section-level officials under the new program is estimated at $75,000 per year, a moderate increase from the present level.

Proposed Position Description for ARRL Section Manager

1) Recruits and appoints eight section-level assistants to serve under his or her general supervision and to administer the following ARRL programs in the section: emergency communications, message traffic, official observers, affiliated clubs, public information, state government liaison, technical activities and on-the-air bulletins.

2) Supervises the activities of these assistants to ensure continuing progress in accordance with overall ARRL policies and objectives.

3) Maintains liaison with the Division Director and makes periodic reports to him regarding the status of Section activities; receives from him information and guidance pertaining to matters of mutual concern and interest; serves on the Division Cabinet and renders advice as requested by the Division Director; keeps informed on matters of policy that affect section-level programs.

4) Conducts correspondence or other communications (including personal visits to clubs, hamfests and conventions) with ARRL members and affiliated clubs in the section; either responds to their questions or concerns or refers them to the appropriate person or office in the League organization; maintains liaison with, and provides support to, representative repeater frequency coordinating bodies having jurisdiction in the section.

5) Writes, or supervises preparation of, a monthly Section Activities column in *QST* to encourage member participation in the ARRL programs in the section.

Section Manager Appointments

The Section Manager will be authorized to make the following section-level appointments. If an appointment is not made, the Section Manager will retain the responsibility and authority assigned to that position. All leadership appointees

[1]Notes appear on page 55.

*General Manager, ARRL

are responsible for bestowing appropriate recognition upon those who assist them in the performance of League objectives, and all must be ARRL members.

Section Emergency Coordinator (SEC): The SEC is, in effect, "Assistant Section Manager for Amateur Radio Emergency Service (ARES) organization." He must hold a Technician class license or higher and is appointed by the Section Manager to take care of all matters pertaining to emergency communication and ARES on a sectionwide basis. His duties include the following:

1) The encouragement of all groups of community amateurs to establish a local emergency organization.

2) Development and implementation of a section emergency communications plan.

3) Cooperation and coordination with the Section Traffic Manager so that emergency nets and traffic nets in the section present a united public service front.

4) Maintenance of contact with other communications services and liaison at the section level with all agencies served in the public interest, particularly in connection with state and local government, civil defense, Red Cross, Salvation Army and the National Weather Service.

5) Appointment of Emergency Coordinators and District Emergency Coordinators, and determination of their areas of jurisdiction; appointment of Official Emergency Stations.

6) Promotion of ARES at the section level, including membership drives, meetings, drills, use of proper operating procedures, etc.

7) Collection and consolidation of EC and/or DEC monthly reports and submission of monthly progress summaries to ARRL headquaters and the Section Manager.

[Note: There are two substantive changes with respect to the SEC. First, Technician licensees will be eligible for the appointment. While in most sections a General class license is required for the SEC to function effectively, this change gives the Section Manager added flexibility in making the appointment should this not be the case in his section. Second, the SEC will make EC and DEC appointments, instead of simply recommending candidates to the Section Manager.]

Section Traffic Manager (STM): The STM is, in effect, "Assistant Section Manager for traffic-handling matters." The STM should be thoroughly conversant with traffic handling by all modes, especially phone and cw. The primary qualifications should be willingness and ability to devote equal consideration and time to all section traffic matters. A General class license or higher is required.

STM duties:

1) Establishment, administration and promotion of a traffic-handling program at the section level, mainly involving (but not restricted to) NTS nets.

2) Cooperation and coordination with the Section Emergency Coordinator so that traffic nets and emergency nets in the section present a united public service front.

3) Appointment of Net Managers consisted with NTS principles and with the concurrence of the net members, and appointment of Offical Relay Stations.

4) Reporting of section net activities monthly to ARRL Headquaters and the Section Manager.

Official Observer and RFI Coordinator: The Official Observer program has operated for more than half a century. In that time, OO appointees have assisted thousands of amateurs whose signals, or operating procedures, were not in compliance with regulations. The function of the OO is to *listen* for amateurs who might otherwise come to the attention of the FCC (or, in Canada, the DOC) and to advise them by mail of the irregularity observed. The program is intended primarily to benefit those amateurs whose infractions are inadvertent; the OO has no vigilante or law-enforcement function. Official Observers must meet high standards of expertise and experience. It is the job of the Coordinator to recruit qualified League members as Official Observers, and to report activity monthly to ARRL Headquarters and the Section Manager.

Another way in which the skills of an experienced observer can be used is in tracking down sources of RF interference in the amateur bands. Potential sources of interference are increasing steadily in number and include electrical power lines, cable TV systems, scanning-type vhf receivers, garage-door openers and similar devices, cordless telephones, and microwave ovens. Local amateurs suffering interference from these sources often need help in tracking them down. This program does not overlap with the Intruder Watch, a program organized at the national level to deal with interference from foreign radio transmitters.

State Government Liaison: Most government actions that affect Amateur Radio occur at the federal or local level. However, a growing need is seen for legislative proposals at the state level to be monitored for possible impact on our interests. Until now, responsibility for this function has not been assigned to anyone within the ARRL structure, although in some states the SCM or an Assistant Director has performed this important function. The ideal candidate for the appointment is someone who is aware of state legislative proposals in the normal course of events, and who can watch for proposals having the potential to affect Amateur Radio without creating a conflict of interest. In those sections where there is more than one government entity, i.e., Maryland-DC, West Indies, Pacific and Martime-Nfld (where the title, of course, would be Provincial Government Liaison), there may be a Liaison appointed for each entity.

Section Emergency Coordinator: The Section Emergency Coordinator is responsible for maintaining contact with state disaster preparedness agencies, and his responsibility and authority are in no way diminished by the appointment of a State Government Liaison. An effective Liaison will cooperate closely with the SEC as well as with the Section PIO, in the latter case to take advantage of public relations opportunities such as a Governor's Declaration of Amateur Radio Week.

In those states were there is more than one section, the Section Managers whose territory does not encompass the state capital may simply defer to the Liaison

Schedule for Elections of Section Managers

Section Communications Managers who choose to do so may implement the new organizational structure in their sections on January 1, 1983 and may assume the title of Section Manager at that time. In other sections, the following schedule will apply for the election of Section Managers, as the terms of present SCMs expire.

In the following sections, Section Manager terms begin April 1, 1983, and the *QST* notice will appear in October 1982: Arizona, Arkansas, Iowa, Kentucky, Mississippi, Montana, North Texas, Ontario, Orange and Wyoming.

In the following sections, Section Manager terms begin July 1, 1983, and the *QST* notice will appear in January 1983: Alberta, Maryland-DC, Nevada, New Hampshire, Northern NJ, Rhode Island, San Joaquin V. and Utah.

In the following sections, Section Manager terms begin October 1, 1983, and the *QST* notice will appear in April 1983: British Col., Colorado, Georgia, Los Angeles, Sacramento V., San Francisco, South Texas, Washington and West Virginia.

In the following sections, Section Manager terms begin January 1, 1984, and the *QST* notice will appear in July 1983: Alabama, Alaska, Delaware, East Bay, Kansas, Michigan, New Mexico, Santa Barbara, Tennessee and Western Mass.

In the following sections, Section Manager terms begin April 1, 1984, and the *QST* notice will appear in October 1983: Eastern NY, Eastern Pa., Louisiana, Mar./Nfld., North Carolina, Pacific, San Diego, South Dakota and Virginia.

In the following sections, Section Manager terms begin July 1, 1984, and the *QST* notice will appear in January 1984: Illinois, Indiana, Maine, Manitoba, Northern Fla., Oregon, Santa Clara V., Vermont and Wisconsin.

In the following sections, Section Manager terms begin October 1, 1984, and the *QST* notice will appear in April 1984: Connecticut, Idaho, Minnesota, North Dakota, Ohio, Oklahoma, Southern Fla., Western NY and West Indies.

In the following sections, Section Manager terms begin January 1, 1985, and the *QST* notice will appear in July 1984: Eastern Mass., Missouri, Nebraska, New York-LI, Quebec, Saskatchewan, South Carolina, Southern NJ and Western Pa.

appointed by their counterpart who is closer to the capitol dome. In this case, the Liaison is expected to communicate equally with all Section Managers. Should some other approach be more appropriate, it should by all means be followed; the objective, initiation of appropriate action to protect Amateur Radio interests at the state level, is more important than a neat organization chart. In any case, the Division Director should concur in the appointment of any State Government Liaison, since the Liaison will be representing the League to elected officials at the highest levels of state government.

Technical Coordinator: This appointment was created in recognition of the continuing need for amateurs to broaden their knowledge and understanding of the technology of radiocommunication. The role of the Technical Coordinator is:

1) To encourage and assist local clubs in sponsoring technical working groups and forums, with the topics to be determined by the interests of the amateurs in the area.

2) To encourage technically minded amateurs to be active in their local clubs, and to share their knowledge with their fellows at the local level.

3) To involve amateurs in the section in interesting technical projects, and to have them share the results of their work with other League members through *QST* articles, programs at conventions and hamfests, and so on.

The ideal candidate for Technical Coordinator is that rare individual who is equally at home in both technical and social pursuits, and who is an effective communicator.

Affiliated-Club Coordinator: The average ARRL section has approximately 30 League-affiliated clubs. The Section Manager will want to maintain contact with them all, particularly the more active ones; however, section activities are likely to benefit if there is someone at the section level that clubs can turn to when they need help — in other words, a section-level "resource person" specializing in providing assistance to clubs. This is the function of the Affiliated Club Coordinator. His job is to concentrate not on the strong, healthy clubs, but rather on those that are new or faltering. He assists clubs in meeting the League's objectives at the local level, by offering advice and by referring club officers to the right person in the ARRL organization for assistance with a particular problem. He should maintain a current record of the section's affiliated clubs (based on information received from Headquarters), encourage new clubs to become affiliated, and insure that annual progress reports are forthcoming from all affiliated clubs. The post is made to order for the successful club officer anxious to cut his teeth on a section-level appointment, or perhaps for a former SCM or Section Manager whose other commitments have forced him to relinquish his broad responsibilities but who wants to remain active in the organization.

Public Information Officer (PIO): Heretofore, ARRL Public Information Assistants were appointed by, and were responsible to, the Division Director. Now, the League recognizes that public relations activities on behalf of Amateur Radio are so important that they should be given more intensive coverage, through supervision closer to the local level. The creation of the section-level Public Information Officer appointment is expected to enhance the League's efforts in this vital field.

Local-level public relations is accomplished primarily through local affiliated clubs, which are encouraged to establish a permanent public relations program as a part of the club's activities. The person appointed by the club to be responsible for this program, whether he works alone or as chairman of a committee, is designated a Public Information Assistant (PIA). Where the responsibility cannot or will not be assumed by a club, the Section PIO is authorized to seek a qualified League member who is willing to accept the responsibility of appointment as a PIA. In either case, regular reporting to the PIO is required to maintain one's status as a PIA. Of course, the information flow is a two-way street, with the Section PIO responsible for passing along news from the section or national level to his Public Information Assistants. Time is of the essence when conveying news; therefore, a successful Section PIO will develop ways to communicate with his PIAs instantaneously.

Bulletin Manager: The Bulletin Manager is responsible for recruiting a team of Official Bulletin Stations to disseminate news and information of interest to amateurs in the section, and to provide a means for getting this news and information to the OBS appointees. The bulletins will include the content of W1AW bulletin transmissions, but should also include items of regional and local interest from other sources, as well as information provided by the Division Director. While the primary focus of the bulletin program in most sections will be 2-meter repeaters and 75- and 80-meter nets, other outlets may also be appropriate. The Bulletin Manager should be sensitive to the opportunities presented by new technology; in some cases it may even be desirable to supplement on-the-air outlets with outlets provided by computer bulletin boards and similar techniques.

Division Cabinet

The Section Manager will have direct access to the League's policymaking activities through participation in the Divison Cabinet. The purpose of the Division Cabinet is to serve as the Director's "brain trust"; that is, to provide a forum where the Director can receive counsel from his own personal advisors as well as from elected officials who, like the Director, have been chosen by the membership as leaders and representatives. In this forum the Director also can share information for dissemination to the membership. It will be up to each Director to decide how best to employ this source of talent and expertise; several Directors already use devices that are similar in concept.

The Division Cabinet will be made up of the Director, who will serve as its chairman; the Vice Director; the Section Managers in the division; the six Advisory Committee members appointed by the Director (see below); and the Assistant Directors. The group should meet at least twice a year, prior to each meeting of the Board of Directors. Because the cost of travel otherwise would quickly drain the League's funds, the Long-Range Planning Committee recommendation calls for the travel expenses only of the elected officials to be reimbursed by the League. This is consistent with established practice.

Advisory Committees

New rules and regulations for the ARRL Advisory Committees were adopted by the Board at its March meeting. The new committees will be organized on the basis of one member per division per committee, a change from the one-member-per-call-area approach that was generally followed in the past. Appointments will be made by the Divison Director for terms concurrent with his or her own. The complete text of the new rules and regulations appears at Mintue 58.[3] As this is being written, the Directors are selecting the Advisory Committee members who will take over on June 21, 30 days prior to the next meeting of the Board.

Tell Us What You Think!

The General Manager and the ARRL Membership Affairs Committee are now preparing final plans for the implementation of the new section-level ARRL structure. To meet the timetable described in this article, these plans will have to be approved by the Board at its July meeting in Cedar Rapids, Iowa, just prior to the ARRL National Convention. As a League member, you have one last opportunity to influence the course of this effort to modernize the League's volunteer structure. If you have some ideas, let's hear from you! QST

Notes

[1]D. Sumner, "Your Place in Your League," *QST*, Feb. 1981, p. 52, April 1981, p. 57, and Nov. 1981, p. 63.

[2]D. Sumner, "Long-Range Planning — Phase II Report Accepted by Board," *QST*, Dec. 1981, p. 56.

[3]"Moved and Seconded," *QST*, May 1982, p. 48.

Potomac Air Disaster: Hams' Response Swift, Sure

One of aviation's darkest days may also be remembered as one of Amateur Radio's finest hours.

By Alan J. Coiro,* W4KSA, and James L. Wilson,** K4BAV

It was 4 p.m. Wednesday, January 13, and hundreds of homeward-bound commuters were threading their way through the traffic and snow clogged streets in one of the Washington area's worst snow storms in many years. Suddenly, a blue and white aircraft swept out of the swirling snow and crashed into the bumper-to-bumper traffic on the northbound span of the 14th Street Bridge, which connects the District of Columbia with Virginia. Air Florida Flight 90, which had just taken off from National Airport, had met its demise in the frozen, murky Potomac River, about 200 feet from the Virginia shore.

One of the commuters, W4YUE, who was monitoring traffic and road conditions on his 2-meter mobile rig, heard an unconfirmed report of the crash as he pulled into his driveway. He immediately headed for his shack and called up the Alexandria Amateur Radio Emergency Service Net. The rapid-fire response was overwhelming. Already on frequency were many ARES members, standing by for the call to duty. By 5:30 P.M., W4YUE had assigned ARES members to provide communications at the various local hospitals that were expected to be caring for survivors. The assignments were as follows: Alexandria Hospital — N4ASX and KA4KTX; National Orthopedic Hospital — WA4SQL and KA4GOI; Mount Vernon Hospital — WD4EPP and WA4YJB; Washington Hospital Center — WB3ELV and WB4ENI.

The Alexandria Amateur Radio Emergency Service (headed by Emergency Coordinator K4BAV, shown here) provided communications for salvage operations during four bitter-cold days from atop the 14th Street Bridge. *(photo by Al Coiro, W4KSA)*

It wasn't just by chance that the Alexandria ARES was ready for this event. A local simulated emergency test on November 7, 1981, had centered around this very type of disaster — a simulated air crash near National Airport. Careful preparation and organization over several years by ARES members had created a group of trained radio operators with a system of workable equipment. Permanently mounted Amateur Radio antennas had also been installed

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W4KSA was one of many amateurs who manned the mobile communications command post during salvage operations following the Air Florida crash. *(photo by Jim Wilson, K4BAV)*

throughout Alexandria, including one repeater site. Most important, the new Fire Department Tactical Communications vehicle had just been acquired by the city of Alexandria (see January 1982 *QST*, page 17). The permanent Amateur Radio station (W4HFH) in this communications command post "bus" had been readied only a week before the disaster; it was dispatched to the 14th Street Bridge crash site, with WA4ZJR, WA4CCF and WD4RFS initially manning the Amateur Radio station aboard.

The Alexandria ARC repeater, W4HFH/r, came to be used mostly for administrative communications. K4PDA offered the use of the WD4PDP (Mount Vernon ARC) repeater, which was used for message handling on behalf of the Alexandria Fire Department, the National Transportation Safety Board, the DC Police, the U.S. Army and the U.S. Coast Guard. WD4PDP/r, with its instant autopatch capability, served until telephone lines were connected to the bus many hours later.

Around 6:30 P.M., as the cold, blustery night wore on, it became obvious that all possible survivors had been rescued. The focus thus shifted to salvage operations at the crash site. The ice- and snow-covered area around Washington's three busiest bridges were all closed to traffic and had taken on a nightmarish and eerie silence, broken only by the sounds of aircraft leaving National Airport on the same path as the ill-fated Flight 90. The operation from the communications bus secured for the night, but Amateur Radio's involvement would not end there.

On Thursday, Alexandria's fire chief notified ARRL Emergency Coordinator K4BAV that the bus was being sent back to the bridge to provide communications for salvage operations. He requested that Amateur Radio operators assist. WA4CCF and WA4RFS were again dispatched and, shortly thereafter, the command post was on the air. Orderly Amateur Radio communications, over the W4HFH and WD4PDP repeaters, took place all day long from the bus.

A variety of administrative and informational functions were carried out during the afternoon on W4HFH/r, while WD4PDP was free for autopatch traffic. Later, N4DBB and N4ASK relieved the others at the command post (also pulling command post duty were W4KSA, N4DBE and WB4DAM). The amateurs were praised by municipal officials; the Alexandria emergency preparedness coordinator made mention to EC K4BAV of "what a fine job your people are doing on the bridge." Many other government officials were equally appreciative.

On Friday, the bus was manned all day by amateurs, but communications activity had decreased considerably. On Saturday, the Amateur Radio operating position was active from noon until 5:30 P.M., when amateur participation in the salvage operation ended. During these four days and nights, rescue workers had quietly gone about their grim task of recovery in subfreezing weather and icy waters, displaying a unique sense of compassion and endurance.

Strengths, Weaknesses and Comments

Strong points demonstrated by the Alexandria ARES during this disaster included:

1) being well-prepared,

2) having two well-organized nets with several net controls,

3) being extremely cooperative; many amateurs, some who had never participated before, offered to assist or to lend equipment,

4) having plenty of equipment on hand, in working condition,

5) having good pre-existing relations with the Alexandria Fire Department and the Office of Emergency Preparedness,

6) having red wallet i-d cards and windshield placards to get through police barricades,

7) having the use of two repeaters (thanks to the Mount Vernon club),

8) having tape recorded nearly the entire event using the WA4DGB VOX system,

9) having people motivated and willing to take time off from work to help.

There were weaknesses, too, including the following:

1) EC K4BAV and assistant EC N4DBE did not have communications equipment with them when the emergency occurred. If he had had his radio, K4BAV could have gone immediately to the crash scene from his nearby location.

2) The method of calling up ARES members at the start of the event was not uniform. At least one ARES member complained that he wasn't aware of the emergency and salvage activities.

3) ARES groups in Arlington and Fairfax Counties were not contacted by the Alexandria ARES, but members of both these groups participated in the event. Alexandria ARES became the primary amateur group at the site because of the radio facilities inside the communications bus.

4) Although tape recordings of both repeaters were made, logs and notes were not well-kept on paper. This became a problem, since the tapes have not to date been transcribed and were not available for a critique of the event.

Lessons for the Future

1) During winter, Amateur Radio operators participating in similar events should be sure to dress warmly, and to bring a pair of headphones and a second transceiver for a possible second net control frequency.

2) Communications vans should be equipped with a portable television (this was used to keep us informed of progress at the crash site). The van should also carry a battery charger and a spare set of fuses at all times.

3) If Amateur Radio operators are asked to operate police and fire department radios, they should be given both stronger authority to do so and better training.

4) Although there were four telephone lines in the communications bus, connecting these lines to the telephone system took hours, causing heavy reliance on the Amateur Radio autopatch system. Arrangements to connect to external telephone lines should be more specific and better planned.

Amateurs Were Highly Motivated

Overall, cooperation among amateurs in different localities during this tragic event was outstanding. Many Metro-area amateurs not mentioned here volunteered to help in many ways (the DC police asked Montgomery County EC WB3LTA to provide communications between the national headquarters of the American Red Cross and the crash site. Six amateurs were provided within one hour of the crash). But the Alexandria ARES is not unique in the ARRL field organization. Simply put, it was in the right place at the right time to assist, and was well prepared for this tragic event.

Mayor Lauds Amateurs for Disaster Assistance

Tuesday, March 23, was designated "Amateur Radio Emergency Service Day" in Alexandria, Virginia. A proclamation by Mayor Charles E. Beatley, Jr., honored members of the Alexandria Amateur Radio Club, as well as the fire department, for their efforts during the Air Florida disaster. A public ceremony in the City Council chambers highlighted the occasion.

Results, 1981 Simulated Emergency Test

By Robert Halprin,* K1XA and Jim Clary,** WB9IHH

"Don't bother me with war games; I'll be ready for the 'big one' when it happens." This comment is often voiced when the subject of amateur emergency communications training comes up. But if it wasn't for those "war games," amateurs in Alexandria, Virginia, to cite just one example, would never have been able to provide efficient emergency communications following the very real Air Florida disaster (see page 56).

There are four objectives guiding the ARRL Simulated Emergency Test. These objectives are as follows: (a) to test the capability of local amateur communications organizations (primarily the League's Amateur Radio Emergency Service) to function under emergency conditions; (b) to test the ability of nets (primarily the ARRL National Traffic System) tofunction under overload conditions; (c) to demonstrate to served agencies (such as Red Cross, civil preparedness, Salvation Army, and so forth), to the public and to the news media, Amateur Radio's value as an emergency communications service; and (d) to provide operator training and experience in emergency communications practices.

These objectives were met partially or totally by various groups throughout the ARRL field organization. And this year, rather than restricting these groups to short "soapbox" comments, we decided to turn the mike over to a few representative groups whose SETs were creative and effective. We'll start with the simulated scenario in Alexandria that proved to be a macabre extrasensory prelude to disaster.

Dateline — Virginia

The city of Alexandria emergency operations plan outlines several potential hazards that could realistically occur within Alexandria. One such calamity is an aircraft crash. Alexandria is located just south of Washington, DC's National Airport and is part of the approach and take-off patterns of the runways. The simulated emergency was as follows: At 8:30 in the morning, an inexperienced air traffic controller mistakenly scheduled a general aviation airplane to land following too close to a 727. The small aircraft became a victim of wake turbulance, dropping almost instantly from an altitude of 400 feet above sea level to 15 feet, slamming into an abandoned rendering plant.

The following sequence of events occurred: At 8:45 A.M. Alexandria's three rescue squads and fire support arrived at the disaster scene and established the parking lot next to the plant as the triage and communications area. A decision was then made not to call additional support from either Arlington or Fairfax Counties, since the Alexandria groups seemed to have the situation in control. The city police arrived and blocked off the area, directing traffic past the disaster site. At 8:50 A.M., the Alexandria Tactical Communications bus arrived on the scene from the fire station. At about the same moment, the city's emergency preparedness coordinator telephoned EC K4BAV to ask for communications assistance from the Alexandria Amateur Radio Emergency Service (ARES). Before leaving his house, K4BAV called his two assistant ECs, asking them to telephone all other ARES members and ask them to tune to the ARES emergency frequency. At 9:05 A.M., K4BAV arrived at the scene and put the Amateur Radio station in the communications bus on the air, establishing immediate radio to telephone communications via autopatch. It was nearly an hour later before telephone lines in the bus were connected into a nearby construction site telephone system.

By 9:15 A.M., the fire had been doused and all crash victims had received medical attention. Critical injuries had been temporarily treated in the field. The ARES group had gotten organized, and two more members had arrived at the disaster site. Since the telephones in the communications bus were still not working, the fire and ambulance radio systems became saturated with emergency message traffic. Amateur Radio communications provided information to and from the local hospitals, the Health Department, the Red Cross Chapter House (which assisted survivors) and a local hotel that agreed to accept the walking wounded until they could be transported to hospitals. By 10 A.M., all victims of the crash were taken to hospitals or transported to homes and other destinations. Radio traffic consisted of some welfare inquiries, information for the news media and clean-up activities. By 11 A.M., the Amateur Radio system was no longer needed, so it secured.

The objectives of this operation were as follows:

1) Test organizational skills and response time in establishing workable, efficient radio networks to supplement Alexandria fire and police communications during emergencies.

2) Determine which ARES members could come out on short notice.

3) Determine what equipment is and isn't in working condition, especially battery powered equipment.

4) Check to see who remembers their i-d cards, windshield cards and ARES emergency plan outlines.

5) Practice message handling during an emergency situation using standard ARRL radiogram format. — *Jim Wilson, K4BAV*

Dateline — Texas

The San Antonio Radio Club, along with the San Antonio Repeater Organization, the San Antonio Emergency Management Support Group, the Alamo Repeater Association and other amateurs, worked together to provide communications during a mock flood in northern Bexar County and a simulated tornado skipping along the ground from Lackland AFB to Calaveras Lake. Both simulated disasters required evacuation of the stricken areas. In addition, a city-wide "loss" of electricity for a portion of the exercise allowed Amateur Radio operators to test their emergency power sources. The above scenarios dictated that most of the operations plans and the agencies for which our local ARES had volunteered to provide communications had to be activated.

To ensure maximum training for the participants, secrecy of the plan was well guarded. WA5RNV, ARES emergency coordinator for Bexar County, gave me the job of chairing the planning of the exercise; a general discussion of it was limited to him and two assistant ECs. Only we four knew the general plan. Only 1 knew the exact scenario.

On Saturday morning, October 17, at approximately 9 A.M., WA5RNV kicked off the exercise by sending a Test Priority message requesting the American Red Cross to take appropriate action in view of the situation. Within minutes of this message, one of the AECs, who was given the job of acting as a Red Cross authority for the exercise, activated the shelter communications plan and the disaster survey communications plan. He dispatched shelter communications teams to several designated shelters on the north side of San Antonio, and a disaster survey communications team to the Bulverde area. Each of the shelter communications teams was required to have a portable 2-meter station with ac power supply and antenna to simulate setting up a complete vhf station at their designated shelter. Each of the disaster survey communications teams was required to have a

NTS/Net SET Summary

	1981	*1980*
Nets reporting	235	231
States/provinces reporting	47	38
NTS affiliation or liaison	202	173
Number of messages handled	17,271	18,764
Number of amateurs participating	7755	4503
Number of emergency powered stations	2545	2502
Total number of points	50,948	40,226

*Deputy Communications Manager, ARRL
**Communications Assistant, ARRL

2-meter radio with a magnetically mounted mobile antenna and cigarette plug, to simulate going with a Red Cross disaster survey person in a Red Cross vehicle.

At about the same time as the shelters were activated, Amateur Radio station WA5UNH, located at the National Weather Service, sent KC5S at the Civil Preparedness Emergency Operations Center a Test Priority message indicating a funnel cloud had been sighted over Von Ormy and was moving toward the east. Shortly thereafter, another message from NWS to San Antonio EOC reported a tornado that had skipped along a path from just east of Lackland AFB to Calaveras Lake, causing severe damage and leaving hundreds homeless. In addition, it had cut all power grid lines to San Antonio. This turn of events necessitated the disaster survey communications manager to dispatch another team to the Calaveras Lake area, and caused the shelter communications manager to dispatch more of his teams to open more Red Cross shelters.

By now, everyone involved was starting to "play the game" by sending messages to and from appropriate agencies via Amateur Radio, simulating events that could well happen if the disasters were fact instead of fiction.

The emergency mobile response team arrived on site a little later than anticipated, but immediately started passing traffic via 40 meters and 2 meters to Red Cross Hq. station W5SC from a mobile station until the more permanent portable station was set up. The portable station consisted of hf and vhf radios and antenna systems, emergency power sources (and backups), tent shelter, food supplies, water, gasoline, and other items necessary for sustained operation without relief for up to 48 hours. Setting up the portable station went without a hitch, reflecting the professionalism with which dedicated amateurs approach an emergency situation.

The disaster survey communications team, which was sent to the Bulverde area, quickly became aware that direct communication with San Antonio was impossible because of the low terrain (a problem normally encountered at a flood site). So, they started relaying messages through the emergency mobile response team station, just as we hoped they would, and how it would probably happen in a real situation. Meanwhile, the other disaster survey communications team at Calaveras Lake was originating messages to simulate the scope and degree of destruction there.

By 12 noon, everybody involved was having so much fun proving that San Antonio amateurs were, indeed, prepared to provide backup communications for two major disasters simultaneously that we had a rough time closing down operations (it took a message from W5SC to do the trick).

All in all, communications during the exercise went smoothly, especially when one considers the lack of exposure some of the participants had to this kind of radio communications. But there are always lessons to be learned, including the fact that preparation is critical to response time. All Amateur Radio operators dedicated to providing an emergency mobile response capability should, in addition to keeping their equipment working and ready, have small scale maps showing the surrounding area in considerable detail. In addition, an aeronautical chart can be of great help, especially when determining best locations for vhf or uhf links from the terrain elevation information available.

ARES/Local Activity SET Summary

	1981	*1980*
Reports submitted	333	316
ARRL sections active	61	58
Number of amateurs participating	6911	5888
Number of emergency-powered stations	4557	3749
Number of emergency-powered repeaters	301	234
Total number of points	69,756	60,425

If a disaster strikes this area in the near future, there are amateurs around who will know how to handle the situation much more effectively than they would have if this exercise had not been conducted. —*Ken Harwood, WA5QZI*

NTS to the Forefront

In addition to all this fine ARES activity, the League's National Traffic System also plays a major role in SET. All four cycles of the system were underway during SET weekend (normally, only two cycles occur) to handle the traffic overload.

The NTS schedule has been a hot topic in the traffic game. In fact, the four-cycle integrated National Traffic System schedule (often referred to as NTS "restructuring") has been an issue that captivated the Amateur Radio fancy of traffic handlers from coast to coast for nearly two years running. With the December 31 deadline fast approaching (which would conclude the trial period of the four-cycle sequence), the three area staffs conducted in-depth face-to-face deliberations in an effort to examine the pluses and minuses of NTS restructuring, and then take any appropriate action.

October turned out to be the month of meetings. The Central Area Staff, gathering in Houston, approved the four-cycle sequence, but only after a most extensive discussion of all the factors involved. While this meeting was occurring, the Pacific Area Staff was meeting in Denver, and they rendered an opposite recommendation. The scene shifted to Richmond, Virginia, later in the month, where the Eastern Area Staff joined their colleagues in the Central Area by approving the four-cycle integrated schedule.

What to do? The conflicting recommendations would have left the Communications Department at Headquarters in a difficult position — with a mandatory reponsibility to resolve the issue, one way or another, that would be both consistent with traditional NTS principles as well as promoting harmony and unity within the system.

Luckily the Eastern Area Staff showed great initiative by taking matters one (giant) step further. EAS hammered out a compromise motion, which passed unanimously, that addressed the very issue that was of prime concern to Pacific Area traffic operators — west to east traffic delay in the daytime. This very important motion read as follows:

> WHEREAS the Pacific Area Staff has continually voiced its concern regarding the efficiency of west to east traffic flow, and
> WHEREAS the Pacific Area Staff has objected to the restructuring proposal as implemented by cycles two and four in all areas as detrimental to this west to east flow, and
> WHEREAS the east to west flow has a built-in advantage of a three-hour local time advantage, and
> WHEREAS the Eastern Area Staff is deeply concerned that mutual goodwill be retained between the Eastern and Pacific Area Staffs, and
> WHEREAS the proposed NTS structure has one of its major advantages, flexibility,
> the Eastern Area Staff recommends to the Communications Manager that cycle one in the Pacific Area be sanctioned, and that the TCC directors staff the appropriate functions.

Shortly after the EAS meeting, the Pacific Area Staff got together on the air and endorsed this compromise recommendation. For the first time in many months, with the traffic delay in the west-to-east daytime flow recognized and at least partially addressed, a strong feeling of unity was evident among the three area staffs.

In view of the fact that both the Central and Eastern Area Staffs endorsed the four-cycle plan, and the major concern of the Pacific Area Staff was addressed in a manner that was acceptable to them, the Communications Manager announced, in a special letter to NTS Officials at year's end, that the four-cycle NTS sequence was accepted as the formal system definition, effective January 1, 1982. More importantly, the compromise area staff recommendation was accepted, and cycle one in the Pacific Area officially became "legal" as of January 1, with TCC skeds implemented to facilitate the efficient flow of west to east traffic. (Actually, those TCC skeds were initiated in mid-December by Pacific and Eastern TCC Directors WØHXB and N2YL.)

Since cycles two and four are already implemented in all three areas, those cycles form the basic daily NTS implementation, along with cycle one in the Pacific Area. Clearly, the activation of all four cycles in each area is in the long-range interest of NTS, but for now effort should be directed towards strengthening the already-implemented cycles.

It's no secret that there has been acrimony from time to time in this drama. The most important lesson to be learned here, however, is that the restructuring dilemma was resolved by a developing consensus within the area staffs themselves, where, it should be mentioned, the four-cycle sequence originated. It would have been difficult, if not impossible, for Headquarters to reconcile the various philosophies and make a decision that would have pleased all parties concerned. But with the various key leaders among the three area staffs taking charge and formulating an acceptable and logical compromise, such a nationally imposed decision was not necessary. Thus, the value of the area staff structure was clearly demonstrated. And now that there has been a rebirth of unanimity and cooperation throughout the system, 1982 should prove to be a very good year for NTS.

A Star is Born

Before we put the 1981 SET completely to bed, a word or two about Larry Lunchbucket is in order. Some of you may have been expecting the further adventures of friend Lunchbucket, vagabond radio ham and ne'er-do-well, to accompany this report. Sorry to disappoint you this time, but we felt that it was important to provide a forum for several notable emergency organizations in radioland, to let the real experts in emergency communications tell their story. Be advised, however, that the popular Lunchbucket saga is not over. For the uninitiated, this series first appeared in June 1979 *QST* (p. 77) and continued in April 1980 *QST* (p. 91) and April 1981 *QST* (p. 85). Although he bears no resemblance to Agent 007 other than durability, like James Bond, Lunchbucket will return!

Local Activity

Jurisdiction	Reported By	Total Points
VE		
Alberta	(348)	268
Calgary	VE6AFO	78
Edmonton	VE6ABC	190
Manitoba	(—)	406
Eastern Manitoba	VE4FK	77
Riding Mountain	VE4ACX	67
Southeastern Manitoba	VE4PG	163
Winnipeg	VE4HK	59
Ontario	(89)	2093
Dufferin, Halton & Peel Co.	VE3IXB	478
Kitchener/Waterloo	VE3KK	85
Oakville	VE3JUZ	44
St. Catherines	VE3OVE	236
Sudbury Region	VE3AIM	184
Toronto	VE3GFN	1013
York Region	VE3HOI	293
1		
Connecticut	(348)	1270
New London Co.	WB1DHZ	445
Northwest Conn.	K1WGO	225
E. Massachusetts	(1042)	870
Section 2B	KA1BLW	76
Bellingham	W1XA	114
Cambridge	WA1YSY	104
Greater New Bedford	W1LE	157
North Shore/Danvers	W1ZMO	142
Taunton	WA1OEZ	208
Winthrop	W1BB	69
Maine	(812)	653
Aroostook Co.	WA1YNZ	639
Hillsborough Co.	W1RGC	224
Rhode Island	(309)	210
Newport Co.	W1JFF	150
Providence Co.	AK1S	60
W. Massachusetts	(805)	1318
Berkshire Co.	WB1HIH	1086
Franklin Co.	W1YI	37
Hampshire Co.	W1GAJ	38
North Worcester Co.	K1JHC	91
South Worcester Co.	W1DOY	64
2		
E. New York	(679)	480
Albany Co.	N2BNY	100
Dutchess Co.	N2ADJ	146
Orange Co.	WB2SON	245
N. New Jersey	(501)	690
Bayonne & vicinity	W2KB	107
Englewood & vicinity	W2CC	05
Hunterdon Co.	WB2IR	147
Monmouth Co.	WA2DPK	202
Morris Co.	WB2VUF	139
S. New Jersey	(1361)	910
Burlington Co.	K2QIJ	474
Camden Co.	WA2ONW	286
Cape May Co.	AG2O	150
W. New York	(1387)	958
Allegany Co.	W2BYO	320
Oneida Co.	WA2GJI	438
St. Lawrence Co.	KA2CMO	11
Wyoming Co.	WB2TXK	187
3		
E. Pennsylvania	(109)	918
Lancaster Co.	AA3B	79
Lycoming Co.	K3CDA	241
Monroe Co.	N3BFL	174
Montgomery Co.	W3ID	47
Somerset Co.	KB3UO	375
Maryland — D.C.	(265)	306
Calvert Co.	W3ZNW	49
Montgomery Co.	WB3LTA	257
W. Pennsylvania	(322)	1051
Allegheny Co.	WA3ZNP	163
Crawford Co.	WA3ZSC	171
Indiana Co.	K3CWL	76
Johnstown	W3SNN	210
Mercer Co.	W3YQ	302
Washington Co.	KB3IN	107
4		
Alabama	(3045)	1804
Calhoun Co.	K4HJM	650
Chambers Co.	WA4VEK	76
Colbert/Lauderdale Co.	KA4BNO	121
Macon Co.	K4HJX	79
Shelby Co.	N4OMA	285
St. Clair Co.	WA4UKB	271
Tuscaloosa	WD4DAT	128
Walker Co.	WB4VZV	217
Georgia	(590)	927
District 11	AA4U	95
District 13	WA4DIW	206
District 14	KA4DFF	95
District 26	WB4APH	147
Douglas/Paulding Co.	N4AVW	152
Muscogee Co.	W4FIZ	212
Kentucky	(1479)	2095
Carter Co.	KA4QIK	77
Ballard/McCracken Co.	AI4T	101
District 1	K4AV	101
District 3	WB4NHO	526
District 4	WA4JAV	204
District 5	NN4H	76
District 6/Bullitt Co.	WA4AGH	292
District 10	K4AVX	61
District 13	WA4UQA	33
District 14	WA4IGD	96
Lake Cumberland Area	K4AXE	206
North Carolina	(1381)	484
Cumberland Co.	KU4W	106
Forsyth Co.	WA4TCR	274
Stokes Co.	K4VHQ	104
N. Florida	(2247)	1277
Alachua Co.	KW4F	228
Baker Co.	KA4MGQ	11
Duval Co.	WA4VZF	412
Leon Co.	KC4N	125
Okaloosa Co.	WB4PGQ	395
Seminole Co.	WD4NIX	127
West Pasco Co.	KE8O	367
South Carolina	(670)	494
Anderson Co.	W4FVV	442
Marion Co.	NG4S	52
S. Florida	(2957)	5834
Broward Co.	WB4KKG	1058
Collier Co.	KA4ASZ	167
Dade Co.	W4IYT	1406
E. Palm Beach Co.	WB4RLU	136
Hardee Co.	KE4DA	98
Hendry Co.	AA4BN	72
Hillsborough Co.	KH4X	573
Lee Co.	WB2OUK	160
Manatee Co.	K4DYB	69
Martin Co.	K47K	247
Monroe Co.	K4URX	57
Osceola Co.	WD4PGG	50
Polk Co.	WB4FVV	58
S. Brevard Co.	KB4OW	2693
Tennessee	(960)	786
Anderson Co.	W4GEK	267
Bradley Co.	WB4BKF	87
E. Sullivan Co.	WD4EKA	305
W. Sullivan Co.	WD4BGU	127
Virginia	(980)	3410
Alexandria	K4BAV	130
First Colony	WB4UHC	324
Montgomery Co.	AB9I	111
North Piedmont	NM4R	14
Rockbridge Co.	WA4LJI	205
Shenandoah Co.	WA4STO	221
Southeast Tidewater	WB4ZNB	42
South Piedmont	WD4DUU	152
Williamsburg, James City and Charles City	K4JRI	51
Winchester, Frederick and Clarke Co.	WB4FNW	171
5		
Arkansas	(714)	111
Van Buren Co.	WD5CAA	111
Louisiana	(378)	191
NW Louisiana	WB5USS	191
Mississippi	(—)	305
Jackson Co.	WD5DCI	126
Pontotoc Co.	WB5OYK	179
New Mexico	(—)	418
Albuquerque	KB5XD	418
N. Texas	(—)	339
Collin Co.	K5MWC	136
Howard Co.	WA5RUF	168
Scurry/Borden Co.	KB5UL	35
Oklahoma	(382)	443
Jackson Co.	WB5KRH	146
Oklahoma Co.	K5SJV	214
Payne Co.	W5ZTN	83
S. Texas	(1107)	1214
Brazoria Co.	WD5AAH	241
Harris Co.	W5CKC	289
Jefferson Co.	KB5SY	244
Montgomery Co.	WA5OKE	105
Washington Co.	WB5RFQ	120
6		
E. Bay	(195)	779
Contra Costa Co.	WB6JGV	520
Fremont/Newark/Union City	AA6SL	92
West Contra Costa Co.	N6DRT	167
Los Angeles	(—)	80
Devonshire Division	K6IYK	80
Orange	(1338)	1593
Barstow	WD6BNG	20
Blythe	N6ANI	156
District 3	WA6HFE	105
District 4	WB6BZZ	262
Inyo Co.	WB6YZY	22
Norco/Corona	WD6DGI	133
North Orange Co.	WB6JGI	258
Riverside	WA6QMW	267
San Bernardino Co.	KK6GS	68
San Bernardino RACES District 4	N6BAE	83
Southern Inyo Co.	W6OHK	134
South Orange Co.	WD6AQK	106
Pacific	(419)	389
Hawaii Co.	AK6K	209
Maui Co.	KH6H	150
Sacramento Valley	(470)	471
Butte/Glenn Co.	KE6EP	355
Nevada Co.	N6AUB	75
Trinity Co.	WA6ZUD	41
San Diego	(—)	881
San Diego Co.	WD6CSS	172
Central, Eastern and Northern San Diego Co.	W6INI	709
San Francisco	(—)	52
Mendocino Co.	WA6OXV	52
Santa Barbara	(498)	207
Ventura Co.	W6RIC	207
San Joaquin	(798)	1359
E. Kern Co.	WA6KZV	141
Fresno Co.	WA6UOR	83
Kings Co.	KD6OM	432
Tulare Co.	KB6CC	263
Tuolumne Co.	WA6EWR	309
Santa Clara Valley	(1498)	776
Palo Alto, Los Altos Mountain View and Los Altos Hills	W6ASH	476
Salinas Valley	WD6EKR	125
San Jose	W6PLT	265
7		
Arizona	(141)	385
Pima Co.	K7NTG	255
Yavapai Co.	K7ZUY	130
Alaska	(—)	1183
Anchorage	AL7AW	475
Juneau/SE Alaska	KL7JFT	430
Sitka	KL7EMA	278
Idaho	(187)	175
Ada Co.	K7RX	175
Nevada	(—)	263
W. Nevada	K7WLY	263
Oregon	(689)	276
Josephine/Jackson	W7FQ	276
Washington	(594)	805
Benton/Franklin Co.	KA7BOD	159
Kitsap Co.	KC7FA	229
Spokane Co.	KM7U	251
Walla Walla	W7OBF	166
8		
Michigan	(4148)	3093
Baraga Co.	WD8LIP	92
Branch Co.	WD8RHU	69
Calhoun Co.	N8BGB	329
Delta Co.	WD8IXZ	325
Genesee Co.	WB8UIN	256
Gladwin Co.	K8BZ	39
Gogebic Co.	K8GXV	85
Ingham/Clinton Co.	WA8BAP	171
Ionia Co.	W8LCU	64
Kalamazoo Co.	K8OQB	98
Lapeer Co.	KB8PW	38
Marquette Co.	W8MAR	183
Midland Co.	WB8WNF	118
Monroe Co.	WA2IOC	136
Oakland Co.	WB8SIW	120
Ottawa Co.	WB8BZF	154
Presque Isle/Cheboygan	N8CZA	36
Sanilac Co.	W8CUP	50
St. Clair Co.	K8UPE	600
Van Buren Co.	K8IZ	32
Wayne Co.	W8JEJ	90
Ohio	(9408)	9097
Adams Co.	WA8WOB	137
Allen Co.	K8EIJ	123
Belmont/Monroe Co.	K8IP	125
Brown Co.	WA8CFX	64
Central Ohio	WB8KO	1356
Clermont Co.	WA8TSX	470
Columbiana Co.	K8JDI	156
Crawford Co.	WD8LWE	14
Cuyahoga Co.	WA8GMT	153
Darke Co.	WA8KZR	220
Erie/Huron Co.	WB8VZX	150
Fayette Co.	WD8PHL	104
Guernsey/Noble Co.	WB8THK	87
Hamilton Co.	K8JE	778
Hancock Co.	N8AEH	126
Hardin Co.	W8OQL	150
Highland Co.	K8CKY	69
Hocking Co.	N8AAW	17
Jefferson Co.	WD8SAB	151
Knox Co.	WB8AYM	210
Licking Co.	WB8VEG	88
Lucas Co.	WB8TTQ	355
Marion Co.	WD8NEE	266
Medina Co.	KA8DJZ	72
Miami Co.	K8SZ	152
Montgomery/Greene Co.	W8ILC	1484
Morrow Co.	WB8TFD	95
Muskingum Co.	WA8CZS	139
Perry Co.	KC8CJ	68
Portage Co.	WD8MPV	77
Preble Co.	WD8DJR	102
Richland Co.	WB8GGR	734
Scioto/Lawrence Co.	N8BLC	96
Stark/Carroll Co.	WD8AYF	426
Summit Co.	WB8HFZ	148
Tuscarawas Co.	WB8DMF	120
Van Wert Co.	W8SGX	122
Warren Co.	K8IOW	150
Washington Co.	WB8UHP	134
W. Cuyahoga Co.	WD8AYH	104
Wyandotte Co.	WD8NEE	40
West Virginia	(1059)	1063
Hancock Co.	K8JEW	159
Harrison Co.	K8DF	90
Marshall Co.	KN8W	584
McDowell Co.	WB8WEZ	31
Monongalia Co.	WA8QYU	202
Pleasant Co.	K8KXE	82
Randolph Co.	AD8T	35
Upshur Co.	WA8NDY	39
Wood Co.	WD8LKT	51
9		
Illinois	(1415)	1247
Cook Co.	W9HPG	305
DuPage Co.	WA9WXC	126
Franklin Co.	W9KSU	8
Jackson Co.	W9CJX	77
Lake Co.	KA9JMG	442
McLean Co.	K9ORP	214
Perry Co.	WB9UEA	1
Union Co.	WB9HLC	24
Wabash Co.	AI9H	50
Indiana	(3676)	4762
Bartholomew Co.	KC9FQ	96
Clark Co.	W9TDI	196
Clinton Co.	WB9WWB	79
DeKalb Co.	W9QWI	72
Delaware Co.	K9UJK	170
Dubois Co.	N9AHP	1012
Floyd Co.	KA9FOF	214
Franklin Co.	K9AMQ	20
Fulton Co.	W9MUL	37
Hancock Co.	K9BRF	120
Hendricks Co.	W9TIZ	19
Henry Co.	K9FVN	81
Howard Co.	WB9VEI	148
Jackson Co.	W9RTH	26
Jay Co.	WA9KWH	37
Lake Co.	WD9EZB	161
Lawrence Co.	KC9EO	355
Marion Co.	N9AJM	74
Miami Co.	WB9FNR	117
Morgan Co.	W9ZSK	78
Orange Co.	N9AET	88
Owen Co.	WD9BKA	38
Pike Co.	WB9NCE	248
Putnam Co.	K9VMG	29
Randolph Co.	W9TJX	186
Scott Co.	KB9JK	35
Tippecanoe Co.	KC9C	92
Vanderburgh Co.	WD9DVA	373
Vigo Co.	W9MJI	291
White Co.	WB9SOY	352
Wisconsin	(1361)	969
Calumet Co.	WA9FBO	115
Pierce Co.	W9SK	157
Oneida Co.	N9AZI	358
Price Co.	AG9G	37
Winnebago Co.	WB9KZU	304
Ø		
Colorado	(974)	1636
Adams Co.	WBØDUV	178
Boulder/Gilpin Co.	WØONF	435
District 10	WDØGRM	174
District 22	WBØTWB	221
District 23	KØQBA	10
District 26	WØACW	614
Morgan/Washington Co.	WDØAUN	4
Iowa	(522)	1282
Buena Vista Co.	KØEVC	36
Crawford Co.	KØCNM	76
Dickinson Co.	WØFQ	610
Harrison Co.	NØAHP	1
Johnson Co.	WBØMCX	65
Jones Co.	WBØENL	300
Pottawattamie Co.	WBØNVL	38
Scott Co.	KØMST	113
Kansas	(208)	1168
Atchinson/Leavenworth Co.	WØNYG	81
Zones 2/3	WØCWJ	151
Zone 6B	WØWVI	370
Zone 7	WBØYWZ	405
Zone 12	WØMI	82
Zone 13	WBØSRP	66
Zone 15B	WBØZUC	33
Minnesota	(635)	317
Dakota Co.	KØJTA	118
Olmsted Co.	KØTS	199
Missouri	(837)	162
Cole Co.	WBØNIE	26
NE Missouri	WØOTF	136
Nebraska	(—)	1006
Douglas/Sarpy Co.	WBØPPF	405
Hall, Hamilton, Howard & Merrick	AJØA	79
Lancaster Co.	KØGND	50
Mid-Nebraska	KØJBL	163
Scotts Bluff Co.	WDØBOM	115
Washington Co.	KCØP	128
York/Polk Co.	WAØBOK	118

National Traffic System Area and Region Nets

	Total Points	Last Year's Total Points
Cycles One and Two		
Eastern Area, WB4PNY	200	543
Central Area, W5KLV	259	276
Pacific Area, KF7R	459	419
First Region, W1TN	427	432
Second Region, W2RQ	318	222
Third Region, WA3THI	159	127
Fourth Region, WD4CNQ	398	469
Fifth Region, WB5YDD	886	297
Sixth Region, WA6LVO	323	596
Seventh Region, WB7WOW	408	398
Eighth Region, K8BMX	259	346
Ninth Region, KA4MZY	301	152
Tenth Region, WBØHOX*		—
Twelfth Region, WØEJD	249	274
Cycles Three and Four		
Eastern Area, K2KIR	612	798
Central Area, WØHI	472	476
Pacific Area, W7EP	473	484
First Region, K1BA	277	232
Second Region, W2MTA	274	422
Third Region, W3NEM	188	179
Fourth Region, W4SHJ	268	337
Fifth Region, N4MD	542	422
Sixth Region, W6IPL	168	—
Seventh Region, W7VSE	209	376
Eighth Region, W8PMJ	116	176
Ninth Region, W9FC	331	231
Tenth Region, WØSS	312	231
Eastern Canada, VE1WF*	—	312
Twelfth Region, WA7GYQ	260	312
Total	9596	8009

*Did not file report.

Section/Local Nets

State-Province	Reported By	Total Points
Alberta	(—)	160
Alberta Public Service	VE6AFO	51
Alberta Disaster Services	VE6ABC	109
Manitoba	(—)	45
Manitoba Traffic	VE4ACK	45
Ontario	(705)	2407
ARES	VE3HOI	155
Kingsmere Traffic	VE3AJA	160
Laurentian	VE3FPI	178
Nickel Basin ARES	VE3IGU	118
Ontario Phone	VE3ONW	585
Ontario Southern	VE3KK	198
Open Line	VE3GFN	1013
Alabama	(513)	388
Alabama Emergency Net "I"	KY4H	23
Alabama Emergency Net "J"	WA4JPK	149
Alabama Emergency Net "U"	WD4DAT	83
Walker Emergency	KD4UV	133
Alaska	(332)	232
Seasaw	KL7JFT	232
Arizona/New Mexico	(129)	104
Southwest	KB5LI	104
Arkansas	(—)	45
White Lightning	WD5CAA	45
California	(1019)	2096
Indian Wells Valley Emergency	WA6KZV	71
Inyo Co.	WB6YZY	32
Calaveras ARS	W6FDL	231
Redwood Empire RA	WA6QXV	70
Sonora Pass RG	WB6LSC	164
S. California	K6DY	245
S. California VHF	WA6QCA	322
Tuolumne ARS #1	K6EEF	104
Tuolumne ARS #2	W6GOJ	53
Tuolumne ARS #3	WB6SLX	41
Tuolumne ARS #4	WA6EWR	36
Trinity Co. RA	WA6ZUD	35
Tulare Co. Emergency	KB6CC	161
Ventura Co. ARES	W6RIC	151
Victor Valley ARC	WB6QFU	52
W. San Joaquin FM ARES	KD6OM	205
Colorado/Wyoming	(743)	450
Boulder/Gilpin Co. ARES	WØONF	270
Colorado-Wyoming	WDØAIT	180
Connecticut	(560)	156
Connecticut CW	K1EIR	155
Delaware/Maryland/DC	(454)	121
Delaware Emergency Phone	K3JL	121
Florida	(3920)	5948
ARES Traffic	WB4RLU	112
Collier Co. Emergency	WB4ZCI	108
Florida Southern Sideband	WB4FVV	194
Florida Crown Emergency	WA4VZF	341
Florida Midday Traffic	WB4AID	746
Florida Medium Speed	KC4MM	49
Florida Phone Traffic	WB4NYG	493
Florida Public Operations	WB4GCK	58
Gainesville AR	W4TKE	120
Lakeland RA	WB4FVV	41
Lee Co. ARES	WB2OUK	118
Martin Co. ARES	K4ZK	206
Okaloosa Co. Emergency	WB4PGQ	425
Pinellas Co. ARES/RACES	W4GPL	506
QFNS	KA4LNA	40
SCARES	WD4HBP	98
South Brevard Emergency	KB4OW	1047
Tropical Phone Traffic	KA4LNA	346
Georgia	(958)	801
ARC of Savannah Two Meter	WD4AFY	157
Georgia Single Sideband	WA4ZOY	644
Illinois	(220)	145
Fulton Co. Radio	W9MUL	22
Illinois CW	K9BVE	123
Indiana	(3079)	2284
ARES	WB9VEI	119
Clinton Co. Amateur	WB9WWB	49
Dubois Co. ARES/RACES	N9AHP	491
Indiana Traffic	W9QYY	739
Jay Co. ARES	WA9KWH	28
Marion Co. ARES	N9AJM	69
Miami Co. ARES	WB9FNR	72
Morgan Co. ARES	W9ZSK	65
Orange Co.	N9AST	39
Pike Co. ARC	WB9NCE	124
Putnam Co. ARES	K9VMG	10
SE Indiana ARES	N9AOJ	140
Tioga Weather	KA9FRO	173
Tri-County	K9LMH	..
Wabash Valley Emergency	W9MJI	160
Iowa	(51)	77
Harrison Co. ARES	NØAHP	36
Westcentral Iowa ARES	KØCNM	41
Kansas	(1443)	2793
Chippewa RC	WØWVI	332
Kansas CW Section	WØFT	146
Kansas Phone	WØOYH	612
Kansas Sideband	WØOYH	1380
Zone 2 ARES	WØCWJ	115
Zone 5B EC	WØNYG	130
Zone 15B ARES 2-Meter	WBØZUC	75
Kentucky	(2164)	2096
Bullitt ARES	WA4AGH	251
Fourth District ARES	WA4JAV	218
District 5 ARES	NN4H	119
Kentucky Novice Training	KB4OZ	352
Kentucky Slow	K54V	214
Kentucky Traffic	KC4XM	788
Lake Cumberland Area D & E	K4AXE	153
Louisiana	(392)	111
NW Louisiana ARES/RACES	WB5USS	111
Maine	(797)	554
Aroostook Emergency	WA1YNZ	243
Maine Public Service	KL7JGM	145
Pine Tree	W1KX	166
Massachusetts/Rhode Island	(2430)	1541
Aquidneck Island Communications	W1JFF	109
Bellingham ARES	W1XA	80
Berkshire Co. Emergency	WB1DBN	833
Eastern Mass.-RI Slow Speed	N1BHH	134
New England Phone Emergency	K1BZD	133
W. Mass. Emergency	W1VPH	270
Western Mass. Phone	WA1ITL	151
Winthrop Emergency	W1BB	51
Michigan	(4838)	3814
Calhoun Co. ARES	N8BGB	248
Genesee Co. ARES	WB8UIN	149
Holland Emergency	WB8BZF	119
Delta Co. 2 Meter Emergency	KA8AID	226
Lapeer Area ARC	KB8PX	225
Michigan Amateur Communications System	K8ZJU	406
Michigan Novice	KA8UEZ	69
Michigan Thumb	W8CUP	114
Michigan Traffic	WD8LRT	187
Monroe Co. ARES	WD8ITZ	115
Michigan QRP	W8LCW	28
Michigan CW Net (QMN)	WA8PIM	34
St. Clair Co. ARES	K8UPE	750
Upper Peninsula	WA8DHB	575
Minnesota	(99)	207
Rochester ARES	KØTS	138
98/06 Emergency	KØJTA	69
Mississippi	(—)	136
Gulf States Emergency	KB5W	136
Missouri	(864)	138
ACL/NEMOE	WØOTF	138
Montana	(148)	164
Big Sky	WB7UTB	164
Nebraska	(—)	161
Scotts Bluff ARES	WDØBOM	66
York/Polk Co. ARES	WAØBOK	95
Nevada	(79)	84
Nevada Sagebrush	W7BS	84
New Hampshire	(767)	781
Granite State FM	K1OSM	306
Granite State Phone	W1VTP	252
New Hampshire CW	N1NH	129
New Hampshire Slow	KA1CXP	74
New Jersey	(1901)	1358
Bayonne Emergency Management	W2KB	62
New Jersey CW	N2XJ	242
New Jersey Phone	W2CC	305
New Jersey Slow	WB2IOJ	134
NW New Jersey VHF	N2BNB	121
Old Bridge Trash and Traffic	N2BOP	323
Union Co. Emergency Traffic	KA2GQQ	171
New York	(1802)	441
Capitol District Repeater	WB2ZCM	191
Rome Area ARES	WB2MNA	250
North Carolina	(2045)	1307
ARES of Forsyth Co.	WA4TCR	187
Cape Fear ARS	KU4W	140
Carolina Training	NJ4L	296
JFK	WB4WII	276
Stokes Co. ARES	K4VHQ	61
Tar Heel Emergency	WA4OBR	347
North Carolina/South Carolina	(—)	75
Carolinas Novice	KA4AUR	75
Ohio	(3460)	3600
ALERT	WD8NEC	156
Belmont Co. ARES	K8IP	97
Brown Co. ARES	WA8CFX	64
Burning River Traffic	WA8GMT	306
Buckeye RTTY	W8EK	121
Deforest ARC	WA8WOB	22
FARA	WD8PHL	96
Firelands Red Cross	WB8VZX	153
HARA	WD8AIL	36
Jefferson Co. ARES	WD8SAB	79
Lucas Co./NW Ohio ARES	WD8DYW	475
MASER	KB8HV	200
Ohio SSB	WD8JGW	958
Ohio Slow	KF8J	45
Ohio Valley Repeater	N8BLC	91
Tri-State Amateur Traffic	K8JE	148
Warren Co. Disaster Services	K8IOW	33
Zanesville ARC	WA8CZS	69
Pennsylvania	(900)	1916
Cambria County 2 Meter Emergency	W3SNN	249
Eastern PA CW	AA3B	129
Eastern PA Emergency Phone and Traffic	WA3EHD	282
Indiana ARES	K3CWL	76
Monroe Co. Emergency Services	N3BFL	98
Montgomery Co. ARES	N3ID	37
PA Traffic and Training	K3JSZ	26
Red Rose	AA3C	50
Washington Co.	N3BKW	90
WB3JOE/R Traffic	WB3CTU	94
Western PA CW Traffic	AC3N	142
Western PA Phone Traffic	N3AOU	642
South Carolina	(389)	366
Anderson 2 Meter	WD4BUH	229
South Carolina Noon Time	KC4LA	137
Tennessee	(927)	2010
Anderson Co. CD/ARES	W4GEK	81
Bristol ARES	WD4EKA	208
OXRC	WB4BKF	207
E. Tennessee VHF	WA4SXM	29
Kingsport Emergency	N4IH	87
Tennessee CW	W4ZJY	247
Tennessee Slow	NG4J	1141
Texas	(1068)	513
Brazosport ARC Emergency	WD4AAH	111
Texas Traffic	WA5RVT	402
Utah	(328)	430
Beehive Utah	W7OCX	349
Utah Code	WA7KHE	81
Virginia	(824)	244
Alexandria ARES	K4BAV	81
Brush Mountain Emergency	AB9I	56
Northern Piedmont Emergency	NM4R	29
Shenandoah Valley Emergency	N4EVV	78
Washington	(142)	210
ARES	W7GBF	61
Washington Section	W7GB	149
West Indies	(281)	403
West Indies Central	WP4BCV	224
West Indies Slow	NP4D	179
West Virginia	(749)	1133
Marshall Co. ARES/RACES	KN8W	366
McDowell ARES	WB8WEZ	19
Monongalia Wireless Association	WD8CDT	52
Pleasant Co. 2-Meter Emergency	K8KXE	78
WC8AAK ARES/RACES	K8QEW	300
Harrison Co. 2-Meter RACES	K8DF	26
Wisconsin	(384)	756
Badger Emergency	WB9ESM	284
Winnebago Co. ARES/RACES Training	WB9KZU	140
Wisconsin Intrastate	K9LGU	78
Wisconsin Side Band	WD9ESZ	188
Wide Coverage-Independent		
Midwest RTTY	K4YZU	57

QST

Happenings

Conducted By W. Dale Clift,* WA3NLO

ARRL Files for Review of Dismissal of RM-3855, Tells FCC "Give Us 10-MHz Band Now!"

As reported last month in League Lines, the FCC has dismissed RM-3855 along with three other petitions concerned with the WARC bands. RM-3855, originally filed by the League March 3, 1981, requested that the Commission study and adopt standards and regulations for the 10-MHz band so that Amateur Radio operators in the United States could begin using the band as soon as WARC-79 is implemented (see April 1981 *QST*, page 67). In a strongly worded Application for Review, filed April 12, 1982, the League asks the FCC to reverse the dismissal and grant an immediate, temporary preratification allocation of the band to the Amateur Service on a secondary, noninterference basis. The League took no position on the other proposals dismissed with RM-3855.

The League noted that the *Order* dismissing RM-3855 had substantially mischaracterized the petition. As a direct result of the mischaracterization, the petition was dismissed as premature. The reasons given in the *Order* for dismissal of RM-3855 are as follows:

1) The United States Senate must ratify the World Administrative Radio Conference (WARC) Final Acts before the Commission can proceed with rule making necessary to make the bands available for Amateur Radio operation.

2) Therefore, the Commission has no authority to implement any provision of the Agreement.

3) The date for exclusive availability of the frequencies allocated to Amateur Radio by WARC-79 is July 1, 1989, so no purpose would be served by early establishment of rules for the use of any of the 10-, 18- and 24-MHz frequencies by amateurs.

ARRL noted that the FCC had claimed that each petitioner essentially proposed the implementation of *three* new high-frequency bands for Amateur Radio Service. This is not the case with respect to RM-3855, the League pointed out. RM-3855 requested the implementation of the 10.10- to 10.15-MHz band *only*; therefore, the reasons for its dismissal are incorrect or inapplicable.

ARRL noted that the 10-MHz band is distinct from the two other hf bands allocated to the Amateur Radio Service at WARC-79 permitting early "temporary" allocation to hams. It can be allocated to amateurs *permanently* upon ratification of the WARC-79 Final Acts. The 10-MHz amateur band is never to be more than a shared, noninterference allocation, secondary to fixed services in that band. While it may be necessary or at least desirable to relocate fixed services currently operating in the 18- and 24-MHz bands prior to allocation of those bands to amateurs, this is not at all the case with respect to the 10-MHz band. RM-3855 requested the FCC make available only the 10-MHz band for use by amateurs on a secondary, noninterference basis as soon as the Final Acts of WARC-79 are ratified by the Senate.

In anticipation of such ratification, which is by all accounts forthcoming shortly, certainly during 1982, it is not only possible but clearly necessary to determine in advance the permanent operating characteristics of Amateur Radio on this band. The League noted that the dismissal of this petition is thus particularly untimely, as well as based on erroneous premises.

ARRL also said it is not true that the U.S. Senate must ratify the Final Acts of WARC-79 prior to issuance of a Notice of Proposed Rule Making in response to RM-3855. Indeed, to wait is not in the public interest. While a permanent amateur allocation at 10 MHz must await WARC-79 ratification, preparation for such an allocation may begin — and should have begun long before. Immediately following the 1979 Conference, the League began an in-depth study of the alternatives for implementation of the 10-MHz allocation. The study aimed to determine how best to serve the overall public interest, including the interests of Commission licensees. RM-3855 was the product of that study.

The belief of the Commission that it has no authority to implement the provisions of the WARC-79 Final Acts prior to ratification has no relevance whatsoever to the request made in RM-3855. FCC should issue a Notice of Proposed Rule Making to discuss and solicit comments on the best and most practical use of this shared, secondary frequency allocation. This would permit amateurs and the FCC to be prepared when a permanent allocation becomes available. Advance planning is in the best interests of all concerned and eliminates unnecessary delay in implementing the provisions of the treaty on a permanent basis.

Furthermore, the League noted that the United States has consistently led the world in technological and regulatory advancements in Amateur Radio. Indeed, the U.S. delegation to WARC-79 was one of the leading proponents of new frequency allocations for amateurs, and it was largely through the efforts of the U.S. that the 10-MHz allocation to amateurs was made. The 10-MHz allocation was regarded by amateurs on the WARC delegation, and is presently regarded by U.S. amateurs, as the most important of the three new hf allocations. It bridges the wide propagation gap between the existing 7- and 14-MHz bands. Thus, it permits long-distance communications when the maximum useable frequency (muf) drops below 14 MHz and ionospheric absorption makes the same communications on 7 MHz impossible.

ARRL said it is singularly inappropriate that the U.S. should be among the last to permit its amateurs to use the 10-MHz band. Yet, this is what is likely to occur. At last count, 39 countries have permitted use of the band. Others, including Canada, are on the verge of opening the band for use within the next month or two. This lack of early allocation of the band to U.S. amateurs reflects negatively on the United States, specifically this administration, as the world's leading proponent of regulatory advancements in Amateur Radio.

The League stated that the unnecessary and untimely dismissal of RM-3855 signals to the worldwide amateur community a lack of interest of the Commission in making this uniquely important allocation at an early date. As other countries are acting one after another to open the 10-MHz band for amateur use, the United States appears to be refusing even to prepare or plan for the allocation. It is imperative that the FCC take affirmative, immediate steps to encourage and prepare for early allocation of this band to the Amateur Radio Service. Without such action, the image of the United States as the leading proponent of Amateur Radio will suffer.

The League pointed out that ITU regulations permit administrations to make exceptions to the table of frequency allocations as long as these assignments cause no interference to stations assigned in accordance with the table. Thus, the FCC, pursuant to Sections 4(i) and 303(r) of the Communications Act of 1934 (47 USC), may assign the 10-MHz band to amateurs immediately on a temporary, interim basis before the 1979 WARC treaty is ratified. In accordance with ITU regulations, such an assignment must be made on a noninterference basis, secondary to fixed-service licensees in that band. Of course, this is identical to the ultimate, permanent status of amateur use of the 10-MHz band following ratification of the Treaty.

In a companion application filed simultaneously with the Application for Review, the League requested that action on these matters be expedited. The League noted that the FCC had erred in dismissing RM-3855, that the delay in allocating the 10-MHz band to amateurs has had an adverse affect on the image of the United States and that circumstances have changed markedly since RM-3855 was first filed. The most notable of these changes is that January 1, 1982 has come and gone without ratification of the WARC-79 Final Acts.

At the time of this writing (late April), the WARC-79 Final Acts have not been ratified with the advice and consent of the United States Senate. ARRL members may wish to write their Senators urging ratification of Senate Treaty Document 97-21, Radio Regulations and Final Protocols, Geneva, 1979. If you do not know who your two Senators are, contact your local library. Address your letters to: The Honorable _____, U.S. Senate, Washington, DC 20510. — *Peter O'Dell, KBIN*

*Deputy Manager, Membership Services, ARRL

NO TELEGRAPHY EXEMPTIONS FOR DISABLED, BUT NO-CODE LICENSE POSSIBLE

The Federal Communications Commission has terminated the docket dealing with the administration of telegraphy examinations to disabled applicants for Amateur Radio licenses, General Docket 78-250. In text accompanying its order to terminate the proceeding, however, the Commission stated that "the matter of a 'no-code' amateur radio operator license class, authorizing privileges which are consistent with the ITU regulations, remains open. We intend to again address this matter at a future date."

In August 1978, the FCC released a Notice of Inquiry to study alternatives for administering telegraphy (Morse code) examinations to disabled applicants. According to the Commission, many handicapped applicants contend that the telegraphy exams discriminate against them because of their disabilities, and some handicapped applicants request the FCC to waive the telegraphy exam. The Commission said it denies such requests because the United States is a member of the International Telecommunication Union (ITU) and is obligated to require Morse code proficiency of its radioamateurs. ITU member countries may, however, waive this requirement in the case of stations making use exclusively of frequencies above 144 MHz. This frequency limit of 144 MHz was changed to 30 MHz at the 1979 World Administrative Radio Conference, but the U.S. has not yet ratified the WARC-79 Treaty.

Although the Commission does not waive the telegraphy requirements, its fundamental policy is that no qualified person should be denied an Amateur Radio license solely because of his or her disability. Therefore, the FCC said, it will make specific efforts to assist disabled applicants by permitting them to demonstrate their operator qualifications in ways that accommodate their disabilities. For example, a blind applicant may use a Braille printer and a deaf person may use a vibrating surface or flashing light for the telegraphy examination. The Commission emphasizes, however, that applicants who use alternative testing methods are still held to the same qualification standards. "It appears that selecting a particular group of license applicants for favorable treatment in terms of less stringent amateur operator requirements would not be a sound licensing policy."

In an obvious reference to a possible future code-free license, the Commission said, "If we decide to introduce a class of amateur radio operator license without telegraphy requirements, it will be available to any applicant, instead of limited to applicants with certain physical or learning disabilities." Though there is no official proposal by the FCC to introduce a code-free amateur license, ARRL has known for some time that such a proposal is being actively considered by some on the FCC staff. If such a proposal surfaces officially, it would, of course, be limited to frequencies above 30 MHz under the new WARC rules.

CORDLESS TELEPHONES TESTED; ARRL FILES COMMENTS

Recently, *QST* reported that manufacturers of cordless telephones had petitioned the FCC to permit more liberal operating conditions for these devices. (See April 1982 Happenings, page 59.) Cordless telephones operate in the frequency range of approximately 1.6 to 2.0 MHz (base-to-portable unit) and approximately 49.6 to 49.9 MHz (portable-to-base unit).

Tests conducted at League Hq. in Newington, Connecticut, both under laboratory conditions and in the field, have established that interference to the cordless-telephone units tested from amateur stations is severe. Not only has the League opposed the requests for liberalized operating conditions for cordless phones, it has requested the FCC to prohibit operation of cordless telephones in or adjacent to the amateur 1.8- to 2.0-MHz band. Laboratory spectrograph photos submitted with the League's engineering study clearly illustrated the poor adjacent-channel rejection characteristics of the 1.7-MHz receivers of the tested units. Field data gathered by the League established that a phone user within 600 feet of an amateur station operating at 1.8 MHz would have a severe interference problem.

The League also tested for interference potential at the 49-MHz (portable-to-base unit) frequencies from amateur 50-MHz transmitters. The cordless telephones tested exhibited severe interference susceptibility at 100-watt and 1000-watt amateur transmitting levels, a result of the lack of any substantial receiver front-end rejection (at the telephone base receiver) and inadequate dynamic range.

The ARRL's tests also found that a serious potential exists for interference *to* amateur stations operating at 1.8 MHz and above. Tests conducted at ranges of 200 to 300 feet from a cordless base revealed severe interference to amateur receivers from fm sidebands of units operated at a center frequency of 1.790 MHz when the amateur receiver was tuned to frequencies as high as 1.825 MHz. Furthermore, strong harmonic signals appeared in the amateur 3.5-MHz band and, in the case of one unit, even in the 7.0-MHz amateur band at close ranges. In the residential operation of cordless phones and amateur stations, the effect of wideband fundamental and strong harmonic emissions is severe interference to amateur mf and hf operation.

The League's tests also disclosed that the three units tested were operating in violation of Section 15.7 of the Commission's Rules and of using power levels far above what is necessary. Section 15.7 limits transmission distance (in feet) of a restricted radiation device to 157,000 divided by the operating frequency in kilohertz; therefore, cordless phones operating at 1.790 MHz are limited to a transmission distance of 93 feet. ARRL field tests revealed that the base-station telephone transmitters tested radiated strong signals for a distance of 1 square mile using only 250 mW, which is half the output power requested by the Electronic Industries Association (EIA) petition. To propose a doubling, as does EIA, or any increase in authorized power or field strength on the frequencies involved, is unnecessary and unwarranted. According to the League, it would not be in the public interest to permit any increase in permissible power output or field strength levels for cordless telephones.

Encouraging News

Since ARRL submitted its test results to the FCC, it appears that industry has taken notice of interference problems between amateur stations and cordless telephones operating at 160 meters. The EIA and the Mura Corporation have both filed petitions that show their willingness to have cordless telephone operation moved off the 160-meter band. Mura Corporation was the first to suggest abandonment of 160 meters in favor of duplex operation at 46.6 to 47 MHz and 49.6 to 50 MHz. The Commission has assigned RM-4062 to this petition. The EIA petition, RM-4075, calls for similar action. Other than the potential adjacent-channel interference problem to cordless phones from amateur 6-meter transmissions, these petitions are basically good news for amateurs. ARRL has filed comments in RM-4062 supporting Mura's petition to the extent that it signals an intent to discontinue cordless telephone operation on 1.8 to 2.0 MHz and adjacent frequencies. According to the League, "The 46.6- to 47-MHz and 49.6- to 50-MHz frequencies are far better suited for cordless telephone operation. It is further suggested that radio frequency interference susceptibility of cordless telephones be considered in advance of any permanent frequency allocation . . . immediately adjacent to the 50 MHz amateur band, where geographic colocation is inevitable." As of this writing, ARRL has not responded to the EIA petition, RM-4075, but it plans to comment along the same lines as it did in RM-4062.

ARRL members who wish to file comments should send them to: The Secretary, FCC, Washington, DC 20554. Label comments "RM-4062" and/or "RM-4075." Any comments addressed to the FCC should also be sent to the petitioners, and the comments should indicate that the petitioners have been served. The petitioners are: RM-4062 — Mura Corporation, c/o Paul J. Berman, Esq., Covington & Burling, 1201 Pennsylvania Ave., N.W., P.O. Box 7566, Washington, DC 20044; and RM-4075 — Electronic Industries Association, 2001 Eye St., N.W. Washington, DC 20006.

THURSTON AND MEYERS ELECTED DIRECTORS EMERITUS

At its March meeting, the ARRL Board of Directors voted Robert B. Thurston, W7PGY, and Raymond E. Meyers, W6MLZ, to the position of Director Emeritus of ARRL. Both have a long history of service to Amateur Radio.

Bob served eight terms as director and two terms as vice director of the Northwestern Division. He was also Washington State SCM for four terms. From 1951 through 1959, W7PGY handled more than 100,000 pieces of overseas and stateside traffic for U.S. servicemen. On three separate occasions, he was listed as top traffic handler in the BPL column in *QST*.

Ray's amateur career began in 1910, at age 15. In 1912, the U.S. Department of Commerce and Labor issued to Ray the Operators Certificate of Skill in Radiocommunication. Ray served as an aide to Sir Hubert Wilkins on his 1931 North Pole Expedition. Retired from the U.S. Navy with the rank of Lieutenant Commander, Ray served with the Pacific Amphibious Forces and on the staff of Admiral Chester Nimitz. In addition to numerous civilian and military radio committee assignments, Ray's resume includes three terms as director of the Southwestern Division. Currently, Ray is the president of the Old Timers Club.

SECONDARY RENEWAL GRACE PERIOD

The FCC has announced that a one-year grace period will be allowed for Amateur Radio operators who want to convert their secondary station call signs to their primary station licenses. This action brings provisions

for switching a secondary call sign to the primary station into consistency with procedures for renewal of an expired license.

The FCC will not renew secondary stations as such, but it will transfer secondary station call signs to primary station licenses, if the licensee applies for renewal either before, or within one year after, the secondary license expires. Previously, Private Radio Bureau Policy did not allow amateurs to recover secondary call signs after they expired. FCC ceased issuing secondary call signs in March 1978, when the new call-sign system was introduced. For more information about this matter, call the Private Radio Bureau's Licensing Division in Gettysburg at 717-337-1212.

MORTON B. KAHN, K4KR/W2KR

Morton B. Kahn, K4KR, of Boca Raton, Florida, became a member of Silent Keys on April 19. Mort, as he was recognized by the many who knew him in person and on the air, was a former League director from the Hudson Division (1958 through 1964) and section communications manager for the New York City-Long Island Section in the '20's. At the time of his election as Hudson Division director, Mort was retired from an active business life as owner and president of TEMCO, a highly successful transmitter manufacturing concern.

During his tenure on the ARRL Board, Mort brough much of his business knowledge to the League. He served as chairman of the ARRL Building Fund, one of the most productive fund-raising campaigns ever undertaken by the League. Additionally, Mort sought organizational reforms in the League and was elected as one of the first directors to the expanded Executive Committee.

Mort's activity in many fields of electronics and communications was highlighted by his early entry into single sideband, where his signal was always recognized as near perfection. He served as a director of the Single Sideband Amateur Radio Association (SSBARA) in its formative stages. He was also a Charter Member of the Quarter Century Wireless Association (QCWA) and was a Senior Member of the Institute of Radio Engineers (IRE, now the IEEE.)

Mort's foresight resulted in the establishment of the Hudson Amateur Radio Council (HARC) as the focal point for Amateur Radio activities in the Hudson Division. Subsequently, the Council has hosted two ARRL National Conventions and is now working on a third. HARC also sponsored the operation of K2US at the New York World's Fair in 1964-65.

Mort will long be remembered for his outoutstanding signal on 20 and 75 meters. "Mr. Radio," as he was affectionately known by many of his close friends, is silent now, but his contributions to communications, Amateur Radio and the League will be heard for decades to come. — *Harry J. Dannals, W2TUK/W2HD*

JACK BRABB, W8DY

Jack Brabb, W8DY (ex-W8SPF), ARRL director from the Great Lakes Division from January 1, 1950 to January 1, 1960, died at his retirement home in Florida on Saturday, March 20. Jack was a retired Naval Reserve captain, having served during World War II as a radar officer on the USS *Shangri-La*. Prior to and following WW II, he had practiced law in Detroit for some 40 years. Jack served as Great Lakes director longer than any other individual, and was an articulate spokesman for the members of the Great Lakes Division. It was this writer's privilege to have traveled extensively with Director Brabb in the Great Lakes Division and to have shared memories of some interesting times and incidents during a difficult period of Amateur Radio history. — *Richard L. Baldwin, W1RU*

ARRL COMMENTS ON PROPOSED BEACON RULES

ARRL has filed comments in PR Docket 81-823, which proposes to authorize the unattended automatic control of beacons and to limit all beacon operation to designated subbands. (For details of the proposal, see Happenings, February 1982, page 59.) ARRL supports the general intentions of the proposal and, in fact, had planned on filing a petition for rule making to permit automatic control of beacon stations in accordance with recognized band plans. The Notice of Proposed Rule Making (NPRM) makes such a petition unnecessary.

Unattended beacon operation, as proposed, will make beacon transmissions more reliable and more standardized. Such transmissions will be of greater use to amateur experimenters and equipment builders.

Although the League generally supports the instant proposal, it has two reservations. First, the segment of the 28-MHz band proposed for beacon operation is inconsistent with internationally recognized band plans. The International Amateur Radio Union (IARU) International Beacon Project Band Plan assigns beacons to 28.2-28.3 MHz, and U.S. Amateur Beacons should, accordingly, be within that segment. Therefore, the League recommends that FCC change its plans to permit unattended beacon operation at 28.08-28.10 MHz to 28.2-28.3 MHz.

The second area of the League's concern is more fundamental and pertains to apparently unintended restrictions on the manual operation of beacons. Presently, there are no restrictions against the *manual* operation of beacons ". . . for the measurement of emissions, temporary observation of transmission phenomena and similar experimental purposes . . . ." The League believes that the amateur community seeks a rule change to permit automatic control of beacons under certain limitations designed to protect the rights of other amateurs. The instant proposal, however, purports to restrict *all* beacon operation, attended or otherwise. The League is unconvinced that manually controlled beacons should be so restricted. Manually operated beacons below 28 MHz for special purposes, such as hf propagation studies during solar eclipses, would be prohibited by the Commission's proposal, except by special temporary authority. Also, it appears that transmitter hunts, except those conducted on the frequencies authorized for beacon operation, would be prohibited by the proposed rule.

ARRL suggested a simple change in the Commission's proposal, which would have the desired effect of permitting the continuation of manually controlled beacons. The League believes such changes would best serve the interests of the Amateur Radio Service.

AMATEUR RULES 97.74 AND 97.71 ELIMINATED

The Federal Communications Commission has eliminated the frequency measurement and regular check rule (Section 97.74). The rule required amateur licensees to provide for measuring the station's emitted carrier frequency and to establish procedures for independently checking it regularly. The Commission noted three problems with the rule: (1) the rule is unenforceable because of its lack of specificity; (2) today's transmitters and receivers are often one unit — requiring amateurs to obtain another piece of equipment to comply with the rule places an unnecessary burden on them; and (3) Section 97.63 of the Rules already requires all transmitted emissions to be confined within the authorized amateur band. Since the rule is unenforceable, burdensome and unnecessary, the FCC said, its elimination advances the Commission's objective of eliminating all unnecessary rules.

The Commission has also deleted a rule which states that Amateur Radio stations operating on frequencies below 144 MHz ". . . shall use adequately filtered direct-current plate power supply for the transmitting equipment to minimize modulation from this source." According to the FCC, this rule, Section 97.71, dates from the early days of radio when a well-filtered dc power supply was more difficult to obtain. Nearly all radio transmitting equipment now employs adequately filtered power supplies.

Special ARRL Membership Dues Rate for Students

A licensed Amateur Radio operator who has not reached the age of 18 may request an annual membership rate equivalent to 80% of the prevailing regular rate. This special rate does not apply to Life Memberships. This student rate, effective immediately, is $20 in the U.S., $25 in Canada and $28 elsewhere, U.S. funds. Students must send proof of age when requesting this special rate. A copy of a driver's license or birth certificate is acceptable.

KENTUCKY AMATEUR LICENSE PLATES

April 2, 1982 was a special day for Kentucky amateurs. That was the day that Governor John Y. Brown signed House Bill 215 to provide special license plates to Kentucky amateurs at an affordable cost. H. B. 215 will become law on July 14 and will allow Kentucky amateurs to purchase a special five-year license plate bearing their amateur call sign. The *total* first-year fee for the plate will be $25 and will *include* the normal yearly registration fee of $12.50. For the remaining four years of the special license-plate period, only the normal annual auto registration fee is paid. The total additional cost for the special plate, therefore, averages only $2.50 per year. Kentucky amateurs have been fighting for years to have such a law passed.

The new law will require Kentucky amateurs to show a copy of their unrevoked and unexpired amateur license when they make application to their county clerk. Furthermore, the Secretary of the Department of Transportation may require such application and payment of the first-year $25 fee on or before September 1 preceding the year in which the plate or renewal thereof is to be issued. The license (registration) period will expire on December 31 of each year.

This writer has no way of knowing how many other Kentucky amateurs became involved with H. B. 215; however, there were many. Thanks to all who helped. — *Bernie Schwitzgebel, WA4JZO*

Canadian NewsFronts

Conducted By Harry MacLean,* VE3GRO

Section 50, U.S. Phone Band Expansion and Related Matters

Many amateurs have become concerned as a result of the article, "Watch Out," in *The Canadian Amateur*, March 1982. They are wondering if this is the full story on DOC section 50 and how it is related to U.S. phone-band expansion. We'd like to share our thoughts on the matter.

DOC Section 50 outlines the conditions under which a foreign amateur may operate in Canada. It states that an amateur from a country that has a reciprocal operating agreement with Canada "shall use the call sign, radio frequencies, types of emission or modes of transmission he is allowed to use in his own country, *if* those frequencies, types of emission or modes of transmission are authorized by these Regulations."

Section 50 is a change in DOC policy. In the past, U.S. amateurs, General class license and higher, were allowed to operate on Canadian phone bands while in Canada. In this way, DOC carried out the terms and the spirit of the Canada-U.S. Convention of 1952, which stated ". . . the amateur station shall be operated in accordance with the laws and regulations of the country in which the station is temporarily located."

Amateurs from other countries were given similar consideration. For example, they were allowed to operate on our 6-metre band even if such a band was nonexistent in their country. They were allowed to operate on the 146- to 148-MHz portion of our 2-metre band, even if their own 2-metre band was limited to 144 to 146 MHz.

With Section 50, all this stopped. This is why national Amateur Radio societies all over the world contacted CRRL, directly or through IARU. Licensing authorities in their countries were not placing restrictions on visiting Canadian amateurs. They were giving Canadian amateurs an appropriate license, and having them operate under the regulations of *their country only*. What these societies requested was a return to the *old policy*. They were seeking *fair treatment*, the same kind of treatment they gave out and had always received from Canada in the past.

This is why CRRL has been asking DOC to modify Section 50. CRRL has been partly successful. Earlier this year, DOC announced that it was prepared to allow amateurs from countries that have reciprocal operating agreements with Canada full use of our 2-metre band. However, hf phone operation continues to be a problem, particularly for visiting U.S. amateurs.

The *TCA* article suggests that modification of Section 50 could lead to U.S. phone-band expansion. The reasoning is that if Canada allows U.S. amateurs to use Canadian phone bands while in Canada, there could be no objection to them using the same bands while in the U.S. We do not find this a very compelling argument. If ARRL were to ask FCC for additional phone bands, it would not be on this basis.

CRRL does not believe that a small number of U.S. amateurs operating on Canadian phone bands while in Canada is a threat. Such operation never was a problem in the past. A greater concern is that if Section 50 is not modified, FCC may choose to minimize the problem by expanding U.S. phone bands so they are more like our Canadian phone bands. We doubt that this will ever be a major factor in FCC thinking, but it could readily be a contributing factor.

CRRL is raising strong objection to current FCC proposals to expand U.S. phone bands on 20 metres and possibly other bands. The presence of Section 50 does nothing to strengthen CRRL arguments. In fact, Section 50 works against CRRL arguments. We urge those who support retention of Section 50 in its present form to rethink the matter. We could be paying dearly for some of the hard lines that have been taken.

CRRL NEWS

☐ At the request of Emergency Planning Canada, CRRL participated in CONCOM '82, the National Communications Conference held in Arnprior, Ontario, on May 26-28. More details next month.

☐ CRRL name badges and diamond lapel pins are available! They're beautiful, and they're reasonably priced. A black-on-gold name badge, with three lines of engraving, is $3, postpaid. A diamond lapel pin, same quality as the ARRL diamond lapel pins, is $2.50, postpaid. Quantity discounts are available on the lapel pins. Order from CRRL, Box 7009, Station E, London, ON N5Y 4J9.

THE NATIONAL CAPITAL AWARD

The National Capital Award is sponsored by the Ottawa Amateur Radio Club. It is issued on proof of contact with stations in the National Capital Region of Canada. This region consists of Ottawa, Ontario; Hull, Quebec; and surrounding area. Stations in Canada and in the lower 48 United States require 20 contacts. Others require 10. The award is also issued to SWLs on a "heard" basis. The National Capital Award will be endorsed for band and mode on request. Fee for the award is $2 in Canada and the U.S., and $3 or 8 IRCs elsewhere. Do not send QSL cards. Send a list of contacts, giving call signs, QTH of stations, dates, bands and modes to Award Manager, Ottawa ARC, Box 8873, Ottawa, ON K1G 3J2.

DOC NEWS

☐ In the March 13 *Canada Gazette*, DOC announced that it plans to review its entire license-fee structure. Among the items being considered: examination fees for classes of license that have no examination fees at present. Amateur Radio examinations could be a target.

☐ DOC will hold Amateur Radio examinations across Canada on June 16. If you plan to write, your application should be in now. QST

*163 Meridene Cr. W., London, ON N5X 1G3

Last December, VO3MEA operated from Signal Hill, Saint John's, Newfoundland, to celebrate the 80th anniversary of Marconi's reception of the first signal across the Atlantic. At the controls: VO1HP. In the background: VO1IF (seated) and VO1IM (standing) *(VO1AW photo)*.

The National Capital Award. If you can't make it to Saskatoon on the Dominion Day weekend, this is what you should be working on! See the text for details.

Who says the Rockies are a barrier? CRRL Assistant Director Bill Gillespie, VE6ABC (l), shakes hands with Burnaby ARC Secretary Fred Houghton, VE7FFK, at the Northern Alberta Hamfest last summer *(VE3GRO photo)*.

Ottawa Mailbox

Conducted By Ray Perrin,* VE3FN

Potpourri

From time to time, Ottawa Mailbox appears in *QST* to deal with some of the questions frequently asked of the Canadian Department of Communications (DOC). Our responses for this column have been confirmed with the DOC and, of course, we will endeavour to reflect the Department's position as accurately and as clearly as possible.

In this month's column, I will highlight some of the lesser-known regulations, together with a few of those the DOC proposed to change in its *Canada Gazette* notice on January 9, 1982. I should mention that by the time this column is printed the official period for commenting on that *Gazette* notice will have expired. However, based on input from its regional directors, other representatives across Canada and many individual amateurs, CRRL has commented on behalf of Canadian amateurs. Numbers refer to sections of the General Radio Regulations, Part 2.

Q. I've heard a lot about the "10-meter endorsement," which is available to holders of Amateur Class Certificates. What's the story?

A. Pursuant to Section 53.(2), where a person holding a radio operator's Amateur Class Certificate satisfies the Minister that he has actively operated his station for at least six months, he may operate according to Schedule VI, in addition to the Amateur Class privileges shown in Schedule V. Schedule VI permits the use of both amplitude-modulated (this includes ssb) and frequency-modulated telephony on the 10-meter band. In addition, it allows amplitude-modulated telephony on the 160-meter band as well as radioteletype (RTTY) on the 80- through 10-meter bands. Actual frequencies available for these emissions are the same as for Advanced Amateurs.

Similarly, after one year's active operation, an Amateur Class Certificate may be endorsed for Schedule VIII, which permits television operation on most amateur frequencies above 434 MHz.

Q. Now that you have mentioned radioteletype (RTTY) operation on the hf bands, what frequencies are available for its use?

A. As a general rule, RTTY may be used on the hf bands (3-30 MHz) by Advanced Amateurs and, as discussed above, by those Amateurs with a "10-meter endorsement." RTTY may also be used anywhere cw may be used, provided that phone may *not* be used. That is, RTTY is permitted in the cw-only segments, but not in the phone bands. This same pattern applies on the 40-meter band, where RTTY is not allowed in the 7050-7100 kHz segment and phone is now permitted. The CRRL has received representations to allow RTTY to share 7050-7100 kHz with phone and cw, and has requested that DOC change the regulations accordingly.

Outside the hf bands (3-30 MHz), the regulations do not permit the use of RTTY in the 160-meter band. However, DOC policy is that, on application, RTTY operation may be permitted by special endorsement. At vhf and higher, RTTY is generally allowed wherever phone is allowed, except for the 902- to 928-MHz band, where only phone is permitted. The CRRL has requested DOC to allow other emissions in the 902- to 928-MHz band and RTTY in the 1.8- to 1.9-MHz portion of the 160-meter band.

Q. That brings us to another point. I thought DOC was removing restrictions on the 160-meter band.

A. For years, amateurs have shared the 160-meter band with the Loran A navigation system. Amateur operations were restricted so as not to cause interference to Loran A. In recent years, the Loran A system has practically ceased operation, and only three stations that may suffer interference from Canadian amateurs remain. These stations operate on 1950 kHz on the east coast of Canada and Greenland. Recognizing this fact, CRRL last year requested DOC to reduce restrictions on amateur operations in the 160-meter band. In the *Gazette* notice of January 9, 1982, DOC proposed to remove most special restrictions in the 1.8- to 1.9-MHz portion and to reduce restrictions in the 1.9- to 2.0-MHz portion of the band. Unfortunately, DOC has not proposed to allow RTTY on 160 meters, except by endorsement. Since, as mentioned above, the only remaining Loran A stations operate on 1950 kHz, CRRL has requested DOC to allow RTTY in the 1.8- to 1.9-MHz portion of 160 meters.

Q. What about mobile operations on 160 meters?

A. Sorry, it's not allowed at present, although the DOC is proposing to permit mobile operations in the 1.8- to 1.9-MHz portion of 160 meters.

Q. I'm interested in setting up a repeater. What do the regulations say about that?

A. The regulations say nothing about repeaters per se. However, Section 59.(1)(b) states that an amateur station shall not "retransmit types A3 or F3 emissions on frequencies below 28 MHz if such emissions are received from a station that is not authorized to use such emissions on frequencies below 28 MHz."

In addition, Section 64.2(f) requires that the amateur station carrier is suppressed during periods of reception when the transmitter is operating on frequencies below 51 MHz. Of course, a repeater station transmitter and receiver operate simultaneously. Thus, the repeater carrier is clearly not "suppressed during periods of reception," and Section 64.2(f) would therefore prohibit repeater operation on frequencies below 51 MHz. In response to CRRL requests, the DOC proposed in its January 9, 1982 *Gazette* notice to change this section to exempt the top 200 kHz of the 10-meter band (29.5 to 29.7 MHz) from this restriction. Therefore, once this proposal is finalized by DOC, repeaters will be permitted in the top 200 kHz of the 10-meter band, as well as on frequencies above 51 MHz.

Q. I'm interested in slow-scan TV (SSTV). Where can I use SSTV on the hf bands?

A. The present situation concerning SSTV is a little confused, but DOC headquarters considers SSTV to be type A5 emission under the existing regulations. There is no provision in any of the schedules for A5 emission on the hf bands (3-30 MHz), and the only way an amateur can operate SSTV on these bands at present is by special authorization pursuant to Section 56. The only provision for type A5 emission in the Advanced class schedule is on most frequencies above 434 MHz. Section 56 provides for special authorization for types of emission that are other than those set out in the schedules. On application to the DOC, the Minister may authorize other such emissions. If an application for SSTV is granted, operation is usually permitted anywhere in the hf phone bands.

In the January 9, 1982 *Gazette* notice, DOC proposed to treat SSTV as a facsimile emission. That brings up another point. At WARC '79, new emission designators were adopted internationally (see "Happenings," January 1982 *QST*, p. 59). DOC is also proposing to replace the existing obsolete emission designators with these new ones. For example, under the old system, Morse code was the familiar type A1 emission and amplitude-modulated radiotelephony was type A3 emission. Under the new designators, Morse code becomes type A1A, while telephony by amplitude modulation becomes type A3E. DOC is proposing to deem the emission type A3C to mean "facsimile by amplitude modulation of a carrier, either directly or by a frequency modulated sub-carrier and includes slow scan television."

In the new schedules printed in the *Gazette* notice, A3C is shown everywhere A3 is shown in the existing schedules for the hf bands (3-30 MHz). So, once the proposal is adopted, amateurs will be able to use SSTV anywhere in the hf phone bands without special authorization. It should be noted that the DOC does not propose to allow SSTV on 160 meters, and SSTV operations will be subject to an occupied bandwidth limit of 6 kHz.

*DOC Liaison, CRRL, 128 Withrow Ave., Nepean, ON K2G 3N7

International News

Conducted By Richard L. Baldwin,* W1RU

Region 3 Conference in Manila

Thirty-two delegates and observers met in Manila, The Philippines, from April 2 to April 5, 1982, to participate in the 5th Triennial Conference of the International Amateur Radio Union Region 3 Association. The host society was The Philippine Amateur Radio Association, which was celebrating the 50th Anniversary of its founding and which did an outstanding job in providing arrangements and logistical support for the conference. The honorary conference chairman was Donato Poblador, DU7DP, president of PARA, while the working conference chairman was Jose Mari Gonzalez, DU1JMG, executive vice president of PARA.

The delegates, representing 10 member societies in Region 3, tackled a number of policy and operating questions. In the policy area, the conference resolved that, insofar as possible, IARU observers from Region 3 would attend those future ITU conferences that might involve decisions affecting Region 3 amateurs. The Conference adopted a resolution endorsing the concept of restructuring IARU so that it would have a policy-making body consisting of representatives from each region and the Hq. society. The Conference examined at great length the so-called "second society problem," wherein there is a conflict as to which society more properly represents the amateurs of a particular country, and passed a resolution forming the basis for a procedure whereby such conflicts could be resolved.

In the operating area, General Ceferino S. Carreon, commissioner of the Philippines National Telecommunications Commission, announced the release of 10.1 to 10.15 MHz to Philippine radio amateurs, albeit with certain initial time restrictions. The Conference examined the status of the 10-MHz band in the various countries of Region 3, and recommended that all IARU societies should agree to a common policy on frequency allocations for the amateur bands.

The Conference urged each member society to continue to work for the establishment of both an Intruder Watch and the necessary liaison with its administration so that complaints of harmful interference to the Amateur Radio Service can be processed in a fashion that will ensure their recognition by the ITU.

In the area of QTH locator systems, the "human language code" system proposed by JARL and the Region 1 "locator" system were adopted.

The New Zealand Association of Radio Transmitters was chosen to administrate a Region 3 award, details of which will be published later.

IARU Headquarters was requested to undertake a number of assignments. It was urged to take the necessary action to ensure proper coordination and use of data resulting from International Beacon Project operations. The Headquarters was asked to seek information from societies in developing countries about the type of assistance they may require to promote the Amateur Radio Service in their countries, and to publish a Contest Calendar, in hopes of avoiding scheduling conflicts.

The Conference modified its structure to increase the number of directors from four to five, and increased the annual subscription rates for its members.

Chosen directors for the next three-year period were David Rankin, 9V1RH (chairman); Jose Mari Gonzalez, DU1JMG; Keigo Komuro, JA1KAB; Arthur "Jumbo" Godfrey, ZL1HV; and Michael Owen, VK3KI. New secretary of the Region 3 Association is Masayoshi Fujioka, JM1UXU.

The next Region 3 Conference will be held in October or November of 1985 in Auckland, New Zealand.

Attending the 5th Region 3 Association Conference on behalf of the IARU Hq. were VE3CJ, WØBWJ and W1RU. From the Region 3 Association directors were ZL2AZ, JA1KAB, VK3KI, DU1JJT and (secretary) 9V1RH.

Representing the various societies were (ARRL) W4KFC; (JARL) JA1AN, JA1HQG, JM1UXU, JR1ANP; (MARTS) 9M2CM, 9M2AV; (NZART) ZL1HV, ZL2AMJ, ZL2NN; (PARA) DU7DP, DU1JMG, DU1OR, DU1POP, DU1BOS; (RAST) HS1WR, HS1YL; (RSGB) G3FKM; (WIA) VK3ADW, VK3KAU. Others present included PAØLOU, chairman, Region 1; YV5BPG, secretary, Region 2 and HK3DEU of the Region 2 Executive Committee; DK3LP of DARC; and VU2ST from India.

Opening ceremonies. Left to right: DU1JJT, ZL2AZ, DU7DP, 9V1RH, General Carreon, VK3KI, JA1KAB.

ZL2AZ, long-term Region 3 director, left, and VE3CJ, immediate past president of IARU, share a moment during one of the receptions.

*International Affairs Vice President, ARRL

Correspondence

Conducted By Peter R. O'Dell,* KB1N

TO APPLAUD ORR NOT TO APPLAUD

☐ The minutes of the last Board of Director's Meeting leave me unsatisfied — something like kissing your sister. So I have a friendly suggestion for you that will make the Minutes more interesting reading.

When Harry Dannals retired as President and gave his swan song, he received "(Applause)." That bit of the minutes is really uninspiring.

Did Harry receive heartfelt applause as a warm friend retiring among his beloved comrades? Or did the Directors give him tepid applause, as they were relieved to get rid of the "old goat." Readers of the Minutes will never know.

To solve the aggravating problem, I propose that you grade the Director's "(Applause)" somewhat in the manner of a signal report. You might do it like this: on a scale of one to five —

1 = (Applause)
2 = (Prolonged applause)
3 = (Tumultuous applause)
4 = (Tumultuous, stormy applause)
5 = (Tumultuous, stormy applause, with a rising ovation)

I am sure that this will make a more meaningful Minutes for the faithful members. — *William I. Orr, W6SAI, Menlo Park, California*

[Editor's Note: Mr. Orr's letter was dated April 1, 1982.]

MORE APRIL FOOLERY

☐ Just a note to let you know how much I enjoyed the article on Noise-Mode Communications (April 1981 *QST*). For the past three years I have struggled to overcome the very problems W6WQC suggests are optimum NMC operating conditions. Now that Mr. Eskay has opened a new way of operating, I would appreciate his help on overcoming the strong magnetic fields created by the activation of the PTT switch on my microphone. I have observed that within nanoseconds of hitting the switch my shack is filled with spurious noises from the telephone, stereo, TV and XYL. Is this problem related to magnetic actions, or is it the direct result of the *Jupiter Effect?* — *Larry K. List, KC8KD, Redford, Michigan*

☐ A. R. Eskay's article ("Noise-Mode Communications") had me going until I realized that it was published in the April issue. A fun article!

I should point out the impression that it is a new breakthrough is incorrect. I recall the days of the "Superregen" 5-meter transceiver. Successful cw QSOs were conducted by "backkeying" the transceiver to produce code characters as noise bursts on the carrier. Those were the days of the 76-41 rush-box, vertical off-center Hertz Antenna and rf burns on the lips! There was a lot of noise mode in those days — in more ways than one! — *Tom Sanders, W6QJI, Port Orchard, Washington*

*Public Information Officer, ARRL

TRIPPED ON ARRL STAFF

☐ Who is Andrew Tripp? I don't find him listed as a member of the staff — as a matter of fact, no amateur call sign was listed after his name at the end of the review. Does he hold a license? If not, what is he doing reviewing a book on Amateur Radio?

Amateur Radio needs more books like this. The current crop of so-called license manuals is laced with the technical garbage that scares people off. My hat's off to Luciani. I've used his book with good success. — *Tim Hardy, NØDCB, Whiteman, Missouri*

[Editor's Note: Mr. Hardy is referring to the review of Luciani's *Amateur Radio — Super Hobby!* (February *QST*, p. 29) written by Andrew Tripp. Tripp has been a member of the ARRL Hq. staff for over two years — first as the public information officer, and now as *QST* features editor. He is not yet licensed. Luciani's book is aimed at persons who are unlicensed.]

EXPAND SUB-BAND NOW

☐ My opinion is that the FCC should expand the 20-meter phone band and that it probably will. I can understand Region 1 not wishing to share this spectrum with an influx of new telephony users; however, we have a need for it. If the FCC does not endorse this expansion, it is my suggestion that we make a concerted effort to promote U.S. RTTY and cw activity in the segment of 14.100 to 14.200 MHz. Presently, we pretty much limit this activity from 14.000 to 14.100 MHz, even though the rules permit this operation in the other segments as well. As a matter of fact, I don't understand why we don't more actively use this segment at the present. — *Larry Bradford, KM5Y, Rowlett, Texas*

☐ We would like to propose the following changes to the 20-meter phone band expansion proposal. The new segment of 14.150 to 14.200 MHz should be available to the Extra Class license holders only. No other changes should be made to the division of the phone band. This would hold down the QRM as anticipated by countries now using this segment. It would be an incentive for upgrading. — *Edouard Cournoyer, W4UMO, Atlanta, Georgia, and Donal Duffey, WA4VMW, Morrow, Georgia*

DARTH VADER'S BREATHING DEVICE

☐ Why should I write this letter? Improper operating procedures, frequency pirating — big power on the weak ones to clear the frequency for contacts — speech compressors set so high that when the operator breathes it is as though he was wearing Darth Vader's breathing device — a potential of splatter over 3 kHz wide at times and beyond even that if more than 2 kW PEP are involved! I hear the deluge of accents that are from CB, as are some of the phrases. When an Extra class cannot copy code or an Advanced class cannot send cw, I suspect that there will eventually be no need for me to upgrade, since I will not be able to jabber-talk with the CBers and bootleggers, anyway. The lack of courtesy was expressed by a 4-lander: "I'll just put on my 5-gallon QRM reducer." Need I say more, or have you listened to the garbage on 11 meters? It sounds almost as bad as on 40. Feeding time at the zoo! — *L. Darrel Wilcox, WDØCZX, Broomfield, Colorado*

TOP BAND ADJUSTMENTS

☐ This letter is to express appreciation for the 160-meter band plan in the August 1981 *QST*, and especially for the follow-up article in the January 1982 *QST*. As a result of the latter, we have moved the Southwestern Division 160-meter ARES net from 1818 to 1940 kHz.

The band plan has been discussed on this net on several occasions and no disagreement was expressed. Many of us are interested in 160 meters only as an interference-free band with excellent local propagation characteristics for emergency communication and information dissemination.

The effect of the move varies from minor inconvenience for most to a major problem for a few. Shorting nine turns on my Butternut antenna coil is all that was needed here. Others have to modify receivers, antenna tuners, towers, etc. A few are having trouble finding the time and favorable weather, but certainly all find the challenge interesting. — *Ivan C. Simpson, W6TET, San Diego, California*

CB, YES

☐ We were heading south on the Taconic State Parkway in New York when both lanes of cars came to a halt. Suddenly there was a knock on my side window from a lady who had seen my 2-meter whip on the roof. Rather sheepishly, I had to tell her that I didn't have CB. Then I tried to open a repeater about two miles south of me, and for some reason I could not. I then switched to a repeater in Carmel, New York and I was answered by a mobile on Interstate 684 who told me he was sorry but he couldn't tell me anything about it.

After about five minutes the cars began to move. About two miles further on, within a few hundred feet, I believe, of the repeater site, several cars had been involved in a chain reaction accident. Luckily there did not seem to be any injuries and the cars did not appear to have much damage.

Maybe in spite of all problems with CB, we should have CB rigs in our cars along with our 2-meter mobile rigs. — *Norman M. Payes, W2SZJ, Shrub Oak, New York*

LUNATIC LOOEY

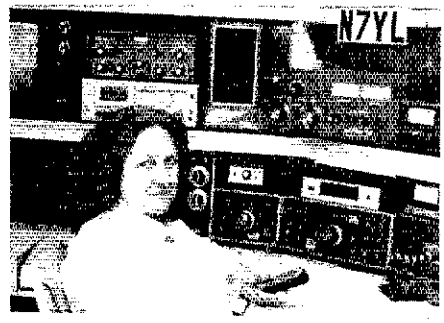
☐ Is that nut on the cover of the April issue of *QST* still alive? It gives me a nightmare just to look at it. — *Don E. Huddleston, K2UAN, Canton, New York*

YL News and Views

Conducted By Jean Peacor,* K1IJV

The Weavers — N7YL and VK6YL

Weekly skeds between two radio stations are not rare, but when both stations have similar calls and identical surnames it's almost more than coincidence. Jan Weaver, N7YL, and Jill Weaver, VK6YL, have weekly skeds when band conditions permit. It was Ed Michael, W2CYM, who first sensed the unusualness of this. The simplest way to obtain more facts about Jan and Jill appeared to be by writing Jan, who then could request information for a write-up from Jill during their sked. Wouldn't you know, band conditions were not favorable. However, thanks to Phyllis Shanks, W2GLB, in Mississippi, Jill received my request for news of herself via Amateur Radio.



Jan Weaver, N7YL

Jan Weaver, N7YL

Jan was living in California when she first learned of Amateur Radio. A local school in Fresno announced that an Amateur Radio Novice course was to be conducted. She attended just to learn what it was all about. Morse code was introduced the very first night, and that was all it took for Jan to become addicted, and to know that she wanted a license. In January 1965, her Novice license arrived; she was WN6PCQ. In May 1965, on Mother's Day, Jan finally gathered all her courage together and made her first contact. Always shy before, Jan fell in love with the overcrowded 80-meter Novice band; she talked with anyone, everyone, anytime. WN6PCQ could be heard burning the airwaves for the next several months. Knowing that her Novice license would expire in one year, she continued studying. January 1966 found her with the General class license, a 15-wpm code-proficiency certificate and an endorsement for 20 wpm.

CW traffic nets were her next challenge. It wasn't long before Jan was NCS for the Northern California Net (NCN) and the Sixth Region Net (6RN), and liaison between NCN and RN6 and betwen RN6 and the Pacific Area Net (PAN). When time permitted, she added code-proficiency endorsements: 25 wpm in October 1966, 30 wpm in March 1967 and 35 wpm in April 1967.

Through the cw traffic nets, Jan met another ham who was almost as crazy about cw as she was. His call was W7AAF; he lived in Nevada. He was also on his way to California to complete his education. They were married in 1972, and John, whose call is now W7IA, and Jan Weaver moved to Las Vegas, Nevada, where they now make their home.

It was John who convinced Jan that every well-rounded ham operates both phone and cw. Mike fright and all, she checked into YLRL's net on 20 meters. YLISSB soon followed, and she's been operating both phone and cw ever since. You'll hear Jan assisting in emergencies and participating in YLRL contests, YLISSB QSO Parties, Sweepstakes, CD parties, Field Day and DXing. Jan upgraded to Advanced class in 1975 and then to Extra Class in 1976, which made her the only licensed YL holding this class in Nevada until 1980. She has taught a YL Amateur Radio class, is a QSL manager for several DX stations and a 20-meter system coordinator for YLISSB, and serves as the checkpoint station in her area for the CQ Awards Program.

Jill Weaver, VK6YL

Bob and Jill Weaver live in Shelley, West Australia. How did Jill become VK6YL? Her words are best: "In 1973 a young man who fixed everything electronic for us was constantly driven potty by my questions as to how these things worked. One day, almost at the end of his tether, he asked if I really wanted to know?" Jill followed his advice and enrolled in a Certificate Course in Radio and Television Electronics. During the next year, many things happened, including the building of stereo speakers, the formulation of a partnership with the young man in a small hi-fi business, and his passing the Amateur Radio license exam. Jill continued studying and passed her exam in February 1976. The amateurs then increased their ranks by one.

Jill attended many radio organizations' meetings, increasing her knowledge along the way. The honor of being secretary was bestowed on her on several occasions. Most of her operating was on vhf, until she completed her certificate in 1978. Her OM, Bob (whose hobbies lie elsewhere than in electronics), and several friends erected an 80-foot tower for her, assembled a TH6DXX and allowed the magic of the hf bands to be hers in 1978.

The past three years have found Jill to be a most active radio operator. She was asked to run a portion of YLISSB to enable new operators on the 20-meter band to meet VK/ZL and Pacific stations. This portion is called Open House and meets Tuesdays and Thursdays from 0920 to 1200 UTC on 14.332 MHz. She's a member of the Natter Net and an avid DXer.

Amateur Radio becomes a family affair during local fox hunts. Jill's OM, Bob, and their daughter, Mandy, both share in the fun of searching for hidden transmitters.

Jill and Jan

Jan isn't exactly certain when and where she first met Jill. She believes it was during a YLRL Anniversary Party; Jill thinks it was on YLISSSB system. They teamed together for last year's YLISSB QSO Party and found it such fun that they plan to make it an annual event. That their friendship has grown since their first meeting is a certainty.

PRIDE OF THE BORDER AMATEUR RADIO SOCIETY

Carlyn Dugan, KA5KHK, age 17 of Del Rio, Texas, has been selected to be a finalist in the 1982 Miss Southern Texas National Teen-Ager Pageant. The pageant was held at San Antonio College May 7, 8 and 9. This pageant is the official finals for the Miss Texas National Teen-Ager Pageant to be held in June 1982. Carlyn is the only known amateur operator ever involved in this competition in the 11 years since its inception.

Pat Dugan, KA5GKO, president of the Border Amateur Radio Society, expresses the club's great pride in having such a multi-faceted YL as a club member. Carlyn is the radio club's secretary; she is both the youngest person and first female ever elected to this post. The Border Amateur Radio Society has over 50 members centralized in southern Texas and Coahuella, Mexico.

Carlyn has held a Novice class license for two years. Her plans are to upgrade immediately following the pageant. May will be a busy month for Carlyn. May it be a most successful one. QST

Carlyn Dugan, KA5KHK

Annalise Nielsen, OZ1FRR, familiar to all who operate ssb contests, is working toward 5BDXCC. Her DX totals one 264/248 confirmed mixed and 259/244 confirmed cw, so chances are Annalise will not be long in attaining her goal.

*Country Club Dr., Monson, MA 01057

On Line

Conducted By Stan Horzepa,* WA1LOU

Microcomputer Code Practice

Numerous articles have appeared in Amateur radio magazines recently regarding the marriage of the microcomputer and Amateur Radio. One article, "Microcomputer QSO Robot" by J. C. Sprott, W9AV, published in July 1981 *QST*, dealt with a BASIC program that enabled the Radio Shack TRS-80® Model I computer to make automated QSOs. It especially caught my eye, since only two months earlier I had become the proud owner of a TRS-80® Model I, Level II computer. It was not so much the concept of automated QSOs that captured my interest, although it was certainly an intriguing idea. Rather, my interest was aroused by the amazingly short program used for receiving Morse code and converting it to alphanumeric characters for display on the video monitor.

A few months ago, I purchased some code-practice cassette tapes for the purpose of improving my code speed in preparation for the Amateur Extra license examination. Although the tapes have been very helpful, I found that it was time-consuming to check my written copy against the printed sheets that accompanied the tapes. Also, by the time I found my errors, it was too late to get constructive feedback. What I needed was a continuous translator that could be checked instantly as the code was being copied. The idea of a computer-aided video translator seemed to be what I was looking for.

According to W9AV's article, the program was capable of a top speed of approximately 25 words per minute and it produced nearly perfect copy from machine-sent cw. Since the code tapes were produced by machine, it seemed that these would make ideal inputs to the program.

The receive portion of the program was typed into the computer and, for the first experiment, I connected a cable from the earphone jack of the cassette recorder used to play the code tapes to the mike jack of the cassette recorder. Soon, sentence after sentence of perfectly translated 20-word-per-minute code appeared on my video monitor!

The use of two cassette recorders was rather cumbersome, so I decided to try using the computer's cassette recorder alone. The code tape was inserted and the computer control cable was removed to permit the tape to be played. Again, perfect code copy ensued . . . this time with only one cassette recorder.

I studied the program and discovered four program lines that controlled the cassette recorder. These were lines 670, 680, 690 and 730. The OUT 255,0 caused the cassette recorder to stop (by controlling the cassette recorder relay). By changing these statements to OUT 255,4, the cassette recorder relay was energized; now, each time I wished to play a tape manually, the control cable would not have to be disconnected. A title and a set of instructions were also added to the program for refinement. (A listing of this program may be obtained by sending an s.a.s.e. to WA1LOU, 72 Stiles St., Waterbury, CT 06706.)

One additional problem remained: The code was not audible while it was being translated because the cassette recorder speaker was disabled. What a dilemma! A search through my junkbox revealed an adaptor that mates two 1/8-inch 2-conductor phone jacks into a single 1/8-inch plug (Radio Shack part no. 274-310). I simply plugged the adaptor into the earphone jack of the cassette recorder, plugged the computer audio input cable into one jack of the adaptor and plugged a set of headphones into the other jack. Voilá! A perfect code-practice monitor that permits instant checking of copy or, simply, instant visual translation — a technique I am experimenting with to help in translating code without writing it down (pretty much a necessity at 20 words per minute-plus).

My auto microcomputer code-practice translator has been working fine for a few weeks, and my code speed has been steadily improving. Just one word of caution: Don't forget to disconnect the headphones the next time you load a program into the TRS-80® microcomputer. Otherwise, you will hear some code (digital computer code) that even an Extra can't translate! — *Herb Bresnick, KB2XM*

[Editor's Note: An alternative to using code-practice tapes is to use station W1AW. By feeding the audio of an hf receiver into KB2XM's system, one may instantly translate W1AW code-practice sessions and, if desired, ARRL cw bulletins. Golden!]

Strengthening a Weak Link

One of the weak links of the TRS-80® Model I computer is its interconnections. After continued use, the tin-plated edge connectors of the computer and expansion interface become oxidized. This causes program and disk errors. To solve the problem, one must use a pink pencil eraser to remove the oxidation from all of the connectors.

My TRS-80® microcomputer had a bad case of this problem. Every two weeks (or less), I would start having disk problems, and I would know that it was time to get out the eraser and rub out the problem. To make matters worse, I had cleaned the connectors so often (and so vigorously) that the tin plating was starting to wear away, exposing bare copper. There had to be a better way.

Perusing a computer magazine, I found an advertisement for Gold Plug 80, a set of connectors with gold-plated contacts that could be piggybacked onto the computer edge connectors to eliminate the oxidation problem. I called the manufacturer and ordered gold connectors for the computer-to-expansion interface connection and the expansion interface-to-disk drive connection.

The Gold Plugs arrived in a week. The instructions were very descriptive. Installation was quick and simple, and the Gold Plugs worked! My system has been running for more than six weeks without a problem and without a biweekly cleaning. If your Model I has the same problem, and you are not afraid to open the computer (and void any pending warranties), get some Gold Plugs and solve your dilemma. (Gold Plug 80 is a product of E.A.P. Co., P.O. Box 14, Keller, TX 76248, tel. 817-498-4242.

COMPUTER NETS, CONTINUED

In the last installment of On Line, there was a list of on-the-air and telephone ham computer nets. The accompanying tables list information about additional nets and update information about some nets listed in the previous column.

Table 1

Landline Nets

Name	*Location*	*Telephone*
G.F.R.N. System	Garden Grove, CA	714-534-1547
Ham Bulletin Board	McLean, VA	via *The Source*
Packet Radio Bulletin Board	Chicago, IL	312-759-7005

Table 2

Radio Nets

Name	*Freq. (MHz)*	*Days*	*Time*	*Mgr.*
Amateur Computer Experimenter's Net — N.W. Wash.	146.55	Dy	0300	W7FEN
Pet/Commodore Net — W. Coast	7.155	Su	1700	
So Cal Am Rad Computer Club — Orange Co.	144.76/5.36	W	0300	WA6WZO
So Cal Packet Radio Net — L.A.	144.76/5.36	M	0330	WB6YMH

Sources: W1CNY, KA6BXT, W6HDO, WA6WZO, W7FEN, WB9QZN.

*72 Stiles St., Waterbury, CT 06706

QST Profiles

Conducted By Carol L. Colvin, AJ2I

"Not of an Age, but for All Time."

H. H. Beverage, ex-W2BML. From the burgeoning era of the birth of radio to the complicated state of the art of present-day communications, the ideas of the creative genius of Harold H. Beverage have withstood the challenges of time and change.

Harold Henry Beverage, ex-W2BML, of Beverage antenna fame, modestly claims that he had the good fortune to be associated with the radio communications business when it was just starting to blossom into a great industry. The "Marconi short-wave revolution" was taking place, and the world was astonished that wide bands of frequencies could be transmitted economically over great distances. That pre-WW I era saw the accelerated development of radio communication before the turbulent war years, and its subsequent peacetime expansion into international public service and broadcasting. Harold H. Beverage was in the thick of it all.

Born on the island of North Haven, Maine, young Beverage was very interested in the Marconi experiments with "wireless." Much to the consternation of his family, who thought that those buzzing noises coming from the boy's receiver were meaningless, Beverage became very proficient at "Morse activities."

After graduating from the University of Maine in 1915, Beverage pursued his interest in radio communication by taking a job with the General Electric Co. There he immediately established contact with Dr. E. Alexanderson, inventor of the high-frequency alternator of the same name. He convinced Alexanderson, his superior, that there was a need on the staff for someone having experience with receivers and radio propagation — who better than young Beverage himself? Beverage's first major assignment at G.E. became the development of the Barrage receiver, so named because it formed a sort of radio barrage to keep the Germans from jamming American signals going to France. Insulated wires, lying on the ground in two-mile-long directions, were used as antennas for the receiver. The success of this idea was overwhelming and led Beverage to deduce that the antennas were unidirectional. From that work sprang the wave antenna, so called because it worked best when its length was one wavelength. Beverage erected the first full-scale wave antenna on Long Island, where it extended nine miles from Riverhead to East Moriches. It was aperiodic (not tuned), and it received a wide band of wavelengths without adjustment of any kind. For years, the wave antenna was used successfully to capture long-wave signals from Europe. Even now, those who have space for a Beverage antenna are considered lucky, indeed.[1]

The wave antenna acquired its inventor's name after Paul Godley used it for a very successful experiment in Scotland. "This antenna was such a simple device, and its principle so easy to understand, that many were erected, and its success naturally followed," Beverage says now.

In 1920, Beverage went to RCA, where he worked in research and development and as a consultant until his retirement in 1958. Graduated from the University of Maine in 1938 with a Doctorate of Engineering degree, Beverage has received numerous awards and honors, including the Presidential Certificate of Merit in 1948. Among those Beverage proudly lists as past associates and acquaintances are Marconi, Einstein, Armstrong, DeForest, Sir Watson Watt, Yagi and Irving Berlin. There are those who feel that Harold Beverage, ex-W2BML, can rightly stand as an equal among such luminaries.

[1]See January 1982 *QST*, page 11, for an updated version of the 1922 classic Beverage antenna article.

QST: *What sparked your interest in radio and kept it going for so long?*

Beverage: Ever since I heard of Marconi and wireless, I knew that I wanted to be a radio engineer. I probably bored my family with my obsession, but to me radio was always very exciting. I was even on the fringe of some famous events. For example, on the evening of April 14, 1912, I copied signals from the steamship *Titanic*, which at the time was sailing at high speed on her maiden voyage and hoping to set a new record for transatlantic crossing. On the next day, I copied signals from the *SS Carpathia* the first ship to reach the *Titanic* after she collided with an iceberg, and was shocked to learn of the disaster in which 1700 lives were lost.

Those early days, kindled by moderate successes and interesting work, kept my love of radio alive. In fact, after graduating from college, I had two job offers: playing trombone at Loews theatre for $22 a week, or working at G.E. for $11.20 a week. I had no hesitation accepting the G.E. offer!

QST: *How did the Beverage antenna develop?*

Beverage: In 1919, I installed a Barrage receiver at the request of the Navy at Otter Cliffs, Maine. I found excellent signals from Europe on the NE wire, but nothing but static on the SW wire. By "horsing" a storage battery and receiver down the cliff to the SW end of the SW wire, I found excellent signals. Obviously, the ground wires were unidirectional, but why? To find out, Phil Carter and I laid out a ground wire six miles long. We inserted a receiver at intervals and determined how the European signals built up and the static decreased as we proceeded toward the SW end of the wire. We found that the attenuation in the ground wire was so great that the static that built up at the NE end was not reflected back to the receiver.

Also, we found that the velocity of the current in the wire was so low that it soon lagged in phase from the space wave so much that the signal in the wire would build up to a maximum and then actually decrease at greater distances. We inserted condensors in series with the wire at intervals in an attempt to increase the velocity, thereby making it possible to use a longer wire. The obvious solution to both problems was to place the wires on poles, thereby raising the velocity to near the velocity of the wave in space, and also to raise the attenuation in the wire. To make the antenna unidirectional, it was necessary to terminate the far end in a resistance equal to the characteristic surge impedance of the wire. The resistance was connected from the antenna to ground so the antenna appeared to be infinitely long.

QST: *Where did your "sparks of genius" come from, practicality or some mysterious source?*

Beverage: In the pioneering days of wireless communication, most inventions were made by members of the experimental school. That is, they were interested in setting up an experiment to test an idea that led to an unexpected discovery. The "spark of genius" was simply to observe the phenomenon and recognize that it was something that could be developed to produce a new and useful result. Electronics now is so complicated that a lone inventor is unlikely to make a major invention in his or her home. Nowadays inventions require all kinds of support and, above all, a nice, big budget.

QST: *What do you consider to be your greatest contribution to the field of radio communications?*

Beverage: It was being the co-inventor with Dr. H. O. Peterson of the "diversity reception system" for combating fading on short-wave signals. This method combined signals independently of phase from spaced antennas or from oppositely polarized antennas at the same spot. It is still widely used on high frequencies and also for reception from satellites on microwaves.

QST: *What excites you in radio today?*

Beverage: When I first started in radio, antenna efficiency was about 20%. Nowadays, using microwaves, a big dish or horn has a gain of 60 decibels. We accept high-quality TV pictures from almost any spot on earth as routine. Even more amazing is the reception of signals from a distance of a billion miles, which a computer turns into beautiful color pictures of close-ups of planets, even including an active volcano on Io [a moon of Jupiter — Ed.]. Someday we may even communicate with intelligent beings on a distant planet in space!

How's DX?

Conducted By Ellen White,* W1YL/4

Roots

During the particular era of the '30s, *QST*'s International Amateur Radio Union News section regularly contained a fascinating array of information on what was going on in the various countries and their growing societies — DX tidbits, interesting photos, record accomplishments, and so on. The column editor was the unique and brilliant author of *200 Meters and Down,* Clinton B. DeSoto, W1CBD.

Late in 1935, a new man joined the ARRL Hq. Secretarial Department (now called Membership Services). He was "low man on the totem pole" to the likes of DeSoto, A. L. Budlong, and K. B. Warner. This new man inherited IARU News reporting and WAC issuances. He was a California import, Byron "By" Goodman, W6CAL (soon to be W1JPE, and now W1DX).

By noted that numerous tidbits of DX information would also appear in Ed Handy's portion of the magazine, Operating News. He felt that such information would be of more use to the Amateur Radio DXer if it appeared centrally in the journal. In fact, he offered to write such a DX column himself. His offer was accepted, with the proviso that it appear in the Operating News portion of *QST*.

W1JPE named the column "How's DX" — apparently after a gag greeting he had picked up in San Francisco. This column contained some pretty corny vaudeville gags, along with good, timely and interesting DX information. Clint DeSoto gave the new column editor some down-to-earth advice — advice your current reporter tries hard to heed: Make the column such that non-DX operators will want to read it. Thus, during the mid-'30s, the "How's DX?" column was born, as an offshoot of the IARU News reports in *QST*.

During that burgeoning period of Amateur Radio there was continuing discussion about counting DX: "How about a list of the countries of the world?" "How do I count countries worked?" "Are Tasmania and Australia separate countries?" These were the questions of the day, with the numbers of countries worked fast becoming the criterion of excellence among outstanding DX stations.

In 1934, an effort to rationalize and unify action on WAC applications by IARU-member societies took place. A tentative list of some 150 countries, limited strictly to continental mainland boundaries, was prepared and submitted to member societies. Even this list, restricted as it was, was not satisfactory. Indeed, almost immediately it was decided that the only satisfactory solution to that particular problem was a map of the world showing continental boundaries. This was prepared and ultimately approved and was published in the November 1934 issue of *QST*.

But, this still left the problem of counting countries worked. The plan, it seemed, was to give the general rule followed in deciding whether a country was a "country," together with some pertinent examples. Each amateur would then have enough information concerning "standard practice" to be able to prepare his *own* list of countries worked — but have it uniform with other lists developed.

There really was just one simple and direct rule: *Each discrete geographical or political entity was considered to be a country.* The apparent solution came close to reducing the definition of "country" to the smallest common denominator — a single unit in the world's geographical and political proportions. This had an added advantage (from an operating point of view) of creating a *long* list — offering the widest possible realm of achievement.

A few general problems illustrated the thinking of the time: Alaska and the United States were considered separate because of the geographical division, just as Mexico and the United States were separate because of the political boundary. Scotland and England were individual countries. The Federated Malay States were one country, having a common government and being connected geographically. Some distinction between islands and island groups was necessitated. Island groups were constituted by several islands commonly grouped under one name and under the same political control, such as the Hawaiian Islands and the Tonga Islands. Where these groups were under different governmental control, they were divided into as many countries as governments. Individual islands such as Trinidad, Ascension and Amsterdam were regarded as "separate."

Thus, during this period of the early '30s, initial discussions of what countries *were* led to a desire for ARRL to sponsor a new DX award, based on this "list" — an award that turned out to be that open-ended DX contest of all time, the ARRL DX Century Club Award — initially conceived by W8CRA (later W3CRA) and ARRL's own and recently deceased editor of *QST*, W1SZ.

The late '30s all too swiftly set the stage for World War II and a hiatus for Amateur Radio. But, at year-end 1945, *QST* announced plans for a brand-new, postwar DXCC, conceding that the new world at that time mandated reorganization of the DXCC to fit the new conditions. A prime consideration in forming rules was that they would be as simple and straightforward as possible. (Times were, after all, simpler 37 years ago!)

Originally, the DXCC was conceived as what might be called a one-shot award for confirming contacts with 100 countries — period. As in many other phases of amateur endeavor, however, the competitive spirit crept in, and a running numbers contest developed among dyed-in-the-wool DXers. (The current day proliferation of DXCC "tracks" shows graphically the evolution of *that* early idea!)

The list used as the early standard, called the Postwar Countries List, the official list for the ARRL International DX Competition as well as the Postwar DXCC, contained 257 separate "listings" on an 8-1/2 × 14 in. sheet, arranged alphabetically by country name, not prefix. (I can hear W1CW groaning at the recollection!) The country names alone carry a sense of history past — Nyasaland, Basutoland, Netherlands Borneo, French Cameroons, the Belgian Congo, the Celebes and Molucca Islands, French Somaliland, Portuguese Timor, etc. (Readers of recent Hows DX? installments will, perhaps, recollect the ebb and fall of these countries as the postwar decades rolled by.)

That list contrasts sharply with today's booklet-type DXCC record, and a half-hundred deleted countries, dozens of prefix cross-references and relatively new additions that sound straight out of an old ARRL *Handbook* tube tables!

But, in the long run (as in most things in life), it is the people who have made it all — the enthusiastic early IARU reporters and historians, Clint DeSoto and his magnificent reporting in the '30s, "By" Goodman and his sidekick, Jeeves, who initiated the concept of *QST*'s DX column, which was continued until recently by the inimitable Rod Newkirk, W9BRD, to the early conceivers of DXCC as the premier DX achievement, to its adoption by the greatly loved and recently lost Mr. Ham Radio, W1BDI, to the 24-year career devotion to the award's implementation by W1CW, to the current DXCC efforts by W3AZD.

And, perhaps most of all, to you, the DXers, who have kept the chase alive, exciting, growing and yet, as history reveals, still so much the same.

Special thanks to W1DX for some early insights.

DX NOTES

A dandy new operating aid has surfaced, thanks to KH6MD. DX Notes is in notebook format with dividers, tabs, labels and very complete instructions, giving you instant access to 2233 DXCC band/mode countries, some of the goodies contained: personalized beam headings, 7 wide columns to allow you to chart your DXCC achievements, time differences, a unique "rareness" guide, standard prefixes and names, continents, distance (both short and long path), and a great deal more. Information from Randall Sherman, Box 158, Kahului, Maui, HI 96732.

A LA RODNEY DANGERFIELD

N3BLT, a big fan of Rodney Dangerfield, wondered what it would be like if Rodney were a ham. Read along and chuckle with us.

"I don't get no DX at all, you kidding? Why, I heard a JA calling CQ, so I answered him. He told me, 'QRU,' then signed off!

"Last night I got on 40-meter phone. I heard the BBC say, 'the frequency is in use, old man.'

"I always had problems with RFI, too, you know? I bought a new rig with digital readout. I got on the air, and it displayed my neighbor's phone number. Why, I'm in his TV set more than CBS.

"I had a nice rig once, a pair of twins. But the receiver had birdies and the transmitter had chirp. My cat tore 'em both to pieces.

"My local repeater gives me problems, too. I heard

*19620 SW 234 St., Homestead, FL 33031

it i-d, so I dropped in my call, said I was listening. I heard the machine go HI HI.

"My club, too — what a bunch of wise guys. Last Field Day, one guy forgot the dummy load. He put a coax end in my hand and told me to stand still.

"I asked the mailman if he had any cards for me. He handed me one from the finance company saying I was overdue on my linear.

"That's the story of my life — no DX! I was in the last DX contest. They told me they didn't need my state!"

HOW MANY COUNTRIES ARE IN THE WORLD

As of 1980 there were 165 independent countries and 49 other colonies and territories known as dependencies. An independent country has its own government, while dependencies are governed by another nation. Independent countries range in size from the 8-1/2-million-square mile Soviet Union, the largest, to SMOM, the smallest (half the size of a football field). The U.S. is third largest, China is second (about 3.7 million square miles), and Brazil ranks fourth. There are currently more than 150 member countries of the United Nations, with new ones being added all the time. QST

QSL Corner

Administered by Joan Becker, KA1IFO

The ARRL DX QSL Bureau System (Incoming)

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

How it Works

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

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

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

Claiming your QSLs

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

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

3) A preferred way to send envelopes is to affix a 20-cent stamp. If you expect to receive more than 1 oz of cards, please affix postage accordingly.

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

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

Helpful Hints

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

DOs

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

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

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

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

Do include an s.a.s.e. with any information request to the bureau.

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

Do be appreciative of the fine efforts of these volunteers.

DON'Ts

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

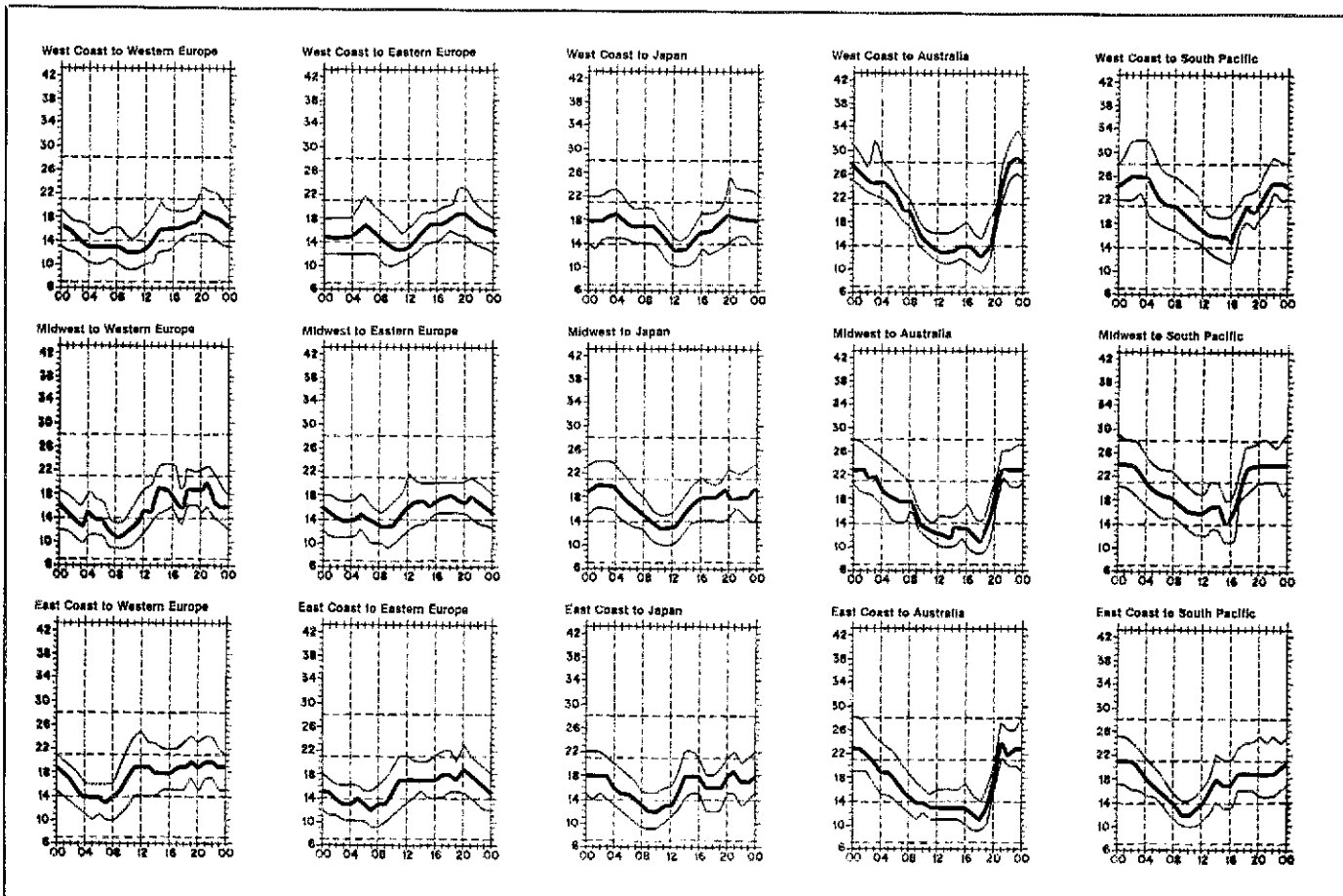
Don't send your outgoing DX cards to this bureau (see "ARRL-Membership Overseas QSL Service" in this column in March 1982 *QST.*)

Don't send envelopes to your "portable" bureau. For example, WA1SQB/2 sends envelopes to the W1 bureau, *not* the W2 bureau.

ARRL DX QSL BUREAU SYSTEM

First Call Area: all calls* — Hampden County Radio Association, Box 216, Forest Park Station, Springfield, MA 01108.

Second Call Area: all calls* — NJDXA, P.O. Box 599, Morris Plains, NJ 07950.



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

Third Call Area: all calls* — Leon Lapkiewicz, K3GM, P.O. Box 6238, Philadelphia, PA 19136.

Fourth Call Area: single-letter prefixes — Mecklenburg ARS, P.O. Box DX, Charlotte, NC 28220.

Fourth Call Area: two-letter prefixes — Sterling Park Amateur Radio Club, P.O. Box 599, Sterling Park, VA 22170.

Fifth Call Area: all calls* — ARRL W5 QSL Bureau, Box 1690, Sherman, TX 75090.

Sixth Call Area: all calls* — ARRL Sixth (6th) District DX QSL Bureau, P. O. Box 1460, Sun Valley, CA 91352.

Seventh Call Area: all calls — Willamette Valley DX Club, Inc., P. O. Box 555, Portland, OR 97207.

Eighth Call Area: all calls — Columbus Amateur Radio Assn., Radio Room, 280 E. Broad St., Columbus, OH 43215.

Ninth Call Area: all calls* — Northern Illinois DX Assn., Box 519, Elmhurst, IL 60126.

Zero Call Area: all calls* — WØ QSL Bureau, Ak-Sar-Ben Radio Club, P.O. Box 291, Omaha, NE 68101.

Puerto Rico: all calls* — Radio Club de Puerto Rico, P.O. Box 1061, San Juan, PR 00902.

U.S. Virgin Islands: all calls — Graciano Belardo, KV4CF, P.O. Box 572, Christiansted, St. Croix, VI 00820.

Canal Zone: all calls — LPRA, P.O. Box 9A-175 Panama 9A, Republic of Panama.

Hawaiian Islands: all calls* — John H. Oka, KH6DQ, P.O. Box 101, Aiea, Oahu, HI 96701.

Alaska: all calls* — Alaska QSL Bureau, 4304 Garfield St., Anchorage, AK 99503.

Guam: AH2, KH2, WH2 and KG6 calls — MARC, Box 445, Agana, Guam 96910.

SWL — Leroy Waite, 39 Hannum St., Ballston Spa, NY 12020.

QSL Cards for Canada (VE and VO) may be sent to: CRRL Central QSL Bureau, Kennebecasis Valley Amateur Radio Club, Box 51, St. John, NB E2L 3X1. Or, QSL cards may be sent to the individual bureaus.

VE1* — L. J. Fader, VE1FQ, P.O. Box 663, Halifax, NS B3J 2T3.

VE2 — A. G. Daemen, VE2IJ, 2960 Douglas Ave., Montreal, PQ H3R 2E3.

VE3 — The Ontario Trilliums, P.O. Box 157, Downsview, ON M3M 3A3.

VE4* — Larry R. Lazar, VE4SL, 30 Bathgate Bay, Winnipeg, MB R3T 0L2.

VE5 — Charles Zsoka, VE5AAD, 1108 Walker St., Regina, SK S4T 5N4.

VE6* — G. D. Holeton, VE6AGV, 4003 1st St., N.W., Calgary, AB T2K 0X2.

VE7* — Burnaby ARC, Box 80555, South Burnaby, BC V5H 3X9.

VE8* — Rolf Ziemann, VE8RZ, 2888 Lanky Ct., Yellowknife, NT X1A 2G4.

VO1, VO2 — CRRL VO QSL Bureau, P.O. Box 6, St. John's, NF A1C 5H5.

VY1 — ARRL QSL Bureau, W. L. Champagne, VY1AU, P.O. Box 4597, Whitehorse, YT Y1A 2R8.

*These bureaus sell envelopes or postage credits. Send an s.a.s.e. to the bureau for further information.

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.

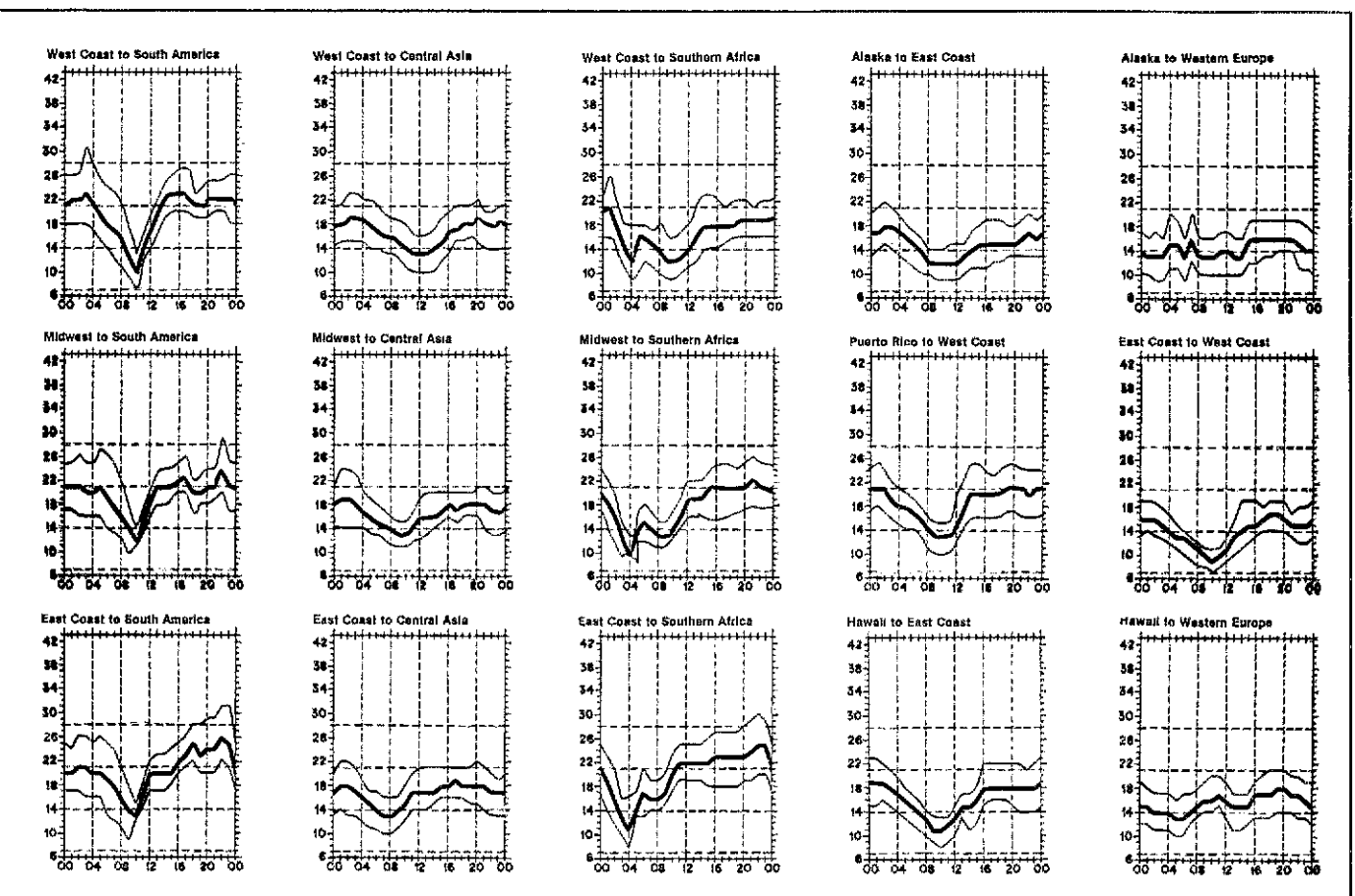
CN8CY (GW3IEQ)
FØDYM/FS (W3HNK)
5Z4CS (JI1VLV)
JD1BAX P.O. Box 2, Ogasawara, Japan
J3AVT (W8UVZ)
OD5LX (SMØDJZ)
OHØBA (OH2BAZ)
PJ2PP P.O. Box 3383,
Curacao, Netherlands
Antilles
TU2IE (DL4BAM)
TYA11 (ON5NT)
VP2EC (N5AU)
VP2ED (AD8J)
VP2EE (AA4NC)
VP8QE (ZL1BJL)
VP9AD (W3HNK)
VQ9CW (WB1DQC)
XK5DX (VE5DX)
XT2AW (KN1DPS)
YK3AB (OE1DH)
ZD8CG (W9CN)
ZK2BB (VK3VU)
ZL2ATU (WB8WMS)
ZLØAEO (WB8WMS)
ZM7VU (F6DYG)
ZS4PB (N7RO)
3D2AB (WB8WMS)
3V8GYC P.O. Box 1, Mareno, Italy
5Z4CV (W2KF)
6Y5DZ (WB6UBR)
9K2BE (G4GIR)
9M2AV (JA3BQE)
9X5SP (DL8OA)

QSL MANAGER VOLUNTEERS

KD6ER
KM5D
KK9G
N8BIE
KC9NU
VE2DPO
N16G, Erik Dean, 920 Rockefeller Dr., No. 9A, Sunnyvale, CA 94087

March 1982 QSL Corner, page 71, contains information on using the ARRL Overseas Membership QSL Service.

For information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main Street, Newington, CT 06111.



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, 1982, assume a sunspot number of 110, which corresponds to a 2800-MHz solar flux of 154.

DX Century Club Awards

Administered by Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmations for contacts with 100 or more countries on the official ARRL DXCC List. You may also submit cards to endorse your award in 25-country increments through 250, 10-country increments through 300, and in 5-country increments above 300. The totals shown below are exact credits given to DXCC members from January 26 through February 28, 1982. 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

DF7FP/106 JH7SLQ/114 VE6CGY/114 KA2GMT/110 AA4CM/259 AK5J/106 KA6EPK/105 KB8ZM/116 N9BQK/104
DJ2BV/167 JA8IXM/308 VE7AEA/106 KN2G/110 K4EFN/105 K5MVP/101 KA6FZN/257 KJ8H/100 W9JBR/100
DL5KAT/117 KL7EWP/101 VE7AHV/102 N2BHJ/105 K4ICH/109 KM5S/102 N6DJW/103 N8CEO/116 W9WAQ/151
DL7FAH/150 KL7IYK/W8/103 YU2CAM/110 N2CHD/131 K4UWJ/133 KR5V/100 N6PE/138 W8ORW/104 WA9WYB/121
DL8FL/323 OE9SLH/127 YU3TLA/109 W2LR/110 K4VJO/102 KU5L/125 WA6ZEF/107 W8OTY/101 WB9AIS/103
F6FDC/104 ON6YH/109 YU3TXM/112 WA2FBE/103 K4WKZ/101 WA5RCL/100 K7WPC/103 WB8ZXY/127 WB9UVD/100
HR1FM/108 PA0WRS/271 ZL2BCW/114 WB2WMJ/215 KD4OM/100 WB5NWE/107 KD7Z/126 WD8RQF/106 KK0L/134
I1ZXT/105 SM5LI/142 KA1DZV/100 KE3R/102 KD4YZ/105 WB5PQX/141 KJ7R/100 K9TV/110 KO0E/146
JA1HRK/109 SM7BYP/289 KA1K/221 N3CJW/125 W4ABI/105 WB5RPT/118 N7RT/274 KA9BZM/103 N0ASA/110
JF1PUW/249 SM7IDF/188 KA1RR/104 W3BWU/104 WA4HOH/101 WB5UJO/114 W7EKM/323 KA9JKQ/201 W0NU/111
JA2DC/188 SP6DXG/227 KB1P/102 WA3ESH/109 WB4HSA/191 AD6J/100 WA7UTM/105 KB9YP/118 WA0STV/111
JA2GCW/112 VE1BHX/108 KE1E/110 WB3GRR/102 WD4HFV/127 AD6X/127 KA8HIB/112 KC9CC/154 WB0ZJE/141
JA2VY/235 VE2CU/100 WB1FVS/124 WB3LTT/101 WD4ORA/111 K6IVY/105 KB8LF/163 KC9JF/108 WD0HXQ/101
JH7COM/100 VE3FIU/102 K2OID/105 WB3EFH/162

Radiotelephone

AP2ZR/109 EA6FS/104 LA2TO/133 VE3DSA/102 N2HF/103 WB4HSA/190 WA5NOM/102 N7RT/264 KC9JF/103
DF2JE/133 F6GXB/139 LA9FY/100 VE3FIU/104 W2LR/105 WB5MNW/101 KA6FZN/225 W7GYZ/107 W9ERZ/108
DJ1UF/108 G3LMH/121 OE9SLH/111 VE7AEA/106 W2ZWB/102 WD4HFV/128 KE6CI/100 WB7UAH/103 W9NTO/178
DJ2BV/103 HK1AHR/W2/104 OH4PW/122 YC2BSF/134 WB2TKY/249 WD4DZH/195 KE6CS/296 KA8KAW/108 WB9TXJ/101
DJ0DI/114 I1XAM/112 OK2PDE/110 ZS6XK/105 WB2WMJ/130 KB5HG/208 N6AQ/105 KI8W/131 WD9BBI/127
DL1MAD/103 JF1PHJ/102 ON6YH/101 KA1RR/103 WB2ZGN/104 KB5RA/110 N6CCL/150 W8ALV/101 K6ILS/109
DL5JP/112 JF1PUW/217 OZ1AXJ/100 K2DSU/100 K4WKZ/101 KC5QW/102 W6WPY/105 WB8ZXY/115 KB0PM/100
DL8LR/165 JA2VY/233 P29NSF/107 KB2WH/106 K4ICH/107 KD5BM/106 WA6VHJ/111 KA9JKQ/187 KB0ZU/102
EA3ARX/106 JR7ICN/196 SM5LI/134 KB2WN/117 KD4WB/103 N5DSK/130 KD7Z/112 KB9YP/117 KC0E/139
EA3BKU/110 JA8UUA/102 SM7BYP/274 N2AWI/113 KW4V/125 W5LVD/245 KI7I/100 KC9CC/149 N0BYK/101
EA3BOX/125 JH8BJG/102 SM7IDF/117 N2CHD/103 W4JIK/216

CW

DF4HP/104 GM3OXX/163 SM7BYP/197 K2QIL/129 W3QIR/105 AA4CM/230 KA5HWH/PA/118 KA7AIG/100 K8NA/100
DF4PA/106 JF1PUW/182 SM7IDF/128 KA2DIV/100 W3SQ/205 KA4F/102 KB8N/101 KA7DLC/102 KR8W/102
DF4QP/105 JA2CG/113 SV1NA/103 W2UU/198 WB3HVS/109 WA4PWF/110 N6PE/108 N7ET/DU/103 W8CY/105
DJ2BV/127 JA2DC/140 VP2MB/100 WB2WMJ/105 WB3JVU/110 WD4SIG/102 K7WF/105 N7RT/231 KA9FCR/103
DL9NAF/104 JA2GCW/110

5BDXCC

JA2IVK OH2BDP KE4E K8NA KL7AF AE0K OZ4PM OH1LA K5MAT
W5AL SM4CTT WB4TIN LU2DSL AA4KT

Endorsements

Mixed

CT1GC/178 JA2CXK/204 VE3GCE/199 K2UKQ/329 N3AKD/205 NE4F/186 KR5X/220 KA7DBS/205 W9DDX/288
DA1WA/HB0/127 JA3ANW/261 VE3II/311 KB2KN/254 W3GG/329 NE4R/302 W5JW/330 KB7MM/210 W9DH/332
DF6TC/167 JA3EMU/320 VE3NE/335 KB2HZ/261 W3KA/341 NF4U/301 W5RJC/290 KI7I/150 W9GSB/201
DJ4TZ/329 JA4GZT/251 VE4ADG/205 KB2TY/226 W3LMZ/313 NJ4Q/180 WA5BDU/137 N7AIF/207 W9HAH/158
DJ5JK/259 JA7FEX/160 VE4AFO/209 KG2A/262 W3SQ/283 NR4V/291 WB5TEQ/204 W7IUV/302 W9HVP/133
DJ9UM/270 JA8ADQ/338 VE4SK/323 W2AAN/187 W3TVB/300 W4AAV/362 WD5GJB/262 W7ZR/303 W9KA/321
DK3SF/319 JH8NYK/195 VE7DXN/233 W2AGW/365 AA4AR/305 W4BBP/344 WD5HMX/228 WA7BEV/319 W9KXW/276
DK4HD/164 KG4WM/230 VE7GI/363 W2BOK/357 AA4MI/305 W4EX/365 K6CBL/310 WB7NFK/176 W9MYG/270
DK6IB/153 KH6CF/305 YU1DD/318 W2BXA/365 AA4MM/334 W4OMO/299 K6NL/280 AI8S/300 W9OPD/232
DL1HH/350 KL7AF/266 YU3VM/259 W2BXC/317 K4BVQ/338 W4NNF/163 K6OXU/200 K8BA/186 W9HPG/192
DL3AR/290 KL7HEI/151 YV5ANF/345 W2FGI/334 K4EED/155 W4PNY/226 K6QS/230 K8JRM/280 W9SFR/356
EA3NA/310 KL7JC/175 YV5HUJ/167 W2FZY/354 K4EWG/330 W4JIK/229 K6XN/285 K8RLQ/125 W9VA/312
EA7OH/269 LA1ND/262 4X4FQ/342 W2GKJ/342 K4FY/302 W4ROA/140 K6YQ/200 K8TL/325 WB9EJE/217
F6GXB/159 LA9CE/334 4X4NJ/320 W2HTX/127 KB4FO/166 W4TFB/319 K6ZO/365 KI8W/154 WB9LFD/271
G2FSP/351 OE1CPP/300 K1FI/300 W2HUG/284 K4IBP/299 W4VN/262 KA6HNY/181 KK8J/310 WB9OTX/224
G3FXB/358 OE1ER/363 K1GSK/300 W2JVU/362 K4JEX/291 W4ZWE/275 KB6JK/270 KN8COQ/265 K9INR/205
G3OLU/175 OE1KJW/150 K1SA/301 W2JWK/231 K4KO/359 WA4BCN/155 KM6K/249 N8BM/300 K9GSV/315
G4JCC/238 OK1ZL/301 K1VSJ/134 W2LV/359 K4LNO/281 WA4HDD/301 N6BFA/218 N8EL/247 K9VV/288
GI6YM/184 OZ4LS/150 KE1F/258 W2SR/244 K4MZU/331 WB4FTU/270 N6DW/168 W8KKF/294 KA0ALX/178
GM3ITN/347 PY2DBU/274 KA1CFC/174 W2TS/253 K4NV/260 WB4HDX/130 N6HR/320 W8ZNH/173 KA0FPK/176
HB9AHL/311 PP5UG/331 W1CYB/202 W2XN/351 K4PVZ/294 WB4MAI/229 N6UC/331 WA8EUK/270 N0ALL/288
HB9BKP/151 SM4CTT/299 W1HX/361 W2YY/349 K4QPR/296 WB4MXI/266 N6VI/275 WA8MOA/287 N0BIZ/155
I2KMG/340 SM5API/333 W1HZ/359 WA2DIG/350 K4TFI/300 WB4OSN/299 N6WK/260 WA8NDL/270 N0JW/224
IV3BCB/202 SM5BDV/202 W1PZR/203 WA2JOC/269 KA4DLC/175 WB4QFH/250 W6MND/264 WB8RNY/178 W0AX/361
I5BOU/201 SM6AVM/132 WA1UDH/125 WA2LMW/264 KA4LXZ/164 WB4TDH/302 WA6JDB/159 AI9F/270 W0AIH/356
I8KDB/352 SM6BGG/226 WA1VVX/127 WB2PMP/272 KC4TR/200 WD4CBA/153 WA6OGW/307 AI9R/284 W0BF/229
I8SCV/200 SM6CVX/329 WB1EMN/282 K3GEV/130 KC4YY/127 AF5H/300 WB8SRK/225 K9JJ/203 W0GK/151
IT9AUA/322 TG4NX/298 AA2P/140 K3HPG/327 N4AXT/271 K5DX/355 WB6VGY/211 KB9EZ/317 W0JSN/227
IT9ZGY/355 VE2FGO/241 K2EQU/165 K3II/353 N4BLX/270 K5RJ/321 WB6WHM/305 KB9QC/306 W0LWG/351
JA1AKH/180 VE2PD/162 K2QVS/175 K3KA/305 N4EZ/199 KA5FUI/204 K7CE/185 KC9EW/181 WA0TKJ/310
JA1ELY/321 VE3BWY/350 K2OWE/230 K3RS/329 N4MM/332 KA5V/294 K7CVL/317 KJ9I/201 WD0DDU/130
JA1FGB/283 VE3BXF/184 K2QIL/262 K3TW/310 N4NW/274 KB5FV/176 K7VV/259 W9CA/262 WD0HDT/126
JR1JFO/308 VE3CPU/278 K2TQC/348 KC3X/223 N4TL/176

Radiotelephone

CT1GC/179 JA1ELY/318 VE4ADG/202 W2FG/326 K4BVQ/328 W4SPK/132 K6XN/269 K7CE/185 KB9MO/199
CT1VY/183 JA2CXK/203 VE4AFO/203 W2GK/338 K4EED/153 W4TFB/310 KA6HNY/177 N7AIF/207 KB9OC/306
DF7QD/203 JA8IXM/304 VE4BJJ/306 W2LV/348 K4FY/281 W4WMQ/260 KB6JK/270 W7EEF/290 KC9JT/145
DJ4PT/325 JH8NYK/193 VP9CP/272 W2XN/340 K4KUZ/263 W4ZWE/234 KB6ZL/176 W7EKM/322 KF9L/130
DJ4TZ/261 JY3ZH/291 YV5ANF/345 W2YY/344 K4LNO/281 WA4HDD/300 KD6BV/230 W7ZR/290 W9DDX/288
DJ9UM/270 KL7AF/250 Z21BP/289 WA2BDP/265 K4QPR/292 WA4OIB/226 KD6CN/149 WA7JUJ/199 W9DH/314
DK3SF/307 LA1ZI/321 Z56GF/202 WA2BGE/138 K4VAA/234 WA4WTG/311 KM6K/249 WA7TTM/280 W9RNX/354
DL1HH/333 LA4HH/225 K1GSK/299 WA2JOC/228 KB4JR/133 WB4FQX/152 KM6N/177 WB7NFK/173 W9SFR/346
DL4YAH/259 LU2AFH/306 KB1I/270 WA2OEP/202 KC4AE/176 WB4FTU/262 N6BFA/216 WB7SQU/174 W9XM/305
DL6NX/310 LU3AJW/296 KE1F/219 WA2SRM/250 KD4NI/149 WB4KTG/272 N6UC/330 WB7SQV/171 W9ZTL/158
DL7FP/305 OE1SKC/227 N1API/234 WA2SSU/160 KF4M/229 WB4NCJ/178 WA6AEO/205 WB7WQE/173 W9ZX/270
EA3AOC/300 OE3WWB/322 W1CYB/202 WB2CEI/291 KQ4O/280 AF5H/291 W6AFF/134 AI8S/299 WB9GMC/177
EA3CFW/151 ON5FU/293 W1DO/324 WB2DND/252 KT4P/270 K5DX/350 W6JQT/154 K8JRM/279 WB9LFD/269
EA3OJ/319 OZ4RP/227 W1HX/350 WB2HNA/129 KV4F/290 K5GE/260 W6QWJ/176 K8TL/200 WD9FOE/229
EA5BCX/180 PA0KB/303 W1PZR/201 KB3PY/270 N4AXT/259 K5RJ/314 W6USG/326 KA8FEL/180 K0INR/180
F9JS/230 PP5UG/328 WB1ETS/151 N3AKD/179 N4BLX/269 K5VYT/229 WA6LOD/213 N8BBJ/227 K0RRY/180
G3UML/335 SM5BDV/161 K2EQU/165 N3AUE/225 N4DQF/208 K5WZ/227 WA6OGW/306 W8KKF/294 K6SE/272
G4JCC/238 SM6AVM/132 KB2DE/217 W3BUI/150 N4JA/290 KA5V/290 WA6SLO/222 W8VSA/153 K6GSV/292
I2KMG/337 SM6BGG/226 KB2EF/125 W3GG/326 N4MM/328 N5ACD/283 WB6SRK/225 WA8MOA/270 N6CXE/128
I2PQW/225 TG4NX/297 KB2HZ/259 W3KA/277 N4NW/267 N5AMA/152 WB6VGY/207 WA8YTM/128 N8ZA/226
IN3ANE/293 VE2PD/160 KB2MK/182 W3KHQ/252 N4TL/176 W5IJU/124 WB6WHM/301 WB8RNY/178 W9EVE/274
I8KDB/352 VE3BX/321 KB2UC/217 W3ZE/151 NE4R/282 W5LLU/124 AJ7Z/191 WD8MPY/177 W9JKM/200
I4LCK/328 VE3II/310 KB2XP/160 WB3KDY/182 NF4U/295 W5RJC/262 K7VV/243 AI9R/272 W9LOH/162
I5ICY/217 VE3MC/310 KB2XP/VE3/136 AA4AR/305 W4EX/363 WB5ROM/230 KA7DBS/197 AI9U/253 W9YNZ/290
I8KNT/304 VE3MRS/302 N2AVI/154 AA4MI/274 W4HKB/123 WD5HEG/133 KB7MO/254 K9LUX/228 WD0AQJ/154
IT9ZGY/338 VE3NE/332 W2BXA/363 AA4MM/334 W4PNY/207 K8EDA/292 KB7SU/210

CW

DK9MB/162 SM5BDV/160 WB1FRZ/206 K3KA/273 NR4V/216 K6AC/267 W6BS/253 W8NPF/175 W9SFR/293
EA7OH/241 TG4NX/242 K2TQC/308 KC3X/139 WA4RRB/191 K6CBL/280 KB7MO/174 AI9R/225 K6GUG/202
I8JOV/149 VE3GCE/150 K2UFM/229 WB3BVL/125 AF5H/200 K6XN/203 W7IUV/264 KE9A/200 KJ0U/209
JA2TK/226 VE3II/207 KG2A/227 AA4MI/261 KA5V/133 KB6EP/165 W7ZR/167 K9JU/203 W0JSN/127
JA7EWS/157 YV5HUJ/157 KJ2O/150 K4NV/260 N5DX/270 KB6ZL/131 K8BA/153 K9MK/178 WB0WLX/132
KL7AF/202 XE1KC/157 W2SR/214 KB4JS/152 W5BWF/150 KM6N/158 K8TL/186 W9DH/202 K0INR/125
LA1ND/151 K1XA/181 WA2JOC/199 N4MM/280 W5KC/264 N6DW/156 K8WW/292 W9HPG/181 WD0AVG/124
PA0WRS/239 KE1F/144 WB2KXD/232 N4RR/260 WA5BDU/137

DXCC NOTES

Announcement is hereby made that the KF1O/CE0X San Felix operation will not be credited for DXCC. Extensive investigative research has been conducted with the licensing authority for Chile, the Subsecretario De Telecommunicaciones. Documentation for a valid San Felix license and authorization for presence on the island cannot be substantiated.

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, 1982. Cards arriving after June 30, 1982, will not be included in the Honor Roll listing.

5BDXCC/5BWAS: Board Minute 53 (September 1981) directed that a suitable certificate be awarded to those qualifying for the 5-Band DXCC (and 5-Band WAS), with plaques available at cost to those desiring them. Effective with applications received July 1, 1982, and after, a fee of $20 U.S. will be charged for those who want the 5-Band plaque. A handsome certificate will be awarded to all applicants free of charge. The plaque will continue to be offered free of charge for all applications received prior to July 1, 1982.

The New Frontier

The World Above 1 Gig

Conducted By Bob Atkins,* KA1GT

1.3 GHz Alford Slot Antenna

The availability of commercial equipment has led to a considerable increase in 1296-MHz activity in recent years. Mobile-to-mobile activity is now present on the band, and several groups are known to be planning beacons. One thing that both beacons and mobile operation require is a high-gain, omnidirectional antenna, horizontally polarized, since that is the normal mode of operation on the microwave bands.

The antenna described here, an Alford slot antenna developed by Mike Walters, G3JVL, is one solution for this need. I do not have the exact gain measurement on this antenna, but it should show in the order of 6-dB gain over a dipole.

The antenna is constructed by cutting a single slot in the wall of a length of copper tube as shown at A in Fig. 1. The dimensions of this slot depend on the tube and are given for two standard tube sizes in the figure. The top of the slot is shorted by soldering a brass or copper disc to the end of the tube as indicated. The length of the tube below the slot has no effect on the antenna, so the same tube may be used both as antenna and support mast.

The antenna is fed halfway along the slot at the points marked "F" in the drawing. The impedance at these points is about 200 Ω, so a 4:1 balun is required for use with a 50-Ω feed line. Such a balun, constructed from 0.141-in. semi-rigid coax, is shown at B in Fig. 1. A 58-mm slot is cut in both sides of the outer conductor of a length of this coax, and connections are made as shown. This slot may be cut with a hacksaw blade or more conveniently with a small, motorized hand tool that uses a circular saw blade, e.g. Weller "Mini Shop." Such tools are often used by model builders and can be found in hobby stores. Of course, any other 4:1 balun designed for use at this frequency can be used. The coax and balun can conveniently be fed up the center of the tube for a neat installation. If weatherproofing is desired, Teflon adhesive tape can be wrapped around the antenna. Since Teflon is water repellent, this would also serve to minimize icing under winter conditions.

This antenna provides a very sturdy mechanical arrangement and is very useful in exposed locations. Since it does have reasonable gain, care should be taken to mount the antenna with its axis as near vertical as possible to maximize its omnidirectional characteristics in the horizontal plane.

The sources of the information presented here are C. W. Suckling, G3WDG, and an item in *RadCom* (RSGB), Aug. 1981, page 732.

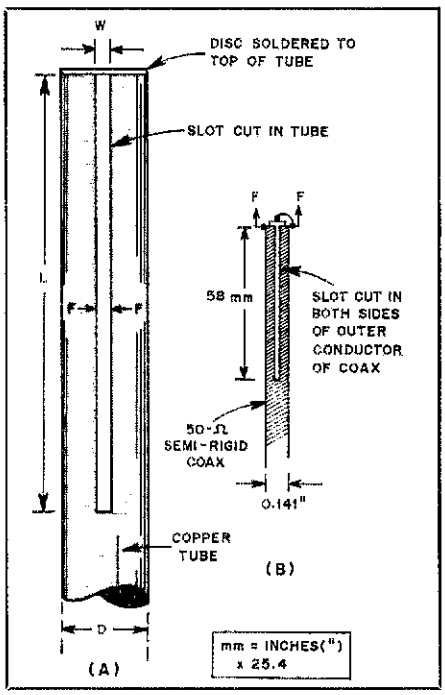


Fig. 1 — Diagram of the 1.3-GHz Alford slot and balun. Dimensions: For D = 1.5 in. (wall 16 swg = 0.064 in), L = 509 mm and W = 11 mm. For D = 1.25 in. (wall 20 swg = 0.036 in.), L = 509 mm and W = 4 mm.

CONFERENCES

The Central States VHF Conference is scheduled for July 29-31, 1982 in Baton Rouge, Louisiana. Keep an eye open for further announcements in *QST*.

23-CM

The Texas-Florida path has been worked again on 1296 MHz. This time, WB5LUA worked W4ODW at 0325Z on January 20 over a 650-mile path. Signals were 529/339. W4ODW was running about 75 W to 4 × 10-element quagis, and I suspect WB5LUA was running several hundred watts to 4 × 4 four-element loop Yagis.

6-CM NEWS

Yes, there is life on 6 cm (5760 MHz), but not a lot! *Break-in*, December 1981, reports a 180.4-km contact between ZL3NW and ZL3FJ/ZL3TCH/ZL3THJ/ZL3HB/ZL3THC. One-watt klystrons were used, and the signals were described as "colossal." I am not sure of the current world DX record on this band, but 180 km is probably close. As of 1980, the European record stood at 152 km (G3BNL/P-G3EEZ/P). Does anyone know, or would anyone like to claim, the U.S. record?

13-CM NEWS

G3WDG reports copying DF0EME (ex-DJ4AU) on 13-cm EME. Both West Germany and Holland have now lost their allocation at 2304 MHz, so European EME on 13 cm has moved to 2320 MHz (PA0SSB and DF0EME). Signal strength on a 12-ft dish was "o" copy and about as strong as the ALSAP beacon on the moon.

*103 Division Ave., Millington, NJ 07946

Strays

SATELLITES AND SCHOLARSHIPS: KEYNOTES OF THE ARRL FOUNDATION ANNUAL MEETING

The scholarship program, and the future of amateur satellites in space were the issues of the day as the Board of Directors of the ARRL Foundation met in annual session recently to discuss its role in the future. In attendance at the invitation of the Board were newly elected ARRL President Vic Clark, W4KFC, and General Manager David Sumner, K1ZZ.

With Vice President John Sullivan, W1HHR, in the Chair, and Secretary Andrea T. Parker, K1WLX, recording the minutes, the Board heard the Treasurer's report. George duPont, WA1SVY, reported balances of the various accounts, and noted the July 1981 disbursement of $56,115 to AMSAT in support of its activities in preparation for a Phase III-B launch (Minute 5).

Mrs. Parker, as Scholarship Committee chairman, reported that the committee will screen applications for the YLISSB, and the Long Island Scholarship awards after the passing of the May 1 deadline for applications. As Foundation secretary, she reported on her handling of significant contributions (Minutes 8 and 9.

Director Jay Holladay, W6EJJ, Amateur Satellite Service liaison, reported on the financial needs and condition of AMSAT, and the upcoming launch of the Phase III-B satellite. He noted with pleasure the donation of another $10,000 in matching funds made by the ARRL. Mr. Holladay closed by emphasizing the importance of a successful Phase III-B launch in generating interest and financial support for future satellite operations (Minute 13). The Board voted at Minute 26 to disburse an additional $15,000 to AMSAT.

There was much discussion concerning additional fund development, including an approach to convention committees for contributions from convention attendees (Minute 33). The Foundation Board also welcomed new member Irvin Emig, W6GC, as an Industrial director.

For a complete copy of the Minutes of the Annual Meeting, write to the ARRL Foundation, 225 Main St., Newington, CT 06111.

The Twentieth Anniversary Amateur Satellite Fund Drive

The Foundation continues to receive fine support in its Twentieth Anniversary Amateur Satellite Fund Drive. With a Phase III-B satellite launch scheduled for later this year, now is the time to make your tax-deductible contribution to the Foundation. Become a part of tomorrow's telecommunications world by mailing your check to the Amateur Satellite Program, ARRL Foundation, 225 Main St., Newington, CT 06111. Thank you! — *Richard Palm, K1CE, Assistant Secretary, ARRL Foundation*

The World Above 50 MHz

Conducted By William A. Tynan,* W3XO

Why Not Make More Use of Those 2-Meter FM Rigs?

Many of the gang active on 2 meters are using multi-mode transceivers, which began to appear on the scene about five or six years ago. These rigs have certainly helped bring about a great increase in the level of ssb and cw activity on our most popular vhf band. Nevertheless, most 2-meter equipment is not of the multi-mode type. By far the majority of the gear is of the fm-only variety.

Generally, however, these fm "radios" are not like those used a few years ago when 2-meter fm was first becoming popular. In those days, crystal-controlled, converted land mobile equipment was king. Since this equipment was not designed for amateur use, the number of channels available on these units was usually very limited. Many were capable of operating only on a single frequency, while some boasted two, and a very few offered four. Next came the commercially manufactured rigs aimed at amateurs, typically including six to 12 crystal positions. The need for still more "channels" led to the birth of add-on synthesizers, the popularity of which laid the groundwork for introduction of the now-familiar synthesized transceivers especially designed for the amateur market.

On a few of these, the makers include ssb and cw capability, hence the "multi-mode" rig. In more cases, however, only fm is provided. Like most other things in this world, cost is the factor that drives the manufacturers to make such decisions. This is reflected by those in the market to purchase a 2-meter rig. Many hams conclude that fm is the only 2-meter mode that will ever interest them, so they decide not to lay out the additional cash for ssb and cw capability. While many of the rest of us feel that buying 2-meter gear without ssb and cw is like buying a car with only three wheels, others do not look at it that way. It goes without saying that each purchaser must, and will, make a decision based on perceived needs and available financial resources.

Once acquired, however, these versatile pieces of modern equipment, capable of operating on "800 channels," are seldom used for anything approaching their full capability. Like the crystal-controlled units of the late '60s and early '70s, much of the time they are parked on a favorite repeater. When the suggestion is made to "go to simplex," the owner's habitual response is almost invariably, "Okay, see you on 52," as if that is the only non-repeater channel in the rig. Occasionally, some other simplex channel is named, but not too frequently.

This pattern can be observed by tuning across the fm portion of the band. Other than the more popular repeater frequencies, 146.52 is the busiest spot one encounters. Activity is sometimes noted on the other established simplex channels such as 146.55 and 58. Occasionally, signals can even be heard on the non-repeater channels above 147 MHz, but activity on them is pretty rare in most parts of the country. The portion of the band between the new repeater segments from 144.9 to 145.1 is almost completely devoid of activity. This lack of use of a substantial part of this popular amateur band certainly does not appear to make much sense. I know of no real impediment to its use for fm simplex. It has not been in general use for ssb since 1978, when Technician class licensees were granted operating privileges between 144 and 145 MHz. Surely 500 kHz is sufficient space for those of us who prefer to use narrowband modes such as cw and ssb, with some space left over around 144.4 for a-m, as several have suggested. In fact, dispersing such operation too much, or dividing it into two or more segments, tends to fragment activity and make it harder for participants to get together. As a result, the overall level of activity often suffers. This was the situation that existed on 2-meter ssb until the advent of the rule change affecting the operating privileges of Technicians.

In addition to the limitations that many 2-meter fm operators impose on themselves by sticking to the old channels left over from the crystal control days, they also tend to miss a lot of what many of us consider to be the real fun of hamming. This is as a result of being exposed only to the "quasi-commercial" type of operating procedure often encountered on the fm portion of the band. Has not the time arrived for greater use of the 200-kHz segment between 144.9 and 145.1 for fm simplex, possibly with a stress on a more traditional "ham" style of operating? Maybe, as a result of this exposure to another side of Amateur Radio, a number of fm-only operators might be inspired to try other modes and bands. One aspect of traditional ham operating techniques would presumably mean that terms like "QRM" and signals like "CQ" would be acceptable, rather than being greeted with derogatory comments, as is sometimes the case above 146. A logical calling frequency for such activity would appear to be 145 MHz, with QSYs up or down after contact is established.

I have discussed the matter of increased use of 144.9 to 145.1 with several fm operators, including W3DTN, who is an old-timer on the fm scene and is well known here in the Mid-Atlantic states. Gary feels that such operation could be beneficial and notes that both fm DX-ing and local QRP work could probably be accommodated in the 200 kHz available between the repeater input and output sub-bands. Some may ask: "Why this particular part of the band? Why not 145.5 to 146 MHz?" There is a good reason for avoiding that area for general activity. The frequencies from 145.8 to 146.0 MHz are already heavily used for satellite operation. They include the uplink band for OSCAR 8 and the Soviet satellites, as well as the telemetry downlink frequency for UoSAT-OSCAR 9. Later this year, when AMSAT's Phase III-B Satellite is launched into space and opened for general use, this 200-kHz segment must also accommodate that satellite's downlink passband and beacons. In the not-too-distant future, the frequencies from 145.5 to 145.8 may be needed also to support other very exciting projects that AMSAT has under active development. One of these involves placing a transponder aboard a synchronous satellite to provide continuous 24-hour-per-day communication relay for amateurs throughout the Western Hemisphere.

In addition to those cited, I believe there is another important reason to foster fm operation in the 144.9- to 145.1-MHz portion of the 2-meter band. It concerns vhf contests. Over the past few months, I have had the opportunity to serve on an ad-hoc committee to develop and recommend changes in rules for League-sponsored vhf contests (see August 1981 *QST*, page 80, and February 1982 *QST*, page 86). Certainly the hottest issue facing this group is what to do about fm operation in these contests. A lot of the mail received by the committee calls for an outright ban on fm participation. When analyzed, however, the major objection seems to be contesting on 146.52 and, to a lesser extent, other popular 2-meter simplex channels. Few find particular fault with fm as a form of modulation. What many perceive as the problem is contesting in the channelized part of the band. Although the majority of those expressing an opinion argue for banning fm contest operation, and a number of others make similar proposals short of an outright ban, a significant number strongly support unrestricted use of fm in the contests, including a lifting of time restrictions placed on the use of 146.52 in recent years. Note that use of this frequency is banned altogether in the upcoming June VHF QSO Party (see May 1982 *QST*, page 80). It has occurred to this conductor that, perhaps with increased general use of the fm mode in another part of the 2-meter band where "traditional ham" operating procedures are the norm, few would object to that segment being used for contest operation. Thus, everyone should be happy. Those wishing to take part in contests via fm would simply congregate around 145 MHz and have at it. Those using cw and ssb would operate in their usual slot between 144.0 and 144.5. Such an arrangement would leave the "communications" oriented people and ragchewers above 146 to do their own thing without disruption from contesters.

As are all other suggestions made in this column, expressions of opinion by the vhf fraternity are welcome. Should fm operation around 145 MHz be encouraged? Will it contribute to helping build activity of various kinds? Will it help encourage those using fm to venture into other modes offering increased DX potential? Could it help bridge the gap that some perceive to exist between the type of operation existing in the fm portion of the band and that which might be considered more traditional amateur practice? Might such

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operation contribute toward solving the fm-in-contests question? Finally, what disadvantages might it have, if any? Views of weak-signal operators, as well as those devoted to the fm mode, are earnestly sought.

CENTRAL STATES VHF CONFERENCE

The Central States VHF Society will hold its annual conference the weekend of July 30-August 1 in Baton Rouge, Louisiana, at the Baton Rouge Hilton. This is always a worthwhile affair for those seriously interested in vhf and higher frequencies, and this year will be no exception. Featured speakers include John Lindholm, W1XX, of League Hq., who has been heading the ad hoc committee that is revising the rules for ARRL vhf contests; Al Ward, WB5LUA, who is well known for his exploits on all bands from 50 to 1296 MHz; and Mike Staal, K6MYC, an acknowledged expert on many varieties of antennas. Equipment for the future 902-MHz band will be a major subject of this year's conference; a category for such antennas will be included in the antenna-gain measurement event.

For more information, send a large s.a.s.e. with 37 cents postage to Ted Mathewson, W4FJ, 1525 Sunset La., Richmond, VA 23221.

VHF/UHF EXPERIMENTS TO TAKE PLACE IN JUNE

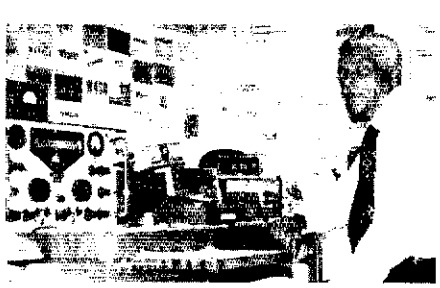
The Royal Air Force ARS is mounting a 10-day expedition to the Isles of Scilly (southwest of Cornwall's peninsula), June 11 to 25, to conduct experiments into 2-meter and 70-cm propagation paths. Emphasis will be on 144-MHz transatlantic communication via sporadic E and, possibly, tropo ducting.

Amateurs wishing to attempt communication should live on the U.S. northeastern seaboard and have EME capability. Modes to be attempted are cw and usb, with hf talkback prior to each attempt. Interested operators or clubs should contact The Administrative Secretary, Royal Air Force Amateur Radio Society, Locking, Weston-super-Mare, Avon BS24 7AA, England.

ON THE BANDS

6 Meters — As of Income Tax Day, the DX continues at a mad pace, at least for many areas. It seems hard to believe, for those of us who have not been experiencing it, but it is true, nevertheless. In some places, in fact, propagation has been nothing short of phenomenal! A person fast becoming an old hand at picking 6-meter DX spots and knowing the right time to visit them has done it again. Most will immediately guess that I am referring to Jim, W6JKV, who will be remembered as the one responsible for putting C5AEH on the 50-MHz map last November. During the first days of April, Jim headed for the South Pacific, stopping first at Fiji, where he proceeded to work many Ws and others as 3D2JT. Thereupon, he journeyed to Tonga where, as A35JT, he racked up QSOs with well over 100 Ws, along with a liberal helping of DX stations. The U.S. stations he worked were mostly 6s and 7s, quite a few 5s in Texas and Oklahoma and a few 4s in south Florida. Once again, W6JKV has demonstrated what can be accomplished with a well-organized 6-meter DXpedition utilizing high power and good antennas. Where next, Jim?

One U.S. station well placed to take advantage of the outstanding early spring propagation was W5UWB Kingsville, Texas, about 40 miles southwest of Corpus Christi. John's reports make a black-hole dweller's mouth water. Between April 5 and April 14 he came up with six new countries, to bring his total to 43. For April 5, he lists LUs 3EX, 8YYO and 4VBY, in addition to 3D2JT and several Ws, and PJ9EE on backscatter. This all took place between 2000 and 2220Z. The following day, the LUs were in again, along with HC1MD/5 and a new country in the form of OA4AWD. Also worked that day was ZL1MQ. John says that April 9 was a down day, as he worked only one new country, A35JT! After a magnetic disturbance on the 10th, April 11 turned out to be a banner day for many, including W5UWB. Beginning at 1712Z, very early for a Pacific opening, John worked FO8DR with S-9 plus signals for another new country, as well as AH8A (also a new country), H44PT, ZL1AKW, OA4AWD and A35JT again. The third new country in less than five hours came at 2130Z, when FK8CR (New Caledonia) went into the log. The 52-MHz path to Australia was negotiated a few days later when W5UWB worked VK2DDC and WA5IYX made the grade with VK2BA. A35JT was also active in that lofty portion of the band, working a number of Ws, including W5UWB.



Well-known Netherlands Antilles 6-meter operator Tirso, PJ2DW. *(photo via W4OO)*

WA8LLY/6 Santa Rosa (north of San Francisco) describes April 3 as the best day he has ever heard for the South Pacific. After an LU opening ending about 2030Z, Steve says that FO8DR and 3D2JT appeared, followed by YJ8RG, H44PT and T32AB. Signals were so strong that he, along with N6CT and K6QXY, decided to try 52 MHz and immediately heard VK9NS in QSO with VK4AUV. Both had good signals, but, because of QSY mixup, none of the three worked them at that time. Thinking that things were over for the day, Steve went outside to do some yard work, only to return to learn that N6CT had contacted 14 VKs! Nevertheless, four new countries in one day isn't bad, especially for a barefoot SB-110 and a five-element beam at 15 feet. WA7JTM Phoenix, Arizona characterizes April 3 as "the best South Pacific opening ever." Pete heard and worked many of the same stations as WA8LLY/6. Contacts with A35JT, H44PT and VK9NS, along with OA4AWD and YJ8RG, worked on the 11th, bring his country total to 54.

From south Florida, K1FJM/4 reports snagging three New Zealanders on April 12. Between 2130Z and 2200Z, Pete hooked up with ZL3s NE, ADT and AAU. And just to show that these fabulous goings-on were not entirely limited to the southern climes, VE3BFM reports working LUs 8EEM, 6DLB, 7DZ and 3EX around 1430Z, April 11. Bob runs just 30 watts to a 4-element beam.

The 10-meter liaison frequency of 28.885 MHz has certainly proven its worth over the past few years. Listening to it, especially when conditions are good in other areas but not in your own, can be informative, if frustrating. A fine example of this was provided by ZD8TC at 1315Z April 15, a few days before Ted was scheduled to leave the island. When I checked the frequency, before leaving for work, I was greeted by signals of the Athens beacon, SZ2DH 50.016, and the Hong Kong beacon, VS6SIX 50.075, being relayed by ZD8TC. Yes, both were being received well on Ascension, but here 50 MHz was stone dead!

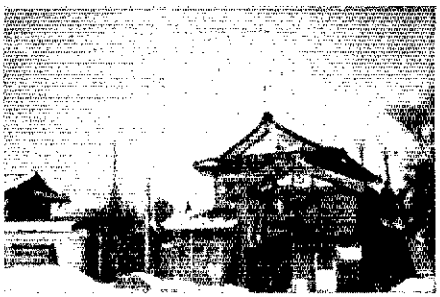
By the time you read this we will be well into the summer Es season. Let's remember the thoughts presented last month, and at other times, with regard to leaving the first 25 kHz above 50.1 open for DX operation. This conductor can be found near 50.2, and I will be looking forward to working as many of you as possible.

Don't forget the ARRL VHF Contest, June 11 and 12, and the SMIRK bash one week later. An s.a.s.e. to K5ZMS will bring details of the latter event.

Have a DX-filled summer.

2 Meters — The major propagation news of this reporting period is the strong aurora that occurred Saturday afternoon, April 10. All bands through 70 cm were affected, although activity was slow to get underway because of the time of day. K1BGU Attleboro, Massachusetts, found conditions quite to his liking. Between 1500 and 2045Z, Steve worked VEs 3FDP, 3DSS, 2DFO and 1UT, in addition to K9MRI, W9SR and K9NM all Indiana; Ohio stations K8RZB, W8LCY and K8EUR; WB8LZB Michigan; Virginians WB4IUS and KØRI/4; and the most southerly station, K4AGV North Carolina. Another who was happy to get in on a good buzz session was K2UVG/9 Indianapolis. Hank, being a recent transplant from southern California, has not had the chance to participate in auroral openings previously. Using 90 watts to a single 19-element Boomer at 63 feet, he succeeded in working WB3LJK Maryland, KB8RQ Ohio, WA3OJH Pennsylvania and KC9OZ in his own state. Heard, but not worked, were stations in New York, Wisconsin and South Carolina. Even this conductor managed to find time to participate. It was fun to get off a few quick QSOs. Worked from here, using 80 watts to a 15-element Yagi, were VE3DSS, VE2DFO, KB8RQ and K9MRI.

WA4LYS Florida reports continued EME success having now worked a total of 48 states and needing only Wyoming and Hawaii to complete WAS. Paul also has such DX tidbits as UA3TCF, UB5JIN, OH7PI, LA1TN, OK1MBS, YU3ULM and JA6DR in his log, and this is not the complete list. KB7Q Bozeman, Montana, continues his moonbounce success. During March, Gene worked WB5ERD Texas, WBØTEM Iowa, and K1MNS New Hampshire, along with OH7PI and SM7BAE.



The QTH of JA9BOH. This 16-Yagi array has been instrumental in pushing Kimio's 70-cm standing to 46 stations in 18 countries and WAC. His U.S. contacts include stations in 19 states.

Over the past few months, N4PZ Sarasota, Florida, has been running an attended beacon on 144.090, aimed at South America. Power output is about 50 watts into an array of eight 4.2-wavelength Yagis of NBS design, which Steve also uses for EME. The intent of these transmissions has been to look for transequatorial propagation similar to the type frequently encountered farther south. His efforts were rewarded when, on March 16, reception was reported by LU6EEG Bahia Blanca, Argentina, a distance of approximately 4600 miles or 7400 kilometers. These tests will be resumed in September, in time for the fall TE season. Any South Americans hearing the transmissions are requested to call Steve, LU8YYO, or KP4EOR immediately. N4PZ's telephone number is 813-377-1314, and his address is Stephen R. Gross, 7398 Leewynn Dr., Sarasota, FL 33582.

1-1/4 Meters and Down — W3GPY writes that he is back on 220 EME to stay. Mike had put up a temporary antenna last fall to work K5FF, but now he has a permanent installation. So far his moonbounce list includes K5FF, W5FF, W6PO, KL7NO, WB6NMT, K7NII, K9XY, K5BMG, WD5CAP, K7ND and WB5LUA. Along with those worked via other modes, Mike's 1-1/4-meter state total now stands at 37.

The East Coast 70-cm Net continues to meet every Wednesday evening beginning at 2100 local time on 432.090. Aided by two well-equipped net control stations, WA4ZIA near Charlotte and K4CAW Greensboro, the net regularly attracts check-ins from a dozen or more states from New York to Florida. In its almost three years of existence, some 102 stations in 15 states have participated. Generally the procedure calls for the NCS to begin the net looking south, working around to the northeast in about 45 minutes to an hour. So, if you are in that direction and don't hear anything at the appointed net time, be patient. Checking in provides a good chance to test out equipment and determine band conditions. The net also serves as a good stimulator of activity. Also useful in promoting activity, the *432 News* published by WØOHU regularly lists schedules kept by many active 70-cm stations.

The moonbounce Dxpedition to Kentucky mounted by K2UYH and W3HQT came off in early April, but not exactly without a hitch. The group, which operated under the call KM4Q and received invaluable assistance from the Ashland Radio Club, ran into considerable difficulty from Mother Nature. High winds, the first night, blew over the portable dish, causing considerable damage, but not before AD1C, W1JR, W5FF and K5FF went into the log. The second night, being unable to make repairs to the dish, they put together an array of Yagis and worked another half-dozen stations, despite not being able to see the moon because of clouds. At least two people consider the operation to have been a great success, as they qualified for 70-cm WAS as a result of it. They are W5FF and W1JR, both very deserving of this hard-to-get award. In the case of W1JR, this gives him nine WASs. Joe has now earned the award on all bands from 160 meters through 2 meters, and now 70 cm. It is believed that he is the first to have achieved WAS on nine bands! What next, Joe, 1-1/4 meters?

In other high-band EME news, WB5LUA is reported to have worked Z25JJ, the new call for ZE5JJ, on 23 cm, and the 13-cm signals of DFØEME have now been heard off the moon by G3WDG. Many Europeans are suggesting that, on 23 cm, EME activity be moved from 2304 to 2320.3. They are in the process of losing the bottom end of the band as a result of WARC decisions.

Club Corner

Conducted By Sally O'Dell,* KB1O

BE GOOD TO THE CLUB YOU JOIN

The first impression someone gets of your club is lasting and usually hard to change. Make that "first contact" a positive one. Club meetings are usually your first contact with new hams. Think about first impressions now, before the first prospective member walks through the door!

What makes a good first impression in clubs? Some people feel that beginning meetings with all people in the room stating their name and call sign is enough. I don't! The beginning starts with a name tag on *everyone* who walks through the door. Any visitors or members who enter the room without a tag are provided with a sticky paper tag on which to write their own name. These are widely available; encourage the use of name tags!

Is a six-hour business meeting the next item on your agenda? Consider cutting the business meeting down to 30 minutes and adding a program of equal length. The business part of a club meeting is important, but couldn't it be conducted more efficiently in committee or in monthly board meetings? As a rule, stop any business meeting that drags on more than 30 minutes. Once the 30-minute rule is established, you'll be surprised at what can be accomplished in that amount of time!

One way to draw members and newcomers to your club meetings each month is an interesting, exciting program. These programs have to be planned in advance. Any style of program is appropriate, ranging from a lecture to a how-to (hands-on or construction project), to a movie. The program doesn't always have to be related to ham radio. Have you tried a visit to a local manufacturer? The opportunities are endless.

One good time to meet informally is the break between the business meeting and the program. This is the time to chat with friends and also to meet new people and to invite them out after the meeting for coffee. The *after-meeting* meetings are the ones at which people get to know each other. Don't forget to ask new people for an address and a phone number before you part company, so you can keep in touch (e.g., call and say you enjoyed meeting them).

A reminder is important and should be issued just before the next meeting. This can be in any form — a postcard, a letter, a newsletter, or even a phone call — whatever works. The important idea is to let everyone know *before* the meeting that the time is coming soon.

Many people are interested or involved in clubs, but who are these people? More specifically, who is interested in your club? It's hard to say, but here are some statistics. Of the 2000 ARRL-affiliated clubs, 1535 are general-interest clubs. These clubs appeal to all areas, not just DX or repeaters, but to everything including camaraderie. They usually combine a little of each area of ham radio, as they run classes, get involved in contests and draw new people into the association.

Your club is important to you. If you want it to be important to others, including your club's members, remember the steps to form a good club and keep it going:

1) Encourage the use of name tags.
2) Keep business meetings short.
3) Add an interesting program of equal length to the business meeting.
4) Introduce club members to *all* visitors.
5) Send a written reminder a week before the next meeting.

A club "says" many things. Do outsiders hear voices saying, "Join *me*! I'm the club for you!"? If this is what you want your club to say, make it happen. It's up to you.

*Club Program Manager, ARRL

A GOOD PLACE FOR AN EXHIBIT

☐ Monthly board meetings of the Baton Rouge ARC are held in the local library. National Hobby Week was in January, and it gave the library an opportunity to invite its regular patrons to a "show and tell." The club set up its station (W5GIX), with RTTY, A1, A3 and 2-meter capability, in the library lobby. Working antique oscillators were also on display. This provided a great opportunity for the public to learn what ham radio is all about. — *Russ Allor, N5ADF, Baton Rouge, Louisiana*

Next time your club wants to do some public relations work, try your local library.

50 Years Ago

June 1932

☐ In his editorial, Secretary Warner reports that the Senate is considering charging license fees for radio stations. Radio administration costs about a million dollars, and $670,000 could be raised to help balance the budget. Radio amateurs would be included in this proposal: $5 the first year and an average of $3 thereafter. The ARRL Board of Directors voted to oppose any charge of more than $2 per year to an amateur.

☐ "What's Wrong With Our C.W. Receivers?" is the intriguing title of Jim Lamb's 8-page lead article that discloses his now-universal "single-signal" c.w. receiver principle. The key, of course, is superheterodyne reception, good i.f. selectivity, and a b.f.o. instead of an oscillating detector. (With no constructional details, this milestone may have been overlooked by many readers.) Jim mentions that most c.w. operators consider the superhet OK for 'phone but inferior to a good regenerative receiver for code reception.

☐ Vere Davis, W9FJV, tells how he gets a "D.C. Plate Supply From Ford Spark Coils." Using the popular '01-A receiving tubes (with grids tied to plates) as diode rectifiers, and using two of the ubiquitous tin-Lizzy ignition devices, he runs almost 25 watts to his Hartley-oscillator transmitter.

☐ "Fun on Five Meters" is a report on the latest gear built by some of the enthusiastic pioneers. Emphasis is on portability, and a new circuit, "push-pull unity coupling," by W1ANC, is featured. George Grammer has a two-tube super regen design, but the "hot" approach by several aficionados is push-pull oscillators mounted at the midpoint of the half-wave dipoles. (Now *that's* reducing feedline losses!)

☐ George Grammer, W1DF, explains the differences and advantages/disadvantages of amplifiers in "The A, B and C of Amplifier Classifications."

☐ "A New Group of Receiving Tubes" reports the '56, '57 and '58, a new 2.5-volt indirectly-heated-cathode series — triode, sharp cutoff and variable-μ. (They were the standard receiving tubes for some time, until 6.3-volt heaters took over.)

☐ In the *Experimenter's Section*, John Shanklin, W3CIJ, reports that a high-pass filter in the audio system of his 'phone rig improved intelligibility and saved modulator power. He tested the filter first on reception, and became a believer. In the same department, Frank D. Lewis, W9AOG, tells how he moves crystal frequencies by slipping a square of paper between the crystal and the top plate. Two slips moves the frequency still more but the power begins to drop.

25 Years Ago

June 1957

☐ The editorial reports that the FCC is contemplating rescinding amateur privileges at 11 meters and permitting the Citizens Radio Service to move in; presently CB is spotted at 460-470 Mc. The editor is opposed to this action, since (short of v.h.f.) 11 is the only band where hams can work duplex, tone-modulated telegraphy, and facsimile.

☐ "Autosync' Frequency Control", by R. J. Moser, W8OPB, describes how the author uses his modified Super Pro receiver and a home-built exciter to give transceiver operation on 160 through 20 meters. (The Collins KWM-1 transceiver, announced last month, covers 20, 15 and 10.) W8OPB uses the v.f.o. of the receiver for transmitter frequency control, but he points out that an additional transmitter v.f.o. would help when U.S. and DX 'phone assignments don't coincide.

☐ V.h.f. Editor Ed Tilton reports on the "Lighthouse Tube Tank Circuits for 432 Mc." of W4ECL. These linear circuits of copper flashing and tubing take no art awards, but they work very well with the "lighthouse" tubes available on the surplus market.

☐ V.h.f. pioneer (since the late '20s) Frank C. Jones, W6AJF, describes his "Low Cross-Talk Six-Meter Converter," designed for use in high-activity areas. The key is *beaucoup* tuned circuits and proper operating biases on the available tubes.

☐ "A Novel Electronic Transmit-Receive Switch," by Sam Sabaroff, W3DM, is one of those "it-won't-work" things when you first read about it. Hang a receiving tube onto the plate of the transmitter output tube? No way! The author lets the 6AH6 tube bias itself to avoid destruction, and couples the output through a broad-band transformer.

☐ To avoid using an antenna tuner, J. M. Shulman, W6EBY, connects "A 200-Watt Balun Coupler for Center-Fed Antennas," an air-core coil assembly giving a 1:1 or 4:1 balun. It works on 80 through 10 meters.

☐ "Mounting a Beam Antenna on a Telephone Pole" is easy if you copy the method of Tom Bryant, W0KLP. He uses readily-available standard pipe fittings.

☐ The 10-meter "Wonder-Bar" antenna of K6OFM is enlarged and liked by Ralph Rosenbaum, W5ECP, as told in "A 'Wonder' on 20 Meters." The center-loaded fan dipole spans 16 feet.

☐ Although sideband is beginning to overtake a.m. in the 'phone bands, Irwin R. Wolfe, W6HHN, makes an excellent case for "A 500-Watt Audio System." He uses a pair of 4X250Bs in AB1, emphasizing the low drive requirements and ability to use an ordinary interstage transformer.

☐ A preliminary report on the foreign DX Contest high (claimed) scores shows KH6IJ leading single ops with 466,074 and KH6CBP leading multi ops with 435,672. (Nice going, Katashi. Like they say, "When you've got it, flaunt it!") — *Byron Goodman, W1DX*

[Fifty years ago (QST, March 1932) the *Experimenter's Section* reported the new "push-push doubler" circuit, sent in by both D4AAR and W6VX (and W2CTK). In his note to *QST*, W6VX credited Jim Brown, W6AY, with the configuration, a point the *QST* columnist of the day ignored at the time despite subsequent pleas by Dave, W6VX, to give credit where credit was due. Fifty years later, after hearing from Dave, I hasten to set the record straight and to apologize for this oversight. — *Byron Goodman, ex-W6CAL*]

In Training

Conducted By Steve Pink,* KF1Y

VOLUNTEER EXAMINING

The ARRL Proposal to Restructure FCC Examination Procedures was the subject of an April "Happenings" item (p. 58) in *QST*. This proposal was made in response to the declining opportunities for an amateur to take an exam at an FCC field office. Over the last few years some FCC field offices have closed, exams at hamfests and conventions have been discontinued, and FCC travel to towns within districts has been severely curtailed. And the situation will almost certainly grow worse. Budget cuts at the FCC have forced the reduction of staff across a number of bureaus, with more reductions on the way. The Private Radio Bureau, for example, which oversees the Amateur Radio Service, has recently announced significant cuts in its Washington staff. The time has come for the amateur community to provide the alternative.

The League has proposed a two-part program; one for the Novice and one for Technician and higher. For the entry level, we are asking the FCC to certify nonprofit organizations and accredited educational institutions that would in turn certify a corps of volunteer instructors to administer FCC-approved training programs that would culminate in the giving of both the code and written portions of the Novice exam. An instructor would be asked to create his or her own written test from a large pool of approved Novice exam questions. Under this system an instructor/examiner would attest on a 610 form that a student has passed both code and theory, and the FCC would simply issue a license. Training programs would be developed by the organizations whose certification would depend on the quality of their programs and their ability to coordinate and monitor a field network of instructors. The FCC could continue its present procedure of mail-back examinations for persons not wishing to participate in a training program, or it could allow such an applicant to take the Novice exam

I WANT *YOU*
TO GIVE AMATEUR RADIO EXAMS

from a certified instructor of one of the organizations.

Technician and Higher

The League's Proposal for the Technician and higher class license examinations would change the present structure in two important ways. We are asking the FCC to certify organizations to in turn certify volunteer examiners (as opposed to instructors) to administer tests around the country. A certified examiner must be at least 18 years old and an Extra Class licensee because he or she would be asked to administer all tests through Extra Class. Three certified volunteer examiners must be present at the examination, and all three must sign the applicant's 610 form. To ensure the integrity of the examination process, examination times should be scheduled well in advance, announced publicly and held in public places, whenever possible. Under this proposal, hamfests and conventions could again provide excellent opportunities for amateurs to upgrade. Off-season events such as weekend club gatherings could also function as testing situations. No more would an amateur have to drive through two states in the middle of the week to take an exam. A certified organization would provide an even geographical distribution of volunteer examiners to make it more convenient and less costly to take a test.

Any meaningful volunteer examining program must protect the integrity of the exam questions. To this end we are asking that the bank of questions for each exam be increased to at least 500. The FCC would approve a standard bank of questions based on items suggested by each certified organization. An organization would then create tests of 50 questions from the bank, selecting items from each of the categories in the FCC Study Guide. Comprehension-style code tests at the 5, 13 and 20-wpm levels can also be created by the organization on cassette tapes. The organization could then mail the tests and answer keys to its teams of certified examiners to administer to applicants. Examiners would mail tests and signed 610 forms back, for screening, to the organization, which would then send them to the FCC for processing. The Commission's role would be reduced to monitoring the program and issuing licenses.

As always, we need your input and support on this crucial issue of volunteer examining. As an ARRL instructor you may play an important role in any future examination program. At present, though, for any volunteer examining program to come about, we must see the passage of House of Representatives bill 5008 which, among other things, gives the FCC statutory authority to use volunteers to give tests. The bill is now in Committee and a letter to your Congressman will help its passage.

Let us have your ideas and comments on the above proposal. Future budget cuts will very likely force the FCC to change examination procedures: How would you like to have it done? QST

*ARRL Training Program Manager

Special Events

Conducted By Mark Wilson,* AA2Z

Smith Falls, Ontario: Smith Falls ARC will operate CZ3SFR from *May 22 until June 2* commemorating the 150th anniversary of the Rideau Canal system linking Ottawa to Kingston. All hf bands and 2 meters. QSL for large s.a.s.e. to: P.O. Box 215, Smith Falls, ON K7A 4T1, Canada.

Fairview, Kentucky: Pennyroyal ARS members will operate from *1500-2400Z June 5* from the Jefferson Davis Memorial State Park. Frequencies: phone — 3.940 7.260 14.310 21.410 28.610; cw — 3.730. Certificate available; members will give out QSL info on the air.

Grand Marais, Manitoba: F.R.E.D. Net will operate VE4AAA during Catfishpedition '82 on *June 5-6*. Suggested frequencies: phone — 14.250 21.350 28.550; cw — 14.075 21.150 28.150. Certificate for large s.a.s.e. and IRC to: Al Hanson, 460 Greenwood Pl., Winnipeg, MB R3G 2P3, Canada.

China Township, Michigan: Ford Tin Lizzy Club, Metro Chapter, will operate N8BYY from *1700Z June 5 until 0500Z June 6*. Operation in the General class portions of 40 and 15 meters. Special QSL for an s.a.s.e. to: Box 545, Sterling Heights, MI 48077.

Pea Patch Island, Delaware: Independent AR Group of DE members will operate from Fort Delaware, a Civil War prison, the weekend of *June 5-6*. Operation in the General class phone bands during daylight hours. Special QSL for s.a.s.e. QSL info will be given on the air.

Poughkeepsie, New York: Poughkeepsie ARC will operate K2KN from *1300Z June 6 until 0100Z June 7* during the opening celebration of the Samuel F. B. Morse house. Frequencies: phone — 3.982 7.282 14.282 21.382 28.582; cw — 3.682 and 82 kHz up from lower band edge; Novice — 45 kHz up from lower band edge, even hours only. Special certificate and QSL cards available. QSL info will be given on the air.

St. Louis, Missouri: Emerson Electric ARC will operate *June 11-13* during a Boy Scout "Adventuree." Frequencies: phone — 14.290 21.360; cw — 7.030 7.130. QSL via: Emerson Electric ARC, Mail Box ERC-1, 8100 W. Florissant Ave., St. Louis, MO 63136.

Norfolk, Virginia: Tidewater-area radio clubs will operate W4NV *June 11-14* as part of the "Harborfest" tricentennial celebration. Operation on 80-2 meters, cw and phone. Certificate for large s.a.s.e. to: KC4YX, 3101 Petre Rd., Chesapeake, VA 23325.

Maryhill, Washington: Tri-City ARC will operate W7VPA from *1600Z June 12 until 0100Z June 13* from the site of the Stonehenge replica near here. Frequencies: phone — 3.900 14.290 21.390 28.690 146.52. Certificate available. For QSL info, contact: W7VPA Special Event, P.O. Box 73, Richland, WA 99352.

Baltimore, Maryland: WB3KUH will operate from Fort McHenry, birthplace of "The Star Spangled Banner," on *June 12-13* starting at 1600Z each day. Frequencies: first 25 kHz of General and Advanced portions of 40, 20, 15, 6 and 2 meters. Possible Novice operation. Certificate for large s.a.s.e. (include QSO number) to: Donald Oakjones, 1806 Willann Rd., Rosedale, MD 21237.

Rondout, Illinois: Libertyville and Mundelain ARS will operate W9HOQ from *0000Z June 12 until 0000Z June 13* near the site of the biggest train robbery in U.S. history. Frequencies: phone — 7.260 14.290 21.375; cw — 7.125 21.150. Certificate for large s.a.s.e. to: KB9BR, Box 656, Libertyville, IL 60048.

Troy, Ohio: Miami Co. ARC will operate W8FW from the Strawberry Festival from *1600Z June 12 until 0200Z June 14*. Operation 25 kHz from the low end of the General class phone and Novice cw bands on 40, 15 and 10 meters. Also 25 kHz from General phone band edge on 20 meters. Certificate for QSL and large s.a.s.e. to: W8FW, Box 214, Troy, OH 45373.

North Platte, Nebraska: North Platte ARC will operate WØCXH from *1700-2300Z June 12-13* during "Nebraskaland Days" in the home of Buffalo Bill Cody. Frequencies: phone — 7.250 14.290 21.400; cw — 7.150 21.150. Certificate for large s.a.s.e. to: NPARC, Box 994, North Platte, NE 69101.

Waterloo, Iowa: N.E. Iowa RAA will operate WØMG *June 12-13* to celebrate "My Waterloo Days." Frequencies: phone — 7.240 14.290 21.370. Special QSL for s.a.s.e. to: NEIRAA, P.O. Box 92, Waterloo, IA 50704.

Stone City, Iowa: Jones Co. ARC will operate KBØVC from *1300-1900Z June 13* from the site of the Grant Wood Art Festival. Frequencies: phone — 7.235 21.370. Grant Wood Country Award available from: R. Yanda, Box 67, Anamosa, IA 52205.

Welch, West Virginia: McDowell ARC will operate W8WVA *June 15-20* to celebrate West Virginia Day. Frequencies: phone — near 3.980 7.230 14.260 21.330 28.600 146.52 and local repeaters. Certificate available; address given on the air.

Spivey's Corner, North Carolina: Cape Fear ARS will operate WB4YZF from 1300-2100Z June 19 from the 14th annual National Hollerin' Contest. Frequency: phone — 7.235. Certificate available. For details, contact: Sonny Barton, N4DBA, Rte. 2, Box 532, Fayetteville, NC 28301.

Goldendale, Washington: Tri-City ARC will operate W7VPA *June 26-27* from the Goodnoe Wind Turbine Site, the largest in the nation. Operation will be wind-powered. QSL info will be announced on the air.

Houston, Texas: Johnson Space Center ARC operates W5RRR during Space Shuttle missions, providing special QSL cards and retransmitting live air-to-ground communications between the Orbiter and Mission Control in Houston. The next mission is tentatively scheduled for *June 27*. Frequencies: phone — 3.940 7.265 14.280 21.365 28.600 MHz. QSL for s.a.s.e. to: JSC Ham Club, RFD 1, NASA, Houston, TX 77058.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding publication. For example, your information would have to reach Hq. by June 15 to make the August issue. QST

*Assistant Communications Manager, ARRL

Hamfest Calendar

Conducted By Marjorie C. Tenney,* WB1FSN

[Note: Sponsors of large gatherings should check with League Headquarters for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

California: The Satellite ARC will hold its annual barbecue/swapfest on June 13, at the Union Oil picnic grounds, south of Santa Maria. Prizes, contests and a Santa Maria-Style Bar-B-Q prepared this year by the world-famous Santa Maria Elks Club chefs. Free admission to swapfest. Dinner tickets: $7.50 for adults, $3.50 for children 6 to 12 yrs. of age. Swap tables are $2.50 for each area. Talk-in on 34/94. Write: Santa Maria Swapfest, P.O. Box 2616, Orcutt, CA 93455 for tickets and more information.

Idaho: The fifth annual Treasure Valley Hamfest sponsored by the Voice of Idaho ARC and the Treasure Valley Radio Assn. will be held June 19-20, at the Mini-dome, Payette. Hours are 9 A.M. Saturday to 3 P.M. Sunday. Pre-registration is $15; at the door $20. Includes breakfast, dinner and prize tickets. Swap tables, dealers, transmitter hunts, special activities for women and children, contests and prizes. Talk-in on 84/24, 72/12 and 52 simplex. For further information, contact Samuel K. Sower, N7DOV, 1909 Grant St., Caldwell, ID 83605, tel. 208-549-8132.

Illinois: The 53rd anniversary and annual hamfest of the Egyptian Radio Club, Inc., W9AIU, will be held on our club grounds near Granite City, on Sunday, June 13. For further information, contact Egyptian Radio Club, Inc., Donald F. Birk, Hamfest Chairman, 1423 Iowa, Granite City, IL 62040, tel. 618-451-7438.

†Illinois: The Six Meter Club of Chicago, Inc. will sponsor its 25th annual hamfest at Santa Fe Park, 91st & Wolf Rd., Willow Springs, on Sunday, June 13, from 6 A.M. to 4 P.M. Admission is $2 in advance, $3 at the gate. Dealers, displays, large swapper's row, AFMARS meeting, picnic grounds, refreshments. Talk-in on 37/97 or 52. For information, write to Val Hellwig, K9ZWV, 3420 South 60th Ct., Cicero, IL 60650.

Illinois: The JARRC will hold its 17th annual hamfest at the Morgan County Fairgrounds in Jacksonville, on Sunday, June 20. Limited indoor space as well as large outdoor swap area. Tickets $2, or 3/$5. Prizes and overnight camping. Come see us on Father's Day! Talk-in on 146.52.

Indiana: The Lake County ARC will hold its 10th annual "Dad's Day" Hamfest June 20 at the Lake County Fairgrounds, Industrial Arts Building, Crown Point. Events held indoors. Prizes. Talk-in on 84/24 or 52. Tickets are $2.50. Mail check to: Lake County ARC, c/o Walley Kozol, KA9FDC, 624 N. Rensselear St., Griffith, IN 46319.

Maine: "Yankee Hamfest '82," sponsored by the Yankee Radio Club, Inc., will be held on Saturday, June 19 from 9 A.M. to 5 P.M. at the Oxford County Fairgrounds in the town of Oxford. Large flea market, displays, manufacturers' booth, women's activities, swap tables, prizes, cw contest, Ham of the Year Award, good food available. Admission at the gate is $1.50. Camper hook-ups available for Friday and Saturday nights at $3 per night. Talk-in on 28/88 and 52.

Maryland: The 5th Annual Frederick Hamfest will be held at the Frederick Fairgrounds on Sunday, June 20. Facilities open at 6 A.M. for commercial exhibitors, all housed in the main building. $10 for first table, $5 each additional table. For further information, contact Rick Ogden, N3RO, 9425 Glade Ave., Walkersville, MD 21793.

Michigan: The annual Monroe County Radio Communications Hamfest is June 13, from 8 A.M. to 3 P.M. at the Monroe Community College on Raisinville Rd., Monroe. Tickets: $2 at the gate, $1.50 advanced. Wives and children free. Parking, contests, auctions, displays, plenty of table space. Talk-in on 13/73 and 52. For information, contact Fred Lux, WD8ITZ, P.O. Box 982, Monroe, MI 48161 or call 1-313-243-1088 Hot Line.

†Michigan: Saginaw Valley ARA will sponsor "Electronic Hobby Expo '82" at the Bridgeport High School, on Sunday, June 13. Doors open at 8 A.M. Net meetings, films, displays, demonstrations, radio control, prizes, special activities for women and children. Admission: adults, $1; tables, $5; trunk sale, $2. Talk-in on 147.24 and 52. For further information, contact N8CAV or W8HZF.

Minnesota: The ACE Radio Club will hold its first radio and computer fleamarket on June 19-20, at the Moorhead Centennial Arena, Moorhead. Talk-in on 146.970 beginning at 8 A.M. For complete details, write to ACE, P.O. Box 452, Moorhead, MN 56520. Please enclose an s.a.s.e.

Minnesota: The Range-Wide Hamfest will be held on July 18, from 10 A.M. to 4 P.M., at Gunn Park, 6 miles north of Grand Rapids, on Hwy. 38. Bring the family for picnic, games and fun! Campgrounds available. Admission and tables free. Talk-in on 28/88 and 52. For more info, call or write to Bob, WDØAAF, 736 Crystal Springs Rd., Grand Rapids, MN 55744, tel. 218-326-2268 evenings.

Montana: The South Eastern Montana ARC (SEMARC) announces the 27th annual Eastern Montana hamfest to be held Saturday and Sunday, June 19-20, at Miles City. Free and commercial overnight parking and camping facilities, flea market, used-equipment auction, prizes, potluck picnic, and games for the kids on Sunday. Talk-in on 28/88. For more info, contact WB7WBA or K7HWK.

New Jersey: The Raritan Valley RC will hold its 11th annual hamfest and flea market on June 29 from 8:30 A.M. to 4 P.M. at Columbia Park, Dunellen. Admission is $3 for sellers and $2 for lookers. Prizes and a snack bar. Talk-in on 625/025 and 52. For further information call Bob, KB2EF, tel. 201-369-7038.

New York: The Staten Island ARA will hold its flea market on June 12, from 9 A.M. to 3 P.M. (7 A.M. for sellers), at All Saints Episcopal Church, Staten Island (I-278 to Victory Blvd. exit, proceed east on Victory Blvd. for 1/2 mile, turn left onto Crystal Ave.). No charge for buyers, $3 per space for sellers (sellers provide own tables), $1 for electricity. Refreshments available. Talk-in on 28/88 and 52. For further information, send s.a.s.e. to George Rice, Jr., WA2AMJ, 480 Jewett Ave., Staten Island, NY 10302.

North Dakota: The 19th annual International Hamfest will be held July 10-11 at the International Peace Gardens between Dunseith, and Boissevain, Manitoba. Activities will be held on the Canadian side of the Gardens in the Canadian Pavilion. Excellent camping available. Activities include: transmitter hunts, mobile judging, cw and QLF contests, seminars, flea market, ham auction, YL activities, Saturday-night dance, Sunday-morning breakfast, prizes and fun. For info, contact WDØGMD or WDØGRC.

Ohio: The 15th Annual Goodyear ARC Hamfest will be held Sunday, June 13 from 10 A.M. to 5 P.M. at Goodyear Wingfoot Lake Park, near SR 224 and 43 east of Akron. Flea market sellers $1 per parking space outside, dealers inside $5 per table. Advance reservations suggested. Picnic tables available, concession stand. Many prizes. Talk-in on 04/64. Family admission $2.50 advance, $3 at the gate. For further information, advance tickets and table reservations, please contact Don Rodgers, WA8SXJ, 161 S. Hawkins Ave., Akron, OH 44103.

†Ohio: The Champaign Logan ARC, Inc. annual hamfest and flea market will be held Sunday, June 13 at the Logan County Fairgrounds, Bellefountaine. Gates open at 7 A.M. (EDST). Many prizes. Tickets are $1.50 in advance, $2 at the door. Tables are $3 in advance. Contact M. A. (Bud) Griswold, W8JXM, P.O. Box 301, Urbana, OH 43078 for information, tickets or tables. Check in on 60/00.

Ohio: The Lancaster and Fairfield County ARCs will hold its annual Lancaster Hamfest on Sunday, June 20 at the Fairfield County Fair Grounds in Lancaster. Tickets: $2 in advance, $3 at the door. R/C model aircraft demonstration. Refreshments, prizes, parking. Flea market tables available or bring your own. Tables $2, out of trunk $1. Talk-in on 03/63 or 52 simplex. Write: Box 3, Lancaster, OH 43130, for information and advance tickets.

Ontario: The 8th annual Ontario Hamfest will be held at the Milton Fairgrounds, Milton, on Saturday, July 10, hosted by the Burlington ARC, Inc. Flea market, displays, latest state-of-the-art, auction, contests and prizes. Admission $3, $2 for pre-registration. Camping available. For advance registration, contact Mike Coff, VE3MWR, P.O. Box 836, Burlington, ON L7R 3Y7, Canada.

Pennsylvania: The Ridley School District, in cooperation with the Delaware County American Radio Association (DCARA), will be holding their third annual hamfest on Saturday, June 5, beginning at 9 A.M., at the football field of the Ridley South Junior High School, Ridley Park. Admission is $2, tailgating $3.

Pennsylvania: The Harrisburg Annual Firecracker Hamfest is Sunday, July 4, sponsored by the Harrisburg RAC, at the Shelisville VFW picnic grounds, Exit 27, I-81, north of Harrisburg (follow signs east of Exit 27, 1 mile). Tables available or bring your own. Admission $3, women and children free, tailgating $2.50. Many prizes. Talk-in on 16/76 or 52 simplex. For additional details, contact KA3HZW, 131 Livingston St., Harrisburg, PA 17113 or tel. 717-939-4957.

South Dakota: The Annual South Dakota Hamfest will be sponsored by the Black Hills ARC, July 10-11, at the Surbeck Center, SD School of Mines & Technology, Rapid City. Pre-registration is $7, $8 at the door. Prizes, free tables for flea market, forums, contests, picnic. For further info, write to Black Hills ARC, c/o Rudy, WBØPWA, 4822 Capitol, Rapid City, SD 57701. Talk-in on 34/94.

Vancouver: The 1982 Northwest DX Convention will be held on July 31-August 1, at the Richmond Inn, located near the Vancouver International Airport. For additional information and program, write to Fraser Valley DX Club, Box 3112, Langley, BC V3A 4R3, Canada.

Virginia: The 1982 YLRL Convention will be held on June 18-20 at the Crystal Gateway Marriott Motel, Crystal City, Arlington, sponsored by the Washington Area Young Ladies ARC. This is the 43rd anniversary of the YLRL and their 9th international convention. For further information, contact WAYLARC, YLRL Convention 1982, 2012 Rockingham St., McLean, VA 22101.

†West Virginia: The Tri-State ARA 20th annual Huntington Hamfest will be held at Camden Park, off Rte. 60 West in Huntington, on June 12, from 9 A.M. to 3 P.M. Admission is $3, 12 years old or younger free. Many activities. Talk-in on 04/64 or 52. For information, write to TARA, P.O. Box 4100, Huntington, WV 25729, tel. 304-429-1920 after 5 P.M.

Wisconsin: The YL International Singlesidebanders (YLISSB) will hold their 1982 convention in Milwaukee on July 8-11. DX Roundup, with presentations by DX members attending. Prizes, banquet and many activities. Detailed information may be obtained from Sus Musachi, KB9OC, P.O. Box 18123, Milwaukee, WI 53218 (business-sized s.a.s.e., please).

Wisconsin: The South Milwaukee ARC will hold its annual swapfest from 7 A.M. to 5 P.M. Saturday, July 10, at the American Legion Post 434, 9327 S. Shepard Ave., Oak Creek. Parking, picnic area, sandwiches and refreshments are available. Overnight camping. Admission $2. Many prizes. Talk-in on 146.94. For details, including a map, write to South Milwaukee ARC, P.O. Box 102, South Milwaukee, WI 53172.

†ARRL Hamfest

*Convention/Travel Coordinator, ARRL

Coming Conventions

June 4-6
Texas State, Dallas

June 4-6
Southwestern Division, San Diego, California

June 5-6
Oregon State, Seaside

June 12-13
Southeastern Division, Atlanta, Georgia

June 19-20
Kansas State, Salina

July 2-5
ARRL/CRRL Midwest, Saskatoon, Saskatchewan

July 3-4
West Virginia State, Weston (Jackson's Mill)

July 11
Indiana State, Indianapolis

July 23-25
Oklahoma State, Oklahoma City

August 6-8
Northwestern Division/Rocky Mountain Division, West Yellowstone, Montana

August 7-8
North Florida Section, Jacksonville

August 22
Illinois State, St. Charles

September 11-12
Georgia State, Warner Robins

ARRL NATIONAL CONVENTIONS

July 23-25, 1982
Cedar Rapids, Iowa

October 7-9, 1983
Houston, Texas

July 20-22, 1984
New York, NY

SOUTHEASTERN DIVISION CONVENTION

June 12-13, 1982, Atlanta, Georgia

The ARRL Southeastern Division Convention and the 54th annual Atlanta Hamfest will fill the Downtown Marriott Hotel, June 12-13. Second in size only to the Dayton Hamfest, the gathering will feature 35,000 sq. feet of exhibits in air-conditioned comfort, with an even larger area of covered flea market items just a few feet away. Thousands of new and used communications items will be available, along with the best in technical knowledge and state-of-the-art information. Prizes will be given almost continuously both days.

Almost two dozen forums will examine and explain the latest information on Amateur Radio, microcomputers, TVROs and many other interesting subjects. Many entertaining opportunities for the entire family will be available in and around the hamfest.

FCC examiners will be on hand to provide testing opportunities to the hopeful among you. No prior forms required; exams start promptly at 8 A.M. (Saturday only). Those wishing to take tests must arrive between 7:30 A.M. and 8 A.M.

Save time and money with an advance registration of $5, plus $1 for spouse. Children free. Two-day ticket is $6 at the door, plus $1 for spouse. Flea market spaces are $10 a day, with no in-and-outs permitted from the flea market area. For overnight reservations, contact Marriott and other motel-hotel facilities directly. Food will be available on-site and nearby. For full information, write The Atlanta Radio Club, P.O. Box 27553, Atlanta, GA 30327.

KANSAS STATE CONVENTION

June 19-20, 1982, Salina

The Central Kansas Amateur Radio Club (CKARC) welcomes you to the ARRL Kansas State Convention to be held on Saturday and Sunday (June 19-20) at the Red Coach West Motel, Salina. The Red Coach features an indoor pool as well as ample space for our large commercial display, meeting rooms and excellent banquet facilities. We will be using their large parking lot for a Dayton-style flea market. Programs include: ARRL Forum with Paul Grauer, WØFIR, Midwest Division Director; DXing conducted by John Kanode, N4MM, Roanoke Division vice director; and League Hq. program presented by Sally O'Dell, K1BO, ARRL club program manager. Other activities include a cw contest, AMSAT and Antique Amateur Radio. We will have Ladies' Programs both days.

The banquet featuring the Swedish Dancers will start at 6:30 P.M. A microwave oven will be awarded during the banquet. Following the banquet there will be a Wouff Hong ceremony at midnight.

Talk-in will be on 147.63/03 and 146.52 simplex. There is plenty of motel space nearby. We will be happy to reserve a room for you at the Red Coach.

General registration is $4, banquet is $8, Wouff Hong is $1. Other awards include a Ten Tec Argosy transceiver. For more details, contact Mike Corder, WDØFWK, 453 Tulane, Salina, KS 67401.

ARRL-CRRL MIDWEST CONVENTION

July 1-3, 1982, Saskatoon, Saskatchewan, Canada

See Canadian NewsFronts, May 1982 *QST*, p. 57, for complete details on this convention.

WEST VIRGINIA STATE CONVENTION

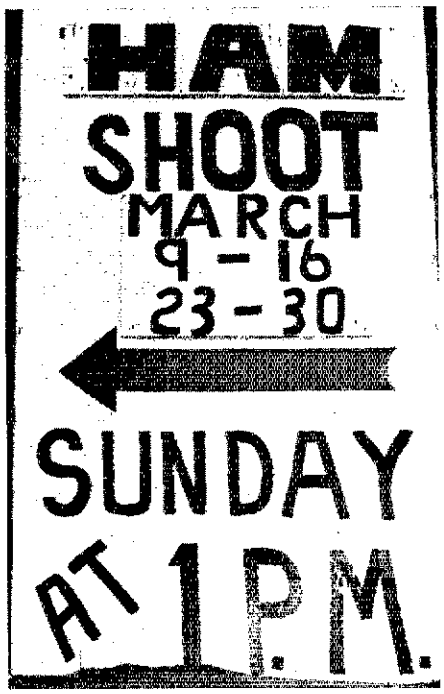
July 3-4, 1982, Jackson's Mill

The 24th Annual ARRL West Virginia State Convention, sponsored by the West Virginia State Amateur Radio Council, will be held at Jackson's Mill State 4-H Camp, near Weston, on July 3 and 4. Commercial exhibitions and flea marketers are welcome at no charge. To add interest to the convention activities, there will be many awards including those for ladies and children.

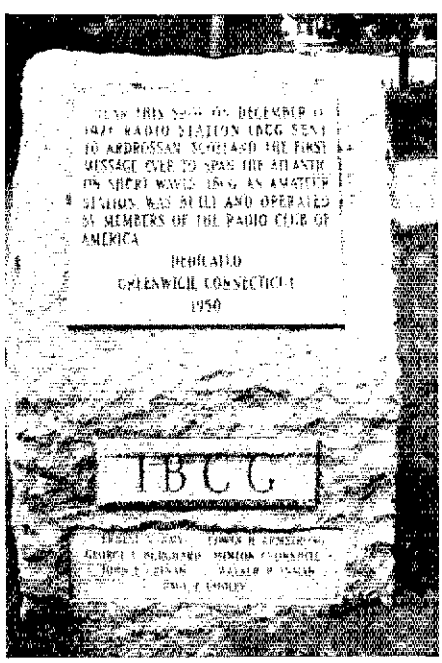
The program will include an ARRL forum, a cw contest, a technical forum and various net meetings. Special guests from the League include Pete (KB1N) and Sally (KB1O) O'Dell, ARRL public information officer and club program manager, respectively.

Registration fee 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 Bill James, WA8GYU, Box 193, Cassville, WV 26527. Plan now to attend a truly informative and entertaining Ham Radio Convention in "Almost Heaven" West Virginia.

Strays



No, this is not someone's idea for solving RFI. But it is enough to send shivers down one's spine — if you're a ham radio operator. Bonn Smith, WB1FMZ, snapped this picture somewhere in rural Connecticut.



Some pretty-well-known names grace this monument, located in Greenwich, Connecticut (on North Street at Clapboard Ridge Road). *(Photo courtesy W2OC)*

Silent Keys

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

W1DMM, Adelbert E. Watkins, Waltham, MA
WB1ESL, Carmine J. "Skip" Langello, Bristol, RI
W1HKY, Kenneth E. Griffiths, Norwood, MA
W1IH, Lawrence S. Bennett, Everett, MA
*W1SZ, Clark C. Rodimon, La Jolla, CA
W1VRR, Edward Mellquist, New Haven, CT
WA1WYS, James B. Keith, Salem, NH
W1YMV, William K. Stewart, Marstons Mills, MA
K2BG, Herbert C. Brooks, Vincentown, NJ
W2HS, Theodore N. Whildin, Oakdale, NY
W2ICJ, Joseph P. Adrosko, Colonia, NJ
WA2ICJ, M. Reede Holly, Newton, NJ
K2JBG, William N. Furman, Jr., Oaklyn, NJ
WB2KBT, John L. Sullivan, Rochester, NY
W2KZH, John M. Murphy, Waverly, NY
WB2MCP, Alvin L. Mumby, Rochester, NY
W2MSR, George E. Kaiser, Ramsey, NJ
WA2QBR, Albert N. Di'Chiara, Yonkers, NY
*WB2VEE/N4BD, Frank G. Krupansky, Miami, FL
N3AMV, George K. Lucey, Baltimore, MD
K3CJF, Donald J. Halke, Halifax, PA
W3LEV, Chester A. Muhar, Greensboro, PA
W3LG, James C. Moulton, Easton, MD
W3NRQ, Thomas J. Algier, Sr., Reading, PA
*W3YE, James M. Fernane, Washington, DC
WA3YKQ, Jack E. Brown, Hagerstown, MD
W4AOK, Bradley H. Overton, St. Augustine, FL
KA4BUG, Charles R. Bush, Smyrna, GA
N4BWG/ex-K4LES, Cha Ru D. Watson, Memphis, TN
K4BY, Donald L. O'Connor, Banco, VA
N4EFZ, Thomas V. Gibbs, Richmond, VA
KA4HCZ, David A. Wright, Knoxville, TN
W4ICO, Edward B. Fussell, Eufaula, AL
K4KNP, Elmer E. Preston, Front Royal, VA
K4KR/W2KR, Morton B. Kahn, Boca Raton, FL
WB4NER, Carroll D. Mason, Winchester, VA
W4NYM, Walter C. Roberts, Naples, FL
W4OCG, Albert E. Corey, Crestview, FL
K4OKD, Francis C. "Cliff" Semken, Summerville, SC
WA4TAO, E. L. Stringfellow, Sr., Birmingham, AL
WB4TTU, Aaron L. McCready, Arden, NC
WA4UYC, Roy M. Hardman, St. Petersburg, FL
W4ZDN, John E. Jacobs, Largo, FL
W4ZIK, Carl E. Morton, Martinez, GA
W5ABW, Melville P. Turner, Palestine, TX
W5AGX, John L. McCollaum, Deming, NM
N5BC, George S. "Doc" Wade, Garland, TX
W5DFI, Stanley J. Durand, New Orleans, LA
WD5GLB, Ewing E. LeFan, Oklahoma City, OK
WB5GNK, Luther C. Ketchum, Stephenville, TX
W5IFV, John D. Barth, Tulsa, OK
WA5KRI, Deanna M. Mercurio, Houston, TX
W5LQR, Jack P. Morgan, Dallas, TX
W5MCO, Victor G. Soens, Edinburg, TX
WB5QPF, William M. Fore, Enid, OK
W5UGH, Herman Haenisch, Lakeview, AR
K5VEE, David King, Panhandle, TX
WA6EHF, Arnold J. Yerman, Fontana, CA
WA6NRP, Harold C. Glines, San Diego, CA
K6OE, Kenneth M. Durkee, Lafayette, CA
WB6QQO, Dr. Phillip L. Miller, Northridge, CA
W6RMI, Vernon V. Story, Torrance, CA
W6TSB, Henry H. Paskin, Salinas, CA
W7BGC, Austin W. Nelson, Seattle, WA
W7FPP, Edgar T. Carter, Walla Walla, WA
W7HJP, Harold F. "Hal" Gribbin, Woodburn, OR
K7QPW, Wilbur Simantel, Hillsboro, OR
WD8BDM, Franklin W. How, Midland, MI
W8CVA, Donald L. Baker, Sylvania, OH
W8DY, John H. Brabb, Satellite Beach, FL
W8GNK, Alfred W. Lundquist, Sault Ste. Marie, MI
ex-W8ITK, Franklin Seeley, Royal Oak, MI
WA8JAK, William S. Bissler, North Canton, OH
ex-8KJ, Edwin C. Denstaedt, Detroit, MI
KA8LCQ, Henry K. Walker, Columbus, OH
W8LR, Roy R. Palmer, Lansing, MI
K8SAF, Merlin A. Hunter, Hesperia, MI
W8SY, Norman C. Ballbach, Grosse Pointe Woods, MI
ex-W8ZHB, Paul F. Montgomery, Lewiston, MI
N9ALA, Thad F. Braffett, Richmond, IN
W9AQD, James H. Thomson, Deerfield, IL
WB9BNN, Virginia M. Sanders, Wheaton, IL
KA9DSN, Joseph P. Simon, Sr., South Bend, IN
W9EHZ, William V. "Cy" Payne, Schererville, IN
WA9FLN, James M. Brett, Chicago, IL
W9HLO, Carl J. Finger, Bedford, IN
W9IFB, Chester M. Benson, Richmond, IN
WA9JKD, Lloyd W. Wantland, Hartford, WI
WA9QPU, Joseph W. Stusse, Rogers, AR
W9REL, Stephen P. Kostyl, Boaz, AL
WB9SAP, James H. McDuff, Peoria, IL
WD0BQD, Burt G. Johnson, Mitchell, NE
WD0BQF, Michael D. Wagner, Scottsbluff, NE
W0CAC, Ivy E. "Nick" Hayes, Carrollton, MO
W0DFD, Marcus L. Bales, Baxter Springs, KS
W0GU, Chester B. Cunningham, Kimberling City, MO
W0HGE, Charles W. Johnston, Scandia, KS
W0HM, Robert J. Tyrrell, St. Paul, MN
K0HOJ, J. Lawrence Hollingsworth, Mount Vernon, MO
W0HRY, Milton G. Landin, Duluth, MN
W0LPY, Robert G. Place, Lee's Summit, MO
W0OGL, E. Paul Howard, Colorado Springs, CO
W0RD, William H. Shaw, Colorado Springs, CO
WA0RZF, Elsie L. Kness, Grafton, NE
W0SKL, Leo H. Jacobs, Englewood, CO
VE3BWI, Robert Allard, Timmins, ON
VE3DGZ, James C. Bailey, Thunder Bay, ON
VE3FYI, Ronald R. Lever, Hamilton, ON
VE3MB, Barney Colleck, Scarborough, ON
VE3XD, J. William McCleary, Willowdale, ON
VE4RY, Cecil Partington, Winnipeg, MB
VE5IH, Leonard R. Horton, Moose Jaw, SK
VE5ZZ, David R. Sarsfield, Regina, SK
VE7AKN, Gordie Willoughby, River Jordan, BC
VE7OM, George Wells, Spring Island, BC
VE7OR, John H. F. Read, Victoria, BC
ex-AC3PT, Palden Thondup Namgyal, Gangtok, Sikkim
DL1GR, Josef Klar, Landshut, Germany
DK3YC, Dr. Johann Tropper, Ottobrunn, Germany
F8NW, Andre Guillaume, Chantilly, France
G2UV, William E. F. Corsham, Middlesex, England
ZL1HJ, Allen N. H. Snow, North Island, New Zealand

*Life Member

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys will henceforth be confirmed through acknowledgment only to the family of the deceased. Thus, those who report a Silent Key will not necessarily receive an acknowledgment from Hq.

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. QST

Strays

BUGS IN MY TS-820S?

☐ While feeling my way around the band, I noticed that the figures on my TS-820S readout panel were going up and down like a yo-yo — without my help! This went on for several days, so I called the manufacturer — no help. Luckily, I happened to spot a very small spider making its way across the inside of the readout panel. Setting the rig on its side, I pulled the bottom and top panels off and, with a healthy shot of Raid from about 4 feet back, did the job. As a preventative, this fall I will spray just the table top under the rig, about the time the 8-legged culprits are looking for a place to nest. — *Howard Jones, WB6LXO, Santa Paula, California*

I would like to get in touch with . . .

☐ amateurs who are interested in an operating event on behalf of Special Olympics athletes throughout the world. John E. Russell, KA3BSA, Director, Pennsylvania Special Olympics, 1033 N. Broad St., Allentown, PA 18104.

☐ radio operators who served aboard the *U.S.S. South Carolina* in 1921. Frank Granicke, W0TKD, 33 Augustine Rd., No. 3, Eureka, MO 63025.

☐ radio amateurs employed by AT&T Long Lines who are interested in intra-Bell System ham contesting. C. P. Harding, N2BNL, AT&T Long Lines, Room 4B200, Bedminster, NJ 07921.

☐ other kids who want to start a phone net where we could share experiences and find ways to get more kids into Amateur Radio. Michael Frost, KA9JOX, P.O. Box 1008, Riverside, IL 60546.

☐ a General class U.S. ham who lives in or takes regular business trips to Argentina. I would like very much to obtain a Novice license this year. Richard N. Burton, Juramento 1934, 1°B, 1428 Buenos Aires, Argentina.

QST congratulates . . .

☐ Warren J. Koppy, WB0KLS, of St. Paul, Minnesota, who was named Ham of the Year by the 3M ARC for his outstanding service to the community as a Novice instructor and a volunteer for the Courage Handi-Ham System.

☐ Chuck Schloss, AG0W, who, after serving nearly 11 years as councilman and as mayor pro tem of Cherry Hills Village, Colorado, has decided to take a respite from politics. Chuck was influential in keeping local officials from adopting an ordinance that would have prohibited an antenna from being more than 5 feet higher than the roof.

☐ Wayne Sellers, WA5YHM, of Palestine, who received the Outstanding Service to Libraries Award from the Texas Libraries Association.

☐ Bill Tippett, W0ZV, of Loveland, Colorado, who was promoted to division manager of the Loveland Instrument Division of Hewlett-Packard Co.

☐ Dr. Edmun B. Richmond, W4MGN, of Lawrenceville, Georgia, who has been promoted to Associate Professor with Tenure at the Georgia Institute of Technology.

When Mac and Norma Willard (KA2EXI and KA2DEK), of Tonawanda, New York, obtained their "QST" flag from ARRL Hq., they got to thinking about a proper way to display it. They decided to decorate their garage door with a world map to provide an appropriate background for the flag, and ended up with a work of art of sorts.

Results, 35th ARRL VHF Sweepstakes

By Mark J. Wilson,* AA2Z

Comments from the 942 entrants in this year's January VHF Sweepstakes contest talked about propagation and the weather, and propagation, and the weather. Seems like it was just plain *cold* all over. WAØNOK reports climbing his tower with the wind chill index at −30° F to wrap a heat tape around a balky rotator. NØCQO reports 58° F temperatures, but 140-mph winds. KØCQ's 432 antenna blew off the tower and didn't work too well buried in the snow. WA2DPU reports stuck rotors and −10° F temperatures. And to think that during the QSO party last June we were all complaining about the record *high* temperatures.

Conditions weren't all that grand this year, either. VE3BZE and VE3LNX report hearing many signals that were just too weak to copy. WD5IKD also reports that signals during the contest seemed even weaker than normal. In the South, WD4MBK reports little activity on 432. WAØLSH had some luck picking up multipliers on scatter, as did WA2YWP, while K2QR says that local oscillators in local police scanners were stronger than most signals. The lone good report comes from WA6PZL, who commented on a good tropo opening on Sunday afternoon. There was no good E_s opening during the afternoon like the one that made last year's contest more enjoyable. It was a contest that helped separate the real vhfers from the "Sunday drivers."

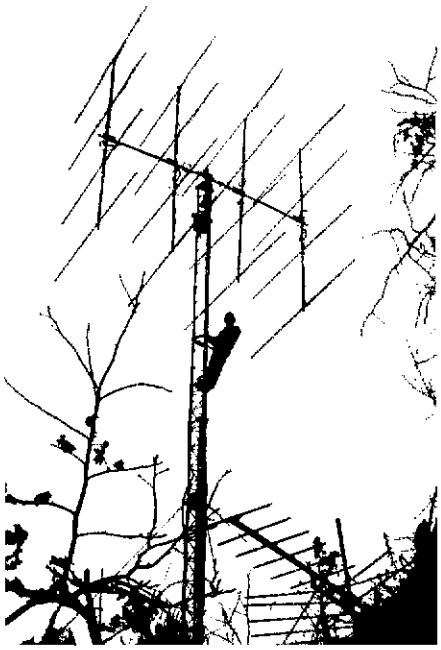
Conditions affected the scores this time around. The only new division records set were multiop records by WA1RWU and N5KW and a single-op record by C6ADV. Other than that, scores were down some.

While QSOs on 6 and 2 were down from last year in most parts of the country, 432- and 220-MHz activity was up as stations looked for ways to keep the scores high. Compare the single-op QSO totals listing with last year's. The totals on 432 and 220 are up in most call areas. WA2DPU's 100 QSO 70-cm score is 27 better than 1981. KA5FLE about doubled last year's high 5-land 432 score, while NØIS found 14 stations to work. Oh yes — the biggest 432 score came from who else but K2RIW. Operating 70 cm only, Dick ended up with 142 stations in 23 sections. Fantastic! On 220, if rising activity over the past few contests is any indication, this band should yield some record scores in June.

The lack of enhanced propagation also encouraged contest participants to take advantage of the 8-point premium placed on 1296-MHz QSOs. While uhf activity is usually low in the January contest because multipliers aren't counted by band, more and more stations are recognizing that the 1296 QSO points add up quickly. In 1981 only two of the single-op call area leaders took advantage of 1296; this year, five did. WA3AXV had 21 QSOs on that band and indicated a potential 30 if stations were on. K3ICH found some people to work in the DC area, while K6GSS worked 10 stations out West. Up in Ontario, VE3CRU increased last year's four 1296 QSOs to nine.

The top nationwide (Eastern PA/Southern NJ - wide?) single-op scores were closer this year than in recent memory. Less than 4000 points separated W3HQT, WA3AXV and WA2DPU. A look at their scores reveals some interesting operating strategy. 'HQT and 'DPU ended up within four QSOs and one multiplier of each other. 'AXV was down about 140 QSOs, but he had five more multipliers. In the end 'HQT won out, primarily because of his 220-MHz-and-above QSO totals. Nice job, Bill. Eight of the Top Ten Stations were Pack Rats, with WB1FVS in Connecticut and K2MLB in Northern NJ the exceptions.

In the multiop class, the Hampden Co. Radio Assn. team at WA1RWU smashed the old all-time multiop record set by K8III in 1979 by almost 10,000 points. Accompanying the logs was a 4-page description of the trials and tribulations this group encountered during its quest for the top. The 'RWU contest site is 2000-foot October Mountain in the northwestern corner of Massachusetts. There is no fixed operating site there, so all towers and antennas were put up in the months before the contest (remember — this is a winter contest) and most of the power came from a 5-kW generator. Sound like what your club does in June? Throughout the contest, the crew was hampered by 50-mph winds and temperatures of −30° F. Equipment failures and antenna problems, while normal for many stations, seemed worse because of the cold. The 1296 station bit the dust, followed by the 432 hardline, 432 mast-mounted preamp, 220 preamp, 6-meter scatter antenna and several rotors. Looks like they really earned that record. Other Top Ten multis were spread around the Northeast, with W1VD and



W5UKQ tends his 16 "RIW-19s" at 75 feet in the air.

*Assistant Communications Manager, ARRL

Club Competition

Club Name	*Score*	*Entries*	*Single Op Winner*
Unlimited Category			
Mt. Airy VHF RC (DE/NJ/PA)	1,105,610	63	W3HQT
Rochester VHF Group (NY)	755,616	188	N2JY
Rochester ARC (MN)	77,824	62	WØRGU
Medium Category			
Hampden Co. RA (MA)	282,094	45	WB1FVS
Ramapo Mountain ARC (NJ)	220,124	27	K2MLB
Potomac Area VHF Society (MD/VA)	151,814	16	K3DUA
Warminster ARC (PA)	144,282	27	AK3O
West Jersey Radio Amateurs	126,756	22	N2CLV
South Jersey RA	125,044	16	WA2KOK
Murphy's Marauders (CT)	108,754	5	K1EM
Six Meter Club of Chicago	46,510	19	WA9FIH
Mobile Sixers RC (PA)	29,062	12	W3ETB
Local Category			
Delaware Valley VHF Society (PA)	85,662	6	WA3NWL
Palos Verdes ARC (CA)	54,282	9	N6BXP
Barnstormers ARC (MA)	45,392	5	AF1T
Suburban ARC (NJ/PA)	42,174	5	WB2YEH
A.W.A.R.E. (DE)	41,666	7	WB3LGC
Wellesley ARS (MA)	34,330	7	K1UR
Gloucester County ARC (NJ)	33,006	9	AI2B
Penn Wireless Assn. (PA)	30,364	7	WB3JHX
Dutchess Co. VHF Society (NY)	30,364	4	WA2TIF
MIT Radio Society (MA)	21,578	5	N1HR
Long Island Mobile ARC	21,218	3	WB2ALW
Montgomery ARC (PA)	18,730	3	WB3CHS
Rochester DX Assn. (NY)	15,312	4	KB2SG
Dayton ARA (OH)	12,460	7	N8AXA
Albuquerque DX Assn. (NM)	11,988	7	K5MAT
Keystone VHF Club (PA)	11,202	6	W3FLD
Mitre-Bedford ARC (MA)	10,664	4	W1FM
Michigan City ARC	6976	3	K9DZE
Wisconsin Valley RA	4520	4	KB9NM
Oneonta ARC (NY)	3370	7	W2SEU

Top Ten

Single Operator		*Multioperator*	
Call	*Score*	*Call*	*Score*
W3HQT	63,168	WA1RWU	90,902
WA3AXV	61,568	W1VD	77,904
WA2DPU	59,396	W3KKN	45,840
WB3CDE	54,180	K2XR	40,362
K3MWV	43,560	WA1MAO	39,900
W2EIF	36,456	WA2OMY	38,772
WB1FVS	35,770	W2SZ/2	36,300
K2MLB	35,496	N2ASC	35,100
N3AHI	32,504	AC3T	31,564
W3HFY	31,408	N2BOW	30,834

Division Leaders

Division	*Single Op*	*Multiop*
Canadian	VE3CRU	VE3LNX
Atlantic	W3HQT	W3KKN
Central	K9MRI	WB9NTL
Dakota	WØRGU	—
Delta	W2GU	K4VPK
Great Lakes	WB8BGY	N4ELQ
Hudson	K2MLB	K2XR
Midwest	NØIS	WBØZKG
New England	WB1FVS	WA1RWU*
Northwestern	W7YOZ	WB7DTI
Pacific	K6GSS	WB6WML
Roanoke	K3ICH/4	W4IY
Rocky Mountain	K5MAT	WAØLSH
Southeastern	WA4NJP	N4SJ
Southwestern	N6BXP	K6HXW
West Gulf	KA5FLE	N5KW*
DX	C6ADV*	—

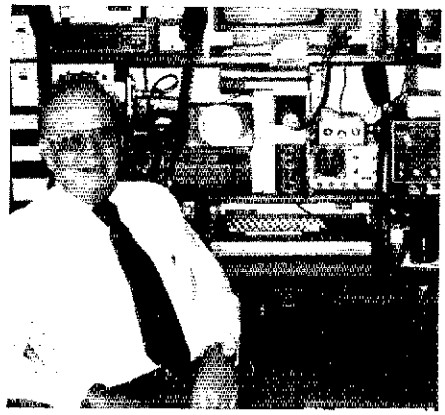
*Indicates new all-time division record

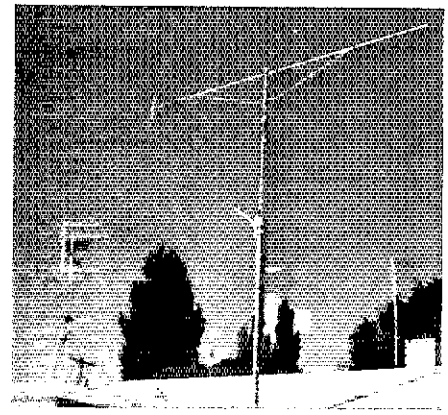
Single Operator Call Area Leaders — QSOs per Band

Call	*50*	*144*	*220*	*432*	*1296*
WB1FVS	149	211	27	44	—
WA2DPU	166	390	75	100	13
W3HQT	158	373	103	89	18
K3ICH/4	106	212	22	31	3
KA5FLE	37	125	36	32	—
K6GSS	78	258	28	28	10
W7YOZ	60	86	—	—	—
WB8BGY	102	124	—	4	—
K9MRI	29	174	11	17	—
NØIS	27	119	—	14	—
VE3CRU	61	81	14	20	9
C6ADV	10	—	—	—	—

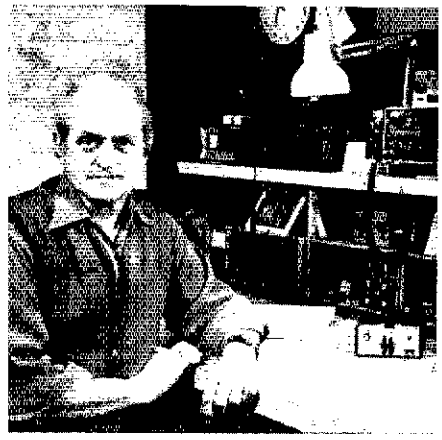
Multioperator Call Area Leaders — QSOs per Band

Call	*50*	*144*	*220*	*432*	*1296*	*10 GHz*
WA1RWU	348	450	51	79	—	—
K2XR	—	651	—	—	—	—
W3KKN	200	274	80	48	10	—
W4IY	95	186	21	38	—	—
N5KW	87	96	3	15	—	—
K6HXW	79	129	27	20	11	1
WB7DTI	61	84	20	17	—	—
WB9NTL	50	149	5	9	—	—
WBØZKG	15	72	—	4	—	—
VE3LNX	72	124	13	21	7	—





W5RKS keeps the bands hopping from New Mexico with a single, 19-element Boomer at 30 feet on 144 MHz and four 8-element quagi antennas for 432.



Chick, WA1VCU, couples his Yaesu radios to stacked Jr. Boomers on 144 and 432 MHz from the Western Massachusetts Section.

AE3T worked 20 widely scattered sections from his Eastern PA QTH.

Two of the three ops at WAØLSH in Colorado pose for a photo of the Rocky Mountain Division leader.

WA1MAO representing Connecticut, W3KKN and WA2OMY representing Eastern PA, K2XR and N2BOW representing Northern NJ, N2ASC representing Southern NJ, W2SZ representing Eastern NY and AC3T representing Delaware.

Club Competition

The Mt. Airy VHF RC, more commonly known as the Pack Rats, took the unlimited class again this year. This makes the 21st time that the 'Rats have come in number 1, thanks to an active, interested club with many members on four or more vhf/uhf bands and a strategic location in the Boston/New York/Philadelphia/Washington corridor.

In the medium class, the Hampden Co. RA recruited some more heavyweights and edged out last year's winners, the Ramapo Mountain ARC. In the local class, the Delaware Valley VHF Society lead the pack with a healthy 85 kilopoints.

One closing note. There seems to be some confusion as to what counts as a valid contact in the vhf contests. In the January contest, the entire exchange — including call sign, serial number, signal report and section — must be *accurately* copied by both stations in order to count. If you can't get the entire exchange, don't count the QSO. Wait until later when conditions improve or ask for fills until you've got it all. You *can* be disqualified for having more than 2% mistakes.

Rules for the June VHF QSO Party, held later this month, were published in May *QST*. Remember to send for your forms early.

SOAPBOX

With the temperature at about −23° C, could it be that the signals are frozen in the ether and will come tumbling down during the January thaw? (K2QR). I had only one feed line and no relay, so I had to climb my tower to change bands — in the dark! (AA4Q). Stations here in the Midwest got little if any help from Mother Nature. Scores reflect the patience factor (WA9YLB). Low scores, but fun. I might add that the requirement to send serial numbers eliminated any chance to try meteor scatter on 2 meters. Might want to look at this requirement again (W5UWB). Condx on 6 and 2 meters were dismal; however, using meteor scatter on 6 really paid off . . . we picked up Arizona, S. Texas, Ohio, Illinois and Michigan. Most

contacts were made in less than 10 minutes using the scatter medium (WAØLSH). A group of us from central and northern Oklahoma are planning a DXpedition to Colorado for the June VHF Contest. Six meters is *seriously* underpopulated out here (N5DUB). I hate serial numbers in weak-signal contests. Asking around showed only 20% of the stations on were interested in the competition. The rest were just on to take advantage of the increase in activity. Activity on 432 (from what I could surmise from others) was nonexistent, being even less than normal because of the lack of incentives to dig out contacts up there. Everyone was on 2 meters, with occasional skeds to move to 6 meters or 432. Never heard a single station even mention 220 MHz. Several said that they could have had 1296, but it wasn't worth the effort because multipliers don't count if already worked on other bands (WD4MBK). New antenna worked well — 27-dB gain at 75' az-el. The darned thing is so sharp that I have to tune either North Houston or South Houston . . . Didn't hear any echos from the moon either. Hoping that the next contest will yield better results (W5UKQ). New York, Pennsylvania, Ontario and Ohio, did you work Wisconsin? It's possible! There are many stations north of Chicago and Milwaukee. Point those beams toward the center of Wisconsin and *try!* (KB9NM). My operating habits this contest were weird. Got on promptly at 1 P.M. on Saturday. At 11:10 P.M. I found myself still needing WVA — and one contact — to fill a logbook. N8II showed up, got nailed — good enough, time to go to bed — *Click* (WB2CUT).

FEEDBACK

The following are changes and corrections to the 1981 VHF SS. See June 1981 *QST*, pp. 70-73. The call sign of the number-three multioperator station from Eastern Pennsylvania should be WA3YUE, not WA3YVE. After submitting a corrected log, the new line score for the KA3DEO multioperator station from Western Pennsylvania should be 4656-97-14-AB. In the Los Angeles Section, W6PFE sent the corrections for his entry; thus, his line score should read 3864-108-4-ABCD.

Scores List:

Call, score, QSOs, multiplier, bands worked (50 MHz, A; 144 MHz, B; 220 MHz, C; 432 MHz, D; 1296 MHz, E; 2.3 GHz, F; 3.4 GHz, G; 5.7 GHZ, H; 10 GHZ, I).

U.S.A.

1

Connecticut

WB1FVS 37,080-435-26-ABCD
K1EM 19,720-323-19-ABD
KA1BXB 14,674-214-19-ABCD
K1VMI 8060-155-16-B
W1INF (AK4L, opr.) 6480-134-14-ABC
KA1GII 6336-132-14-B
W1FAJ 5040- 90-11-ABCD
WA1ZNT 4576-104-12-AB
K1WA 3726- 81-13-B
W1WHL 3648- 76-14-A
WA1GTP 3404- 74-13-AB
W9KDR 2352- 56-11-AB
W1FXS 2044- 73- 4-B
KA1GIY 1900- 50- 9-A
K1TN 1176- 47- 2-BC
K1VYU 1044- 29- 8-B
WB1CZX 952- 28- 7-B
W1WEF 924- 66- 7-B
N1BGA 768- 32- 2-B
K1WVX 720- 30- 2-B
KE1A 240- 10- 2-B
W1VD (+K1s JX, ZZ, KA1s EKY, BRD, WA1STO, WB1AVA) 77,904-958-26-ABCDI
WA1MAO (+WB1FVS) 39,900-517-25-ABCDI
WB1BXS (+K1GX) 11,872-212-18-B
W1QK (+W1ENL, WA1WXV, WB1EZL) 10,950-214-15-ABCD

Eastern Massachusetts

K1FWF 17,200-242-15-ABCD
WB1FUB 16,440-262-20-ABD
N1AIS 11,544-209-16-BD
KA1CXC 11,180-201-16-ABD
N1BRM 10,992-219-14-ABC
WA1JOF 10,368-192-17-B
WB1FKF 10,250-157-15-BCDE
KA1DHO 9072-171-14-ABD
W1GXI 8160-136-14-ABCD
W1QXX 6486-142-13-AB
N1HR 5568-116-14-B
W1PSG 5192-118-12-B
W1FM 5040-126-10-AB
KA1AMR 4048- 92-12-AB
KA1FVG 3570- 85-11-B
K1DAT 2640- 60-12-A
KA1IU 2478- 59-11-B
N1BC 2190- 48- 5-BD
K1CM 2108- 31- 7-D
K1CHY 1408- 40- 6-ABCD
G3BVU/W1 616- 11- 4-D
KA1R 484- 22- 1-B
W1MX (WA2EYC, opr.) 196- 7- 4-A
W1TTY 144- 6- 2-B
WA2EYC/1 66- 3- 1-B
WB1BUM 22- 1- 1-B
K8UR/1 (+K1KEC, N1RC) 20,574-337-17-ABCDE
W1XM (W1XG, WA4TTG, oprs.) 15,264-241-14-ABCDE
N1BCI (+N1BCG) 7280-140-16-B
K1NKR (+N1AIA) 3600- 90-10-AB

Maine

KA1MP 3078- 57-17-AB
K1TMJ 450- 13- 5-BD

New Hampshire

WA1OUB 21,584-279-28-ABCD
WB1CJT 17,632-269-19-ABCD
AF1T 15,602-225-19-ABCDE
W1LJ 8668-146-12-ABCDE
W1HNZ 5376-128-11-B
W1JSM 4004- 91-12-B
AC1J 3616- 99- 6-ABCD
WA1GDR 1692- 47- 8-AB
K1KA 1650- 55- 5-AB
K1TR/1 (+K1s BA, MON, N1BEM, W1KGZ, WA1s, ONB, PBU, K3WM) 20,792-395-13-ABCD

Rhode Island

W1AJR 2688- 56-14-AB
K1DS (+AG1M) 6394-133-13-ABCD

Vermont

W1AIM 4136- 78-12-ABCD
W1EXZ 336- 12- 4-A
KA1WX (+K1s GOX, IKN, WA1s HAH, TMZ, ZPI, W2MCF) 11,850-235-15-ABC

Western Massachusetts

AC1T 12,240-240-14-ABC
WA1VCU 7480-165-12-BD
WA1PLS 7084-144-12-ABC
K1SF 6700-120-15-ABCD
W1JP 6644-151-12-AB
N1PF 5544-119-12-ABD
W1WLE 5382-117-13-AB
K1BE 5376-128-11-AB
WB1ABF 4884-111-12-AB
WB1APD 4876-106-13-B
W1UPH 3916- 89-12-B
W1KK 3906- 91-11-ABD
W1CJK 3560- 89-10-B
K1NWE 3136-112- 4-B
WB1EHS 3124- 71-12-B
W1NLE 2828-101- 4-B
K1MAL 2800-100-14-B
K1UR 2784- 80- 6-BI
N1CM 2730-105- 3-B
WB1CXC 2546- 66- 9-BC
KB1Y 2340- 90- 3-B
WB1GLZ 2204- 58- 9-AB
KA1CRX 2132- 82- 3-B
WA1YYK 2072- 74- 4-B
WB1BPJ 2016- 72- 4-B
W1NY (K1BE, opr.) 2010- 67- 5-AB
WA1YYW 2002- 77- 3-B
WB1DLE 1976- 76- 3-B
WB1DLH 1924- 74- 3-B
KA1CTM 1820- 70- 3-B
WA1UOL 1800- 45-10-B
K1JDL 1690- 65- 3-B
K1GXU 1672- 44- 9-B
N1SR 1608- 66- 2-BC
W1VNE 1560- 60- 3-B
WB1EMN 1482- 57- 3-B
K1UOR 1404- 54- 3-B
WA1ZLQ 1372- 46- 4-BC
W1MDL 1344- 56- 2-B
K1ZQB 1326- 51- 3-B
WA1GVV 1144- 44- 3-B
KA1CYK 1008- 42- 2-B
KA1FVT 936- 36- 3-B
WA1JUJ 924- 33- 4-B
W1RED 648- 27- 2-B
WA1VHU 480- 20- 2-B
W1UWX 352- 16- 1-B
W1JWV 312- 13- 2-B
K1IJU 264- 11- 2-B
K1JG 96- 4- 2-B
K1TK 44- 2- 1-B
WA1RWU (+K1s FO, TOL, KA1s APR, AVJ, N1CQ, WA1s ECR, UQC, WB1CAC) 90,902-927-31-ABCD
W1YK (K1s OGF, TK, UR, N2AWG, WA1s PQY, YOJ, ZLQ, oprs.) 27,486-435-17-ABCDI
WB1ETS (+KA1DNX, N1AEH) 7722-174-12-ABC

2

Eastern New York

WA2TIF 24,012-382-19-BD
WA2TEO 22,848-347-18-ABCDEF
W2CRS 17,952-249-23-ABCD
WB2EHC 5280-120-12-AB
K2SHB 3888- 70-14-ABD
WB2THN 2160- 60- 8-B
AH2I 2014- 53- 9-AB
AB2J 450- 15- 5-B
W2SZ/2 (WB1CBH, K2UF, W2ARQ, WA2AAU, N8AFM, oprs.) 36,300-501-23-ABCD
N2CMS (+WA2LYM) 15,264-159-14-ABCDEFGHIJ
N2FV/2 (WA2YTM, WB2IEY, oprs.) 132- 6- 1-B

New York City - L.I.

WA2YWP 27,780-430-20-ABCD
K2RIW 18,744-142-23-D
WA2SLY 12,258-227-17-AB
WB2ALW 8684-162-16-ABC
WA2TWO 6660-167-10-B
N2BAR 6342-151-11-AB
WA2FBB 6192-113-14-ABD
WB5LZN 3432- 78-12-B
KK2D 2848- 71- 6-ABCD
WB2VEX 560- 20- 4-B
K2OVS (Multiop) 19,836-313-19-ABD
KB2WS (+KC2GI) 18,662-301-21-B
N2RQ/M (+WB2IJY) 260- 10- 3-B

Northern New Jersey

K2MLB 35,496-556-19-ABCD
WB2QOQ 22,410-356-17-ABCDE
WA2CWA 20,384-364-18-AB
KA2BTD 17,280-302-14-ABCD
WB2WIH 14,592-234-14-ABCD
N2CJP 13,300-236-15-ABCD
WB2CUT 12,852-238-17-B
N2CIA 9792-204-14-AB
N2BMN 8234-150-13-ABCD
WB2IKL 7700-154-15-B
WA2ZIJ 6096-127-14-B
WA2ALM 6072-138-12-B
WB2TMD 5842-127-13-AB
WA2UPK 5502-123-11-BC
K2ULR 5280-112-10-ABCD
N2CG 5280-109-10-ABCD
W2RS 5192-109-12-BD
N2CTF 4872-116-11-AB
N2COI 4704-112-11-B
WB2BJH 4320-108-10-B
KA2BZE 3838-101- 9-AB
KT2B 3060- 85- 8-B
K4BNC 2828-101- 4-AB
WB2WLW 2280- 60- 9-B
WA2HCC 2048- 64- 6-AB
WA2YLY 1908- 53- 8-B
WA2ZNT 1820- 65- 4-B
KB2M 1620- 47- 5-BD
K2LPG 1292- 38- 7-B
WA2UEJ 1064- 38- 4-AB
W2TO 936- 26- 8-B
WB2LAH 672- 24- 4-B
WA2EKM 650- 25- 3-B
W2WCE 552- 23- 2-B
K2XR (K2s JWE, OWH, KC2X, WB2WIK, oprs.) 40,362-651-21-B
N2BOW (+N2s BMP, CEI, KA2s MKD, NMS) 30,834-503-17-ABCDI
N2AAZ (+W2FPY, W2TFM, WD2AAI) 26,676-465-17-ABC
K2BJG (+WB2RFB) 13,000-250-10-ABCDE
WA2JSW (+KA2NDZ, N2CJJ) 10,350-207-15-AB

Southern New Jersey

WA2DPU 59,396-744-21-ABCDE
W2EIF 36,456-463-18-ABCDE
WB2YEH 20,790-382-11-ABCD
N2CLV 19,278-357-17-AB
WA2KOK 18,720-336-14-ABCD
W2PAU 18,090-335-17-AB
WB2VLA 15,340-260-16-ABC
N2FY 14,112-252-14-ABD
W2ORA 13,112-298-12-AB
W2EKB 13,062-272-11-ABC
N2BUH 12,768-266-14-AB
WA2EMB 11,952-220-14-ABD
W2HRW 11,502-202-17-ABD
WA2RHJ 10,736-244-12-AB
N2CLX 10,656-222-14-AB
K1TQ 9320-233-10-AB
K2SQS 9160-229-10-AB
AI2B 8280-247- 5-BC
WA2PFC 6900-196- 5-ABC
WA2WJL 6776-154-12-B
W2EA 6380-145-12-B
W2GGB 6216-173- 4-BC
W2AXU 5580-111- 8-ABC
W2SUA 5460-182- 5-B
KA2BBW 4592-164- 4-B
W2FGY 4576-143- 6-B
WB2ALQ 4392-122- 8-AB
WB2LCC 4284-153- 4-B
KB2GI 3864-138- 4-B
KA2MIN 3744- 78-14-B
W2BN 3672-102- 8-AB
W2BLV 3600- 72-15-B
WA2TRJ 3388-121- 4-B
KC2DY 3172-122- 3-B
N2AQJ 3168- 88- 8-AB
K2HJY 3164-113- 4-AB
N2AWC 2756-106- 3-B
WB2RVE 2528- 78- 6-AB
WB2IOE 2464- 88- 4-B
KM2C 2304- 86- 2-B
N2HF 2184- 78- 4-B
WA2VSL 1950- 75- 3-AB
WA2WMK 1924- 74-13-B
WB2UVB 1872- 72- 3-B
W2GSN 1846- 71- 3-B
N2CEN 1776- 74- 7-AB
KB2GW 1768- 68- 3-B
WB2DXB 1768- 65- 3-BC
WB2OEF 1768- 34- 3-C
WA2KCE 1638- 63-13-AB
WB2RXM 1560- 30- 3-C
KA2CUX 1248- 48- 3-B
WB2SPJ 1148- 41- 4-AB
WB2KKS 1066- 41- 3-B
WA2JXD 1008- 42- 2-B
KC2JK 672- 28- 2-B
WA2MGV 648- 27- 2-B
W2EWN 624- 26- 2-B
N2BLI 480- 17- 2-BD
WA2NBJ 168- 8- 2-B
N2ASC (+N2s ATV, ME, WB2KKS) 35,100-542-17-ABCD
WB2RVX (+K2EVW, W2PJC) 27,002-451-13-ABCDE
WA2JSG (+WA2ZMN) 4260-105- 5-BC

Western New York

N2JY 25,056-395-19-ABCD
K2YCO 21,476-360-16-ABCDE
WB2JLR 19,548-339-17-ABCD
WB2KIW 17,376-330-14-ABCD
DL/KX/W2 16,936-275-19-BD
K2AN 15,824-326-13-ABD
K2OXT 13,840-319-10-ABCD
K3MP 12,558-278-21-ABD
WA2WVL 12,320-279-20-ABCD
WA2YEK 11,840-296-10-AB
KC2GZ 11,638-253-13-AB
K2RHS 11,248-296- 9-AB
K2VCZ 11,016-281- 8-ABCD
WB2JFL 10,920-273-10-AB
W2UAD 10,166-221-13-B
W2CNS 10,028-199-13-ABCD
W3AV 9860-153-19-BD
W2FBF 8608-259- 6-ABD
W2XG 8360-220- 9-AB
KA2ENE 8220-257- 5-ABD
K2OEQ 8160-224- 7-ABD
WB2RJB 7700-275- 4-AB
W2EQW 7680-256- 5-AB
WB2DSR 7618-264- 3-ABCD
WA2MSA 7520-235- 6-AB
K2OS 7488-144-16-B
KD2K 6900-211- 5-BD
WA2ZNC 6480-202- 5-ABD
WA2ALW 6060-202- 5-AB
KC2EI 6000-200- 5-AB
N2AUV 5964-196- 4-ABCD
WA2SRY 5940-198- 5-B
WB2VPH 5572-199- 4-B
W2OWI 5504-172- 6-AB
WB5IGD 5486-188- 3-ABD
WA2EKT 5226-201- 3-B
N2TW 5200-200- 3-AB
WB2HWO 5130-163- 5-ABD
KB2SG 5016-209- 2-B
K2SPO 4950-157- 5-ABD
W2HZ 4800-200- 2-AB
KA2J 4776-199- 2-AB
WB2OZS 4776-194- 2-ABC
WB2RCB 4550-175- 3-B
KA2KFV 4342-167- 3-B
K2UW 4092-186- 1-AB
WB2FNF 4060-145- 4-A
K2JIQ 4048- 92-12-B
WB2NOJ 3982-181- 1-B
WB2JOR 3960-180- 1-B
WB2LWM 3960-180- 1-AB
K2GMZ 3900-130- 5-AB
KB2SE 3894-177- 1-B
W2LLS 3850-175- 1-B
W2SNI 3792-146- 2-ABCD
KA2DBD 3768-157- 2-B
KA2EFO 3744-156- 2-B
WA2YPT 3744-156- 2-B
K2JA 3720-155- 2-B
WB2MDC 3674-167- 1-B
K2KWK 3672-153- 2-B
N2AJK 3652-166- 1-B
KC2BS 3648-152- 2-AB
KC2BT 3648-152- 2-AB
WB2LEG 3648-152- 2-AB
K2QR 3608- 78-12-BD
KA2HNX 3600-150- 2-B
N2CTB 3600-150- 2-B
AG2A 3504-146- 2-B
WB2YHD 3456-144- 2-AB
WA2IEO 3432-156- 1-B
KB2NU 3366-153- 1-B
WB2UTI 3360-140- 2-B
WA2ELC 3322-151- 1-B
W2DHV 3278-149- 1-B
KA2BHK 3256-148- 1-B
WA2NFY 3256-148- 1-B
WB2ZFS 3234-147- 1-AB
KB2KY 3146-143- 1-B
KA2EFC 3102-141- 1-B
KF2C 3058-139- 1-AB
KS2I 3036-138- 1-B
WA2UBD 3036-138- 1-B
WB2HJV 2976-124- 2-B
WB1GHG 2970-135- 1-B
KC2AW 2928-122- 2-AB
WB2SUN 2882-126- 1-BC
KB2LB 2834-109- 3-B
KA2BNI 2832-118- 2-B
KC2ES 2816-128- 1-B
WA2CRR 2760- 92- 5-B
K2CAB 2750-125- 1-B
K2SA 2728-124- 1-B
WB2QIN 2706-123- 1-B
W2YGW 2684-122- 1-B
N2CSB 2662-121- 1-B
WA2ECD 2596-118- 1-B
K2PPO 2574-117- 1-AB
KA2GOH 2568-107- 2-B
KA2AFE 2530-115- 1-B
W2GIM 2530-115- 1-B
K2EAW 2508-114- 1-B
WA2ZPE 2470- 72- 3-ABCD
KB2KZ 2464-112- 1-B
N2AMU 2464-112- 1-B
KA2KVE 2418- 93- 3-B
KA2JRK 2310-105- 1-B
N2CSY 2236- 86- 3-B
KE2I 2222-101- 1-B
WB2QKO 2222-101- 1-B
KA2OBE 2200-100- 1-B
KA7E 2178- 99- 1-B
KA2KDA 2136- 89- 2-B
KJ2P 2134- 97- 1-B
N2BUL 2134- 97- 1-B
KA2BHB 1958- 89- 1-B
K2GHA 1892- 86- 1-B
WB2FRG 1870- 85- 1-B
K2DIU 1848- 84- 1-B
N2AL 1826- 83- 1-B
KB2UN 1804- 82- 1-B
KB2XI 1804- 82- 1-B
WB2BWQ 1694- 77- 1-B
K2CTN 1650- 75- 1-B
KA2HAR 1650- 75- 1-AB
K2RUC 1628- 74- 1-B
WB2ZJY 1606- 73- 1-AB
W2SEU 1548- 43- 8-AB
KA2GCE 1540- 70- 1-AB
K2OID 1474- 67- 1-B
WA2EKN 1400- 50- 4-A
KA2HAC 1386- 63- 1-B
KS2N 1364- 62- 1-B
KC2HE 1320- 60- 1-B
KD2X 1320- 60- 1-B
WB2GGM 1320- 60- 1-B
WB6MTO 1276- 58- 1-B
K3NAU/2 1254- 57- 1-B
N2JC 1254- 57- 1-B
K2UUY 1210- 55- 1-B
KA1CNF 1210- 55- 1-B
KB2VS 1200- 50- 2-B
WA2QNS 1166- 53- 1-B
WB2LRO 1152- 36- 6-AB
K2IAV 1144- 52- 1-B
WB2FQS 1100- 50- 1-B
WB2DPI 1012- 46- 1-AB
KA2HRS 990- 45- 1-B
WA2JTT 946- 43- 1-B
N2ATY 696- 29- 2-B
N2AGA 660- 30- 1-B
K2WW 616- 28- 1-B
WA2SOR 506- 23- 1-AB
W2ICE 462- 21- 1-B
W7VKZ 420- 15- 4-B
AB2F 286- 13- 1-B
WB2UAJ 264- 12- 1-B
W2DYY 238- 7- 7-B
KA2HYY 208- 8- 3-AB
KA2DZC 176- 8- 1-B
KA2NZL 154- 7- 1-B
K2VTT 110- 5- 1-B
KA2NSU 110- 5- 1-B
N2CZL 88- 4- 1-B
WA2KGM (+KA2FND + 1 opr.) 17,350-337-15-ABD
K2JFV (+WA2IMC) 17,262-369-11-ABCD
WD2AKA (+N2BUL, WA2s RHW, VUB, WD2AFH, WB8ZPE) 14,350-287-15-AB
W2DUC (+N2s AFR, BXA, WA2PFA, WB2s EMS, FWZ, RIP) 11,960-274-10-ABCD
WA2EKK (+KA2CKR) 7904-247- 6-AB
N2WK (+WA2LAQ) 7140-255- 4-AB
WB9EAE (+WB2MVF) 6208-194- 6-AB
KB2WN (+KA2JRC) 6058-233- 3-AB
WB2QMY (+WB2EKP) 5740-205- 4-AB
K5ZZ (+KA2KGM) 5260-263- 1-AB
N2BNE (+WA2MXL) 4510-205- 1-AB
WA2FQE (Multiop) 4488-183- 2-ABD
WB2PSI (W2AV, WB2PKO, oprs.) 3780-126- 4-ABD
KA2LCW (+KA2BXM, KC2LC) 2712-113-12-B
K2JD (KA2J, N2EH, oprs.) 2664-111-12-AB
KB2BY (+WA2TIJ) 2288-103- 1-ABD

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Delaware

K4CHE/3 3542- 77-13-AB
WB3FGL 2774- 73- 9-B
WB3DPJ 1300- 34- 3-BC
N3AYE 1196- 27- 3-BCD
W3CGV 1184- 35- 6-AD
WA3OVR 546- 21- 3-AB
N3CAK 182- 7- 3-B
AC3T (+N3s AYJ, BHS) 31,564-511-16-ABCD

Eastern Pennsylvania

W3HQT 63,168-741-22-ABCDE
WA3AXV 61,568-601-27-ABCDE
WB3CDE 54,180-620-25-ABCD
K3MWV 43,560-556-20-ABCDE
N3AHI 32,504-374-24-ABCD
W3HFY 31,408-470-16-ABCDE
K3IUV 30,576-443-14-ABCDE
WA3NUF 29,900-440-15-ABCDE
WA3YUE 29,536-446-16-ABCD
WA3JUF 27,810-358-17-ABCDE
W3HMU 25,500-340-15-ABCDE
W3ZD 24,908-434-16-ABC

WA3AAJ 22,908-396-13-ABCD
AK3O 22,400-424-15-ABD
W3ITT 21,800-381-15-ABC
W3CL 20,944-359-12-ABCD
K3BPP 18,336-294-14-ABCDE
WB3JYO 17,856-329-14-ABC
N3MW 17,066-291-13-ABCD
AE3T 16,740-278-20-AB
WB3KNU 16,476-331-13-ABC
W3ETB 16,192-299-12-ABCD
WA3NWL 15,930-218-17-BCD
K3KTY 15,408-265-14-ABCD
WB3ESS 14,634-189-17-BCD
K3DMA 14,516-323- 9-ABC
K3NHX 14,112-266-11-ABCD
WA3AQA 13,986-272-11-ABC
K3MXM 13,398-268-11-ABC
WA3NFV 12,900-222-15-ABC
WB3LNZ 12,816-267-14-AB
K3VYG 12,720-253-10-ABC
WB3FXJ 10,752-224-14-B
N3ADC 10,704-193-14-BD
N3BBI 9548-217-12-AB
K3SZY 9504-158-17-ABD
KA3FQT 9400-235-10-B
W3GJC 9200-200-13-B
KA3HHG 9144-198- 8-ABCD
W3CXU 8806-171- 7-ABCDE
W3AJF 8200-168-10-ABC
WA3EHD 8008-286- 4-AB
K3EPB 7872-204- 6-ABC
WA3PUI 7562-152- 9-ABC
K3GAS 7440-187- 5-ABCDE
N3AOG 7406-161-13-B
WB3IND 7056-196- 8-AB
WA3UGP 6762-135-13-ABCD
KB3IB 6674-144-13-B
WA3IQJ 6360-212- 5-AB
W3IWU 6288-131-14-AB
K3LYB 6248-129-12-AC
WB4EPU 6248-142-12-B
WA3TSE 6000-124-10-BC
W3HK 5952-146- 6-ABC
KA3EAQ 5680-142-10-B
WA3TYF 5400-180- 5-B
K3QQ/M3 5320-155- 4-BC
KF3I 5180-185- 4-B
K3EBZ 5040-180- 4-AB
KA3FBP 4896-153- 6-B
WB3JHX 4680-180- 3-B
KA3BCA 4598-121- 9-B
K3PHY 4290-125- 3-BC
N3CIZ 4200-150- 4-B
K3KMN 4060-126- 4-ABC
K3ZIG 4004-131- 3-ABC
KB3JW 3978-153- 3-B
WA3HIT 3874-104- 3-BC
N3CFE 3724- 98- 9-B
W3AWA (WA3KFT, opr.) 3712-115- 6-ABC
WA3TCM 3692- 71- 3-C
WA3JMM 3588- 96- 3-ABC
W3NTD 3444-123- 4-B
KB3NQ 3432-132- 3-B
KB3XD 3434-101- 7-B
N3CIH 2940- 98- 5-B
W3NSI 2912- 56- 3-C
WA3WAK 2910- 97- 5-AB
KA3CHB 2800-100- 4-B
WA3IMT 2754- 81- 7-A
WA3IWI 2688- 61- 6-BC
N3CGT 2268- 81- 4-B
WA3YON 2208- 43-13-ABC
KA3EHL 2088- 87- 2-B
N3CCQ 2064- 86- 2-B
W3ZAA 2028- 78- 2-B
WA3KSK 1800- 75- 2-B
N3AHP 1624- 58- 4-AB
W3KM 1530- 45- 7-B
K3QXC 1440- 60- 2-B
WB3FJC 1430- 55- 3-B
W3FLD 1376- 43- 6-B
AK3M 1300- 50- 3-B
KB3NE 1296- 54- 2-B
W3QFI 1200- 50- 2-B
W3IQF 1092- 37- 4-ABD
WB3DSK 1032- 22- 2-BC
K3DLS 1008- 21- 2-C
KA3HVI 1008- 21- 2-C
KA3FLG 806- 31- 3-B
W2DGZ 792- 31- 2-BD
K3GFF 720- 30- 2-B
N3COO 720- 30- 2-B
WA3SPR 720- 21- 2-ABCD
WA3NAO 702- 27- 3-AB
W3SST 616- 21- 4-AD
AA3W 540- 23- 8-BC
K3FKW 456- 19- 2-B
K3WAJ 390- 15- 3-B
K3RSK 338- 13- 1-AB
WA3IGY 338- 11- 1-BC
WB3HDP 312- 13- 2-AB
K3ON 288- 8- 2-BD
W3EDO 286- 13- 1-B
WA3HFJ 192- 8- 2-A
WA3JNF 88- 4- 1-A
W3KKN (+K3KMN, W3CXU) 45,840-609-20-ABCDE
WA2OMY (+AA2Z, Net) 38,772-568-17-ABCDE
K3PA (+K3s OK, YL) 29,500-497-15-ABCDE
K3HP (+KB3HE, WB3IRQ) 28,836-434-17-ABCD
WØRSJ (+KB3QM) 27,104-429-18-ABC
WB3CPW (+WA3FOF, WB3CTP) 21,492-359-17-ABC
K3JJZ (+K3HES, WB3DNH) 20,256-348-14-ABCD
W3CCX (K1IC, K3DLS, KD6KD, oprs.) 14,724-316- 8-ABCD
W3SK (AA3B, AG3R, WB3s DJF, FRL, oprs.) 14,212-323-12-AB
N3KZ (KA3IJP, N3BMH, oprs.) 8844-201-12-B
W3HZU (K3MOA, KA3CCA, W3SST, WB3s AWJ, BWG, oprs.) 7040-144-12-ABD
WB3HHO (+WB3HHP) 5152-134- 4-BC
WB2RRE/3 (WA2YTM, WB2IEY, oprs.) 1122- 51- 1-B

Maryland - D. C.

K3OUA 26,160-375-20-ABCDE
W3IP 16,308-235-17-ABCDE
W3WFM 11,480-205-18-AB
WA3NZI 10,696-120-18-ABCD
W3YO 10,206-162-17-ABCD
W4NVW/3 9840-174-14-ABCD
WB3CHS 8720-180-17-B
WA3OYW 8140-148-12-ABCD
WA3EOQ 7392-122-12-ABCD
KC3H 6768-118-14-BD
K3AKR 6380-113-12-ABCD
W3OZ 4968- 54-13-D
W3HQX 4600-100-13-B
WA3DMF 4368- 82-11-ABD
WB3DPN 2242- 50- 9-BD

KB3WL 2000- 49-10-ABD
W3JPT 1800- 60- 5-AB
W3GN 940- 77- 5-ABD
W3MSN 672- 14- 2-D
W3PGA (K3s PHH, YZY, KB3EL, N3BGC, W3s JDF, BRO, WA3s LAW, TUN, WB3s KUH, BIT, IVG, oprs.) 1710- 45- 9-A

Western Pennsylvania

WA3FFC 9882-166-17-ABD
WA3DJG 7150-135-15-ABD
K3USC 4876-106-13-B
K3MD 4066- 93- 9-ABD
W3CSA 2242- 59- 9-AB
LA4LN/W3 18- 3- 3-B
W3KWH (W3s IOH, SVJ, WB3s BRY, EML, oprs.) 3144-131-12-AB
KA3DEO (+WA3s JBV, UKE) 2688- 64-11-AB
AF2K/3 (+N2CSB) 1800- 60- 5-B

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Alabama

WA4NPL 2480- 62-20-AB
WA4LTT 1152- 32- 8-B

Georgia

WA4NJP 9570-140-19-ABCD
W4VO (WB4AEH, opr.) 2856-102- 4-AB
WB4NMA 1984- 62- 6-AB
WD4MBK 1760- 43-16-ABD
W4LNG 1127- 33- 7-AB
AK4T 216- 9- 2-AB
N4SJ (KA4s FIB, JMD, WB4s NNW, NPA, WD4PTE, oprs.) 1586- 61- 3-B

Kentucky

KC4EG 6144-110-14-ABD
N4ELQ (+KA4TET, KC4TS) 5922-129-11-ABD

North Carolina

K4CAW 7550-109-15-BD
K4PKV 4512- 79-14-ABCD
WA4ZIA 4142- 27- 9-ABCD
WD4ODS 2280- 60- 9-AB
N4AJF 1764- 63- 4-AB
K4ROM 308- 11- 4-AB
WA4WZQ (+KA4HKK, WA4WZP, WD4GQU) 3306- 76- 9-ABCD
W4ATC (KA4HAM, N4ELM, NT4T, WB4TQD, oprs.) 952- 25- 7-ABD

Northern Florida

W4ODW 3648- 96- 6-ABCDE
W5RUD 2400- 73- 5-ABD
NI4Z 1742- 57- 3-ABD
WD4FAR 1272- 49- 2-ABD
N4EEV 360- 15- 2-AB

South Carolina

N4DT 3066- 73-11-AB
WA4LDU 2356- 55- 9-ABD

Southern Florida

K4KCF 528- 22- 2-B
K1FJM/4 480- 19- 2-ABD
AA4Q 312- 10- 2-BD

Tennessee

W2GU 3920- 90-10-ABD
N4VC 2438- 53-13-AB
WA4WUQ 342- 9- 9-B
K4VPK (+KS4J, WA4NVM, WB4OVT) 3358- 69-13-ABC

Virginia

K3ICH/4 23,544-374-17-ABCDE
W3IY/4 17,172-257-17-ABCDE
W2KFC/4 8004-136-13-ABCDE
N4RA 5460-130-11-AB
W4DO 3916- 89-12-AB
K4FTO 3564- 81-12-AB
WA4SBC 2688- 50-11-ABCD
WD4AZG 1950- 65- 5-AB
KL7GLL/W4 1590- 53- 5-AB
K4GOK 1520- 38-10-AB
W4PSJ 1296- 48- 2-ABC
KA4SCA 858- 33- 3-AB
K4EVH 768- 24- 6-B
N4CD 512- 16- 6-A
W4IY (K4HWG, KA4CKI, KD4IC, WB4RWJ, KØRI, NØKV, oprs.) 23,142-340-19-ABCD

West Indies

WP4ACV 66- 5- 1-AB

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Arkansas

W4UHJ 2432- 53- 9-BD
WB5JAR 1932- 46-11-AB
N5DL (+WD5CAP) 2448- 64- 7-ABD

Louisiana

W5EW 2200- 55-10-B
WB5LBT 1920- 49- 5-ABCDE
W5UKQ 616- 11- 4-D
N5JM 224- 9- 4-A
N5BHO (+N5DLW) 1760- 44-10-AB

Mississippi

W5RCI 2320- 49-10-BCD
W5UCY 1428- 46- 4-ABD
KK5K 928- 29- 6-B
WD5IKD 816- 24- 7-B

New Mexico

K5MAT 4728-177- 2-ABC
W5RKS 3304-114- 4-BD
W5JW 2552-116- 1-B
KN5D 2266-103- 1-B
KC5DT 1958- 89- 1-B

WB5AOX 960- 32- 5-B
K5TA 220- 10- 1-AB
K5JW 184- 7- 1-B
WB5CYK 110- 5- 1-B

Northern Texas

KA5FLE 10,728-230- 8-ABCD
WA5VJB 9760-253- 6-ABCD
WD5HDM 5824-150- 6-ABCD
WD5IBM 4928-131- 6-ABC
KA5FKH 2940- 79- 5-ABCD
KB5HP 104- 3- 3-AD
WB5LUA (+K5DOI, W1GGM) 11,214-197-11-ABCDE
WB5KTC (+ADSI) 6816-199- 6-ABD

Oklahoma

W5NZS 2556- 63- 8-ABD
WD5AGO 1600- 50- 6-B
W1GOM 552- 22- 2-ABD
N5DUB 390- 15- 3-AB
N5KW (+K5CM) 16,644-201-28-ABCD

Southern Texas

KC5GB 3690-115- 5-ABD
K5BZU 936- 39- 2-B
W5UWB (+WA5IBE) 2160- 53- 5-ABDE
N5DGD (+WB5YVD) 744- 31- 2-ABD

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East Bay

WB6ZEP 3488- 91- 6-ABD
WD6CHL 3360- 79- 6-BD
N6AMG 2888- 87- 9-ABCDE
WA6LHD 2080- 52-10-B
WB6NMV (+WA6VPH, WB6s MYC, NAC) 9720-197- 8-ABCDE

Los Angeles

N6BXP 20,786-470- 9-ABCD
WA6TMJ 9962-255- 7-ABC
N6DBA 7430-249- 5-B
WA6HXM 6726-177- 9-AB
WA6PZL 6132-146-11-AB
KA6LSV 2850- 95- 5-AB
N6DBS 2408- 56- 4-BC
W6PFE 2040- 53- 5-ABCD
N6KN 720- 24- 5-B
K6KSY 660- 22- 5-AB
N6HE 624- 20- 2-BC
K6LMN/6 (+WB6DTA) 15,552-325- 8-BCDE
W6NUI (+K6SVL) 9120-212- 6-BCD
WA6YCL (+N6KN) 1050- 35- 5-B

Orange

WA6EKD 15,240-318-10-ABCD
K6PVS 7220-169- 9-ABD
W6MFQ (+K5HSS, KD6UJ) 3724- 98- 9-AB

Sacramento Valley

N6EAM 4080-127- 5-ABC

San Diego

KA6FTP 2010- 67- 5-AB

San Francisco

WB6WML (+W6LID, WA6LCN, W9DHK) 10,960-220-10-ABCDEH
WA6KLK (+KA6MQH, KD6RC, N6EEK, WB6KFA, WD6FGX) 420- 11- 5-ABD

San Joaquin Valley

K6JKQ 2784- 52- 6-ABCDE

Santa Barbara

K6ELQ 1080- 9- 5-E
K6VMN 928- 25- 6-BC
K6HXW (+W6OAL, WA6s EJQ, OYS, WB6s UNH, YQN, WB9KMO) 16,284-267-13-ABCDE
KD6JY (+WB6RIJ) 1232- 34- 4-ABCD

Santa Clara Valley

K6GSS 21,472-402-12-ABCDE
KI RZ/6 15,276-330- 9-ABCDE
WH9AJZ/6 4446-101- 9-BC
WB2SZK 2910- 81- 5-ABC
AJ6T 2040- 34- 5-D
N6EJG 930- 31- 5-B

7

Alaska

KL7WE 452- 20- 1-ABD
WB4WXE/KL7 22- 1- 1-A

Arizona

K2DNR/7 3192- 95- 2-ABDE
WA7JTM (+WA7JTL) 3344- 76-12-AB

Idaho

KA7BTQ 360- 15- 2-AB

Montana

KB7Q 66- 3- 1-B

Nevada

K3ZAP/7 462- 14- 1-ABCD
WA7JUQ/7 (+KA7CVV, N7BPA) 4284- 84- 7-ABDE

Oregon

W7TYR 2860- 88- 3-ABCDE
N7DB 2412- 62- 8-ABCD
W7UDM 624- 23- 2-ABD
WB7QIW (WD4HVY, KA7s AGH, IUG, ATX, ESE, KI7Z, W7TWL, WA7s BMR, IIM, WB7s QQQ, W1D, oprs.) 5012-162- 4-ABD

Utah

N7BHC 374- 16- 1-ABD

Washington

W7YOZ 4088-146- 4-AB
WB7UUP 3822-128- 3-ABCD
W7ERH 1040- 40- 3-B
K7LYT 650- 25- 3-AB
KB7G 624- 26- 2-B
WB7OTI (+K7ND) 9636-182-12-ABCD

Wyoming

W7LFL 780- 30- 3-AB

8

Michigan

WB8BGY 14,508-230-21-ABD
W8KNH 4620-110-11-B
WD8KLU 2240- 62- 6-ABCD
W8CAP 2204- 58- 9-A
WA8ZCO 1224- 18- 7-CD
WB8YFE 1152- 27- 8-ABCD
WB8TGY 858- 39- 1-AB
W8QOI 684- 19- 8-A

Ohio

WA8ZHE 9150-155-15-ABCD
KD8Z 7968-141-14-BDE
N8CSL 7400-185-10-AB
N8AXA 7038-127-13-ABCDE
K8DIO 6864-134-12-BD
WD8CTX 6302-125-13-ABCD
WD8CVH 5270-129- 7-ABCD
WA8NPR 3520- 88-10-AB
WD8JPP 3380-101- 3-ABCD
WB8CCL 3132- 87- 8-AB
WD8MSF 2040- 60- 7-AB
KC8PS 1980- 66- 5-AB
W8VPD 1980- 55- 8-B
K8OCL 1856- 58- 6-B
WB8VSU 1430- 42- 3-BCD
K8VAZ 1368- 57- 2-BC
KG8P 1342- 61- 1-B
WA8WJW 1272- 42- 2-BC
W8JRN 1248- 50- 2-ABC
KA8BAQ 1188- 54- 1-B
WD8LWD 990- 35- 1-BCD
W8OK 984- 36- 2-BC
WD8RHP 888- 37- 2-B
W8LCY 480- 16- 5-B
WD8CYD 480- 20- 2-B
KG8Q 264- 12- 1-B
K8YXZ 176- 8- 1-B
W8FPA 154- 7- 1-B

West Virginia

K8RJ 2604- 59-11-BD
W8AEC 1680- 30-11-ABD
W8UT 1020- 26- 7-BD

9

Illinois

WB9SNR 8480-157-10-BCDE
K9MBX 7360-169-10-BD
WA9FIH 5120-133- 6-ABCD
WA9YLB 4708- 83-12-BCD
N9ADU 4318-120- 7-BD
W9UD 4312- 70-18-ABCD
K9GJU 3604- 97- 7-ABC
KA9KCG 3336-139- 2-B
WD9JLZ 3328-128- 3-AB
K9BQL 3276- 91- 8-B
K9AKS 3080- 77-10-AB
AJ9L 2618-119- 1-B
WD9GJK 2592-108- 2-AB
KA9ERZ 2496- 80- 3-ABCD
WB9SPV 2492- 74- 4-ABCD
K9ZWV 2352- 94- 2-ABC
KB2WU 2352- 94- 2-ABC
KA9LFD 2304- 91- 2-BD
K9QYT 2280- 90- 2-BD
WA9ASD 2236- 73- 3-BC
KA9BFG 2100- 70- 5-B
KA9BGE 1872- 78- 2-B
WB9WMM 1782- 33-17-AB
K9ENZ 1768- 68- 3-AB
AF9R 1440- 19- 8-DE
W9NBG 1342- 61- 1-AB
W9HPG 1152- 48- 2-B
WA9WXC 896- 30-14-BC
WA9CJZ 888- 37- 2-AB
WB9KHR 638- 22- 1-BC
WB9VDV (+KA9s JYI, MLM) 6480-102-17-ABCD

Indiana

K9MRI 15,022-231-19-ABCD
N9AZC 4656- 92-14-ABC
K9DZE 3168- 88- 8-AB
K9WZB 2964- 78- 9-B
K9EFX 1700- 50- 7-B
W3EP/9 884- 26- 7-B
WB9NTL (+K9XA, N9ACT) 11,804-213-16-ABCD
KK9N (+K9QKE, KA9LAU) 2108- 62- 7-B

Wisconsin

KB9NM 4240- 97-10-BCD
WA9KGQ 3404- 72-13-ABC
KB9RR 192- 7- 2-BD
KA9KHV 66- 3- 1-B
KA9JJY 44- 2- 1-B
KA9KEQ 44- 2- 1-B

Ø

Colorado

KBØCY 576- 20- 2-BC
WDØDJU 456- 14- 2-BC
NØCQQ 364- 14- 3-B
W9MHI/Ø 242- 11- 1-A
WDØBZA 168- 7- 2-A
WAØLSH (+KØUNS, WA2VMS) 3828- 87-12-AB
AAØL (+ADØO, KAØFOZ, NØOV, WBØSDW) 2130- 69- 5-ABD

Iowa

WAØRJT 1558- 41- 9-B
KØCQ 972- 26- 8-ABD
WBØUSU 672- 21- 6-AB
WBØZKG (+AKØP, KNØO) 3990- 91-11-ABD

Kansas

WØRT 4578- 94-11-ABCD
WBØISW 3842- 94- 7-ABCD
NØLL 3696- 77-14-AB
KØVUA 1088- 34- 6-AB
WØQOA 870- 26- 5-BD
AEØG 588- 21- 4-B

Minnesota

WØRGU 5000-114-10-ABCD
WØVB 4674-117- 9-ABC
KØSE 2660- 71- 9-B
WAØCQG 2210- 55- 7-ABCD
WDØHEB 2158- 78- 3-BD
KØTS 2132- 78- 3-ABD
KCØP 2028- 76- 3-ABC
WDØETA 1960- 64- 4-BD
WØMN 1924- 74- 3-B
WAØVEZ 1920- 77- 2-BD
WBØISF 1898- 64- 3-B
WBØYEE 1872- 72- 3-B
KAØJZU 1846- 71- 3-B
NØBSG 1704- 71- 2-AB
KAØCRO 1638- 61- 4-ABC
WBØHOX 1638- 63- 3-B
NØAVB 1608- 67- 2-AB
WAØULE 1534- 59- 3-B
KAØCRY 1464- 61- 2-B
NØBOC 1464- 61- 2-B
WDØEOI 1430- 55- 3-B
KØSIR 1416- 59- 2-AB
WDØGBU 1404- 54- 3-B
WAØDCQ 1368- 57- 2-B
KCØA 1344- 56- 2-B
KØKTY 1344- 56- 2-B
NØBTU 1296- 54- 2-B
KBØYI 1254- 57- 1-B
KBØLU 1254- 57- 1-B
WAØWTV 1248- 52- 2-B
KAØHMM 1152- 48- 2-B
KAØGHU 1122- 51- 1-B
NØBCB 1118- 43- 3-B
WDØGCP 1080- 45- 2-B
WAØVLG 1056- 44- 2-B
KØEWA 1056- 44- 2-B
WDØGNK 1032- 43- 2-B
KBØS 968- 44- 1-B
KFØS 936- 39- 2-B
NØAXU 912- 38- 2-B
KØIHV 888- 37- 2-B
WBØSFF/Ø 880- 40- 1-B
WDØFFB 880- 40- 1-B
KNØC 836- 38- 1-B
KAØJZT 814- 37- 1-B
WAØVHX 792- 33- 2-B
KØXL 720- 30- 2-B
KCØZ 704- 32- 1-B
KØWJK 682- 31- 1-B
WØOHU 660- 11- 5-D
WDØHHH 660- 30- 1-B
WBØJCL 616- 28- 1-B
KØPSH 600- 25- 2-B
WØUAA 572- 26- 1-B
NØBVB 552- 23- 2-B
WDØGLS 528- 24- 1-B
KØJCF 528- 22- 2-B
WAØEWK 528- 24- 1-B
KØIJU 440- 20- 1-B
KØQJX 408- 17- 2-B
WØSA 336- 14- 2-B
KAØCIR 144- 6- 2-A
WBØYMI 110- 5- 1-B
WAØVEB 66- 3- 1-B

Missouri

NØIS 9048-180-16-ABCD
WAØNOK 5620-122-10-ABCD
WØRWH 4600- 82-15-BD
KØCB 1344- 39- 6-ABCD
NØDCD 264- 11- 2-B
KØXT 22- 1- 1-B
KØFA (KAØELU, NØs AQC, AQZ) 616- 22- 4-B

Nebraska

KFØY 912- 24- 9-AB
KØPTK 350- 15- 5-B
NØAJU (+WØEKB) 2660- 70- 9-AB
WDØBQM (+KAØCRI, WDØBQG) 338- 13- 3-AB

South Dakota

WBØHHM 1440- 40- 8-B

VE

Maritimes - Newfoundland

VE1YX 468- 13- 8-A

Quebec

VE2BXF 624- 19- 3-ABCD
VE2ADE (+VE2EHN) 638- 29- 1-B
VE2CUA (VE2s DUB, FUK, oprs.) 378- 14- 7-B

Ontario

VE3CRU 12,300-185-15-ABCDE
VE3BFM 3306- 75- 9-ABE
VE3BZE 1944- 54- 8-B
VE3FGU 1764- 42-11-AB
VE3DSS 1476- 33- 6-ABCD
VE3UOT (VE1BCZ, opr.) 1426- 46- 4-ABD
VE3LNX (+VE3s ADJ, KWI) 15,184-237-16-ABCDE

British Columbia

VE7BLF 1288- 49- 4-ABCD

DX

C6ADV 320- 10- 6-A

Check Logs

KA1CDZ, K2EUR, KA2HNQ, WA3USH (+N3s ASL, BFM) W4ISS, N6CA, W7FK (W7UGK, opr.), WA8LXJ, WA8SVV

Disqualifications

WB3CZG (+K3MKZ, WA3NVS, WB3s CAI, FAA, FFT, FYT, IWZ), call sign/exchange errors; WA8ONQ (+WA3OJX, N4AMG, K8s MN, VVV, N8BPB, WA8s NJR, OGS, WB8IGY, KA9KIC, W9OEH), call sign/exchange errors.

Results, 1982 Novice Roundup

Beginner's Luck

By Bill Jennings,* K1WJ

The Novice Roundup is unique among Amateur Radio contests. It is a contest in which everyone who participates is a winner. There are no losers in the NR.

The Novice Roundup provides a medium in which the "newly" licensed ham can share and enjoy the "Novice Experience," enter into friendly competition with her/his contemporaries or, in the true spirit of friendly amateur cooperation, jump in to give a QSO or two to those who are participating in the NR.

It takes a little more than luck to come out of the NR with one of the ARRL Section Winner awards. Those valued hunks of wall-paper are earned by those operators who work at developing their operating skills and take the time to fully utilize their station equipment. The 200 QSO Award and even the score listing for the Novice Roundup in *QST* are no lesser achievements. The very fact that one's score is listed shows that there was a certain resolve to undertake operation in the NR and to wade through the paperwork necessary to see that resolve through to its logical conclusion.

Can any of those who entered the Novice Roundup and put in their best effort, no matter where they ended up in the score listings, say they didn't come out a winner? We think not. Don't believe it? Drop on by next year for NR '83 and give it a whirl. You'll be glad you did.

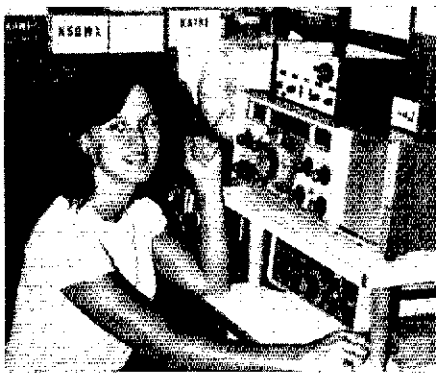
There were 469 entries received in the wake of NR '82 — 362 from Novices and Technicians, the other 107 coming from non-Novices and in the form of check logs. Even though this is not a record number of entries for the Novice Roundup (615 entries were received as a result of NR '81), it's still a pretty fair showing.

The checking of this year's NR entries revealed a diverse group of entrants. There was one Novice operator aged 10 years and a couple of Novice/Technician ops in their early 60s. At least one Novice received her new ticket as the '82 NR was half over, while more than just a few of the Novices and Technicians entered in this year's NR have been licensed more than five years.

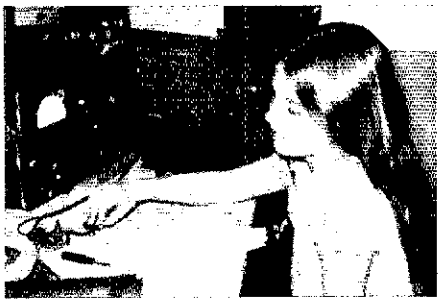
The station equipment used showed the same span of diversity as that of the operators themselves. Homebrewed transceivers and crystal-controlled transmitters hooked to simple wire antennas performed quite well for their operators, as did those brand new, fancy, state-of-the-art kilobuck transceivers coupled to multi-element quads and Yagis. The point is that if you are on the air or plan to be, and if you have the interest, there is a place for you, the Novice or Technician operator, in the Novice Roundup.

CU in NR '83.

*Communications Assistant, ARRL



Debra, KA4OTP/T, with 567 NR QSOs, was the number three Technician in the 1982 NR.



Ten-year-old Annie, KA3IHU/N, after only three months on the air, made 200 QSOs and led the Maryland-DC section.

KA8LTQ/N from the Ohio section.

Tobi, KA9MMY/N, received her license on Thursday, February 4 — right in the middle of the contest — and still managed to make a respectable 117 NR QSOs. No, the amplifier in the photo was not used in the contest. It belongs to Tobi's OM, K9WZB.

Top 10 Novices

Call	Score
KA2BNF/N	82,875
KAØGFA/N	69,445
KA5GWI/N	65,110
WA4PGM/N	65,075
KA4VNS/N	61,404
KA7HJQ/N	53,856
KA5KPE/N	50,544
KA4IOU/N	49,118
KA7HBK/N	48,626
WB5LUU/N	48,438

Top 10 Technicians

Call	Score
WB2DNP/T	52,624
KA7LGC/T	52,104
KA4OTP/T	48,762
KA8IPG/T	37,425
WD4RAF/T	35,364
KA9KAW/T	31,668
KA9EKG/T	26,496
WD5AFR/T	23,363
N8CVY/T	22,555
WD8NHN/T	21,888

Brian, KAØLAE/N, 11 years old, made 420 QSOs in the NR, and is pictured enjoying some heavy reading when the QSO rate dropped during the contest.

SOAPBOX

This was my first contest. Prior to this year's Novice Roundup, I only had a total of 14 contacts logged. Thus my 32 contacts in the contest more than doubled my previous total (KA6JMS/N). TNX to PY1VT for sitting on 15 meters and calling CQ NR. He was my first South America (KA7IZO/N). May I suggest that in the future you designate LAC for Los Angeles Section. This would eliminate any doubt as to whether you are talking to Louisiana or Los Angeles (KA2NID/N). [Bruce, we now recommend LAX for the Los Angeles Section. — Ed.] I often caught myself listening rather than operating. This was probably because I was an SWL for so long. Hard to break old habits — Hi! (KA4UTB/N). I went into the NR operating at approximately 10 wpm and came out the other end at about 15 wpm (KA5MSV/T). Was happy to see the number of General class and above operators that ended up in my log. I estimate 50%. TNX to the OM! (KA1GPG/N). None of the KL7s appeared to be informed of my crystal frequencies . . . Had to choose between staying home and contesting or going to a high school invitational meet on the first Saturday of the NR. I chose to stay home, but Mom chose the invitational. Since she's the only one in the family who can cook, guess which one I went to? (KA5LYG/N). I'm looking forward to NR '83 from the other side of the fence. I plan to reciprocate for the help that I received from the higher class licensees this year (WD5DOB/N). I worked KH6 and KL7 for the first time and my antenna was only a dipole on the den floor (WB4CVH/T). Did not take QSO point credit for dates on CD — 48 (Hi!). 87 QSOs + 4 days = 91 × 43 sections + 3913? (WA6YKW/N). [Don't rub it in, Dave. So we made a little mistake on the sample log sheet in *QST* (hi). — Ed.] The highlight of the event for me was working WA3ZMY/3G in Delaware the day after I read his Soapbox entry in the results of the 1978 Novice Roundup (WA2KRO/N). A little confusion in the rules for the NR on the starting date. Was Friday evening January 29 or January 30? (WDØGZE/N). [The first Friday evening of the Novice Roundup was January 29 in *local* time and after 2359 became January 30 in UTC — Ed.] I had fun, and that is what counts. I wish more people would think that way (KA4UBN/N).

Score Headings

Score listings indicate call sign, score, number of QSOs, multiplier (number of ARRL sections + DXCC countries) and total hours (e.g., WB1DVE/N had 47,592 points and made 641 QSOs in 72 sections/countries in 21 hours).

U.S.A.

1

Connecticut

WB1DVE/N 47,592-641-72-21
KA1HJK/N 33,624-447-72-30
KA1EHK/N 32,700-416-75-40
KA1GPG/N 31,758-402-79-30
WB1DSS/N 25,350-305-78-30
KA1EXR/N 20,262-307-66-24
KA1HKC/N 16,188-274-57-24
KA1HPS/N 12,567-198-59-28
KA1GTO/N 5192-108-44-21
KA1EHO/N 5170-110-47-20

Eastern Massachusetts

KA1HFY/N 24,010-333-70-28
KA1GEU/N 16,302-276-57-30
KA1FSN/N 3145- 85-37-15

Maine

WB1CBP/N 28,083-387-69-30
KA1CRP/N 20,424-266-74-29
KA1DOD/N 20,160-265-72-22
KA1EAP/N 18,144-288-63-30
KA1GPI/N 9487-164-53-29
KA1DSY/N 378- 27-14- 4
KA1HVX/N 36- 6- 6- 4

New Hampshire

K1FUB/N 44,477-538-79-30
KA1GMP/N 21,216-312-68-26
KA1HNV/N 12,509-190-61-26
KA1HSW/N 12,474-211-54-30
KA1HLI/N 8112-169-48-28
KA1HXM/N 616- 28-22- 3

Rhode Island

KA1GUW/N 14,446-234-62-17

Western Massachusetts

KA1HSP/N 19,278-306-63-30
KA1ETR/N 16,848-312-54-23
KA1EBU/N 16,836-276-61-20
KA1HUS/N 13,310-227-59-30
KA1HVF/N 4080-102-40-12
WB1CLD/N 2847- 73-39-15
KA1EKQ/N 120- 12-10-10

2

Eastern New York

KA2JKA/N 26,412-367-71-30
KA2NVI/N 16,506-262-63-25
KA2IKJ/N 11,024-208-53-19
KA2NNM/N 1888- 59-32-20
KA2MYJ/T 520- 26-20-17

New York City - L.I.

KA2KPK/N 17,304-304-56-30
KA2NYQ/N 16,954-257-62-27
KA2OFM/N 12,095-205-59-28
KA2LHN/1 9108-207-44-20
WA2KRU/N 4452-106-42-16
WB2FQE/N 1421- 49-29- 6

Northern New Jersey

KA2BNF/N 82,875-945-85-27
WB2DNP/T 52,624-598-88-27
WA2VJD/N 28,650-367-78-28
KA2NOJ/N 19,593-311-63-25
KA2NTW/N 17,934-279-61-19
KA2NTS/N 15,311-251-61-29
KA2HSF/N 13,020-207-60-17
KA2OJN/N 12,798-237-59-26
KA2DLW/N 9625-100-49-30
KA2MAT/N 2370- 79-30-15
KA2NUP/N 1540- 55-28-10
WB4CVH/T 1200- 38-25-11

Southern New Jersey

KA2KGD/N 47,964-561-84-30
KA2IRM/N 30,020-369-79-30
KA2JAR/N 25,060-358-70-29
KA2NDX/N 15,211-287-53-25
KA2MIN/T 8540-170-52-26
KA2NID/N 5985-133-45-30
KA2NVU/N 2268- 63-36-20
KA2AIA/N 1798- 47-29-17
KA2MUI/N 1632- 51-32-27

Western New York

KA2KGK/N 29,190-407-70-29
KA2MUD/N 16,077-233-69-30
KA2NXJ/N 11,024-202-52-27
KA2JAT/N 5670-147-36-24
KA2LGJ/N 1421- 49-29- 6
KA2IKU/N 736- 32-23-16
KA2DHJ/N 646- 28-17-19

3

Delaware

KA3GRQ/N 15,163-257-59-25
KA3DDB/N 2759- 79-31-12
KA3HAW/N 925- 37-25-17

Eastern Pennsylvania

KA3IFG/N 23,270-358-65-29
KA3GYZ/N 13,376-209-64-27
N3CMF/T 11,950-239-50-28
WB3IMO/N 11,092-178-59-20
KA3EFA/N 10,535-200-49-25
KA3FWW/T 10,400-200-52-25
KA3HYS/N 10,302-202-51-20
KA3DXQ/T 5712-136-42-11
KA3FOK/N 5504-118-43-14
KA3ESA/N 2970- 55-54-23
KA3DSX/N 1060- 43-20-24
KA3FBP/T 154- 14-11- 8

Maryland - D.C.

KA3IHU/N 11,600-200-58-20
KA3HCP/N 2262- 87-26-23
KA3IEG (+KA3s FSH, IEN, IEP, N3CLV) 18,120-302-60-27

Western Pennsylvania

KA3FJM/N 28,416-369-74-30
K3CR/T (WN3VAW, opr.) 16,592-272-61-24

4

Alabama

KA4WNT/N 32,184-437-72-25
KA4MXN/N 32,175-429-75-30
N4DLV/T 1316- 47-28-17
KA4PTD/N 154- 14-11- 3
KA4PTE/N 90- 10- 9- 6

Georgia

KA4IOU/N 49,118-584-82-30
KA4OTP/T 48,762-567-86-30
KA4BAL/N 27,090-367-70-28
KA4VQH/N 49- 7- 7- 3

Kentucky

WD4BVW/T 11,350-217-50-30
KA4MIU/N 5244-114-46-19

North Carolina

KA4UVZ/N 21,888-342-64-30
KA4WBR/N 13,936-208-67-26
KA4UYP/N 11,928-213-56-29
KA4LTC/N 11,918-202-59-28
KA4UBN/N 1525- 61-25- 4
KA4VIP/N 221- 17-13- 3

Northern Florida

KA4VNS/N 61,404-701-84-30
KA4ICW/N 20,191-331-61-18
N4GCA/T 19,630-292-65-29
N3BRT/T 11,752-226-52-27
KA4IPS/N 10,550-211-50-28
KA8LEX/4N 8316-198-42-29
KA4SYW/N 8008-154-52-30
KA4WNI/T 6328- 8 178-28
K4DTR/T 4200-105-40-13
KA4EAO/T 3116- 82-38-19

South Carolina

KA4LHV/N 16,120-248-65-20
KA4VKG/N 16,260-271-60-29
KA4ITQ/N 13,230-210-63-21
KA4LHG/N 12,586-203-62-21
KA4UWN/T 12,462-201-62-20
WD8PYR/N 5418-116-43-28
KA4EPB/N 2828- 91-28-16

Southern Florida

WD4RAF/T 35,364-406-84-28
KA4YIP/N 22,248-309-72-30
KA4SGK/N 13,780-250-52-14
KA4VAY/T 13,585-237-65-28
KA4QZJ/N 11,550-210-55-30
N4FXV/T 10,098-198-51-20
KA4TLQ/N 4182-102-41-10
WA4LQQ/T 3040- 70-38-13
KA4WXX/N (+KA4WXW) 9396-174-54-25

Tennessee

KA4RWC/N 29,145-436-67-26
KA4UYZ/N 14,640-244-60-25
KA4RPO/N 7446-146-51-18
WA4OID/N 5289-129-41-30
KA4INX/T 4850- 97-50-19

Virginia

KA4YII/N 21,508-283-76-11
KA4WRA/N 16,554-267-62-30
KA4WWA/N 9063-159-57-28
N4FLF/T 7476-178-42-30
KA4UTB/N 1100- 34-25-28

West Indies

NP4EK/1 12,688-208-61-24

5

Arkansas

KA5KPE/N 50,544-609-81-30
KA5MKB/N 726- 23-22- 6

Louisiana

WA5OXK/T 13,456-212-58-19
KA5JPY 11,128-214-52-27

Mississippi

KA5BCE/N 45,900-612-75-30
KA5MMK/N 16,296-291-56-23
KA5MTF/N 15,489-243-63-21
KA5MWD/N 9632-172-56-20

New Mexico

KA3GME/N 44,480-556-80-28
WD5AFR/T 23,363-383-61-29
KA5DIU/N 20,248-317-64-27
WB7OVB/5N 3848-104-37-14

Northern Texas

KA5GWI/N 65,110-746-85-30
KA5LYG/N 34,884-513-68-29
KA5LAQ/N 2409- 73-33- 9
KA5MBM/N 36- 9- 4- 4

Oklahoma

KA5IFE/N 40,434-586-69-28
KA5MSV/T 13,395-225-57-16

Southern Texas

WB5LUU/N 48,438-606-78-30
KA5LSH/N 14,300-220-65-16
KA5MLP/N 3003- 77-39-14
KA2MHT/5T 1260- 45-28-15

6

East Bay

KA6MXK/N 12,322-202-61-30

Los Angeles

KA6AKL/N 39,192-552-71-30
KA6RAD/N 29,016-468-62-28
KA6RAI/N 25,806-359-69-26
KA6OSC/T 15,142-226-67-24
KA6JFL/N 13,080-203-60-19

Orange

KA6IZQ/N 38,624-524-71-30
KA6FMZ/T 13,860-225-59-24
KA6PTS/T 11,605-211-55-28
KA6NRD/N 8162-154-53-30
KA6JMS/N 736- 32-23-12

Pacific

KH6NX/T 15,799-259-61-29

Sacramento Valley

KA6QOA/T 966- 36-21-27

San Joaquin Valley

KA6OWZ/T 12,031-207-53-13
WA6YKW/N 3741- 87-43-17

Santa Barbara

WB6SJC/N 18,561-269-69-30
KA6FDG/N 11,664-201-54-14
KA6LWK/N 1376- 43-32- 8

Santa Clara Valley

KA6RLQ/N 19,229-287-67-27
KA6ING/T 17,080-244-70-21
KA6CLK/T 10,200-204-50-30
N6EJG/T 4042- 84-43-30
KA6PZE/N 3367- 74-37-11
WD6DXH/N 3115- 85-37- 6
KA6SEF/N 78- 13- 6- 3
N6ETZ/T 36- 6- 6- 3
KA6SIQ/N 30- 6- 5- 8

7

Alaska

WL7AME/N 41,720-581-70-20
WL7ARN/T 12- 4- 3- 2

Arizona

WB7QBM/N 42,032-548-74-25
KA7LRZ/T 18,980-272-65-21
KA7GQW/N 13,674-258-53-30
KA3AIX/7N 11,000-200-55-24

Idaho

KA7ISK/N 5500-100-50-14

Montana

KA7HBK/N 48,626-668-82-30
KA7GVI/N 14,504-259-56-26
KA7HTC/N 3485- 85-41-30
KA7LRO/N 572- 26-22- 7

Nevada

KA7GXO/N 41,710-685-86-20
KA7ICF/N 24,004-333-68-29

Oregon

KA7MDM/N 30,464-433-68-23
KA7KDU/T 16,560-276-60-30
WB7DHW/N 12,474-231-54-30
N7CNH/T 3608- 88-41-20

Utah

KA7LWH/N 2376- 66-36- 9

Washington

KA7HJQ/N 53,856-748-72-30
KA7LGC/T 52,104-668-78-25
WB7WSX/N 31,824-442-72-19
KA7IZO/N 24,321-348-67-24
N7DCY/T 21,105-305-67-30
KA7ITK/N 16,348-244-67-18
KA7GAZ/N 15,892-274-58-28
N/DOF/T 2775- 75-37-14
KA7KRB/N 900- 45-20-30

Wyoming

KA7ALT/N 14,616-252-58-16
KA7FPZ/T 17,685-205-67-20

8

Michigan

KA8OCR/N 49,583-577-79-29
KA8EBG/N 41,220-458-90-26
KA8JBK/N 41,198-535-77-30
KA8IIN/N 39,220-520-74-28
N8CVY/T 22,555-337-65-30
KA8GCC/T 21,289-349-61-29
KA8FXT/N 20,820-347-60-30
KA8MSU/N 20,286-322-63-30
KA8NDV/N 20,280-338-60-30
KA8MHE/N 16,933-277-59-25
KA8NYQ/N 15,458-247-59-27
KA8KCT/N 14,030-219-64-30
WD8ECM/N 8379-156-49-24
KA8MRX/N 7605-154-45-16
KA8HUB/T 7602-181-42-30
KA8NWP/N 7446-146-51-26
KA8MWQ/N 2485- 71-35-21
KA8KAE/T 704- 13- 8- 6

Ohio

KA8OFK/N 37,814-498-73-30
KA8IPG/T 37,425-499-75-30
KA8IYN/N 29,726-334-89-22
KA8LNB/N 19,908-316-63-25
N8CHH/T 18,205-321-55-30
KA8NNA/N 16,802-271-62-30
KA8MZJ/N 16,184-228-68-26
KA8NYO/N 14,906-257-58-21
KA8HFN/N 13,944-229-56-28
KA8NTP/N 13,500-250-54-28
KA8OIG/N 11,232-234-48-29
KA8NDC/N 10,650-213-50-28
WD8MZH/N 8685-192-45-26
KA8ILT/N 8680-155-56-16
KA8LZP/N 8120-203-40-21
KA8LTQ/N 6895-197-35-23
KA8JHL/N 6642-108-64-18
KA8ISL/N 6050-111-50-30
KA8NDV/N 5750-115-50-28
WD8JUF/N 3588- 98-36-20
KA8EOP/N 3315- 85-39-25
KA8GVR/T 3182- 74-43-15
KA8MDC/T 3000-100-30-14
KA8KSO/N 2842- 98-29-20
KA8MWE/T 1914- 58-33- 8
KA8MKL/N 1242- 46-27- 8
KA8OKH/N 1008- 42-24- 8
KA8LOH/N 828- 36-23- 5
WD8OKP/N 294- 21-14-17
KA8IHI/N 108- 12- 9- 2

West Virginia

WD8NHN/T 21,886-338-62-30
KA8KGI/N 1050- 42-25- 9

9

Illinois

KA9KAW/T 31,668-491-78-30
KA9KKD/N 21,980-310-68-24
KA9JNG/N 20,856-296-68-30
KA9EXQ/N 19,648-292-64-27
N9CHS/T 18,018-286-63-30
KA9LTR/N 17,745-263-65-30
KA9HZO/T 14,952-267-56-30
KA9MHZ/N 12,432-222-56-19
KA9FKT/N 12,000-200-60-30
KA9KTM/N 11,826-209-54-17
N9BFR/T 11,600-200-58-30
KA9KRV/N 11,232-201-52-13
KA9FXT/N 9800-181-50-26
KA9MCS/N 9798-213-46-21
WD9JCB/N 9699-183-53-21
KA9KBH/N 4992-118-39-24
KA9KEF/N 4800-105-40- 8
KA9BZY/T 2345- 67-35-10
KA9HRJ/N 1848- 66-28-19
KA9KKL(+KA9s KCR, KCS) 988- 38-26-10

Indiana

KA9KIC/N 31,995-395-81-26
KA9LLJ/N 28,897-392-71-27
KA9LUM/N 21,780-315-66-22
WD9DSC/N 20,904-312-67-30
KA9IKB/N 16,048-272-59-25
KA9JFK/N 13,622-278-49-18
KA9LEG/N 12,870-207-62-27
N9CUX/T 12,150-225-54-27
KA9MIZ/N 11,826-219-54-22
KA9MGF/N 11,256-201-56-30
KA9IBF/T 8215-155-53-24
KA9HKP/N 8037-141-57-12
KA9JKF/N 5400-108-50-25
KA9MMY/N 5967-117-51-21
KA9JDM/N 4173-107-39-26
N9CKN/T 2754- 81-34-16
KA9JMR/N 918- 34-27- 9
KA9LAA/N 154- 14-11-11

Wisconsin

KA9MFV/N 39,537-558-69-30
KA9FDL/N 34,952-514-68-30
KA9IXL/N 29,127-389-73-30
KA9EKG/T 26,496-384-69-29
KA9IXM/N 24,850-340-70-30
KA9KTX/N 20,150-305-62-29
KA9KHV/T 18,910-305-62-18
KA9KUA/N 17,940-276-65-22
KA9LXC/N 12,749-209-61-28
KA9DHM/N 12,036-204-59-30
KA9LWN/N 11,648-224-52-28
KA9LOE/N 11,169-219-51-17
KA9KJD/N 5334-112-42-18
KA9IMO/N 286- 26-11-10

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Colorado

KA0GFA/N 69,445-797-85-30
WD5DOB/0N 24,420-397-60-30
KA0LJO/N 19,778-304-62-30
KA0RMQ/N 13,570-230-59-24
KA0KVW/N 10,608-204-52-14

Iowa

KA0IUF/N 37,985-535-71-28
KA0LAE/N 30,240-420-72-26
KA0LXJ/N 14,365-221-65-28
KA0LUZ/N 13,644-208-58-25
KA0BLE/N 9360-175-48-30
KA0IFG/N 6076-124-49-25
KA0LSJ/N 4247-101-42-19
KA0GWK/N 3861- 99-39-21

Kansas

KA0LUM/N 33,116-477-68-29
KA0LQZ/N 18,666-306-61-30
KA0DOP/N 18,226-288-63-30
KA0DJR/T 11,492-221-52-20
KA0MRS/N 4120-103-40-27
N0CBG/T 460- 23-20- 9

Minnesota

WD0GZE/N 23,298-338-66-12
KA0AEH/N 7392-134-48-21
KA0MIW/N 2275- 65-35- 9

Missouri

WA4PQM/N 65,075-660-95-30
KA0EFG/N 20,368-289-67-14
KA0DLD/T 11,925-225-53-30
KA0HBR/N 11,536-206-56-29
WD0QFG/N 11,330-206-55-25
WD0FPK/N 2088- 58-36- 4
KA0KKV/N 1206- 67-18- 9
KA0LUE/N 630- 30-23- 9
WD0BBP/N 594- 27-22- 3

Nebraska

KA0FVE/N 11,256-201-56-20
KA0MOK/N 2590- 74-35-12

North Dakota

KA0HHH/T 9065-175-49-27

South Dakota

KA0LGL/N 12,840-214-60-13

Non-Novices

WA5IPS 16,644, W3ADE 14,455, W1FM 13,452, KA9CIM 12,544, WB0NIE 12,159, K5RDX 11,934, W4KFC 11,600, NG4E 10,556, K7WR 10,261, WA2EYA 9628, KA7JVW 9048, KA8QMI 8100, WD9INF 6222, KA2BNL 7130, KB7LQ 4800, W4YOK 3440, W1AW (AK4L opr.) 3400, N4DM 2490, W6PRI 3219, WB5HLB 3003, WB8KKI 2847, W7HO 2839, KA1MM 2736, N6JM 2074, KB7QC 1792, KC8LA 1682, KA1MIX 1680, PY1VT 1375, KK7A 1300, HP1AC 1040, KC8A 1000, NJ4Q 888, N4EQG 814, K9GDF 368, F6EPO 359, WB9TCJ 320, N8DEQ 299, WA3LGG 266, AF3Z 255, KB9W 143, SK0LM (SM0DRD, opr.) 64, WA7HTJ 25, KA9KSV (+KA9s A, AAL, MAQ, MMH), WA9JWL, WB9s URL, ZBG, ZBH) 19,276, K9GXU (+N9BPK, WA0LIS) 9646, KA2KXC (+KC2JS) 7065, WB1QE (+K8AQM, K8ss HW, RH, KC8s A, KQ, W8KSK, WB8VHP, WD8LCC, WD9INF) 1700, W9CJS (+KA9s FXM, LSA, MBR, WB9PCM, opr.) 2100, KA2OJM (+N2CKF) 646

Check Logs

5M6BZE, VE2MJ, VE3BWM, VE9ACY, AD1Z, AE1X, KA1CLV, KA1GPX/N, KF1B, KA1UE, KC1X, N1BEY, AA2Z, AK2H, K2PF, K2QR, KA2CGV, KA2KAG, KJ2V, N2BNB, W2HAE, W2JFK, WA2ASQ, WA2PXH, WA2QKH, WB2YOF, KA3HKL, KC3Q, W3ARK, W3US, WA3LBR, KA4KDM, KA4WDY, KA4AKK/4 NV4Q, W4YE, WA4VYW, WB2RLC/4, WB4NNC, K4RF, KB5UL, N5AFV, W5PDD, N6HE, N6FSV, W6DDB, KA7GYW, KL7FDQ/7, KN7C, K8DI, N8DIF, W8VUV, W9FSD, WB9UIA/N, KA9LUV/N, KC9EP, N9CLV, N9DJJ, WB9OKY

Disqualification

WB5LVL/N QST

Public Service

Conducted By Robert J. Halprin,* K1XA

A Year Ago This Month

On Saturday, June 13, 1981, at 3:23 in the afternoon, a devastating tornado surprised Cardington, Ohio, a rural community 35 miles north of Columbus. The tornado struck suddenly, destroying apartments, industries and homes. Damage estimates were in the millions of dollars. Amateur Radio operators provided much of the essential communications into and out of the stricken Cardington community in the wake of the tornado, as telephone workers fought to replace downed lines and cope with the very heavy demands on the remaining telephone facilities.

At the time of the touchdown, weather nets were in operation at Columbus (16/76), Mansfield (34/94) and Marion (90/30) because of watches that were issued previously for the southwestern parts of the state. Although there was no sighting report until after Cardington was hit, the ham community of central Ohio got the word quickly through these weather watches.

KA8GKT, west of Cardington, saw the tornado at about the time it touched down and reported it to the Marion net. His sighting was confirmed shortly thereafter by K8NQY from his car in his garage. His tower had been toppled by the twister just before it swooped into, and flattened, a trailer park.

Members of the Morrow County Amateur Radio Emergency Service (ARES) arrived on the scene within minutes of receiving word of the touchdown. Morrow County Emergency Coordinator WB8TFD rushed back from a business trip in Columbus and set up the first command post at the Methodist Church, as provided for in the local disaster plan.

The highway patrol and sheriff's deputies quickly sealed off access to Cardington, except for emergency traffic. Personnel of both agencies accepted ARES cards as adequate credentials and admitted amateur operators through the roadblocks.

Shortly thereafter, Amateur Radio operators from other counties (Marion, Franklin, Delaware, Richland and Knox) began to arrive in Cardington. For some time, it was difficult to get to the shelters and command post because of trees and debris in the streets and danger from damaged gas lines. The authorities soon decided to move headquarters to the local high school, where the amateur communications center was relocated. The school was on the edge of the damaged area and hence was more accessible to the incoming hams. Some, without ARES cards, found it impossible to get into town.

The MASER group from Richland County (with K8RT in charge) brought their communications trailer and set up a link with Mansfield Red Cross on 34/94. Marion County EC WD8NEE activated the station at Marion Red Cross headquarters and kept it manned throughout the weekend. W8BKO and the Columbus hams arrived with badly needed hand-helds. K8NQY parked his mobile at the Morrow County Hospital and served as a runner to back up the emergency squad communications, for which service the hospital administrator expressed thanks.

Cardington, Ohio, June 13, 1981. Anything over two stories was destroyed in the west end of the business district. *(photo courtesy WB8TFD)*

Once the obvious casualties had been taken care of, Red Cross and DSA personnel organized search-and-rescue teams to look for other survivors. Amateur Radio operators were assigned to each team to provide communications. The communications between these teams and the command post were handled on 52 simplex, which is common to all hand-helds and is competent for the short ranges (not more than 2-1/2 miles).

The search-and-rescue activities continued until darkness made searching futile. While some operators stayed on to maintain watch on the radio circuits, many of the volunteers returned home. Some found cots in the school. W8JRL returned to Mount Gilead to provide access to the Morrow County telephone system outside the Cardington area.

Searching resumed the next day (Sunday), earlier than had been announced. Few operators were available until an hour and a half after the first teams had gone to assess the damage and make a second search for survivors. All teams had hams accompanying them before they returned to base, however. As the teams returned, the Red Cross gathered their information.

Health and Welfare traffic, in both directions, was held in abeyance until Sunday afternoon. Anticipating a flood of messages as news of the disaster spread, WB8TFD divided the entire town into sections to be canvassed for outgoing traffic. This suprised some from larger towns, but WB8TFD was certain that the community could be covered in reasonable time and that organizing outgoing Welfare traffic would reduce the number of incoming messages. Three hours and 15 minutes later, the last group returned, after having left a most favorable image of Amateur Radio with the residents visited. Outgoing Welfare traffic was then disbursed to Marion, Mansfield and Columbus.

The amateur communications center was closed Sunday night, as a number of telephone lines were installed. It was reactivated by N8BUW and KB8X for a time on Monday, when it appeared that the Red Cross at Mount Gilead was having trouble reaching Cardington. This problem proved short-lived, and operation at the site was discontinued.

But it was not over for the Morrow County hams on the Marion repeater, who again and again answered when asked, "How do I get a message into Cardington?" This traffic was handled through the Red Cross for local delivery, as many of the addressees were displaced or without phone service.

It was a time for learning for many of the hams who took part. Two important lessons for those who would help in an emergency are: (a) carry your ARES membership card; and (b) a hand-held with a dead battery (and no replacement) is just dead weight. Be prepared.

Recapping: A total of 83 hours and 57 minutes of net time was logged at Marion, Mansfield and Cardington. A total of 172 Welfare messages were handled. Organizations served were the Morrow County Red Cross, Morrow County Sheriff's Department, Ohio State Red Cross and the DSA. Nearly 100 amateurs participated. To all, thanks very much for all the help. — *Jerry Sellars, WB8TFD, emergency coordinator, Morrow County*

*Deputy Communications Manager, ARRL

Third-Party Traffic Treaties

Here is the latest list of countries with which U.S. and Canadian amateurs may legally handle third-party traffic.

U.S. Agreements

North America: Canada, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama.

South America: Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.

Europe: 4U1ITU.

Africa: Ghana, Liberia, The Gambia.

Asia: Israel, Jordan.

Oceania: Pitcairn Island*.

*Informal agreement. See League Lines, October 1981 *QST*, for details.

Canadian Agreements

North America: Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, United States.

South America: Bolivia, Chile, Colombia, Guyana, Paraguay, Peru, Trinidad and Tobago, Uruguay, Venezuela.

Europe: 4U1ITU.

Africa: none.

Asia: Israel.

Oceania: Australia.

Keep in mind that during emergency situations special, *temporary* third-party agreements are often established between the countries concerned. W1AW carries information on these temporary authorizations. When in doubt, monitor W1AW.

COMMUNICATIONS SERVICE OF THE MONTH

Sweet XVI. How sweet is was for thousands of Superbowl fans and nearly 40 hams. Superbowl XVI and all related events were very successful in spite of record-breaking sub-zero temperatures, high winds and adverse national press (by those writers who didn't enjoy our winter!).

One of the events leading up to Superbowl 1982 was the Super Parade — that's where Amateur Radio fits in. Every year in December, our groups (the ECHO repeater and L'anse Creuse Radio Club) provide communications for a local Christmas parade. This year, after the parade, we were approached by the Superbowl Host Committee. Having observed our communications skills, they were highly impressed and requested our assistance with their project. Of course we said yes!

The two weekends prior to the parade saw many changes. On both weekends, temperatures ranged from 0 to 10° F, with winds of up to 45 mph, resulting in a wind chill factor of approximately −50°. Several bands and float groups that had previously planned to brave a wintertime parade reconsidered and cancelled out. Thus, organizational lists, line-ups and plans were revised over and over as changes developed. The weekend before, we had conducted our dry run, and everything went smoothly in spite of the weather.

Friday, January 22 (the night before the parade). The National Weather Service predicted freezing rain throughout the night and issued a traveler's advisory for southeast Michigan.

Saturday, January 23, 4:30 A.M. Wake-up call. Outside temperature 30° F, freezing drizzle with streets having glare ice under slush (a mini ice storm).

4:55 A.M. K8RO ventured out early with the L'anse Creuse radio communications van to ensure its arrival for net control operation and repeater setup.

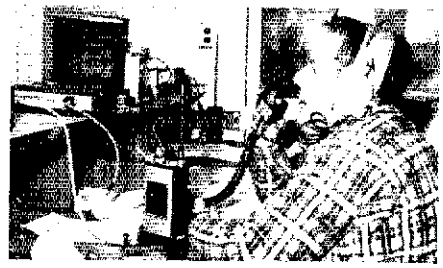
5 A.M. K8RO gave a call for help on the repeater — the communications van had slid into a ditch.

5:05 A.M. N8DHZ to the rescue with chains and four-wheel-drive. In 15 minutes, the van was again on the road.

5:45 A.M. Our first (of two) net control stations was set up at a car dealership where parade coordination and registration was to take place. W8PBO operated 147.42 simplex with KA8DRV on 446.00 simplex for a link between the two net controls.

6:10 A.M. The communications van was set up with the portable repeater running fine. Net control on the 147.69/09 repeater was assumed by K8RO. This net was used for message traffic relating to police, ambulance, department of public works, tow trucks, and so forth.

6:10-6:30 A.M. All operators were directed to meet at the parade coordination point to receive position assignments from W8PBO and KA8DRV. These included parade checkpoints, courtesy cars, police radio room and other locations.



K8RO was net control from the communications van during the Super Bowl XVI Parade. See Communications Service of the Month. *(photo courtesy WA8QAF)*

6:30-7 A.M. Operators were instructed to report to their assigned positions and check rigs for operation from their locations.

7 A.M. Many delays in arrivals. Reports received at parade registration included numerous floats stuck and a bus with band members stuck in a ditch.

7:30-10 A.M. Registrations and parade lineup assignment took place. A separate frequency was established directly between the pre-assignment check-in point (KG8F operator) and the registration area. This frequency (145.63 MHz simplex) reduced traffic on the coordination frequency, and at the same time increased efficiency in assignment of lineup positions and directions for parade participants. Also during this period, several pieces of traffic were handled regarding participants. These and other problems were quickly resolved by relaying the info to the proper source.

10:15 A.M. Following a brief squabble over who was to be number one in the lineup, the parade finally began. By this time, the winds had picked up to 25 mph with gusts to 45 mph, and a temperature of 25°, which produced a wind chill of −9°.

Some of the traffic handled during the parade included problems with parade pace, traffic getting through barricaded areas into the parade route, and wind-related problems. The wind actually blew in a few storefront windows and overturned portable outhouses placed along the route. One of the more tense situations developed when the courtesy car that W8LDB was assigned disappeared, along with his new 440-MHz hand-held radio. The incident was immediately reported to net control K8RO, and from there relayed to police. Within 10 minutes, the car was recovered; a parade official had taken the car on business farther up the parade route.

After the parade, we gathered at a local restaurant for a lunchtime critique. The consensus was that the majority of our efforts went smoothly. Some of the positive highlights expressed included the excellent operation of the communications van — especially the portable repeater, split net control stations that handled separate functions, and overall professional, efficient station operation (i.e., only transmit when necessary or when asked by the net control).

To some, parade or event exercises may seem wasteful. After all, shouldn't we as public service operators sharpen our skills in emergency-type drills or SETs rather than such "trivial" areas? The answer to that question is found in what each group gains from such activities. For our group it was very important; we not only served the public during the parade, but also gained more public exposure for Amateur Radio. Our operators gained experience in network operation, portable preparation and traffic handling in other than ideal conditions. For us, it was worth it! — *Brian Cox, WA8QAF*

ARRL SECTION EMERGENCY COORDINATOR REPORTS

☐ For March, 38 SEC reports were received, denoting a total ARES membership of 21,478. Sections reporting were: AL, AK, AB, AZ, CO, ENY, IN, KS, KY, ME, MI, MN, NH, NLI, NC, NFL, NTX, OH, OK, ON, RI, SV, SDGO, SJV, SCV, SC, SFL, STX, TN, UT, VT, VA, WA, WV, WMA, WNY, WPA and WI.

REPEATER LOG

According to reports received between March 21 and April 21, the following repeaters were involved in the delineated public service events.

	Weather Emergency	Criminal Activity	Medical Emergency	Vehicular Emergency	Fire	Search and Rescue	Public Safety Events	Drills/Alerts	Power Failures	Total
W1ABI								1		1
K1HF							1			1
W1KOO								1		1
K1LT							1			1
W1XJ				2			1	4		7
WR2ADJ				5			1	2		8
KC2CY				1	1			1		3
K2QIJ				2				5		7
W2VL				20						20
WR3ABM	1									1
N3AIA			1	2	1					4
K3JSZ								13		13
WR4AMJ				5		1				6
AK4B	1									1
WA4GIC								1		1
NN4N				1						1
WB4PZA								1		1
WA4QBG								6		6
WB4QES			3	8						11
WA4SWF	1							1		2
W4VOA								1		1
W4VQA	1							1		2
KB5CY				1			2	1		4
W5GIX			1	4	1					6
W5RVT				3	1					4
W8ASH							1			1
WD8AWP	1		4	4						9
WD6FGX	3	2		4			2			11
W8IYY	1			4				4	1	10
K7CC				1			32			33
KC7FA				2	1		5			8
W7HSG						1		4		5
K7OMR						8	4			12
WB7TPY				3		1	5	1		10
W7WGW				4					2	6
WR8ADO						1	1	5		7
WR8ARB				1						1
K8DDG	1						2	4		7
W8NXD				1			1			2
WA8ULB	1			2						3
WR9ACJ	4			6				2	2	14
WR9ADQ	2							2		4
W9EBN								1		1
N9RD	2							2		4
WØAFG	64									64
WBØHSI								1		1
WØMME	1			1						2
Total	83	2	9	87	5	12	59	65	5	327

NATIONAL TRAFFIC SYSTEM

Detailed elsewhere in this issue are the results of the 1981 Simulated Emergency Test (see page 60). From the NTS standpoint, it was another successful activation of the four-cycle sequence, which is now a permanent part of the NTS picture. See the SET results for more information. Doug, W2XD, is the new 2RN/c2 manager, replacing Bill, W2RQ. We'll be looking for you in those vineyards, Bill. Thanks for your good work. W2XD is no stranger to NTS, as he was the assistant manager of the net, as well as the publisher of the highly regarded NTS newsletter, *QSB*. WB4PNY reports that EAN/c2 is pleased to have K8LGA back as a net control. WBØMTA received a TWN/c2 certificate. WD8RNQ received a 8RN/c4 certificate. The following amateurs received 8RN/c2 certificates: N8BTF KA8CPS WB8DMF WD8DYW KA8GHF K8JDI WD8MIO WB8MRL WB8MZZ WB8UBR. Your conductor worked EAN/c4 manager K2KIR on five bands during the April Open CD Party (cw).

March Reports

	1	2	3	4	5	6	7
Cycle Two							
Area Nets							
EAN	31	1335	43.1	.915	98.2		
CAN	31	808	26.1	.598	100.0		
PAN*	60	734	12.2	.391	96.2		
Region Nets							
1RN	61	519	8.5	.426	91.0	100.0	
2RN	62	385	6.2	.332	90.3	100.0	
3RN	62	188	6.1	.400	95.0	100.0	
4RN	62	836	13.5	.502	82.0	100.0	
RN5	31	346	11.2	.356	96.8	100.0	
RN6	62	492	7.9	.312	87.0	96.8	
RN7	85	782	9.2	.920	100.0	96.8	
8RN	62	370	5.9	.447	73.1	96.8	
9RN	62	374	6.0	.370	100.0	100.0	
TEN	31	249	8.0	.240	82.1	100.0	
ECN						80.6	
TWN	61	271	4.4	.286	69.7	95.2	
TCC							
TCC Eastern	111[1]	790					
TCC Central	86[1]	376					
TCC Pacific	104[1]	443					

Cycle Four						
Area Nets						
EAN	31	2068	66.7	1.553	94.6	
CAN	31	1155	37.3	.991	100.0	
PAN	31	1303	42.0	1.292	100.0	
Region Nets						
1RN	47	579	12.3	.540	92.9	93.5
2RN	91	583	6.4	.488	96.3	83.9
3RN	62	393	6.3	.529	96.8	100.0
4RN	62	720	11.6	.537	95.2	100.0
RN5	62	694	11.2	.531	87.3	100.0
RN6	62	825	13.3	.490	100.0	100.0
RN7	62	665	10.7	.918	98.8	100.0
8RN	62	482	7.8	.414	95.0	100.0
9RN	62	578	9.3	.492	98.0	100.0
TEN	62	394	6.4	.449	87.3	100.0
ECN	62	268	4.3	.374	87.1	90.3
TWN	62	592	9.5	.454	96.8	100.0
TCC						
TCC Eastern	127[1]	828				
TCC Central	60[1]	487				
TCC Pacific	115[1]	883				
Sections[2]	10,559	30,943	2.9			
Summary	12,111	53,018	4.4			
Record	8632	54,333	18.1			

*PAN operates both cycles one and two.
[1]TCC functions not counted as net sessions.
[2]Section and local nets reporting (252): APSN ATN (AB), ABN ACN AMN (AK), AENB AEND AENH AENI AENJ AENK AENN AENW AENY ATNM (AL), ATEN HARC (AZ), NCN NCTN (CA), CN CPN NVTN RSN WCN (CT), DEPN DTN SEN (DE), FAST FMSN FMTN FPON FPTN GN MCEN MEN NFPN PEN QFN QFNS SPARC SWFTN TPTN (FL), CGVHFN GCN GSN GSSBN GTN (GA), I75MN ICN ITEN TLGN (IA), BSN IMN MSN MTN (ID/MT), ILN (IL), ICN IPN ITN QIN (IN), KPN KSBN KWN QKS QKSSS (KS), 3ARES 4ARES 6ARES 11ARES 13ARES BARES CARN CCEN KEN KNTN KPON KRN KSN KTN KYN MKPN PAEWTN SEKEN TSTMN (KY), LAN LRN LSN LTN (LA), EM2MN EMRI EMRIPN EMRISS HHTN NEEPN (MA/RI), CTC MEBN MMN MTN WRIN (MB). AEN CMEN MPSN PTN SEN SPSN (ME), MACS MITN MNN QMN UPN (MI), MSN MSPN MSSN MSWX (MN), NEMOE (MO), APN (MR/NF), MTN (MS), 160WN CCTMN MNARES NCHN NMPN NSN NE40 NE75 PARC2MN PVTN WNN (NE), CN CNCTN CNN JFK M2MEN NCSSBN PCTN RARS THEN (NC), NSN (NV), GSFM GSPN MCEN NHN NHSN (NH), NHN NJPN NJVN NWNJVN OBTTN TCETN (NJ), CDN CNYTN EPN NLICW NLIPN NLIVHF-NYPON NYS OCTEN SCVHF SDN STAR WDN (NY), ALERT BN BRTN CLARC COARES HCARES LCNWARES MCTN O8MN OSN OSSBN OSSN TATN VWN (OH), OFON OLZ STN (OK), BSN ORARES OSN PDXARES SOAN SOFMN (OR), D3ARES D5ESN EPA EPAEPTN LCARESN MTGARES PFN PTTN WARCVTN (PA), WQVUARES (PQ), PWN RARA S2MN SATN SPN (SK), GPD2MN LC2MN S2MN SCNTN SCSSBN YC2MN (SC), NJQ SDN SDWX (SD), TNCW TNPN TNVN TSRN (TN), BARC DFW HATN TEX TSN TTN (TX), BUN UCN (UT), STARES SVEN VLN VN VNTN VSBN VSN VWSEN WARC (VA), VTN (VT), EWTN NTN NWSSB PSTS SCARES WARTS WSN (WA), BWN NWTN WIN WNN WSBN WSSN (WI), MDN WVARES WVFN WVHN WVN (WV), WCN WTN (WY).

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — AVERAGE
5 — RATE
6 — % REP.
7 — % REP. TO AREA NET

Transcontinental Corps

KØDJ has issued TCC-P/c4 certificates to the following (number of years in parentheses): W6EOT (26) W7DZX (22) W6VZT (19) W7GHT (13) W7EP (10) KØBN (7) VE7ZK (7) W6OA (7) K7HLR (5) W7LYA (4) W7VSE (4) K7KSA (3) WA7GYQ (3) WØHXB (3) KT6A (2) KN6C (1) WØOGH (1) KCØD (1).

	1	2	3	4	5
Cycle Two					
TCC Eastern	125		94.1	1600	790
TCC Central	93		92.5	752	376
TCC Pacific	124		83.9	924	443
Summary	342		90.2	3276	1609
Cycle Four					
TCC Eastern	146		89.4	1659	828
TCC Central	62		96.8	954	487
TCC Pacific	124		92.7	1753	883
Summary	332		93.0	4366	2198

1 — AREA
2 — FUNCTIONS
3 — % SUCCESSFUL
4 — TRAFFIC
5 — OUT-OF-NET TRAFFIC

TCC Roster

The TCC Roster (March) *Cycle Two* — Eastern Area (N2YL, Director) — K1s CE EIC, N1BHH, W1s QYY XX, AH2M, K2s KIR PH, KB2HM, KO2H, N2s CER YL, W2s CS XD ZOJ, WB2s IQJ MCO, K3JSZ, WB3GZU, WA4CCK, WB4PNY, AF8V, W8PMJ, W8BYDZ, VE1WF, VE3s GOL HTL. Central Area (W9JUJ, Director) — K4VM, KA4MZY, W4OGG, WD4HIF, W5s CTZ KLV TFB, N5s AMH AMK EFG, WA5EQQ, KB5TC, WB5s NKC YDD, K5s BNH KJN, W9s JUJ NXG, WB9WGD. Pacific Area (WØHXB, Director) — KV5U, K6s OWA, UYK, KN6C, KT6A, KU6D, N6s AED, FTQ, W6FAS, WA6LVO, WB6EIG, KF7R, KOTV, W7s DZX GHT TGU VSE, WA7WQE, WB7s DZX TQF WOW, KØDJ, KBØMB, KJØG, N8ACW, W8s EJD HXB, WBØMTA, WDØAIT, VE6CHK. *Cycle Four* — Eastern Area (W2CS, Director) — W1s EFW QYY TM, N1NH, WB1CPF, W2s CS FR GKZ XD ZOJ, WA2SPL, N2YL, AH2M, KF2T, W3s ATQ FAF PQ, WB3GZU, W4UQ, K4ZK, N4KB, WA4CCK, WB4s PNY UHC, AB4V, W8PMJ, K8JQ, WB8MTD, AF8V, N8XX, VE1WF. Central Area (W5GHP, Director) — W4s WXH ZJY, W5RB, K5s GM TL, N5s RB TC, W9s CXY NXG, WB9UYU, AEØR, KØEZ, WØs AM HI. Pacific Area (KØDJ, Director) — W5KH, N6FTQ, W6s EOT OA VZT, KN6C, KT6A, K7s HLR KSA, KD7I, KN7B, W7s DZX EP GHT LYA VSE, WA7GYQ, WB7NHR, N7AKX, KØs BN DJ, KCØD, WØs HXB LQ OGH, WDØAIT, VE7ZK.

Independent Nets (March 1982)

	1	2	3	4
Amateur Radio Telegraph Society	31	1369	323	
Central Gulf Coast Hurricane	31	167	2369	
Clearing House	31	176	575	
Early Bird	31	796	385	
Empire Slow Speed	31	49	425	
Hit and Bounce Traffic	31	304	634	
IMRA	27	694	1353	
Midwest RTTY	31	91	263	
Mission Trail	31	246	1509	
New England Novice	31	75	323	
North American SSB	27	162	263	
Pico All Day Watch	73	329	2958	
Southwest Traffic	31	106	1420	
20-Meter ISSB	27	1148	598	
75-Meter ISSB	31	467	1161	
7290 Traffic	50	661	3608	

1 — NET
2 — SESSIONS
3 — TRAFFIC
4 — CHECK-INS

Public Service Honor Roll March 1982

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.

199
K5CXP
163
KAØAID
158
WD4COL
153
KBØMB
152
WD8LRT
148
KA3CDQ
139
NG4J
KE4OI
135
WB2MCO
134
KZ4K
130
WB3GZU
129
AF8V
127
KD5P
126
KA2KVZ
N2AKZ
KA1ON
124
WA4PFK
123
WB1HIH
122
WD4HIF
KM9B
121
W1EOF
KB2HM
118
K3JSZ
WD8IBY
N5EEY
117
W9JUJ
W2AHV
115
W1IDK

WØOTF
113
N4EDH
112
WB2EAG
AG2R
111
KA8CPS
WA4JDH
110
K4SCL
WA1TBY
109
WA5RVT
W4WXH
W5DTR
N7AKX
K2VX
108
K4JST
106
K6YD
KB5W
105
N2APB
104
W2YJR
WD8RHU
N8DTZ
W2XD
WB1GXZ
W9DM
KC9CJ
103
W1TN
WD4ALY
KY4U
KT6A
WD9ESZ
102
NI6A
WB7DZX
WDØAIT
WD4CNQ
WP4AOH
WØOYH
WD4AWN
101
KV5X
WB5YDD

KT6D
WA3WIY
WB8MTD
WB8JGW
N4EEB
100
KA5CXW
AK1W
N4BZH
99
W7VSE
98
W8NTN
W8HUJ
KA4GFU
WB4WYG
K3JL
KA9HPQ
97
WB5MMI
N5EFG
W2MTA
N6FTQ
N1ARI
N5AMK
W7LNE
96
KD4PJ
W4ANK
95
N5EIH
WB8QBZ
KY4K
W4GPL
94
W7GHT
KB3DT
WB1CGK
KA3DLY
N8DSW
W4CKS
93
VE3DPO
KAØJQG
K1OSM
N1NH
WA4SRD
KA4ASZ
92
KB5NX
N2XJ

K8OZ
N7BGY
91
AC3N
K3CR
KB5EK
W1RWG
K5TL
W4OGG
WA8PIM
K4ZK
VE3WM
90
KC5NN
W5TFB
K4EV
KA3GJT
WA4CCK
WB8SYA
N6AWH
W4SME
KA5DLV
KC7LW
WA4QXT
89
W5CTZ
W2ZOJ
KA1T
KA4AUR
KB2KW
KB4OZ
WB7EMO
AG9G
KA9IKR
88
W2BIW
NØBDG
N8BQK
87
W2AET
NT4S
86
W5WZ
WAØTFC
85
K4VWK
K2ZM
N9BYK
84
W5VMP
KA2BHR

WB3FKP
KB3UD
WA4EIC
KF8J
VE2GAG
W9NXG
83
N5DKW
N5TC
KC5SF
WA1VRL
NP4D
82
WA7MEL
81
WØOGH
W6RNL
KN6C
K8KQJ
80
N1ALM
K4IWW
N2BOP
79
KK5B
WB2IDJ
W3VA
KM6I
WA4EYU
78
VE3GOL
77
WD5JYI
KA5KRI
W5KLV
WD5GKH
WB4WII
76
N5RB
W4LXB
N2BNB
75
WØKJZ
W4LXP

74
KB5UL
WB2OWO
K4ZN
N4DZW
KA7ELI
N9ATP
73
N5BT
KV5N
N6AUB
WA8GMT
72
K1JHC
KA4IUM
WB9WGD
KS2G
WB2HDU
N8AUH
WD8MIO
KA4MGR
KG9B
71
WA6QCA
K9BVE
W7BS
W9UMH
WD8KBW
70
W6CPB
WD5AAH
N2BLX
KB3XO
WB4FDT
KB8MX
WB7OEX
N7BGW
69
KA2GOH
K2ZVI
WA8DHB
KAØCUF
KA2GSX
WA8HGH

WB9YPY
68
N5BFV
WA7DPK
WBØHOX
KA4MGQ
67
AJ5F
W4HON
WA3EHD
W9TLU
WD4BSC
WB7RKU
WD9FRI
66
N3ADU
W6JTA
VE3KK
65
KZ5J
KA5AZK
WB4NTW
KØDJ
WB5LBR
WD8RNQ
KØJCF
WA7LGN
N9AZI
64
N3CJP
KP4DJ
KA1EHR
KA4BBA
WA7IHS
N4UF
N4PL
63
WA3WQP
KK9N
AK2E
WB4AID
62
W5GHP
WB1ABQ

WB2HWX
N1BPD
VE2EDO
61
KA1EMQ
WA2KOJ
KØSI
K1NAN
KA4ERP
W9JIJ
WD9HZF
W4ZJY
KA2GFU
KD4TY
KD4IF
VE3HTL
VE3JRT
60
KB3NV
WA5QFD
WBØQAM
WØOUD
WA1YNZ
K3RZR
KAØE
W8EK
KA8MEB
W1FAI
55
N8DAD/T
52
KA8GGZ/T
49
WB2TWQ/T
43
KA5IWF/T
KA9GBG/N
42
KA4SAA/N
KA5MSP/N
K8PGX/T
41
N8BZC/T
N2CPX/T

Brass Pounders League March 1982

BPL Medallions (see April 1979 *QST*, page 77) have been awarded to the following amateurs since last month's listing: VE4IX NG4J K8NCV WØACH.

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	733	879	1330	41	2983	
KA9CPA	33	1310	244	845	2432	
NØBQP	31	1088	195	608	1922	
WAØHJZ	31	814	40	487	1372	
W5SHN	357	197	628	13	1195	
WØZWL	0	527	0	540	1067	
WØACH	26	433	459	0	918	
W9JUJ	3	443	444	16	906	
WA4JDH	1	433	395	10	839	
WB2EAG	4	389	351	9	753	
W3VR	227	129	298	16	670	
KCØAS	4	515	129	17	665	
KE4OI	2	295	298	35	630	
WD4HIF	6	291	304	26	627	
WB5YDD	1	309	260	42	611	
K8NCV	27	270	302	7	606	
KT6A	2	283	291	17	593	
WB3GZU	26	254	272	32	584	
WB7TQF	48	246	258	26	578	
W7DZX	9	291	274	3	577	
W1EOF	1	221	322	25	569	
KBØMB	13	258	260	68	557	
WB7WOW	53	198	239	63	553	
N3ADU	1	285	255	7	548	
N7AKX	76	185	264	23	548	
WB8MTD	2	328	208	5	543	
N1NH	246	94	195	5	540	
W3ATQ	2	269	262	4	537	
AF8V	51	211	237	28	527	
NG4J	16	269	209	30	524	
KI1M	255	77	183	6	521	
WD9ESZ	2	189	323	2	516	
KA8CPS	93	173	202	45	513	
WB4PNY	0	264	247	0	511	
WB8MZZ	175	75	260	0	510	
W7FJZ	25	223	244	10	502	
W5SHN (Feb.)	5	290	280	7	582	
W9JIJ (Feb.)	12	250	240	10	512	
Multioperator stations:						
WB1HIH	10	363	273	16	662	
WD4IIO	241	27	241	27	536	

BPL for 100 or more originations plus deliveries:

K6UYK	154
KAØAID	138
WD4COL	109
WD8LRT	108
WD8MIO	107
WA8PIM	104

1 — CALL
2 — ORIG.
3 — RCVD.
4 — SENT
5 — DEL.
6 — TOTAL

Operating News

Conducted By John F. Lindholm,* W1XX

DXCC Integrity — Part 2

Pursuing credits in the DX Century Club program is a popular activity. Thousands of radio amateurs stalk the airwaves daily seeking "new ones" to add to their DXCC totals. Headquarters maintains 35,000 individual records of DXCC members, and processes nearly three-quarters of a *million* cards annually. To support this activity, the famous "DXCC desk" consists of 4.5 people (one part-time) with a total annual budget just a shade under $100,000. No small potatoes.

The basis of DX interest is, of course, rooted in the pleasure it imparts to participants. The FCC recognizes this in Amateur Radio's basis and purpose, Part 97.1: ". . . enhance international good will." But what happens when a participant's perspective becomes warped to such a degree that gaining the almighty DXCC credit becomes an end to itself? The fun and international goodwill aspects become lost when worshiping the "golden DXCC calf" is carried to such extremes.

Part I of "DXCC Integrity" (September 1981 *QST*, page 86) reported on one such recent instance of illegitimate activity — the so-called QSL scam of phony cards. Fortunately, this was nipped in the bud, for the DX community was not about to sit still for such shenanigans. Old-timers in the DX game well remember the hassle involving litigation that developed in the '60s when a famous DXer (who was probably one of the best operators of all time) claimed to be at rare DX locations, when in fact he was not. That necessitated some tightening up of DXCC administrative procedures. Honor among hams could no longer be assumed. Thus, the two main requirements for receiving credit for DXpeditions was instituted: (1) proof of proper license; (2) proof of legitimately being physically present at the location in question. This turned out to be an administrative nightmare, as operations from some pretty common places did not always produce documentation. This procedure thus evolved in 1970 into today's scenario, whereby credentials need to be produced only when there may be some question. The wisdom of this procedure was again confirmed recently when the documentation for the October 1981 San Felix operation could not be substantiated by the licensing authorities. See DXCC Notes, page 75.

Establishing the authenticity of such operations places a great deal of responsibility on the League's DXCC desk. It is incumbent upon the DXCC staff to ensure that an operation for which credit is given is legitimate. Ascertaining this is not always a simple matter, nor do all countries have the same degree of legitimacy. The objective is to treat all cases alike. Each situation is different, however, because of different licensing procedures in each country. Decisions must be made, therefore, on a case-by-case and country-by-country basis. This can lead some to believe that less-than-objective criteria are employed. Such erroneous beliefs can be fostered by a need for a particular country credit. When "I want the credit no matter what" prevails, then the proper perspective of DXing and DXCC has been lost.

Unfortunately, the DXCC program is subject to just such a credibility gap. The nature of the hobby permits discussion of the merits of an operation on the air, without full knowledge of the facts. Documenting those facts can take several months, during which speculation on the airwaves runs rampant. Such conjecture is rarely accurate and can do a disservice to the program. Sensitivity to the concerns of DX enthusiasts must be recognized. But, likewise, the program must be administered in a just and objective manner, not doing what is simply expeditious or popular.

Some of the newer brethren to the DX game sometimes wonder about consistency in decisions. They query, "How can the State of Kaopectate not count when there are 'countries' such as United Nations Headquarters, Kingman Reef and Desecheo?" What is not always readily understood is that, although the rules for country status have been followed faithfully, the rules have changed from time to time. For example, prior to January 1, 1979, the criteria for country status recognized the concept of "separate administration." Thus, such countries as the above, plus ITU Geneva, Southern Sudan, Scotland, Estonia, Åland Islands and a host of others made the official countries list. The "separate administration" rule was eliminated by the Board on the advice of the DX Advisory Committee when it appeared that such places as Catalina Island and the Statue of Liberty might indeed qualify as separate countries.

With the removal of this clause from the rules, it is far more difficult to qualify for separate country status. The only new country since 1979 is the Sovereign Military Order of Malta. And it took the DXAC several months of research and a mountain of documents to confirm SMOM's territorial and governmental sovereignty.

One of the more controversial and highly publicized cases for DXCC credit has been the operation from Burma during the past year. Two decades of Burmese radio silence enhanced the universal wish for it to count. No one refutes that operations are taking place in Burma. Thorough research, however, has clearly established that any amateur activity in Burma is strictly prohibited by the central government in Rangoon. See International News, April 1982 *QST*, page 61. This precludes legitimate DXCC credit from being given.

In summary, all should recognize that administrative decisions that affect the operation of the DXCC program are being made in a prudent, consistent, and proper manner. Short of conducting an FBI ABSCAM-type investigation, research will continue to be conducted where warranted. Maintaining the integrity of the DXCC program demands nothing less. You, the members of DXCC, should expect nothing less than the proper administration of the DXCC program. We pledge to continue to live up to those high ideals.

SCM APPOINTMENT

In the Idaho Section, Norman E. Spidell, K7RT, has been appointed to complete the term (until September 30, 1982) of Lemuel H. Allen, Jr., W7JMH (resigned).

MIDNIGHT SPECIAL RESULTS

The January Midnight Special can be called a success on most counts. The 93 logs received indicate that there is a place for these short contests. They don't take up the entire weekend, they provide some intense competition, they are fun because of the relatively high QSO rates possible and they don't take up the entire band, prompting complaints from non-contesters. There were a fair number of stations active this time, as evidenced by the high QSO totals among the top stations. Remember that this is only a 2-hour test!

The combination of 20 and 40 meters worked pretty well except there was a bias towards the West Coast on 20. Not that 20 was dead in the east; it just required more listening for the weak signals. However, the superb 40-meter conditions more than made up for 20. Signals were strong for everyone on 40, providing local and cross-country QSOs.

Many participants commented favorably on the time — early evening out west and late evening in the east. This one didn't require super-human effort just to drag your tired body out of bed to start the contest. We may use this time frame again in the future and place the emphasis on 40 and 80 meters. Let us know what bands you like for these, and let us know what time is good. Keep in mind, however, that we try to keep the specials away from normally busy frequencies/times and structure them so that all areas of the country will have good propagation to somewhere. The following are the top three scores from each call area. Scores read: Call, score, 20-M QSOs, 40-M QSOs, original section, present state. — *Mark Wilson, AA2Z*

KA1R	167-54-113-EMA-MA
W1IHN	106-42-64-ME-MA
W1MX (AE9Y, opr)	95-38-57-IN-MA
N2MF	155-64-91-WNY-NY
W2CXM (W2PA, opr)	128-39-89-MDC-NY
N1EE	119-48-71-NLI-NY
K3LR	138-45-93-WPA-PA
W3FG	64-20-44-SNJ-MD
K3TM	49-17-32-OH-MD
N4QB	114-43-71-WI-AL
K4JEX	110-31-79-NC-NC
W4YE	83-35-48-LAX-VA
N5JJ	161-51-110-STX-TX
KN5H	151-50-101-DE-TX
K5MM	149-36-113-AZ-TX
N6TR	198-96-102-NWT-CA
N6RO	188-99-89-ENY-CA
KV6O	156-75-81-IL-CA
K6LL	161-79-82-RI-AZ
AC7P	91-47-44-CO-ID
W7TC	73-40-33-LAX-OR
WB8JBM (WB8DQP, opr)	113-44-69-OH-OH
WD8AUB	96-28-68-OH-OH
WB8KKI	88-50-38-OH-OH
K9RS	133-40-93-DE-IL
WB9TIY	128-33-95-IL-IL
K9KM	127-37-90-IN-IL
N2IC/Ø	149-83-66-WNY-CO
WAØDEL	60-9-51-MN-MN
KBØG	56-14-42-KS-KS
VE3FGU	86-15-71-ON-ON
VE2ED	58-24-34-PQ-PQ
VE3KK	44-16-28-DX-ON
G5CMX(N8ET, opr)	7-0-7-WNY-DX

W1AW NOTE

The complete W1AW summer operating schedule appears in April *QST*, page 84. A W1AW schedule also is available on request from ARRL Headquarters. Please enclose an s.a.s.e. See the "Contest Corral" section of *QST* for times and dates of W1AW Code Proficiency Runs.

*Communications Manager, ARRL

Amateur Radio Satellite Schedule

	AMSAT-OSCAR 8			Soviet RADIO 5		Soviet RADIO 6		Soviet RADIO 7		Soviet RADIO 8	
Date (UTC)	*Ref. Orbit*	*Time (UTC)*	*Long. W.*	*Time (UTC)*	*Long. W.*	*Time (UTC)*	*Long. W.*	*Time (UTC)*	*Long. W.*	*Time (UTC)*	*Long. W.*
1 June	21,603A + J	0103	81	0146	86	0138	86	0145	87	0046	71
2 June	21,617X	0107	82	0140	86	0123	83	0135	86	0044	72
3 June	21,631A	0112	84	0135	87	0107	81	0126	85	0041	73
4 June	21,645A + J	0116	85	0130	87	0052	79	0116	84	0038	73
5 June	21,659J	0121	86	0124	87	0037	76	0106	83	0035	74
6 June	21,673J	0125	87	0119	87	0021	74	0057	82	0032	75
7 June	21,687A	0129	88	0114	87	0006	72	0047	81	0029	76
8 June	21,701A + J	0134	89	0108	87	0149	99	0037	81	0027	77
9 June	21,715X	0138	90	0103	88	0134	97	0028	80	0024	77
10 June	21,729A	0143	91	0058	88	0118	95	0018	79	0021	78
11 June	21,742A + J	0004	67	0052	88	0103	92	0009	78	0018	79
12 June	21,756J	0008	68	0047	88	0048	90	0158	107	0015	80
13 June	21,770J	0013	69	0042	88	0032	88	0148	106	0012	81
14 June	21,784A	0017	70	0036	89	0017	85	0139	105	0010	81
15 June	21,798A + J	0022	71	0031	89	0001	83	0129	104	0007	82
16 June	21,812X	0026	72	0026	89	0145	110	0120	103	0004	83
17 June	21,826A	0030	74	0020	89	0129	108	0110	103	0001	84
18 June	21,840A + J	0035	75	0015	89	0114	106	0100	102	0158	115
19 June	21,854J	0039	76	0010	90	0059	103	0051	101	0155	116
20 June	21,868J	0044	77	0004	90	0043	101	0041	100	0152	116
21 June	21,882A	0048	78	0159	120	0028	99	0031	99	0150	117
22 June	21,896A + J	0053	79	0153	120	0012	96	0022	98	0147	118
23 June	21,910X	0057	80	0148	120	0156	124	0012	97	0144	119
24 June	21,924A	0101	82	0143	121	0140	122	0002	96	0141	120
25 June	21,938A + J	0106	83	0137	121	0125	119	0152	125	0138	121
26 June	21,952J	0110	84	0132	121	0110	117	0142	124	0135	121
27 June	21,966J	0115	85	0127	121	0054	115	0133	124	0133	122
28 June	21,980A	0119	86	0121	121	0039	112	0123	123	0130	123
29 June	21,994A + J	0123	87	0116	121	0023	110	0113	122	0127	125
30 June	22,008X	0128	88	0111	122	0008	108	0104	121	0124	125
1 July	22,022A	0132	90	0105	122	0151	135	0054	120	0121	126
2 July	22,036A + J	0137	91	0100	122	0136	133	0045	119	0118	127
3 July	22,050J	0141	92	0055	122	0120	130	0035	118	0116	128
4 July	22,063J	0002	67	0049	122	0105	128	0025	117	0110	129
5 July	22,077A	0007	68	0044	123	0050	126	0016	116	0107	129
6 July	22,091A + J	0011	69	0039	123	0034	123	0006	116	0104	130
7 July	22,105X	0016	71	0033	123	0019	121	0156	145	0101	131

Orbit predictions by K1HTV, KA1GD and W9KDR. To keep abreast of the latest developments, tune in the regular phone and cw bulletins over W1AW, or the AMSAT nets. Tuesday — East Coast and Mid States at 9 P.M. and West Coast at 8 P.M. local time on 3850 kHz. Saturday — International at 2200 UTC on 28,878 kHz. Sunday — International at 1800 UTC on 21,280 kHz and 1900 UTC on 14,282 kHz. OSCAR 9 orbits are no longer listed — because of its low altitude, long-range predictions are not always accurate. Use W1AW and AMSAT Bulletins for weekly updates. OB modes of operation are Monday and Thursday — Mode A. Tuesday and Friday — Modes A + J. Wednesday is reserved for authorized experiments or recharge of the batteries. Do not operate through the OSCAR or RADIO satellites on Wednesday UTC. *Do not use more power than is needed to operate through the OSCAR or RADIO satellites.* Your downlink signal should never be stronger than the satellite's telemetry beacon. *Reduce your uplink power* to prevent overload causing 10 dB attenuation of received signals. Advise operators whose signals are stronger than the telemetry beacons.

Exact orbit numbers have not been determined for the Radio satellites.

Satellite	*Period (min.)*	*Increment (deg.)*	*Inclination (deg.)*	*Height (km)*
OSCAR 8	103.1725	25.7953	98.79	919
RADIO 5	119.5555	30.0157	82.96	1682
RADIO 6	118.7174	29.8061	82.95	1632
RADIO 7	119.1966	29.9260	82.94	1654
RADIO 8	119.7640	30.0679	82.95	1681

RADIO 3 and RADIO 4 orbital data will not be listed because these satellites are for Soviet experiments. QSLs and telemetry reports should be sent to Box 88, Moscow.

Spacecraft Frequencies

	Uplink	*Downlink*	*Beacon*
OSCAR 8			
Mode A	145.850-145.950 MHz	29.400- 29.500 MHz	29.402 MHz
Mode J	145.900-146.000 MHz	435.200-435.100 MHz	435.095 MHz
RADIO 5	145.910-145.950 MHz	29.410- 29.450 MHz	29.330/450 MHz
RADIO 6	145.910-145.950 MHz	29.410- 29.450 MHz	29.410/450 MHz
RADIO 7	145.960-146.000 MHz	29.460- 29.500 MHz	29.340/500 MHz
RADIO 8	145.960-146.000 MHz	29.460- 29.500 MHz	29.460/500 MHz
RADIO 5 ROBOT	145.826 MHz	29.331 MHz	
RADIO 7 ROBOT	145.835 MHz	29.341 MHz	

RADIO 3 and RADIO 4 are for experiments only to be announced by USSR.

OSCAR 9
Hf Beacons — 7,050, 14,002, 21,002 and 29,510 kHz. On-off keying with Morse telemetry. Interspersed with a carrier or continuous carrier.
Vhf Beacon — 145.825 MHz nbfm ±5 kHz. ASCII, Baudot, voice, afsk and Morse.
Uhf Beacon — 435.025 MHz nbfm ±5 kHz. ASCII, Baudot, voice, afsk and Morse.
S-Band Beacon — 2401.0-MHz nbfm ±10 kHz. ASCII, Baudot, voice, afsk and Morse.
X-Band Beacon — 10.470-GHz steady carrier. S- and X-band beacons use lhcp.

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 s.a.s.e., to ARRL Hq.

Further information on the radio amateur satellite program can be obtained free of charge from ARRL Hq. The all-new OSCARLOCATOR package is now available: $7 U.S., $8 elsewhere.

Strays

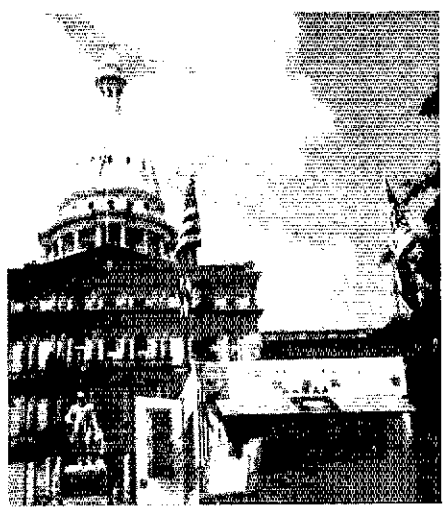
Governor William F. Winter (seated) signs a proclamation designating June 21-27 as Amateur Radio Week in Mississippi. The governor is flanked (l-r) by NT4A, N5DDV, Delta Division Director W5CH and Mississippi SCM KW5T. The governors of the three other states in the division — Arkansas, Louisiana and Tennessee — issued similar proclamations.

STRAY HINTS

☐ "Strays" are those interesting fillers used when space allows in *QST*. Think you have an item with Stray potential? Here are some hints to help your submission become one. (1) Be sure the information will be of interest to most readers of *QST*. (2) Submit your material before deadline — the 8th of the second month preceeding desired publication (i.e. arrive at Hq. before June 8 for August *QST*). (3) Any photographs you send should be good quality, black-and-white glossy prints. Color prints, slides and instant photos do not usually reproduce well.

Items submitted are normally acknowledged, but that doesn't necessarily mean that your Stray will be appearing in *QST*. We receive far more material than we can find room for. If you want your material returned, please include a statement to that effect and an s.a.s.e.

Follow the above hints and maybe your Stray will find a home in *QST*. — *Andrew Tripp*



A Capital Idea! Last year, in the week preceeding Field Day, the Central Michigan ARC managed to catch the attention of the public and the news media. During that week, which was proclaimed Michigan Amateur Radio Week by Gov. William G. Milliken, club members took up temporary residence (with permission, of course) on the grounds of the state capitol, where they operated for three days from their club trailer. *(photo by Dennis L. Larson, W8KXW)*

Contest Corral

A Roundup of Upcoming Operating Events

Conducted By Mark J. Wilson,* AA2Z

JUNE

1

West Coast Qualifying Run, 10-35 wpm, at 0400Z June 2 (9 P.M. PDT June 1). W6OWP prime, W6ZRJ alternate. 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 s.a.s.e. will help expedite your award/endorsement.

5-6

New York State QSO Party, May *QST*, page 88.

8

W1AW Qualifying Run, 10-40 wpm, at 0200Z June 9 (10 P.M. EDT June 8). Transmitted simultaneously on 1.835 3.58 7.08 14.08 21.08 28.08 50.08 147.555 MHz. See June 1 listing for more details.

12-13

ARRL June VHF QSO Party, May *QST*, page 80.

World Wide South America Contest, May *QST*, page 88.

19-20

All Asian DX Contest, phone, sponsored by the Japan Amateur Radio League, from 0000Z June 19 until 2400Z June 20. Cw August 28-29. 160-10 meters. Single op, single band; single op, multiband; and multiop, multitransmitter classes. W/VE call CQ AA. Only one signal per band; no cross band contacts. Exchange signal report and two figures denoting operators age; YL stations may send 00. Count 1 point per QSO with an Asian station on 7-28 MHz, 2 points on 3.5 MHz and 3 points on 1.9 MHz. Multiply by number of different Asian *prefixes* worked per band. Note: Only JD1 stations on Ogasawara count for Asia; contacts with KA stations do not count (they are considered military rather than amateur). Use separate logs for each band; mark multipliers; use a complete summary. JARL Asian countries list: A4 A5 A6 A7 A9 AP BV BY CR9 EP HL/HM HS HZ JA JD1 JT JY OD S2 TA UA9-0 UD6 UF6 UG6 UH8 UI8 UJ8 UL7 UM8 VS6 8Q VU XU XV XW XZ YA YI YK 5B4 1S 4S 4W 4X 7O 8Z4 9K 9M2 9N 9V and Abu Ail. Enclose s.a.e. and IRC for results and mail to: JARL, P.O. Box 377, Tokyo Central, Japan.

Summer SMIRK Party, sponsored by the Six-Meter International RC, from 0000Z June 19 until 2400Z June 20. 50 MHz only. No cross band contacts or partial QSOs. Single op only. Exchange SMIRK number (if member) and ARRL section, province or country. KH6 and KL7 count as countries; Washington, DC counts as a section; Canadian provinces count separately. Count 2 points per QSO with SMIRK members, 1 point for others. Multiply by total sections, countries and provinces. Entries *must* be submitted on official forms. Mail entry by July 11 to: Spencer Ritchie, KA2MHT, 5122 Sagamore, San Antonio, TX 78242.

22

W1AW Qualifying Run, 10-35 wpm, at 1300Z (9 A.M. EDT). See June 8 listing for more details.

26-27

ARRL Field Day, May *QST*, page 81.

World Cup Radio Contest, sponsored by the Union de Radioaficionados Españoles (URE), from 0001Z June 26 until 2400Z June 27. 160-10 meters, phone and cw. Single-operator and multiop single transmitter classes. Single ops work max. 30 hours. Work stations with AM and AO special prefixes. Work stations once per band and mode. EA stations send signal report and province code; others send report and *CQ* zone. Count 1 point per QSO. Multiply by EA provinces worked per band plus the number of EA cities where matches will be played ×3. Mail by July 30 to: URE, Concurso Radio Mundial 82, P.O. Box 220, Madrid Spain.

30

West Coast Qualifying Run, 0400Z July 1 (9 P.M. PDT June 30). See June 1 listing for more details.

JULY

1

Canada Day Contest, sponsored by the Canadian Amateur Radio Federation, from 0000-2400Z July 1. Everybody works everybody. 160-2 meters, phone and cw. Entry classes: single op, all band; single op, single band; multiop, single transmitter; QRP. Work stations once per band and mode. No crossmode QSOs. CW QSOs in cw parts of band only. Exchange signal report and serial number starting with 001. VE1 stations must also send their province. Count 10 points per VE QSO, 1 point for others. 10 point bonus for any CARF station using TCA or VCA suffix. Multiply by total VE provinces worked per band (VO1/VO2 VE1-PEI VE1-NB VE1-NS VE2 VE3 VE4 VE5 VE6 VE7 VE8 VY1). Suggested frequencies: phone — 3.770 3.900 7.070 7.230 14.150 14.300 21.200 21.400 28.500 50.1 146.52; cw — 1.810 3.525 7.025 14.025 21.025 28.025 50.1 144.1. Suggest phone on the even and cw on the odd hours UTC. Mail within 30 days (include s.a.s.e. or s.a.e./IRC for results) to: CARF. P.O. Box 2172, Stn. D, Ottawa, ON K1P 5W4, Canada.

7

W1AW Qualifying Run, 10-35 wpm at 0200Z July 8 (10 P.M. EDT July 7). See June 1 listing for more details.

10-11

IARU Radiosport Championship, May *QST*, page 82.

17-18

International QRP Contest

World Wide DX SSTV Contest

21

W1AW Qualifying Run

24-25

CW County Hunters Contest

AUGUST

7-8

ARRL UHF Contest

SEPTEMBER

11-12

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.

*Assistant Communications Manager, ARRL

Strays

IT'S ALL RELATIVE

☐ George, WA9IRY, visited Hq. the other day. He signed the guest log at the reception desk and took the standard tour. After the tour, while talking with tour guide Libby Karpiej, KA1DTU, the visitor mentioned that he had been admiring the ARRL Museum collection before the tour, and noted seeing the Edwin H. Armstrong exhibits, including Armstrong's original breadboard circuit of his now famous super-regenerative squelch oscillator. The visitor, WA9IRY, it turned out, is Armstrong's great, great grandson! — *Laird Campbell, WICUT*

RFI TO SINK YOUR TEETH INTO

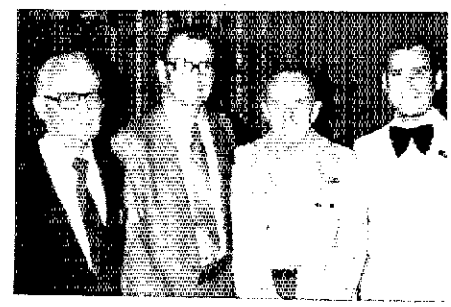
☐ I have had my share of RFI experiences, including raising and lowering my neighbor's electric garage door opener and coming through another neighbor's stereo. But while I was on the air recently I experienced the most unusual RFI problem yet. And it came from my 16-year-old daughter, Wendy.

When she was fitted with dental braces, and then a retainer, I kidded her about wiring her up as a 20-meter antenna. While operating one night she came into the shack and said, "Dad, I hear you." My first thought was that I was coming in on her stereo, but I was surprised to hear her say, "I hear you on my retainer. I can practically hear the words!"

Do I now ground my daughter? — *Bob Wertz, WB7OPT, Flagstaff, Arizona*

I would like to get in touch with . . .

☐ members of college Amateur Radio club stations who would be interested in starting an interstate college net on 40 meters. Kenneth M. Klima, KA8BQF, The University of Akron ARC, 302 E. Buchtel Ave., Akron, OH 44304.



ARRL Southeastern Division Director Frank Butler, W4RH (second from left), and Assistant Directors (l-r) W4MGO, W4MB and KB4T gathered recently to help celebrate the 25th Anniversary of the Daytona Beach (Florida) Amateur Radio Association.

Section Activities

Coordinated By Jim Clary, WB9IHH

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 — SCM/SEC: VE6XC. ASCM: VE6AMM. STM, NM ATN, ANM APSN: VE6ABC. Supplying radio communications for a number of hockey games in the Edmonton area was handled by NARC operators. As the hams training schools close down for another year, we wish the students luck in the writing of exams. We will really miss a steady traffic handler, who became a Silent Key. He is VE6HO. Our deepest sympathy to his XYL Liz, VE6APD. Traffic: VE6CHK 210, VE6ABC 30, VE6AMM 10, VE6ARN 4, VE6XC 4.

BRITISH COLUMBIA: SCM, H. E. Savage, VE7FB — British Columbia Amateur Radio Publice Service Net, 3757 kHz, 0200Z. With poor conditions the month's report is high 201, low 116, total 4911. BC Emergency Net lost one more, VE7DIC. He became a Silent Key whilst at his key. VE7LC can produce his 1923 drivers licence, and we have another, VE7RQ, who was a sparker on Empress boats before war one. He's never driven a car, yet both have forty or better years as an amateur. VE7HW is in Vancouver for medical treatments and is operating VE7SCR. VE7EDN good PR job on CBC Northern Radio. Traffic: VE7ZK 142, VE7FAZ 108, VE7FB 40, VE7BLO 33, VE7CDF 16, VE7BZI 8.

MANITOBA: SCM, Peter Guenther, VE4PG — ASCM: JP. SEC: HK. STM: RO. NMs: VJ ACX NM TE. The March 27 SET was a good learning session. Coordination between Sask, Ont and Manitoba was most gratifying. A special meeting was held by the EMO at Morris and several amateurs were invited. This was in case of a flood this year. Looks like a busy year for some towns that are celebrating their centennial. Some traffic is already moving. MMN QNI 590, QTC 34, sess 31. WRIN QNI 233, QTC nil, sess 8. MTN QNI 269, QTC 113, sess 31. MEPN QNI 1115, QTC 35, sess 31. CTC QNI 148, QTC 37, sess 28. Traffic: VE4AJE 160, VE4ACX 117, VE4RO 78, VE4PG 68, VE4OI 45, VE4TE 32, VE4FK 20, VE4AGR 16, VE4AAD 15, VE4JA 14, VE4UM 14, VE4ID 13, VE4AFO 8, VE4LB 8, VE4ADS 7, VE4TL 7, VE4NM 6, VE4NE 3, VE4CR 2, VE4AAU 1.

MARITIME — NEWFOUNDLAND: SCM, D. R. Welling, VE1WF — ASCM: VO1FG. SEC: VE1EI. NMs: VO1JN VE1WF. Silent Key — VE1BQO. Hosp. VE3IQ/VE1. EMO-N.B. announces an emergency communications network under the guidance of VE1BKF. Many club bulletins are becoming a thing of the past because of high postage costs and lack of attendance. News for this column is becoming harder to obtain because of lack of bulletins. Edmundston, N.B. has a new repeater in operation on 28/88. Results of VE1 Contest: CW-VE1BKH VE1ARB VE1BZV: Phone-VE1CB VE1VK VE1AKO. Congrats all. Nets: APN sessions 31, tfc 114. Traffic: VE1WF 472, VE1XF 61, VE1LCR/RO 39, VE1BXA 17, VE1ALU 14, VO1AW 9, VE1BPM 3.

ONTARIO: SCM, Larry Thivierge, VE3GT — ASCM: VE3GOL. SEC: VE3GV. A/STM: VE3GT. A-1 Operator VE3AWE was deeply involved with the Canadian-built remote control arm that was used successfully with the space shuttle "Columbia". Several ARES groups including Bruce Co. and London area groups held successful exercises under the direction of VE3EFX and VE3WM respectively. Congrats to VE3AYL on the excellent article describing her amateur activities and those of CARTG, the RTTY group, that appeared recently in the Toronto Star. VE3GFN, who has finally mastered touch-typing and has received his 35 wpm cw sticker has instituted a University of Toronto message service via the NTS. New appointments: VE3HTL, NM OSN/L; VE3LBU, EC-Prescott/Rockville area; VE3GDJ, OBS. Niagara Peninsula ARC will operate special event station VE3ROW during early August in commemoration of the 100th anniversary of the Royal Canadian Henley Regatta. The Hamilton ARC is celebrating their 50th year in 1982. Congrats! VE3s NN LXE RL HJ BYO and HBS of Quinte ARC have built up an over-modulation indicator as a club project. Don't forget the Central Ontario Amateur Radio Flea Market in Guelph sponsored by the Guelph ARC on June 5. VE3KLX advises that the number of Ottawa amateurs are still in the running for the Wise Owl certificates on repeater VE3TWO. VE3ISW is enjoying his new TRS-80. Don't overlook the 100 bonus points for originating in standard ARRL message form, a Field Day message to me or to the SEC, VE3GV, stating club name or club group, number of operators, field location and number of ARES members participating. Welcome to the following new calls: VE3s MGU MGW NMD NMC NMH NMG. Traffic: VE3KK 214, VE3GOL 194, VE3LOK 123, VE3CYR 113, VE3HGJ 102, VE3HTL 100, VE3DPO 99, VE3GNW 92, VE3BZB 91, VE3FGU 69, VE3CUR 62, VE3WM 61, VE3GT 60, VE3KCZ 56, VE3KXB 53, VE3BVG 51, VE3FPI 39, VE3JRT 36, VE3WG 27, VE3AJN 26, VE3KLX 20, VE3AWE 18, VE3IXB 16, VE3AYZ 13, VE3LNN 13, VE3EWD 7, VE3EFX 6, VE3DZH 3. (Feb.) VE3FGU 164, VE3GFN 69, VE3HOI 13, VE3FGV 7. (Jan.) VE3HOI 12.

QUEBEC: SCM, Harold Moreau, VE2BP — SEC: VE2DEA. STM: VE2PJ. NMs: VE2PJ VE2FSA. New appointment: VE2FTU now ORS. Congrats to VE2DPJ, for having 200 countries confirmed (mixed). Rain or shine, let's have a good turnout on Field Day. VE2MO a publie un tres beau repertoire de ses membres et associes. L'auto patch de VE2RTR, a achemine 2097 appels apres quatre mois d'operation. Prompt retablissement a VE2BLN. Traffic: VE2EDO 92, VE2EC 50, VE2FFE 39, VE2BP 38, VE2EKC 32, VE2GAG 24. (Feb.) VE2FFE 37.

ATLANTIC DIVISION

DELAWARE: SCM, Harold K. Low, WA3WIY — STM: W3DKX. SEC: W3PQ. PSHR: WA3WIY K3JL .A news letter for Del. is being started by AC3U. If you have not received one yet, contact your club officers. KB3PD received a nice trophy from the DXCC/QRP Assn. Welcome to new Novices in Sussex Co. KA3IXF KA3IXV and KA3IXW, also to KA3ITN in New Castle Co. AWARE welcomes new members WB3GOI N3CBS WB3JRM W3GGM and WB3KAZ. The DSSN has passed away, because of a lack of interest. Keep an open spot on your agenda for the Delmarva Hamfest in August. DTN QNI 363, QTC 56. DEPN QNI 49, QTC 10. SEN QNI 35, QTC 13. Traffic: W3PQ 188, WA3WIY 91, W3QQ 89, K3JL 50, N3AKC 42, WB3DUG 38, W3DKX 14, W3WD 13, WA3PWT 11, K3ZXP 10, N3AXH 8, W3FEG 6.

EASTERN PENNSYLVANIA: SCM, Karl W. Pfeil, V3VA — SEC: WA3PZO. STM: K3JSZ. DECs: AA3C K3QXC KB3QW N3BFL N3CJP W3EEK.

Net	Freq.	Time	QNI	QTC	Sess.
EPAEPTN	3917	6 P.M. Dy	587	165	31
EPA	3610	7/10 P.M. Dy	464	251	59
PFN	3958	5 P.M. Dy	293	259	30
PTTN	3610	6:30 P.M. Dy	206	77	31

Local & vhf nets reporting (QNI QTC sess): D3ARES 254 34 5; D5ESN 47 8 4; LCARSN 114 13 8; MTG Co ARES 120 4; WARCVTN 38 9 3. OO reports: W3FAF W3GOA W3GVR W3KEK KB2XO. OBS reports: N3CJP KB3QW KB3VV W3ID W3VA WB3CAI. OVS: W3GOA. PSHR: K3JSZ KA3DLY KA3GJT KB3UD KB3XO KE3U N3CJP W3VA WA3EHD WA3WQP WB3CAI WB3FKP WB3FYT. New appointments: KB3QW, DEC for district 6; W3TWV, NM for D6ARESN; KB3VV to ORS. Upgrades: Adv-KA3FJJ N3CMF: Gen-KA3GVC; Tech-KA3ILD. KB3RW now KG3G. EPA welcomes KA3GVC KI3C. PTTN welcomes KA3EJG KA3GVC KB3TS N3AIW W3GQC WB3KVR. WB3KUZ working DX for first time in 4 yrs. KA3BFY now on 6M with IC-881D. New gear: K3YD Ten Tec Argosy & TR7730, WA3YON TRS-80, N3AVZ FT-208R and W3AQN 40W 2M touch tone xcvr. KA3EJG reports for first time. Welcome aboard. W3KEK reports Murphy struck his Quad ant with high winds. WA3JWP making improvements on W-B ATV repeater. WB3HRU now active on 2M ssb. Murgas ARC station, K3YTL, in operation and open to public Tuesday evenings. New DEC for District 6 is KB3QW. I wish to thank W3YZW for the fine job he did as DEC for District 6. New officers Hazelton ARC: K3PGI, pres.; W3IVG v.p.; WB3EGD, secy.; KA3CAN, treas. Murgas ARC: WB3KNB, pres.; W3DZI, v.p.; WB3CTU, secy.; WB3AYT, treas. W3BUI reports York area hams provided comms and emergency support, via WRACC rpt, for the annual down river wild water Kayak and Canoe race for the sixth year. K3JSZ announced that the annual EPA Section picnic will be held July 17 at Tuscorara State park, 4 miles west of Tamaqua. This is a basket picnic and all hams and their families are invited to attend. The D3ARES and the LCARSN nets participated in the emergency test drill for the Susquehanna Stream Electric Atomic Station. PEMA officials were well pleased with the job these nets did. The R.F. Hill ARC annual banquet was a great success and "Ham of the Year" award was presented to W3BUR and the John Michaels Memorial award to KB3MM. Traffic: K3JSZ 392, WA3WQP 224, W3IPX 153, KA3GJT 144, KB3UD 142, AA3B 125, W3VA 106, W3FAF 85, W3DP 81, WB3KUZ 80, WB3FKP 66, KA3DLY 65, WA3EHD 65, WA3OGM 40, W3TWV 34, KB3XO 34, N3CD 30, W3ADE 27, N3CJP 24, K3QXC 24, WB3CAI 18, WA3CKA 15, W3ID 15, K3KW 11, KE3U 11, KB3VV 10, W3AQN 9, KB3QW 8, KA3EJG 7, N3BAY 7, W3PTM 6, K3YD 4, WA2WXM/3 3, N3AKQ 2, W3HK 1, AF3Z 1.

MARYLAND — DISTRICT OF COLUMBIA: SCM, Karl R. Medrow, W3FA — STM: WB3GZU. SEC: WA3TAI. Among many at the MD Communications Workshop were W3ABC WA3TAI WB3LTA WA3TOY K3UAV K3MVL and W3FA. W3NPL had a short presentation on amateurs. Our longest interim KA3CWA is now N3CRW. WA3ZAS is KI3P. N3CET is KB3XM. N5CGE is KB3ZB. New General is KA3GWE. New Techs are KA3ERU and KA3IQH. New Novice is KA3IVM. Congrats to you all. W3EOV is back from FL, scuba diving, swimming, and blimp riding. It's been a bad winter; WB3LTA and the ARES/RACES gang covered another severe weather alert. The Greater Baltimore Hamboree and Computerfest was big success. KC3D found things he needed there. N5EAZ/3 is now on his acreage. W3CDQ is back from the Caribbean in time for the QCWA dinner. WB3KJT finds work interferes with his hobby. W3IK has the retirees complaint — no time. W3OYY lost his love for the snow. WB3BFK has upgraded. FB. KB3WL is a 3rd liaison man. K3ORW walks a mile a day for his health. W3LDD tries to be first with new DX. W3FZV finds his fun in the QSO parties. W3UT is expanding his operating activities. KA3CDQ reports MTN doing better 5 nites a week on 3737 at 1930 local time with W3UT KA3FJM and KB3VP helping as NCS. N4DR/3 reports 30-meter KK2XGH is doing well with over 450 reports. AK3X finds looking is cheaper than buying. WB3GZU and KA3CDQ are the competition in traffic handling. KB3NL plans to explore 2-meter ssb. W3CVE keeps W3CUL busy. KA3GWH is working DX with 10 watts. WB3JRW was featured in the MEPN bulletin. Net/manager sessions/traffic/QNI avg. MDC PON/W3OYY 4/10/20.5. WR PON/WB3BFK 23/28/17.6. MEPN/WB3GZU 28/118/29.8. Topper W3LDD. Others KA3AMK KA3ARH WB3BFK KA3CDQ WB3GZU W3HTB and K3ONU Feb MDD/W3PQ 56/214/6.8 with Brass W3FA and K3JL. Traffic: WB3GZU 584, W3CVE 231, KA3CDQ 180, W3FA 172, W3UT 161, K3ORW 66, KB3WL 49, WB3BFK 42, N4DR/3 18, W3FZV 10, AK3X 9, KC3D 6, W3LDD 2, WB3LTA 2, KB3NL 2, WB3KJT 1.

WESTERN NEW YORK: SCM, William W. Thompson, W2MTA — SEC: W2BCH. STM: W2ZOJ. ASCM: WG3LH. DECs: WA2AIV KA2BHR WB3CUF WA2DHZ WB2NAO. Now W2ZOJ STM as N2APB takes NYS helm; thanks KA2CTU for services with NYS. Appts: OVS—W2AET WA2AWX K2CJ WA2RXB; OES—W2AET K2CJ WA2KOJ; OO—W2AET; OBS—K2KWK; ORS—W2AET K2CJ WA2KOJ W2PPS WB2VSJ KB2YU; EC—WB2MVX Cayuga; NM—WA2PUU; DEC-WB3CUF; STM—W2ZOJ. BIG THANKS W2GLH WB2NAO hosts WNY LO meeting at Watertown. Regret to report Silent Keys W2BOC Pittsford, WB2KBT Rochester, WA2KUJ Honeoye Falls, and W2PZL Orchard Park longtime NYPON stalwart. Club officers: Fulton ARC-W2TOF K2DUR WB2LBI WB2LBE; Liverpool ARC-WA2MQM WB2PEL KA2MKV WA2FWW. Thanks for newletters. Clubs are invited to send to SCM for WNY column. LAST CALL Rome Ham Family Day, Beck's Grove, June 6. Batavia Hamfest at Alexander July 11, RAWNY Picnic July 18, RAGS Picnic Aug 1, Traffickers Picnic Newark Valley Aug 14, Hamburg Sept 11. Reports: OBS—W2GLH K2KWK; OVS—KA2LHO K2QR; OO—WB2MMB 2. Thanks WA2MFU, past EC Lewis Co. RARA also hatching Novices. County ECs still needed, contact W2BCH, and be prepared in your area.

Net	Freq.	Time/Day	Mgr	QNI	QSPOND
NYS/1*	7077	1000/M-S	WB2EAG	156	35 26
NYSCN	3677	1000/Sn	W2MTA	38	17 4
THIN	3913	1600/Sn	WA2KOJ	39	— 4
NYPON*	3913	1700/Sn	K2KQC	745	346 31
NYSPTEN	3925	1800/Dy	KA2Q	827	89 31
ESS	3590	1800/Dy	W2WSS	425	49 31
OCTEN*	34/94	1830/Dy	KO2H	—	— 31
Q Net	31/91	1830/Dy	KA2CMQ	453	2 31
STAR/E*	99/39	1830/Dy	N2BLX	66	12 22
WDN/E*	04/64	1830/Dy	N2APB	655	114 31
NYS/2*	3677	1900/Dy	N2APB	413	191 31
SLVARES	31/91	1930/Sn	WB2NAO	55	0 4
JCARCN	10/70	2000/Dy	WA2WAX	398	3 30
OARCN	25/85	2000/W	K2VTT	79	0 5
WIN	04/64	2000/M	WA2AIV		(SKYWARN)
WNYECN	3955	2000/Sn	W2BCH		(A.R.E.S.)
BRVSN	055/655	2100/Dy	WB2OFU	214	1 31
CNYTN*	90/30	2115/Dy	WA2PUU	494	65 31
STAR/L*	325/925	2130/Dy	N2BLX	79	23 24
WDN/L*	04/64	2130/Dy	N2APB	910	131 31
NYS/3*	3677	2200/Dy	N2APB	336	203 31

*NTS nets. Blueline Service Net 147.93/33 1900 daily. Black River Valley Service Net Feb. 221-5-28. PSHR: W2AET N2APB KA2BHR N2BLX KA2GOH WB2IDS WA2KOJ W2MTA WB2OWO W2ZOJ. Traffic: W2ZOJ 325, WB2IDS 276, KO2H 254, W2MTA 238, N2APB 215, WB2OWO 179, W2AET 172, W2GLH 154, KA2CLT 106, W2FR 92, KA2BHR 81, KA2BHD 76, KG2D 70, WB2QIX 68, KA2GOH 55, N2BLX 43, AF2K 38, N2ABA 37, KA2BCH 27, W2TZ 27, KA2HCB 25, WA2KOJ 24, KA2NHV 22, W2GJ 18, KA2BHB 16, N2ARD 15, KA2DBD 15, K2IUT 14, WA2RXO 13, K2RN 10, WA2SMZ 10, AF2A 6, WA2AIV 6, KA2NHQ 6, WB2PID 6, WA2MFU 5, WB2NAO 4, WA2RXB 4, N2BQV 1. (Feb.) KN2F 148, WA2MFU 36, KA2BHB 33, WA2AIV 9, WB2VSJ 1.

WESTERN PENNSYLVANIA: SCM, Otto L. Schuler, K3SMB — ASCM: N3EE. NMs: AC3N N3ADU W3NEM W3MML. SEC: AB3Q.

Net	Sess.	QNI	QTC	kHz	T/D
WPACW	31	464	220	3585	7 P/D
WPAPTN	31	700	164	3983	6:15 P/D
WPA2MTN	31	462	93	146.28/88	8 P/D
NWPA2MTN	28	417	10	146.04/64	9 P/D
PFN	31	293	259	3958	5 P/D

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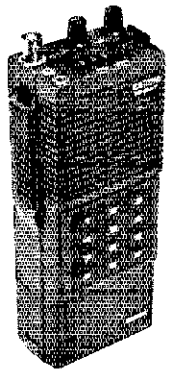

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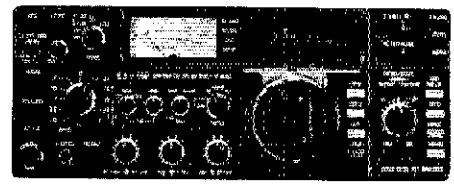

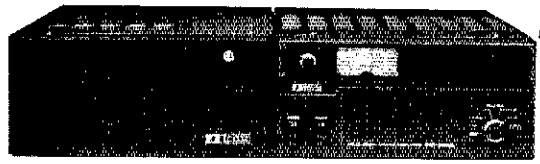

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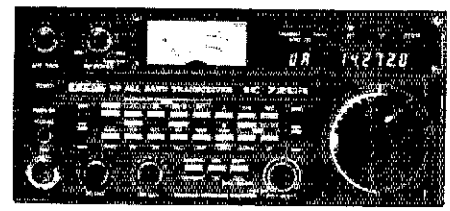

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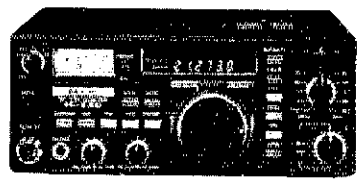

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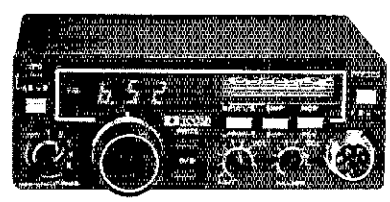

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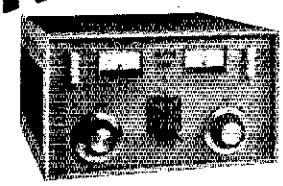

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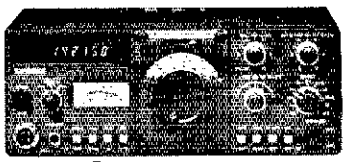
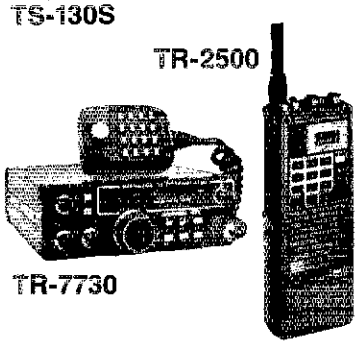
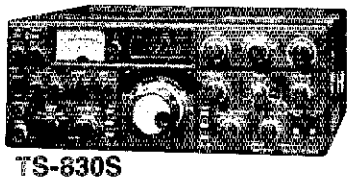


TS-130S

TR-2500



TR-7730



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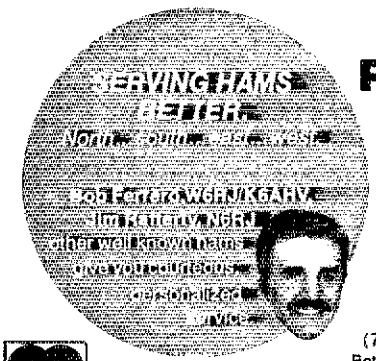

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In the April column K3GL should have been KG3L and KF3V is KF3V. KF3V is pres and KG3L (WB3JZN) v.p. of the Beaver Valley ARA. Nittany ARC Board of Directors are: WB3AEI, pres.; N3BBH, v.p.; WB3CXR, secy.; W3SAY, treas.; W3NEM K3BIE K3CM WA3IFC N2WS, trustees. Our best to LA4LN and LA2SR who are returning to Norway. LA4LN will be at the Univ. of Oslo. New Novices are KAs ITW ITX ITY ITZ IUA IUQ ITO ITA ITQ & IUH. I want to thank the net managers and traffic handlers in the WPA section and also the amateurs who have volunteered for various appointments. Someone may ask why is he given that appointment? Well, that person was the only one willing to spend his time doing the work and effort needed to get it done. He is the person referred to when you don't want to help but say what a lousy job he is doing. Traffic: N3ADU 548, AC3N 320, N3GM 158, K3CR 146, W3EGJ 115, KB3DT 103, W3IA 101, W3IW 89, W3OKN 81, KA3FJM 80, KA3CDV 78, N3CKQ 61, N3BKU 52, K3SMB 43, WA3QNT 41, KA3ETC 39, W3IQD 32, W3MML 32, WA3UNX 32, W3NGO 28, W3SMV 27, N3WS 27, W3RUL 23, KI3C 18, KB3NV 17, KB3UO 16, K3HCT 13, W3SN 12, W3AHH 11, K3LTV 11, N3KB 10, W3KMZ 10, K3VOV 10, KA3BGC 9, W3KUN 9, N3BKV 8, WB3GUK 8, AB3X 4, W3TTN 2, W3LOD 1. (Feb.) N3WS 125, KF3V 12.

CENTRAL DIVISION

ILLINOIS: SCM, Larry M. Keeran, K9ORP — SEC: W9QBH. STM: WB9JSR. ASCM: WD9EBQ.

Net	Freq.	Times/Days	QTC	Sess.
ILN	3690	2300/0300 Dy	263	61
IL Phone	3915	2130 Dy	148	—
NCPN	7270	1215 Dy	—	—
	3915	1700 Dy	125	52
IEN	3940	1400 Sn	7	4
ITN	3705	1900 Local Dy	76	29

NOTICE: Congrats to David E. Lattan WD9EBQ for being declared the new Illinois SCM, effective July 1st. All reports for July and on should be sent to: David E. Lattan, WD9EBQ, SCM Illinois Section, Route 1, Box 46E, Makanda, IL 62958. The BPL recipient for February W9JUJ with a QTC of 512 was inadvertantly left our of last month's report. D9RN 100%. Stations: W9HOT W9NXG WB9WGD N9AJE K9CMO KA9FCZ, DRN9 (CAND) 100% stations: W9NXG W9HOT WB9WGD W9TKL. W9VEY Memorial Station had a QTC of 8 during 5 sessions. KA9HVX has compiled a complete visual history of the Fox River Radio League activities: the canoe race, Field Day, horse trials, hamfest. They presented them in the March meeting. The FRRL is looking for "chat" ins for their cw net on Wednesday nights at 8 P.M. local at about 21.150 MHz. The Illiana Repeater System, P.O. Box G, Catlin, IL 61817 is looking for suggestions on activities for the club. A new repeater, licensed under the Knox ARC, serves Monmouth ARES as W9GFD/R. The Christian Co. assistant EC KB9TI has a successful Novice class in Taylorville. The Sterling-Rock Falls ARS participated in the Coloma Park District snow sculpture contest as their winter activity in February. They won first place for a sculpture of a pig (some think that is a ham), holding an HT. The Western Illinois ARC in Quincy presented K9ZJV with an outstanding service award for over 9 years service to the community and Amateur Radio as Radio officer. He has helped provide comms for many community activities as well as several local and distant disasters. He is the net control station for the Wednesday night emergency net. A brand new net for those intelligent enough to play over the radio called Dungeons and Dragons is run by KA9JOX Saturday mornings 1500Z (9 A.M.) on 28.720 or 28.820. Meet the "brains" there. The Central Illinois Chapter of the QCWA has elected W9MRT president. Friday June 18th is Amateur Radio Night at Busch Stadium. Call WB0QXW at (314) 351-5021 for info on the 5:35 P.M. doubleheader. Car pools are being formed all over the state. Contact your local club for further information. Hamfests: June 6th Starved Rock RC at Princeton Bureau Co. Fairgrounds will have ARRL's Asst Training Editor and W9PRN, Central Division Director, in attendance. Bulletins: WD9EBQ 169. Traffic: W9NXG 434, W9HOT 256, K9BVE 182, WB9WGD 112, KB9X 110, W9JIJ 100, WD9HZF 97, N9AJE 91, N9DR 82, KN9BAM 73, W9RJM 72, W9TLU 58, W9OK 42, W9LNO 32, WB9YAS 30, W9KR 25, W9HBI 24, W9HLX 20, K9SW 11, WD9EBQ 6, WA9RUM 6, WD9CJB 5, W9SSP 5, WB9EED 4, W9KSU 2, KA9GJN 1, W9HPG 1. (Feb.) W9JIJ 512.

INDIANA: SCM, Bruce Woodward, W9UMH — SEC: W9UMH. STM: W9JUJ. NMs: ITN-W9QYY; QIN-WD9GXW; ICN-WD9CSZ; VHF-W9PMT; IWN-K9DCX; IPN-W9DLF.

Net	Freq.	Time/UTC/Daily	QNI	QTC	QTR	Sess.
ITN	3910	1330/2300	2350	326	2017	62
QIN	3655	1430/0100/0400	780	427	2217	93
ICN	3708	0015	105	18	532	31
IPN	3910	2130	1103	133	859	31
IWN	3910	1310	1747		480	31

Hoosier vhf nets: QNI 4619, QTC 296, QTR 15068, bulletins 30 for 25 nets. D9RN 100%, 374 messages in 62 sessions. IN stn. W9JUJ K9CGS W9URO WB9MIK W9QLW KJ9J. DEC for Northwestern Indiana is N9CQD. Appointments: OVS-K9SBW; ORS-W9TG W9RTH W9QLW WA9OHX W9EI. ECs-KB9GP St. Joseph Co., KB9JK Scott Co., WB9UKG Knox Co., K9KTH Monroe Co. K9AGJ Ripley Co., KA9FDF Floyd Co., WA9ABI Adams Co., WB9WWB Clinton Co. W9RTH Jackson Co., WA9OHX Tipton Co., W9CTC Orange Co., K9IIB Putnam Co. The National Weather Service seminar for ECs was very well attended, and I feel it has paid off in a better coverage during severe weather this year. Thanks to all who attended. WB9ZQE, the 10/70 repeater and KM9B make a very good team and all of us seem to be doing a better job. The extremely heavy melting snow brought a national disaster to the Fort Wayne area. Thanks to WB9PXT and over 200 amateurs in the area who worked for over a week helping keep things from being more serious. It was a pefect example of the role of ARES in an emergency. I receive many fine news letters each month. They are appreciated. I am starting a news release program for these publications. I hope it works. Muncie Area ARC ed. WD9HQH, asst. WD9FVX; Lake Co. "Short Skip" ed KA9JKV; Richmond WWVARC ed. KB9QR; Hams-O-Gram ed. K9LSB; Columbus ARC Transmitter ed. WA9YIF; The Bison ed. W9REV, Clark Co. News and Views ed. N9AOJ; Indy RC ed. W9JVF, Frankfort ARC ed. WD9EEB; Indy RA "Beacon"ed WB9ZQE, Beacon, Fort Wayne RC "Hamsplatter" ed. K9TUS; Tri-State ARS "Sparks" ed. WB9VSQ, "HAWK" News letter ed. W9RTH. CAND Report 808 messages in 31 sess. D9RN 100% IN St. W9JUJ & W9QLW. Traffic: W9JUJ 906, KJ9J 221, W9EI 179, KM9B 120, K9FZX 114, W9QYY 114, W9QLW 108, W9URQ 99, W9UMH 91, KB9HH 74, K9DCX 58, W9WKM 55, K9WWJ 53, KK9N 44, WB9MIK 37, WA9OKK 29, WA9YIF 29, N9AEI 28, WB9YAY 22, WB9AWI 17, W9JZV 17, KK9K 17, W9RVM 16, N9PS 16, WD9HII 15, W9RTH 11, W9XD 11, K9DIY 10, WD9EXJ 10, K9CGS 9, N9CQS 8, KA9FFO 8, KG9K 8, WA9OHX 8, N9AST 7, N9BLK 7, WD9CIV 6, WB9RVN 6, WD9ART 5, WA9JNC 5, W9ATG 4, WD9DWD 4, KB9WI 4, W9DKP 3, K9OUP 3, W9BDP 1, W8LKU 1, W9WEI 1.

WISCONSIN: SCM, Roy A. Pedersen, K9FHI — SEC: W9OAK. STM: K9UTQ. BWN 3984 1215Z QNI 1173, QTC 1434 WB9YPY. BEN 3985 1800Z QNI 678, QTC 210 WB9ESM. WSBN 3985 2300Z QNI 1057, QTC 402 WD9ESZ. WNN 3723 0000Z QNI 230, QTC 51 KA9HPQ. WSSN 3645 0030Z QNI 191, QTC 40 N9BYK, WIN-E 3662 0100Z QNI 427, QTC 233 W9YCV. WIN-L 3662 0400Z QNI 383, QTC 139, K9LGU. XPO 3925 1801Z QNI 340, QTC 44 W9AKY. NWTN 3/4/.94 0030Z QNI 482, QTC 47 WB9YPY. Gr. Bay .72/.12 Tue .0245Z QNI 12, QTC 0 WB9NRK. WCWTN .31/.91 0030Z QNI 346, QTC 74 N9AUG. NWTN certificates to WA9BRU KA9HYO W9YZS WB9YPZ WB9TOC KA9LER W9LDQ. W9UW has Kenwood R-600 receiver. WNA meeting on the air was very successful. WNA picnic September 11 at Northwood Co. Park. Mark your calendars; we want YOU ALL there, fun, fun... Note new time for Green Bay 2 Meter area net (0245Z) Tuesday. Received word from headquarters that yours truly is SCM of Wisconsin for another two years. I know I will enjoy it. Wisconsin QSO Party was a success. Where were the rest of the counties?? BEN certificate to W9DM. BPL to KA9CPA & WD9ESZ. K9VAL has Extra and is a Life Member. Mancorad officers WB9OBX, pres.; K9LWI v.p.; WB9BQD, secy.; W9BZU, treas.; K9HAG, WB9CYC N9BCX, dir. Traffic: KA9CPA 2432, WD9ESZ 516, W9CXY 324, W9YCV 289, WB9YPY 276, K9GDF 193, KC9KQ 174, K9FHI 146, WA9WYS 143, WD9FRI 132, N9AUG 130, N9AZI 129, KC9CJ 126, WB9ICH 120, N9BYK 116, W9UCL 115, K9AKG 101, WB9ESM 84, KA9HPQ 83, W9IEM 80, W9SO 76, W9LDO 73, W9KTG 70, K9LGU 69, W9DND 67, KG9B 66, AG9G 57, WA9ZTY 57, KA9IKR 54, N9ATP 53, KB9CV 53, KB9NG 50, WB9NRK 44, N9BDL 44, K9EC 36, WB9JGA 34, WB9JSW 34, K9UTQ 34, K9JPS 32, K9HDF 31, KA9GYD 30, WD9BKT 29, KB9GO 28, KA9EMF 24, KC9GW 22, WB9PKL 21, N9BCX 19, W9UW 19, K9ANV 18, KA9MFV 18, KB9W 17, WA9DXW 14, WD9IMZ 14, KE9C 13, KB9FM 11, KA9IHR 7. (Jan.) K9JPS 40.

DAKOTA DIVISION

MINNESOTA: SCM, Helen Haynes, WB0HOX — ASCM: KC0T. STM: AD0S. SEC: KN0J. Congrats to our new Novices - KA0MXK KA0MXJ KA0NIS KA0HVH KA0MOE; Generals - KA0LWZ N0CZA N0CZB KA0EQH KA0DHZ; Advanced - N0DNU N0DJA KC0ML N0ADM WD0ENX KA0EQH. K0JCF did a FB job with some Falkland Is. Traffic on 4-5 on cw. Nice show. W0LHS is the DX editor for the RTTY newsletter. THANKS to all the clubs for a copy of theirs; the 3M one is super. WB0BIN is the new EC for Moorhead. The St. Paul RC meets 1st Fri monthly at the Red Cross bldng & has a vry nice newsletter. The Headwaters ARC is 3 mo. old & growing. KC0NL is pres. Fargo had a super banquet, & Robbinsdale Hamfest was packed. Mid-Range Hamfest, Hibbing, July 18. Thanks to all for high check-in count 3142.

Net	Freq.	Time	QNI	QTC	Mgr
MSWX	3929	6:15 P.M.	594	478	WD0CGM
MSPN/E	3929	5:30 P.M.	1274	305	KC0T
MSN/1	3685	6:30 P.M.	328	115	W9DM
MSN/2	3685	10:00 P.M.	191	94	K0JCF
MSPN/N	3945	12:10 P.M.	627	80	WA0AIN
MSSN	3710	7:00 P.M.	128	17	WB0WXU

7230-backup, 7110, 7070 back freqs for cw if needed. Traffic: KB0MB 857, WA0TFC 406, W0HZU 214, WB0HOX 167, KA0JUX 161, W0MFW 137, KA0EPY 137, W9DM 127, KA0IAQ 122, KC0T 105, W0DFX 104, AD0S 88, K0CSE 62, W0WRL 62, WB0NZB 58, K0JCF 57, KN0J 43, N0CLS 41, WA0AIN 32, WB0WXU 32, WD0BGS 24, WB0LAR 24, K0DEG 23, KC0Z 20, WB0HDD 17, W0ZSW 17, WA0YVT 16, KC0NF 14, WB0VYE 14, KA0JCO 6, AE0M 6, W0PNE 6, N0BSG 1.

NORTH DAKOTA: SCM, Lois A. Jorgensen, WA0RWM — Congrats to N0DLI KA0MEH, Nov to Tech, new call N0DJE. KB0TN's new call KC0Y and WA0CRH is KR0W. W0DM was honored at an open house for his 80th birthday. Sioux ARC of UND will use the callsign N0ND for special events as Field Day and Centennial Celebration of UND. Red River ARC banquet was very successful with 90 in attendance and main speaker was AD0S, who showed slides of his adventures on Kingman Reef and Palmyra Island. WD0GRC has taken a big task of compiling a ham operators of North Dakota book and has done a tremendous job. If anyone can assist him with new hams or repeaters, he would appreciate the help. Congrats to N0DDS and XYL on their new harmonic. Events to remember: June 6, Mayville Hamfest; June 26-27, Field Day; Jul 10-11, Peace Garden; Jul 23-25, ARRL conv. Cedar Rapids Ia; Aug 1, Annual Cornfeed. Traffic: WA0TWM 166, KA0FSM 22.

SOUTH DAKOTA: SCM, Erwin Heimbuck, K0OTZ — Well, it looks like a race is shaping up for the SCM position as I have heard that two people are in the process of filing petitions. I would like to see the loser consider the job as ASCM, since there is a candidate from each end of the state. My best wishes to both and may the best candidate win. Make sure that you are planning on being in Rapid for the annual SD hamfest and picnic. It looks to have something for almost everyone. The dates again are July 10 & 11. There will be a Friday evening warmup as in the past at the favorite watering hole for those interested. K0AS is moving to CA and will be missed by all of us. Traffic: W0ZWL 1067, W0HOJ 154, WA0VRE 116, K0AIE 111, WA0UEN 101, KC0OO 31.

DELTA DIVISION

ARKANSAS: SCM, Dale Temple, W5RXU — SEC: WB5IGF, Searcy. K5DVT passed away on March 3. He was well known as a stalwart supporter and user of the 16/76 Huntsville rptr. and will be missed in Arkansas. NWAARC is installing a complete hf station at the Red Cross building in Fayetteville. The CAREN Hamfest in Little Rock, April 3 & 4, was a big success with over 1200 in attendance. Razorback Net, 1245 checkins, 143 traffic, 674 min. SARC 2-Meter Net 45 checkins, 5 traffic, 105 min. SCARC 10-Meter Net 27 checkins, 1 traffic, 88 min. Mockingbird Net 820 checkins, 19 traffic, 10 hours. Ark. Phone Net 601 checkins, 33 traffic, 1172 min. OZK 139 checkins, 11 traffic, 356 min. Traffic: W5QFU 58, W4AZJ 53, W5UAU 14, W5EIJ 8, W5QL 8, W5TUM 1.

LOUISIANA: SCM, John Mever, N5JM — ASCM: KC5SF. STM: W5GHP. With summertime upon us, it's not too

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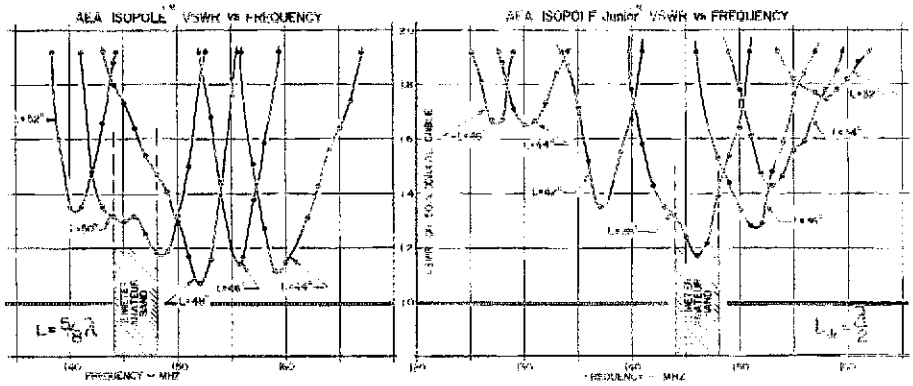

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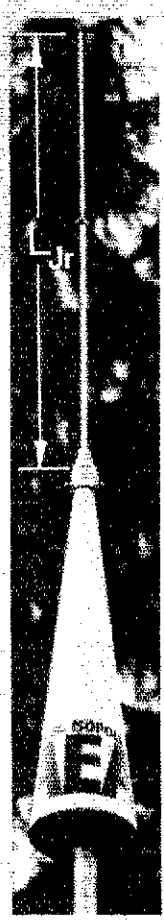

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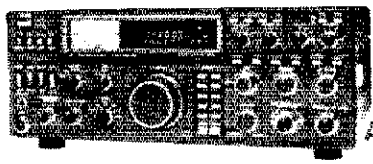

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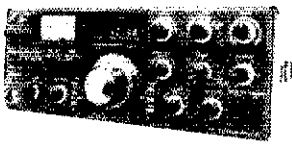

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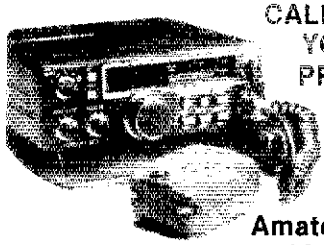

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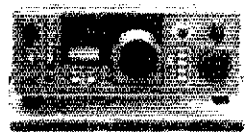

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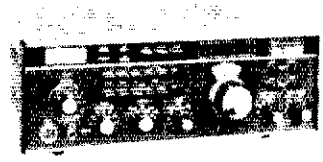

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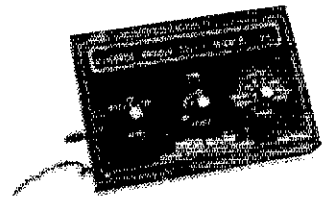

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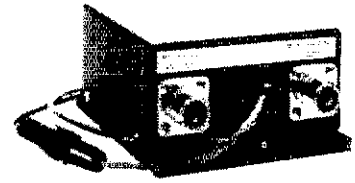

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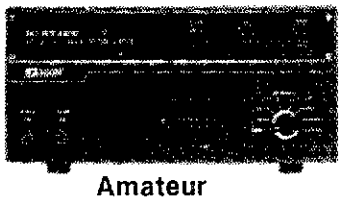

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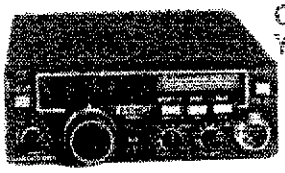
No adjustments necessary when changing frequency or bands. Fully automatic. Compatible with IC-730 and IC-720A.

MINICOM IC-25A

Full featured 2m FM transceiver in a very compact package. 25W too!

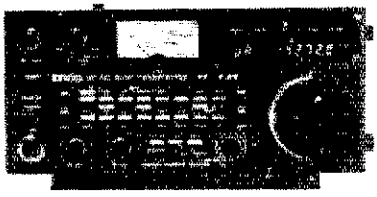


CALL FOR YOUR PRICE

Amateur Net $349.00

Measures 2"(H)x5½"(W)x7"(D). Dual VFO's with band scan and memory scan with automatic resume after preset delay or carrier drop. Encoding microphone also included. 5 memories with priority channel. Tuning rates 5KHz (A VFO) or 15KHz (B VFO).

IC-720A HF TRANSCEIVER



CALL FOR YOUR PRICE

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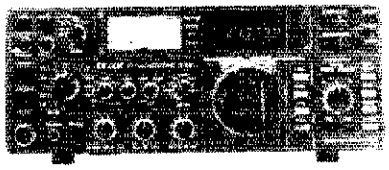
Available with all accessories

NEW FROM ICOM, IC-740

Extensive Versatility for the Serious Operator



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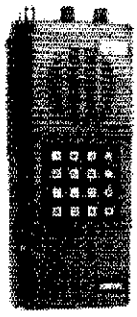
Contains the most asked-for features in a HF base station. 160 thru 10M amateur band coverage, 10-100W output. Many features including adjustable noise blanker, pass band, tuning, notch filter, adjustable AGC, squelch, optional FM and optional internal AC supply.

IC-3AT/IC-4AT



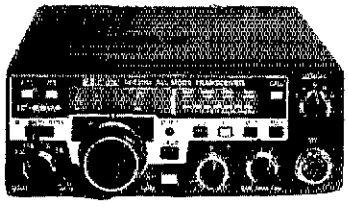
A 220mHz or 450mHz handheld based on the very popular IC-2A/2AT. Compatible with all 2A accessories. IC-3AT (shown) with 16 button encoder.

SALE $269.00

with Free UPS Surface

Amateur Net $299.95

IC-290A 2M ALL MODE TRANSCEIVER



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Amateur Net $549.00

5 memories with priority and scan/squelch on SSB. Dual VFO's for FM operating ease. Encoding microphone included.

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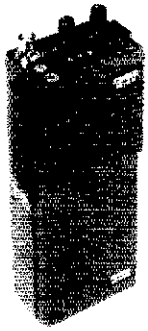
THE VERY POPULAR IC-2A/IC-2AT



IC-2A
Am. Net $239.50
(Shown)

IC-2AT
Am. Net $269.50
(with encoder)

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early to think about the hurricane season. We need hams state-wide to work as Emergency Coordinators to tie in with cd and parish agencies. Volunteer now and avoid the rush when the wind starts to blow. Traffic totals continue to climb nicely, and a family picnic is scheduled June 12th at Chicot State Park near Bunkie to bring the hard working traffic group together for some R & R. Interested? Contact W5QHP or check into any net listed below for details. Congrats to WD5CWK new net manager on LSN; dust off your key and meet him. N5RB reports an activity increase on LRN. DDXA bids farewell to K5OA as he leaves for a stint in TJ-land: the hunter becomes the hunted. The Baton Rouge .79 and .88 rptrs have been upgraded and improved, so check them out as you pass through town. GNOARC repeaters new ident is W5MCG.

Net	Freq.	Time	Mgr.
LAN	3615	7 & 10 P.M. Dy	K5TL
LTN	3910	6:30 P.M. Dy	N5ANH
LSN	3703	7:30 P.M. Dy	WD5CWK
LRN	3587.5	6:30 P.M. Sn/8 P.M. W	N5RB

Traffic: W5QHP 283, W5LQ 242, K4TL 210, KC5SF 112, W5VMY 71, AC5R 59, WB5LBR 45, N5NFV 39, N5ANH 33, W5TVW 14, WD5CWK 13, WA4YIU/5 9, WA4MUW/5 4.

MISSISSIPPI: SCM, Paul Kemp, KW5T — STM: KB5W. SEC: K5QNE. Freq. Coord: WD5DCI. With pleasure I announce K5QNE has accepted appointment as SEC. Tnx for fine job by WB5FXA. WA4BKP and WB5AMI appointed AEC for Yazoo Co. N5XA back on 2M with new IC-25A. Welcome to W9WIB in Tupelo. KB9TN now on air with 70 ft crank up and monobanders on 20, 15 & 10. He tks those who made it possible: WD5BSJ KA5HPD WA4OYN KA5FXK N5DYE KA5HKQ KA5AGD KC5VD KW5T. You would have to see the setup to appreciate the work these people did. WB5HAS and hams in Philadelphia are planning a station at the Neshoba Co. Fair. If you can help, contact WB5HAS. N5EEJ has new harmonic. MSBN (WD5EYM) sess 31, QNI 2431, QTC 50. MN(WB5RMW) sess 31, QNI 693, QTC 17. MTN (K5OAF) sess 31, QNI 178, QTC 40. MSN (KA5GGG) sess 20, QNI 137, QTC 21. DRN5 (WB5YDD) sess 31, QTC 346. MS rep 100% CAND (W5KLV) sess 31, QTC 808, MS rep 100%. CAEN (KA5AGD) sess 4, QNI 81, QTC 1. GSEN (KB5W) sess 22, QNI 474, QTC 13. Traffic: N5AMK 261, KB5W 231, K5OAF 128, KT5Z 57, KD5P 52, W5HKW 44, W5WZ 35, W5LSG 11.

TENNESSEE: SCM, John C. Brown, NO4Q — STM: K4YOL. SEC: K4TKQ. The hamfest season is now in full swing. I hope that all are taking advantage of these to express your reaction or otherwise to the SCM, STM or SEC about how things are within the section. That is the only way we will know what and how the affairs of things are. The newest net in the section is the EC net on Tuesday night local. NM is naturally your SEC, and the net is conducted just following the TPN evening session. K4TKQ will be looking for all DECs, ECs and all other interested stations. W4ZJY has asked to be replaced as the TN (cw) manager and K4VM has agreed to step up from being his assistant. She will be looking for the continued participation as before. Upgrade surge is still going well. Congrats to all those that made it. There were and are many. Humboldt, Music City and Cedars of Lebanon hamfests are looking to have a good attendance. See You There. TSN Honor Roll: WA4CMS N4EAM N4EFB N4FTC NG4J N4GJK WA4LXP KA4PWU WA4UCE WB4YSN W4DDK NX4C. TN Honor Roll W4WXH W4ZJY W4DDK W9NXC NO4Q. Net traffic: LF-sessions 80, QNI 4500, QTC 328; VHF-sessions 107, QNI 2646, QTC 471; CW-sessions 52, QNI 683, QTC 551; RTTY-sessions 28, QNI 83, QTC 8. Traffic: NG4J 524, W4WXH 365, W4QGG 195, N4EAM 132, W4ZJY 129, K4VM 82, W4DDK 74, WA4UCE 54, N4DZW 42, W4MRD 35, K4WOP 31, KA4BSG 28, KY4L 28, KE4QL 24, WD4SIG 18, NM4W 11, W4RUW 8, WD4EKA 6, W4TYV 6, W4EWR 5, WA4GLS 5, NX4C 4, W4PSN 4, W4DPO 2.

GREAT LAKES DIVISION

KENTUCKY: SCM, Dave Vest, KZ4G — STM: KA4GFU. SEC: WA4UQA. Nets reporting: KRN MKPN KTN KYN KSN KNTN KEN BARES CCEN CARN 11ARES 4ARES KYPON PAEWTN 6ARES SEKEN 3ARES TSTMN. Sessions 347, QNI 5619, QTC 705. New appointments: DEC-KU4A, EC-KA4ADF, OVS-W4RHZ. Upgrades: KA4SAA KA4YJA KA4WBY NV4Q. New Novices 2 YLs from Shepherdsville, KA4ZAO and KA4ZAP. From B.G. KA4YYA. Had 65 stations participate in NWS Severe WX Test. PSHR: KD4IF KD4TY KA4SAA KB4OZ KA4GFU WD4BSC. Traffic: KA4MZY 161, WD4IYI 119, KA4GFU 107, WA4JTE 107, KC4WN 83, WD4BSC 60, KB4OZ 59, NW4P 59, W4WQV 47, KZ4G 46, KS4V 44, WB4APC 39, WA4SWF 39, K4MHL 33, KA4SAA 33, N4GD 31, K4JLX 31, KD4IF 24, WA4AGH 23, WA4UIV 22, WD4CQF 21, K4HOE 21, WA4UQA 21, WA4YPQ 19, KA4BCM 17, WB4NHO 16, KD4TY 16, WD4CJQ 15, WB4ILF 15, WA4AVV 13, KA4AVX 13, W4PKX 13, KD4SN 13, NN4H 12, WA4JAV 12, WA4GAL 11, WD4IYH 11, KA4MAP 5, W4OYI 4, KU4A 2, WB4AUN 2, KA4MBF 2.

MICHIGAN: SCM, James R. Seeley, WB8MTD — ASCM: WA8DHB. SEC: WA8EFK. STM: AF8V. DECs: KC8DN WD8MBB K8RCT W8VWY. NMs: WA8DHB N8DSW K8LNE K8KMQ WD8LRT WD8NKT WA8PIM W8SCW WD8RNQ WB8YDZ W8YIQ K8ZJU.

Net	Freq.	Time/Day	QNI	Tfc	Sess.	Mgr
QMN*	3663	1800 Dy**	1248	428	93	WA8PIM
MITN*	3953	1900 Dy	727	339	31	WD8LRT
GLETN	3932	2100 Dy	1103	154	31	WD8LSV
MNN*	3722	1730 Dy**	376	121	62	N8DSW
MACS	3953	1100 Dy**	597	115	31	K8LNE
UPS*	3922	1700 Dy	672	113	35	WA8DHB
WSSBN	3935	1900 Dy	513	28	31	WB8SUR
SR	3930	1730 M/S	376	28	28	WB8ZGP
MEN	3930	0900 S	120	7	4	WB8ZGP
YASYL	3922	1900 M	35	5	5	KM8E

*NTS nets. Times local. QMN late net, 2200; MNN late net, 2000; MACS Sn 1300. Vht nets 9 rpts, QNI 569, tfc 37, sess 44, mgr WD8NKT. 3932 is MI emer. freq. Traffic workshop Sn 3953 kHz, 1600. ARES net Sn 3932 kHz, 1730. Silent Keys, with deep regret: W8DY (ex-W8SPF, former Division director), WA8ODC. Heartfelt thanks to AF8V for 16 months of fine service as STM. He has resigned for personal reasons and is being replaced by the very capable WD8RHU, who steps aside as Branch Co. EC to take the new post. New ECs: N8CTI, Branch Co.; N8CPO, Livingston Co.; KU8H, Shiawassee Co. Upgrades: N8DGN WD8RNQ to Extra. FCC Roulette: KA8DEZ to N8DSW; KA8LHJ to KU8H; KA8IWW to N8DTZ. MACS certificates to KA8CPS K8KCF K8OCP KI8Q. I note a shortage of Novices on the Novice net! Higher grade licensees are welcome always, indeed are vital to the operation, but one of the main functions of the net is training in cw and traffic skills for Novices and

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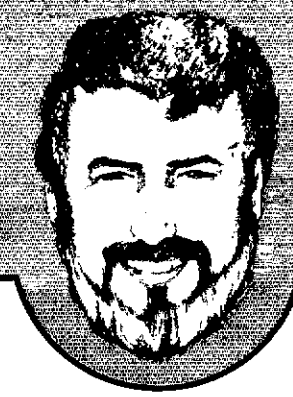

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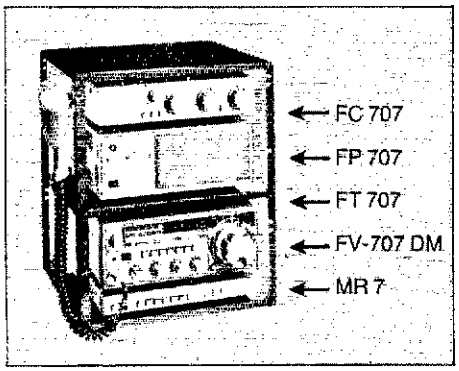

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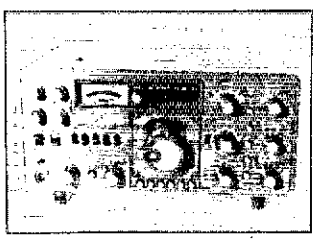
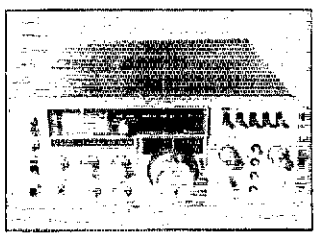
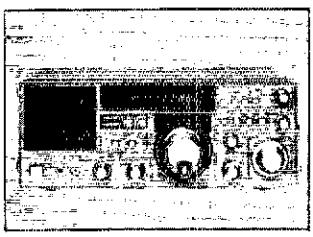


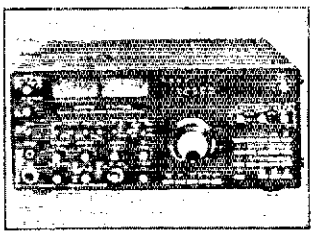
FT 902DM
LIST 1535.00



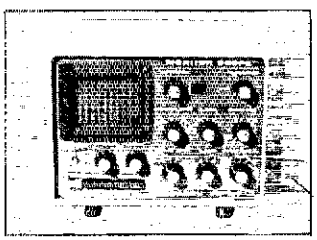
FT 107 M
LIST 1149.00



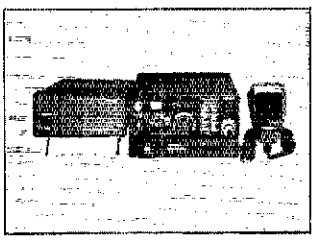
FRG 7700
LIST 550.00



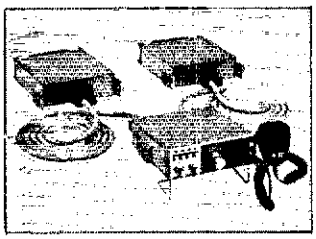
FT-ONE
LIST 2995.00



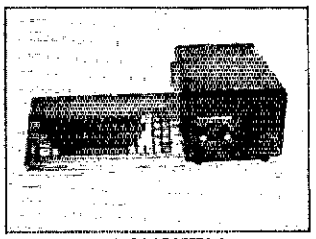
YO 101 SCOPE
LIST 320.00
N&G PRICE 220.00



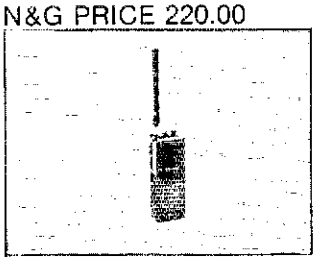
FT-290-R 2-METER
ALL MODE LIST 399.00



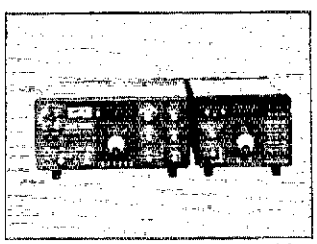
FT-720 SYSTEM
U.H.F. - V.H.F.



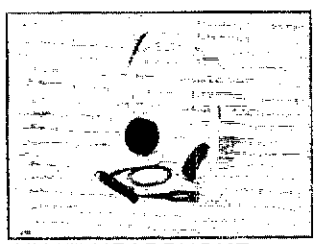
CW-RTTY SYSTEM
YK-901 LIST 175.00
YR-901 LIST 730.00



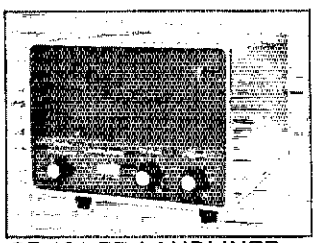
FT-208 R FT 708-R
LIST 359.00



FT—101 ZD-III LIST 925.00
FV—101 DM LIST 359.00



YH-77 HEADPHONE
LIST 15.00



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Techs. Clubs, instructors, present members: let's start promoting MNN to the newcomers at every opportunity. Attention all vhf nets: You are welcome and encouraged to report your activities each month to our vhf manager, WD8NKT. Checkins, traffic, and number of sessions make up the standard report, along with notes on any emergency and/or public service operations. Vhf nets are an important part of the amateur scene. Let's hear about them. Congrats again to the Genesee Co. gang for their superb annual Red Cross Month message originations. Six BPLs this month: KA8AID KA8CPS WD8LRT WB8MTD WA8PIM AF8V. Traffic: WB8MTD 543, AF8V 527, KA8CPS 513, WD8LRT 360, WA8PIM 316, KA8AID 307, KB8MX 271, K8KMQ 210, K8KQJ 180, K8GXV 168, N8DSW 159, N8DTZ 147, N8BNC 113, WA8DHB 109, WD8IBY 104, KT8V 96, WD8MJB 95, WD8RNQ 89, W8IHX 76, W8IXJ 70, WD8OSE 64, WD8RHU 58, W8YIQ 58, WB8SYA 57, KS8P 56, KT8G 50, K8OCP 46, WD8NKT 43, W8VIZ 43, W8SCW 42, W8ECK 40, WD8EIB 39, WD8BSE 37, K8LNE 34, WB8TTA 29, K8DD 25, N8BBY 24, K8UPE 24, WB8YDZ 24, KU8H 23, W8VPW 23, KI8Q 21, W8MOF 18, WD8DRI 17, WD8OIP 16, WB8HPZ 15, W8RNQ 15, N8CQA 14, WD8IXZ 14, WB8YWA 14, W8YY 14, W8CUP 11, K8KCF 11, WB8SIW 10, K8ZJU 9, N8BYB 8, W8TBP 8, WB8YRY 8, KA8JFM 7, W8LDS 7, N8DGN 6, KB8GT 6, WD8ROK 6, WD8IYA 5, WD8LIP 4, KF8M 4, W8JUP 3, KJ8A 2, W8LOU 2, KE8X 2.

OHIO: SCM, Allan L. Severson, AB8P — ASCM: W8MOK. SEC: K8AN. STM: K8OZ. NMs: WA8BUW WA8DYX W8EK KF8J WB8JFW WD8KFN WB8YTD.

Net	QNI	QTC	Sess.	Time (local)	Freq.
BN	407	211	62	6:45/10 P.M.	3.577
BNR	324	70	31	6 P.M.	3.605
ONN (Feb)	181	45	25	6:30 P.M.	3.708
OSN	247	112	31	6:10 P.M.	3.577
OSSBN	2727	1042	93	10:30 A.M., 4:15 & 6:45 P.M.	3.9725
OSSN				6:45 A.M.	3.577
O6MN	507	32	31	9:00 P.M.	50.160

Good news from Cincinnati: K8JE advises that the 1983 Ohio State Convention has already been scheduled for February 26 and 27, of next year. ARRL sanctions have been received, so now all the convention crew has to do is attend to the six million and some details such a project incurs. And I've no doubt they'll do it with gusto! Sharp-eyed readers have probably noticed a new local net, Medina Co. Traffic Net, managed by KA8DJZ. This enthusiastic traffic area welcomes the new net. Speaking of traffic: I'm extremely pleased with the number of club newsletters which now include columns on traffic, with calls, traffic totals, PSHR, etc., excerpted from QST. This trend apparently started with a column by WB8SIQ in the NOARS "Log" and is spreading. It can only encourage participation in our traffic endeavors. EC appointments: KA8BYU, Lorain Co.; KA8BCD, Greene Co., WB8RYA, Clark Co. Welcome all! Upgrades: N8FU (Cincy OO) advises that wife (K8DHK) and son (now KC8MZ) are now Advanced class.

Local Nets	QNI	QTC	Sess.
ALERT	75	6	5
BARF	186	83	28
BRTN	460	204	31
CCOMF	135	12	9
COARES	120	5	4
IE Net	186	11	5
LCNWOARES	721	185	62
MASER (Feb)	122	6	4
Medina Co.	181	21	16
RARA	98		5
TATN	361	301	31
TSRAC	1129	115	34
VWCEN	40	2	4

Traffic: K8NCV 606, WB8MZZ 510, WD8MIO 406, W8PMJ 396, K8BYR 314, WD8KFN 305, N8BQK 263, W8GGX 246, K8JDI 221, WB8JGW 190, W8UPD 162, AB8P 161, K8OZ 159, WA8HGH 150, WA8GMT 144, W8QZK 134, WB8QHU 132, WB8UBR 132, WB8OHV 128, WD8KBW 117, W8WEG 117, WB8DMF 116, KF8J 109, K8JE 102, K8YUW 93, KA8IUK 91, WD8QAC 90, K8AN 81, W8EK 70, WD8DYW 68, KA8DJZ 65, N8CWU 62, KC8JI 60, KA8MEB 60, N8CW 55, W8MOK 54, WB8QXN 54, N8AUH 53, K3RC 53, W8TXV 52, W8SKP 48, N8JR 44, K8PYT 43, WD8CJU 40, WA8SSI 40, K8DL 39, WA8ZID 38, N8DAD 36, K8CKY 35, WB8SIQ 32, KA8GJV 28, W4SIG 28, WA8DYX 26, W8RG 26, W8QEM 25, WD8OYO 24, W8TP 24, WD8NFC 22, K8NJQ 22, WB8SJE 22, WB8MRL 21, WB8VOA 21, WB8HHZ 20, KA8KFW 20, WD8ODV 19, K8EF 18, WD8EKI 18, WD8JAJ 18, W8BHL 17, WD8ICK 17, N8CHS 15, W8FUP 15, W8OQL 15, WD8RGS 15, WD9HDZ 14, WB8TTQ 13, KA8GGZ 12, KA8LNA 12, WB8TRK 12, K8VOY 12, AC8X 12, KA8NXD 11, N8BZC 8, KA8DGO 8, KA8GMF 8, KA8HGH 8, KB8VE 8, WA8WCU 8, WB8AWM 7, K8CMR 7, KA8MKS 7, W8EMK 6, WD8MFX 6, N8CGM 5, WB8NTR 5, WB8YTQ 5, N8AJU 4, WA1QAA 4, WA8HED 3, W8LZE 3, WB8PIY 3, WB8NHV 2, WA1QAA 1.

HUDSON DIVISION

EASTERN NEW YORK: SCM, Paul S. Vydareny, WB2VUK — SEC: KB2KW. STM: WA2SPL. ASCM: KB2TM.

Net	Time/Day	Freq.	NM
EPN	2200Z	3.902	WB2MCO
ESS	2200Z	3.590	W2WSS
NYS	2300/0200Z	3.677	N2APB
NYS/M	1400Z M-S	7.077	WB2EAG
NYPON	2100Z	3.913	K2KQC
NYSPTEN	2200Z	3.925	—
NYS RATT	2290Z	3.625	W2ODC
CDN	2230Z	146.34/94	WB2ZCM
HVN	2330Z SSnM	144.535/135	N2BDW
HVN	2330Z T-F	146.37/97	N2BDW
SDN	0130Z	147.66/06	K2ZVI
SCRN	0100Z	147.735/135	WB2HDU

OO W2DW reports monitoring on 21 and 28 MHz. Also reports working 16 countries on ssb during contest using QRP. AARA reports K2VZQ and WB2VOR are Silent Keys. W2XL of Ulster reports active month in nets. To keep the column more up-to-date for those with varied interests, I am looking for volunteers to serve as ASCMs for DX, vhf operation, and experimentation. Contact me if you are interested. BPL WB2EAG, Feb. PSHR: W2YJR WB2ZCM K2ZM. March PSHR: WB2MCO KA2KVZ WB2EAG W2YJR KB2KW W2BIW K2ZM WB2HDU K2ZVI AK2F WB2TWQ N2CPX. March Traffic: WB2EAG 753, WA2SPL 358, WB2MCO 215, KA2KVZ 134, WA2JBO 127, KB2KW 96, K2ZM 93, W2BIW 90, W2YJR 85, K2ZVI 80, WB2HDU 76, AK2E 70, N2BDW 56, WB2OHR 34, WA2CJY 31, WB2SON 22, K2HNW 18, WB2TWQ 18, AA2Y 16, W2BWA 15, N2CPX 7, N2CSX 7. (Feb.) WB2ZCM 183, K2ZM 152, W1YJR 151.

NEW YORK CITY — LONG ISLAND: SCM, John Smale, K2IZ — SEC: WA2KKJ. STM: WB2BNY.

NLI CW	3630 kHz	1900/2200	K2GCE	

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NLIPN	3928 kHz	1815	KS2G
NLS	3720 kHz	1930	WB2EUF
NCVHF	6.04/64	2100 MWTh	N2BZL
BAVHF	7.915/315	2030 M-F	N2BMF
SCVHF	4.77/5.37	2030 M-F	WA2ARC
LIMARC	6.25/85	2100	N2BZL
ESS	3590 kHz	1800	W2WSS
NYS	3677 kHz	1900/2200	KA2CTU
NYS	7077 kHz	1000 M-S	WB2EAG

Note: All times are local; please try and help out by checking in whenever you can. Plan now to attend the Hudson Division convention being held Oct 29-31 at the Playboy Club at Great Gorge, NJ. After 20 yrs as WA2ZRT, he is now KT2R. N2CON also upgraded to Extra. Metroplex had K2IZ as their speaker for their April meeting. If your club has an open month and needs a speaker, I am available; just give me a few months notice please. SIARA graduated 10 new Novices from their classes in Jan. K2PR was presented with a 50-year Golden Anniversary Certificate awarded by the QCWA for his 50 years as a licensed Amateur Radio Operator. Net certificates for NLI CW were awarded to N2AKZ WB2BNY WB2EUF K2HD W2MLC and W2XS. KS2G has finally completed 5BWAS. NLIPN welcomes new members WB2IWJ and WB2EUF. WB2JAY now has a Ringo Ranger up at 40 ft for 223.5 MHz fm. It is with deep regret that we list KC2ID as a Silent Key. SIARA will hold their flea market on June 12th at All Saints Episcopal church, Staten Island, for more info contact George Rice, Jr WA2AMJ, 480 Jewett Ave., Staten Island, NY 10302. K2JFE reports that he has been keeping a sked with WB4ASG for the past 16 years. Humble apologies to KA2GFU. I had listed KA2GFA instead of KA2GFU for Jan traffic totals. NLI CW welcomes WB2IWJ to the ranks. Traffic: W2AHV 138, N2AKZ 121, K2GCE 76, W2GKZ 68, W1XS 60, KA2NMA 59, WA2ARC 30, W2DBQ 29, K2IZ 23, KA2GFU 17, KS2G 12, N2BQD 11, WB2IWJ 4, WB2JAY 1. (Feb.) N2BSS 70, N2BQD 33.

NORTHERN NEW JERSEY: SCM, Robert Neukomm, KB2WI — ASCM: W5DTR/2. SEC: WB2VUF. STM: W2XD. NMs: W2CC AG2R N2BNB N2BOP KA2GQQ KA2HNQ WB2IQJ & W2PSU.

Net	Mgr	Freq.	Time	Sess	QNI	QSP
NJPN	W2CC	3950	6 P.M. Dy 9 A.M. Sn	35	503	157
NJN/E	AG2R	3695	7 P.M. Dy	31	389	143
NJN/L	AG2R	3695	10 P.M. Dy	31	252	94
NJSN	WB2IQJ	3735	6:30 P.M. Dy	31	260	186
OBTTN	N2BOP	72/12	8 P.M. Dy	31	605	120
TCETN	KA2GQQ	855/255	7:30 P.M. Dy	31	248	64
NJVN	KA2HNQ	49/49	10:30 P.M. Dy			
NJRTTY	W2PSU	147.51	Autostart			

W2CC announces that the New Jersey QSO Party will be held the weekend of August 14-16. Reserve these dates. Congrats to KU2C (ex-WA2ROF) and N3ACN on upgrading to Extra, and to KA2KBX on getting his General ticket. KA2MNF recently got his Technician ticket. N2XJ's ORS appointment has been endorsed for another two years. N2BOP reports OBTTN net certificates have been issed to WA2RAM WA2SIM and WA2TXY. W2LV worked a KH6 for WAS-Satellite and Asia for WAC-Satellite. Want to have some fun and help earn credits for Amateur Radio? Then join a group and help with the many public service events during the summer. Are you a member of the Amateur Radio Emergency Service? If not, sign up and also support your local and state nets. Be trained when your help is needed. N2BNB reports the demise of the NWNJ VHF Net owing to not enough help. The net met four times in March with 25 QNIs and handled one piece of traffic. W2NKD reports W2LTP has moved to Delaware. K2TKN is making progress with the packet radio controller boards. PSHR: KB2HM AG2R K2VX W5DTR W2XD N2XJ KA5DLV N2BOP N2BNB KA2GSX WA7DPK WB3HWX. Traffic: KB2HM 286, K2VX 227, AG2R 191, N2XJ 148, W2XD 145, W2RQ 132, KA5DLV 90, N2BOP 85, N2BNB 73, W5DTR 57, WA7DPK 51, WB2KLF 50, KC2AK 36, WB3HWX 34, WB2RMJ 31, WA2GKG 29, W2ZEP 27, KA2GSX 24, W2CC 21, WA2OPY 6, W2IU 4, KA2JMH 3. (Feb.) W2RQ 258.

MIDWEST DIVISION

IOWA: SCM, Bob McCaffrey, KØCY — SEC: WØRPK. STM: KAØX. NMs: WØYLS WDØHND WBØAVW WAØAUX. Will be looking forward to meeting you in Cedar Rapids. Congrats to WAØAUX who has been selected as "Iowa ARRL Amateur of the Year." He was cited for his work at Camp Sunnyside, Handi-Hams, Pony Express relay and his dedication to traffic handling, consistently the traffic leader in Iowa. Our STM is spreading the word in recent visits to Waterloo, Mt. Pleasant and Muscatine. New OBSs are KØZQ and KBØXY. Thanks to all the hams in western Iowa for participating in "Find KØCY." The emergency message was important and your effort was outstanding. A great time in Sioux City. Waterloo staged a successful mall demo for SKYWARN. EC NØCAZ reported an incoming tornado which eventually struck his farm. He was not injured. Participate in SKYWARN — we need your help. Now receive Quad Cities news. This is the month for upgrades; congrats to NØBLA WBØFTD KAØGCN WAØLOG WBØUPF WBØVGJ NØCBC WBØBFV KAØKMG KAØKMF KAØKME WBØTSG and KAØITT (now NØDOK). WDØAXH achieved DXCC. Iowa Great Lakes Club elected WØFQ WAØYFQ WAØQID. 75M Phone, 2117/107/54. TLCN 442/157/62. ICN 96/40/14. PM net 206/6/23. Traffic: WAØAUX 254, AEØR/KAØX 246, WØSS 153, WBØQAM 142, WØYLS 122, KAØJQG 106, KØGP 88, WDØHND 77, KA9GBG 43, KØCY 36, WBØUPF 30, WØBW 18, KAØADF 15, WBØAVW 15, KBØOZ 14, WBØJJX 8, KAØLUZ 8, KØZQ 8, KAØJPN 7, KØIIR 3.

KANSAS: SCM, Robert M. Summers, KØBXF — SEC: WØKL. STM: WØOYH. Looks like the storm season is upon us and the proof was in Zone 7. There were two tornadoes reported in SE KS and the group had a real work out. WØKL says 914 ARES members are registered with the ECs. Feb. net reports: KWN 577 reports; KSBN QTC 114; KPN QTC 37; QKS QTC 77; QKS-SS QNI 9. March net reports: KWN QNI 1563, QTC 650; KPN QNI 335, QTC 23; KSBN QNI 1312, QTC 167; QKS QNI 337, QTC 74; QKS-SSQNI 44, QTC 5. I hope many of you, especially the newer amateurs, have the opportunity to attend the Salina Hamfest this year June 19 and 20. There will be a session on traffic handling presented this year. Hopefully we will be able to entice a few more of you to join us on the traffic nets. Central States Traffic Net (old KS PO Net): QNI 1753 QTC 147. Congrats to a new ARRL affiliate from Wichita — BOEING EMPLOYEES ARS OF WICHITA (BEARS/Ø). WØKL reports that the newly formed Kansas Disaster Teams have been formed. Those of you interested will read about them in more detail in the

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INNOVATORS IN DIGITAL COMMUNICATIONS

"Kansas Amateur Radio." I am sure a few more of you out there can qualify for the Public Service Honor Roll each month. Look into the matter!!! Traffic: W0FRC 146, W0HI 112, WB0ZEN 102, W0QMT 101, W0FIR 90, W0OYH 87, WA0LBB 76, KA0CUF 61, AC0E 54, W0CHJ 53, WB0YLP 39, N0BDG 36, KA0E 33, W0NYG 28, W0FDJ 27, K0BXF 25, W0PB 19, W0RBO 10, W0KL 2, W0OAG 2, WA0OWH 1.

MISSOURI: SCM, L. G. Wilson, K0RWL — ASCM: W0OTF. STM: KM0L. SEC: N0AJI. W0NUB is sporting a new 2-meter rig. KC0MY has acquired an SB200 linear, and WB0PLY has settled into a recently built ham shack. The Mo. Valley ARC is trying to purchase a new club rig. It is with regret that I report the passing of George Love, a graduate of the last HARC Novice class, who died before his ticket arrived in the mail. *Congrats to the remainder of the class who received their licenses:* KA0s NLT NLU NLV NLW NMI NMJ. My DXCC totals are sure to suffer owing to loss of rig time, but I am extremely proud that my XYL is now KA0NLW. Congrats to new licensees: KA0s NFT NGU NHE; General — KA0LZM; Extra — KS0B KC0MY. Happy birthday to W0CKK, who recently turned 86. Deepest sympathy to the family and friends of WA0DSO who joined the ranks of the Silent Keys. Traffic: KC0AS 665, W0OTF 144, KI0K 128, W0BMA 126, K0PCK 84, W0OUD 71, W0BV 51, K0SI 40, KC0CL 27, WB0SSB 25, W0NUB 18, K0RWL 5, KM0L 2.

NEBRASKA: SCM, Shirley M. Rice, KA0BCB — SEC: N0AIH. STM: WD0BQG. Sympathy to the families of W0LZO W0GFK & K0BRS, who has been OBS & reported to me weekly. I will certainly miss his reports & added notes. KA0BQS new v.p. of the North Platte Club with W0EUT club historian. Every club needs an "EUT". He is doing a great job! Congrats to new upgrades: Novice-KA0NFJ; Tech-N0DHA WD0GKA WD0GKD KA0KPT N0DGM KA0MCQ KA0LRF KA0NCR; Gen-KA0MWO KA0MUF KA0JTH; Adv-KA0DWJ KC0OZ; Extra-W0NQU KC0O KR0N. Nice demonstration at NU's museum in Jan. by KB0WB & K0PKW. Hats off to Kearney's Midway ARC for a GREAT state convention! All who attended know the banquet, music & speaker were SUPERB! Now I know what DR you hams have been going to! HI! HI! N0AIH & N0AZF presented an outstanding slide & film program on tornado spotting. This was by far the most informative I've ever seen! W0EUT WB0GMQ KA0DJA KR0N all have new rigs! FB guys. Traffic: W0HOP 43, WB0GOB 34, K0DKM 32, W0ZNI 25, KA0BCB 16, WA0BOK 11, WA0DXY 11, WA0PCC 8, WB0GWR 7, WB0SGB 7, WB0GMQ 5, W0NIK 2, K0ODF 2.

NEW ENGLAND DIVISION

CONNECTICUT: SCM, Pete Kemp, KA1KD — SEC: K1WGO. STM: K1EIC.

Net	Freq.	EDT (loc)	QTC	QNI	NM
CN	3840	1900/2200	212	343	K1EIR
CPN	3965	1800/1000 Sn			WB1AIU
NVTN	28/88	2130			WA1ELA
WCN	78/18	2030	138	413	W1DPR
RTN	13/73	2100			WB1CPF

High QNI: CN-W1QJM K1UQE WB2PJU. Big news for CT traffic handlers: CPN is back on 3.965. Appointments: OVS-KA1FJR; ORS-KA1EUQ. Upgrades: Tech-KA1GSY; Gen-KA1GMG KA1DJX N1BOW; Adv-N1BRV. Call changes: WB1HCA/KJ1B. Good luck to all clubs and stations in Field Day. Remember preparation, practice and fun are all key ingredients to a successful event. AK4L & WB9IHH were active in the recent vhf contest. Congrats to former SCM WA1LOU who recently became engaged. WA1KMR/XE1 while attending med school in Mexico. CT DXers getting ready for summer DXpeditions FP and VE1. W1ICQ is busy on air with HW8 and solar cells doing his bit for ecology. W1FAI new v.p. of the Nautilus Nest. WB3ANC bk from sea duty. W1EFW & W1CUH bk from FL and the Orlando Hamfest. Don't forget the Boxboro Convention Oct 2/3. N8AXA/1 received WAS and WAC on 50 MHz. Welcome N2BQA to tfc nets. Ops having problems with the W1 QSL buro are asked to send copies of all correspondence, with specific details to K1FHN at Hq, as well as to the buro. WA1WXV getting ready for EME operations. KA1ZT finally hit his 100th country. Staffers at Hq have been busy speaking at area clubs: K8CH at FARA on TVI; KB1N/KB1O at CARA on DF. Tri-City ARC annual meeting/banquet set for June 8th. Congrats to CT amateur K1ZZ, newly elected GM of ARRL and W4KFC as pres. A BIG TNX to all ops involved in the Mar 19th CP/Emergency Evacuation/ARES drill. All LOs, NMs, section appointees are reminded to get their reports in early. Traffic: W1EFW 188, WB1GXZ 167, K1AQE 156, WB2PJU 127, W1FAI 126, K1EIR 119, W1XX 88, N1BPD 83, WB1EKV 74, KA1BHT 68, KA1KD 68, K1EUX 58, WB9IHH 53, WB1ESJ 42, W1BDN 35, WB1CRH 35, N2BQA 23, K1EUQ 23, K1XA 12, W1VS 2.

EASTERN MASSACHUSETTS: Rick Beebe, K1PAD — STM: WA1TBY. SEC: WA1BLG. ASCM: K9HI.

Net	Mgr	Freq.	Time(loc)/Dy	QNI	QTC
EMRI	NTGQ	3.658	1900/2200/Dy	465	296
EMRIPN	KA1BJY	3.949	1730/Dy	267	206
EM2MN	KA1CGP	23/63	2000/Dy	369	94
NEEPN	K1BZD	3.945	0830/Sn	79	20
HHTN	K1BSO	04/64	2230/Dy	543	199
EMRISS	N1BHH	3.715	2030/Dy	193	79

At the March Board of Directors meeting of the ARRL which I attended, the following things took place. Vic Clark, W4KFC, was elected president of the League, replacing the retiring Harry Dannals, W2HD, who dedicated 10 years to the job. Dave Sumner, K1ZZ, was elected general manager of League Headquarters. He replaced Dick Baldwin, W1RU, who is retiring after a distinguished career at ARRL. The Board also made plans to file comments to the FCC on their modification to the League's 20-meter phone band expansion. The FCC's proposal would have a split General portion in the phone segment, which was undesirable. The League will file an application for review of RM-3855, which requested early allocation of the 10 MHz band. The FCC has the authority to do this even though the WARC report has not been ratified by Congress. Many countries are already on the band. The Board did underscore the concept of no League sponsored contests or operating awards on the band when we get it because of the size of it and the fact that we will be there on a shared basis. Because of the success of our local alerting scheme sponsored by AB1Z, I asked our director to make a motion charging the Emergency Comm Advisory Committee to study and select a prefered one for League endorsement. His motion was passed unanimously and with a lot of written support by us. AB1Z's idea may "go national." The Billerica club had its annual dinner and the 19/79 club is planning their's. Framingham club had a talk on antique radio by KA1GEN. Wellesley club completed their Novice class. Massasoit club had WA1MRH give a talk on computers.

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220 MHz AND 432 MHz
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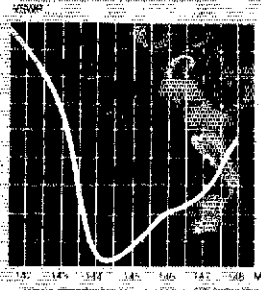

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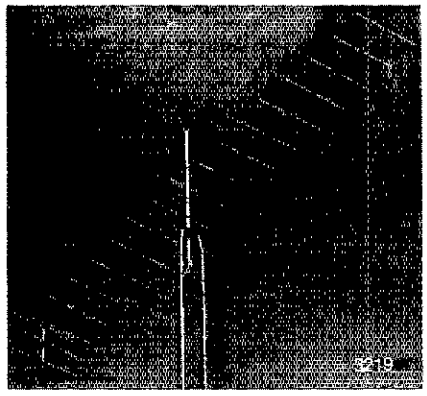
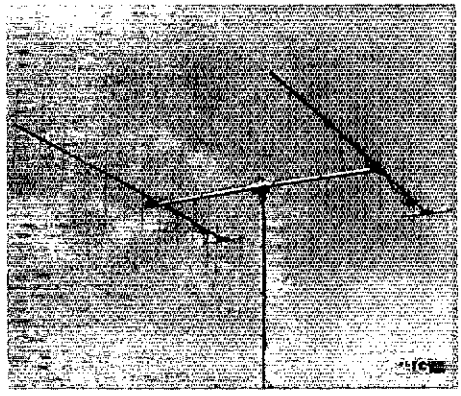
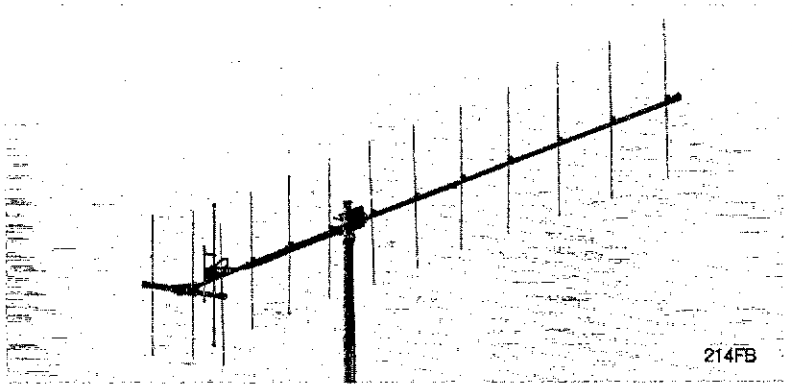
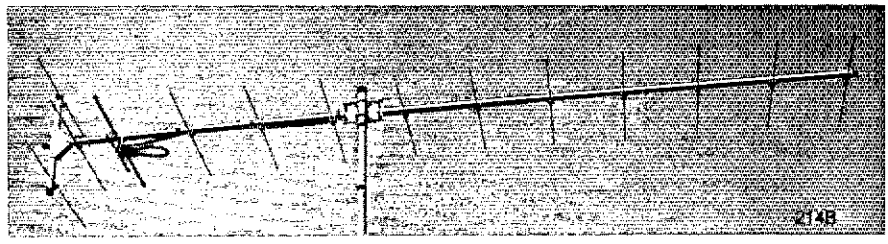
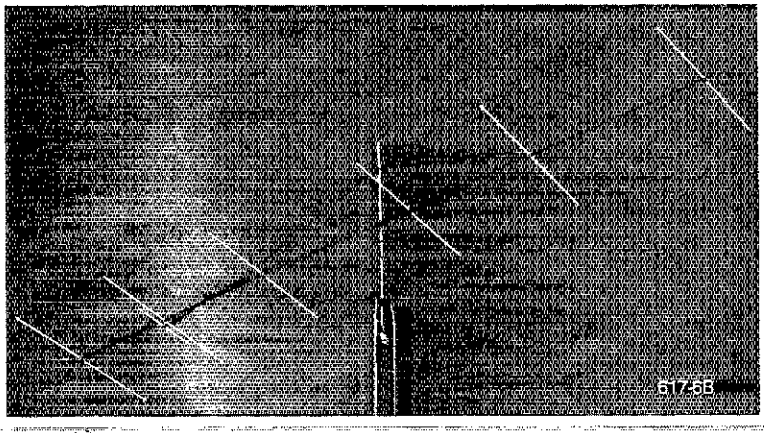
The new six meter Boomer offers more boom and more gain from its new element spacing. The six meter Boomer has Cushcraft's typical attention to detail, including T match feed with balun, and extra heavy duty mechanical construction. The key to this Boomer's super performance and relatively lightweight is special element spacing and boom length.











Specifications

Model No	32-19	214B	214FB	228FB	617-6B
Frequency range (MHz)	144-146	144-146	144.5-148	144.5-148	50.0-51
Forward gain (dBd)					
Front to back ratio (dB)					
E-plane B/width (deg)	2x14	2x17	2x17	2x17	2x19
H-plane B/width (deg)	2x17	2x18	2x18	2x9	NA
Side lobe attenuation (dB)	>60	>60	>60	>60	>60
SWR less than (typ)	1.2:1	1.2:1	1.2:1	1.2:1	1.2:1
Impedance (ohm)	50	50	50	50	50
Recommended stacking distance					
E-plane (ft)	14	10	10	10	NA
E-plane (m)	4.27	3.05	3.05	3.05	NA
H-plane (ft)	12	10	10	10	22.5
H-plane (m)	3.66	3.05	3.05	3.05	6.86
Weight (lbs) (kg)	12 5.44	8 3.63	8 3.63	22 9.98	26 11.79
Length (ft) (m)	22 6.71	15 4.57	15 4.57	15 4.57	34 10.36
Longest element (in) (cm)	40⅜ 102.5	40⅜ 102	39½ 100.3	39½ 100.3	113¾ 289
Turning radius (ft) (m)	11 3.35	7.5 2.29	7.5 2.29	9.5 2.90	17.7 5.39
Windload sq (ft) (sq m)	3.5 .33	1.7 16	1.7 16	4.0 .37	4.8 45

Stacking Kits

For stacking two Boomers, use the following coax harness and power divider kits.

32-19 = 32-SK 214B = 22-SK 617-6B = 617-SK

When stacking four Boomers, use the following complete stacking kits. They include H frame, harness, hardware and complete instructions.

32-19 = 324-QK 214B = 224-QK

Specifications, Stacked Boomers

Antenna	2x214-B	2x32-19	2x617-6B	4x214-B	4x32-19
Forward gain (dBd)					
Front to back ratio (dB)					
E/H plane beamwidth (deg)					
E-plane	34°	28°	35°	17°	12°
H-plane	19°	17°	20°	19°	15°
Stacking dist. Vert. (ft) (m)	10 3.05	12 3.66	34 10.36	10 3.05	12 3.66
Horiz (ft) (m)	--- ---	--- ---	--- ---	10 3.05	14 4.27
Wt approx (lb) (kg)	18* 8.16	26* 11.79	62* 28.12	69 31.30	97 44.00
Turn radius (ft) (m)	9 2.74	11 3.35	18 5.49	9 2.74	13'4" 4.06
Wind Area (Ft2) (sq m)	3.4* .32	7.0* .65	9.6* .89	8.3 .77	15.2 1.41

*Support mast not included

The nominal dimensions and weights listed are for complete arrays. The antennas and stacking kits must be ordered separately.

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

Algonquin club had a successful flea market. Norwood club happy with their new meeting place in the library and also with the success of their Novice class. Middlesex club is having informal breakfast get togethers to discuss tech topics. By the time you read this all of the heavy DXers out there probably have worked the station(s) in China. If so congrats; if not keep at it. In any case good operating!! Traffic: WA1TBY 401, N1BHH 336, WB8TDA 213, KA1ON 148, K1BA 115, W1IDK 106, WA1LPM 97, KA1BBU 80, KA1KU 71, N1AJJ 68, KA1EMQ 59, WA1DXT 58, K1GN 57, WB1GQO 55, KA1MI 52, N8TM 51, KA1GBS 46, KD1B 44, K1BZD 28, N1AVP 14, W1ATX 12, KA1R 12, KC1P 11, WA1FNM 9, W1CE 6, K1LCQ 5. (Feb.) N1AVP 11.

MAINE: SCM, Cliff Laverty, W1RWG — SEC: KL7IJG. STM: AK1W. Mid-Coast RC annual mtt Warren June 12; Yankee Hamfest Oxford June 19; Amateur Outing Kezar Lake July 18; Blackstrap Hamfest ARRL Cumberland Co. Fairgrnds Aug 7; Ham Band (musical) Bangor Aug 29; Windsor Hamfest ARRL Sept. 17. OBS: W1CTR WB1GKI.

Net	Freq.	UTC	Sess	QTC	QNI	NM
AEN	13/73	8 P.M. Sn	5	2	74	WA1YNZ
SGN	3940	2000 M-S	27	168	1176	K1GUP
PTN	3596	2300 daily	53	179	532	W1KX
CMEN	10/70	0000	9	16	128	W1WCI
			13	17	111	KA1AVU

Traffic: AK1W 254, W1KX 153, W1RWG 99, W1AHM 91, W1HDC 63, KA1AVU 58, N1BJW 55, W1BMX 49, AC1G 47, N1BUN 41, W1JTH 36, KL7IJG 30, W1GCB 28, K1NAN 25, W1CTR 17, WB1EIL 12, K1PV 12, KA1TJ 11, WA1YNZ 11, KA1GCW 10, W1WCI 10, N1BME 9, KA1EIW 8, KA1ENL 7, KA1FTL 4, KA1GGE 3, KA1ENM 2, W1GKJ 2.

NEW HAMPSHIRE: SCM, Robert C. Mitchell, W1NH — STM: W1TN. SEC: AK1E. NMs: N1NH K1OSM W1VTP. New Nashua repeater on 224.28. Seen on hyways and byways: KA1OPZ WA1PSI WB1FOI K1JNJ W1UBQ W1BXM. Saddle-back repeater new officers: AG1W, pres.; W1GWU, v.p.; KA1DON, secy/treas. Congrats to SEC AK1E on new publication of "Dits and Dahs" for NH Slow Net. KA1HDD now Tech. K1ACL new EC for Strafford Co. WB1HJP spoke on transformers at the Great Bay RA meeting. W2IQD/1 won the NH QSO Party. Activity was down owing to last minute listing. KF1V was P47A on DXpedition to St. Maarten. WA1QCD heard mobile to and from Manchester. K1OX spoke to the Nashua club on contest station and on the 2-meter repeater in greater Chester. W1HZN reports another successful mall show demonstrating Amateur Radio to the public. K1JC and WA2ROJ/1 have computers. Fishing season is here. Hope to work many of you on 2 meters from various fishing holes. Traffic: N1NH 540, KI1M 521, W1TN 348, K1OSM 155, K1YMH 112, N1ALM 92, AK1E 74, KI1R 73, W1VTP 72, W1MHX 64, KA1FKM 58, KA1BJ 51, KB1A 47, W1CUE 37, W1ALE 28, K1ACL 18, K1NH 15, KA1GOZ 9, WA1YAZ 9, N1BOF 8, W1NH 7, KA1CJI 6. (Feb.) K1ACL 18.

RHODE ISLAND: SCM, Gordon F. Fox, W1YNE — SEC: KA1EHR. STM: KA1FE. NM RIEM2MTN WA1OSL reports 23 sess, 204 QNI, 29 QTC. New appointment KC1G will replace KA1FE as STM. KA1FE's job requires that he be out of state a great deal, so he decided to resign as STM. The OSARG 220 rptr is operating from a temporary location in Jamestown. ARES is working on agreement with Nat Wx Svc to set up RTTY at wx svc office. KA1BAT and KA1EHR providing liaison. Traffic: W1EOF 569, W1YNE 52, KA1EHR 50, KA1SO 50, KC1G 19, WA1CSO 16, KA1FPP 12, AE1S 12.

VERMONT: SCM, Bob Scott, W1RNA — SEC: WB1ABQ. STM: N1ARI. I thank the amateurs who took an active part in the Rowe Nuclear drill. It points out the need for point-to-point contact and relay as well as the use of various frequencies because of band conditions. Overall, it was a job well done. I would like to hear from VT stns operating RATT, band & times. We are trying to get a 2 mtr tfc net going daily about 2100 hours; object, to form a reliable communications link throughout VT. Mt. Anthony HS Club Stn reported 180 tfc during Rowe drill. SBN 31/511/106; Carrier 27/486/45; GMN 27/468/53; VTN 28/85/55; RFD 4/80/12; VPN 4/68/4. VTN busiest tfc per ck. In! Traffic: W1RNA 167, K1BQB 151, KA1GID 96, AE1T 94, N1ARI 87, WB1ABQ 75.

WESTERN MASSACHUSETTS: SCM, William J. Hall, W1JP — STM: W1UD. SEC: WB1HIH. ACC: W1YI. This SCM's hat is to ARES/NTS in what appears to have been a highly successful effort supporting the Red Cross/CD in the 25 March Yankee-Rowe nuclear evacuation exercise. SEC WB1HIH, who masterminded ARPSC involvement, is pulling together full report. Congrats to WA1OUZ appointed NM of WMPN. Mni tnx to WA1ITL who held reins since Feb. '81. Club Coordinator W1YI offers following tidbits: Central ARA emergency group to emphasize more public service work, less on drills, according to WB1GSO. KA1ENC is new ARRL Liaison Officer. From Northern Berkshire ARA, news of vy QRP activities by WB1ESN & KA1CDC. WB1BTJ expects to have another cookbook out soon. Hampden Co. RA "Zero-Beat" publishes "ARRL Bulletin Nr. 32" regarding FCC plans to change callsign structure (again!) in its April issue. Back to reality, OVS K1SF reports quiet March. WMEN reports strong QNI of 444 and QTC of 400+ in 5 sessions. PSHR: WB1HIH WB1CGK KA1T K1JHC. Traffic: WB1HIH 662, W1UD 413, KA1T 349, KA1CDC 290, W1TM 268, WA1VYO 190, WB1CGK 113, K1SIF/1 90, W1KK 84, K1IJV 83, W1ZPB 83, WB1HKN 82, WB1HKN/1 80, K1PUG 73, K1FFK/1 65, KB1W 62, K1JHC 62, WB1ABF 59, W1JP 58, KB1W/1 46, K1SGK 14.

NORTHWESTERN DIVISION

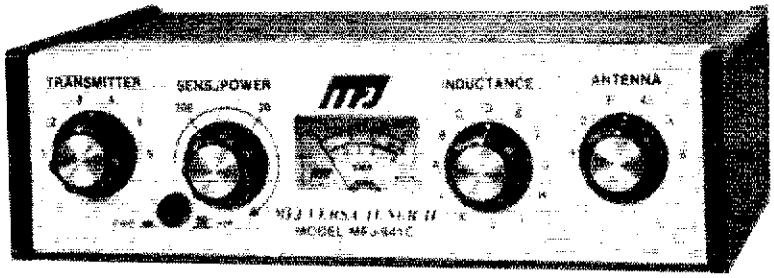
ALASKA: SCM, Richard Henry, AL7O — SEC: AL7AC. STM: WL7H. Southeast Alaska ARA forming to set short and long range plans/goals for SE. Initial organization of SAARA by W6SJJ. AL7DL assumed editorship of the AARC newsletter. OVS reports received from KL7JAI and KL7NO. Congrats to KL7EKZ for upgrading to Extra. AL7N and KL7OD handled comms for the Nome-Solomon snowmobile race. New members of ADXA are WL7E and AK7S. Arctic ARC handled comms for the Arctic Winter games held in Fairbanks. The Eielson/North Pole ARC renamed Borealis ARC. Traffic: AL7N 44, KL7LO 40, KL7LA 34, KL7T 33, KL7JKW 27, KL7EKZ 21, KL7RU 14, KL7KD 2. (Feb.) KL7KE 46, WL7H 32, KL7LA 28, W6SJJ 8, KL7KD 7.

IDAHO: SCM, Lem Allen, W7JMH — Club News: Mt. Home — Congrats to KA7CKU on first place in 7-land in the 10-10 QRP contest. Members getting ready for March of Dimes "Superwalk". Kootenai club — WA7BTA has retired. Congrats. New officers are: KA7DDO, pres.; N7CZD, v.p.; Rachelle Hall, secy.; N7BOC, treas.; KK7X, editor/historian. People and Things: W7IWU had heart bypass surgery and is recovering satisfactorily at home. W7JMH has resigned as SCM and K7RT has been ap-

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.



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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.

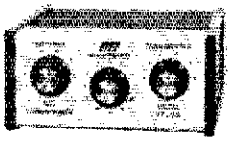
Built-in 4:1 balun for balanced lines. 1000V capacitor spacing.

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

$49.95 (+ $4)

Matches coax, random wires 1.8-30 MHz.

Handles up to 200 watts output; efficient air-wound 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, $59.95 (+ $4), like 900 but includes 4:1 balun for use with balanced lines.

MFJ-16010, $39.95 (+ $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

$229.95 (+ $10)

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), 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, $189.95 (+ $10), similar but less SWR/Wattmeter.

MFJ-10, 3 foot coax with connectors, $4.95.

MFJ-984 VERSA TUNER IV

MFJ-984

$329.95 (+ $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.

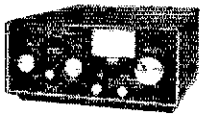
18 position dual inductor, ceramic switch.

7 pos. ant. switch. 250 pf 6KV cap. 5x14x14".

300 watt dummy load. 4:1 ferrite balun.

3 MORE 3 KW MODELS: MFJ-981, $239.95 (+ $10), like 984 less ant. switch, ammeter. **MFJ-982, $239.95** (+ $10), like 984 less ammeter, SWR/Wattmeter. **MFJ-980, $209.95** (+ $10), like 982 less ant. switch.

MFJ-989 VERSA TUNER V



MFJ-989

$329.95 (+ $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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pointed to fill the unexpired term. K7RT represented Idaho at the ARRL Restructuring meeting in Spokane and did an excellent job. Our congrats go to him and best wishes for a successful term in office. W7HZL reports much success with his 40-meter sloper, a real DX-getter.

Net	Freq.	Time/Day	Sess	QNI	QTC
FARM	3935	7 P.M. Dy	30	1710	35
CD	3990	8:10 A.M. M-F	23	857	17
IMN	3635	8 P.M. M-F	23	170	91

Get yourself ready for any emergency. The life you save may be your own! Traffic: W7GHT 232, W7JMH 58.

MONTANA: SCM, Les Belyea, N7AIK — SEC: W7LR. ASCM: KØPP. STM: WB7DZX. The Yellowstone ARC put up a successful special event station at the Rim Rock Mall (Billings) over the Memorial Day weekend under the call of K7EFA, operating simultaneously on ssb, cw and Novice cw. WA7JDX and WA7ZMC have their 444.2/449.2 repeater and 2-meter remote base station operational. It's quite a machine; from any 450 rig with 16 button TT pad the user can dial up any possible 2-meter frequency whether its duplex or simplex. Sorry to report that W7RYZ from Butte is a Silent Key. W7LR has a QSL card from W6KFC (who is now W4KFC) from a QSO way back in 1937. W4KFC is now the ARRL president. KB7Q worked Finland and Sweden on 2 meters, via the moon (EME). FB. New 2-meter net in Butte — WR7ABY meets each Monday evening at 7 P.M. Net manager is KB7SE. K7JZO is back printing the Libby ARC newsletter after an absence of 4 months. PSHR: WB7DZX.

Net	Sess.	QNI	QTC	NM
MTN	23	962	113	K7TQM
IMN	23	170	91	K7JV
BSN	14	220	9	WB7UTJ
MSN	4	92	—	KB7SE

Traffic: W7TGU 268, WB7DZX 181, N7AIK 48, WB7WVD 37, W7NEG 25, KC7IK 2, KB7SF 2.

OREGON: SCM, William R. Shrader, W7QMU — STM: W7VSE. SEC: K7WWG.

Net	Time/Day	Freq	QNI	QTC	NM
OSN	0230/0600Z Dy	3587	515	362	KA7ELI
BSN	0145Z Dy	3908	1229	46	W7FQ
OARES	0115Z Dy	3993.5	753	143	W7HLF
OARES	0230Z Dy	3993.5	44	0	W7HLF
WCN	0300Z Dy	3702	532	28	WB7RKU
PTTN	0300Z Dy	146.76	471	48	W7LRB
PdxARES	0300Z Dy	147.32	1518	24	K7WWR
SOARES	0300Z MThFS	146.94	613	134	KC7OR
SOFM	0330Z T	146.64	150	3	W7FDU

Upgrades: Extra-KB7UK WA6HZO; Adv-KC7PF KA7IJY N7CTY WB7RKC KA7KIS KA7KOB KA7EXM; Gen-WB7CYS N7CYG; Tech-KA7KDF KA7MJV; Novice-KA7NQB KA7NQH KA7MOF KA7MMT KA7MMS KA7MJO. KA7MPO is YL Novice at 9 yrs old in a ham family: Grandma is KA7MPN and Grandpa is KA7JFQ. Congrats to the whole bunch! KA7MPN got Tech two days after receipt of Novice. KN7B/KM7Z Laryl and Pat get married on 17 April. Happy honeymoon! Central OR rptr on 147.38 now on air near Madras. WB7NLP new OO/OBS in so. OR. W7TC '81 160-meter champ for Oregon. BSN still outdoing itself each month. OEN picnic Willamette Park, Corvallis on 7-8 August. Traffic: W7VSE 618, WB7RKU 195, W7LNE 170, W7ZB 136, KA7ELI 108, N7BGY 103, WA7LGN 97, KI7Y 95, WA7IHS 91, WB7EMO 81, WB7OEX 75, KC7LW 67, K7GV 52, W7HLF 47, W7QMU 42, N7BGW 25, KA7AID 23, W7TC 22, KC7OR 21, W7LT 15, W7FDU 12.

WASHINGTON: SCM, Joe Winter, WA7RWK — ASCM: KD7G. SEC: K7SH. STM: W7GB.

Net	Freq.	Time(Z)	QNI	QTC	Sess.	Mgr
WARTS	3970	0200	3026	152	31	W7SFT
NWSSB	3945	0230	760	58	—	W7JHR
SCARES	147.18	0330	101	4	10	KA7AML
PSTS	145.33	0130/0630	145	66	62	W7IEU
NTN	3970	1930	869	55	31	W7VL
WSN	3590	0245/0545	620	235	62	WA7YCM
EWTN	146.64	0130/0530	87	84	50	WA7CBN

W7IEU likes his new TS 530-S. KG7U W7JIE WA7RCR are active OOs. KM7U N7AGG N7AFZ KD7G et al active during recent Mt. St. Helens eruption. KG7U has new CSK RTTY/cw reader. Evergreen ARS provided comms for two runs, also building port. rptr. KA7CSP is heading up comms for Bloomsday race with 20,000 runners expected. W7WIL heading up comms for Lilac Parade. PIA W7CKZ helped promote 60th anniversary of ARS 7YS which became comm RS KGY Olympia with 1st broadcast 4-18-22. W7YS operates from replica of 1914 AR shack of 7YS Apr. 18-24. GTE rptr has new ant & improved coverage. KE7A rcvd DXCC award and is also active as OBS. Thirty-five ARES & REACT mbrs. provide comms for two hr Daffodil parade in Tacoma, Puyallup & Sumner. RC of Tac awards banquet drew 125 mbrs & friends. W7RGD received the W7OS Inspiration Award for 1981. Congrats. Also many other awards in this active club. W7AZI is chief cook for RCT Mothers Day breakfast. WB7BLQ & KG7V have new computers. W7JIE presented talk on Intruder Watch at WWDXC. 1982 DX Convention July 31-Aug 1 in Vancouver BC. Contact VE7WV VE7AZG. RASC donated 17 battery cells for their rptr, tnx to W7IXF & GTE. W7GAT & W7AKY presented talk & demo on good old days of AR. Clallam Co. ARC planning bus trip to OR convention, and are planning to work the M.O.D. Walk-a-thon. Fifty-three mbrs of Clark Co. ARC had fun on outing down the Columbia Gorge organized by K7SUQ & K7SUR. Tnx to all ARRL appointees for their reports, please keep them coming. Let's have the most successful Field Day ever. Contact your FD chairperson or team up with some friends for the FUN. With the summer season upon us, I hope to see many of you at the hamfests and invite you to take part in the ARES/ARRL Forums, your ideas and comments are valued. Please contact your EC or club activities person and offer your services for the many public service events that take place this year. Correction A.C. Mar. *QST* WB7WOW back on tfc after long trip with Navy, not WB7SWW. WB7WOW is also an asst. dir. in this area. Traffic: WB7TQF 578, W7DZX 577, WB7WOW 553, W7FJZ 502, N7ANE 173, N7CSP 167, K7GXZ 149, W7GB 138, K7CTP 109, AD7G 96, W7LG 90, N7AFY 82, WA7BDD 77, W7HNA 64, WA7JEB 62, N7AFZ 54, N7DNG 54, WA7RCR 41, W7BUN 39, KC7NA 10, KD7G 10, W7APS 9, K7OXL 5.

PACIFIC DIVISION

EAST BAY: SCM, Bob Vallio, W6RGG — ASCMs: W6ZF N6DHN VE2AQV/W6. New SEC W6LKE, of Walnut Creek, takes the place of WB6KQU, who has requested to be relieved because of other commitments. My thanks to WB6KQU for his years of service as SEC, during which he resolved many ticklish problems and raised the level of participation and preparedness within the section. KA6NRO is chasing her OM, WA6TPE, and has just passed her Tech. LARK recently honored their guest

speaker, W6XN, with their "Klutz of the Month" award for locking his keys in his car. NI6A received his 35 wpm code proficiency endorsement. EBARC participated in the Pinole Marathon, and is forming the next session of their Novice and General cw classes. HARC starts their first Novice class for this year next month. MDARC members recently married are N6DN on March 6 and WD6DKW on March 13. Congrats! WB6NSV is now N6EYX. Traffic: NI6A 333, K6APW 89.

NEVADA: SCM, Ralph E. Covington, W7SK — SEC: WA7KCD. STM: W7BS. WA7TWL is leaving for BY-land this month. Tri club meeting in Reno each month is a great success. Contact W7LIZ for details. W7CX sent in his report on ARRL form number 1 dated September 1938. Maybe he needs new supply. OM W7CX and YL W6HUY vacationing in Hawaii. Congrats to N7AKX on yet another BPL. Nevada Sagebrush Net weeknights at 7 P.M. PT on 3906 kHz. Traffic: N7AKX 548, W7BS 64, W7BKO 12, W7CX 6, W7SK 3.

PACIFIC: SCM, Army Curtis, AH6P — SEC: KH6B. ECs: Hawaii-AH6K; Maui-KH6H; Kauai-KH6S. Aloha from the Big Island to ALL of the Pacific section. With your help, we can fly. Please feel free to contact me at any time with your ideas, comments, complaints, compliments, etc. One man alone can do little; many together can do everything. Sixteen amateurs on Maui provided comms for the Maui Marathon in March, excellent emergency training. New ARRL President W4KFC stopped on Guam and Oahu in early April. KH6HIJ is retiring from 5 years of PTN. Please you cw ops, we need your help with traffic. Maui's first autopatch repeater should be on the air shortly. Traffic: KH6HIJ 64, KH6B 10, KH6H 1.

SACRAMENTO VALLEY: SCM, Norman Wilson, N6JV — SEC: N6AUB. ASCM: KI6T. The Yolo Co. ARES provided comms for the Davis March of Dimes bike race and the Woodland Chapter's Walk. Mount Vaca RC assisted with the Buena Vista Bicycle Road Race. KB6JM reports that he has helped get Assembly Bill 2388 on the floor. It will grant ham license call plates to Novice class hams. Congrats to N6AUB on making PSHR. K6GYB KC7IW/6 K6CTU N6AUB and KD6GY have volunteered more than 300 hours to the CDF/VIP program by instructing more than 1000 children in fire safety and prevention in their elementary schools. The fire season will soon be upon us. Those wishing to participate in the CA Div. Forestery program call N6AUB. Traffic: W6RSP 48, N6EPG 31, N6AUB 14, N6JV 4.

SAN FRANCISCO: SCM, Bob Smith, NA6T — SEC: KE6CD. STM: K6TP. The letter writing campaign for the CATV problem is working; the FCC has its own form letter for answering your letter! Sonoma RA Inc. battled cable TV and WON. Cable in SANTA ROSA can't use amateur freq. for transmission of television in cable. Petaluma and Mendocino Cos. are the next battle grounds. Hello to our new section member, Lake Co.; contesters take note! MARC has hot water and portable power at the HAFB clubhouse. Now they need a MICROWAVE. SFRC participated in annual earthquake exercise. See KE6CD about ham computer bulletin boards in SF area. WD6AFG is heading up FD at SFRC-everyone pitch in. New rptr freq. on Mendo Coast is 146.19-79 MHz. HARC is now meeting on 1st Tuesday at Nat'l Guard Armory, and they provided comms for Kinetic Madness in Humbolt Co. over Easter weekend. AG6C graduated 12 Novices. Congrats. Traffic: W6NL 370, W6IPL 237, W6RNL 112, K6TWJ 82, K6TP 60, WB6RTE 31, WA6AUD 8, W6GGR 6, WA6GXV 4.

SAN JOAQUIN VALLEY: SCM, Charles McConnell, W6DPD — SEC: WA6YAB. STM: N6AWH. ASCMs: K6YK W6TRP NF6K. WA6EWR is back as EC for Tuolumne Co. Officers of CCAC are: WA6HMB, pres.; WD6FIP, v.p.; WB6JIT, secy.; WA6JII, treas. The club operates repeaters on 2 and 3/4 meters. W6ERE is pres of SARA; WA6ZLO is v.p. N6HB is secy of CVRC. W6GGL and WA6UYL are Silent Keys. WA6EVW KA6ITL and N6AWH are Advanced. KA6SUP is Tech. WA6CPP is KE6RN. KA6SKB is N6GGY. New calls in the section are KA6SPE KA6SRF and N7BZJ. W6KRO and WB6ITM have FL2100s. WA6VIS has TR7730. W6BVM has KT34A. N6DTB and WB6VGL have computers. K6YK has 2400 counties. The Fresno-Madera Chapter of the NCDXC meets the 1st Sat. in Fresno. The Central CA DXC is affiliated with ARRL. Let's have big FD scores from the SJV this year. Traffic: N6AWH 110, WA6YAB 22, W6DPD 16, K9YBM 9, WA6JDB 5, WD6FRS 4, W6SX 3.

SANTA CLARA VALLEY: SCM, Jettie Hill, W6RFF — SEC: WB6IZF. STM: W6ZRJ. SCVRS were presented a program on "Home Alert" by San Jose police, are busy with Public Service events. New members are N6CMJ WD6CZY N6FRA N6FXE WB6JFP WB6JPY WA6KTX K6KQI WA6POG KB6QJ WA4SWS and WA6YBA. NPS ARC enjoyed a talk on Ni Cad batteries. New members are WD6CSL WD6FJI KC5X N6GAI and WB6OTS. They had a successful outing at the Bing Crosby Pro-Am with 213 contacts being made. SEC WB6IZF will be spending half time in Cairo for a few months, and K6LFZ will be acting SEC when WB6IZF away. WB6GFJ entertained FO8HL and also rcvd WPX, CQ DX and WAZ awards. K6AYB busy with OO duties. W7YTH now N6GDQ. W6ZRJ busy on nets and overhauling his nr 2 final amp. W6ZM and W6RFF attended ARRL Board of Directors meeting in Hartford. RFF made a few contacts from W1AW. Field Day preparations are the order of business for most clubs at this time. The votes should be in and a new SCM elected to take office July 1st. A talk on "Monterey Peninsula Law Enforcement/Fire Communications Network" was given by N6GAI to the NPS ARC. KE6JH and KE6JK upgraded to Extra. SCC ARC enjoyed a film on "Diagnosing Common Cable System Faults". Silent Key in Santa Cruz is WB6JON. Plans for the Oct 8-10th Pac Div convention are progressing well. SLVARC enjoyed N6ARP's talk on "Communications Nostalgia". N6IA described his computer-aided contest training machine to the FARS group. WB6OTS has moved to Fort Ord, and is busy with tfc on NCN. WD6GIT also sent in OO rpt. SMRC listened to a talk by N7TD on "Special Olympics" and saw a film on the subject. Traffic: W6YBV 232, W6ZRJ 39, WB6OTS 34, W6RFF 28.

ROANOKE DIVISION

NORTH CAROLINA: SCM, Ian C. Black, WD4CNR — STM: W4EAT. SEC: NB4L.

Net	Time	Freq.	QNI	QTC	Sess.	Mgr
CMN	1245Z	3927	204	217	31	W4EAT
JFK	2330Z	3923	1001	104	31	WB4WII
THEN	0030Z	3923	1119	146	31	WA4OBR
CSN	2300Z	3715	204	49	30	KA4AUR
CN	0100/0400Z	3574	613	338	61	AB4S

Hope everyone who made it to the Charlotte hamfest enjoyed it as much as Dot, Ken and myself. What a crowd.

What exhibits. What a crowd. What goodies. What a crowd. Wow. Could have used more participation in the tfc program and in the League forum. A lot of things of interest to a lot of hams went on in those two meetings. My thanks to all those helping to get club list up to date. RARS did it to me again. I was all ready to get the schematic for "The Monster" 'til I turned the page. Anyone else get AFd? Look for RARS DXpedition to Kitty Hawk. Understand AB4S giving tech help to the group. Should work out well: He sure helped Orville & Wilbur. Congrats to N4CRH WD4DLE KA4KOP WD4OKZ N4GFU KA4YFF and KA4TOS, all upgraders from Rockingham Co. Mike says big doings this summer. Bikathons, raft races, etc. Howsabout inviting your SCM? Roanoke Div. tfc nets deemed most active in nation. Also we were lauded for accuracy! Way to go gang. Fine job by Forsyth ARC. Notice increase in membership always a good sign. Alamance Co. also hard at it. KA4KJI to teach Novice course. Teach 'em how to put up an antenna, Gary. Happy sunburn, mosquito bites, poison ivy, wet feet, missed meals and strained backs to all you Field Dayers. I'll miss all the fun, so please send reports. We still need more dual mode operators on the nets. Y'all spent a lot of time learning code. Don't throw it away. Traffic: WD4GNR 324, KD4PJ 273, WB4WII 254, WD4CNQ 231, W4PCN 197, W4EAT 167, AB4S 145, NB4L 107, KF4R 100, WA4SRD 86, KU4W 84, WA4OBR 61, NT4K 60, WD4LRG 55, K4IWW 47, N4GGI 44, KA4KJI 44, N4CJJ 43, WA4MNR 38, KA4LKF 34, W8PJS 32, K4FTB 30, N4CYG 29, NE4J 29, WB4CYN 28, KZ4A 21, WD4AIE 16, KA4OJU 14, KA4ATK 13, W4ACY 11, KC4AM 11, WD4HTE 11, W4WXZ 11, W4RVE 10, WD4DCY 9, N4UE 9, WD4LOO 8, W4TWD 7, N4EHM 4, WB4SLF 2.

SOUTH CAROLINA: SCM, Richard McAbee, W4MTK — ASCM: WB4UDK. SEC: WD4HLZ. STM: W4ANK. NMs: K4PFC KC4LA KA4AUR. Thanks to all who attended the signing of the proclamation by Gov. Riley. Amateur Radio Week is June 21-27. Looking forward to seeing you at the Columbia Hamfest. Checkins traffic: SCSSBN 1376/167; Blue Ridge 2 Meter Net 2191/85, SCNTN 349/90; Lancaster Co. 2 Meter Net 130/16; Western SC Emergency Net 488/28; Newberry Co. ARES Net 98/6; Carolina State Line Net 50/2; Greater Pee Dee 2 Meter Net 1161/104; CSN 196/38, York Co. ARES Net 241/52. Traffic: K4ZN 291, W4ANK 167, KA4AUR 137, W4NTO 116, W4FMZ 89, K4EAR 59, K4FRX 55, K4ZB 52, WD4EDM 46, W4MTK 36, WB4UDK 36, K4LYU 26, KA4LRM 20, WA4JWS 15, K4ADI 4, W0IKT 3, W4DRF 2.

VIRGINIA: SCM, Phil Sager, WB4FDT — ASCM: K3RZR. SEC: WB4UHC.

Net	Freq.	Time	NM
VNTN	7260	Noon	WD4FTK
VSBN	3947	6:00 P.M.	W4NWM
VSN	3705	6:30 P.M.	WB4KSG
VN	3580	7/10 P.M.	W3ATO/K4JST
VLN	3947	10:15 P.M.	WD4ALY

All Virginia amateurs should know how to handle message traffic in case of emergency. If you don't, you should listen or check-in to one of the above nets. Many a Virginia amateur celebrated long into the night upon hearing that W4KFC had been elected President of ARRL. WB4UHC has been appointed new SEC. KC4LY K4COW and W2MS are new ECs. The *Virginia Ham* is now in its 39th year of publication. Every VA amateur interested in public service should be receiving it. The new editor is Ruth Genter, WA4FDV, 9852 Fairfax Sq., #220, Fairfax, VA 22031. Write her to get on the mailing list. Congrats to WA4WJG and WA4WJH of Richmond, who recently finished teaching their fifteenth Novice class. N4YE and NA4EBU are getting married. I am very pleased to see the high quality of club newsletters published throughout the state. A well-written club newsletter does much to encourage club activity. Traffic: W3ATO 537, WB4PNY 511, K4JST 332, WA4CCK 278, WD4ALY 272, WA4LJI 259, KY4K 208, K4KDJ 185, KZ4K 184, W4NWM 144, K3RZR 135, KA4IUM 109, KA3DTE 108, K4JM 86, WB4FLT 85, W4HIR 77, K4RC 65, K8LGA 63, NN4I 60, WB4KSG 57, W4UQ 56, N4YQ 55, WB4FDT 54, NA4EBU 53, W3BBN 52, W4NFA 49, W3BBQ 48, NT4S 45, W4LXB 43, KB4OG 42, KA4ERP 34, WA1VRL 31, WB4KIT 28, K4VWK 25, WB4MAE 22, WB2OMZ 22, KC4HN 20, KB4WT 20, N4EPO 19, W4CFV 18, KA4JXZ 17, WB4RWY 16, WB4ZTJ 16, WB4DQZ 15, W4TZC 15, KE4FM 14, W4YVG 14, WB4ODZ 13, N4LE 13, WB4UHC 13, N4FNT 12, W4PVA 12, WD4CNG 10, W4OKN 10, K4MLC 8, WB4ZNB 8, W4KXE 7, WA4TVS 7, KI4W 6, K4LMB 6, WD4DUU 4, N4YE 4, W4YE 4, N4BJX 2, N4DW 1, WA4EQW 1. (Feb.) WB4FDT 44.

WEST VIRGINIA: SCM, Karl S. Thompson, K8KT — SEC: K8OEW. STM: KD8G. Rptr Coordinator: K8LG. WV state conv. July 3 & 4 at Jackson's Mill. Contact WA8GYU for details. Whig hamfest will be held on July 25 at Wheeling Park. Everyone is welcome. K8DF is now DEC for Zone 4 in addition to being EC for Harrison Co. KJ8J is new EC for Marshall Co. Gen. class at Oak Hill is being taught by KA8IBO. Congrats to all who upgraded in Chas. in April.

Net	Freq.	Time	QNI	QTC	Sess.	NM
WVN	3567	7	186	53	28	KD8X
WVFN	3990	6	530	104	30	K8MHR
WVMD	7235	noon	476	43	31	W8FZP
Hillbilly	14290	1600Z	164	34	4	W8YP
WV 6 MTR	51150	8	206	4	26	KA8CGU
KFC 2 MTR	87/47	8:30 M	81	6	5	WD4KHL
KARC 2 MTR	28/88	8:30 S	90	1	4	WD8AEW

Traffic: KD8G 62, K8JQ 52, K8KT 38, K8OEW 37, WD8DHC 36, K8MHR 36, KD8X 32, KC8CR 30, W8HZA 30, W8FZP 28, N8AJC 23, KC8CS 20, W8CAL 11, N8CFX 7, KA8OPP 5, WB8WEZ 2.

ROCKY MOUNTAIN DIVISION

COLORADO: SCM, Lawrence E. Steimel, WØACD — SEC: K3PUR. STM: WDØAIT. NMs: WØHXB WØLAE WDØAIT WØEJD WAØRYL. Our thanks to WBØMCL for his time and efforts as STM as well as to KBØZ as net manager. They both had to resign because of other commitments. The Amateur Radio Severe Weather Net is again in action ready to assist the National Weather Service with reports, and the Weather Service has provided spotter training for a number of amateurs from the Denver office. The Aurora RC Explorer Post 73 has done a very fine job in providing comms for a number of public service events. It is a small post in number but does a fine job of providing comms. The Rocky Mountain Radio League will hold their field demonstration day 18 July. Ski Country ARC Hamfest 17 and 18 July, in Glenwood Springs area. Columbine picnic 17 July, in Dillon. Colorado Council of Radio Clubs quarterly in Glenwood Springs area. I know there are more activities during the summer, so please let the time and place be known so it can be included in the column. HNN sess 31, QNI 1817, QTC 135, inf 247, QNF 1237. CWN sess 30, QNI 231, QTC 255, QNF 823. Colombine sess 27, QNI 1183, QTC 107,

inf 315, QNF 1153. Traffic: NØBQP 1922, WAØHJZ 1372, WØACH 918, WØWYX 480, WØACD 347, KØDJ 301, KBØZ 260, WDØAIT 196, WØEJD 183, WØLAE 180, WØNFW 53, WØGO 42, KØCNV 27.

NEW MEXICO: SCM, Joe T. Knight, W5PDY — SEC: W5ALR. NMs: WA5UNO KB5LI W5VFQ. Southwest Net (SWN) meets daily on 3583 at 1930 local and handled 295 msgs with 237 stations in. New Mexico Roadrunner Net (NMRRN) meets daily on 3.939 kHz at 0100Z and handled 108 msgs with 1282 stations in. New Mexico Breakfast Club meets daily on 3.939 kHz at 0700 local and handled 113 msgs with 948 checkins. Yucca 2 Mtr Net, 147.78/18 handled 21 msgs with 728 checkins. Caravan Club 2 Mtr Net, 147.66/06, handled 5 msgs with 130 checkins. Vy sorry to report passing of W5ZA & W5SA. Alamo Club did FB handling traffic during landing of space shuttle. WB5TGR, Socorro, and many others performed well during search & recovery of plane and helo crash on Mt. Withington. Traffic: W5DAD 576, KV5U 208, W5JOV 89, W5ENI 73, W9OBV 48, KB5LI 38, WA5MIY 26.

UTAH: SCM, Leonard M. Norman, W7PBV — SEC: WB7BZJ. STM: W7OCX. WIMU joint Rocky Mountain/Northwestern ARRL Convention at West Yellowstone, August 6-7-8. Utah Beehive Net meets daily at 1230 local time. Utah Code Net meets daily on 3710 local time. ARRL appointments open to qualified members. Check with WB7BZJ or W7PBV for details. Utah VHF Weather Net reports 1428 checkins thanks to W7BE. Traffic: K7HLR 309, WA7MEL 81, WA7JRC 31, W7OCX 22, W7PBV 5.

WYOMING: SCM, Dick Wunder, WA7WFC — SEC: WB7EIN. STM: WØOGH, WY. Hamfest is July 17 & 18 at Meadow Lark. WTN is looking for more traffic to handle, and all are invited to check in at 8 P.M. MST daily on 3720 kHz. W7LCF has been active on the cw nets. Recent upgrades: WB7RGN to Extra; KA7GVL to Advanced. New Novices are KA7MQK & KA7MSV. Congrats to all. WØOGH reports the WY Traffic Net held 31 sess with 163 QNI, 86 QTC. WB7NHR reports the WY Cowboy Net held 23 sessions with 843 QNI, 13 QTC. WAØPFJ reports the WY Jacklope Net held 27 sess with 696 QNI, 0 QTC. Enjoyed the Midwestern Division Convention at Kearney, NE. Traffic: WB7NHR 234, WØOGH 174, K7TFW 147, K7SLM 35.

SOUTHEASTERN DIVISION

ALABAMA: SCM, H. H. Wheeler, W4IBU — SEC: N4DMA. STM: WA4PIZ. ASCMs: legal - KA4WVU; publicity - N4DRV. FCC exams in Mobile in January and July, in B'ham in February, and in Montgomery in August. Cullman ARC reports severe wx alert April 2 & 3. KA4WMI has new call, N4GRU. Muscle Shoals ARC working on second ARES vehicle. SCARES reports progress on EOC in Red Cross Bldg. KC4AF is now the pres and N4YZ is v.p. WAARS has new rptr on 147.90/30. BirminghAMfest is May 15 and 16. Y'all come. May 9 thru 15 is Amateur Radio Week in Alabama. Decatur ARC provided comms for walkathon March 27 and has graduated nine students from the Novice class. KA4PSX has new call, N4GMV. Mobile ARC provided comms for Azalea Trail Run. Big success. KA4TIQ is no longer a Novice. Welcome to the phone bands! The Board of Directors has voted to implement some of the LRPC recommendations at an early date. Read the minutes of the meeting! PSHR: WA4JDH W4CKS WA4LXP KA4VFC. Congrats, guys!!! DRN5 reports Alabama represented 100% by N4BEN W4CKS WA4JDH K4LYY W4WJF and W4IBU. CAND reports DRN5 100% W4CKS. Traffic: WA4JDH 839, W4CKS 121, WA4LXP 85, K4AOZ 66, N4BIT 63, W4IBU 60, WA4ZPZ 26, KA4VFC 25, WA4JPK 20, WD4DHI 16, K4HJX 16, KY4H 12, W4WJF 10, WB4TVY 8, K4GXS 7, WA4HRV 6, W4RNX 5, WA4OEA 2, K4UMD 2, WD4DGH 1, W8ICM 1.

GEORGIA: SCM, Eddy Kosobucki, K4JNL — ASCM: K4VHC. SEC: WB4HXE. STM: W4WXA. Chief OBS: W4BIA. After a very hectic winter & violent spring we are now approaching the good old summertime. With it comes the annual Atlanta Hamfestival on June 12-13. This year we host the Southeastern Div Convention. The sponsors have been working for almost a year putting things together, so plan to attend the best one yet. Beautiful weather & a fine attendance made both Columbus & Marietta successful in their recent endeavors. The Chehaw ARS is now ARRL affiliated. Congrats. On the subject of clubs, please consider having yours ARRL affiliated, because under the new plan recommended by the LRPC it will be most beneficial to all members. During recent months the section really had its share of communication emergencies. The amateurs turned out to help in any way they could. Governor Busbee wants to thank all on behalf of the citizenship of Georgia for a job well done. Remember it's through the public service we render is why we exist on the amateur frequencies. For personal reasons WA4ZOT had to resign as president & net manager of the Georgia SSB Association. Tnx for the FB job. W4GH assumes his duties, & at a recent election WB4LBM was elected the new v.p. The month of June also means Field Day. I hope that by now your plans have been formulated. The League is trying to put together a slide presentation on FD. They are interested in color slides, so if photography is also your hobby & you can help please contact me for details. Hoping to C U at one of the forthcoming outings. Have a good summer. Traffic: W4WXA 125, WB4NTW 124, K5TF 114, K4EV 105, K4JNL 38, W4ELO 31, AK4T 25, K4NM 17, AA4EI 16, W4HON 15, W4FIZ 14, KC4WL 14, K4BAI 13, AA4RF 8, W4REI 6.

NORTHERN FLORIDA: SCM, Billy F. Williams, N4UF — New officers of the Five Flags ARA of Pensacola are: WB4QBB, pres.; KA4DLC, v.p.; WD4CFP, secy/treas.; K4HYV W4JV, trustees. The 147.03 rptr in Pace now has two input freqs.: 147.83 in Pace area & 146.43 in FWB area. There is a weekly net there on Sun. at 2015 local time. N4SS reads OBs and AMSAT/OSCAR data on that net. A real active club in the section is the Gulf Coast ARC, which has had over 100 at each of the two meetings. WB4TZR & KC4JL tracked down a keyed-up rig which made the 07/67 rptr useless. The Tallahassee ARS has been very busy with public service activities. Twenty-one members helped with March of Dimes "Superwalk", and among those helping with a 215 mile bicycling contest were W4MLE K4AQQ WD4ODB KD4XK N4FMP W4GAA WB4VFS NS4V N4ECR and WD4DAH. The 31/91 rptr there was kept on the air by W4CUJ WA4DSW & KA4YOD who traced down tower problems. KC4N & KA4DCF returned from vacation in CA and wrkd 2 meters all the way. Daytona Beach ARA awarded following members for good work: W4MB (beacon xmsn); WD4OSS (SKYWARN); K4RNS (newsletter articles); WB4KRR (meteorology); WD4LPK (rptr

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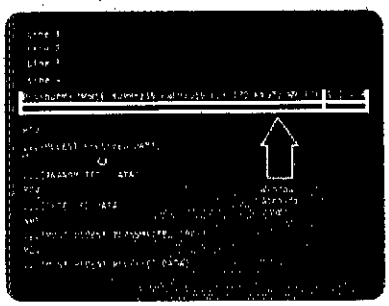

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assistance); N7SD & WB7PHL (training classes). DBARA also thinking about a one-day hamfest later this year. W4LDY is new mgr on VEN. OPARC Korn Kobblers Net meets 2100 local on Fri. on 28.7 MHz. KA1BNQ is now N4GNP and is AEC for Clay Co. FCC exams will be given at Jax on Aug. 6th, the day before the Jax Hamfest. RANGE assisted public TV stn WJCT in raising funds by manning telephones. NOFARS, RANGE & OPARC assisted with Scottish Games. New calls include NX4G (ex-WA4TUB); NX4F (ex-WD4IWD); KE4OV (ex-N4FAJ). WD4IIO, club stn of the Cloverleaf Farms ARC in Brooksville, has complete new Info-Tech RTTY system. That group of 18 operators is very active on FL traffic nets as well. Hats off to W4ILE WA3YMV WD4FNX and the rest of the group there. Traffic: WD4HIF 627, WD4IIO 536, N4PL 426, N4EDH 312, W4JL 294, WA4QXT 255, N4EEB 205, WB4GHU 167, WA4EYU 154, W4SIZ 151, W4MGO 134, KE4PO 118, WB4TZR 84, N4BZH 73, WB4ADL 51, W3QO 40, KA4MGR 25, N4ADI 24, WB4DTS 21, KB4T 20, KA4MGQ 18, W3IDO 16, N4AXN 14, K4DHX 14, N4GIY 9, WB4YQP 8. (Feb.) KA4MGR 14, WA4ZTS 4.

SOUTHERN FLORIDA: SCM, Woodrow Huddleston, K4SCL — ASCM: W4KGJ. SEC: KB4OW. STM: WA4PFK. KB4OW relieved AA4WJ as SEC on March 13th. The new SEC has issued a nice newsletter, including results of the EC survey he conducted as ASEC. Sorry to learn K4DYB resigning as EC Manatee. Our congrats to KA4ASZ, EC Collier, as he has been named Collier Co. Ham of the Year. K4ZK, EC Martin, reports Martin Co. Emergency Net now meeting twice weekly on the Stuart 147.06 repeater and in process of qualifying as NTS Local Net. W4UIO reports he is "now QSY to Tennessee for the summer." W1NJM likewise to Connecticut, until December. Congrats to K4KE retiring after 32 years with Florida Power Corp. He is also proud owner of a new IC-4AT received as retirement present. K5IHH reports his newest rig this month is an IC-251A, and it sure worked well as net control for Parade Net in St. Pete March 30 and April 3. These were dates of Festival of States Night Parade and Day Parade repsectively. About 55 radio amateurs provided safety comms with three simultaneous networks in operation. Red Cross first aid stations and doctors coordinated through our nets treated total of about 124 patients with two requiring ambulance transport to hospital emergency room. Stations active were: WB4AIZ W4APV N4APZ N4AUO KA4BBA N4BGS KA4BPO K4BR K9BSL W4BUB W1BXU W4CF WD4COL W4EGM K4EPH WA4FEN WB4FVN W4GH W4GPL KA4HXL KA4HWY K5IHH WA4IIT KO4J ND4K K4KE WD4KGY KA4KKI KA4LDB W4MAK KA4MWM K4NAN WA4NCY WD4NHH WB4OAT KA4OIT WD4ONZ WA4PGS WD4PUV K4RBJ W4ROF K4SCL WA4SSB K4SQ WB4TEJ W1UEF KC4UU W4VIP KA4VXG WA4WOU K4WYN KA4TGZ KA4LKL WA4LTX and WB4ZPU. I want to call attention to page 82 of April *QST* where it states, "The all-time record of 100% reporting still belongs to SFL with 30 consecutive years of reporting." Our SEC hasn't missed a monthly report in all that time — a record we can be proud of. Also please note page 85 soliciting nominations for SCM candidates from our section. I am not running anymore. It is time for a change. AA4WJ reports Hillsborough ARS is building and equiping a trailer for emergency comms. He spoke to the club on emergency message handling, and says his daughter, Sarah, 8-years-old, I think, is awaiting her Novice license. Look for her on QFNS soon! Terrible tornadoes in Midwest reminds us that we will be entering the hurricane season about the time this is published. It is time for the annual inventory and check-out or upgrading of equipment which may be needed. Traffic: W3CUI 2983, W3VR 670, KE4QI 630, WD4COL 483, W4NFK 354, K4SCL 353, WA4PFK 352, K4TH 328, K4ZK 326, VE3BSY 325, WD4AWN 304, W4SME 224, KY4U 173, WA4HXU 171, WB4PIB 158, WB4AID 145, W1NJM 134, N4ET 122, W4GPL 122, KA4ASZ 117, K4EUK 113, WA4EIC 94, KE4O 93, WB4WYG 76, W8PDP 75, KE4DA 59, W4DL 59, NJ4O 49, W4ESH 47, WB4GCK 47, W8BZY 46, W3LTV 45, WD4CHO 38, K5IHH 31, N4APE 30, W4IRA 30, KA4FZI 26, W4LVA 23, W4UIO 23, AA4BN 19, KA4CPS 18, KB4OW 11, W4WYR 11, KA4BBA 6, KM4G 4, W4JM 4, W4NFI 4, K4SJA 3. (Feb.) W4NFK 281.

WEST INDIES: SCM, Julio Negroni, KP4CV — V.I. CLUB NEWS: 5 of 6 passed cw test. Waiting for test papers from FCC. WP2ABN upgraded to Technician; new call is NP2AP. W@DX KP2A and others spent weeks on Navassa Island, with 30,000+ contacts during DXpedition. STM news report: WP2ACP is back on VI after trip to Leeward Is. maritime mobile. WP4CEK is new QNI WINS. KV4BA is back on WINS. KP4EMX is hot on 6 mts. WP4ADG is now building a new high QTH in Lares. NP4D now suffers QRM from newborn baby harmonic. WP4AOH reports 140 QNI on WINS. 4RN-16 WP4AOH, 7 NP4D; 75 QTC passed in 31 sess, averaging 2.7 QTC per day. FB! PSHR: WP4AOH NP4D KP4DJ. New Appointments: OBS NP4CF WP4FIX; Section Net Certificates: NP4D WP4AOH NP2AP KP2DJ WP2BBQ; NCS endorsement WP4AOH KP4DJ NP4D; Liaison endorsement WP4AOH NP4D. Traffic: WP4AOH 124, KP4DJ 88, NP4D 65, WP4BCV 18.

SOUTHWESTERN DIVISION

ARIZONA: SCM, Erich J. Holzer, N7EH — STM: W7EP. NMs: WA7FDN WA7KQE. There was a large number of amateurs participating in public service events this past month. In Phoenix, KA7BCI N7BCB N7AOU KB7FE KA7DTS N7BCC K7NIY KA7DTT and W7BHJ provided comms for the Wickenburg "Gold Rush Days" parade. In Tucson, WB7PZJ K5DGZ K1OOR KA7IZC KB7KZ WB7OBF K7KYW KC7HU N7EH K7RIS K7VAU WB7VFL WB7CPH W7HTQ KA7DAC WB7TWM WB7QAW WB7CGQ KA7FRY W8BID AF7M KA7BRI WA7RKI WB7VOM WB7TXQ WA@NNC WD6BBQ WB7OMM AG7H KB7JM K7CO W@YOY K7OMR and WA7JCK participated in one or more of the following: Tucson Rodeo and Parade, Shrine Circus, and the March of Dimes "Superwalk". AF7M has put finishing touches on new QRP rig; reports first QSO on 20M was an OK1. N7CSC says he's working on an RTTY interface for his computer, I would like to meet your club for details — contact me. Keep club newsletters coming. Hope to see you at SW Division Convention in SDgo. W7YS reports KA7MNA and KA7MNB are new calls in Flagstaff, while W7LVB reports KA7MSN is new call in Lake Havesu. KA7HHJ now KR7D. ARA reports the following Silent Keys: W7KRU and WA7ZQI. New appointment: K7CO-OO. Cactus Net (Feb.): QNI 1064, QTC 298, ATEN: QNI 1069, QTC 148. SWN: QNI 295, QTC 237. Traffic: W7EP 153, W7LVB 77, K7UXB 71, K7NTG 44, WA7KQE 34, W7OIF 29, KE7W 24, K7NMQ 22, N7EH 21, W7LBW 18, WA7NXL 16, K7GLA 4, KQ7Y 4, W7DQS 3, W7YS 2.

LOS ANGELES: SCM, Stan Brokl, N2YQ — SEC: N6UK. STM: K5DY. Congrats to WA6LAU on his new appoint-

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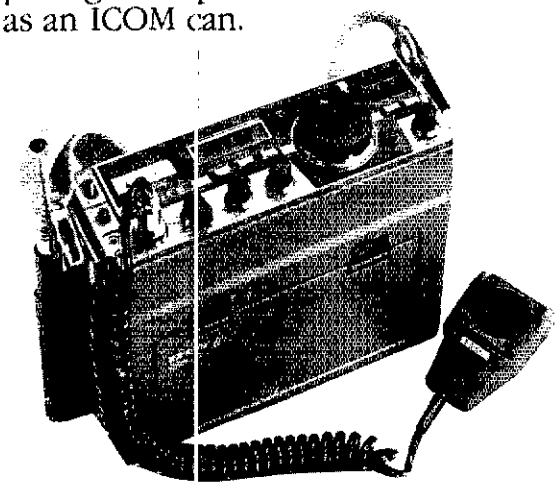
All this in a portable package that performs only as an ICOM can.



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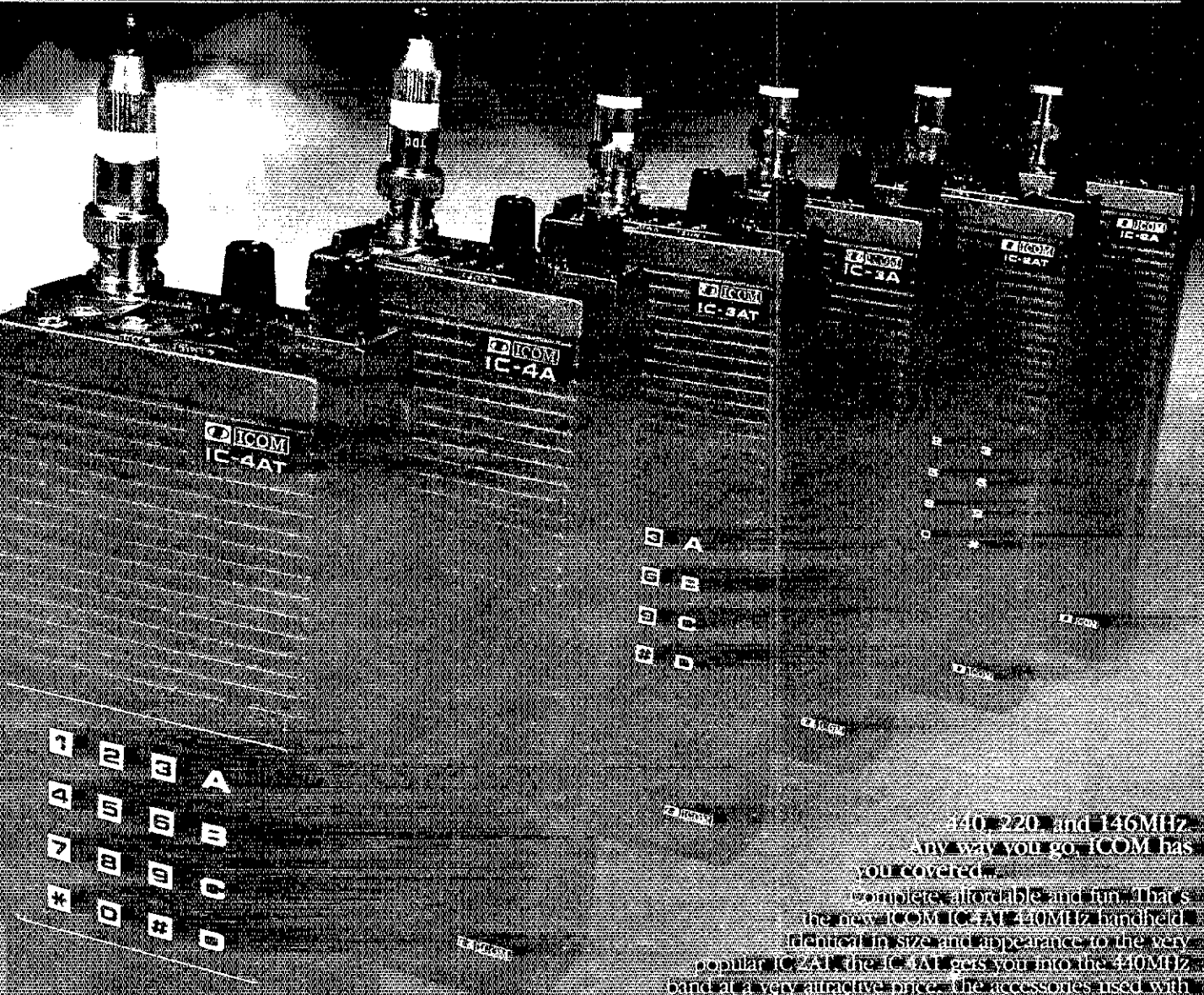
Hut, 2, 3, 4...



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Complete, portable and fun. That's the new ICOM IC-4AT 440MHz handheld. Identical in size and appearance to the very popular IC-4A, the IC-4AT gets you into the 440MHz band at a very attractive price. Accessories used with the IC-4AT are the same items you may previously have purchased to use with your 4A.

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Is this new KDK FM2030 the best 2 meter FM radio in the world?

"...best...in the world?

That's a pretty strong claim considering the competition.

Let's look at some of the features . . .

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INTRODUCTORY PRICE!
Includes Tone Pad Microphone
and all accessories. Shipping: $5.00 eastern U.S.A. $7.50 western U.S.

- KDK continues the tradition of being the ultimate in VHF FM mobile operations. We make maximum use of multiple function, multiple shaft controls and only three sets of knobs are located on the front panel. Still many new features have been added, such as digital RIT, reverse button, memory channel readout number and more!
- The new KDK 4 bit microprocessor chip is an in-house developed software which makes all these new features possible. Plug in modules are used for CTCSS tone and diode matrix duplexing.
- We gave it a very heavy textured paint finish on the case and mounting bracket that is highly resistant to scratching! No more micro-thin paint finishes!
- Modern styled front panel with dials intelligently arranged so you can best utilize the multi-function, easy to handle controls.
- Good audio with the famous KDK audio output capability of 1.5 watts . . . you can't blow out our audio IC!
- RF power is a good, clean no spurious signal of 25 watts on high and 5 watts (adjustable) on low.
- Frequency coverage 143.005 - 148.995 mhz. S/N better than 35 db at 1 uv input. Better than .2 uv at 12 db SINAD. Squelch sensitivity better than .15 uv. Bandwidth at −6db: ±6khz, at −60db: ±16khz. Image ratio better than 70db. Double superhetrodyne. Transmitter uses variable reactance frequency modulation with maximum deviation set at ±5khz.
- Nicads for memory retention built in, nothing extra to buy. Disconnect the FM2030 from the power source and the memories remain!
- Easy to use mobile mount with instant disconnect knobs for f simple removal. DC Cable and mounting hardware, spare fuse, exter speaker plug and complete simplified instruction book includes cir diagrams and even complete alignment instructions! No extras to purch
- Control functions: Select memories, show memory channel numb or select memories and show frequency of channel, or dial frequenc with two speed selectable control. Instant choice of either 5 or 100 k tuning steps. Band scan or frequency scan selectable.
- Frequency shown in 5 bright LED digits. LED indicator shows wh signal is received (unsquelched), LED indicator shows transmit.
- Modern LED bar meter shows signal strength of received signal on transmit shows relative output power.
- Microphone includes tone pad, and up and down buttons to cha dial frequency or memory channels.
- A standard microphone with up-down buttons only is availa separately.
- The FM 2030 is basically as easy to use as a crystal receiver w rotary switch frequency selection for full "eyes-on-the-road" mo operation.
- And, in case we forgot to mention it, we retained our good point point wiring and printed circuit boards and eliminated troublesc relays and those pesky internal plugs that can give trouble.
- Smaller case size: 55mm (2 3/16") high, 162mm (6 3/8") wi 182mm (7 3/16") deep.

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What is "tradition"? Fifty years of HF communications experience and a high technology base that makes us an industry leader. Plus added value like the KWM-380 12-month warranty and 24-hour factory "burn-in" followed by individual testing and calibration of each transceiver.

The Collins KWM-380 gives you "tradition" in one box. Microprocessor control provides operation from the front panel or optional remote interface connector. Plug-in read-only-memory I.C. allows the addition of WARC band changes. Built-in AC/DC power supply lets you operate almost anywhere.

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The ultimate team...the new Drake "Twins"

The TR7A and R7A offer performance and versatility for those who demand the ultimate!

TR7A Transceiver

• **CONTINUOUS FREQUENCY COVERAGE** — 1.5 to 30 MHz full receive coverage. The optional AUX7 provides 0 to 1.5 MHz receive plus transmit coverage of 1.8 to 30 MHz, for future Amateur bands, MARS, Embassy, Government or Commercial frequencies (proper authorization required).

• **Full Passband Tuning (PBT)** enhances use of high rejection 8-pole crystal filters.

New! Both 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity are standard, plus provisions for two additional filters. These 8-pole crystal filters in conjunction with careful mechanical / electrical design result in realizable ultimate rejection in excess of 100 dB.

New! The very effective NB7 Noise Blanker is now standard.

New! Built in lightning protection avoids damage to solid-state components from lightning induced transients.

New! Mic audio available on rear panel to facilitate phone patch connection.

• **State-of-the-art design** combining solid-state PA, up-conversion, high-level double balanced 1st mixer and frequency synthesis provided a no tune-up, broadband, high dynamic range transceiver.

R7A Receiver

• **CONTINUOUS NO COMPROMISE 0 to 30 MHz frequency coverage.**

• **Full passband tuning (PBT).**

New! NB7A Noise Blanker supplied as standard.

• **State-of-the-Art features** of the TR7A, plus added flexibility with a low noise 10 dB rf amplifier.

New! Standard ultimate selectivity choices include the supplied 2.3 kHz ssb and 500 Hz cw crystal filters, and 9 kHz a-m selectivity. Capability for three accessory crystal filters plus the two supplied, including 300 Hz, 1.8 kHz, 4 kHz, and 6 kHz. The 4 kHz filter, when used with the R7A's Synchro-Phase a-m detector, provides a-m reception with greater frequency response within a narrower bandwidth than conventional a-m detection, and sideband selection to minimize interference potential.

• **Front panel pushbutton control** of rf preamp, a-m / ssb detector, speaker ON / OFF switch, i-f notch filter, reference-derived calibrator signal, three agc release times (plus AGC OFF), integral 150 MHz frequency counter / digital readout for external use, and Receiver Incremental Tuning (RIT).

The "Twins" System

• **FREQUENCY FLEXIBILITY.** The TR7A / R7A combination offers the operator, particularly the DX'er or Contester, frequency control agility not available in any other system. The "Twins" offer the only system capable of no-compromise DSR (Dual Simultaneous Receive). Most transceivers allow some external receiver control, but the "Twins" provide instant transfer of transmit frequency control to the R7A VFO. The operator can listen to either or both receiver's audio, and instantly determine his transmitting frequency by appropriate use of the TR7A's RCT control (Receiver Controlled Transmit). DSR is implemented by mixing the two audio signals in the R7A

• **ALTERNATE ANTENNA CAPABILITY.** The R7A's Antenna Power Splitter enhances the DSR feature by allowing the use of an additional antenna (ALTERNATE) besides the MAIN antenna connected to the TR7A (the transmitting antenna). All possible splits between the two antennas and the two system receivers are possible.

Specifications, availability and prices subject to change without notice or obligation.

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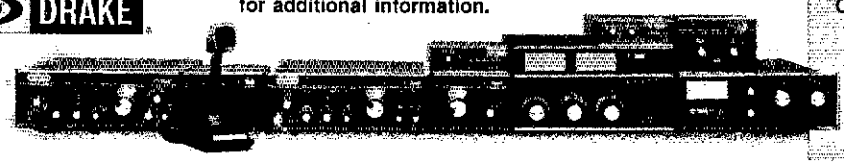

COMING SOON: New RV75 Synthesized VFO Compatible with TR5 and 7-Line Xcvrs/Rcvrs

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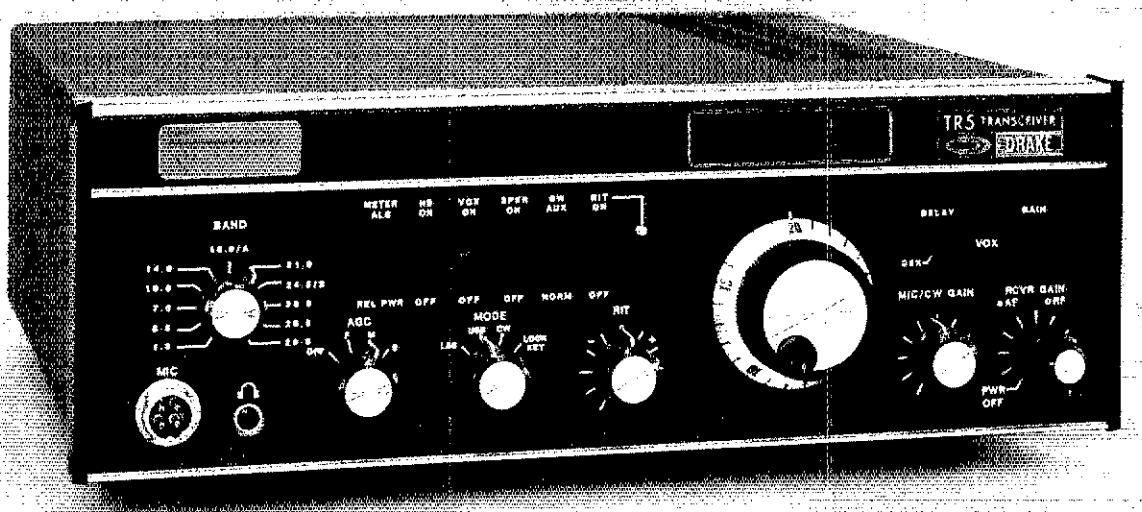
New Drake TR5 Transceiver



far above average!

COMING SOON:
RV75 Synthesized VFO
featuring the Drake "VRTO"

• Frequency Synthesized for crystal-controlled stability • VRTO (Variable Rate Tuning Oscillator*) adjusts tuning rate as function of tuning speed. • Resolution to 10 Hz • Three programmable fixed frequencies for MARS, etc. • Split or Transceive operation with main transceiver PTO or RV75

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With the new TR5 versatility and value are spelled D-R-A-K-E . . .

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The dynamic range of the TR5 is unexcelled by any transceiver in its class. The TR5's greater than 0 dBm third order intercept point (85 dB two-tone dynamic range) at 20 kHz spacing can be achieved only by the use of a passive diode-ring double balanced mixer. Drake was the first to bring this technology to the Amateur market with a high-level mixer in the TR7.

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Drake is the only Amateur Radio manufacturer who offers a full complement of accessories to satisfy almost every desire the HF Amateur may have. This wide selection allows any operator to assemble a station which meets his needs, and assures compatible interfacing and styling instead of a desk full of equipment with a variety of styling and poor operation as a system.

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Everyone wants to be heard! The accessory L75 and its 3-500Z (1200 watts PEP input) and a decent antenna will do the trick. This rugged self-contained amplifier/power supply will put the TR5 on an even footing with the best of them.

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The TR5 and all Drake Transceivers, are backed by the best in engineering. The TR5 is the result of an extensive engineering effort, combining proven past techniques and ideas with new state of the art concepts.

As a result, the TR5 will not be superceded by a new model every six months. It represents a true radio communications value that will provide many years of operating enjoyment.

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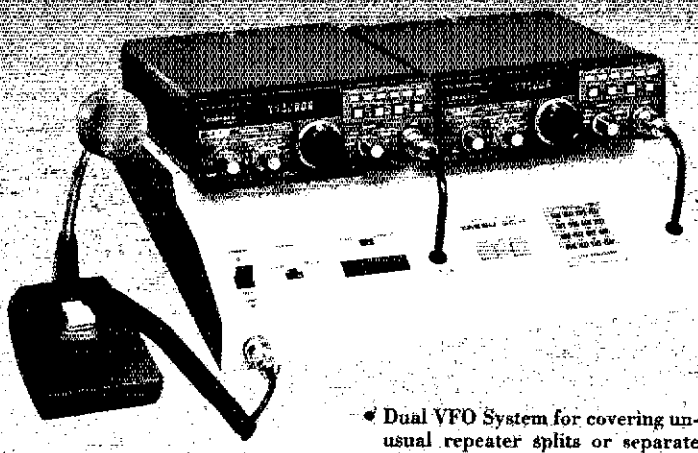
VHF/UHF Line of the 80s
FT-480R/FT-680R/FT-780R
SC-1 Station Console

NEW!



- Dual VFO System for covering unusual repeater splits or separate TX/RX Frequencies during weak signal work.

- Microprocessor-controlled multimode transceivers with three mode-optimized synthesizer step selections.
- Up-down Scanning, Priority Channel, and four Memories with Memory Scan.
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- Satellite operation provided using FT-480R and FT-780R. Transmit frequency may be varied while transmitting to follow Doppler Shift.

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Look to the future with the most complete line of VHF Multimode Transceivers available — The Line of the 80's . . . from Yaesu!

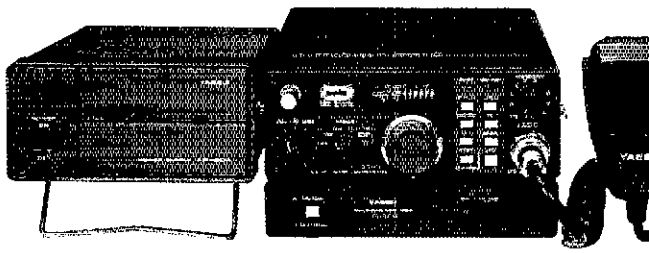
FT-290R

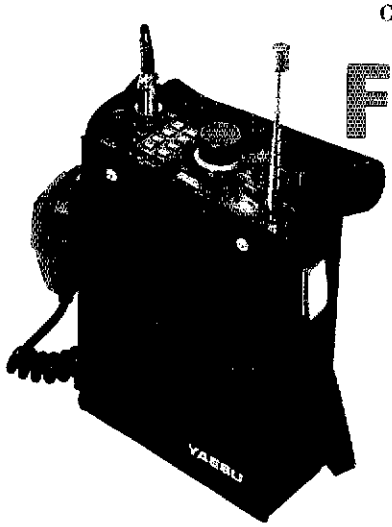
NEW!

2 METER MULTIMODE PORTABLE

- Completely self-contained, battery powered 2 meter multimode Transceiver with Telescoping Antenna.
- Microprocessor control for operating convenience usually found only in base station equipment.
- Dual VFO System with two synthesizer steps per mode. Use one VFO for the FM band and the second VFO for SSB, if you like!
- Ten memories, priority channel, and up/down scanning of band or memories for busy or clear channels.
- Built in Noise Blanker, RIT, Hi/Low Power Switch and Battery Condition Meter. Lithium memory backup battery with estimated 5 year life.
- Optional MMB-11 Mobile Bracket, FL-2010 10 watt Amplifier, LCC-90 Leather Case, NiCd C-Cells, YM-49 Speaker/Microphone and CTCSS Boards.

Don't miss those great DX openings this year! T FT-290R and FT-690R are ready whenever (a wherever) you are!!!





FT-690R

6 METER MULTIMODE PORTABLE

- Repeater splits of ±1 MHz built in for FM work.
- Use with FT-290R accessories, including YM-50 16 Button Tone Encoder Microphone and NC-11B Battery Charger. Use FP-80A AC Power Supply for base station work. FL-6010 Amplifier available outside USA.
- LCD Display with night light for excellent visibility.
- 2.5 watts RF Output on SSB/CW, 800 MW Output on AM.
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- AC and DC Supplies built in.
- One Year Factory Warranty.
- Noise Blanker using all-new circuitry with threshold control.
- RF Speech Processor for increased talk power.

FT-707

COMPACT SOLID STATE TRANSCEIVER
TOP OF THE LINE PERFORMANCE, AT HOME OR AWAY!

- All Solid State, with individual Low Pass Filters for each band providing excellent Harmonic Attenuation.
- 80 through 10 Meter operation, including the new 10, 18 and 24 MHz bands.
- Variable IF bandwidth using cascaded crystal filters for excellent interference rejection and ultimate attenuation.
- Wide Receiver Dynamic Range provided by doubly-balance Diode Ring Mixer.
- Optional FV-707DM provides 12 memories with scanning in 10 Hz steps.
- CW-wide and CW-narrow Selection using optional 350, 450 or 600 Hz Crystal Filters.
- Optional FP-707 AC Power Supply, FC-707 Antenna Coupler, MR-7 Mounting Rack, YM-35 Scanning Microphone (Scan Function with FV-707DM).

The FT-707 is the ideal traveling companion, yet you need not sacrifice performance away from home. Ask your Authorized Yaesu Dealer for a demonstration today!

YAESU

The radio.

382-1

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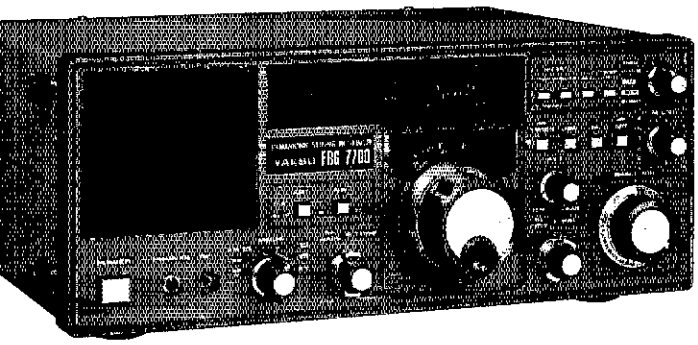
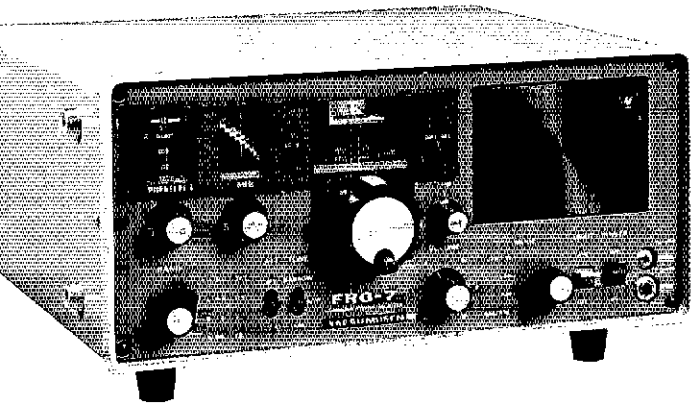
FRG-7700

DELUXE HF COMMUNICATIONS RECEIVER



- 150 KHz through 29.99 MHz coverage on AM, SSB, CW and FM
- Three AM bandwidths for changing interference conditions on crowded shortwave broadcast bands.
- Built-in Quartz Digital Clock with timer for control of station accessories.
- Tape Recorder Output Jack on front panel.
- Noise Blanker and AGC Selection controlled from front panel.
- Optional memory unit allows storage and recall of up to 12 frequencies — no more frantic dial twisting at I.D. time!
- Optional Accessories: FRV-7700 VHF Converter, FRT-7700 Antenna Tuner, FF-5 500 KHz Low-Pass Filter, DC-7700 DC Kit, YH-77 Headphones and QTR-24D Deluxe World Clock.

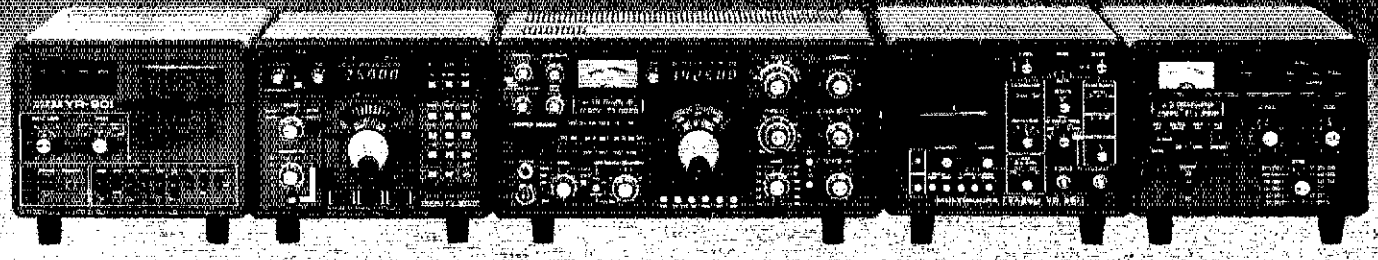


FRG-7 HF COMMUNICATIONS RECEIVE

- Top-selling Shortwave Receiver provides high performance at a reasonable price.
- 500 KHz - 29.99 MHz using Wadley Loop Synthesizer for excellent stability.
- Audio Filter for enhanced reception under difficult conditions.
- Built-in Tunable Preselector for excellent out-of-band interference rejection.
- Front panel Tape Recorder Jack plus Headphone Jack.
- Dial Lamps may be switched off for reduced power consumption.

FT-101ZD MK III

COST-EFFECTIVE DX PERFORMANCE!



- 160-10 Meter coverage on SSB and CW. AM or FM Unit may be added as optional accessory.
- Variable IF bandwidth, using cascaded crystal filters for excellent interference rejection.
- Audio Peak/Notch Filter for razor-sharp selectivity.
- CW Wide-Narrow Selection using optional 350, 450, or 600 Hz CW Filter.
- RF Speech Processor and Adjustable-Threshold Noise Blanker are built in.
- Worldwide Power Capability provided by Multi-Tap Power Transformer, covering 100/110/117/200/220/234 VAC.
- Rugged 6146B Finals with RF negative feedback.
- Optional Accessories: FV-101DM Scanning VFO with 10 Hz Synthesizer and Memory, FTV-901R VHF/UHF Transverter, FC-902 Antenna Coupler, SP-901P Speaker/Patch, DC 101Z DC-DC Converter, FA-9 Cooling Fan, complete line of Microphones.

YAESU

The radio.

38

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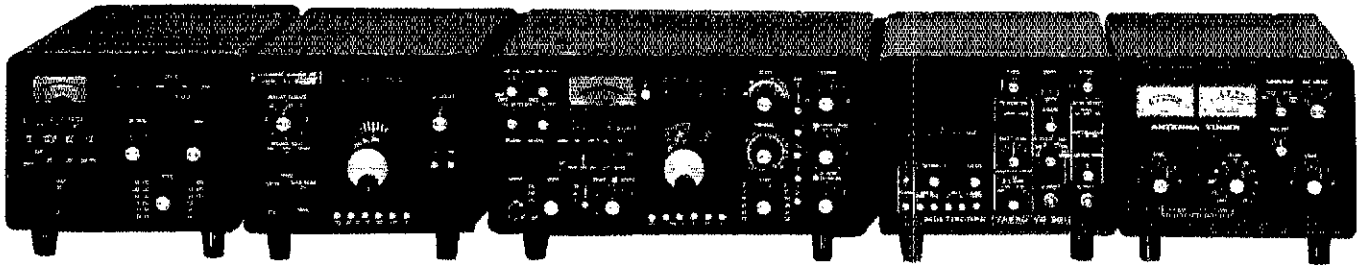
FT-902DM

THE CHOICE OF CHAMPIONS FOR DX AND CONTEST OPERATION AROUND THE WORLD



- SSB, CW, AM, FM and FSK operation built in for All-Mode Versatility.
- 160-10 Meters, including the new bands recently assigned at WARC.
- Variable IF Bandwidth and IF Rejection Tuning for outstanding Selectivity. Cascaded Filters standard, not optional accessories.
- Audio Peak CW Filter provides single signal reception.
- Built-in Curtis 8044 IC Keyer.
- Built-in Memory System for control of Transmit, Receive, or Transceive Frequency.
- Rugged 6146B final tubes with RF negative feedback for excellent spectral purity.
- Built in RF Speech Processor and IF Noise Blanker.

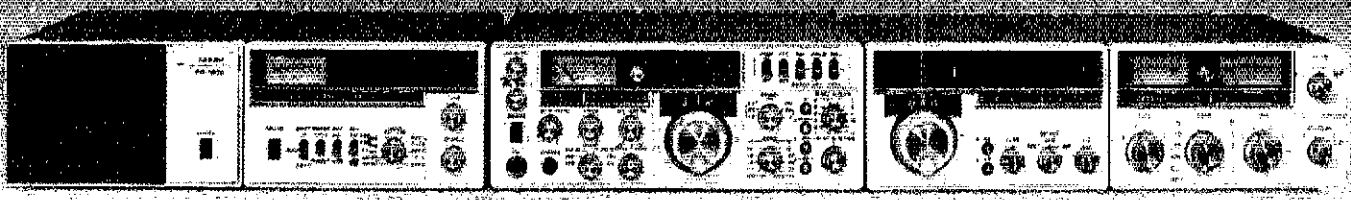
FT-902DM Accessories

- FTV-901R extends coverage to 50, 144, and 430 MHz on full duplex (External Receiver required for duplex operation) for satellite work. 6M/70CM Units optional.
- FV-901DM Synthesized VFO scans in 100 Hz steps and sports 40 Frequency Memory Bank for DX or contest work.
- YO-901P Multiscope includes IF Monitor, Panadapter, and Two-tone Generator for quick station testing.
- FC-902 Antenna Coupler provides for matching 3 Coax-fed Antennas plus one random wire.
- YR-901 CW/RTTY Reader provides versatile Teletype or CW Monitoring using external video monitor.
- SP-901P Speaker/Patch and SP-901 External Speaker round out your FT-902DM Total Communications System.

FT-107M

SOLID-STATE HF TRANSCEIVER

BROADBAND PERFORMANCE FOR EASE OF OPERATION



- All Solid State, 160-10 Meter Transceiver equipped for SSB, CW, FSK and AM operations.
- 12 Frequency Memory System with Digital Memory Shift providing scanning capability (Scanning Microphone optional).
- Excellent VSWR Turndown Characteristics: 75% Power Output at 3:1 SWR.
- Variable IF bandwidth using Cascaded Crystal Filters, Audio Peak/Notch Filter built in.
- Diode Ring Mixer for strong IMD performance. Low-Noise Premix Crystal Local Oscillator.
- Digital plus Analog Frequency Counter Readout. Digital Display utilizes true frequency.
- Built-in RF Speech Processor and IF Noise Blanker.
- Choice of optional internal or external AC Power Supply.
- Optional 350, 450, and 600 Hz CW Filters.
- Optional Accessories: FV-107 External VFO, FTV-107R VHF/UHF Transverter, FC-107 Antenna Coupler, SP-107P Speaker/Patch, SP-107 Speaker.

Price And Specifications Subject to Change Without Notice or Obligation

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382-3

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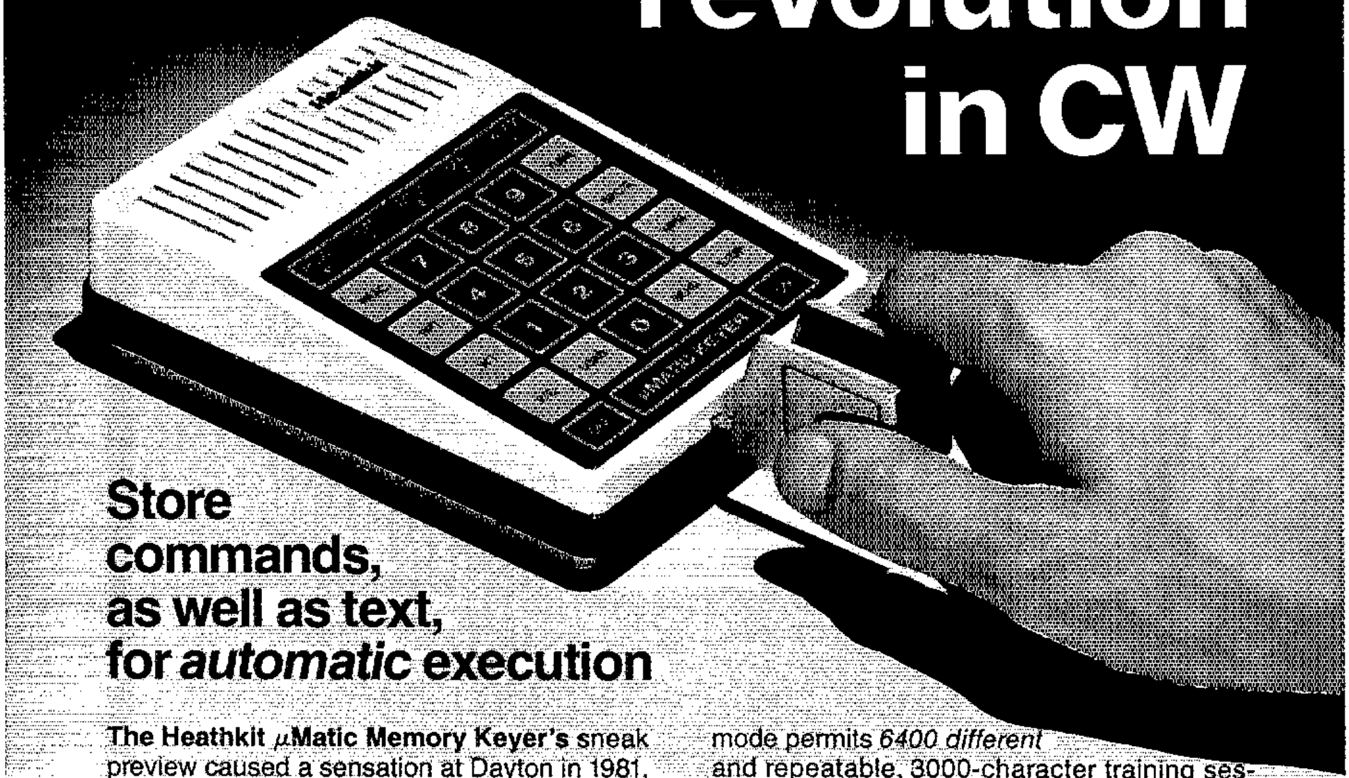
The Memory Keyer that started a revolution in CW



Store commands, as well as text, for *automatic* execution

The Heathkit μMatic Memory Keyer's sneak preview caused a sensation at Dayton in 1981, and the excitement is still running high. *Ask about it on the air.* Those who own one will tell you it revolutionized their operating practices, eased their hand fatigue, multiplied QSOs – and increased the number of incoming QSLs. In contest, you can prove it's the best every time.

Inside, a custom microprocessor stores up to 240 characters of text or commands. *Variable-length buffers* eliminate wasted memory space. *Command strings* let you sequence speed, weight and repetition alterations or text in any order you desire. Choose the speed (1-99), any of 11 weight settings, plus spacing and message repeat count, then sit back and collect contacts...

Capacitive-touch iambic paddles unplug and store inside the keyer when not in use. Left handed? A two-key function will reverse the paddles! Or a socket will connect to your favorite keyer. To boost copy, a 4-level random 'practice' mode permits *6400 different* and repeatable, 3000-character training sessions at any speed you like.

Other features include a built-in sidetone oscillator and speaker with volume/tone controls, phone jack and earphone, message editing, entry error alarm, self-diagnostics, battery back-up and a unique auto-shutoff should you forget. Complete details on the revolutionary μMatic Memory Keyer are in the new Heathkit Catalog and at your nearby Heathkit Electronic Center.*

Send for a free catalog! Write:
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Benton Harbor, MI 49022
In Canada, contact Heath Company,
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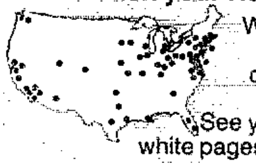
Visit your Heathkit Store

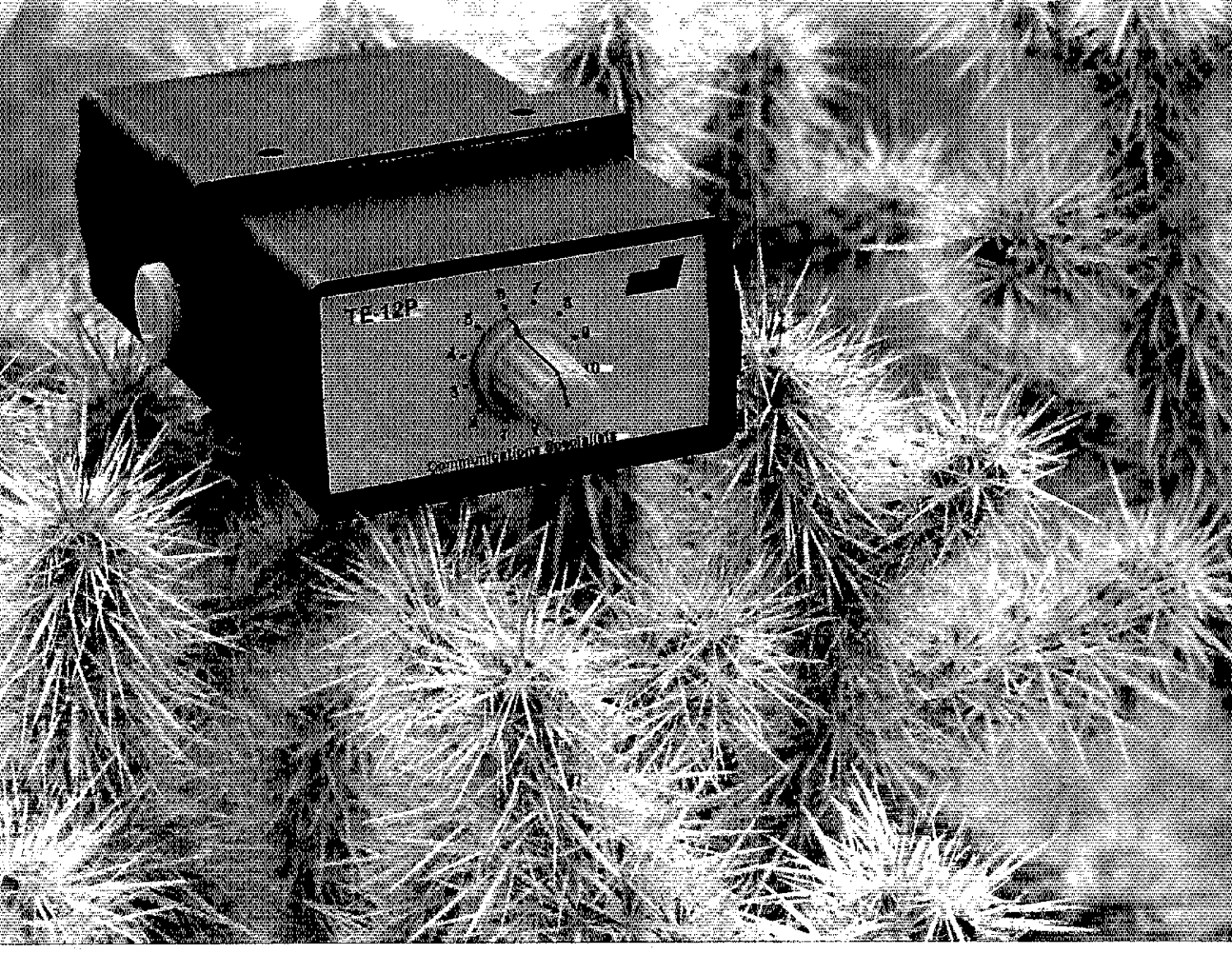


Where Heathkit products are displayed, sold and serviced. See your telephone white pages for locations.

*Units of Veritechnology Electronics Corporation in the U.S

Heathkit®

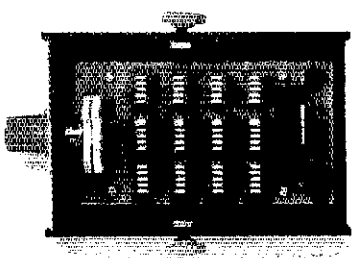
AM-422R1



Stuck with a problem?

Our TE-12P Encoder might be just the solution to pull you out of a sticky situation. Need a different CTCSS tone for each channel in a multi-channel Public Safety System? How about customer access to multiple repeater sites on the same channel? Or use it to generate any of the twelve tones for EMS use. Also, it can be used to access Amateur repeaters or just as a piece of versatile test equipment. Any of the CTCSS tones may be accessed with the TE-12PA, any of the audible frequencies with the TE-12PB. Just set a dip switch, no test equipment is required. As usual, we're a stickler for 1day delivery with a full 1 year warranty.

- Output level flat to within 1.5db over entire range selected.
- Immune to RF.
- Powered by 6-30vdc, unregulated at 8 ma.
- Low impedance, low distortion, adjustable sinewave output, 5v peak-to-peak.
- Instant start-up.



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	
82.5 YZ	100.0 1Z	123.0 3Z	151.4 5Z	186.2 7Z	

- Frequency accuracy, ±.1 Hz maximum −40°C to +85°C
- Frequencies to 250 Hz available on special order.
- Continuous tone

TE-12PB

TEST-TONES:	TOUCH-TONES:		BURST TONES:			
600	697	1209	1600	1850	2150	2400
1000	770	1336	1650	1900	2200	2450
1500	852	1477	1700	1950	2250	2500
2175	941	1633	1750	2000	2300	2550
2805			1800	2100	2350	

- Frequency accuracy, ±1 Hz maximum −40°C to +85°C
- Tone length approximately 300 ms. May be lengthened, shortened or eliminated by changing value of resistor

$89.95

COMMUNICATIONS SPECIALISTS

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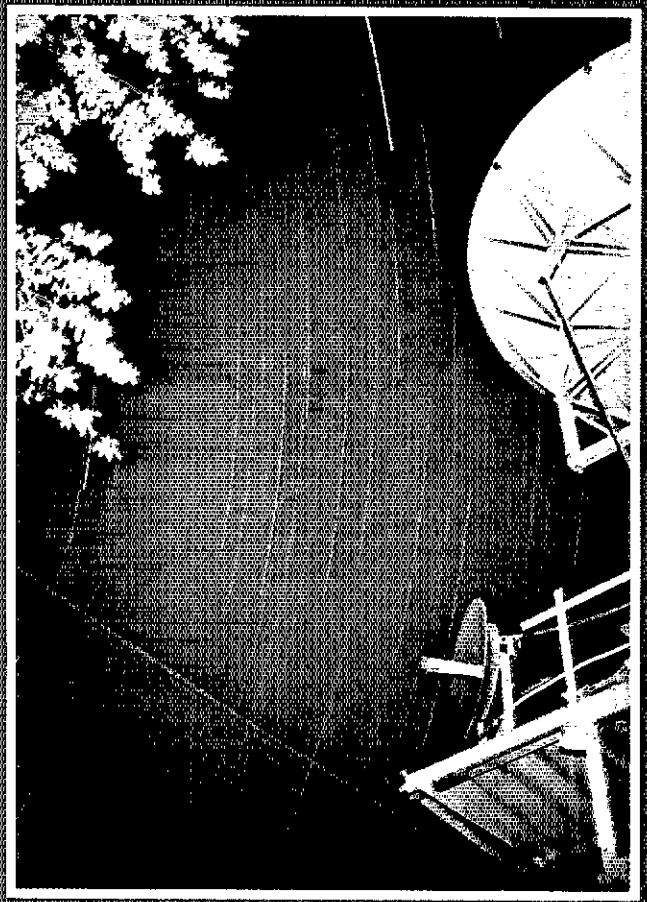
THE ARRL ANTENNA BOOK



IN THIS UPDATED 14th EDITION YOU WILL FIND:

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- PRACTICAL CONSTRUCTION DETAILS OF MF, HF, VHF, UHF, AND MICROWAVE ANTENNAS FOR FIXED STATION, MOBILE, AND RESTRICTED-SPACE USE
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FOR MORE INFORMATION SEE PAGE 140

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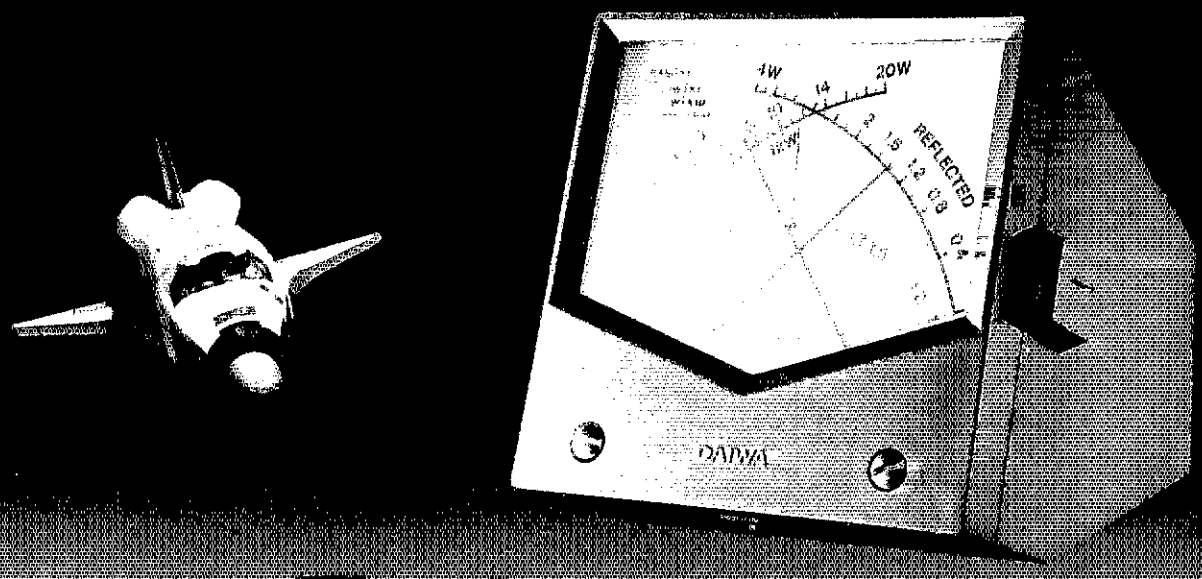
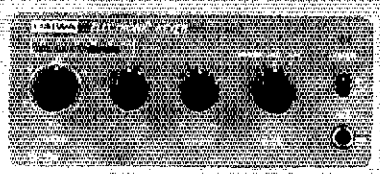


Future Technology Today

NEW! DK200/DK210
Electronic Keyers

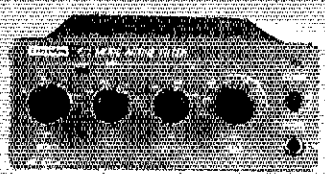


CW is both communication and art. Sharpen your "fist" with Daiwa precision!

DK210—L.E.D. Speedmeter: Reads speed to 50 WPM • Iambic operation with squeeze key • Automatic, semi automatic, or tune modes • Dot-dash memory • Solid state keying • Weight Control: Adjusts dot-dash space ratio • Dimensions: 150W x 62H x 150D m/m • Rugged, all metal cabinet

DK200—Same as DK210 without L.E.D. speedmeter

NEW! AF606K/AF406K
All Mode Active Filters

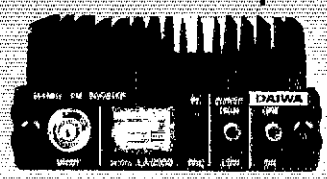


Luxurious selectivity at an affordable price!

AF606K—Innovative PLL Tone Decoder circuitry locks onto the CW signal and reproduces it with incredible clarity • Variable Notch Frequency: 300-3000Hz • CW Pass Band: 140Hz., 110Hz., & 80Hz • Lowpass and Highpass filtering for excellent SSB reception • Built-in speaker • Dimensions: 150W x 62H x 150D m/m

AF406K—Same as AF606K without PLL Tone Decoder • CW Pass Band: 170Hz., 140Hz., 110Hz., 80Hz

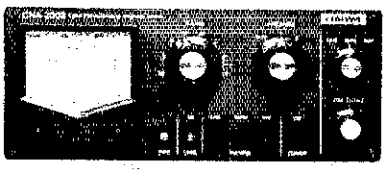
NEW! LA2030
2 Meter Power Amplifier



Be Heard! Give your hand-held the boost it needs!

LA2030—Selectable power output: Low (15 watts) or High (30 watts) (all models) • Power Input: 150mW - 300 mW (LA2030A), 300mW - 600mW (LA2030B), 1.5 - 2.5 watts (LA2030C). Choose the model that's right for you • Fast acting protection circuitry • RF level indicator • BNC input, SO-239 output • Compact size: 90W x 42H x 121D m/m

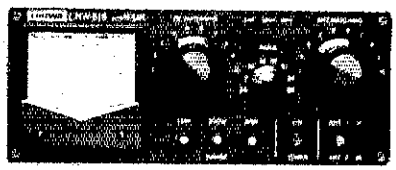
CNA2002
Automatic Antenna Tuner



State-of-the-art automatic antenna matching in under 45 seconds.

CNA2002—Frequency range: Amateur bands 3.5 - 30MHz, including new WARC bands • Power Rating: SSB-2.5 kW PEP, CW-1 kW (50% duty), AM-500 watts, SSTV, RTTY-500 watts (10 minutes) • Dummy Load: 50 watts continuous (100 watts/1 minute) installed • Two antenna outputs for unbalanced lines • Dimensions: 225W x 90H x 275D m/m

CNW518/CNW418
Manual Antenna Tuners

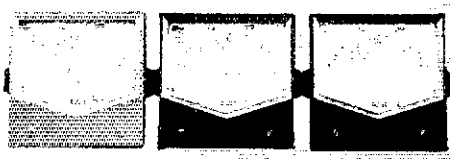


Maximize station performance with high quality Daiwa tuners.

CNW518—Frequency range: Amateur bands 3.5 - 30 MHz including new WARC bands • Power Rating: SSB-2.5 kW PEP, CW-1 kW (50% duty) • Two antenna outputs for unbalanced lines • Dimensions: 225W x 90H x 275D m/m

CNW418 (not shown)—Same specifications as CNW518 except: Power Rating: SSB-500 watts PEP, CW-200 watts • Dimensions: 225W x 90H x 245D m/m

CN520/CN540/CN550
Cross Needle Meters



Daiwa cross-needle convenience in a compact case! Get SWR and Power readings in a single glance.

CN520—Frequency: 1.8 - 60 MHz • Power rating: 2 kW max. • Sensitivity: 40 watts minimum • Accuracy: ±10% at full scale • Dimensions: 72W x 72H x 95D m/m

CN540—Frequency: 50 - 150 MHz. • Power rating: 200 watts max. • Sensitivity: 4 watts minimum • Accuracy: Same as CN520 • Dimensions: Same as CN520

CN550—Frequency: 144 - 250 MHz • Power ratings: 200 watts max. • Sensitivity: 4 watts minimum • Accuracy: Same as CN520 • Dimensions: Same as CN520

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DAIWA

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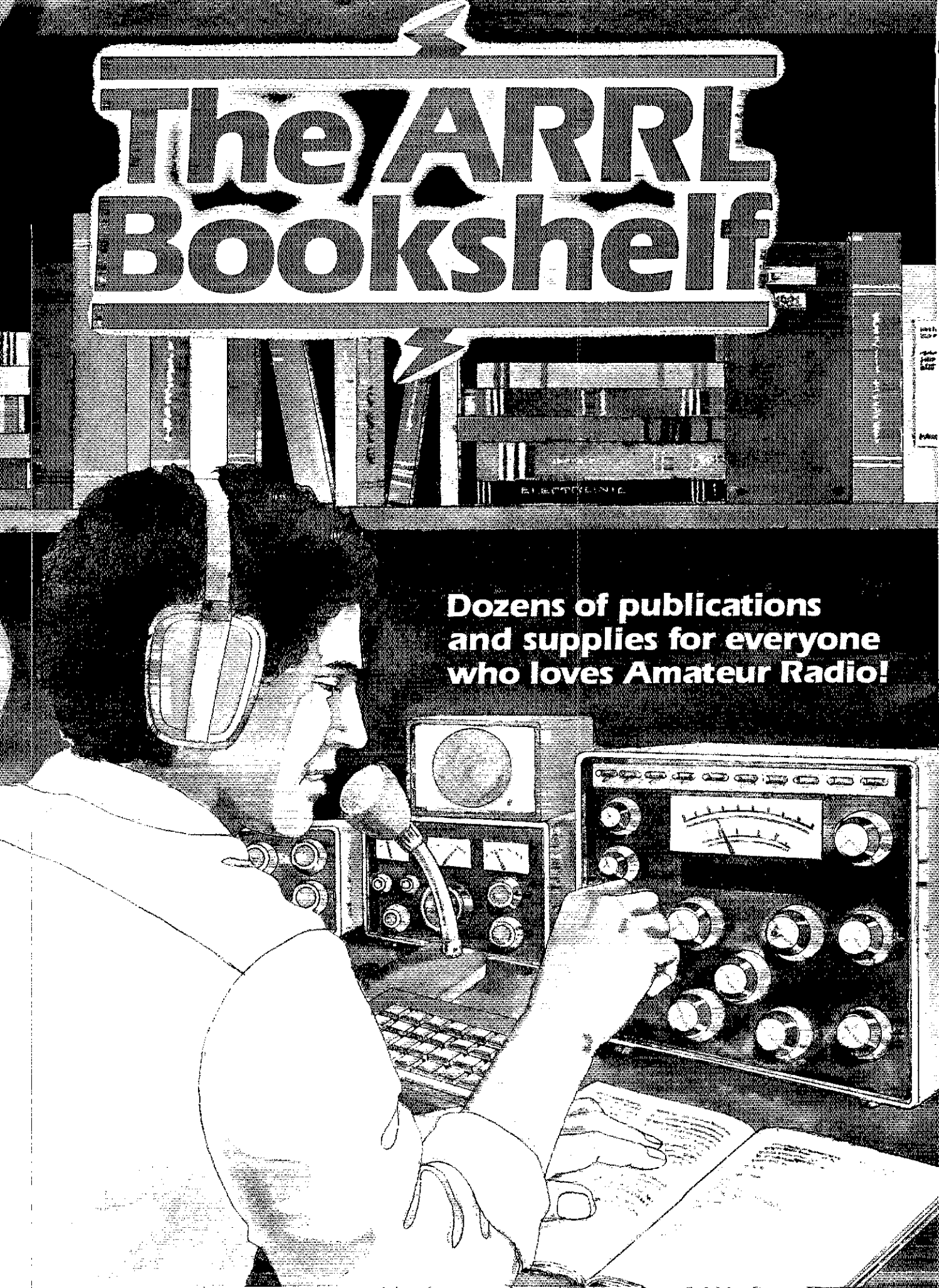
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  EXPLORING HAM RADIO: Hams come from all walks of life; age is no barrier; building your own station; a look back in time.

  MANAGING THE RADIO SPECTRUM: The FCC; rules and regulations; the Novice license; licensing classes.

  LEARNING YOUR NEW LANGUAGE: The Morse Code — why every ham knows it; how to learn it the right way.

  UNDERSTANDING BASIC THEORY: Easy-to-learn explanation of electronic theory and what you need to know to qualify for a Novice license.

  SETTING UP YOUR STATION: Choosing a location; how to select your equipment; what antenna to use; glossary.

  OVER THE AIRWAVES PAINLESSLY: How to operate; tuning up; safety; identifying stations in foreign countries; awards; clubs; The ARRL and QST.

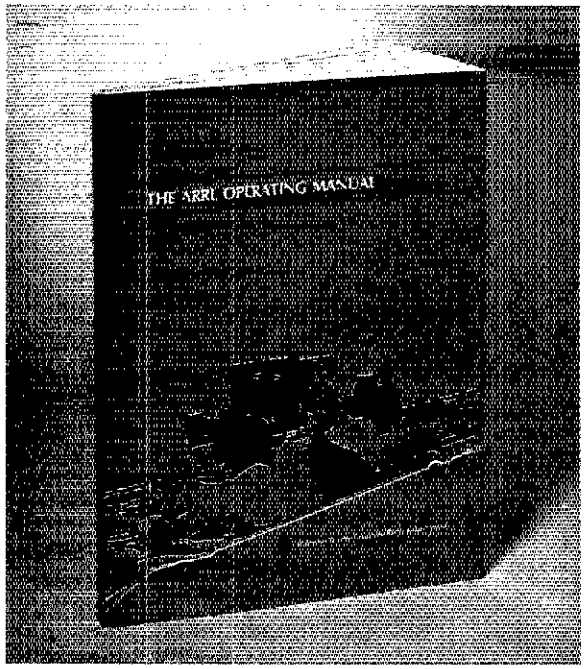
  In addition to the 134 pages of text, the booklet contains 26 pages of equipment and publication advertising. Copyright 1981. **$8.50.**

THE ARRL OPERATING MANUAL

We think that this is the finest book on Amateur Radio operating ever written, and the 1980 Edition is well on its way to becoming one of the ARRL's best sellers! Each chapter was written by an expert with extensive on-the-air experience in his or her field. You'll find dozens of useful charts and tables. All facets of operating are covered in a style which shows how fun and rewarding the Amateur Radio experience can be.

Chapters include: Basic Amateur Radio, Rules and Regs, Traffic Handling, Emergency Communications, DX and DXing, Contests, Awards Chasing, FM and Repeaters, VHF/UHF Operating, Satellites, Visual Communications, Microcomputers, and Shortwave Listening.

Contains these important references: 5BDXCC country check-off list with continents, ITU and CQ zones of each country, ARRL Numbered Radiograms, International Call Sign Allocations, Q Signals, CW Abbreviations, RST System, Beacon Frequencies, DX Operating Code, Spanish Phonetics plus much more!



The 1980 Edition is the first in the large (8-1/2 x 11) format and replaces the *Operating Guide* and the three previous editions of the old *Operating Manual.*

154 Pages, $5.00 in the U.S., $5.50 elsewhere

UNDERSTANDING AMATEUR RADIO

Just the book for the newcomer and experienced amateur. Some of the topics contained in this "junior handbook" of interest to the beginner are:

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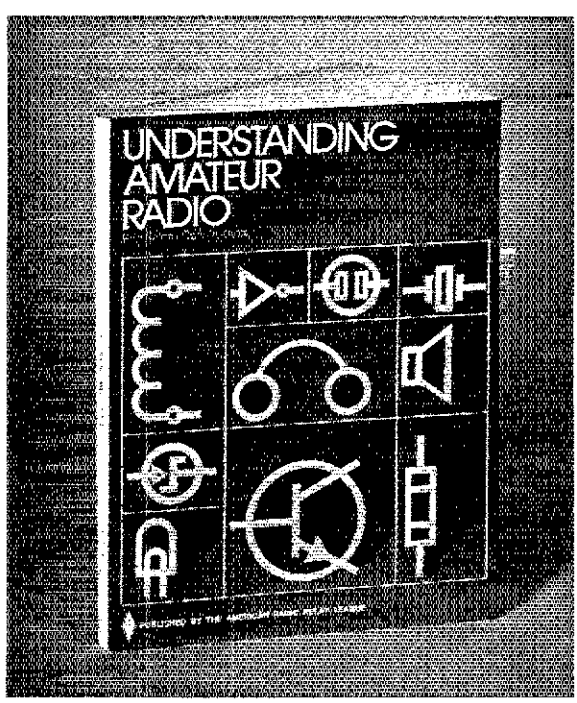
- THEORY NEEDED FOR THE TECHNICIAN/GENERAL FCC EXAM
- HOW TO USE A TRANSMATCH
- HOW TRANSMITTERS AND RECEIVERS WORK

The more experienced amateur will find:

- HOW TO TROUBLESHOOT YOUR EQUIPMENT
- WHERE TO BUY COMPONENTS
- HOW TO BUILD USEFUL ACCESSORIES
- REVIEW OF ELECTRONIC BASICS

3RD Edition, Copyright © 1977, 217 pages. $5.00 U.S., $5.50 elsewhere.



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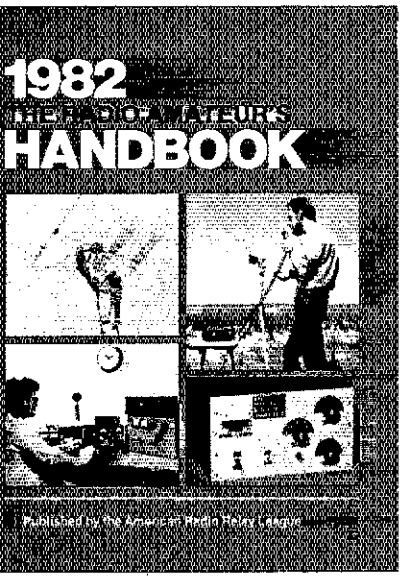

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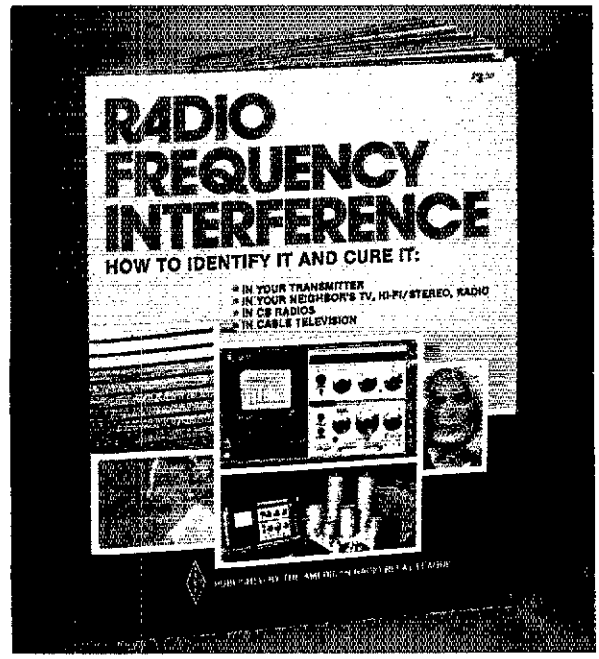

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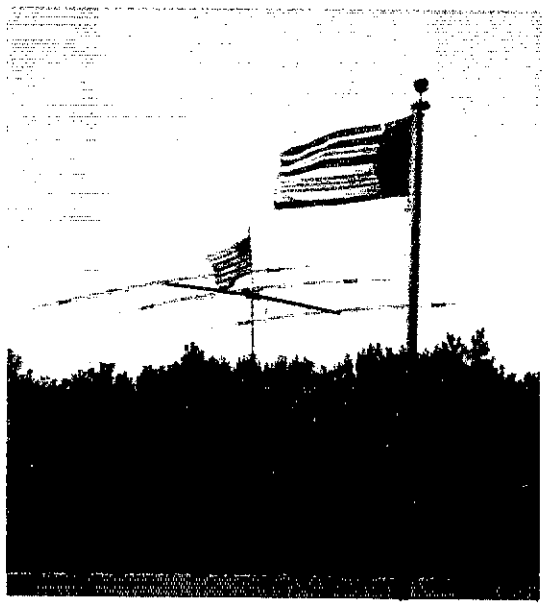

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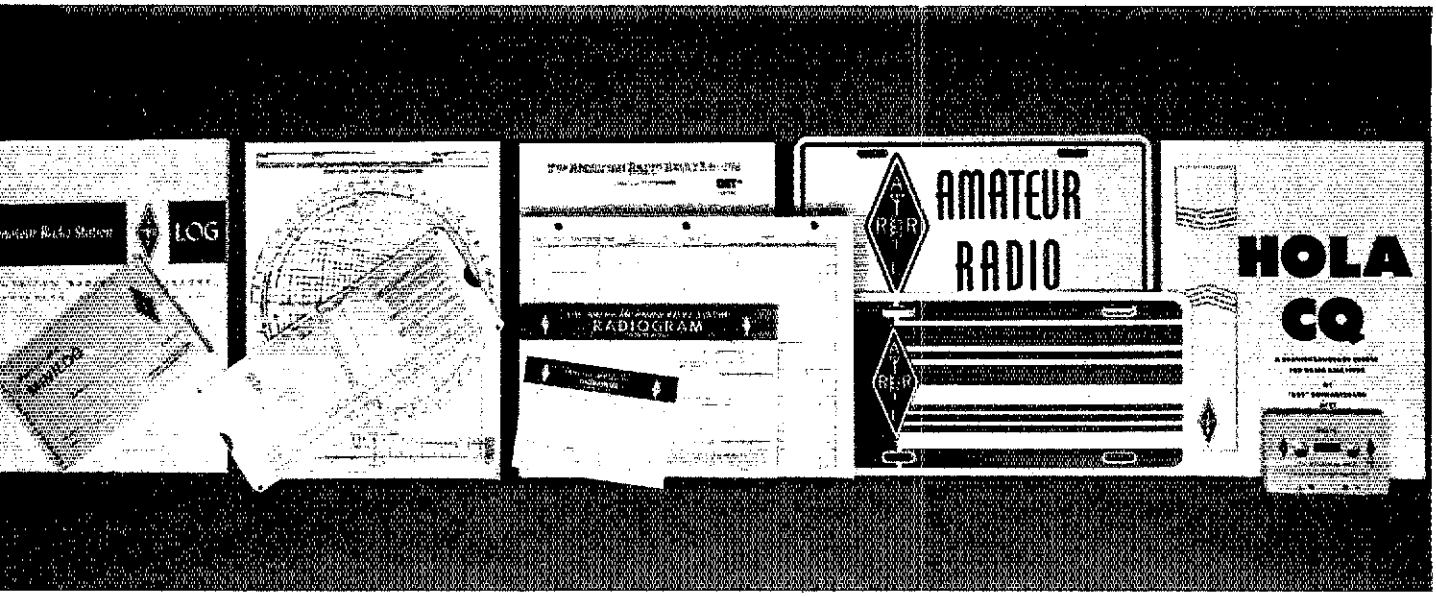

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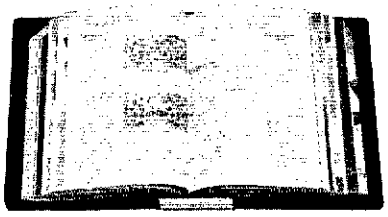

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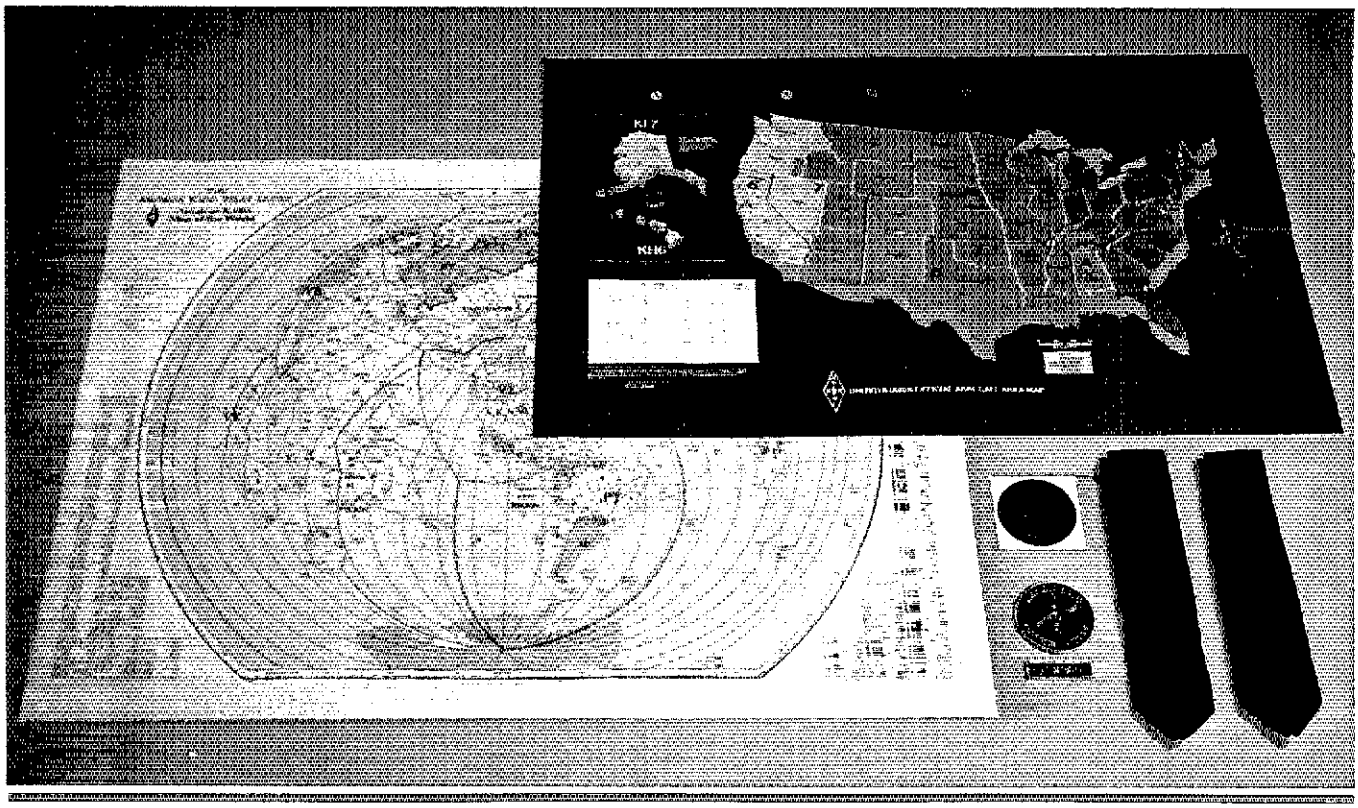

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ARRL WORLD MAP A great circle map centered on the U.S. which shows country boundaries, prefixes, radio districts, and ITU boundaries. Printed in 6 colors by Rand McNally. The countries listing is by prefix and shows country, continent and both ITU and CQ zones. Map size is 30 x 40 inches. Copyright 1980. $4.50.

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ment as DEC for the Northwestern District. Also to N6ZH as EC and assistant to WA6LAU. N6ZH will also be a key liaison to the LAPD. Congrats to WB6ELR on his OES appointment. His repeater, WB6ELR/R on Mt. Lee, 223.88 out/222.28 in, will be used by ARES groups, in support of emergency activities. A special thanks to K6IYK for his help as DEC in the Northwestern District. He will be missed as DEC. On March 7 WA6LAU WB6BSA K6IYK K6CTT W6ORD N6ZH N6DVZ N6CDJ KA6GSE KA6DLJ WA6DUB WA6MPG and WA6AQQ supported the Tree Peoples 10K Freeway run on the Marina Freeway. During the most recent flight of Columbia W6VIO/R broadcast simultaneously the audio from the spacecraft. WA6MJY and WA6PEA initiated this effort. The transmissions were retransmitted from 80 through 2 meters by other amateurs in this area. LA area clubs are preparing for Field Day, with chairman and other activities appearing in the bulletins this month. It looks like it will be a big turnout this year. OO reports: K6KA 100. Traffic: K6UYK 310, W6INH 123, KT6D 86, AD0A 48. WA6OCM 34, N6DZQ 21, W6NKE 15, WD6CZW 10, K6GL 9, N6HE 4. (Feb.) K5DY 21.

ORANGE: SCM, Fried Heyn, WA6WZO — ASCM: WA6WZN. SEC: W6UBQ. STM: KN6C. DECs: K6GGS W6LKN WB6JBI WB6YZY. NMs: WB6AKR W6CPB K6JT WA6QCA WA6WZO. KA6NII (W/C ARC pres) appointed OVS and OBS. The new Packet Radio Net is being held Mondays 7:30 P.M. on 144.86/5.36, WB6YMH/R, with the SCARCC Net still being held Tuesdays 7 P.M. New club officers: Beach Cities Wireless Society (San Clemente) — KE6RG, pres.; KA6PDW, v.p.; KA6NMS, treas.; WD6FLA, secy. Hughes (Fullerton) ARC-W6UYW, pres.; WA6JKZ, v.p.; KA6FZN, secy. Barstow ARC-WD6BNG, pres.; N6DWL, v.p.; N6EHI, secy/treas. Coachella Valley ARC — WB6VMR, pres.; W6PNM, v.p.; WA6QGH, secy/treas. SANDRA — W6UZL, pres.; WA6AIL, v.p.; W6OGC, secy; WA6OYI, treas. TASMA — WA6KOS, chmn; WB6MOQ, v.chmn.; N6BVU, secy.; WB6JPI, treas. The Chaffant Valley repeater WD6EBI/R has changed freq to 146.28/.88. Inyo Co. DEC WB6YZY, EC W6DHK & EC W6DQR attended Civil Defense meeting that included REACT, CAP, Red Cross, Mtn Rescue, BLM, CHP & OES. At a So. Org. Co. ARES organization meeting that included representatives from six area clubs EC WD6AQK announced new nets: Thursdays 7:30 P.M. 144.54/5.14 (W6CNL/R) and Wednesdays 11:30 A.M. 147.045/.645 (WD6AWP/R). Tnx KA6DZU N6AXR N6FRW KA6ABB WA6FIE WD6EWL W6LKN KA6ABJ N6AIX & WA4NFZ for supplying Riverside Cancer Bike-A-Thon comms. OES WB6FRB (Riverside Red Cross board member) furnished comms at Red Cross Disaster Action Team Demonstration. Send comments on EC workbook to W6INI, who is doing the revision. The SW Director has appointed WA6ITF of WestLink, Public Information Assistant (PIA) and N6VI Assistant Director (responsible for antenna problems info). ARRL SW Division Convention (combined with computer fair) "HAMCOMP" will be held June 4-6 in San Diego at the Town & Country Convention Center — See you there! PSHR: W6NTN WB6OBZ KN6C WA6QCA W6CPB. NM WA6QCA reports SCN/V: QNI 593 & QTC 260. K6HAP reports SCN/2: QNI 226 & QTC 106. Traffic: KN6C 313, W6NTN 238, WB6QBZ 121, W6RE 72, W6CPB 52, WA6QCA 52, K6XI 42, K6ZCE 31, W6RIK 30, W6TKV 15, KA6DZV 13, WA6WZN 3, WB6FRB 2.

SAN DIEGO: SCM, Arthur R. Smith, W6INI — STM: N6GW. SEC: W6INI. Southwestern Division Convention (HAM-COMP) at the Town & Country Conv Cen on Jun 4-6, 1982. See you all there! North County Tfc Net held 30 sess with 97 msgs handled. Excellent net for beginners. Daily at 2000 on PARC repeater, 146.13/73 MHz. South Bay ARS Ham of the Year Award given to K6KPV at club's annual dinner. City of Coronado dedicated its mobile command post van on April 6. The 1954 Reo is capable of operating on hf and vhf amateur bands. WA6CUP officiated. Operators are needed for San Diego (city) Civil Defense Auxiliary. Contact W6INI (273-1120) for info. Forty-five ARES members currently support this unit. The San Diego Co. AR Council has provided funds to support ARES emergency communications for cities of San Diego and Coronado as well as the Red Cross. ARES/Volunteers-In-Prevention will man CA Dept of Forestry booth at Del Mar Fair Jun 18 thru Jul 5. Do you have your driver's license number engraved on all your gear? Recommended by law enforcement agencies. Traffic: KT6A 593, W6HUJ 335, KM6I 256, K6HAP 132, KU6D 70, KB6AI 66, N6AT 33, N6GW. (Feb.) W6HUJ 405.

SANTA BARBARA: SCM, Robert N. Dyrutt, W6POU — Proposed ARRL changes to open added local posts as publ. info. off, state gov't liaison, sctn bulletin mgr., coordin. of official observers, interference, publ. svc. rptr inter-tie and tech. development. Volunteers welcome! Publ. service comms in all counties: SLO SKYWARN alert-heavy rain; Cancer Society Bike-a-thons drew ops in Oxnard/Camarillo/Fillmore/Ojai by K6BGU. 27 ops in SBAR so. 100 miler by N6AJA/AB6S. 6 ops Ste Maria by WA6QPO; 33rd Cal-Poly Motorcycle Enduro in rain/mud/dark saw joint SLO/SB comms incl. WA6KDH W6MSG KA6Q WA6QPO and WD6ELE. Ventura Co. ARC drew over 150 at 1st Mini-Vention; Satellite ARC set June 13 annual BBQ/Swapfest - will update Central Coast Directory; TRS80 users group by WA6QQZ for LOM/SM/VAFB. Data/RTTY tests made to LA/Riverside EOC via SCATS rptr & K6TZ/220 by W1UUQ. Over 50 SBAR Sctn ops needed MONDAY, June 7 for largest-ever county-coord. quake drill for all gov'ts/private agencies, schools, hosps, ARC, S.A. with comms to other county's/state's OES. Employers' support urged. Traffic: N6FTQ 484, K6YD 170, W6JGS 85, W6ZRR 61, W6JTA 43, KA8BPH 15, N6MA 12.

WEST GULF DIVISION

NORTHERN TEXAS: SCM, Phil Clements, K5PC — ASCM: WA5QFD. SEC: W5GPO STM: W5VMP. NMs: AA5J AE5I KC5FX KA5MAY WD5JYI. The Wichita Falls RC and the Altus, OK club have installed a new rptr in Wichita Falls on 146.25/.85, with links to Altus and Crowell, TX, with excellent coverage. It will be the primary ARES machine in the area. WB5KRH WA5UTA WB5AFY and W5GPO were instrumental in getting this system operational. KA5AKA has just installed a new machine in Bowie on 147.195/.795. This rptr can easily be accessed by fixed stns in the D/FW Metroplex and the Wichita Falls area, and will be utilized in emergency situations by ARES, linking the wx bureau in both areas. Congrats to KA5KKO and KA5KKP in Foard Co. on their upgrades to Extra! KA5KKO is the son of W5UOV. New ECs: WB5GKE, Midland Co.; W0KPK, Somervell Co.; KA5GFJ, Ward Co. N5CSU is conducting a Novice class on the cable TV system in Garland, entitled "CQ Ham Radio". Each lesson is repeated three times per week at convenient times to folks who work or attend school. Since I began typing this column, the tornado at Paris has taken place. Next month's column will be devoted

entirely to the operations leading up to, during, and after the disaster. PSHR: KC5NN WD5JYI N5EEY KK5B N5BT AJ5F WA5QFD KB5UL KA5MSP KA5AZK N5DKW KA5IWF W5VMP KZ5J. Congrats to KA5IWF on his upgrade! He is a dedicated ARPSC operator, and we can sure use him on the ht phone nets. Traffic: N5BT 184, WD5JYI 155, K5BNH 148, KA5AZK 113, N5EEY 102, AA5J 93, KB5UL 83, W9OYL 68, KV5W 49, AJ5F 44, WA5QFD 40, KC5NN 38, W5VMP 37, N5DKW 34, W5ERT 34, KK5B 26, WA5EZT 22, KZ5J 22, KA5IWF 19, K5PC 18, KA5MSP 10, K5HGX 8.

OKLAHOMA: SCM, Leonard Hollar, WA5FSN — March saw considerable emergency activity going on with tornados at Ada and Bartlesville. Much excellent operating carried the load. Ben Barker, Tulsa NWS rep, presented Bartlesville club with FB plaque for their cooperation and FB work. Lawton hamfest FB, with lots of eyeball QSOs and swapping. KE5J will be inactive for a time, because of change in jobs. KB5EK well on way to 5BDX CC on cw. KD5ET has new tower and 4 ele. beam. Tnx to K5WG & KA5DNE for the help. So many new calls on the air from upgrades and new licensees, I cannot keep up with all of them and more classes going on. WD5IFB is new NM for Sooner Traffic Net. K5CAY has done a FB job for many years, and is taking a well earned rest?? Affiliated clubs: Take notice of the benefits available from the League. They are to your benefit and should be used. Shawnee ARC is latest to affiliate. FB. The League has some new info out on antenna laws, also a FB brochure on helping handicapped hams. Don't forget Ham Holiday July 24-25 in Oklahoma City. Traffic: K5CXP 269, W5RB 215, KV5X 170, KA5CXW 165, W5AS 163, KB5EK 137, N5EIH 119, W5REC 118, WA5OUV 76, WB5ELG 74, W5VXU 67, WB5EAY 60, WA5FSN 58, WA5ZOO 43, WB5TFX 36, W5SUG 35, KB5XI 32, K5CAY 28, W5VOR 28, WA5JGU 27, W5VLW 24, NØIN 22, W5UYH 11, WB5NKC 7, KC5OU 6, WB5LSW 4, W5JJ 3.

SOUTHERN TEXAS: SCM, Arthur R. Ross, W5KR — ASCM/TM: N5TC. SEC: WA5RVT. BPL: W5SHN WB5YDD. ORS/OBS N5FN has 205 DX countries confirmed; working on new tower warm days. EC N5EHO upgraded again and has new call, KD5JD. GREAT! OTS K5RVF reports Port Arthur ARC handled communication for the YMCA marathon and muscular dystrophy marathon during March. DEC K5DG ran in the MDA marathon in Harlingen. He also headed the thirty Amateur Radio Ops, locals and winter Texans, who provided communication for the Rio Grande Valley Livestock Show in Mercedes. There was the usual run of lost children and lost parents. Amateur Radio served to tie together the other five communication systems which were operating during the show (police, sheriff dept, show hq, security, and carnival operators). The Brownsville Repeater Organization commissioned the new phone patch. Fuzz buzz and other emergency numbers will be programmed when the board is ready. Traffic: W5SHN 1195, WB5YDD 611, W5TFB 427, W5CTZ 269, W5KLV 224, N5EFG 206, KV5N 135, N5TC 93, W5BGE 72, WD5AAH 67, WB5MMI 62, WA5RVT 56, W5KR 42, KA5KRI 35, WD5GKH 34, KB5NX 31, K5HZR 17, N5CRU 6, KD5JD 6, K5RVF 5, N5FN 1. (Feb.) W5SHN 582, K5GM 113, N5EHO 19. (Jan.) K5GM 52. (Dec.) K5GM 387.

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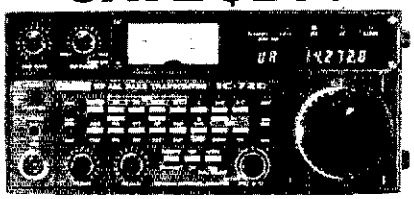

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IC-451A UHF All Mode Transceiver for OSCAR mode B or J & simplex. Models for 430-440 or 440-450 MHz. Similar to IC-251A (Regular $899) ..... **NOW $769.95**
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IC-551 6m SSB/CW/(FM*) transceiver, 50-53.999 MHz. 10w, digital readout, memories, scan, two VFO's & noise blanker. 13.8vdc/117vac (Reg. $479) ... **NOW $399.95**
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EX-107 VOX unit (Reg. $55) ..... **NOW** 49.95
EX-108 PB tune/RF proc. (Reg. $105) ... **NOW** 94.95

IC-551D same as 551 but 80w. EX-107 & EX-108 built-in. 13.8vdc/18A - PS-20* (Reg. $699) ... **NOW 599.95**
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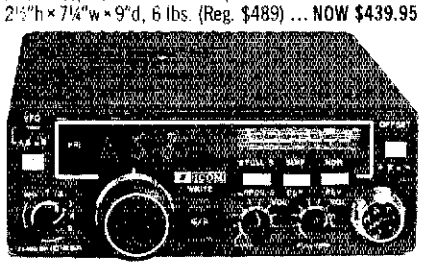
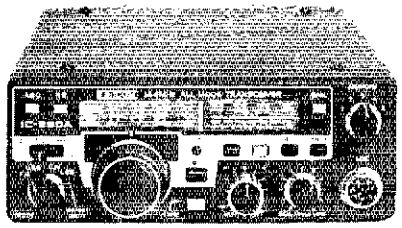


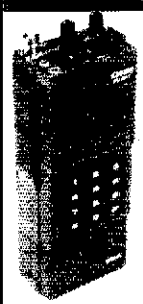
IC-25A Compact 2m FM Mobile Xcvr. 25w, 5 memories, scan, priority ch., 2 VFOs, T/T microphone. 2"h × 5¼"w × 7"d, 3¼ lbs. (Regular $349) .... **NOW $309.95**



IC-290A 2m All mode mobile transceiver. 143.8-148.199 Mhz, 1/10w, 5 memories, 2 VFOs, scan, T/T mic. Remote tuning w/opt. HM-10 mic. 6½"w × 2½"h × 8¾"d (Regular $549) ..... **Limited Special! $439.95**

IC-490A 432 MHz All Mode mobile transceiver. 430-439.995 MHz, 10 watts, scanning microphone .... **TBA**

IC-22U 800 ch. mobile. 144-147.995 MHz, 1 or 10 watts, thumbwheel frequency selection. 6⅛"w × 2⅛"w × 8½"d, 3¼ lbs. (Reg. $299) .. **Limited Special! $239.95**
EX-199 Remote frequency selector 35.00



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IC-2AT Synthesized 2m FM Hand-held with T/T pad. 800 ch. in 5 KHz steps, 144-147.995, selected by thumb wheels & +5 KHz upshift switch; ± 600 KHz offsets. .15 or 1.5w output with supplied nicad pack. Optional packs for larger capacity or higher power. Supplied with 250 ma. nicad pack (BP-3), wall charger, flex antenna, belt clip, strap, earphone and plugs. 6.6"h × 2.6"w × 1.4"d, 1 lb.

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IC-3AT 220 HT/T/TP, nicad & chgr	299.95	**269.95**
IC-3A 220 HT/nicad & charger	269.95	**244.95**
IC-4AT 440 HT/T/TP, nicad & chgr	299.95	**269.95**
IC-4A 440 HT/nicad & charger	269.95	**244.95**
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BC-25U Extra wall charger		$12.50
BC-30 Drop-in charger for BP-2, 3 & 5		69.00
BP-2* 450 ma, 7.2v nicad pk, 1w output		39.50
BP-3 Extra 250 ma nicad pk, 1.5w output		29.50
BP-4 Alkaline battery case		12.50
BP-5* 450 ma, 10.8v nicad pk, 2.3w output		49.50
*BC-30 required to charge BP-2 & BP-5		
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DC-1 DC operation module		17.50
HM-9 Speaker/microphone		34.50
Leather case (specify radio)		34.95
FA-2 Flexible antenna for 2A, 2AT (BNC)		10.00
3A-TTN TT pad for 2A, 3A, 4A		39.50
Commspec **SS-32M** 32-tone encoder		29.95

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IC-20L 2m, 10w ampl. (Reg $98) .... **NOW** 89.95
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IC-30L 10w, 432 amp. (Reg. $105) .... **NOW** 94.95
IC-502A 6m SSB port. (Reg. $239) ..... **NOW** 214.95
IC-3PS ps/spkr; portables (Reg $95) .... **NOW** 89.95
BC-15 Nicads & AC chgr for portables 57.50
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Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. A special rate of 25 cents per word applies to hamfest and convention announcements, to individuals seeking to dispose of or acquire personal equipment, and to other advertising which, in our opinion, obviously qualifies for the individual rate.

(3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 20th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 21 through September 20 will appear in November *QST*.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permited in *QST* advertising.

(6) New "commercial" advertisers must submit a production sample of their product (which will be returned) and furnish a statement in writing that they will respond appropriately to customer complaints and will stand by and support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or character of their products and services. Individual advertisers are not subject to scrutiny.

Clubs/Hamfests

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA 95402.

CQ and QST 1950-1982 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 SASE, chronological order and payment to W6LS, 2814 Empire Avenue, Burbank, CA 91504. Available issues and refund sent within one month.

YAESU OWNERS — join your International Fox-Tango Club — now in its eleventh year. Calendar year dues still only $8 US, $9 Canada, $12 airmail elsewhere. Don't miss out — get 1982 top-rated FT Newsletters packed with modifications monthly, catalog of past modifications, free advertisements, technical consultation, FT Net (Saturdays, 1700Z, 14.325MHz), more. Go Fox-Tango! To join, send dues to FT Club, Box 15944, W. Palm Beach, FL 33406.

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, 1 Pryer Manor Rd., Larchmont, NY 10538.

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.

INTERESTED in QRP? Full information for large s.a.s.e. QRP/ARCI, Box 12072, Capitol Station, Austin, TX 78711.

WARREN Amateur Radio Association Inc. will host their 25th annual Hamfest Sunday August 15, 1982, at Kent State University (Trumbull Campus). Beginning at 6:00 A.M., including Forums, Programs, Dealers Exhibits inside, Giant Flea Market, XYL Suite, 5 acres of space. For further information QSL: Warren Hamfest P.O. Box 809 Warren, OH 44482.

PLAYBOY RESORT at Great Gorge, McAfee, NJ — the place to relax and enjoy — see all the manufacturers' and dealers exhibits — attend the vital and informative forums — renew old acquaintances and make new ones — all at the ARRL Hudson Division Convention, October 30-31. Send SASE now for complete details to HARC, Box 528, Englewood, NJ 07631.

STARVED ROCK Hamfest - June 6 - ARRL-approved. Princeton, Illinois. S.A.S.E. for complete info SRRC/W9MKS, RFD 1 Box 171, Oglesby, IL 61348 815-667-4614.

DON'T MISS WNY's friendliest hamfest, The Batavia Hamfest presented by GRAM, Inc. on July 11th in Alexander, NY. Advance registration $2 by 7/1 to Batavia Hamfest, Box 572, Batavia, NY 14020. See July *QST* Hamfest Calendar for more info.

CANTON, OH - 8th Annual Hall of Fame Hamfest will be held Sunday July 18, 1982 at the Nimishillen Grange, 6461 Easton Street, Louisville, OH. Flea Market will open at 9:00 AM $2.50 advanced, $3. at the gate, under 16 free. Tables available for rental on a reserved basis. Awards, Forums, Food, Dealers, Flea Market, XYL Activities, and more. Mobile check on 146.19/79, 146.52/52 simplex, and 147.72/12. For tickets and information contact WA8SHP, 19877 Hazelview Ave., Alliance, OH 44601. 216-821-8794.

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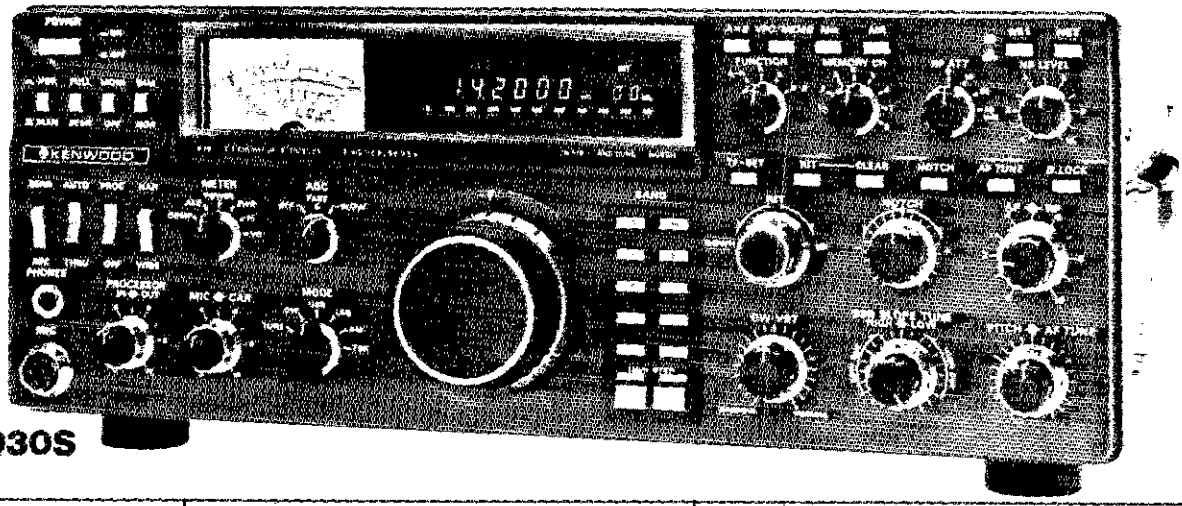

TS 930S

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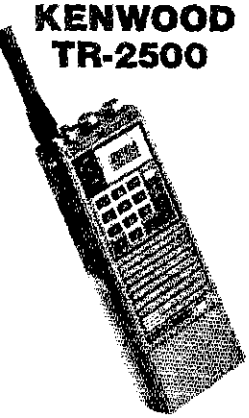

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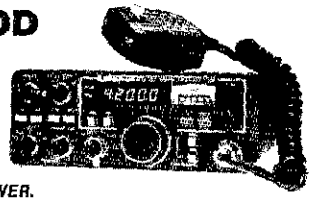

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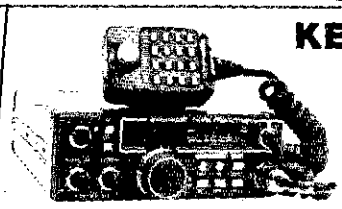

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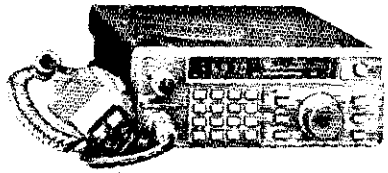

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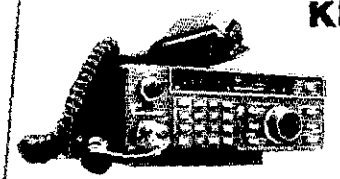

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NEW YORK City — Electronic Hamfest Hall of Science Amateur Radio Club annual indoor/outdoor, rain or shine Hamfest, will be held Sunday June 13, 9 A.M. to 4 P.M., at Municipal Parking Lot, 80-25 126th Street, (1 block off Queens Blvd.) Kew Gardens, Queens, New York City. Sellers: donation $3., Buyers $2., XYL's, kids free. Walk/talk-in frequency 145.520. Info contact KA2DTB, 212-738-8687.

HAMFEST WV's "biggie". TSRAC Wheeling WV Hamfest, Sunday, July 25, 9 AM to 4. Major awards, indoor dealer displays, flea market, auction, refreshments, park attractions-family affair. Reasonable motel accomodations, catch WWVA Jamboree, Saturday night. Donation $2., children 12 under free. Contact: TSRAC Box 240, RD 2, Adena, OH 43901.

STRUGGLING Amateur Radio club will gladly accept contributions of operating equipment or money. Contact W1PUO, UMASS Amateur Radio Association, RSO Box 17, Amherst, MA 01003.

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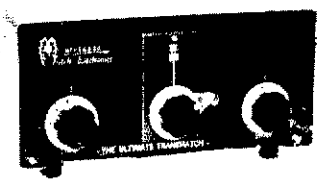

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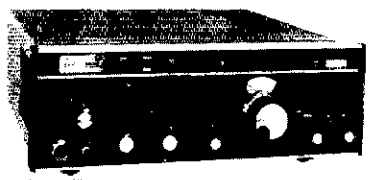

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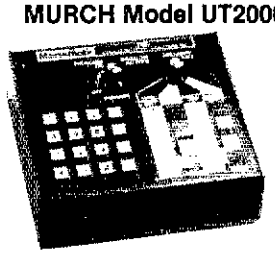

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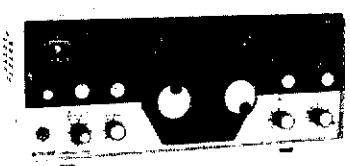

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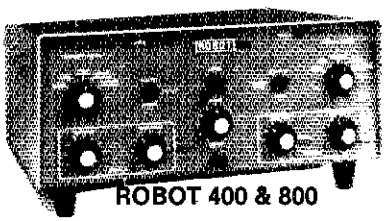

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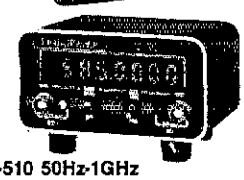

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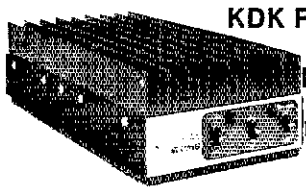

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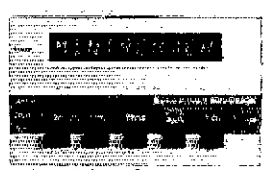

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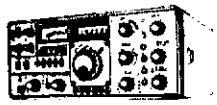

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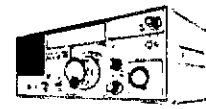

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Freight prepaid on Fold-over towers. Prices 10% higher west of Rocky Mts.

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TH2MK3S Thunderbird, 2 Element	$128.00
TH7DX Thunderbird, 7 Element	$336.00
392S TH6DXX Conversion Kit to TH7DX	$135.00
105BAS 5 Element 10m "Long-John"	$114.00
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Free delivery offered for shipping points within 48 States. ADDED BONUS: Include M.O. or Certified Ck. with order and receive a Van Gordon PD-8040 Dipole FREE.

NO SUBSTITUTIONS PLEASE. SALE ENDS 4/30/82.

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MASON A-2 suitcase receiving system. 2kHz - 2GHZ; am/fm/cw; CRT spectrum monitor; ac/dc; working, all accessories, manual $1500 FOB. Webb, WA2MOT, Box 157, Morris Plains, NJ 07950. 201-267-1117.

COLLINS S-line (round emblem)- 75S-3B, 32S-3, 312B-4, 516F-2 - excellent - $1350 - Kenwood TR-2400 h.t., ST-1 desk charger, speaker mike. $260 K3KD 1-215-754-6286.

WANTED: For own use vacuum tubes 204-A, 250-TH, 304-TL and 849. To trade or sell new pair Eimac 7S-TH, Heathkit oscilloscope OP-1, signal generators Ferris Instruments # 22-A and Navy LX-1. Steve Taylor, W6FL, 2030 Sombrero Dr., Los Osos, CA 93402 805-528-1604.

MUST SELL: Clipperton-L w/10 mtrs; FT-101ZD cw filter fan; FV-101Z; SP-901P; SP-901; Century 21; MT-3000iA; MFJ-941; MFJ-751; KT-34A; 18AVT/WB; more. Send S.A.S.E. for list. Best offer. K5XI, Sid Leach, P.O. Box 4433, Houston, TX 77210 713-266-4719.

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WANTED: Hammerlund HQ145. Call Arnie Berger 212-925-6048.

DX Eng. speech processor LC-2-T-4X $50 Signal diodes 1000 - $10. Zeners 125V-100-$5. K2JSO, 1-914-386-RD#7 Bx 153, Middletown, NY 10940.

WANTED: Collins late KWM-2, S-line with accessories 30S1. Al Adcock, W4FOO, Box U, Tifton, GA 31794 912-382-5566, 7:30-6:00, 7 days.

WANTED: Aluminum tower sections 813-842-7315, 813-847-5851, K4XS.

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.

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VHF Communications Magazine: a quarterly radio magazine catering to VHF-UHF-SHF technology. Published in spring, summer, autumn, and winter. Subscription: $20/year. Make check payable to: Selecto Inc. 372 Belmarin Keys, Novato, CA 94947.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

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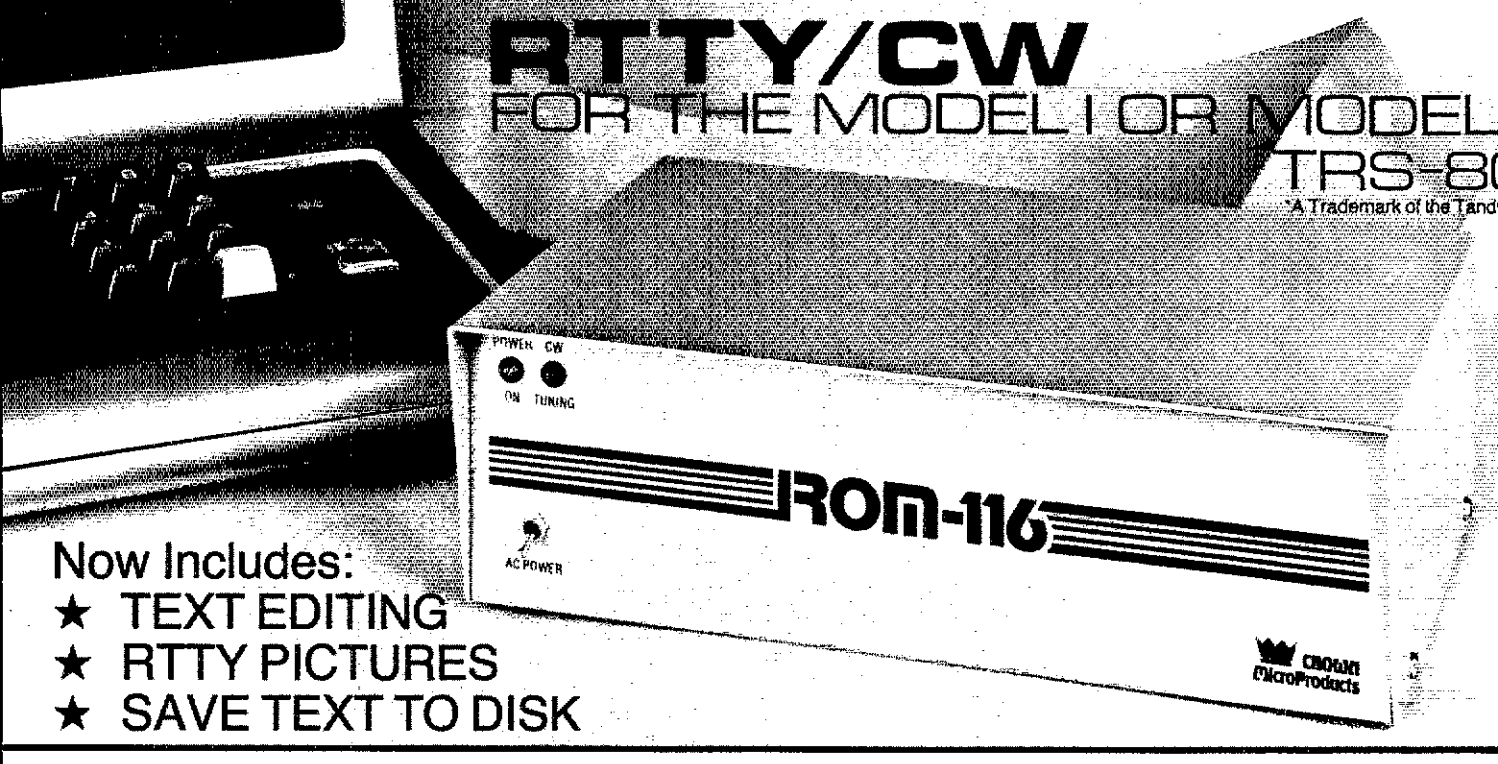
DRAKE R4C, FL-500, FL-1500, T-4XC, AC-4, and Dentron 160-10AT tuner. Mint condition. Best offer. Roger Young, 1037 Glouchester, Schaumburg, IL 60193.

COLLINS 75A3, 32S3, 516F2, Magnum Six Speech processor $895. Texrex beams for 10/15/20. Art Lewis, W3TV 412-463-9328.

OLD books: Amateur, radio, engineering, etc. SASE list. K6WZ, 13638 Sproule, Sylmar, CA 91342.



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The ROM-116 is housed in an attractive 10 x 7 x 3 inch grey cabinet. The cabinet contains a terminal strip for interfacing the TTL and RS-232 input and output signals; controlling the transmitter and audio input for the CW decoder. Also provided on the back panel is a two prong connector for the 60 MA. loop and a DB-25 connector (RS-232 or 20 MA.) for connecting to an ASCII printer or modem.

FEATURING:

- Two Serial Ports
- Fourteen Buffers
- Automatic CW/ID
- Transmit Control
- Selective Call Feature
- Error Correction & Editing
- Word Wrapping
- Easy to Interface
- 30 Day Unconditional Guarantee
- Hardware Requirements: TRS-80 Model I or III 16K

OTHER FEATURES:

1200 BAUD OPERATION. Not limited to 110 baud because of timing loops. 60, 66, 75 & 100 W.P.M. Plus 110, 150, 300, 600 & 1200 baud operations possible.

FLEXIBILITY OF OPERATION. Instantly change: Baud Rates; Program Mode (ASCII, Baudot); Program Status.

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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.

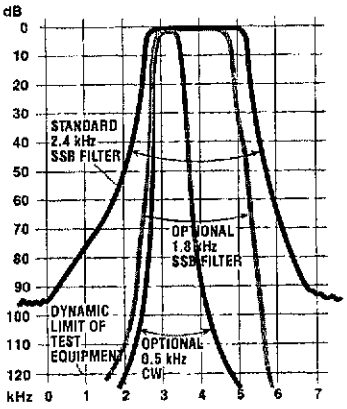
Tailored i-f response. OMNI is equipped with the potential for ***seven*** response curves to handle any listening situation.

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.



OMNI/SERIES C I-F RESPONSES WITH STANDARD AND OPTIONAL FILTERS.

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.

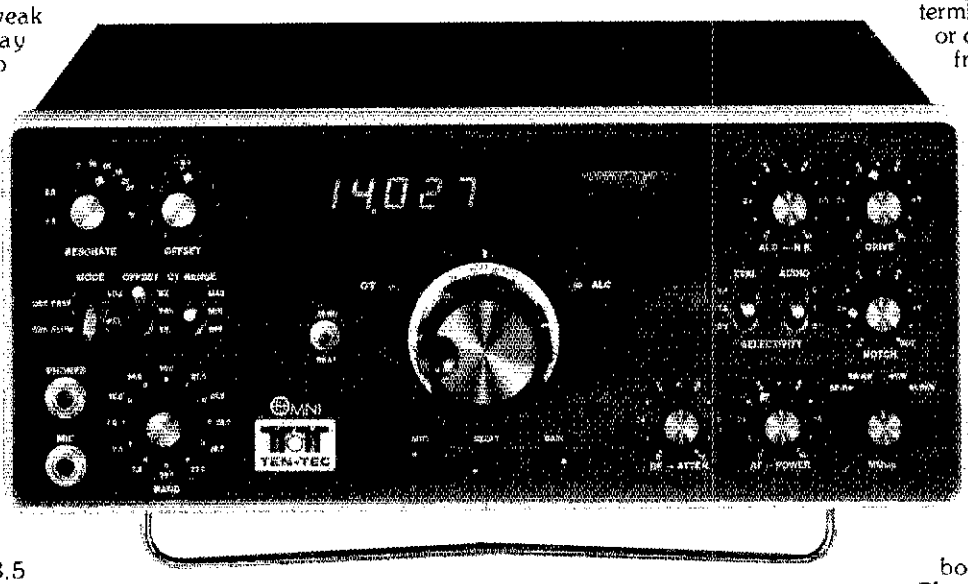
3-mode, 2-range offset tuning. To put you where the others aren't and where the elusive DX is. Move just the OMNI receiver, or just the transmitter section, or the entire transceiver, ±500 Hz or ±4 kHz. For complete freedom of frequency movement to get away from the crowds.

Built-in noise blanker for those times when your noise-generating neighbor is crowding your receiver. Filtered to handle the big signals easily.

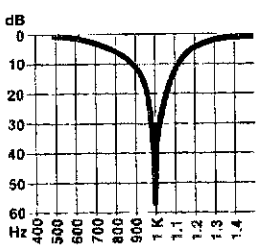
2-speed break-in. When QRM or QRN is heavy, switch to "Slow." Use "Fast" for instant, full break-in for enjoyable rag-chews or stalking DX.

OMNI-C features stand out in any crowd.

All solid-state—from the pioneer, Ten-Tec.



TEN-TEC OMNI-C



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 *original*.

"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.

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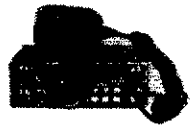

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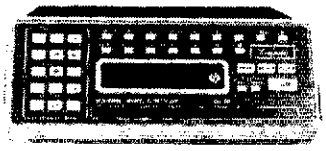

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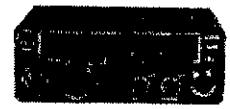

IC-25A

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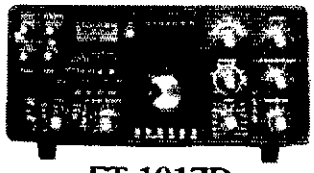

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WANTED: Hallicrafters HT-30 and HT-6. W8AU, Box 73, Massillon, OH 44648. 216-832-8612.

FOR SALE: Absolutely mint condition S-Line. Late Cedar Rapids issue. 32S-3A, 75S-3C, 516F-2. Includes DX Engineering processor and 500 Hz cw filter. All cables and manuals. Original cartons. Very little use. Best offer over $1,500. K2ZGC.

CENTURY 21 (analog), keyer, calibrator, OSCAR crystal. $275. N7DH, SW 310 Skyline, Pullman, WA 99163.

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COLLINS REPAIR and alignment: Collins always has been and still is the very best. For superior, versatile performance from reliable commercial/military-grade S-Line, KWM-2 and latest HF-380 and KWM-380, think Collins. For WARC, consultation backed by factory training, modifications, and fixed-fee servicing on all models, contact K1MAN. Former Collins engineer (registered). Extra, First Radiotelephone, calibration laboratory. 207-495-2215.

WILL TRADE my TS-130S, PS-30 power supply, cw filter and mobile mounting bracket for your TS-830. 130 never mobile, mint condition, see Review in July 1981 QST. No collect calls, S.A.S.E. please. Call before 10 PM EASTERN time. Peter O'Dell, KB1N, 7 Brian Road, South Windsor, CT 06074. 203-666-1541 days and 203-644-3543 evenings.

NATIONAL NCX-3 80/40/20 meter transceiver: 200 watts PEP ssb, 175 watts cw, 75 watts am, w/matching NCXA power supply/speaker and manuals, $175. Steve, WB2WIK, 24 Louis Drive, Budd Lake, NJ 07828 201-376-2004 M-F 9AM - 4:30PM.

FT101E (needs work) trade Atlas 210X or $350 W6RQZ tel or write, Ronald M. Nagata, 1330 Curtis, Berkeley, CA 94702.

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SELL Heath SB614-$85. SB634-$75. SB230 $300, HM-102 $20. Murch 200A Transmatch $65. MFJ 900 transmatch $30. QF1A $40., MFJ 721 audio filter $20. Palomar all bands preselector $35. Palomar noise bridge $45. Vibroplex-Vibrokeyer $35., Yaesu FRG-7 $145., Yaesu 208R HT $235., BW kW LP filter $15. All mint condition. Uship W6OWD 415-728-7136.

A STEAL! QST March 1928; Sept, Oct, Nov 1930. 389 copies from 1947 thru 1981. ARRL Handbooks: Good 1934, 1967, 1968, 1971. Fair 1929, 1942. Poor 1941, 1945, 1953. Ham Radio 123 copies from 1969 thru 1981. $150. You pick up and take all. Separate items are not for sale. Dick Hammell, W2FRC, 201-273-2824.

ALPHA 76A, mint $1200. N6BK 714-365-6676.

CAPACITORS 41 uf - 3.8 kV., continuous voltage rating, tested & guaranteed. 706 Harvest Rd., Bothell, WA, 98011. 206-481-8090.

SALE - Tempo S1 2m transceiver w/TTP, good condition $175. WØMZC 303-776-1249.

HELP: Junior High School 22 needs you. Contact WB2JKJ via Callbook for information.

FOR SALE - Yaesu 101E with digital display YC601-Yaesu FT221 R-2 meter-144 to 148 VFO-am-fm-usb-lsb-cw 30 watts-Dentron MLA-2500-all money back guaranteed perfect condition. Best offer, W1CPI 401-789-1817.

WANTED, a National, NC303 receiver, in good condition, state price. Tel. 617-432-0169, W1LRM.

HEATH-SB-220-$425 - SB-303-$225 SB-610 scope-$95 -SB-630 console $95 - W8LMH - 2472 Bandon Drive, Grand Blanc, MI 48439 - Ph. 313-694-1129.

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HEATH SB-200 factory aligned, HP23 SB-600, SB630 console. All working. $250. W5LLU 7614 Skyline, Houston, TX 77063.

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FOR SALE: Kenwood TS-120S, excellent condx, hardly used $425 Dick Whitten, WAØAHQ 976 Motherhead Rd., St. Charles, MO 63301 314-441-2617.

FOR SALE SB-101 w/ps & mic, SB-200, SB-600, SB-610, SB-620, SB-630, SB-640, SB-650, HW-102. $1250. K8JKK 1-517-787-3179.

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1982 ARRL NATIONAL CONVENTION

CEDAR RAPIDS, IOWA

July 23, 24, 25, 1982

The CVARC invites you to the ARRL National Convention, to be held in the new Five Seasons Civic Center. Excellent hotel and parking facilities attached directly to the Center. Commercial exhibits, a large flea market, excellent forums and a banquet featuring **Robert M. Hisamoto** as guest speaker. Mr. Hisamoto was born in Honolulu, Hawaii. Bob was first licensed in 1925, and he founded the Japanese Amateur Radio League (JARL) in 1926. He has been continuously active in Amateur Radio, and has had 15 different calls.

Grand Door Award - Collins KWM-380 (Drawing - Sun. 2 PM)

Convention Opens Friday, July 23, with Registration beginning at 12:00 Noon.
Exhibits Open (6:00 PM - 10:00 PM—July 23)
Ladies Activities Room Open (4:00 PM - 10:00 PM - July 23)

CONVENTION REGISTRATION (After July 1 - $8.00)	$6.00
BANQUET (Saturday, July 24)	$12.50
FLEA MARKET TABLES - Enclosed Area ($7.00 At Door)	$6.00
COLLINS TOUR (Remaining Tour Capacity Is Limited)	No Charge
AMANA COLONIES TOUR/WITH LUNCH	$22.50
WEST BRANCH TOUR/WITH LUNCH	$20.50
CEDAR RAPIDS HISTORY RE-VISITED TOUR/WITH LUNCH	$14.50
WOUFF HONG (July 24)	Payment at Door
CODE SPEED RUN (Record Run Only)	No Charge

For General Information, Hotel/Motel form and Registration form: CEDAR VALLEY AMATEUR RADIO CLUB - P.O. Box 243, Marion, IA 52302. Pre-registration must be received before July 1 - All registration/Tickets will be held for arrival - CVARC will confirm pre-registration.

HOTEL/MOTEL - JULY 23, 24, 25 1982 - NO RESERVATIONS WILL BE TAKEN BY PHONE —
Reservations Must Be Received By July 1, 1982

HOTEL/MOTEL	SINGLE 1 BD/1PR	DOUBLE 1 BD/2 PR	TWIN 2 BD/2PR	TRIPLE 2 BD/3 PR	QUAD 2 BD/4PR	COMPLIMENTARY
STOUFFER'S *	$42		$52	$62	$72	Free Coffee AM
ROOSEVELT *	$38	$44	$44	$50	$56	Breakfast/Cocktails
HOLIDAY INN						
REGULAR	$37	$43	$43	$47	$51	Coffee AM
HOLIDOME	$42	$48	$48	$52	$56	Champagne PM
KING LEISURE	$48	$52	$52	$56	$60	
SHERATON INN	$32	$37	$37	$42	$47	Coffee AM
INTERNATIONAL HAWAIIAN INN	$32	$37	$37	$42	$47	Breakfast
EXEL INN	$24	$28	$30	$32	$34	Not Firm Price
HOWARD JOHNSONS	$26	$29	$33	$37	$41	Coffee AM
RED ROOF INN	$25	$28	$28	$32	$32	
TOWN HOUSE (Best Western)	$30	$35	$35	$38	$41	
VILLAGE INN (Best Western)	$28	$32	$38	$41	$44	
LONGBRANCH (Best Western)	$27	$27	$27	$31	$35	Continental Breakfast

HEADQUARTERS HOTELS (*)
ALL ROOMS ARE SUBJECT TO STATE AND LOCAL SALES TAX. CONVENTION RATES APPLY TO RESERVATION

CONVENTION CHAIRMAN -
WBØVVZ Dick Isard, P.O. Box 994, Cedar Rapids, IA 52406 -
Home (319) 364-0855, Office (319) 365-7551

REGISTRATION CHAIRMAN
WDØBHR Duane Rinderknecht - (319) 377-2761

ARRL NATIONAL CONVENTION
CVARC P.O. Box 243 - Marion, IA 52302

CEDAR VALLEY AMATEUR RADIO CLUB — WØGQ

- ★ **AMSAT** — Ralph Wallio, WØRPK
- ★ **ANTENNA BALUNS** — George Badger, W6TC
- ★ **ANTENNA TOWER CONSTRUCTION** — Wayne Groff, WØRU
- ★ **ARRL COMMUNICATION DEPT.** — John Lindholm, W1XX
- ★ **ARRL FORUM** — Paul Grauer, WØFIR: Dave Sumner, K1ZZ: Vic Clark, W4KFC:
- ★ **ATV/SSTV** — Mike Stone, WBØQCD
- ★ **AURORA BOREALIS** — Robert Hisamoto, KL7AM
- ★ **BIG GUN DX STATIONS** — Rodger Hoffman, N4RR
- ★ **CONTEST FORUM** — Ed Gray, WØSD
- ★ **DX FORUM** — Jim Spencer, WØSR
- ★ **EME-IOWA STYLE** — Ken Kucera, KAØY
- ★ **FCC FORUM** — James Daley, James McKinney
- ★ **FREQUENCY SYNTHESIZERS** — Bill Weaverling, WBØJJL
- ★ **HF ANTENNAS** — Glenn Whitehouse
- ★ **HISTORY OF COLLINS AMATEUR EQUIP.** — Warren Bruene, W5DLY
- ★ **HOMEBREWING LINEAR AMPLIFIERS** — Jeff May, WØONM
- ★ **MACHINE CW** — Bud Southard, NØII
- ★ **MICROPROCESSORS IN AMATEUR RADIO** — Barry Buelow, WAØRJT
- ★ **NATIONAL SCM MEETING** — Ralph Wallio, WØRPK
- ★ **REGIONAL FREQUENCY COORD-MEETING** — Dr. Dennis Crabb, WØGGI
- ★ **RTTY BASICS** — Bill Henry, K9GWT
- ★ **SPECIAL TECH TALK** — Doug DeMaw, W1FB
- ★ **SPREAD SPECTRUM TECHNIQUES** — Bill Sabin, WØIYH
- ★ **STATE-OF-THE-ART RECEIVERS** — Dr. Ulrich: L. Rhode, DJ2LR
- ★ **TEN METER FM** — Bob Heil, K9EID
- ★ **WASHINGTON SCENE** — Perry Williams, W1UED
- ★ **WEATHER SATELLITE RECEIVERS** — Dave Farmer, N9BDH
- ★ **FLEA MARKET** — Sat. & Sun., July 24th & 25th, Open 6 A.M.

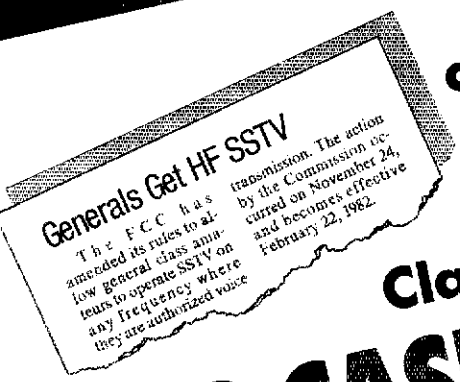
COLLINS TOUR
No Cameras or Radios Allowed

CVARC Information Frequencys - 1600 UTC Time

MONDAY	3970 MHZ.
TUESDAY	7258 MHZ.
WEDNESDAY	14300 MHZ.
THURSDAY	21395 MHZ.
FRIDAY	28650 MHZ.

By Calling NØDAK - JIM HAMBLIM
You Will Receive Convention Information

Robot extends $100 cash rebates!



Generals Get HF SSTV

The FCC has amended its rules to allow general class amateurs to operate SSTV on any frequency where they are authorized voice transmission. The action by the Commission occurred on November 24, and becomes effective February 22, 1982.

Robot celebrates FCC ruling on use of SSTV on General Class Phone Bands

$100 CASH REBATE
ON ROBOT 400 SSTV SCAN CONVERTER

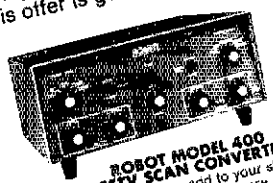
$100 CASH REBATE
ON ROBOT 800 SUPER TERMINAL

$250 CASH REBATE
WHEN THE 400 AND 800 ARE PURCHASED TOGETHER.

With the new FCC ruling approving SSTV on the General Class Phone Bands, and with our $100 rebate, now is the perfect time to add slow scan TV to your station. Purchase a Robot 400 or 800 from your Robot dealer and receive a check from the Robot factory for $100.

If you buy both the 400 and 800 together, you get an extra $50, or a total rebate of $250.

This offer is good through May 31, 1982.



ROBOT MODEL 400 SSTV SCAN CONVERTER

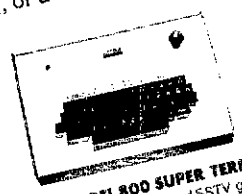
Simple to operate, easy to add to your station. All connections to your transceiver are with ready made connecting cables. No modifications required.

List price	$795
Less rebate	100
	$695

See your Robot dealer for complete information on this money saving offer and for a free demonstration.

ROBOT

ROBOT RESEARCH, INC.
7591 Convoy Court
San Diego, CA 92111
(714) 279-9430



ROBOT MODEL 800 SUPER TERMINAL

For Baudot/ASCII, Morse and SSTV graphics.* The Robot 800's built-in demodulator equals or exceeds the performance of those found only in expensive stand-alone terminal units.

List price	$895
Less rebate	100
	$795

*Model 400 required to receive SSTV.

World leaders in Slow Scan TV, Phone Line TV and Image Processing Systems.

Above is reproduction of original rebate ad as it appeared in May 1982 magazines.

The response to our $100 Cash Rebate on Robot 400 Scan Converters and Model 800 Super Terminals was truly impressive. More Robot SSTV Scan Converters and Robot terminals were purchased than in any like period in our history.

To encourage the continued growth of SSTV on the General Class Phone Bands, Robot is extending our $100 Cash Rebate offer on our Model 400s and 800s another 60 days to July 31, 1982.

Now is definitely the time to consider SSTV for your station. Prices will never be lower, there's never been more SSTV stations to work, and there have never been more frequencies available for SSTV.

The picture telephone of the future is here now for the amateur radio operator. See it at your Robot dealer today.

ROBOT

ROBOT RESEARCH INC.
7591 Convoy Ct., San Diego, CA 92111
(714) 279-9430

World Leaders in Slow Scan TV, Phone Line TV and Image Processing Systems.

HAL DS-3100 ASR terminal unit and HAL ST-6000 demodulator. Original boxes. Original cables. Used 15 hours maximum. Mint condition. Steve Zondlak, P.O. Box 9061, Livonia, MI 48151. Phone 1-313-420-3156.

FOR SWAP: Model 33 ASR TTY with data set, need direct connect 300 baud Modem. Dick Whitten, WA0AHQ, 976 Motherhead Rd., St. Charles, MO 63301 314-441-2617.

SALE: Heathkit Digital Techniques course with trainer $100. Also Microprocessers Course with factory-built trainer $175. or both for $250. All parts intact. Call WB3BPY, 215-775-1880.

WANTED: For Drake C-line 4-N.B, all accessory crystals, excellent condition only. Evenings 1-617-433-9587, Fred, WA1TNY.

HEATH HW-12A 75 m 200W ssb transceiver with fixed/mobile power supplies, speakers, mikes, and xtal calibrator-$75. Wilson T-1405SM 1&5 watt, 6-channel 2m HT with case, charger, mobile mike, and 3 antennae -$85. Heath SB-303 80-10m receiver with ssb and cw filters - $150. Trac electronic keyer and Vibroplex paddle - $40. Best offer over the above amounts within 30 days of publication date takes it. John Efird, WB4WIS, 1109 SE Cypress Lane, Palm Bay, FL 32905, 305-724-9092.

SELL: MFJ 901 tuner $40. Drake W4 wattmeter $50. Harry, KA6CEW 714-559-0257.

WANTED: Ten-Tec 544 and 262G ps/speaker. Don, KB2FR, 609-429-4949.

MINT-Drake T4X, R4A, AC4, MS4. Xmtr factory overhauled. C/line filter. $400. W2RBK 109 Dewberry, Syracuse, NY 315-488-0760.

ARGONAUT 509, mint $225 Walt, K8CV, 1-313-549-1846.

HAM SHACK clean up, all in good condition, HW-16 with HG-10 VFO $130, Heath phone patch HD-15 $30, Ameco TX-62 with VFO-621 (2 & 6 meter am), $135 and Heath HW-2036, $145. Joe W3FD 215-399-0470.

ROBOT 400 $525., Microcraft Code Reader (eight digit) $150., Yaesu FL-2100-B linear $400., FTV-650-B $185., all mint condition. Murch UT-2000-A Transmatch very good condition $90. N3AFI 215-678-8929.

ARRL Handbooks 1940-70 wanted for my collection. Also want Hallicrafters SX-71, S-76, S-40B, SX-24 near mint only. Also James Millen RF Power Amp 90811 uses 829B or 90810 transmitter. Johnson, Millen or ect. Sockets for 810 and 810 tubes W. Smitherman, KD4AE, Rt. 4 Box 37, East Bend, NC 27018 919-699-8699.

SELL: Heath SB-630 Station Console with manual $100. WB4CSK 615-433-5114.

WANTED - Alliance C225 rotator control box, also cw keyer and paddle set. Send price and description K4IHP, 6950 Hunter's Knoll, Atlanta 30328, 404-393-9508.

WILL ACCEPT any reasonable offer-Signal One CX7B, CX7A, Yaesu FT901DM, Collins KWS1, 75A4, Sigma linear model XRD3000 2 × 3-500Z, ETO PA-70V amplifier. Many spare parts for above. Collins round emblems for 30S1 51S1 new $25. each. 28 V power module for 51S1 new $30. Power cords for 516-F2, 75/32S $10. ea. Export inquiries invited. Dr. Mark Musen, P.O. Box 210, East Rockaway, NY 11518.

ANYONE having any mods for HAL DS-3000 KSR and ST-6000 such as IDing, ect for RTTY, Harold Palmer, W4VDC - 4009 Peach Drive, Jacksonville, FL 32216.

DRAKE R4C w/Sherwood CF600/6. FL500 & FL250. T4XC, MS4, AC4, TC2 & SC2 $100. Yaesu FT-101 $400. A. B Buscaglia K2NV, 2497 West River Rd., Grand Island, NY 14072. 716-773-5290.

VIKING Vallant $160, Heath DX-60 HG-10 VFO $95, Gonset G-77 xmtr $65, Heath HD-10 keyer $40, New 4CX250B $40, 4CX250K $30. W8IFN, 4813 St. Charles Rd., Columbia, MO 65201. 314-474-2017.

WANTED: HRO-60 coilsets. Need A, E, F, AA. Sense, 7991 Lutz N.W., Massillon, OH 44646. 216-854-4884.

ROSS'S SECRET: Price, selection, and service mean more than size of ad. New: Kenwood 130SE $569.90. Used: FT101B, cw, for $489. Huge selection, your call will save $$$ or send .37 stamps for 5 pages used, or .95 stamps for 63 pages new. Closed Monday at 2:00. Ross Distributing Co. Preston, ID 83263. 208-852-0830.

OLD TIMERS: Collector-historian looking for old bugs, Vibroplex, McElroy, Speed-X, Bunnell etc. K5RW Neal McEwen 1128 Midway, Richardson, TX 75081. Phone 1-214-235-8636.

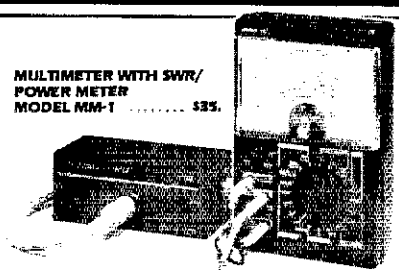
SECRET: Ross's prices, selection, and service, new and reconditioned, are known to many, but too few. A call is worth $$$ or .37 stamps gets 12 pages of special and used gear. Closed Monday at 2:00. Ross Distributing Co. Preston, ID 83263. 208-852-0830.

FOR SALE: Kenwood TS-530S plus MC-30 mic. Purchased 3/11/82 - brand new, perfect condx. Getting new Kenwood. W1CPI 1-401-789-1817.

HEWLETT-PACKARD 5245L laboratory counter with 5253B 500 MHz module, calibrated like new, very nice. Taffett TS-382F/U laboratory audio generator, works fine. Both with factory cables; operating, service manuals. 30% off current Tucker price, postpaid! Craig, K4TXK; 916-885-0225.

HAMMARLUND receiver service by former Factory Service Manager. Limited supply of service manuals and parts. Send wants, SASE. Wayne Cordell, K4HCS, Blue Ridge Communications, Route 4, Weaverville, N.C. 28787 704-645-7070.

FACTORY-DIRECT INFLATION FIGHTERS! PRICES SLASHED DRAMATICALLY!

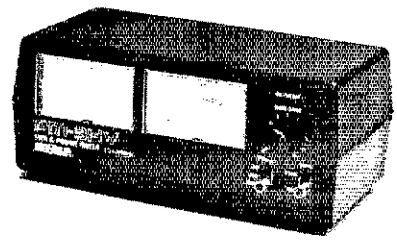


MULTIMETER WITH SWR/ POWER METER MODEL MM-1 ..... **$35.**

The MM-1 is a high quality 20K-ohm/VDC Multimeter usable as a SWR/Power Meter by connecting the directional coupler unit included.

Specifications:

DC Volt	0 — 0.3, 1.2, 6, 30, 120, 600V (20K-ohm/V) ± 3%
AC Volt	0 — 6, 30, 120, 600V (8K-ohm/V) ± 4%
DC mA	0 — 60uA, 3, 300mA ± 3%
OHM	Rx1, Rx10, Rx1K
dB	−20 — +18 0 — +32dBm
C	200pF — 0.5uF
LI	0 — 0.1, 10, 100mA
Frequency Coverage	3.5 — 150MHz
VSWR	1:1 — 3:1
RF Power Range	0 — 20, 200, 1000W ± 10%
Accessory Included	Directional coupler unit with relevant connector cable, test leads and battery
Dimensions	4⅛"(W) x 6¼"(H) x 2"(D): Multimeter 4¼"(W) x 2¼"(H) x 2"(D): Coupler
Net Weight	1.06 lbs. (480 grams): Multimeter 0.75 lbs. (340 grams): Coupler

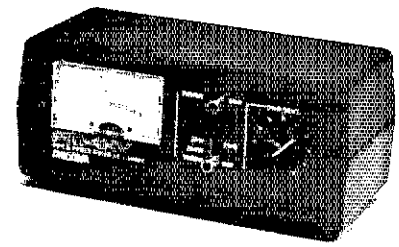


SWR & POWER METER FOR HF/VHF BAND MODEL PM-3HV ..... **$40.**

High quality SWR/Watt meter designed so that SWR and power can be measured independently. Includes meter illumination and "On-the-Air" indicator lamp.

Specifications:

Frequency Coverage	3 — 150MHz
RF Power Range	0 — 20, 200, 1,000W, 3 ranges ± 10% accuracy
Power Source	12V AC/DC (for meter illumination only)
Accessory Included	7ft. long connector cable with fuse for meter illumination purpose
Dimensions	7"(W) x 3"(H) x 3½"(D)
Net Weight	1.8 lbs. (0.8 kgs)



SWR & POWER METER FOR HF/VHF BAND MODEL PM-4HV ..... **$30.**

Compact and light weight SWR/Watt meter designed for mobile operation as well as base station use.

Specifications:

Frequency Coverage	3 — 150MHz
RF Power Range	0 — 20, 200, 1,000W, 3 ranges ± 10% accuracy
Accessory Included	Velcro double back adhesive mounting for mobile installation
Dimensions	6"(W) x 2¾"(H) x 2½"(D)
Net Weight	1 lb. (0.44 kgs)

Mfg. by AKIGAWA ELECTRONICS CORP.

• **Exclusive Distributors: MACAW ELECTRONICS, INC. • P.O. Box 66; Carlsbad, CA 92008; Phone (714) 434-1078; TELEX: 181743 MACAW CSBD**

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ASTRON	BIRD	CDE	HUSTLER	KENWOOD	MIRAGE	REGENCY	UNARCO-ROHN
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MADISON Summer: Big rig buys: FT1 $2395.; TS930S-call; TR7A $1495.; Icom HF-call; Santec ST144UP $299.; FT208R $289.; IC3AT/IC4AT $269. ea; AEA MBARO $269.; MBARC $349.; Kantronics interface $159.; software-stock; IC290A $439.; IC22U $250.; IC25A $309.; TR7850-call; TR7730 $289.; FT480R $449.; TR7730/TTM $309.; Robot '800A $749.; '400 $675.; HAL CT2100 $699.; KB2100 $159.; CWR685A Telereader $875.; CWR670 reader $429.; R600 - call; FRG7700 $449.; Yaesu FT101ZD/Mark 3 $749. Mosley, KLM KT-stock; Visa - MC. Prices fob Houston, items guarenteed. Madision Electronics, 1508 McKinney, Houston, TX 1-713-658-0268; nite 1-800-231-3057 7-10PMCT MWF.

SELL: Heath system with all accessories, mint, antenna system. SASE for details. WD8JMY P.O. Box 728 Jackson, MI 49204-0728.

MACROTRONICS TM800 ham interface for TRS80 factory wired complete M80 M800 FSD1 AFSK $200. WB2VJF 201-471-3798.

KEYERS - $39.95 SASE for information, Webco, Box 740211, Houston, TX 77274.

SELL: Triton IV digital, pwr supply, n/b, cw filter. Excellent condition. Best offer over $350. Cleveland, KC7IW, 12585 Jones Bar Rd., Nevada, City, CA 95959.

STANCOR P-8026 transformer 115 Vac 1000-0-1000 1250-0-1250 300 MA. Brnad new never used $100. or best offer W1KWA 401-434-0889 after 5 PM.

OMNI-D Series B $750 Swan 250C $250 Kenwood 7400A $255 MFJ tuner $50. Frequency Counter $110. Also numerous items. WA3IWW Phone 1-215-385-3343.

WANTED - Manual and parts for Transistor Specialties 365 AR frequency counter. David Potter, Physics-ACC Box 2285 Austin TX 78768.

NOVICES, start with quality. Kenwood R-599 receiver, clean. $250 includes UPS shipping. N6CJH, 182 Montclair Drive, Ventura, CA 93003.

MOTOROLA HT-220 handie talkie, H33FFN-1194. 8-freq, 2M, 5 watts output; Universal (speaker mike included); PL & Omni case; with fresh rapid charge battery and station charger. Heliflex antenna; factory leather case; operating, service manuals; complete records. One owner, excellent, $450. Craig, K4TXK; 916-885-0225.

FT901DM with microphone and SP901P speaker/patch little used $800. Henry 2K-3 80-10m $700 + ship. Johnson kW Matchbox needs relay $50. Swan WM-3000 wattmeter $50. CL-33 on Rohn 37' tower with Ham-m $300 + you take down. WAØJKT Box 75 Hopkins, MN 55343 612-933-3139 days or 612-933-5208 eves.

COLLINS filters F455 FA21 $50, F455 Y 21 $50, F455FA08 $60. W9ZR, 807 bSunbeam Circle, Oneida, WI 54155. 1-414-434-2938.

WANTED Mac-Key K4NBN "no bad news".

WANTED: QKT network (protective interface for telephone patch). John, WB8IPG, 26316 Falmouth; Warren, MI 48089.

REPLACE rusted antenna bolts with stainless steel. Small Quantities, free catalog. Elwick, Dept. 452, 230 Woods Lane, Somerdale, NJ 08083.

MORSE-A-WORD wanted - Myers, 1425 E. Jackson, Elkhart, IN 46516.

HEATH SB-303 receiver, 10 through 80 meters and 33 meters. Ssb, cw and am filters, noiseblanker. KB2FS, 5 Park Drive, Woodstock, NY 12498.

R390A, good condition $300; 28ASR teletype, good condition $250. Bill Hallmark, 304-845-7257.

DRAKE T4XC, R4C, MS4/ps, filters and accessories . . . $1100. WA4BUE after 5PM . . . 804-424-1855.

SELL AN/SRR-13A 4-32mc 5 bands with manual. Good condition. $130. FOB. 415-447-2560 X6394. Karl Pemper.

FOR SALE: Hallicrafters top-of-the-line xmtr, HT-32B. New finals, just aligned - $250 or best offer. Wanted to buy: Used rotator. KA1HRB-Rob. 203-523-5430.

WANTED: RBA-7 VLF receiver, Navy type CFT-4615 B. Prefer excellent to mint condition. Will pay shipping. Jerry Bennett W4BGK 3980 Pineview Dr., Smyrna, GA 30080 404-432-3670.

YAESU FTDX-401: ssb/cw filters, Mint, little use. K4JIL, 305-735-9137. $425.

COLLECTOR'S ITEMS — QSTs complete year 1925, 1926, 1930, 1932, 1938. Partial year 1922, 1923, 1931, 1933, 1937, 1940. Sell complete collection only - total of 82 issues. $195 plus shipping. Howland, 501 Sumner Ave., Clarks Summit, PA 18411. 717-587-5731.

HEATHKIT SB303 (3 filters) $250; SB401 $200; SB620 $125; SB614 $125; SB630 $75; HM102 $25; MFJ-949B $100. All in mint condition. Shipping not included. KA8IDX 313-625-0856 evenings.

SELLING: RTTY package. All mint Drake R-4C, T-4XC, MS-4, PS-4; HAL ST-6000, DS-2000 with Morse decode, 9" electrohome monitor, custom cabling, extra tubes and crystals. Selling only as package, $1600 firm. Prefer pickup See or hear in operation. No unpleasant surprises for buyer. Jim , WB6TFS, 805-397-6579.

WANTED: Digital display unit DG-1 for Kenwood TS-820. Bill Shear, WB2IIG, 12 McFall Road, Apalachin, NY 13732.

WANTED: AM1178/GRC 432Mc multi-amp. W6RQZ 415-526-7345 or write.

SELL: 2-meter FM, Tenham 153 with 832B VFO, manuals. $185. 6-meter Swan 250 with 117XC supply, manual, $225. Will ship, Bill KAØCIR 612-432-0438.

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AMCOMM
S-225 2m FM Xcvr $189 f
ATLAS
210X/NB Xcvr $369 mw
220CS Power supply 99 w
DMK Deluxe mobile mt 19 m
VX-5M VOX 39 m
110L Xcvr (RX+TX) 189 m
PS-110H 12v ps 69 m
CLEGG/SQUIRES-SANDERS
Interceptor VHF Rcvr $ 99 m
CLIFFORD INDUSTRIES
30RM 30A ps w/meters $139 f
COLLINS
75S-1 Ham Rcvr $275 w
75S-3 Ham Rcvr 375 mc
75S-3B Ham Rcvr 450 mf
75S-3B Rcvr (round) 549 w
75S-3C Rcvr (round) 649 m
51S-1 SW Rcvr 995 w
32S-3 Transmitter 425 wc
30L-1 Linear 499 c
312B-4 Station control 199 w
KWM-2 Xcvr 499 wfc
KWM-2 Xcvr (round) 599 v
312B-5 PTO console 299 c
351D-2 Mobile mount 45 f
516F-2* AC supply 175 mwfcv
*Not sold separately
CC-2 Carrying case 49 w
DENTRON
160-1DAT-3K Tuner $ 99 w
MT-3000A Tuner 249 me
GLA-1000 Linear 249 w
Clipperton L Linear 479 w
HF-ACS Power supply 39 m
DRAKE
SW-4A SWL Rcvr $169 f
SPR-4 SW Rcvr 249 v
SSR-1 SW Rcvr 149 mc
2B Ham Rcvr 129 mf
2BQ Spkr/Q-mult 29 m
R-4 Ham Rcvr 199 m
R-4A Ham Rcvr 229 mwf
R-4B Ham Rcvr 269 mwfc
R-4C Ham Rcvr 375 mc
MS-4 Speaker 19 mwfv
4NB Noise blanker 49 m
FS-4 Synthesizer 169 m
FL-250 Filter 35 m
FL-500 Filter 35 m
FL-1500 Filter 35 w
R-7/4 filters SW Rcvr 1149 e
SC-2 2m rcv conv 69 w
2NT CW transmitter 79 m
T-4X Transmitter 239 m
T-4XB Transmitter 275 v
T-4XC Transmitter 375 mw
TR-3 Xcvr 229 v
TR-4 Xcvr 299 mfc
TR-4/NB Xcvr 349 m
TR-4C Xcvr 375 mwf
TR-4CW/NB Xcvr 499 m
RV-4 Remote VFO 69 f
TR-6/NB 6m Xcvr 469 m
AC-3 AC supply 59 mwce
AC-4 AC supply 89 mwfv
DC-3 DC supply 49 m
DC-4 DC supply 85 f
TR-7/NB/3 filt/fan/aux 1199 m
PS-7 Power supply 199 m
WH-7 Wattmeter 89 ce
MN-4 200w tuner 69 v
MN-7 250w tuner 129 w
UV-3 (3-band)/TTP mic 699 m
PS-3 Power supply 59 m
Theta 7000E Terminal 699 m
HAL
RVD-1005 Video unit $249 m
ESM-914 9" monitor 119 m
CT-2100 Terminal 599 f
KB-2100 Keyboard 125 f
ICOM
IC-701PS Power supply $ 99 w
IC-730 Xcvr 569 e
IC-551 6m Xcvr 299 mf
IC-551D 80w 6m Xcvr 449 m
IC-22U 2m FM Xcvr 179 f
IC-230 2m FM Xcvr 129 mc
IC-245 2m FM Xcvr 199 mf
IC-245/TTP mic 239 c
IC-245/SSB 2m Xcvr 269 mwf
IC-255A 2m FM Xcvr 219 e
IC-280 2m FM Xcvr 199 w
IC-202S/BC-20 2m Xcvr 229 v
IC-3PA ps/speaker 39 m
KLM
Multi-2700 2m Xcvr $369 m
Echo 70 432 Xcvr 289 m
4-80BL 2m 4/80w amp 119 w
10-35CL 450 10/35w 89 m
15-40CL 450 15/40w 129 w
KANTRONICS
Field Day Reader $269 c
KENWOOD
TS-511 Xcvr $269 c
PS-511 Power supply 69 c
VFO-5 Remote VFO 69 c
R-599A Ham Rcvr 229 c
T-599A Transmitter 269 c
TS-120S Xcvr 449 m
TS-130V QRP Xcvr 429 w
VFO-120 Remote VFO 119 m
AT-120 Ant tuner 69 w
TS-520 Xcvr 449 f
TS-520/CW filter Xcvr 479 c
TS-520S/DC mod Xcvr 479 f
AT-200 Ant tuner 115 c
TS-600 6m Xcvr 469 f
TS-700A 2m Xcvr 389 wfc
TR-2200A 2m FM Xcvr 119 mf
TR-7400A 2m FM Xcvr 229 f
TR-7600 2m FM Xcvr 199 w
TR-7625 2m FM Xcvr 239 mwc
TR-7730 2m FM Xcvr 229 e
TR-7800 2m FM Xcvr 269 m
TR-9000 2m FM Xcvr 299 f
MCM (DAIWA)
CNW-518 Ant tuner $229 m
MFJ
494 Keyboard $189 m
752B Dual filter 59 f
MACROTRONICS
TA-650 Interface/Apple $349 m
MICROCRAFT
Model II CW reader $ 89 m
MICROLOG
AKB-1 Keyboard $199 m
AVR-2 Demodulator 399 m
MIDLAND
13-510 2m FM Xcvr $199 m
13-510A 2m FM Xcvr 229 m
J.W. MILLER (DAIWA)
AT-2500 Ant tuner $569 m
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P-310X Preamp $ 89 m
PANASONIC
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RF-2900 SW Rcvr 169 wce
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270 Cygnet Xcvr 269 wf
270B Cygnet Xcvr 269 wf
270B/SS-16 filter 299 m
300B Cygnet Xcvr 289 m
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350 Xcvr 189 v
500 Xcvr 249 c
HF-700S Xcvr 329 mc
750CW/SS-16 Xcvr 399 m
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117XC AC ps/spkr 99 c
PSU-3A AC supply 119 mfc
412 DC supply 29 m
512 DC supply 29 f
405 MARS oscillator 34 c
600R/SS-16 Custom Rcvr 289 m
600T Transmitter 249 m
VX-2 VOX 29 mf
DD-76 Digital dial 119 m
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Tempo One Xcvr $289 wc
AC One AC supply 89 wc
VFO One Remote VFO 89 w
2020 Xcvr 469 wc
8120 Speaker 19 w
S-1T 2m FM HT/TTP 169 e
TEN-TEC
509 Argonaut Xcvr $269 m
515 Argonaut Xcvr 299 m
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210 AC supply 19 m
670 Keyer 19 m
276 Calibrator 19 m
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252G Power supply 99 w
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Omni-D conv B/NB/filts 599 m
Omni-D series C Xcvr 799 mc
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525 Argosy/CW filter 399 m
225 Power supply 89 m
214 Electret mic 19 m
215P Microphone 15 m
216 Microphone 15 m
KR-50 Keyer 59 w
645 Keyer 59 m
VOMAX
4-C Speech processor $ 89 v
WILSON
WE-800 2m FM Xcvr $199 mc
YAESU
FRDX-400 Ham Rcvr $199 f
FL-101 Transmitter 299 m
FT-101 Xcvr 449 mf
FT-101B Xcvr 469 mwf
FT-101E/CW filter 599 m
FT-101EE Xcvr 539 f
FT-101EE/proc/CW filt 599 m
FT-101ZD Dig Xcvr 599 mv
FT-101ZD/CW filter 629 v
SP-101P Speaker/patch 49 w
FP-107E Power supply 99 f
FT-301 Digital Xcvr 429 w
FT-301AD Dig Xcvr 469 c
SP-901P Speaker/patch 55 m
FV-901DM Remote VFO 269 m
YO-901P Monitor scope 359 m
YR-901 RTTY/CW read 369 m
YK-901 Keyboard 119 v
FTV-901R 2m Xvtr 269 m
FT-707 Xcvr 549 m
FC-707 Ant tuner 89 v
FL-2100 Linear 369 w
FRG-7 SW Rcvr 189 v
FRG-7000 SW Rcvr 329 m
FTV-650 6m Xvtr 139 m
FTV-250 2m Xvtr 169 mw
FT-620B 6m Xcvr 289 wf
FT-625RD 6m Xcvr 449 f
FT-627RA 6m FM Xcvr 249 m
FT-690R 6m port Xcvr 269 m
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FT-127 220 FM Xcvr 219 f
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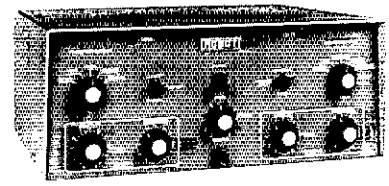

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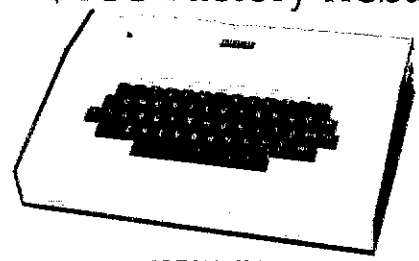

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★ ★ ★ **BONUS** ★ ★ ★
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f = **Orlando, FL** 32803; 621 Commonwealth Ave	(305) 894-3238	1-800-327-1917	1-800-432-9424
c = **Clearwater, FL** 33515; 1898 Drew Street	(813) 461-4267		
v = **Las Vegas, NV** 89106; 1072 N. Rancho Drive	(702) 647-3114	1-800-634-6227	
e = **Chicago, IL** Erickson Communications (Associate)	(312) 631-5181	1-800-621-5802	

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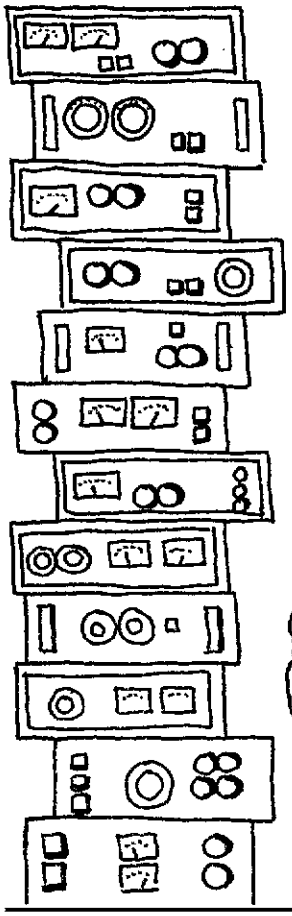

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$55. WB5GDB, 9816 Honey Suckle, Oklahoma City, OK 73159.

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FOR SALE: Heathkit Model SB-614 station Monitor Scope. Finished assembly and tested at the factory. Never used. K3DHM, Lawrenceville, PA 16929. 717-827-2521.

ALPHA 78 Mint $2000 W4ZJY.

FOR SALE, RTTY models ASR-28, ASR-33 and assorted parts, Western Union Telefax, and Heathkit IO-104 15 Mhz oscilliscope, write or call Chris, WB1FSS for details, 401-846-9058.

TR-4, AC-4 power supply, speaker. Perfect operating condition. $265. W4YHB 305-732-1673.

30S1, $1750. 75S1, 300 Hz cwf $350. Prop-pitch (large), converted by M.E. (MIT), control console; beautiful $495. Dentron AC-1200-PS (new) $75. 75S1, 32S1, 516F2, 312B4 $750. IC255A (new) $299. James Craig, 32 Birchwood Drive, Rye, NH 03870. 603-964-6658.

KENWOOD TS-830-S transceiver mint new 10/81 $695., Henry 2KD-5 linear with 10 meters mint new 9/81 $695., Kenwood SM-220 oscilloscope with BS-8 panadaptor excellent $300., K6KUQ, 209-733-3215, Box 3923, Visalia, CA 93278.

DRAKE TR7-DR7 transceiver, PS7 power supply, 2FA7 fans, SL500 cw filter, SP75 speech processor, RV7-VFO, MS7 speaker, Shure 444 mike. This complete station guaranteed perfect working and mint condition - $1495. Berne-KO2F-212-634-2167 Evenings-weekends.

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KENWOOD TR-9000 All mode 2M transceiver — mint condition $325. W7BYG 509-682-2440.

WANTED: Collins KWM2A, 75S3C, 30L1, 30S1, RCA TacTec. W9QYH, 1605 Ridge Rd., Green Bay, WI 54304.

TS 120S, SP120 and mike $450. Heath SB644A VFO $75. Mint. D. Sowers, K4SUE 522 McGeorge Dr., Vinton, VA 24179. 703-890-2372.

WANTED: TA40KR Mosely 40-meter extender, AC9H, 15890 Allison, New Berlin, WI 53151.

COLLINS 32S3 $395, Magnum-6 $85, 351R-2 rack mount (new) $35. Randy Schaaf, 807 Sunbeam, Oneida, WI 54155. 1-414-434-2938.

HAL DS-2050 video RTTY terminal. Mint condition. $525. N5SM Scott McDowell, 3715 Lenwood Amarillo, TX 79109. 806-355-5019.

VERY MINT Hallicrafter station; HT33B, HT32B, SX115, R-47, plus three used PL-172 tubes. Asking $1000. Pickup or will deliver within 300 miles. WB9UQP 414-763-7405.

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PARTS Needed: Ranger mod. xfmr. 10 × 17 × 5 steel chassis with bottom plate. 1-3p5t ceramic switch. 1-1p1t ceramic switch. 2ea. Johnson "E" type cap. 154-0016-001, 32-241pf, 4500V, 10" long. Con Helber KØRAX Star Route, Middlebrook, MO 63656.

SELL Heathkit HW-101, power supply, speaker, phone patch, Astatic mike, manuals, $300. Will ship UPS. W9ZVY, J. B. Catlin, 1640 Palisades Dr., Appleton, WI 54911, 414-731-1519.

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ALPHA amplifier wanted, W4JVN.

SALE: TS-830S - $700. MC-50 mic - $50. N2BJC, 716-683-5703.

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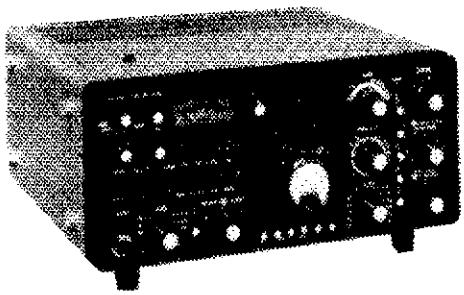

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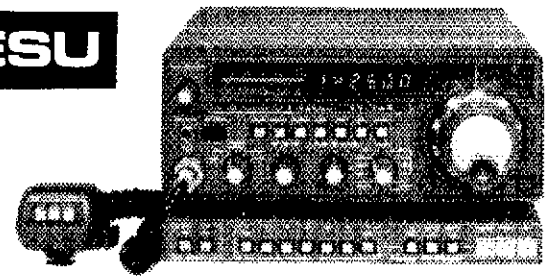

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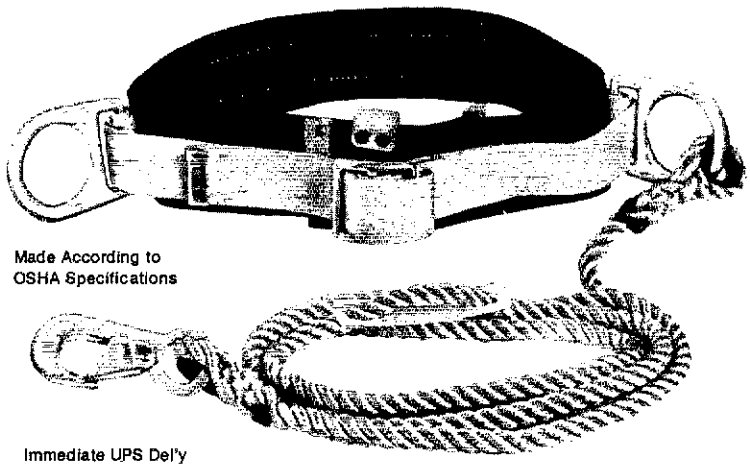

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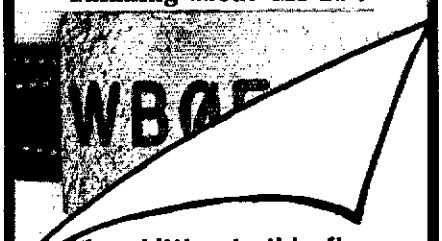

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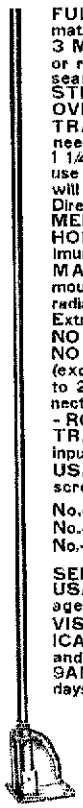

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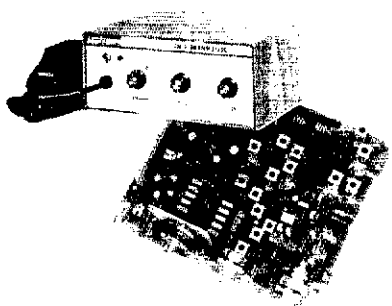

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TEN-TEC Argonaut 515. Mint $300. WD5JFK, 8204 Columbia, Tyler, TX 75703.

COLLECTORS - Old portable Wheatstone Bridge. $100 postpaid W2PTI 315-788-1621.

DRAKE C-Line; 1.5 & .5 filters, n.b., 10 SW xtals, AC-4, MS-4, manuals, $850. Sony ICF-2001 $250. WB9AQI, 3935 N. 75th St., Milwaukee, WI 53216. 414-438-0291.

FOR SALE: Drake 2B receiver, 2BQ Q-Multiplier and speaker, $125. or best offer; Kantronics Mini-Code reader, $230./best offer; Heathkit IB-101 counter and IB-102 scaler, both $90/best offer, counter serviced April 1982; all equipment in excellent condition; Paul, WA6NLJ, 213-843-0879.

DENTRON Clipperton-L 160-10, 2kW amplifier. New Dahl H-D transformer and Cetron tubes. Major overhaul just completed, all parts tested and replaced, if necessary. This one is better than new. Mint with manuals, cartons and cover. $525 Tye, KB8FJ, Rt. 1, Box 49-H, Lost Creek, WV 26385. 304-745-5275.

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SELL Telco 125 2-meter amplifier. 1 watt in for 25 out. See Product Review in March 1978 QST. Like new condition. $50 pp in 48. Call before 10 PM EASTERN time. Peter O'Dell, KB1N, 7 Brian Road, South Windsor, CT 06074. 203-666-1541 days and 203-644-3543 evenings.

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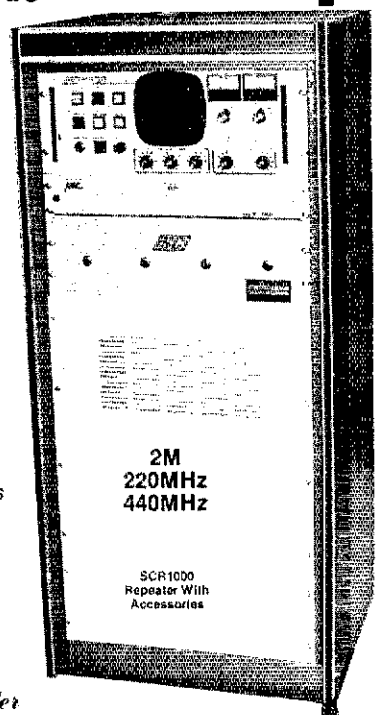

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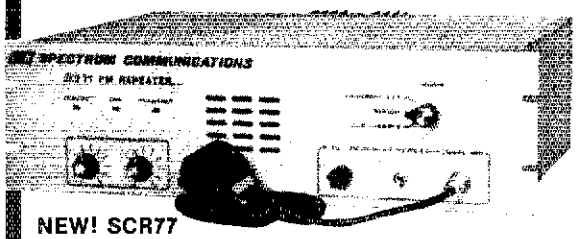

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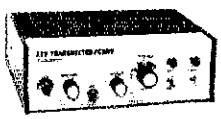

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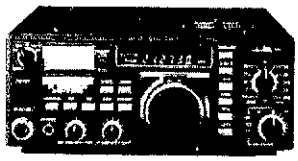

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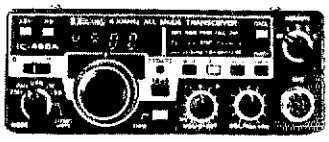

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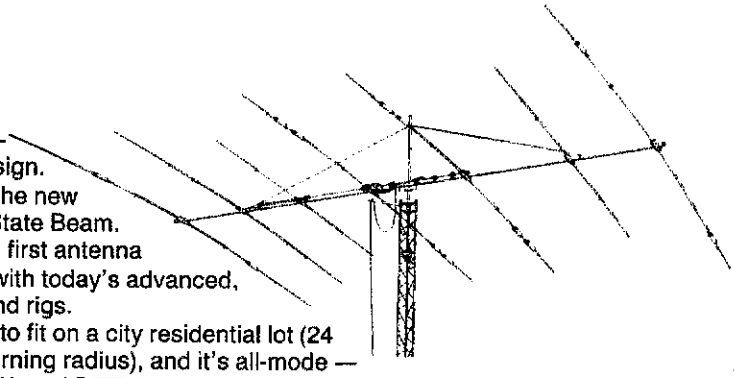

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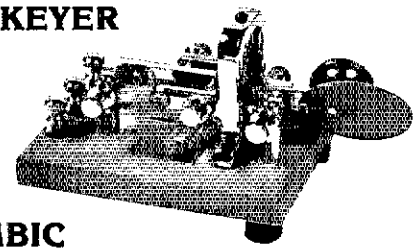

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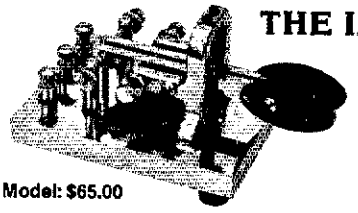

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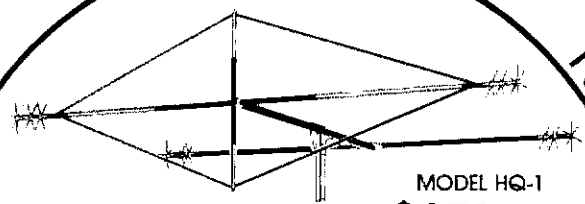

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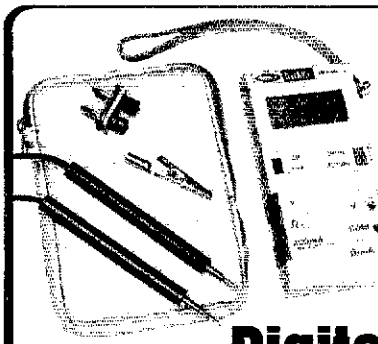

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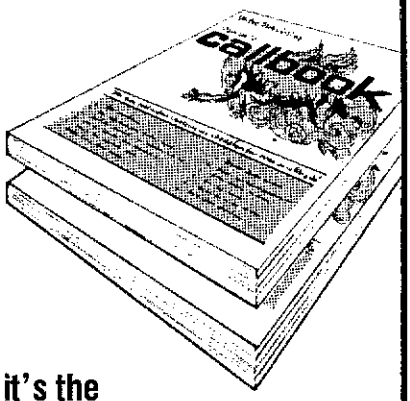

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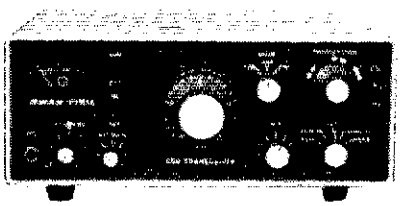

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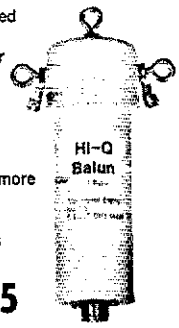

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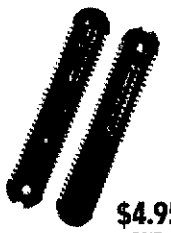

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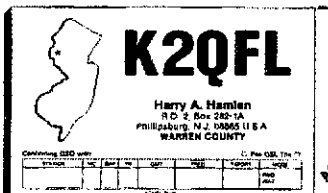

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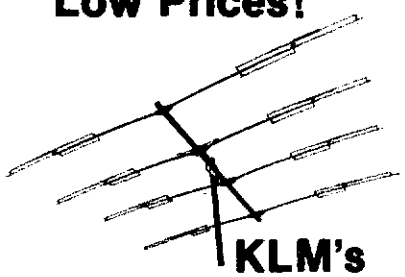
Index of Advertisers

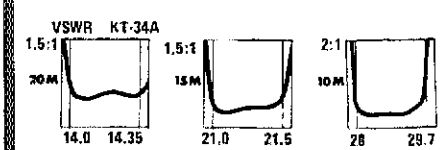
ANTENNA SYSTEMS/TOWER HARDWARE

KLM - In Stock at Terrific Low Prices!



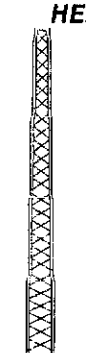
KLM's KT-34A

The new concept in triband antenna design. Gain and band width all in one compact package. VSWR curves.



List Price 389.95 SALE PRICE $319

HELD OVER by Popular Demand



UNARCO-ROHN Self Supporting Towers — On Sale!

Freight Prepaid

These rugged beauties are being offered at Big Discounts and - we are shipping them freight prepaid! Look over the specifications and pick the unit most suited for your needs, then - Call us to place your order with Mastercard/Visa or write and include your check for quick shipment - Freight Prepaid!

And – Save even more – include antenna and rotor of your choice with the order and we will ship them along freight prepaid also! Hows that for good old fashioned savings?

Tower Model	Tower Ht.	Load Rating	Ship Weight	Tower Base	Tower Price	Base Price	Total Price
HBX40	40 ft	10 sq ft	164	BXB6	269	24	293
HBX48	48 ft	10 sq ft	303	BXB7	349	26	375
HBX56	56 ft	10 sq ft	385	BXB8	419	30	449
HDBX40	40 ft	18 sq ft	281	BXB7	313	26	339
HDBX48	48 ft	18 sq ft	363	BXB8	399	30	429

BUTTERNUT

HF6V	80-10 mtr. Vertical	$109
TBR160	160-mtr. Coil Kit	$ 33
RM KIT	Roof Mount w/Stub Tuned Radials.	$ 33
STR KIT	Stub Tuned Radial Kit	$ 20
2MCV	2 mtr. Trombone Vertical	$ 29

CUSHCRAFT

A3	3-El. Triband Beam	$169
A4	4-El. Triband Beam	$209
A743	40 mtr. Add-on Kit for A3 Antenna	$ 59
A744	40 mtr. Add-on Kit for A4 Antenna	$ 59
R3	New Motor Tuned 20/15/10 mtr. Vertical.	$229
AV5	80-10 mtr. Trap Vertical	$ 89
20-3CD	3-El. 20 mtr. Beam	$169
20-4CD	4-El. 20 mtr. Beam	$239
15-3CD	3-El. 15 mtr. Beam	$ 89
15-4CD	4-El. 15 mtr. Beam	$ 99
10-3CD	3-El. 10 mtr. Beam	$ 69
10-4CD	4-El. 10 mtr. Beam	$ 89
A50-5	5-El. 6 mtr. Beam	$ 59
617-6B	6-El. 6 mtr. "Boomer"	$169
214B	14-El. 2 mtr. "Boomer"	$ 66
214FB	14-El. 2 mtr. FM "Boomer"	$ 66
228FB	28-El. 2 mtr. FM "Power Pack"	$189
32-19	19-El. 2 mtr. "Super Boomer"	$ 79
220B	17-El. 220 MHz "Boomer"	$ 69
ARX2B	2 mtr. "Ringo Ranger II"	$ 36
ARX450B	450 Mhz "Ringo Ranger II"	$ 38
A147-20T	2 mtr. Vert. & Horiz. 10-El. Beam	$ 59
A144-10T	10-El. 2 mtr. Satellite Antenna	$ 45
A144-20T	20-El. 2 mtr. Satellite Antenna	$ 66
A432-20T	20-El. 432 MHz. Satellite Antenna	$ 45
A14T-MB	Dual Antenna Mounting Assembly	$ 24

MANY OTHER CUSHCRAFT ANTENNAS IN STOCK – CALL!

HYGAIN

V2S	New 2 mtr. Base Vertical	$ 38
TH5DXS	5-El. Triband Beam	$209
TH7DXX	New 7-El. Triband Beam	$339
TH3MK3S	3-El. Triband Beam	$199
TH3JRS	3-El. Triband Beam	$159
TH2MK3S	2-El. Triband Beam	$139
HY-QUAD	2-El. Triband Quad	$249
402BAS	2-El. 40 mtr. Beam	$189
205BAS	5-El. 20 mtr. "Long John"	$289
155BAS	5-El. 15 mtr. "Long John"	$169
105BAS	5-El 10 mtr. "Long John"	$119
204BAS	4-El. 20 mtr. Beam	$219
203BAS	3-El. 20 mtr. Beam	$119
153BAS	3-El. 15 mtr. Beam	$ 72
103BAS	3-El. 10 mtr. Beam	$ 59
DB1015AS	3-El. 10/15 mtr. Beam	$159
64BS	4-El. 6 mtr. Beam	$ 49
66BS	6-El. 6 mtr. "Long John"	$ 99
18HTS	80-10 mtr. Hy-Tower Vertical	$329
18AVT/WBS	80-10 mtr. Trap Vertical	$ 89
214	14-El. 2 mtr. Beam	$ 33
28DQ	80/40 mtr. Trap Dipole	$ 49
5BDQ	80-10 mtr. Trap Dipole	$ 89
BN86	80-10 mtr. KW Balun	$ 15

HUSTLER

3TBA	New 3-El. Triband Beam	$199
4BTV	40-10 mtr. Vertical	$ 79
5BTV	80-10 mtr. Vertical	$ 99
G6-144B	2 mtr. Base Vertical.	$ 69
G7-144	2 mtr. Base Vertical.	$ 99

HF Mobile Resonators (STD 400 Watt) Super 2 KW)

10 & 15 mtrs.	$10	$15
20 mtrs.	$12	$18
40 mtrs.	$15	$21
75 mtrs.	$17	$32

BUMPER MOUNTS, SPRINGS, FOLDING MASTS IN STOCK CALL!

KLM

KT34XA	6-El. Tribander	$479
7.2-1	40 mtr. Rotatable Dipole	$159
7.2-2	2-El. 40 mtr. Beam	$299
7.2-3	3-El. 40 mtr. Beam	$449
7.0-7.3-4A	4-El. 40 mtr. Beam	$629
144-148-13LB	13-El. 2 mtr. Long Boomer	$ 79
432-16LB	16-El. 432 Mhz. Long Boomer	$ 69
144-150-16C	16-El. 2 mtr. Circular Pol. Beam	$ 99
420-450-18C	18-El. 435 MHz. Circular Pol. Beam	$ 59

CALL FOR OUR LOW PRICES ON OTHER KLM PRODUCTS!

MINI PRODUCTS

HQ-1	Mini-Quad Compact 20/15/10 mtr. Antenna	$139

MOSLEY

CL-33	3-El. Triband Beam	$229
CL-36	6-El. Triband Beam	$309
TA-33	3-El. Triband Beam	$199
TA-33 Jr.	3-El. Triband Beam	$149
TA-36	6-El. Triband Beam	$309
S-402	2-El. 40 mtr. Beam	$279

ROTORS & CABLES

Alliance HD73 (10.7 sq. ft. Rating)	$ 99
Alliance U100 (For small beams & Oscar Elev. Rotor)	$ 45
CDE Ham 4 (15 sq. ft. Rating)	$169
CDE Tailtwister (30 sq. ft. rating)	$239
HYGAIN HDR-300 (Most H.D. Rotor for BIG Arrays)	$399
8 COND (2-#18 GA/6-#22 GA) Rotor Cable	$0.19/ft.
H.D. 8 COND (2-#16GA./6-#18GA.) Rotor Cable	$0.36/ft.

COAXIAL CABLE & CONNECTORS

RG213/U (95% shield - non-contaminating jacket)	$0.29/ft.
RG8X (95% shield-non contaminating jacket).	$0.18/ft.
RG11/U (75 OHM - 95% shield)	$0.35/ft.
½" Aluminum Hardline w/poly jacket	$0.69/ft.
½" Copper Hardline w/poly jacket	$1.10/ft.
½" Alum. H.L. Conn (UHF or N - Male or Female).	$15.00
½" Copper H.L. Conn (UHF or N - Male or Female)	$22.00
Amphenol Silver Plate PL259	$ 1.25
Amphenol Nickel Plate PL259	$ 0.90
Amphenol N Type Male Conn For RG213/U	$ 2.95

HYGAIN CRANKUPS

HG37SS	37 ft. Self Supporting	$589
HG52SS	52 ft. Self Supporting	$829
HG54HD	Heavy Duty 54 Ft. Self Supporting.	$1379
HG70HD	Heavy Duty 70 Ft. Self Supporting.	$2379
HG50MT2	50 ft. Side Supported.	$689

ALL HYGAIN TOWERS FREIGHT PAID! CALL FOR PACKAGE QUOTE ON TOWER, ANTENNA & ROTOR—FREIGHT PAID.

ROHN TOWERS

20G – $32.50 25G – $38.50 45G – $87.50

HBX32	32 ft. Free Standing (rated 10 sq. ft.)	$169
HDBX32	32 ft. Free Standing (rated 18 sq. ft.)	$189
HBX40	40 ft. Free Standing (rated 10 sq. ft.)	$229
HDBX40	40 ft. Free Standing (rated 18 sq. ft.)	$259
HBX48	48 ft. Free Standing (rated 10 sq. ft.)	$289
HDBX48	48 ft. Free Standing (rated 18 sq. ft.)	$319
HBX56	56 ft. Free Standing (rated 10 sq. ft.)	$349
FK2548	48 ft. 25G Foldover Tower	$719
FK2558	58 ft. 25G Foldover Tower	$799
FK2568	68 ft. 25G Foldover Tower	$879
FK4544	44 ft. 45G Foldover Tower	$1019
FK4554	54 ft. 45G Foldover Tower	$1119
FK4564	64 ft. 45G Foldover Tower	$1219

Foldover Towers Freight Paid-10% Higher West of Rockies.
ALL ROHN ACCESSORIES IN STOCK – CALL!

GALVANIZED STEEL TWR. HARDWARE

3/16" EHS Guywire (3990 lbs.).	$12/100 ft.	$111/1000 ft.
1/4" EHS Guywire (6000 lbs.)	$15/100 ft.	$139/1000 ft.
5/32" 7 x 7 Aircraft Cable (2700 lbs.)		$11/100 ft.
3/16" CCM Cable Clamp (3/16" or 5/32" Cable).		$0.30
1/4" CCM Cable Clamp (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)		$6.50
1/2 EE (1/2" Eye & Eye Turnbuckle)		$8.50
1/2 EJ (1/2" Eye & Jaw Turnbuckle)		$9.50
3/16" Preformed Guy Grip		$1.65
1/4" Preformed Guy Grip		$1.85
6" Diam - 4 ft. Long Earth Screw Anchor		$12.50
2" Diam - 10 ft. Long Heavy Duty Steel Mast.		$39.00
5000 Guy Insulator (5/32" or 3/16" Cable)		$0.95
502 Guy Insulator (1/4" Cable).		$1.95
5/8" Diam - 8 ft. Copper Clad Ground Rod w/clamp.		$11.00

ANTENNA WIRE & ACCESSORIES

12 Ga. Solid Copperweld (Multiples of 50 ft.).	$5/50 ft.
14 Ga. Solid Copperweld (Multiples of 50 ft.).	$5/50 ft.
14 Ga. Stranded Copper (Multiples of 50 ft.)	$5/50 ft.
14 Ga. Stranded Copper (70 ft. coil)	$ 7.00
14 Ga. Stranded Copper (140 ft. Coil)	$ 14.00
18 Ga. Copperweld (1/4 mile spool)	$30.00
Heavy Duty B&W End Insulator	$4/Pair
HYGAIN Model 155 Center Insulator	$ 5.95
HYGAIN Model 157 Center Insulator w/S0239.	$11.95
450 OHM H.D. Low Loss Ladder Line.	$.14/ft.

master charge

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A DIVISION OF TEXAS RF DISTRIBUTORS, INC.
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Does Your Shiny New Rig Really Have:

"STATE-OF-THE-ART" SELECTIVITY

EXCITING NEW RADIO ACCESSORIES

Add an Autek.

QF-1A Active Filter

For SSB & CW

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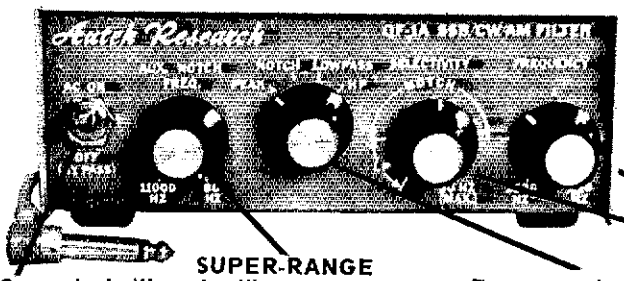
Only $73 ppd. U.S.A.



115 VAC supply built-in. Filter by-passed when off.

SUPER-RANGE Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.

Four main filter modes for any QRM situation.

Continuously variable main selectivity (to an incredible 20 Hz!)

Continuously variable main frequency. (250 to 2500 Hz, all modes.)

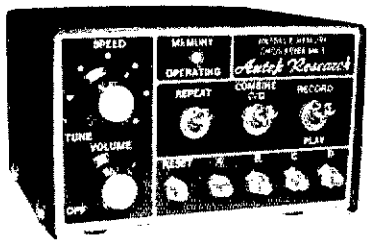
AUTEK pioneered the **ACTIVE AUDIO FILTER** way back in 1972. Today, we're still maintaining that engineering leadership. Our **QF-1A** evolved from suggestions from thousands of owners, and years of dedication to making the "ultimate" filter. No gimmicks — just something that really "works" like the ad says. You're in for a treat!

Autek filters gained their reputation by using a costly **INFINITELY VARIABLE** design. Yet, mass-production (we sell only **ONE MODEL** — the best) makes it a tremendous bargain. You're not limited by a few fixed positions. You vary selectivity 100:1, and vary frequency over the entire usable audio range. **PEAK CW** (or voice) with an incredible **20 HZ BANDWIDTH**, but also variable all the way to "flat." Imagine what the **NARROWEST CW FILTER MADE** will do to **QRM!** Reject whistles with the most flexible **NOTCH** you've heard. Wide or narrow. Depth to 70 dB. **LOWPASS** helps you cope with **SSB** hiss and splatter. Skirts exceed 80 dB. Most above features were in the popular QF-1 (See excellent review in March, 1977 **QST**.) The new "A" model is more selective, adds a **HIGHPASS** mode for **SSB**, and a great **AUXILIARY NOTCH** (35 to 60 dB) to give **TWO NOTCHES, NOTCH/PEAK, NOTCH/LOWPASS,** or **NOTCH/HIGHPASS!** If this doesn't convince you, please **ASK ON THE AIR.** Owners are our best salesmen!

Due to cost and panel-space limitations, even the latest rigs only include a fraction of the **QF-1A** features. We recommend you buy the best rig you can afford, spend $3,000 or more, then add a **QF-1A** and listen to the improvement! **WORKS WITH** Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Collins, Heath, S/1, etc., **ANY RIG!**

Hooks up in minutes. Plug into your rigs phone jack, or attach to speaker wires. Plug speaker or phones into **QF-1A** rear-panel jack. That's it! Filter supplies 1 watt to fill a room. No batteries rqd. (+12 VDC hookup possible.) 6½x5x2½". Handsome light/dark grey styling. Get yours today.!

CMOS PROGRAMMABLE KEYER MAKES CW FUN!



Calls CQ while you relax.
Also remembers name, QTH, contest exchanges.
Record anything you want in seconds!

Model MK-1 $104.50 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. 6x3½x1.5". Burned-in and tested. Sockets for IC's. Full instructions.

NOW AVAILABLE. 4096 BIT MEMORY EXPANDER (ME-1) allows 16 messages, 400 chars. & "combine" for longer messages. Plugs into memory socket of **ANY MK-1** ever made. Installs in 10 to 30 mins. Full instructions. Buy your **MK-1** now and easily add memory later if you wish!

FLASH! An MK-1 breaks its old world CW record! A single operator worked well over 4000 DX QSO's in 48 hours. And heard the weak ones through a QF-1. Second-place wasn't even close. Get the choice of champions — AUTEK!

ORDER BLANK (Or Use Separate Sheet of Paper)

Please Rush ppd. via Speedy UPS.

- ☐ **QF-1A Filter at $73.00**
- ☐ **MK-1 Keyer at $104.50**
- ☐ **ME-1 Expander for MK-1 at $35 [factory installed]**
- ☐ **ME-1 Owner installed at $25 [save $10]**

Add 5% tax in Fla. Add $3 each to Canada, Hawaii and Alaska. $3 for UPS air. Add $18 each elsewhere [shipped air].

Enclosed is $ _____

VISA or MC# _____ Exp. date _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Send to Autek Research, Box 302, Dept. E., ODESSA FL 33556

PRICING: Autek is an innovator, so we're heavily copied. Yet, the "copies" cost you much more. We also give you a free AC supply and pay US shipping. How do we do it? Volume. And because WE SELL ONLY FACTORY DIRECT. No 25% to 50% middlemen markups.

DELIVERY: For 9 years we've shipped over 95% of orders from stock. Some companies have regular long delays. Not us. Order with confidence.

REPUTATION: Don't take our word. Ask on the air for a personal recommendation.

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Autek Research

Box 302
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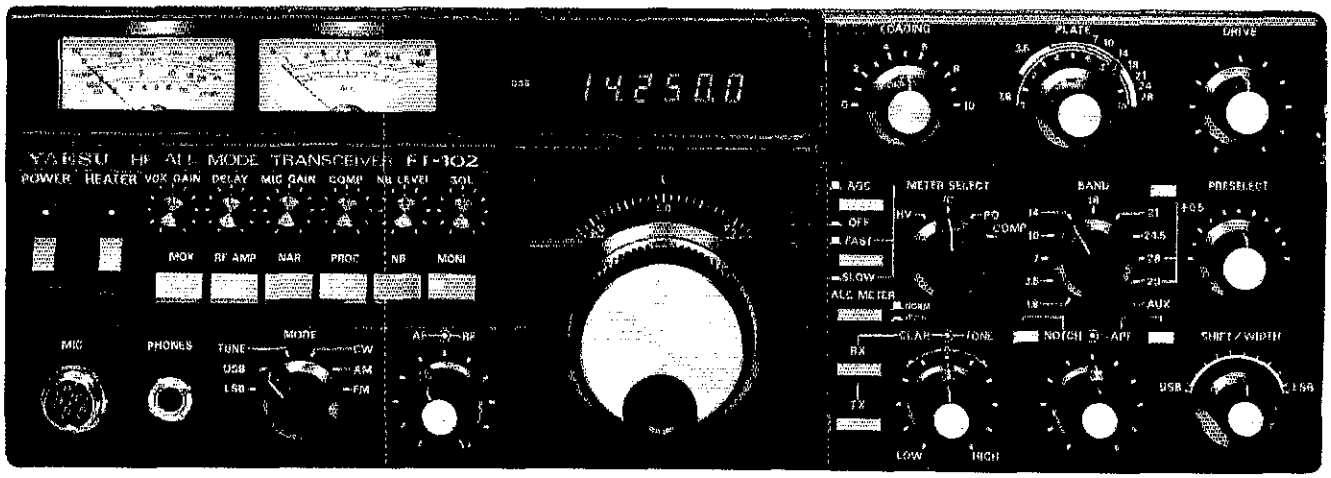
ODESSA, FL
33556

New Yaesu FT-102 Series
Transceiver of Champions!



The long-awaited new generation of Yaesu HF technology has arrived! New research in improved receiver filtering and spectral purity is brought to bear in the competition-bred FT-102, the HF transceiver designed for active Amateurs on today's intensely active bands!

Unique Cascaded Filter System
The FT-102 utilizes an advanced 8.2 MHz and 455 kHz IF system, capable of accepting as many as three filters in cascade. Optional filters of 2.9 kHz,1.8 kHz, 600 Hz, and 300 Hz may be combined with the two stock 2.9 kHz filters for operating flexibility you've never seen in an HF transceiver before now!

All New Receiver Front End
Utilizing husky junction field-effect transistors in a 24 volt, high-current design, the FT-102 front end features a low-distortion RF preamplifier that may be by-passed via a front panel switch when not needed.

IF Notch and Audio Peak Filter
A highly effective 455 kHz IF Notch Filter provides superb rejection of heterodynes, carriers, and other annoying interference appearing within the IF passband. On CW, the Audio Peak Filter may be switched in during extremely tight pile-up conditions for post-detection signal enhancement.

Variable IF Bandwidth with IF Shift
The FT-102's double conversion receiver features Yaesu's time-proven Variable Bandwidth System, which utilizes the cascaded IF filters to provide intermediate bandwidths such as 2.1 kHz, 1.5 kHz, or 800 Hz simply by twisting a dial. The Variable Bandwidth System is used in conjunction with the IF Shift control, which allows the operator to center the IF passband frequency response without varying the incoming signal pitch.

Wide/Narrow Filter Selection
Depending on the exact combination of optional filters you choose, a variety of wide/narrow operating modes may be selected. For example, you may set up 2.9 kHz in SSB/WIDE, 1.8 kHz in SSB/NARROW, then select 1.8 kHz for CW/WIDE, and 600 Hz or 300 Hz for CW/NARROW. Or use the Variable Bandwidth to set your SSB bandwidth, and use 600 Hz for CW/WIDE and 300 Hz for CW/NARROW! No other manufacturer gives you so much flexibility in selecting filter responses!

Variable Pulse Width Noise Blanker
Ignition noise, the "Woodpecker," and power line noise are modern-day enemies of effective Amateur operation. The FT-102 Noise Blanker offers improved blanking action on today's man-made noise sources (though no blanker can eliminate all forms of band noise) for more solid copy under adverse conditions.

Low Distortion Audio/IF Stage Design
Now that dynamic range, stability, and AGC problems have been largely eliminated thanks to improved technology, Yaesu's engineers have put particular attention on maximizing intelligence recovery in the receiver. While elementary filter cascading schemes often degrade performance, the FT-102's unique blend of crystal and ceramic IF filters plus audio tone control provides very low phase delay, reduced passband ripple, and hence increased recovery of information.

Heavy Duty Three-Tube Final Amplifier
The FT-102 final amplifier uses three 6146B tubes for more consistent power output and improved reliability. Using up to 10 dB of RF negative feedback, the FT-102 transmitter third-order distortion products are typically 40 dB down, giving you a studio quality output signal.

Dual Metering System
Adopted from the new FT-ONE transceiver, the Dual Metering System provides simultaneous display of ALC voltage on one meter along with metering of plate voltage, cathode current, relative power output, or clipping level on the other. This system greatly simplifies proper adjustment of the transmitter.

Microphone Amplifier Tone Control
Recognizing the differences in voice characteristics of Amateur operators, Yaesu's engineers have incorporated an ingenious microphone amplifier tone control circuit, which allows you to tailor the treble and bass response of the FT-102 transmitter for best fidelity on *your* speech pattern.

RF Speech Processor
The built-in RF Speech Processor uses true RF clipping, for improved talk power under difficult conditions. The clipping type speech processor provides cleaner, more effective "punch" for your signal than simpler circuits used in other transmitters.

VOX with Front Panel Controls
The FT-102 standard package includes VOX for hands-free operation. Both the VOX Gain and VOX Delay controls are located on the front panel, for maximum operator convenience.

IF Monitor Circuit
For easy adjustment of the RF Speech Processor or for recording both sides of a conversation, an IF monitor circuit is provided in the transmiter section. When the optional AM/FM unit is installed, the IF monitor may be used for proper setting of the FM deviation and AM mic gain.

WARC Bands Factory Installed
The FT-102 is factory equipped for operation on all present and proposed Amateur bands, so you won't have to worry about retrofitting capability on your transceiver. An extra AUX band position is available on the bandswitch for special applications.

Full Line Of Accessories
For maximum operating flexibility, see your Authorized Dealer for details of the complete line of FT-102 accessories. Coming soon are the FV-102DM Synthesized VFO, SP-102 Speaker/Audio Filter, a full line of optional filters and microphones, and the AM/FM Unit.

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

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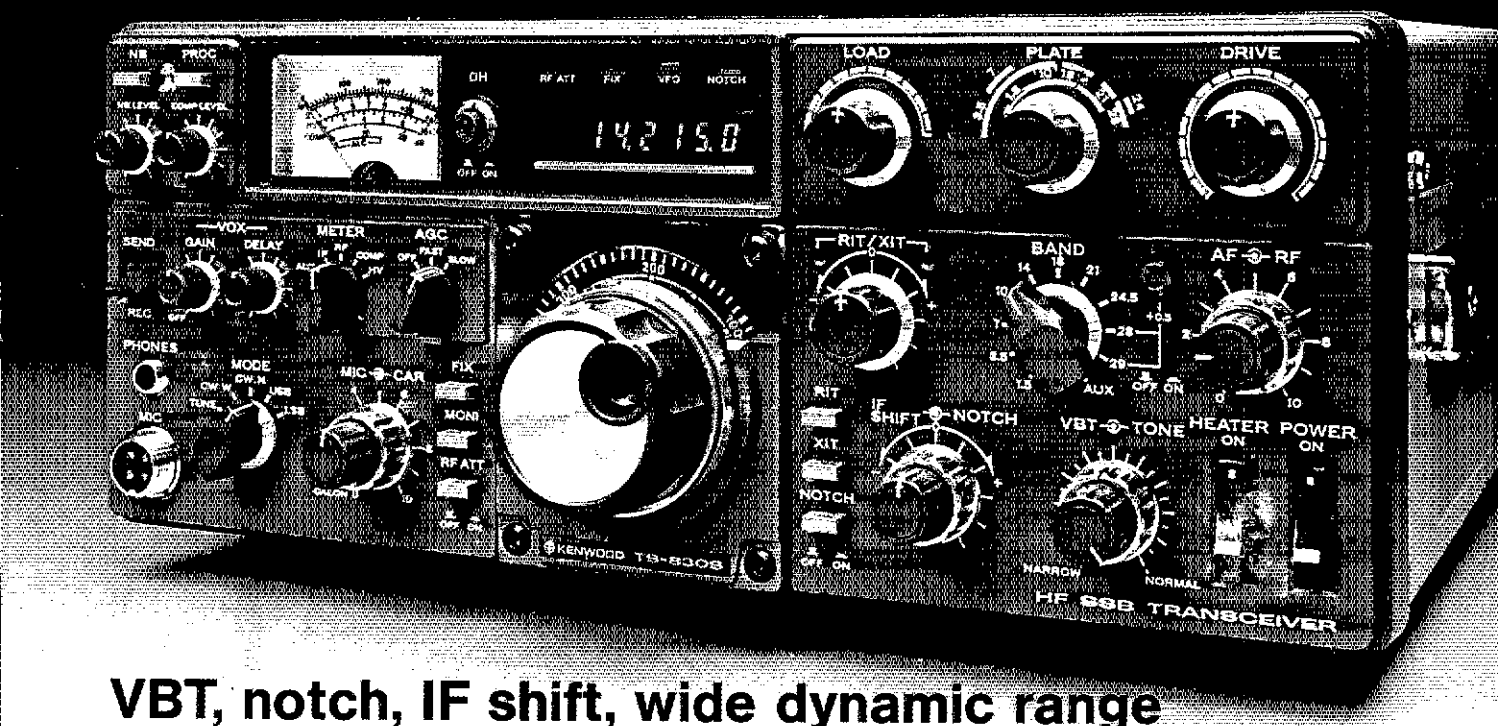
YAESU Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246 ● (513) 874-3100

Top-Notch.



VBT, notch, IF shift, wide dynamic range

TS-830S

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

TS-830S FEATURES:

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

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

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Matching accessories for fixed-station operation:

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

Other accessories not shown:

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

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