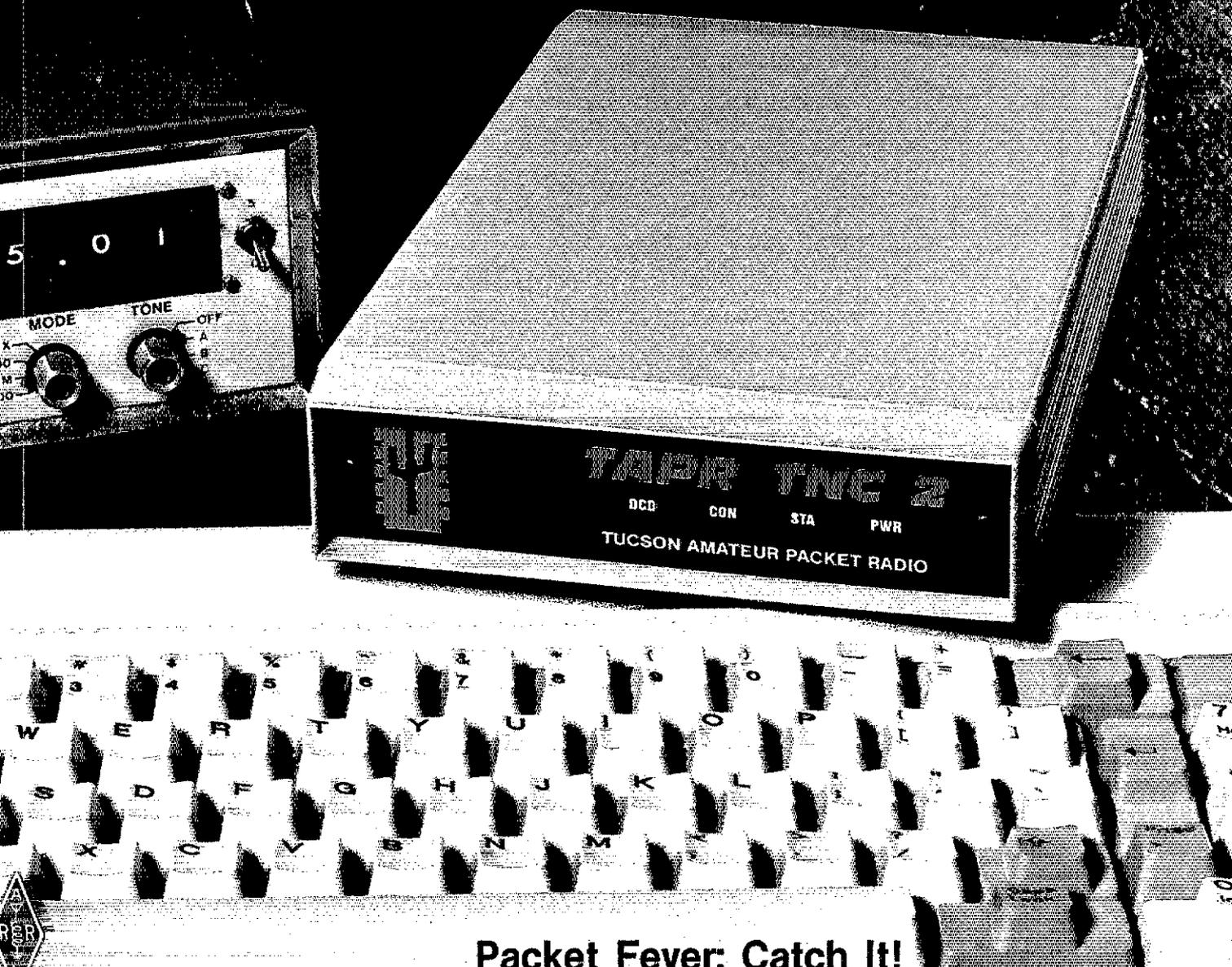


QST

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Packet Fever: Catch It!





the tempo S-15

...a no nonsense radio that provides more power, broader frequency range and simplicity of operation

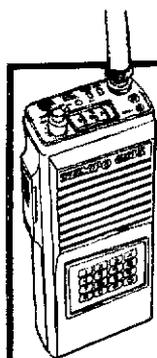
...the kind of hand held most people want...simple rugged, reliable, easy to use. The S-15 offers a full 5 watts of power...power that extends your range and improves your talk power. Its state-of-the-art integrated circuitry provides far more reliability and ease of maintenance than conventional circuitry.

Consider these features before you decide on any hand held:

- 5 watt output (1 watt low power switchable)
- 10 MHz frequency coverage: 140-150 MHz (For export only: B version 150-160 MHz, C version 160-170 MHz)
- Electrically tuned stages. Receiving sensitivity and output power are constant over entire operating range.
- Three channel memory. (1 channel permits non-standard repeater offsets. 200 micro amp memory maintenance (standby)).
- A new "easy remove" battery pack
- One hour quick charge battery supplied (450 ma/HR)
- Plug for direct 13.8 volt operation
- Speaker/microphone connector
- BNC antenna connector and flex antenna
- Extremely small and light weight (only 17 ounces).
- Ample space for programmable encoder.
- Fully synthesized
- Extremely easy to operate
- Its low price includes a rubber antenna, standard charger, 450 ma/HR battery (quick charge type) and instruction manual.

OPTIONAL ACCESSORIES: 1 hour quick charger (ACH 15) • 16 button touch tone pad (S 15T) • DC cord • Solid state power amplifier (S-30 & S-80) • Holster (CC 15) • Speaker/mike (HM 15)

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...the proven Tempo CS-15, plus three new commercial mode Tempo synthesized radios

The CS-15 is a fine quality radio with 5 watt output, 10 MHz receiver coverage, is fully synthesized, and is 10 channel internally programmable. It's also sturdy, compact and affordable.

The new Tempo FMH-15S, FMH-44S & FMT-25S (mobile)

...all feature 16 channels, CPU controlled EPROM PLL, CTCSS encode/decode programmable per channel, priority scan to Channel 1, and time-out-timer.

- FMH-15S...** 138-174 MHz (10 MHz) frequency coverage
1 watt (low)/5 watts (high) RF power output
- FMH-44S...** 400-512 MHz (20 MHz) frequency coverage
1 watt (low)/4 watts (high) RF power output
- FMT-25S...** 138-174 MHz (10 MHz) frequency coverage
25 watts RF power output

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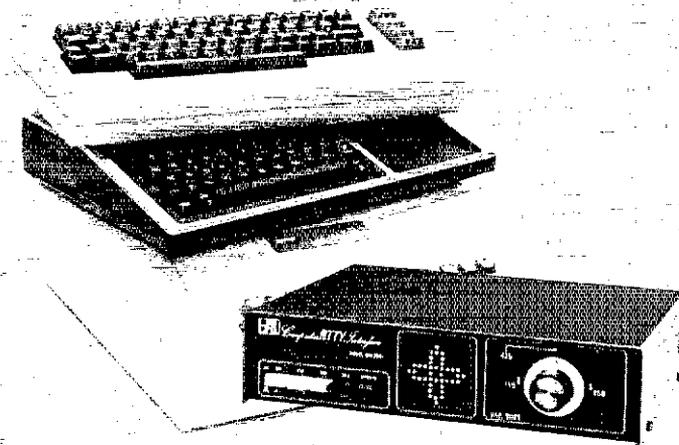
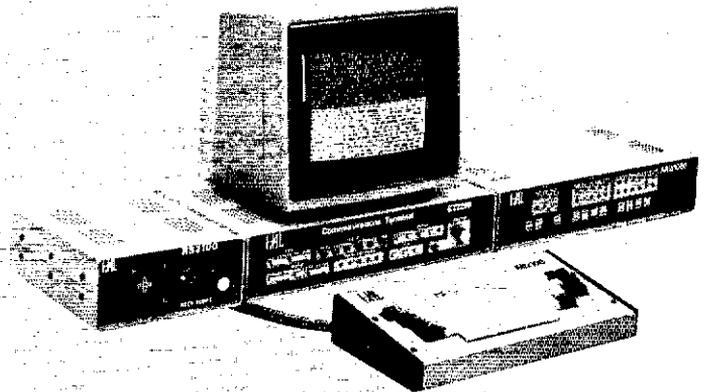


MPT3100 + DSK3100 + ST6000:

MPT3100—the acknowledged top-of-the-line system for both commercial and serious amateur RTTY and CW stations. HAL pioneered the radio mailbox technique with the MPT3100, and now the new DSK3100 disc drive option gives you 326,000 characters of message storage. The system is designed particularly for the amateur, commercial, or military operator who has to handle a large amount of traffic. You can collect, edit, and retransmit traffic perfectly with a minimum of effort. The ST6000 is renowned for its weak-signal performance and reliability. Add the ARQ1000 for full AMTOR operations, including an AMTOR mailbox. If you are serious about your code and need high performance and reliability, this system is the proven world leader.

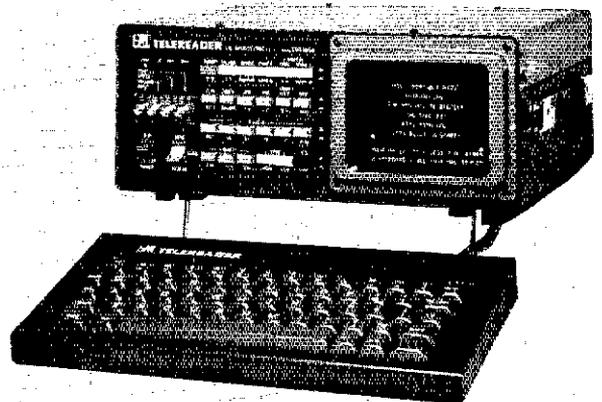
CT2200 + KB2100 + ARQ1000 + RS2100 + KQ12:

The CT2200 and KB2100 give you an integrated system that includes video, RTTY demodulators (high, low, modem low, and modem high tones), and many advanced features. Operate Baudot or ASCII at 45-1200 baud and CW at 5-99 w.p.m. Add the ARQ1000 for ALL AMTOR features (not just *some* of them). The RS2100 RTTY Scope gives you the acknowledged best tuning indicator for a complete RTTY system. Also included in the CT2200 is selective-call ASCII printer output, split screen, 36 or 72 characters per line, smooth scroll, and 2 or 4 pages of display memory. In addition, the CT2200 has 2 HERE IS and 8 large "brag-tape" memories that are programmable and non-volatile. This is our most popular system, used by thousands of amateurs around the world.



CRI-200:

At last, a computer interface that *really* works and has an accurate tuning indicator. Take advantage of HAL's years of experience in RTTY and see how good computer RTTY can be. Best of all, it's universal and you can select the computer and software of your choice. Why be frustrated with computer RTTY? Hook up the CRI-200 and work ALL the stations!



CWR6850:

Have a space problem or want portable RTTY? The CWR6850 is a one-package complete RTTY system. All you need is your transceiver and 12 VDC—the rest is in the CWR6850, including the screen. The high-performance RTTY demodulator for all shifts and either high or low tones is built-in. AND, the system is expandable! Add the ARQ1000 for AMTOR, the RS2100 RTTY Scope, and an ASCII printer, and you have a no-compromise base station for all modes.

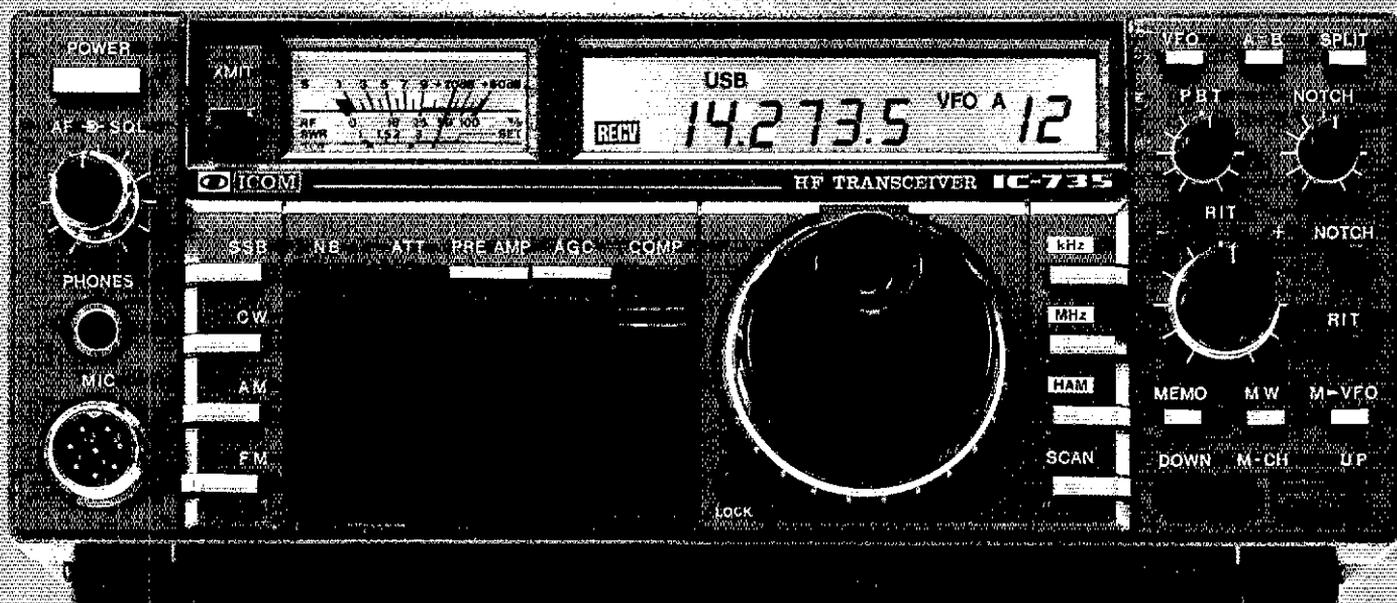


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URBANA, IL 61801 • (217) 367-7373

NEW!

ICOM HF TRANSCEIVER

IC-735



Ultra Compact

The new ICOM IC-735 is what you've been asking for...the most compact and advanced full-featured HF transceiver with general coverage receiver on the market. Measuring only 3.7 inches high by 9.5 inches wide by 9 inches deep, the IC-735 is well suited for mobile, marine or base station operation.

Superior Performance

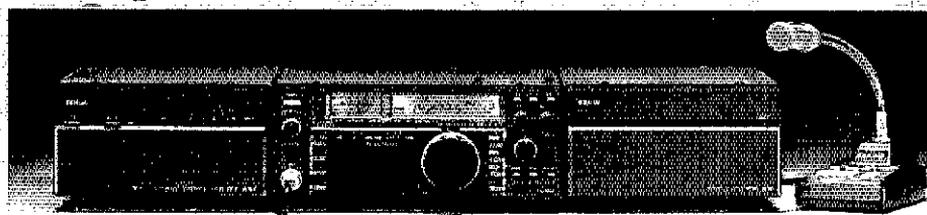
It's a high performer on all the ham bands, and as a general coverage receiver, the IC-735 is exceptional. The IC-735 has a built-in receiver attenuator, preamp and noise blanker to enhance receiver performance. PLUS it has a 105dB dynamic range and a new low-noise phase locked loop for extremely quiet rock-solid reception.

Simplified Front Panel

The large LCD readout and conveniently located controls enable easy operation, even in the mobile environment. Controls which require rare adjustment are placed behind a hatch cover on the front panel of the radio. VOX controls, mic gain and other seldom used controls are kept out of sight, but are immediately accessible.

More Standard Features

Dollar-for-dollar the IC-735 includes more standard features...FM built-in, an HM-12 scanning mic, FM, CW, LSB, USB, AM transmit and receive, 12 tunable memories and lithium memory backup, program scan, memory scan, switchable AGC, automatic SSB selection by band, RF speech processor, 12V operation, continuously adjustable output power up to 100 watts, 100% duty cycle and a deep tunable notch.



Options. A new line of accessories is available, including the AT-150 electronic automatic antenna tuner and the switching PS-55 power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories.

See the IC-735 at your authorized ICOM dealer. For superior performance and innovative features at the right price, look at the ultra compact IC-735.



First in Communications



August 1985

Volume LXIX Number 8

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David Sumner, K1ZZ

Publisher

Paul L. Rinaldo, W4RI

Editor

E. Laird Campbell, W1CUT

Managing Editor

Joel P. Kleinman, N1BKE

Assistant Managing Editor

Andrew Tripp, KA1JGG

Features Editor

Charles L. Hutchinson, K8CH

Technical Editor

Gerald L. Hall, K1TD

Associate Technical Editor

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Senior Assistant Technical Editors

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Robert Scheitgen, KU7G, Bruce O. Williams, WA8IVC

Assistant Technical Editors

Maureen Thompson, KA1DYZ

Technical Editorial Assistant

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Operating News

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Happenings, League Lines

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Contributing Editors

Brooke Craven, Production Supervisor; Shelly

Fulni, Assistant Production Supervisor; Sue

Fagan, Technical Illustrations; Jodi McMahon,

Layout Artist; Rose Cyr, Typesetter

Production Staff

Lee Aurick, W1SE

Advertising Manager

Sandy Gerli, AC1Y

Deputy Advertising Manager

Larry Evans, KA1KQY, Circulation Manager;

Debra Chapor, Deputy Circulation Manager

Offices

225 Main St., Newington, CT 06111 USA

Telephone: 203-666-1541

Telex: 650215-5052 MCI

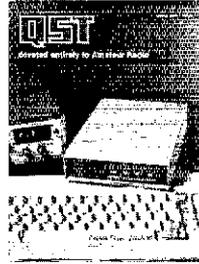
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OUR COVER

Here it is, in all its glory: TAPR's TNC. Want to know what it does, and how it works? See page 17.

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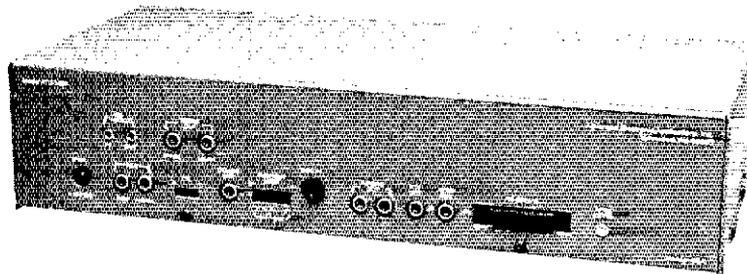
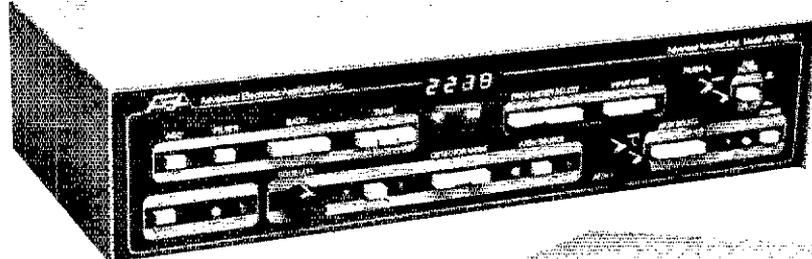
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More Hardware Features And Performance Than Any Other Morse, Baudot, ASCII, AMTOR, SITOR, or H.F. Packet Terminal Unit Anywhere At Any Price!

We recognize that there are few amateurs who can appreciate or afford the outstanding value of the ATU-1000, but those who can are in for some very pleasurable operating. The ATU-1000 is a commercial/military unit with all the performance and flexibility that is attainable from today's technology. Just check out the features below.

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OWN THE WORLD WITH THE R3 NO RADIAL VERTICAL 10, 15, 20 METERS

The R3 half wavelength design eliminates the ground radial system required by other verticals. Optimum current distribution gives more efficiency and low angle radiation for DX communications.

R3 brings high performance antenna features to those living in apartments, condominiums or on small city lots. Even if you have plenty of space, R3's combination of neat appearance and DX capability make it ideal for your station. The R3 includes an integral tuner to give a perfect match across 10, 15, and 20 meters. The remote tuning feature allows easy fingertip control as you operate your station.

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- Gain, ref $\frac{1}{4}\lambda$ whip
- No Radials
- 360° Coverage
- Integral Tuner with Remote Control Console and Indicator
- 24 Volts To Tuner
- 110 or 220 Volt Operation
- 75 ft (22.9m) Control Cable Included
- Only 22ft (6.7m) High
- 1 sq ft (.09 sq m) Space
- Self Supporting
- Stainless Steel Hardware
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Add up the features—you'll find that you can have ALL OF THIS PERFORMANCE without the need to buy tower, rotator and associated hardware. **R3 IS ANOTHER PRODUCT CREATED FOR THE ENJOYMENT OF YOUR HOBBY BY THE WORLD RENOWNED CUSHCRAFT ENGINEERING DESIGN TEAM.**

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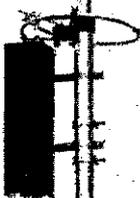


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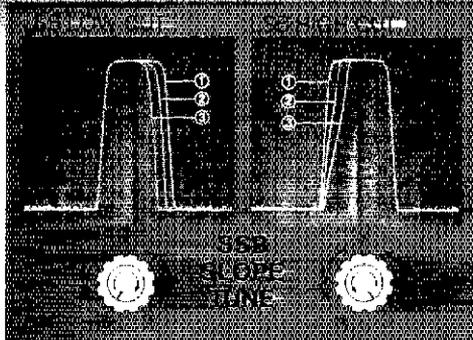
“DX-traordinary”



TS-930S

**All band HF transceiver/
general coverage receiver.**
The TS-930S (with or without automatic antenna tuner) is a high performance DX and contest transceiver delivering superior features and field-proven performance. Compare the TS-930S with other HF rigs in its price class and see why no other rig comes close!

- **160-10 meters, with 150 kHz-30 MHz general coverage receiver.**
An innovative, quadruple "UP" conversion digital PLL synthesized circuit provides superior frequency accuracy, stability, plus greatly enhanced selectivity.
- **Non-volatile operating system.**
Kenwood transceivers retain all micro-coded operating functions even when the lithium memory back-up batteries fail.
- **Easily modified for HF MARS and CAP operation.**
- **All solid-state, 28 volt final amplifier for lowest intermodulation distortion.**
- **Power input rated at 250 watts on SSB, CW, FSK, and 80 watts on AM.**
- **Full break-in or semi-break-in CW.**
- **CW VBT and pitch controls.**
CW Variable Bandwidth Tuning control tunes out interfering signals. The CW pitch control shifts the IF passband and simultaneously changes the beat frequency pitch.

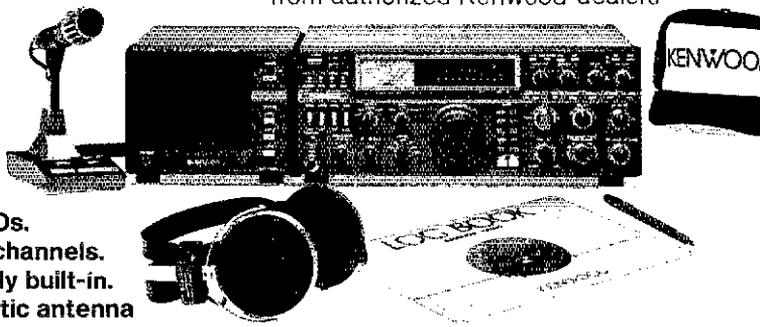


- **SSB slope tuning—Another Kenwood First!**
Allows independent adjustment of the low and/or high frequency slope of the IF passband, for best interference rejection.
- **IF notch filter.**
- **Tunable audio filter built-in.**
- **RF speech processor.**
- **Dual mode noise blander.**
- **Dual digital VFOs.**
- **Eight memory channels.**
- **AC power supply built-in.**
- **Built-in automatic antenna tuner (optional).**
Covers 80-10 m. *Another industry first by Kenwood!*
- **Fluorescent tube digital display.**
- **Excellent receiver dynamic range.**
- **One year limited warranty.**

Optional accessories:

- AT-930 automatic antenna tuner
- SP-930 external speaker, with selectable audio filters
- YG-455C-1 (500 Hz) CW filter
- YG-455CN-1 (250 Hz) CW filter
- YK-88C-1 (500 Hz) CW filter
- YK-88A-1 (6 kHz) AM filter (all plug-in type)
- SO-1 commercial stability TCXO
- MC-60A, MC-80, MC-85 desk microphones
- TL-922A linear amplifier (not for CW QSK)
- SM-220 station monitor
- PC-1A phone patch
- SW-2900, SW-200, SW-100 SWR meters
- HS-4, HS-5, HS-6, and HS-7 headphones.
- LF-30A low-pass filter

More TS-930S information is available from authorized Kenwood dealers



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Specifications and prices subject to change without notice or obligation.
Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

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NEW!

“DX-cellence!”

TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

• **100% duty cycle transmitter.**

Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.

• **Programmable scanning.**

• **Semi or full break-in (QSK) CW.**

• **Low distortion transmitter.**

Kenwood's unique transmitter design delivers top "quality Kenwood" sound.

• **Keyboard entry frequency selection.**

Operating frequencies may be directly entered into the TS-940S without using the VFO knob.

• **Graphic display of operating features.**

Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT-940 antenna tuner status.

• **QRM-fighting features.**

Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.

• **Built-in FM, plus SSB, CW, AM, FSK.**

Optional accessories:

- AT-940 full range (160-10 m) automatic antenna tuner
- SP-940 external speaker with audio filtering
- YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters;
- YK-88A-1 (6 kHz) AM filter
- VS-1 voice synthesizer
- SO-1 temperature compensated crystal oscillator
- MC-42S UP/DOWN hand mic.
- MC-60A, MC-80, MC-85 deluxe base station mics.
- PC-1A phone patch
- TL-922A linear amplifier
- SM-220 station monitor
- BS-8 pan display
- SW-200A and SW-2000 SWR and power meters.



• **High stability, dual digital VFOs.**

An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel!"

• **40 memory channels.**

Mode and frequency may be stored in 4 groups of 10 channels each.

• **General coverage receiver.**

Tunes from 150 kHz to 30 MHz.

• **1 yr. limited warranty.**

Another Kenwood First.



More TS-940S information is available from authorized Kenwood dealers.

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*Executive Committee Member

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Manitoba
Maritime-Nfld
Ontario
Quebec
Saskatchewan

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Eastern Pennsylvania
Maryland-DC
Southern New Jersey
Western New York
Western Pennsylvania

Central Division

Illinois
Indiana
Wisconsin

Dakota Division

Minnesota
North Dakota
South Dakota

Delta Division

Arkansas
Louisiana
Mississippi
Tennessee

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Kentucky
Michigan
Ohio

Hudson Division

Eastern New York
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Midwest Division

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Nevada
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San Francisco
San Joaquin Valley
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Virginia
West Virginia

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Southeastern Division

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Richard Baier, WA2HEB, 1226 Audubon Dr., Toms River 08753 (201-270-9292)
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Joseph N. Winter, WA7RWK, 819 N. Mullen St., Tacoma 98406 (206-759-9857)

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Glenn Koropp, W9YFW, 1980 Santa Maria Way, Sacramento, CA 95864
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Rae Everhart, K4SWN, P.O. Box 41, Lexington 27293-0041 (704-249-8734)
James G. Walker, WD4HLZ, Rte. 1, Box 5395, Marion 29571 (803-423-3645)
Claude E. Felgley, W3ATQ, 135 The Main—RR #1, Williamsburg 23185 (804-253-0658)
Carl S. Thompson, K8KT, 5303 Pioneer Dr., Charleston 25312 (304-776-4352)

William "Bill" Sheffield, KQ8J, 1444 Roslyn St., Denver 80220 (303-355-2488)
Joe Knight, W5PDY, 10408 Snow Heights Blvd., N.E., Albuquerque 87112 (505-299-4581)
James R. Brown, NA7G, 865 Manchester Rd., Kaysville 84037
Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82001 (307-634-7385)

Joseph E. Smith, Jr., WA4RNP, 1211 13th St., N., Bessemer 35020 (205-424-4866)
Edmund J. Kosobucki, K4JNL, 5525 Perry Ave., Columbus 31909 (404-322-2858)
Phillip O'Dwyer, WF4X, 543 Mooney Rd., N.E., Fort Walton Beach 32548 (904-682-2353)
Richard D. Hill, WA4PFK, 3800 S.W. 11th St., Ft. Lauderdale 33312 (305-583-6832)
Carlos Flores, NP4KA, 2 Monserrate Towers, Apt. 1804, Carolina, PR 00630 (809-757-1584)

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THE AMERICAN RADIO RELAY LEAGUE, INC



The American Radio Relay League, Inc., is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, 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.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1954. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

"Of, by, and for the radio amateur," ARRL 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.

A bona fide interest in Amateur Radio is the only essential qualification of membership; an Amateur Radio license is not a prerequisite, although full voting membership is granted only to licensed amateurs in the U.S. and Canada.

All membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA

Telephone: 203-666-1541

Telex: 650215-5052 MCI

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"It Seems to Us ..."

How Are We Doing?

Last October, the ARRL Board established ambitious goals for membership promotion and new-ham recruitment. We're shooting for an increase of 25,000 in League membership this year, with 20% annual growth thereafter. For recruiting new radio amateurs, our goal is 600,000 licensees in the U.S. by the end of the decade. The latter target will require an annual increase in the number of licensees of about 50,000.

At this writing, the midyear results of our membership promotion efforts are in—and they look encouraging. As of June 30, the League had 5741 more members in the U.S. than at year end 1984, bringing this number to 126,155. When Canadian (which are also up slightly) and overseas memberships are included, the total is 136,491.

The bulk of this increase has come about in response to a direct-mail solicitation mailed in mid-May to nonmember FCC licensees. But, a significant part has come through the efforts of local affiliated clubs participating in the "Club Challenge for the '80s." As of June 28, 289 clubs have been responsible for 561 new League members. We're counting on renewed club efforts following the usual summer hiatus to boost both of these figures substantially. Thanks to the generosity of Heath, ICOM America and Trio-Kenwood, the most successful clubs will earn themselves a brand new HF transceiver! To count toward the Club Challenge, the member must be new to the League—not one who is returning after a brief absence. Each new League member recruited by a club (as indicated by a special four-digit code inserted by the club on the application form), whether from among its own members or from outside, earns \$5 for the club treasury. With a little effort, that can add up in a hurry! If your club isn't yet participating in the Club Challenge, get after your club officers and make sure the opportunity doesn't pass you by. With your help, we can reach that 25,000 goal.

Other membership promotion plans for the year include increased efforts to bring lapsed League members back into the fold. Many good members left our ranks several years ago, during a period of spiraling dues increases. The dues have remained stable now for more than four years, and have actually declined for multiple-year terms. An over-65 member pays less for a three-year membership now than in 1979! Even more important, members are getting more protection, service and information for their dues dollar than ever before.

As for recruiting new adherents to Amateur Radio—well, we're off to a slow start. At the end of 1984, FCC records showed 412,156 in-

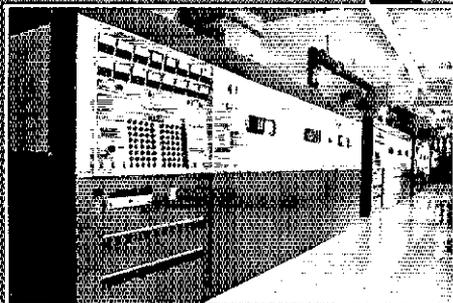
dividual amateur licensees. By the end of April, that number had actually dropped by 1534. During May there was a slight increase, to 410,846. (June figures are not yet available.)

In the first five months of 1985 we gained 8803 new licensees. But, 10,113 licenses expired and were not renewed. Some of these are Silent Keys; others simply lost interest, or just forgot to renew. ICOM America has launched a direct-mail campaign to encourage amateurs whose licenses have expired to renew them, even if they're not presently active. It makes sense—these people worked hard for the licenses, there's no longer an activity requirement for renewal, and the only cost is the stamp on the envelope to mail the renewal application to Gettysburg! Should they regain their interest at some point in the future (and unquestionably, many will), they'll face an easier task in getting back on the air if they don't have to clear the licensing hurdle again.

The rate of entry into Amateur Radio was 9% less in the first five months of 1985 than in the same period a year ago. The 1984 figures were pushed upward by the unusual amount of publicity we garnered from Grenada and the Owen Garriott Shuttle mission, and in fact the month of May this year was 15% ahead of May 1984; so, compared to a "normal" period we may not be doing too badly. But clearly, we need a dramatic increase in the number of newcomers if we're to see any growth in our ranks. There's no simple solution to this problem. Enhancing Novice privileges will help. Imaginative programs to expose young people to Amateur Radio certainly must be a part of the plan, as should programs to reach retirees, "empty nesters," and others for whom Amateur Radio can have special meaning. Efforts by local clubs to reach out into their communities may hold the greatest promise of all; an increasing number of clubs recognize this responsibility.

Perhaps the most encouraging sign comes as a result of the efforts of thousands of Volunteer Examiners from throughout the country. Thanks to the more frequent and convenient examination opportunities provided by the Volunteer Examiner Program, the number of amateurs upgrading is running 56% ahead of last year! While the licensee totals are down, the number of non-Novice licensees is actually up by 1199 from the beginning of the year. Since the League became a Volunteer Examiner Coordinator, 2793 ARRL-accredited Volunteer Examiners have administered exams. They each deserve a thank-you from the rest of us!—David Sumner, K1ZZ

Hugh Fallis, VP Engineering,
Radio Free Europe, Munich, stands
beside CE 100 kW HF transmitter
using EIMAC 4CV100,000C tube



EIMAC tubes provide long life for Radio Free Europe Service.

Radio Free Europe transmitters in Biblis and Lampertheim, West Germany, use EIMAC 4CV100,000C power tubes in 12 Continental Electronics 100 kW HF transmitters.

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These figures are representative of the long life EIMAC tubes log in a variety of high power broadcast applications.

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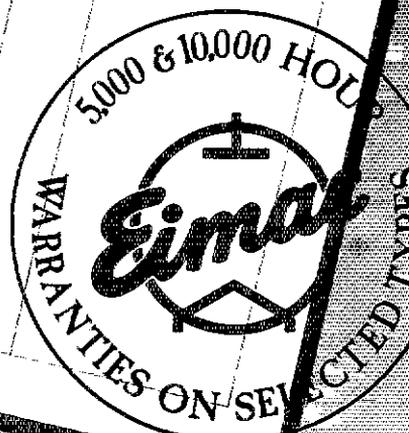
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Telephone: 415 • 592-1221

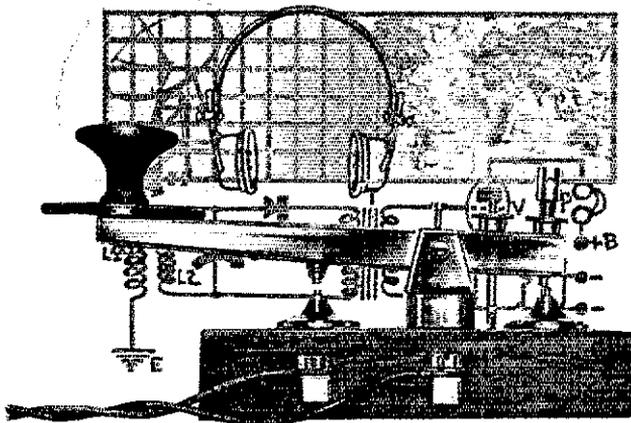
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STP#: *Biblis* MONTHLY to December, 1984

TYPE	IN SERVICE		SEARCH		REMARKS
	Serial	HOURS	Serial	HOURS	
4CV	A6N-413	62660			
100,000C	A6N-415	60879			
	E6U-265	61029			
	E6C-270	58616			
	E6M-597	62456			
	E6L-896	59244			
	H6S-263	55892			
	H6J-368	64300			
	H6T-840	59472			
	P6U-624	64066			
	U6U-155	62454			
	H6T-367	59907			
	H6J-371	59991			
	U6A-2	57805			
	U6V-817	62279			
	F3C-730	59786			
	D6V-815	41426			
	E6G-273	47349			
	U6A-7	50057			
	E6G-266	57026			
	P6M-1297	57865			
	H6C-161	36683			
	U6A-6	11752			
		69755			





75th Anniversary of Amateur Radio: The Wireless Institute of Australia

Add another to the list of Amateur Radio stamps around the world. On May 22, the Australia Post issued a prestamped envelope in commemoration of the 75th anniversary of the Wireless Institute of Australia. The oldest radio society in the world, WIA is the IARU sister society of ARRL in that country. WIA has a limited supply of the envelope, both first-day-cover and mint, and offers to help foreign amateurs obtain copies as long as the supply lasts. If you want a copy, send \$2 Australian to the Secretary, Wireless Institute of Australia, P.O. Box 300, South Caulfield, Victoria 3162, Australia.



Ham Is Finalist for First Teacher in Space

The odds of having a radio amateur as the first teacher aboard a Space Shuttle mission are far better than reported in this column in June. **David Marquart, WA7QKD, of Boise, Idaho,** has been chosen as one of 10 teachers being considered as a mission participant for a future Shuttle flight. A backup will also be chosen.

An Extra Class licensee since 1980, Dave teaches data processing and accounting at Boise High School. With his application Dave submitted a project in which he would use Amateur Radio to com-

municate with classrooms across the U.S. while in flight. As part of the final evaluation process, Dave will go to Houston, where he will take part in testing and training that NASA Astronauts undergo.

Of his achievement, Dave says, "To combine my interests in space flight and Amateur Radio—I can't think of anything better!" Two other radio amateurs—Jeanine Duane, WB2MBW, and William Townsend, WB1CRB—were also among the 114 candidates who recently took part in the evaluation process in Washington, DC.

VECs to Maintain Exam Questions?

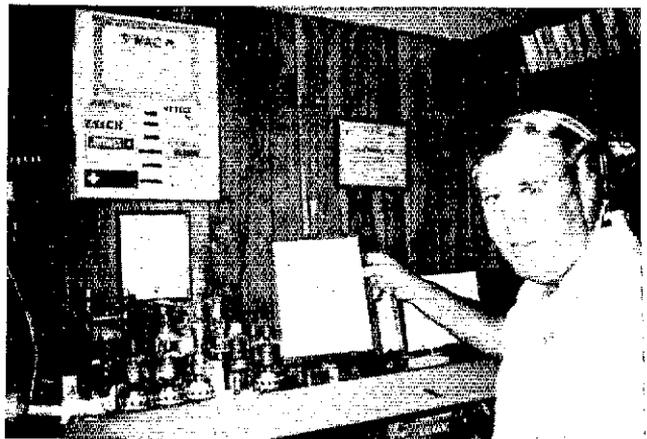
Volunteer Examiner Coordinators will play an even greater role if the latest FCC action in this area is approved. In PR Docket 85-196, the FCC has proposed to allow VECs to maintain the question pools used to make amateur exams. If the proposal is

adopted, VECs will have to maintain 10 times the number of questions actually used on each test, and to make public the questions and formulas used to create the tests. See this month's Happenings for details.

Record Microwave QSO Achieved

A new amateur world distance record has been established on 47 GHz. According to a report in the German UHF/VHF quarterly publication, *DUBUS*, two Swiss amateurs, Erich Zimmermann, HB9MIN/P, and Arnold Sporbeck, HB9AMH/P, set the mark with a 53-km QSO on January 13, 1985. During the contact, Zimmermann was about 3300 feet above sea level, and the temperature was -11°C (12°F). Falling snow scattered the signals, enabling the antennas to be moved ±3° without a significant change in signal strength.

Zimmermann used a 25-mW, 23.5-GHz M/A-COM Gunn oscillator, a homebuilt doubler and a GaAs Schottky-diode mixer. The antenna was a 0.6-meter dish with a slotted-radiator feed, offering 45-dB gain. Sporbeck ran a 10-mW, 47-GHz Gunn oscillator and an MA-40406 mixer, similar to Zimmermann's, to a 0.4-meter dish with a slotted-radiator feed. A description of HB9MIN's homebuilt 47-GHz equipment will be included in the ARRL *UHF/Microwave Experimenter's Book*, now being prepared.



"Whoever says you can't do much as a Novice has a surprise in store." So says Clyde Kane, KA0NVT, of Blaine, Minnesota. Since earning his Novice license, in April 1982, Clyde has achieved an impressive operating record: Worked All Continents and Worked All States on 15 meters, and WAS on 40 and 80 meters. Not content with this wallpaper, he has also chalked up more than 80 countries and all but VE8-land in Canada—all on the Novice bands. Since getting his Technician ticket in May 1984, Clyde has amassed 38 states on 6 meters while also getting into 2-meter FM and SSB.

League Lines

Members who do not wish to have their names released on commercial mailing lists should inform Hq. immediately by providing us with the 7-digit control number that appears on the *QST* mailing label, along with a note informing us that they do not wish to have their names released. Present plans call for the list to be made available for commercial mailings in the fall.

Approximately *130 visitors toured ARRL Hq.* on Sunday, June 9, as an adjunct to the Newington Amateur Radio League flea market. Both the open house and the flea market received local press and TV coverage. The next ARRL open house is scheduled for September 22. If you would like to arrange a visit for your group, contact John Lindholm, W1XX, at ARRL Hq.

ARRL-Accredited Volunteer Examiners have received notices in the mail that their *accreditations have been extended* until December 31, 1985. We experienced some delays in producing and mailing permanent renewal endorsements for VE credentials. We hope to have the permanent credentials out to our VEs by the end of September.

The FCC and several *VEC organizations will meet at Gettysburg* August 9 to discuss improvements to the VEC program. We plan to have a full report on this meeting in October or November *QST*.

VUCC pins are now available for VUCC certificate holders. The pins are available for \$2.00 from the Awards Branch, ARRL Hq.

The FCC has fined James Brantley, K6KPS, \$2000 for violating Section 97.113, which prohibits broadcasting in the Amateur Service. For a long period, the FCC had received complaints about K6KPS's operating practices, and on December 19, 1984, FCC personnel observed him making lengthy CQ calls and calls to nonexistent stations on 20-meter SSB. He did not make contact with any station, even though stations repeatedly tried to answer him. The FCC indicated that prolonged calls, calls to nonexistent stations and refusing to establish communications when his calls were answered were violations of the no-broadcasting rule. The fine was issued on June 13.

In response to an ARRL petition, *the FCC has extended the deadline for comments* in PR Docket 85-22, the *repeater coordination docket*. The League requested a 45-day extension so the ARRL Board of Directors could consider input from members at its July 25 meeting. The comment deadline was originally set at July 1. By Order released June 19, the comment deadline is extended to *August 15*. The reply comment deadline remains September 30. Details on the Docket appear in the Happenings column in April 1985 *QST*.

Your club can get a reduced rate on a set of ARRL publications! This set is made up of 18 of the most popular titles, including *The ARRL Handbook for the Radio Amateur*, *The FCC Rule Book*, *Tune in the World with Ham Radio*, the *ARRL Code Kit* and the *Tech/General* and *Advanced Class License Manual*, and is available for \$90.00 per set, postpaid. Radio clubs often purchase a set for donation to a local library. This is a great way to get more people interested in Amateur Radio, and pick up some publicity for your club as well.

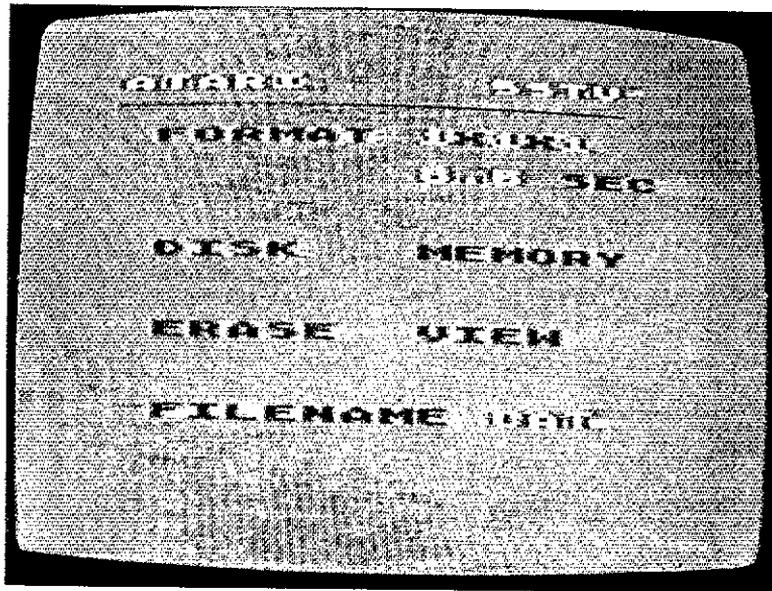
The new *ARRL Operating Manual* is now available from Hq. or your favorite dealer. Covering everything from DXing to digital, from shortwave listening to satellites, the *Operating Manual* is your source for contemporary operating techniques, and it includes international voltage/current requirements by country and international WARC band (10/18/24 MHz) allocations. Individual copies are \$5 plus \$1 for shipping. See June *QST*, page 116, for more details.

The FCC has dismissed a petition for rulemaking filed by Harry Lewis, W7JWJ, which proposed to *increase the code-speed requirement* for the Technician license to 7 words per minute and for the Advanced license to 15 WPM. By making the code requirements more rigorous, Lewis sought to permit Technician class Volunteer Examiners to administer the 5-WPM code test to Novice applicants, and to permit Advanced class VEs to administer the 13-WPM test for the General class license. In this fashion he hoped to release a potential pool of over 96,000 Advanced class operators to administer tests for the General class license. In turning down the proposal, FCC said in part, "Within 1½ years of the creation of the program volunteers appear to be administering amateur operator examinations to over 4000 applicants each month. This is 50% above the rate they were administered in 1983 under the previous system. There is no indication at this time that the volunteer program suffers either from a lack of volunteer examiners or a lack of examination opportunities."

Color SSTV and the Atari Computer

Start enjoying color SSTV reception! You can build this simple interface quickly, and the software is readily available.

By Martin F. Schick, KA4IWG
1000 Woodstone Dr., Kingsport, TN 37663



Many amateurs have purchased personal computers, and use them when operating CW and Baudot and ASCII RTTY. Computers certainly make it easy to use these modes, and I soon found myself wondering what other ham-shack duties the computer could handle. Immediately, logging and antenna-design programs came to mind. I realized, however, that these uses employ only the mathematical speed of the computer and fail to take advantage of one of the most impressive capabilities of modern personal computers: graphics displays. The colors and resolution available on many personal computers suggested their use for SSTV operation.

General Description

The software routine and hardware interface discussed here allow an Atari® 400 or 800 computer to receive SSTV signals. Other Atari computer models can be used with minor software changes. The Atari computers were chosen because of their straightforward structure and easy manipulation of their graphic displays. The computer must contain at least 48 kbytes of RAM to store the various SSTV color frames. Furthermore, the computer must have the GTIA display IC. This is the custom Atari IC that produces high-resolution graphics with up to 16 luminance levels.

A simple interface unit attached to the audio output of an SSB receiver performs the frequency-to-voltage conversions, filtering, sync separation and analog-to-digital (A/D) conversions for the com-

puter. Although the Atari computer can perform its own A/D conversions, the low cost of the converter IC and the isolation it provides offset the software development required to use the internal converter.

The key to the software operation is the storage of each SSTV frame into a separate section of memory. When reception is finished, the three color frames—red, green and blue (RGB)—are sequentially, though rapidly, presented on the monitor screen. Unfortunately, these frames are changed only during the vertical scan retrace. That retrace occurs every 1/60 second, and cycling through all three frames will take 1/20 second. This causes a slight display flicker that can be partially compensated for by adjusting the display contrast.

The software is designed for use with the current 8.5-second RGB formats. Black-and-white 8.5-second scans can be collected by storing two blank frames and one real scan frame. Formats other than the standard single frames of red, green and blue can be received and displayed, but additional frames of a particular color will simply overwrite the previous frame of the same color. Color composite pictures of 12- and 24-second scans can also be collected as black-and-white pictures.

The vertical scan of the normal monitor screen is composed of 192 horizontal lines, but normal RGB SSTV frames are sent as 128-line frames. Thus, SSTV frames will cover only 128 of the 192 available lines. This creates a slight aspect-ratio distortion but allows the total picture to be seen. The software allows the aspect ratio to be improved by expanding the picture to the full-

screen height, but in doing so, crops some of the picture. All received pictures can be saved on disk.

Hardware

The demodulator/interface is adapted from one described in an earlier issue of *QST*.¹ Fig. 1 is a schematic diagram of the modified circuit. The first demodulator section is the frequency-to-voltage converter composed of U1, D1, D2 and D3. D1 and D2 clamp the input voltage to U1. D3 clamps the output of U1, preventing more than 5 V from reaching the following TTL gate.

U3, a monostable multivibrator, eliminates any remaining FM-signal components and produces an output signal with an average voltage proportional to the AM video signal. U2A and U2B produce an out-of-phase triggering signal for U3 at twice the input frequency. R1 adjusts the output-pulse length of U3.

U4A, U5A and U6A act as a 6-pole Butterworth low-pass filter with a 900-Hz cutoff frequency. Here, high-frequency signal components are filtered out. U6B produces the video signal; U4B separates the sync pulses. The video signal from U6B is limited to a 5-V maximum by D6 and is fed to U8, an 8-bit A/D converter. The converter is configured in a free-running arrangement and produces a continuous output signal once power is applied. The four most-significant bits of U8 are fed to

¹Notes appear on page 16.

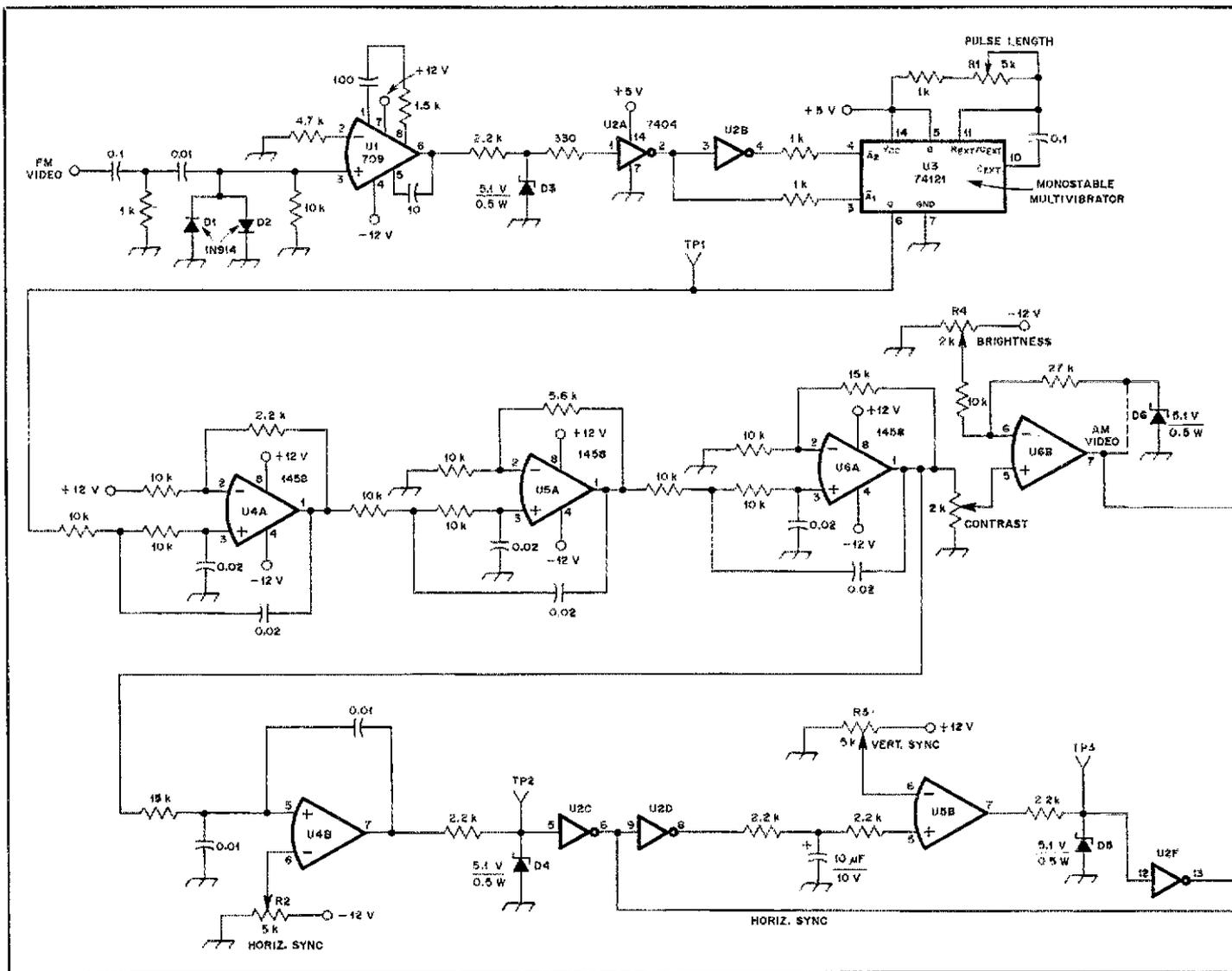


Fig. 1—Schematic diagram of the Interface.

JOYPORT 1 of the computer. Pins 1-4, inclusive, of JOYPORT 1 are tied to pins 14-11, respectively, of U8.

U2 sections C and D improve the shape of the horizontal sync pulses that are detected by U4B. Vertical sync pulses are detected by U5B. Both sync signals are logically ORed and fed to the base of Q1. Q1 is connected to the trigger of JOYPORT 1, pin 6. A sync pulse applied to Q1 grounds the trigger level. Horizontal and vertical sync pulses and data lines 0 through 3 are provided for experimental purposes.

The signal ground of JOYPORT 1, pin 8, is tied to the demodulator circuit ground. A shielded ribbon cable is used to connect the interface to the computer. Any power supply capable of delivering the voltages required by the demodulator may be used. A small, internally mounted switching supply is used in the prototype shown in Fig. 2. Most of the demodulator-circuit component

values are not critical, and substitutions are possible. Simply follow good construction techniques.² A metal case should be used to house the demodulator.

Demodulator Alignment

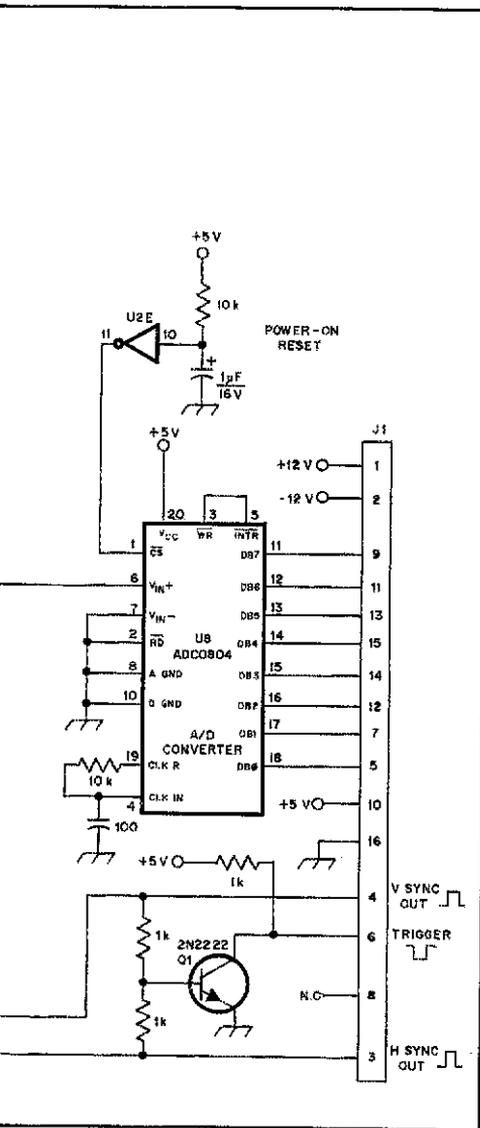
You'll need a signal generator, a frequency meter and an oscilloscope or voltmeter to align the demodulator. A pulse generator is used to simulate the sync pulses during adjustment of the vertical-sync-pulse circuit.

R1 and R2 effectively control the horizontal-sync passband. The horizontal-sync line must remain high with a 1500-Hz signal present. Preset the arm of R2 to -2.5 V dc. Inject a low-voltage, 1200-Hz sine-wave at the FM VIDEO input point; connect the oscilloscope or voltmeter to TP1. Adjust R1 to obtain an approximate square-wave pulse of 1200 Hz. Note: You can obtain a 2400-Hz pulse, but you do not

want this. Next, connect the oscilloscope to the horizontal-sync line, TP2, and adjust R1 again until the 1200-Hz signal causes the sync line to go low. Lower the input frequency slightly until the sync line is again high. Repeat this procedure until the sync line drops low at 1200 Hz, but rises again at a slightly lower frequency.

Apply a 1200-Hz signal to the FM VIDEO input point again. While monitoring the horizontal-sync line at TP2, adjust the HORIZONTAL SYNC potentiometer, R2, until the line goes low. Increase the signal-generator frequency slightly and observe when the sync level goes high. Continue to adjust the signal-generator frequency and R2 until the 1200-Hz signal causes a low sync level and a slightly higher frequency brings the line high.

Adjustment of the VERTICAL SYNC control, R3, is similar to the horizontal-sync alignment. This adjustment can be approxi-



ble with all Atari models except the 1200. To run the program on the later Atari models (600 XL and 800 XL), the translator program should be loaded first. This software is available from the librarian of the Atari Micro-computer Radio Network.³

Place the disk containing the SSTV program in a disk drive and turn on the computer. With no cartridge in the computer, turn on the computer. The software is in an AUTORUN.SYS file, so the routine will be loaded into memory and will display a menu. When the disk-drive light extinguishes, remove the SSTV-program disk and replace it with a blank, formatted disk.

Software use is simplified by a menu. As shown in the title photo, the menu offers a variety of options, whose descriptions follow.

SSTV Format

Pressing the F key changes the scan

(F)ormat. After the F key is pressed, the program pauses to receive three digits. These digits may be any combination of 0, 1 or 2. For example, to receive a black-and-white scan, enter 1, 0, 0. This collects only one red frame, but the frame will appear black and white once the color cycling

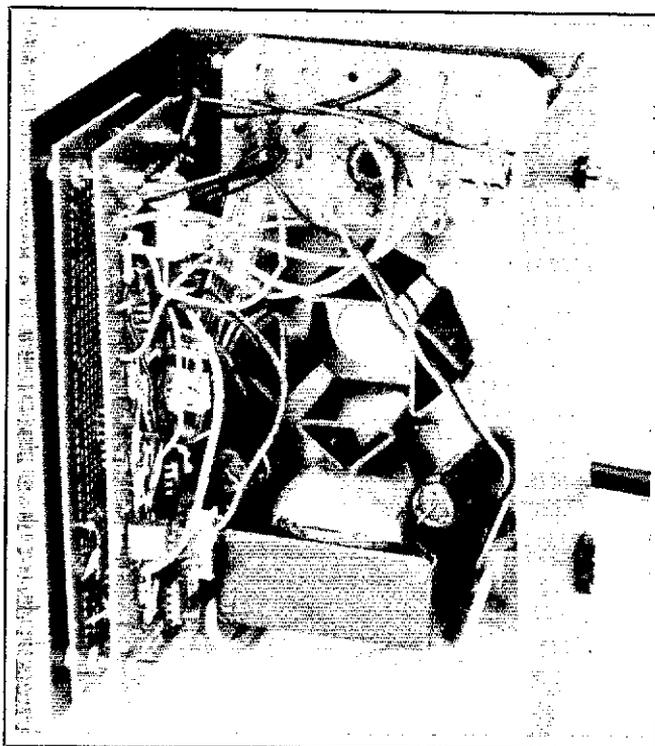


Fig. 2—An inside view of the author's SSTV converter. A small switching supply occupies the bottom of the enclosure. In this prototype, the circuit is assembled on perf board. PC boards are available (see note 2).

ated if a pulse generator is not available since the horizontal-sync line also detects vertical sync. The best adjustment procedure is to inject a sine wave from a signal generator into a pulse generator so that 30-ms-duration, 1200-Hz pulses are produced. R3 is then adjusted so that the vertical-sync line is low during the 30-ms pulses.

The brightness potentiometer, R4, is adjusted by injecting a 1500-Hz signal into the FM VIDEO input and monitoring the video output. With the 1500-Hz signal present, adjust R4 for no voltage at the video-output point. This adjustment determines the overall resolution of the scan. Repeat the procedure until a 2300-Hz signal produces 5 V at the video output point, and a 1500-Hz signal creates 0 V at that point. This completes the circuit alignment.

Software

The software routine should be compati-



(A)



(B)

Fig. 3—At A, the unexpanded display of the picture of a cat. The same picture is shown at B after having been expanded.



(A)



(B)

Fig. 4—Another example of normal (A) and expanded (B) displays.

occurs. The same picture could have been collected with a 0, 1, 0 or 0, 0, 1 combination. Normal RGB scans require a 1, 1, 1 format. For any screen with a 2 format (e.g., 2, 1, 1), the second scan of similar color will simply overwrite the prior frame scan for that color. Composite pictures ignore the format parameters.

Scan Speed

The scanning speed used during development of the Atari SSTV system is the 8.5-second scan. However, 12- and 24-second scans are available for composite pictures. Pressing the S key enables the (S)hort, 8.5-second, scan. Similarly, the M key activates the (M)edium, 12-second, scan; the L key enables the (L)ong, 24-second, scan. Use of the M or L keys automatically causes a composite picture to be collected.

Scan Erase

To erase a picture in memory, press E. All three color frames will be (E)ras(ed).

Scan Expand

Selecting z(Z)ooms the picture presently in memory to full screen. A small portion of the top and bottom of the picture will be lost, however. If you want to save the picture to disk, do so prior to expanding the picture.

Scan View

Pressing v allows you to (V)iew the picture in the computer memory. This routine can be used to view scans that have been retrieved from disk as well as scans obtained directly from the radio receiver.

Disk Storage

Choosing D stores the picture in memory on (D)isk. The DISK and FILENAME

labels are highlighted on the menu. You can then key in a file name. The file name must be seven letters or less. No extension should be applied to the name. Three files, one for each of the color frames, are stored with the extensions .R, .G and .B. Once the frames are stored, the DISK and FILENAME patterns return to their normal color.

Memory Storage

Pressing C allows a scan stored on disk to be called into (C)ore (memory). The MEMORY and FILENAME labels on the menu are highlighted. When a file name is entered, the three color frames associated with that file are loaded into memory and can be viewed or readied for transmission. (Transmission capabilities for the program are planned, but not yet available.)

SSTV Scan

To begin the collection of a picture, press the START key while the menu is displayed. This causes a timer routine to check for the 30-ms frame-start pulse before collecting the first frame. If a scan starts prematurely because of noise, the OPTION key causes that particular frame to be reset and initiates a wait for the 30-ms pulse. Should a frame scan not start when it should, the SELECT key immediately enables the scan. This key can be used to initiate the scan of any frame. While the system is scanning, the pressing of any of the alphanumeric keys aborts the complete scan, but saves what is presently in memory. This option is useful for ending scans that may have lost some sync pulses and did not finish completely.

Color Adjustments

While in the VIEW mode, the intensity of each of the three color frames can be adjusted separately. Pressing R for (R)ed,

G for (G)reen or B for (B)lue, increases the luminance of these colors. Once the intensity has reached maximum, the color resets to the original luminance level. If necessary, these keys can be used to make a partial contrast adjustment for any of the frames.

Wrap Up

My system has been in operation for about a year and has performed admirably. Though this system will probably not produce pictures of the quality available from commercial SSTV systems, it is an inexpensive introduction to SSTV for amateurs wishing to explore this expanding field. Further work is planned for the development of composite-color receive and transmit capabilities. I'd like to express my thanks to Mark Akers, WB4RRH, Dave Ingram, K4TWJ, and members of ROBOT Research, Inc. for their help.

Notes

- ¹G. R. Steber, "Slow-Scan to Fast-Scan TV Converter," QST, May 1975, pp. 28-48.
- ²PC boards and parts kits are available from A & A Engineering, 7970 Orchid Dr., Buena Park, CA 90620, tel. 714-521-4160. PC board only, \$12; complete kit, \$39; add \$1.25 for shipping and handling on each item.
- ³Persons interested in joining the net and obtaining this program and others should contact Jack McKirgan, WD8BNG, 4749 SR 207 NE, Washington C.H., OH 43160. Assembly-language program listings are available from the ARRL for \$2.50.

Martin Schick obtained his Novice license in 1978 and his Advanced class license in 1983. He earned a BS in Chemistry from Purdue University in 1974 and an MS in Chemistry from East Tennessee State University in 1979. He is employed by the Eastman Chemicals Division of Kodak as a research chemist. In addition to Amateur Radio, Martin enjoys working with computers. His knowledge of computer languages embraces FORTRAN, BASIC, FORTH and assembly, and he's experienced in the use of Intel, Data General, Digital Equipment Corporation (DEC), ATARI and Nicolet computers.

New Products

HAL SPT-1 TUNING INDICATOR

□ Designed to get you on frequency quickly and accurately, the SPT-1 may be used for tuning in RTTY (high and low tones), CW, SSTV and FAX signals. A calibrated, 40-segment, LED bar graph displays the frequency spectrum of the received signal. The SPT-1 works with any demodulator and has a 25-Hz frequency resolution. With the SPT-1, you can see the received signal "walk" across the display and determine which way to tune your receiver for proper reception. You simply align the bar segments with the front-panel markings and you're on

frequency. By means of a front-panel potentiometer, you select which 1-kHz range of frequencies from 300 Hz to 3 kHz you wish to display.

Hookup is relatively easy (if the supplied connectors match your equipment connectors): A source of +12-V dc and an audio line from the receiver are all that's required for operation. You may also connect an external calibration source to the unit. Two cables with phono connectors on each end are supplied for the audio and calibration lines. One end of each of these cables is terminated in PC-mount phono jacks on one of the PC boards. The power-supply cable is soldered to the PC board internally and terminated externally in a 1/8-inch-diameter female plug. Unfortunately, these connectors were not suitable for use with my equipment, so I had to use some adapters.

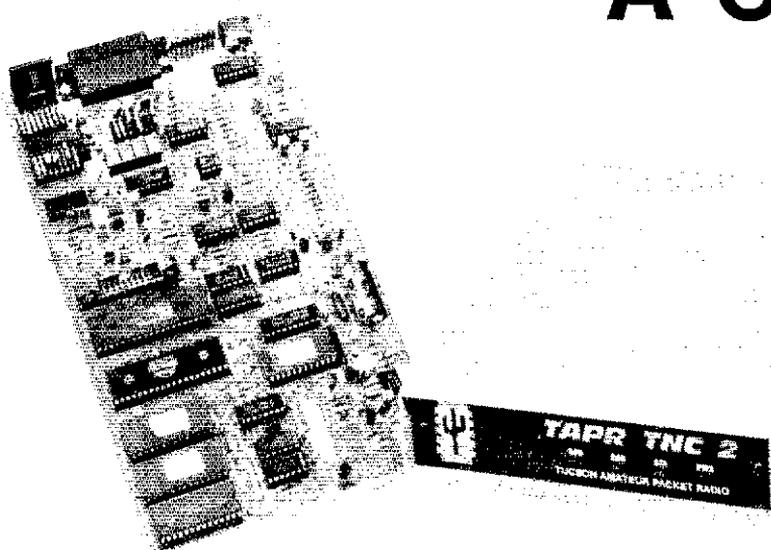
The components are enclosed in a two-tone gray, plastic, clam-shell case that

measures 2-1/2 × 6-1/8 × 6-1/4 inches (HWD). Two PC boards, an input board and a display board, are mounted directly behind the front panel. About 75% of the case is empty, so there's plenty of room in which to mount a small power supply.

In the circuit, an LM709 op amp operates as a limiter and feeds an LM2197 frequency-to-voltage converter (FVC). The linearly proportional dc output voltage of the FVC drives a 40-segment voltmeter display composed of an LM1458 dual op amp and four LM3914 dot/bar display drivers. A 7805 regulates the dc supply voltage. An LM555 timer is configured to provide a source of negative dc voltage required by the circuit. A pair of schematic diagrams is included in the manual.

The SPT-1 is available from HAL Communications Corp., Urbana, IL 61801, tel. 217-367-7373. Price class: \$170.—Paul K. Pagel, N1FB

A Closer Look at Packet Radio



Last month we introduced you to packet radio; this month we'll look at what makes packet work—the terminal-node controller.

By Harold Price, NK6K
1211 Ford Ave., Redondo Beach, CA 90278

If you've read last month's article on packet radio, you have probably already joined the ranks of packet users and are ready to learn more about how packet works. If you haven't read last month's article, please read it now. We'll wait.

While we're waiting for them to get back, let me mention a few things that happened in the shack today, all of them fairly common occurrences on packet. You'll recall, of course, that packet is a mode of communications that allows information in digital form to be passed easily between amateur stations, that it is high speed, and that it guarantees perfect transmission of data. Packets are also easily manipulated by computer, allowing computer-assisted relaying of messages and data files.

I received a message that originated at a station in Newington, Connecticut. It had been relayed by computer on VHF to a station in Boston, where it was relayed by computer on 20 meters to a station in California. Then, I picked it up on VHF at my home in Redondo Beach in Southern California. I added some comments to the message and transmitted it on VHF through two real-time relay stations to a computer 200 miles north of me, where it will be picked up tomorrow by another station 200 miles farther to the north. I "talked" by keyboard to a station 400 miles north, in San Francisco, using four relay stations. I transmitted a copy of a packet-radio newsletter to a local ham at the speed of 120 characters per second. All of this was done using a VHF radio attached to a packet-radio controller called a *terminal-node controller* (TNC). One of the messages, by the way, discussed plans to begin transmitting data at 960 characters per second.

Is everybody back now? Good. This month, we're going to take a look at some of the technical parts of packet radio, specifically the TNC—that combination of hardware and software that does much of the hard work involved in supplying all of the services described previously.

Since it is sometimes useful to point to a concrete example of a concept under discussion, we'll use a TNC called TNC 2 (Fig. 1), designed by several hams who are part of an organization called TAPR, the Tucson Amateur Packet Radio Corporation. TAPR is a nonprofit research and development group that does work in packet radio in much the same way that AMRAD and AMSAT do work in their fields. The concepts that will be discussed here hold true for most TNCs, but are particularly applicable to the implementations by AEA, Heath and Kantronics, since their TNCs employ elements of the hardware and software previously developed by TAPR.

What A TNC Does

In professional circles, a TNC is called a packet assembler/disassembler (PAD). From this name, it is easy to figure out that a TNC's primary task is to convert data into packets, and packets into data. The TNC gets data from the user, forms it into packets and sends it out. The TNC also listens for packets, changes them back into data and passes the data to the user. There are several subsections to a TNC that allow it to do this. In the following discussion, refer to the block diagram in Fig. 2.

The User Connection

The TNC is usually attached to a local data device. This can be a terminal, a com-

puter, a modem, a digital voice encoder or any other data-generating/using device. The TAPR TNC 2 communicates with this "user" through a serial communications port using standard *RS-232-C* voltage levels and signals. This means that if you have a terminal or computer that can be connected to an external modem, you can use the TNC 2. The flow of information on the user port is independent of the flow of information through the radio; the speed and data format used on the user connection don't have to match what's going on elsewhere in the TNC. Your terminal or computer doesn't even have to "know" that it is connected to a TNC. Most TNCs permit data rates between 110 bit/s and 19.2 kbit/s on the user port. While some TNCs change data rate with a software command, the TNC 2 uses switches.

The Radio Connection

The TNC must monitor the incoming signals and convert the tones it hears into ones and zeros that the rest of the TNC can deal with. It must also convert ones and zeros that the TNC wants to send into a form the radio can transmit. These jobs are performed by a demodulator and a modulator, respectively. The combination of modulator and demodulator is called a *modem*. The TNC 2 is equipped with an on-board *AFSK* modem that can be used to send data at various speeds, using various mark and space tones. On VHF packet radio, the 1200-bit/s standard is based on the Bell 202 modem standard. It uses mark and space tones of 1200 and 2200 Hz. For HF, 300 bit/s and the Bell 103 modem standard is used, using 1070- and 1270-Hz tones. As it turns out, which tone is used for mark and which for

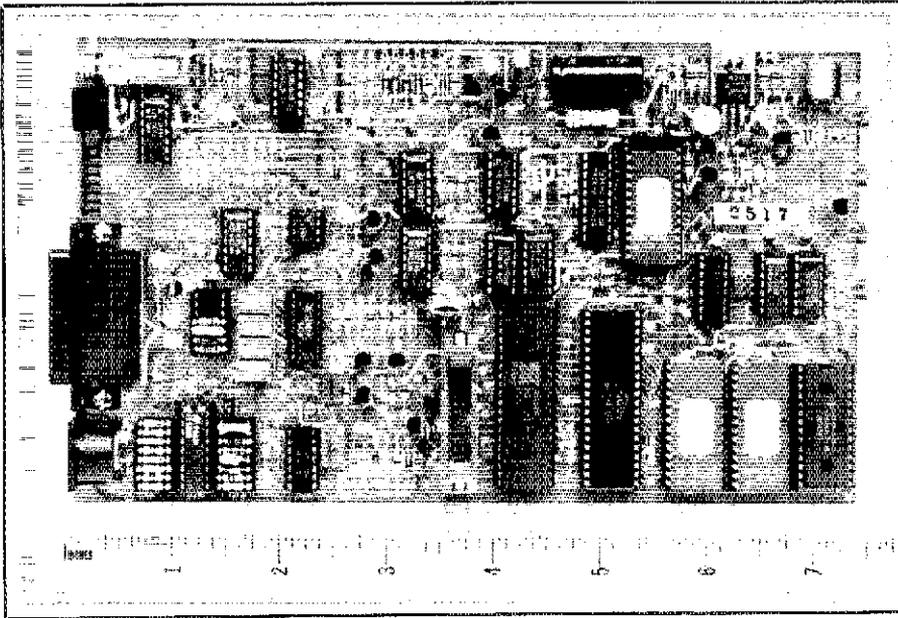


Fig. 1—The PC board for the TAPR TNC 2 shows the size and parts-count reductions made possible by advances in IC technology and experience gained through design of the TAPR TNC 1.

space is of little importance on packet, since the data is sent using the special *Non-Return-To-Zero-Inverted* (NRZI) encoding. With NRZI, a change from one tone to the other is used to signal a zero, and no change of tone signals a 1.¹

Although the modem in the TNC 2 is limited to 1200 bit/s or slower, TNC 2 and several other TNCs provide a way to bypass the on-board modem and use an external modem. A *modem disconnect* jack is avail-

able for this purpose, and, with the correct external modem, the TNC 2 will support data rates up to 56 kbit/s.

Before they are sent to the demodulator, received signals are conditioned by a switched-capacitor input filter. This is done because the frequency response of most VHF FM radios is somewhat less than optimal for easy decoding of a 1000-Hz shift. An entire article could be devoted to the intricacies of the modem, and, in fact, one has.²

In addition to modulating and demodulating, the TNC must control the push-to-

talk (PTT) circuit of the radio. Since TNCs are sometimes used as unattended automatic repeaters, the FCC and common sense dictate that there be some protection against a TNC failure causing a long key-down period. The TNC 2 provides a timer on the PTT line that will turn off the transmitter if it is on for more than 15 seconds. Fifteen seconds is longer than it will take to transmit the longest possible group of contiguous packets.

In the TNC 2, as Fig. 2 shows, both the radio I/O functions and the user I/O functions are performed by a single Zilog serial I/O (SIO) chip. The SIO provides two independent serial I/O channels in one IC. This reduces parts count, power consumption and price over previous TAPR designs, while retaining the high speed made possible by having these functions performed in hardware.

Data Processing

Packet radio is easy for the operator, but it is no simple task for the TNC. The TNC must listen to both the user's data port and to the radio. It must watch the stream of packets, looking for packets addressed to it. It must acknowledge packets received correctly, complain about those received out of order and ignore those received with errors. The TNC must send out its own packets, keeping track of those that have been acknowledged and those that haven't. It must time several events: how long to wait for an acknowledgment, how long to wait for the transmitter to turn on, and others. The TNC must know who it is talking to (so it can tell other TNCs it is busy), keep track of the number of times a packet has been retransmitted and be able to relay (*digipeat*) other user's packets when

¹Notes appear on page 20.

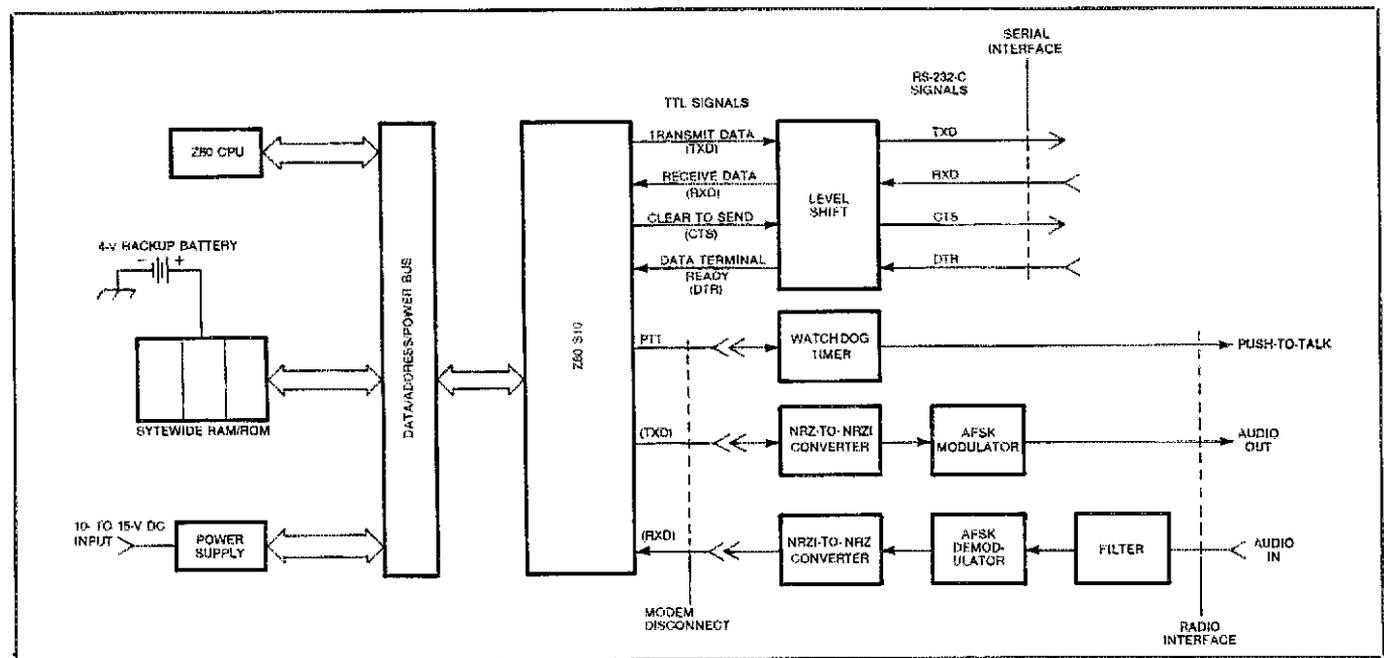


Fig. 2—A block diagram of the TAPR TNC 2. While TNC implementations vary, the services provided by the subsections in this TNC are provided in all other TNCs.

Glossary

acknowledgment (ACK)—a packet sent by a station to confirm correct reception of a packet or group of packets.

address—in amateur packet radio, a station's call sign followed by a number from 0 to 15.

AFSK—audio-frequency shift keying.

ASCII—the American National Standard Code for Information Interchange, a common binary code that specifies 7-bit representations of letters, digits, punctuation and special characters.

AX.25—the most common packet-radio protocol. AX.25 is specified in the ARRL publication *AX.25 Amateur Packet-Radio Link-Layer Protocol*. This protocol defines communication between two stations with only rudimentary relaying by intermediate stations.

bit—a single signal element, which can be either a binary 0 or 1. Groups of bits are used to convey information. Signaling speeds are usually stated in bits per second (bit/s).

bulletin board—a computer system used to store messages, files and bulletins.

connection—the imaginary "data pipeline" that exists between two stations that are communicating using a packet-radio protocol. During a connection, all data sent by one station will be delivered to the other station without errors.

data—bits that convey information.

digipeat—to retransmit a packet after it has been received. This is a specific function of the AX.25 protocol and is performed by *digipeaters*. With suitable radio equipment, a TNC can act as a digipeater.

flow control—a means of controlling the rate at which data is transferred between two devices. Examples are the XON/XOFF character-based flow-control system used between the TNC and the host computer or user; hardware flow control, which uses the RS-232-C control lines; and the "sliding window" flow-control system used between TNCs.

frame check sequence (FCS)—a 16-bit number included in every packet to aid error detection. The number is the result of a calculation called a cyclic redundancy check (CRC).

gateway—A device that provides a path for data flowing between two networks. In amateur packet radio, it may be used to connect stations on two different bands or frequencies.

host system—a computer system that can be accessed via packet radio. As well as providing the services of a bulletin board, a host system can run programs for remote users.

mailbox—see *bulletin board*.

modem—the device that converts logic voltages to audio tones for transmission, and tones to voltage levels for reception. A contraction of modulator/demodulator.

monitor mode—a mode of TNC operation during which the TNC displays all packets that it receives, not just those addressed to it.

network—a group of stations that can relay data among themselves.

network node—a station that uses a special *network protocol* (as yet, none of these exist in Amateur Radio).

NRZI—Non-return-to-zero-inverted. A form of bit coding in which a 0 bit causes a change of state, or level, and a 1 bit causes no change in state.

packet—a group of bits that contains, along with any data being communicated, the addressing, control and error-detection information necessary for error-free communication.

protocol—a set of rules agreed upon by two stations in order to communicate.

RS-232-C—the specification of the voltage levels and signals of a serial interface.

teleport—a station that provides a link between a terrestrial network and a satellite.

terminal-node controller (TNC)—a dedicated, microprocessor-based device that communicates with other TNCs using a packet protocol and with the user's terminal or computer using serial ASCII (RS-232-C).

user interface—the set of commands that a user can enter into the TNC and the messages or responses returned by the TNC to the user.

ternal battery keeps memory active, so the rig can "remember" repeater frequencies and offsets. TNC 2 uses its battery-backed-up RAM to remember your call sign and the settings of the more than 70 variable parameters used to configure the TNC to your needs.

Software

Writing the software used to control a TNC is one of the more difficult programming tasks required in Amateur Radio. It is rivaled only by the software in OSCARS 10 and 11, and the software on some of the more complex hilltop repeater and remote-base systems.

A TNC requires two different types of software. First, the TNC is a computer speaking to other computers. It does this using an agreed-upon language called a *protocol*. A good protocol definition is very precise, leaving no room for interpretation or surprises. The packet-radio protocol in widest use today is called *AX.25SM pend.*. The specification of AX.25, 40 pages of protocols, is perhaps the most comprehensive set of rules that any large segment of the Amateur Radio population has ever agreed to live by (apart from Part 97 itself).³ AX.25, however, is only the first floor of a multiple-story house that is being built by the packet-radio community. The task of specifying (and agreeing upon!) protocols has really just begun. Although the AX.25 protocol is sometimes hard for humans to understand, it is just the type of well-defined task at which computers excel.

The second type of software in a TNC is the *user interface* program. Here things are a little less certain; humans have an amazing propensity for attempting things never before tested, tried, planned or even imagined. What humans lack in speed, they make up for with the talent for unerringly choosing the wrong thing to do at the wrong time. There are no reliable methods for guessing what people will do next. Computers and computer programmers do not like this kind of behavior. Thus, the amount of software written to talk to the user usually exceeds the amount written to talk to the other TNCs.

Writing TNC code is not for the faint of heart, but it can be a rewarding experience. TNC 2, like most other TNCs, comes with all the necessary protocol and user software stored in EPROM. This means that if software updates are necessary, they can be accomplished by merely changing a memory IC or two.

Power Supply

TNC 2 requires an external 10- to 15-V dc supply. An on-board switching-mode power supply converts that input to regulated +5 V, and -5 V. The supply also provides -7 V for the RS-232-C outputs. (The two RS-232-C output levels

called upon to do so. It must listen to the radio and not transmit if another signal is on the air.

It takes a computer to keep track of all this. The last item in the preceding paragraph has proven especially difficult for human operators to do; just listen to 20 meters on any contest weekend. The processing power for the TNC 2 is provided by a Zilog Z80[®] CPU, running at 2.45 MHz. The TNC 2 has three memory sockets. These sockets usually hold

16 kbytes of read-only memory (EPROM) for program storage and 8 kbytes of read/write memory (RAM) for data storage. Using the largest available ICs, it is possible to get a total of 56 kbytes of memory into the three sockets, which leaves some room for expansion of the TNC software.

A lithium battery supplies backup power to the TNC 2 RAM when main power is removed from the TNC. This is exactly the same scheme that is used in most mobile or hand-held VHF/UHF radios; a small in-

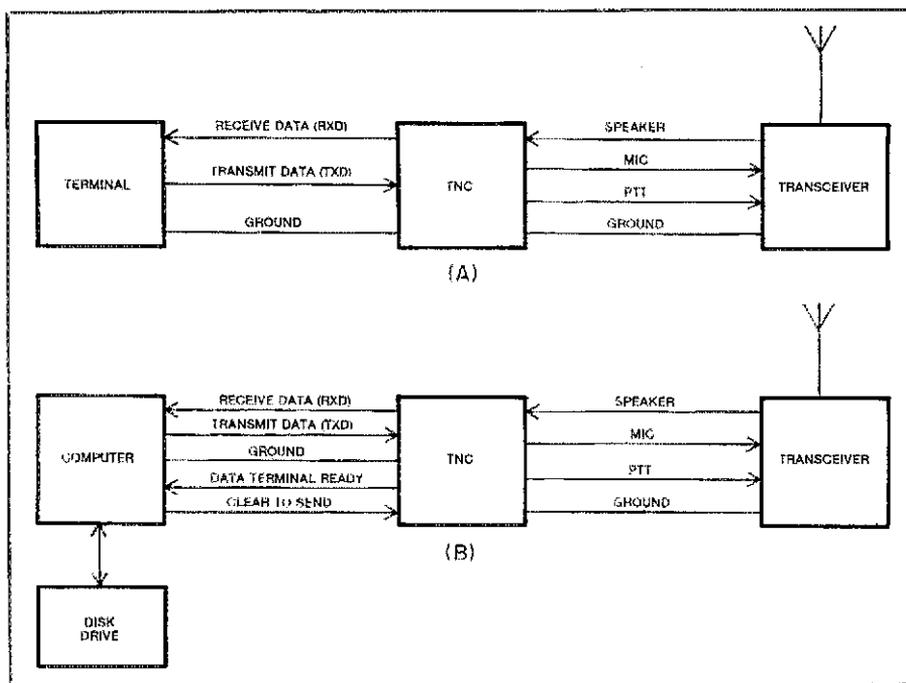


Fig. 3—A shows the simplest TNC, radio and terminal connections. In B, the additional hardware flow control lines between the computer and the TNC make it possible to transmit large data or message files.

are -7 V and the positive input voltage.) Populated with NMOS ICs, the TNC 2 draws 260 mA at 12 V. For lower-power consumption, the TNC 2 was designed so that it could be built with CMOS parts. With CMOS ICs, the TNC draws less than 120 mA at 12 V.

Status Indicators

You never quite feel you've gotten your money's worth unless you've got flashing lights. TNC 2 has four of them: POWER ON (the function should be obvious); CONNECTED, lights when a connection to another TNC has been established; DATA CARRIER DETECT glows when a mark or space tone is heard; and STATUS is lit when the TNC has sent a packet but has not yet received an acknowledgment for it.

Hooking It Up

The TAPR TNCs grew from a single overriding desire: to make packet radio as easy as possible to use! The Bell 202 modem standard and 1200-bit/s data rate are used because this is as fast a signal as can be easily forced into the microphone jack and taken from the speaker terminals on most VHF/UHF radios. To go faster requires a direct connection to the modulator and discriminator. This is not particularly difficult, but would limit packet operation to those with older, larger rigs or to surgeons and jewelers with the steadiness of hand, keenness of eye and tiny tools necessary to make modifications to shirt-pocket radios.

Since the TNC was designed for easy installation, it should not be surprising that hooking up a TNC to your station is very

simple. As shown in Fig. 3A, you can get by with three wires to your computer or terminal and four to your radio. The hard part will be finding a proper mic connector for your radio! Just remember, when connecting a TNC to your radio, think of the TNC as a microphone and a speaker; when connecting a TNC to a computer, think of the TNC as a modem.

If you use your TNC only for RTTY-like typing contacts, you need to connect only three wires between the TNC and your computer: one for data from the computer to the TNC (TXD), one for data from the TNC to the computer (RXD) and one ground (Fig. 3A). If you want to use your computer to send large files or messages to your TNC, then you must provide a way for the TNC to control the stream of data coming from your computer. This is called *flow control*. Flow control is required because your computer can send data to the TNC faster than the TNC can send data to the receiving station. If you send a stream of data at 1200 bit/s to your TNC, retries—caused by collisions, dropped packets or other mishaps—will cause the limited RAM in your TNC to fill up with characters waiting to be transmitted. Your computer must be prepared to wait when the TNC memory gets full. Two flow-control methods are available on the TNC 2: hardware flow control, using the CTS and DTR lines on the serial port (Fig. 3B), or software flow control, using the ASCII XON and XOFF characters.

As mentioned earlier, on TNCs that have a modem disconnect, you are not limited to use of the on-board modem. The TNC 2 is capable of running at 56 kbit/s with an

appropriate external modem. A 9600-bit/s modem that connects to the modem disconnect has been designed, and other, even faster, modems are under discussion.⁴ High speeds will be used primarily for communication between *gateways* and *network nodes*, but that's a topic for another day.

Wrapping It Up

We've seen what a TNC is and what it does. We've used the TAPR TNC 2 as a specific example. I'd like to mention the chief architects of that project. Paul Newland, AD7L, did the hardware design, and Howard Goldstein, N2WX, did the software. Steve Goode, K9NG, provided input on the modem, and other design input and review came from Pete Eaton, WB9FLW, and Lyle Johnson, WA7GXD.

What happens next? I'd like to suggest that you stop reading about packet radio and *do* something about it. Packet radio is a young enough part of our hobby that you can get in on the ground floor and have a very real effect on the future growth and direction of computer networking in the Amateur Radio Service. You might just also affect the future of Amateur Radio itself.

If you'd like to see more *QST* articles about packet, including things on high-speed modems, gateways, n-port digipeaters and network access ports, send a letter to the editors. If they hear that there is interest in packet radio, they are more likely to publish packet-related articles. To stay current in the meantime, you can join any of the several packet radio clubs that print newsletters. Also, the biweekly ARRL packet radio newsletter, *Gateway*, provides short reviews and summaries of packet development activity.

See you on packet!

Notes

- ¹The 1985 ARRL Handbook for the Radio Amateur, p. 19-25.
- ²M. Morrison and D. Morrison, "Designing the TAPR TNC Audio Input Filter," *Proceedings of the 2nd ARRL Amateur Radio Computer Networking Conference*. Available from ARRL for \$9.
- ³AX.25 Amateur Packet-Radio Link-Layer Protocol, Version 2.0, Oct. 1984. Available from ARRL for \$8.
- ⁴S. Goode, "Modifying the Hamtronics FM-5 for 9600-Baud Operation," *Proceedings of the 4th ARRL Amateur Radio Computer Networking Conference*, available from ARRL for \$10.

Strays



I would like to get in touch with...

anyone using an EAGLE IIE computer to work RTTY, AMTOR and packet. Jack Clark, W9HJM, 93 Downing Dr., Chatham, IL 62629.

anyone with a four-section electrolytic can capacitor rated at 20 μ F / 20 μ F / 20 μ F / 30 μ F at 650 V. Charles Schramm, Jr., KA2JLC, 28-28 35 St., Long Island City, NY 11103.

A Utility IC—The CA3046

Five bipolar VHF transistors on a chip! Countless projects can be built around this 14-pin IC. It's an experimenter's delight!

By Doug DeMaw, W1FB

ARRL Contributing Editor, P.O. Box 250, Luther, MI 49656

Have you worked with transistor arrays? If not, here is your chance to find out how compact you can make a "Dick Tracy wrist radio." Imagine having five VHF bipolar NPN transistors in one package! The circuit possibilities are practically without limit. Should you have a transistor failure, servicing is a simple task when you simply plug in another IC and commence using your circuit again.

There are many diode- and transistor-array ICs available, but my favorites are the RCA CA3046 and the Motorola MC3346P. Both have the same pinout, and roughly the same electrical characteristics. For Amateur Radio HF projects they are interchangeable. I have used the CA3046 through 2 meters for RF work, and the performance was entirely acceptable. The manufacturer leans toward 120 MHz as the upper frequency limit, consistent with the commercial performance specifications of the chip.

The Inner Sanctum

If we could walk through the interior of the CA3046, we would find a common platform (substrate) on which five NPN transistors are formed. We would note that two of the transistors have their emitters connected internally (Q1 and Q2 of Fig. 1). We would observe also that the emitter of Q5 is connected to the substrate of the IC. These two features present the only restrictions we need consider for most of our experiments. First, we must use Q1 and Q2 for circuits that permit the emitters to be in parallel. Second, pin 13 (Q5 emitter) must always be grounded directly to the negative voltage bus. If we allow pin 13 to be above ground, the IC can be damaged. If Q5 is used, be sure the related circuit calls for a grounded emitter.

For lack of a better description, we may think of the five transistors as being similar in characteristics to 2N2222 or 2N3904 discrete transistors. The rating of each internal device is about 300 mW at a case tem-

perature of 20°C. The maximum safe collector voltage (base open) is +15.

Circuit Possibilities

I have used the CA3046 countless times in recent years to build compact receivers, audio amplifiers, VFOs and QRP transmitters. Numerous other applications will come to mind. The IC is suitable for nearly any circuit, from audio through 144 MHz, that requires two or more NPN transistors. It would be interesting to see how many circuits you could develop around the CA3046. Certainly, the editors of *QST* would be interested in considering your practical circuits for publication.

The purpose of this article is to acquaint you with the transistor-array IC, and to encourage you to experiment. Trying new circuits and innovating has, after all, been the technical backbone of Amateur Radio since the beginning.

Differential-Amplifier Hookup

Differential amplifiers are balanced circuits. For the sake of simplicity, we may consider them balanced push-pull ampli-

fiers. They are useful as odd-order frequency multipliers (third or fifth harmonic, for example), balanced mixers, balanced product detectors and push-pull audio or RF amplifiers. The RCA CA3028A is internally configured as a differential amplifier with an NPN transistor connected as a *current source*. Some of the biasing resistors are included on the IC substrate. The inner workings of the CA3028A are shown in Fig. 2. If you compare this circuit to that of the CA3046 in Fig. 1, you will see how easy it can be to arrange Q1, Q2 and Q3 of Fig. 1 to provide the same circuit. The main difference is that we need to use external biasing resistors for the CA3046. The CA3028A works well as a mixer, IF amplifier or product detector. It has been used by a number of hams as the front end for direct-conversion (D-C) HF receivers. Proper hookup of the CA3046 will permit the same applications listed for the CA3028A.

QRP Transmitter Idea

As an illustration of how we might use the CA3046 as a low-power CW transmitter

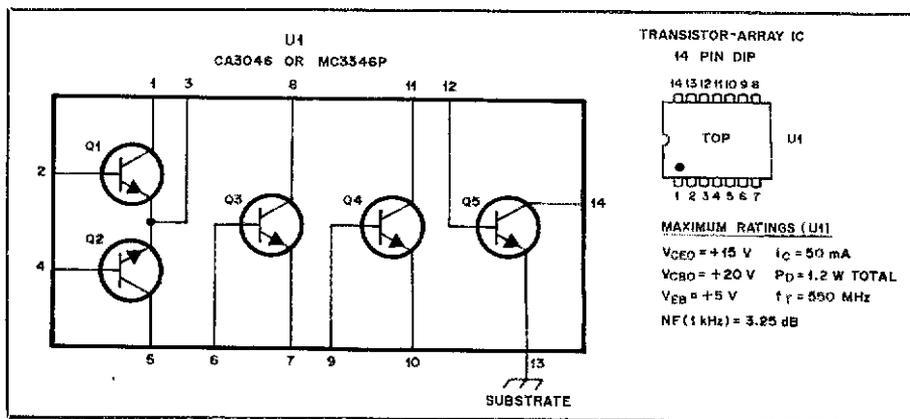


Fig. 1—Internal components of a CA3046 transistor-array IC. The inset drawing shows the pinout of the 14-pin IC.

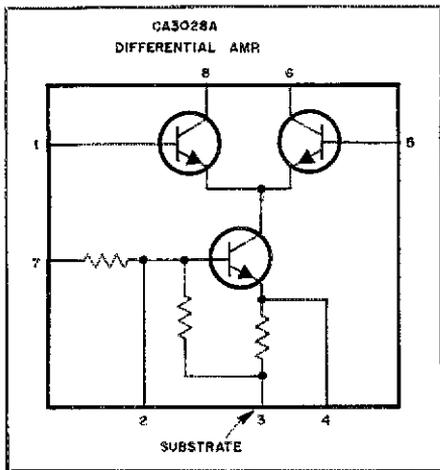


Fig. 2—Circuit elements of a CA3028A differential amplifier IC (see text).

(pocket size!), please check the circuit in Fig. 3. This is offered as a starting point for those who want to try the "wrist-radio" concept. I have not built the exact circuit of Fig. 3, but I have constructed similar ones using the CA3046 chip. The major difference between this and previous transmitter circuits for the CA3046 is that the design in Fig. 3 is an improved one.

Compare the block representation of Fig. 3 against the schematic diagram of Fig. 1 to learn how the five transistors are used. In brief, Q3 operates as a crystal oscillator (tuned collector), Q4 is a broadband buffer/amplifier, and Q1/Q2 are connected in parallel as a final amplifier. Q5 is unused, but it could be employed for some special job, such as a dc switch or sidetone oscillator, provided pin 13 is grounded. If you decide to try this circuit (Fig. 3), it may be worth converting Q3 to a VFO or VXO.

To keep the transistors of U1 within their safe voltage ratings, we will use a 9-V power supply. Since the recommended maximum V_{CE0} is +15, we need to allow for the swing of the collector voltage during the RF sine-wave cycle. This means that the peak ac voltage can rise to +18 which, with the circuit shown, will be safe for the IC. If we used a +12-V supply, the ac swing to +24 V would probably destroy the internal transistors (Q1 and Q2, in particular). The emitter resistors of Q1/Q2 and Q4 will provide safe operating conditions (collector-emitter voltage) for the transistors.

I have obtained up to 250 mW of output with the general arrangement shown in Fig. 3. The CW note is chirp free when C1 is adjusted for the best-sounding note, consistent with maximum output power. Zener diode D1 acts as a clamp to limit the peak swing of the PA collector voltage—a safety device.

Layout for this or any other circuit that contains a CA3046 is somewhat critical, but no more so than when working with sepa-

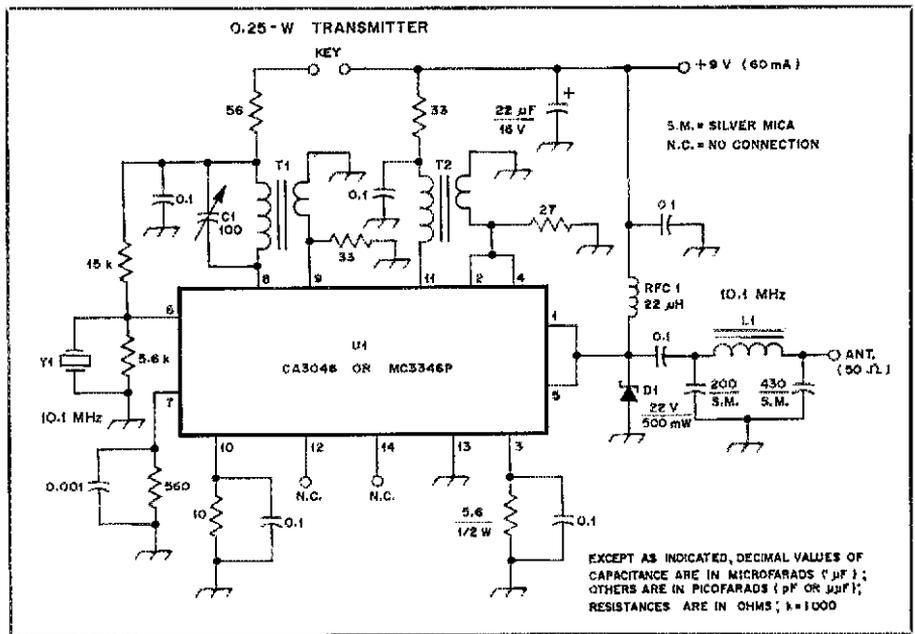


Fig. 3—Suggested QRP CW transmitter built around a CA3046 IC. Fixed-value capacitors are disc ceramic unless otherwise noted. Capacitors with polarity marked are electrolytic or tantalum. Resistors are 1/4- or 1/2-W carbon composition. If the oscillator does not start, add a small-value capacitor (10 to 100 pF) between pins 6 and 7 of the IC.

- C1—Ceramic or mica trimmer, 100 pF.
- D1—Zener diode, 22 V, 500 mW (1N5251 or equiv.).
- L1—1.5- μ H toroidal inductor. Use 19 turns of no. 26 enam. wire on an Amidon, RadioKit or Palomar Engineers T50-6 toroid core.
- T1—3- μ H primary winding. 24 turns of no. 26 enam. wire on a T50-2 toroid core. Secondary has 4 turns of no. 26 enam. wire over

- primary winding.
- T2—15 turns no. 26 enam. wire on Amidon FT50-43 ferrite toroid. Secondary has two turns of no. 26 enam. wire.
- Y1—Fundamental-mode crystal for chosen portion of 30-meter band. International Crystal Co. type GP or equiv., 30-pF load capacitance.

rate transistors. All RF leads need to be as short as possible, and related components must be located as close to the IC pins as can be managed. T1 and T2 should be spaced apart from one another, and they should not be close to L1, lest unwanted feedback occur; this could lead to self-oscillation.

Practical Direct-Conversion Front End

I have found the CA3046 and CA3028A ICs to be excellent performers in the front ends of simple D-C receivers. Most of the unwanted AM detection that comes with the use of a single-ended product detector, such as a 40673 MOSFET, is eliminated through the use of a singly balanced product detector. The conversion gain of the differential-pair detector is on the order of 10 dB, which is useful in D-C receivers, since they require between 80 and 100 dB of overall gain (audio amplifier included) to provide ample weak-signal output.

An RF amplifier is not needed ahead of the detector for the bands below 20 meters. A low-noise preamplifier will improve the receiver noise figure if it is added between the antenna and the CA3046 detector at 20 meters and higher.

The problem with AM detection is the "blanketing" of the ham band being listened to. The condition is caused by strong out-of-band commercial AM sta-

tions that can be heard along with the desired signals. In-band AM broadcast stations can also cause the same problem. A doubly balanced product detector offers the best rejection of AM signals, and the diode-ring doubly balanced mixer (DBM) detector is probably the ultimate choice. But you should experience no significant difficulty with AM detection while using the circuit of Fig. 4. An abbreviated schematic diagram of the innards for the CA3046, as related to the circuit in Fig. 4, is provided in Fig. 5. This shows how the five transistors are used.

Q3 is connected as a current source for Q1 and Q2, thus making the trio similar to those of the CA3028A of Fig. 2. Q3 provides a convenient way to inject the local-oscillator (LO) voltage on the emitters of Q1 and Q2.

Q4 is used as an audio amplifier. It should be followed by a high-gain audio chain. In my testing of the receiver, I used a two-pole RC active CW filter (700-Hz peak) immediately after Q4,¹ then routed the audio signal to a 2N3904 AF amplifier and finally to a 741 op amp set for 40 dB of gain. This provided ample weak-signal output into a pair of headphones.

¹Notes appear on page 24.

cuit of Fig. 4 for use on 160, 80, 75 or 40 meters. The only changes necessary are winding T1 for the proper inductance when changing bands. The transformer turns ratio will remain the same, regardless of the band of operation. Also, the LO frequency will need to be changed for the band of your choice.

Various VFO circuits can be found in *The ARRL Handbook* and the League's book, *Solid State Design for the Radio Amateur*. Information concerning RC active CW filters is available in the same publications. Whether you have read this presentation purely for "book larin" purposes, or because you plan to experiment with the CA3046, good luck to you!

Notes

¹See page 138, Fig. 40 (lower drawing), of *Solid State Design for the Radio Amateur* (Newington: ARRL, 1977). Practical circuit given.

²A & A Engineering, 7970 Orchid Dr., Buena Park, CA 90620, tel. 714-521-4160. A PC pattern and parts overlay are available from the ARRL for \$1 and an s.a.s.e.

³IC available from State Street Sales, P.O. Box 249, Luther, MI 49656, \$1.50 each, includes shipping.

Strays



I would like to get in touch with...

□ anyone with information on a Navy 'scope, OS-34/USM-32, a Mite teleprinter (TT299B/UG) and a Collins SSB book. M. Crestohl, VE2FW, Box 642, Montreal, PQ H3Z 2Y7, Canada.

□ anyone with a *Marine Radio Telegraph Operators License Manual* by Edward M. Noll. Jack Vollrath, KH6ANF, S9-654 Kawoa Pl., Haleiwa, HI 96712.

□ anyone with tube data for the B&K Dyna Quik Model 650 with Model 610 test panel and the Hickok Model 600 "Micromho." Peter L. Waasdorp, KF6MM, 324 Calle Adela, San Marcos, CA 92069.

□ anyone with a service and operating manual for a Model LA-239C oscilloscope, manufactured by Lavoie Laboratories.

Peter Atenczuk, N3DRM, 8243 Algon Ave., Philadelphia, PA 19152.

Next Month in QST

Interested in remotely controlling your station? An article in September tells you how to control your digital-mode communications from the workplace. Also in September is the first installment of "Under Construction," an intermediate-level series for the amateur builder. This installment explains the basic building blocks of a 75-meter transmitter. Been on the contest sidelines too long because of the stiff competition? Learn how contests can be just for fun, too. Also, if your emergency-communications skills need brushing up, check out the Simulated Emergency Test announcement.

New Books

SWITCHED CAPACITOR CIRCUITS

by Phillip E. Allen and Edgar Sanchez-Sinencio. Published by Van Nostrand Reinhold Co., New York, NY. First edition, 1984. Hard-bound, 6 x 9 inches, 759 pages including appendixes and index. \$56.50.

Here is a book that contains a wealth of information about switched-capacitor integrated circuits. It covers the latest design, analysis and fabrication techniques of these ICs, made possible by MOS technology.

The book is well-written, and contains an almost inexhaustible supply of technical information. It is not for the average radio amateur, however, nor even for an undergraduate-level electrical engineering student. It is intended to be used as a graduate-level text or as a reference for the practicing design engineer. Both authors are university professors, and they have combined their knowledge with the latest MOS fabrication techniques from the semiconductor industry to produce a textbook for the advanced technical audience.

Each chapter concludes with a sampling of relevant problems to review the material just presented. Although there are no answers provided for these questions, you may gain further useful knowledge by working out the solutions. The text is fully illustrated with many tables, graphs and diagrams to aid your understanding of the material.

A review of the prerequisite background and an introduction to sampled-signal-processing theory is provided in the first two chapters. A thorough presentation of the relationships between continuous and discrete time domains and the transformation differences between the s and z domains when the sampling rate is also greater than the frequencies of interest is also included. The equivalence of switched capacitors and resistors in active networks is well illustrated. This is a subject area that has not been treated well in other books.

Chapter 3 introduces the performance characteristics of switched-capacitor filters (SCFs) using the bilinear Z transform for component simulations. A different approach to switched-capacitor-filter design is offered in Chapter 4. The analog-filter transfer-function parameters, H(s), are transformed into discrete-time-filter transfer-function parameters, H(z). The authors show how to combine individual switched-capacitor building blocks into realizable filter systems. Low-order SCFs are synthesized with examples of low-pass, high-pass, band-pass and band-elimination-type classifications.

Other switched-capacitor applications are introduced in Chapter 6. Some of the examples presented are voltage comparators, phase shifters, modulators, multipliers and oscillators. This offers to a designer the latitude to consider an analog or a digital approach to these devices. I found this chapter especially interesting because the examples cited are usually considered to be classical analog/linear-type circuits instead of digital ones. Through the use of switched-capacitor techniques, they may be implemented digitally. Chapter 7

covers the subject of analog-to-digital and digital-to-analog conversions, using switched-capacitor and MOS technology.

Chapter 8 presents the physical aspects and practical fabrication techniques of CMOS and NMOS technology used by the semiconductor industry. This chapter describes how ICs are built by various fabrication processes. Analog-circuit design techniques are also covered. This information should prove useful to IC designers responsible for the topography and architecture of MOS devices.

The book includes three appendixes. Appendix A contains diagrams and data tables providing information about various passive-filter designs. The second appendix covers the method of bilinear transformation of an analog-filter transfer function into a sampled-data transfer function. This involves replacing the H(s) terms in the analog-filter transfer function using a bilinear transformation operation to obtain the H(z) transfer function:

$$s = K \frac{1 - z^{-1}}{1 + z^{-1}} \quad (\text{Eq. 1})$$

where

K = a constant involving frequency prewarping, and $z = e^{j\omega T}$

where

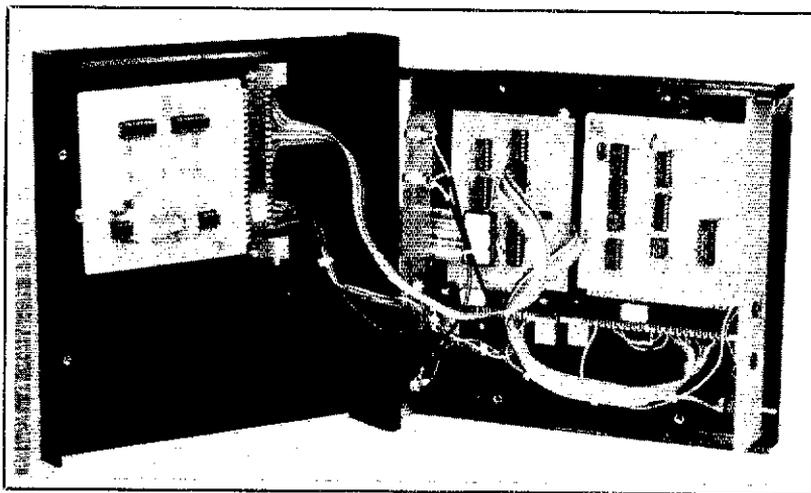
$j\omega$ = the frequency and T = the switching period.

Appendix C offers a number of program routines for the TI-59 and HP-41 programmable calculators to analyze MOS devices.

I recommend this up-to-date textbook for those who wish to advance their knowledge and skill in applying switched-capacitor circuits to the fields of instrumentation and telecommunications.—R. R. Schellenbach, W1JF (SK)

The VIP: A VIC Image Processor

As seen on TV: Create enhanced satellite weather pictures in your own shack.



By Grant Zehr, WA9TFB
2003 Woodfield Rd., Bloomington, IL 61701

It is difficult to believe that almost 20 years have passed since Wendell Anderson's landmark article describing the first practical homebuilt weather-satellite ground station appeared in *QST*.¹ Since then, many interested amateurs have built similar stations, some of which have also appeared in *QST*.

The type of imagery most often used by amateurs is a relatively simple type known as Automatic Picture Transmission, or APT. Unlike the very-high-resolution imagery used by most military and commercial meteorologists, APT imagery can be received using medium-bandwidth receiving equipment; modified amateur receivers are often used. In addition, the signal can be stored on standard audio tape and displayed using simple drum or CRT display systems.

Because of its comparatively low resolution, amateurs have been concerned that the APT service would be abandoned in favor of the high-resolution systems that can provide more-detailed imagery. These fears have proven to be unfounded. Since the APT service is also used by ships at sea, scientific observers and the international community, as well as educators and amateurs, it appears that the APT service will continue to be supported. There have been some changes in the APT service since

1965, however, with generally higher-resolution imagery available now. Other improvements since that time include combined visible and infrared imagery (Tiros-N series) and operational geostationary spacecraft (GOES and METEOSAT). Recently, the U.S. and the Soviet Union have settled on line rates of 120 lines per minute and 240 lines per minute. This cooperation simplifies construction of an APT station, since only two line rates need be accommodated for all active spacecraft.

The U.S. polar-orbiting Tiros-N series spacecraft transmit APT imagery in both visible and infrared channels. The Soviet Union transmits visible imagery from its operational Meteor 2 series spacecraft as well. The U.S. GOES spacecraft and the European Space Agency METEOSAT satellites have provided APT imagery in the WEFAX format. In addition to these operational spacecraft, the Soviet Union has used the standard APT format to transmit imagery from some of its experimental spacecraft. Amateurs around the world have received imagery from Meteor 1-28, 1-30 and 1-31. Most recently, European amateurs have been able to receive imagery from COSMOS 1500 and COSMOS 1602, which are radar-imaging oceanographic satellites. With only minor modifications, the same equipment can be used to produce satellite imagery from any of these spacecraft.

With this many satellites available,

amateur reception of APT imagery has remained popular. Depending on their interests and skills, amateurs have tried many methods of displaying APT imagery. Three of the most popular methods include direct printing on a drum or facsimile machine, photography of an oscilloscope or CRT face and, more recently, display on a video monitor with storage of the digitized image in computer memory. This last method uses a scan-conversion process similar to that used for amateur slow-scan television (SSTV). Amazingly enough, the very best amateur APT imagery still relies on a drum machine with photographic paper and a glow-modulator lamp!²

I have enjoyed listening to polar-orbiting weather satellites during the past seven years, and have obtained APT imagery from a number of American and Soviet meteorological spacecraft. My station is built around a converted 2-meter FM-receiver kit, a stereo tape recorder and a CRT display patterned after one demonstrated by David Latsch at the Dayton Hamvention® several years ago. It seems there is always room for improvement somewhere in the antennas, radio receiver or imaging system. Like most weather-satellite enthusiasts, I find myself spending a lot of time thinking of ways to improve my pictures.

I have watched with interest the latest developments in commercial satellite imagery. Conveniently, TV weather broad-

¹Notes appear on page 31.

casts feature computer-enhanced satellite imagery. In these images, the cloud tops, which would normally appear bright white, are often assigned a black or dark gray shade to help identify the highest (and coldest) areas, which often correspond to areas of thunderstorm activity.

After getting my conventional analog APT system working properly, I began to wonder whether it might be possible to produce computer-enhanced imagery using a simple microcomputer. After I studied the question carefully, computer enhancement began to seem feasible. This article describes a method of computer enhancement (or "digital image enhancement") using a VIC 20™ microcomputer. All of the required hardware is described, and the software listings are included. This unit is designed to operate as an addition to a "normal" CRT or drum display. The image does not appear on the VIC 20 monitor.

General Principles of Image Enhancement

The general principles of digital image enhancement are easily understood. First of all, the analog signal (in this case the incoming APT signal) is sampled using an analog-to-digital converter (ADC). The value of the digital sample will correspond to a level of gray (called a *gray level*) somewhere between dark black and bright white. The computer transforms the sampled gray level to another gray level, and then sends the new level to a digital-to-analog converter (DAC), which feeds the APT monitor. In this way, for example, the bright whites may be assigned a dark gray or black to make them stand out from all the other "whites." If you want to display the image as it was originally transmitted from the satellite, simply have the computer send the original A/D sample straight to the DAC, without transformation.

After you have decided what values to use for all the original shades from black to white, plot them on a graph to help visualize the transformation. Fig. 1 is a graph showing a linear relationship. The input value is shown on the X (horizontal) axis, and the output value is shown on the Y (vertical) axis. As the input value increases from left to right (from black to white), the output value also increases from bottom to top (also black to white). This is usually the situation in the electronic amplifiers used by amateurs in their APT printing devices. Using this curve, the digital system simulates the standard APT printer. Fig. 2 shows a modified linear curve with the zero output (black) assigned to the four brighter whites seen at the input. A picture produced using this curve will show the familiar "black clouds" while maintaining the true gray scale at the darker shades. More complex curves are used by meteorologists to emphasize a variety of meteorological features. Fig. 3 shows a version of the Dvorak hurricane curve. The dark grays are brought up to

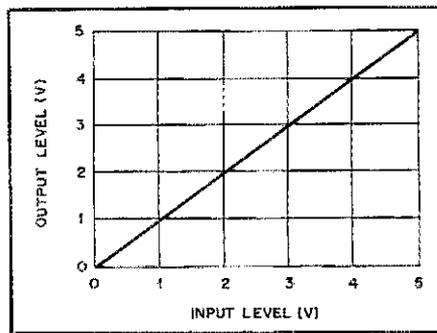


Fig. 1—Graph showing a linear enhancement curve.

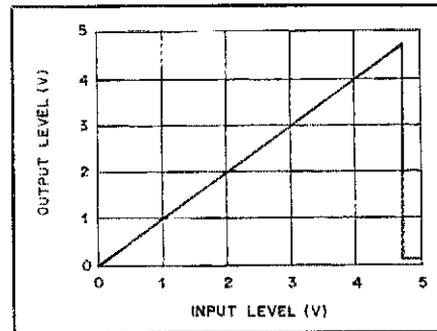


Fig. 2—Graph showing modified linear enhancement curve.

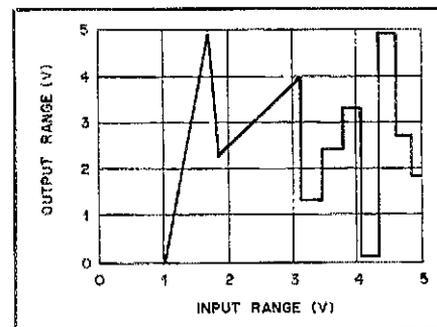


Fig. 3—Dvorak hurricane curve.

white, the mid grays are assigned a different curve and the bright whites are assigned still different steps in the gray scale. A discussion and examples of the various curves used by NOAA can be found in the *GOES Users Handbook*.³

APT System/Signal Characteristics

Let's briefly review the nature of the APT signal received from the spacecraft. This is covered in greater detail in other sources.⁴

The signal coming from the APT transmitter is carried as a wideband VHF FM signal (30 kHz for U.S., approximately 50 kHz for Soviet spacecraft). After reception and FM detection using conventional techniques, the APT signal is an audio signal. This audio signal consists of an audio tone (or "subcarrier") that varies in amplitude in relation to the gray level in the

image. The higher the amplitude of the tone, the "whiter" the area of the image. When viewed on an oscilloscope, the peaks represent white areas and the valleys represent black areas on the image as it will later be printed. U.S. satellites use a 2400-Hz subcarrier, while Soviet satellites use a subcarrier frequency that at times varies, remaining in the 2-3 kHz range.

Just how much data is available from this signal? Each subcarrier peak can carry a different gray level, so new data will appear each 1/2400 of a second (400 microseconds). If we can measure the amplitude every 400 microseconds, we will get all of the resolution available in the APT image. At first this sounds exceptionally fast, but it is actually well within the limits of current technology.⁵ The ADC used for this project can sample approximately every 180 microseconds.

Hardware

Several steps are taken prior to actual A/D conversion. Fig. 4 shows the analog-processing circuit. First, the signal is fed into a 600-Hz high-pass filter to reduce low-frequency interference. This is an active op-amp filter built around a 741 or an LM 351 IC (U1). Next, the signal is rectified by a precision detector (U2). R1 is adjusted to ensure that both peaks of the detected sine wave are of equal amplitude. This is best accomplished by observing the signal on an oscilloscope during adjustment. The dc peak value is then obtained by passing the signal through a sharp low-pass filter (U3, U4). The resulting dc envelope is then inverted and adjusted (U5) to be between 0- and 5-V amplitude. The signals expected from each test point are shown in Fig. 4B. These analog circuits provide a clean analog signal to the ADC.

The signal from U5 is sampled by a 6-bit ADC (Fig. 5). This circuit uses discrete components in the TTL-LS family. It is a ramp-type ADC patterned after one described by Roger Mikel.⁶ It was necessary to add R2 and C1 at the output of U6 as a low-pass filter to ensure reliable counting and A/D conversion. U8, a 74LS00, and the 3.58-MHz crystal provide a clock signal for the ADC. The crystal was obtained from a surplus computer board; a high-precision crystal is not necessary. U10 and U11 count clock cycles and send the count into an "R/2R" network. This provides the voltage ramp needed for the A/D conversion. The 1R resistors are single 10-kΩ, 1% precision resistors. The 2R resistors are two 10-kΩ, 1% resistors in series. When the ramp voltage at comparator U6 pin 2 goes above the analog input at U6 pin 3, the 6-bit sample from U10 and U11 is latched into the 74LS374 (U12). Although this ADC might not be considered state of the art, it does operate at the speeds needed and can be built from available components.

You should adjust the A/D board in several steps. Connect a 5-V supply to the

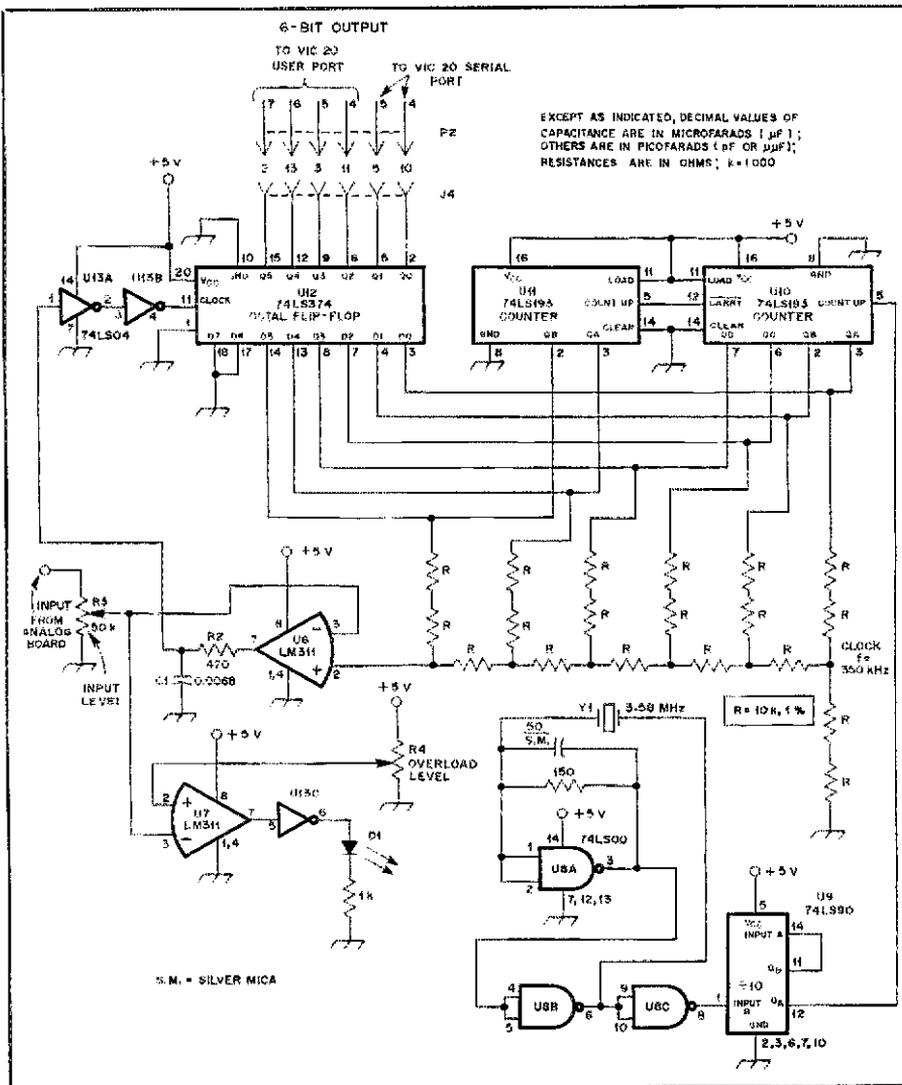


Fig. 5—Schematic of the analog-to-digital converter circuit.

Radio Shack outlet or at hamfest flea markets.

Software

The BASIC program listed in Table 1 loads the machine-language routines needed for the program. The main function of the BASIC program is to prompt

you and remind you what is going on inside the computer at the moment.

The heart of the software is a machine-language program residing between \$1B00 and \$1B20 (Table 2). Values beginning with "\$" are hexadecimal numbers. The machine-language program performs the major steps required for converting your

VIC 20 to a "VIC Image Processor," or "VIP."

First, the input and output ports are identified. This is done by loading the correct binary combination in the data-direction register of the 6522 chip. Load \$FF into \$9112 to set up port B as an output port. Port A is already set for input when the computer is turned on. A peripheral control register on the second 6522 (mostly used for keyboard input) must also be changed by one bit to enable input at pin 14 of port A. This is done by loading the value \$DC into address \$912C.

Next, the starting address for the look-up table must be loaded. \$00 is loaded at location \$01, and \$1C is loaded at \$02. This tells the microcomputer that the look-up table will begin at \$1C00. This is done by the BASIC program in lines 150 through 220.

After this initialization comes the main program loop. The value at \$9111 (port A—input) is loaded into the accumulator (LDA \$9111). The 7th and 8th bits are then stripped off (AND #3F), and the value transferred to the Y register (TAY). Then, using indirect-indexed addressing, the value at the address corresponding to \$1D00 plus the input value (range 0-63 decimal, \$00-\$3F hex.) is found and sent to the output port (LDA (\$01), Y; STA \$9110).

Following this, the value at \$91 is loaded into the accumulator and compared to \$FD. If the LEFT SHIFT key has been pressed, the program ends. If the LEFT SHIFT key has not been pressed, the value at \$91 will not equal \$FD and the program loops back to read another sample from port A. Note that the RIGHT SHIFT key will not trigger an escape from this loop. If the LEFT SHIFT is pressed, the program will "break" back to the introductory BASIC program (at line 270), which then continues to run.

The program as listed here will load only one look-up table. These numbers are poked into memory between \$1C00 and \$1C3F. To use this curve, simply load the program and press function key number one (F1) when asked to select a curve. Other numbers can be poked in from the BASIC program to replace these values.

Table 2
Machine-Language Program Used by VIP

1	* VIC I.P.	22	**** FIRST LOAD A BYTE FROM INPUT PORT (A) AT \$9111.
2	* (VIC IMAGE PROCESSOR)	23	LOOP LDA \$9111
3	* MACHINE LANGUAGE LISTING	24	**** NEXT STRIP OFF TWO MSB TO GET 6 BIT VALUE.
4	* -- MAY BE ENTERED DIRECTLY FROM THE MONITOR--	25	1B00: 29 3F 25
5		26	**** MOVE VALUE TO Y REGISTER.
6		27	TAY
7	* START MACHINE LANGUAGE PROGRAM AT \$1B00.	28	**** LOOK UP NEW VALUE.
8		29	LDA (\$01),Y
9	ORG \$1B00	30	**** SEND NEW VALUE TO OUTPUT PORT.
10		31	STA \$9110
11	* FIRST UNCONFIGURE THE PERIPHERAL CONTROL REGISTER	32	**** CHECK TO SEE IF LEFT SHIFT KEY HAS BEEN PRESSED.
12	* SO THE SERIAL PORT PINS 4 AND 5 CAN BE USED BY PORT A.	33	LDA \$91
13	* (PORT A WILL BE INPUT BY DEFAULT)	34	AND #3F
14	LDA #8DC	35	**** IF NOT THEN GO BACK TO START OF MAIN LOOP AT \$1B00A.
15	STA \$912C	36	ORP #8FD
16	* NEXT UNCONFIGURE PORT B AS OUTPUT PORT BY LOADING	37	SNE LOOP
17	* \$FF IN THE DATA DIRECTION REGISTER AT \$9112.	38	**** IF KEY PRESSED SET THE LEVEL TO ZERO,
18		39	LDA #00
19	LDA #6FF	40	STA \$9110
20	STA \$9112	41	**** THEN EXIT TO BASIC "CONTROL" PROGRAM.
21	* BEGIN THE MAIN LOOP.		RTS
		1B0A: AD 11 91	
		1B0F: A9	
		1B10: B1 01	
		1B12: 8D 10 91	
		1B15: A5 91	
		1B17: C9 FD	
		1B19: 08 EF	
		1B1B: A9 00	
		1B1D: 8D 10 91	
		1B20: 60	

Table 1
BASIC Program for VIP

```

100 REM VIC IMAGE PROCESSOR--G. ZEHR WA9TFB
102 GOSUB 400:REM LOADMACHINE LANGUAGE ROUTINE
105 POKE 55,253:POKE56,25:REM SET HIMEM
110 GOSUB600:REM POKE IN CURVE
115 PRINT"(CLR)":PRINT"VIC IMAGE PROCESSING":PRINT"G. ZEHR WA9TFB":PRINT:PRINT
120 PRINT"(RVON) STANDBY MODE "
125 PRINT:PRINT
130 PRINT:PRINT"FUNCTION KEYS TO":PRINT"SELECT CURVE":PRINT:PRINT:PRINT"(F1 TO
F8)"
135 PRINT:PRINT:PRINT"(E) TO END
140 GET X$:IF X$="" THEN 140
150 IFASC(X$)=133 THENPOKE 1,0:POKE2,28:GOTO250
160 IFASC(X$)=137THENPOKE1,64:POKE2,28:GOTO250
170 IFASC(X$)=134THENPOKE1,128:POKE2,28:GOTO250
180 IF ASC(X$)=138THENPOKE1,192:POKE2,28:GOTO250
190 IF ASC(X$)=135THENPOKE1,0:POKE2,29:GOTO250
200 IFASC(X$)=139THENPOKE1,64:POKE2,29:GOTO250
210 IFASC(X$)=136THEN POKE1,128:POKE2,29:GOTO250
220 IFASC(X$)=140 THEN POKE1,192:POKE2,29:GOTO250
225 IFASC(X$)=69 THENGOTO700
230 GOTO 115
250 PRINT"(CLR)":PRINT"VIC IMAGE PROCESSING":PRINT"G. ZEHR WA9TFB":PRINT:PRINT
260 PRINT"(RVON)DATA PROCESSING MODE":PRINT"(RVOF)"
265 PRINT:PRINT"LEFT SHIFT KEY TO":PRINT"EXIT D.P. MODE"
270 SYS 6912:GOTO 115
400 REM POKE IN MACHINE LANG. ROUTINE
410 DIMV(33)
440 A=6912
450 FOR N=1TO33
455 READ V(N)
460 POKEA,V(N)
470 A=A+1
480 NEXTN
500 DATA169,220,141,44,145,169,255,141,18,145,173,17,145,41
510 DATA63,168,177,1,141,16,145,165,145,201,253,208,239,165,0,141,16
520 DATA 145,94
530 RETURN
600 REM POKE IN ONE CURVE--LINEAR
610 DIM W(64):A=7168
630 FOR N=1TO64:READ W(N)
640 POKE A, W(N):A=A+1
650 NEXT
660 DATA0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24
670 DATA25,26,27,28,29,30,31,32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47,48,
49,50
680 DATA51,52,53,54,55,56,57,58,59,60,61,62,63
690 RETURN
700 REM END
710 PRINT"(CLR)":PRINT"(RVON) VIP TERMINATED ":PRINT
720 PRINT"(RVON) RUN TO RESTART ":END

```

READY.

The block of memory from \$1C00 through \$1DFF is reserved for seven more 64-byte look-up tables. Any of the eight tables can be selected by one of the VIC 20 function keys. These eight blocks start at \$1C00, \$1C40, \$1C80, \$1CC0, \$1D00, \$1D40, \$1D80 and \$1DC0. Starting at these addresses, a new table can be entered by typing in the 64 Y-axis values in sequence. The first address in each of these eight blocks will correspond to the X-axis value 0, and the last address in each of these eight blocks will correspond to the X-axis value 63. The number stored in each address will correspond to the Y-axis value for that X-axis value. Memory from \$1C00 to \$1C3F can be examined after running the BASIC program to see how the look-up table is set up.

Using a monitor, the seven additional blocks of 64 values can be entered fairly easily. After a new block of numbers has been entered, a "block save" from the monitor can save it to tape or disk. New groups of curves can then be loaded quickly.

The BASIC program uses the function keys by checking which one has been pressed, then POKEing new values into addresses \$01 and \$02 to start the look-up at the location of the selected table.

As mentioned before, the program can be entered much more quickly from the monitor. When you use the program this way, these commands should precede the machine-language listing:

```

LDA #500
STA $01
LDA #1C
STA $02

```

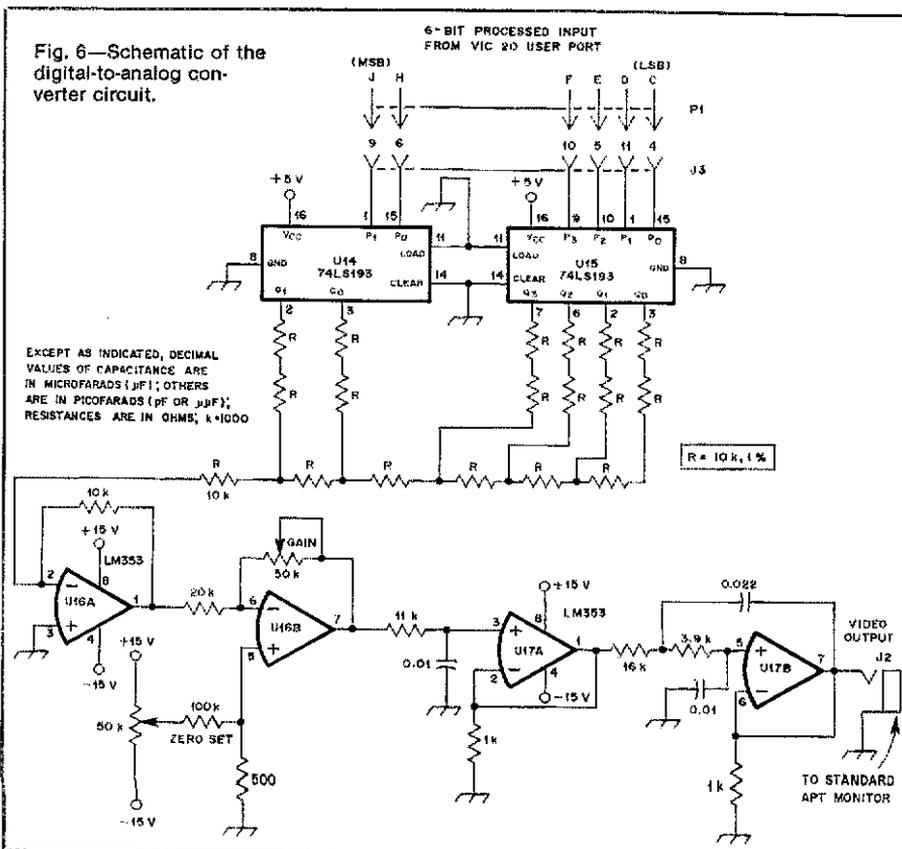
This tells the computer where the look-up table will start (\$1C00).

Operation

After all the circuits and software are working properly, imagery can be obtained. Load the BASIC program into the VIC. If several look-up tables are available, load them from the monitor. Go back to the BASIC environment and run the program. The first screen prompt asks you to select a curve by pressing one of the function keys. When you do, the program jumps to the machine-language subroutine and runs in the main machine-language loop until you press the LEFT SHIFT key. The screen message reminds you that you are in the "data processing" mode. After pressing the correct shift key, you will exit and return to the BASIC program. The screen prompt will remind you that you are in "standby mode." You may then pick another curve or exit the program.

Examples of Enhanced Imagery

Two sets of images are included here to illustrate the effects of digital enhancement. The first group consists of three versions



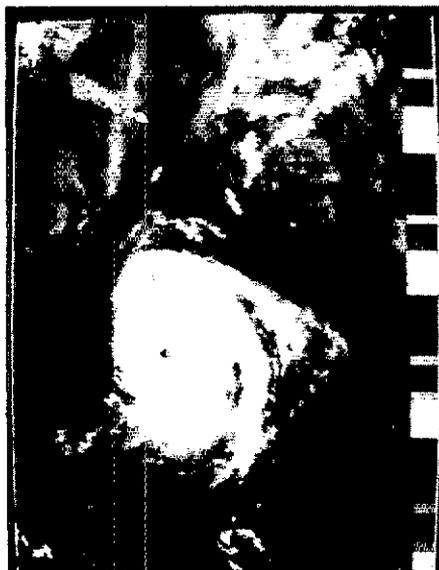


Fig. 7—Unenhanced photo of Hurricane Diana.



Fig. 9—Photo from Fig. 7, enhanced using Dvorak hurricane curve from Fig. 3.



Fig. 8—Photo from Fig. 7, enhanced using modified linear curve of Fig. 2.



Fig. 10—Photo from Meteor 2-10 satellite, enhanced using the logarithmic curve in Fig. 11.

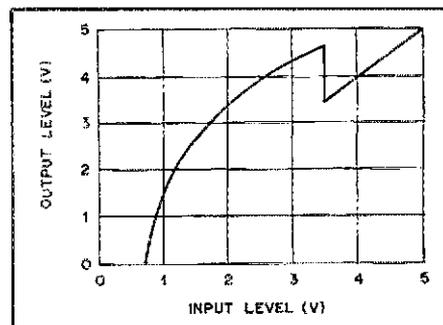


Fig. 11—Logarithmic enhancement curve used for Fig. 10.



Fig. 12—Enlargement of Fig. 10, using the same enhancement curve.

of an infrared image of Hurricane Diana off the coast of the Carolinas September 11, 1984; taken by NOAA 6.

In the first image (Fig. 7), a linear curve (Fig. 1) was used. This corresponds to a "normal" picture as would be obtained by normal linear electronic circuits. The second image (Fig. 8) uses the linear curve with one change. In this curve (Fig. 2), the four bright shades of white were assigned the value 00. This assigns the very bright whites the color black. The effect is striking, and the central cloud tops are now easy to spot. The third image (Fig. 9) uses a more complex curve, patterned after the Dvorak hurricane curve (Fig. 3). In this image, the dark shades in the water are emphasized, bringing out the sea-surface temperature variations. The mid-gray levels are more or less

normal. The brighter whites are assigned values from black, to gray, to white again. The bright whites (coldest area of the storm) show as three white- and black-speckled crescents that lie at about 2 o'clock from the eye of the storm. These areas cannot be seen in the unenhanced image.

The second group of images are from a pass by Meteor 2-10, and show ice and snow cover in the northern Great Lakes. The first of these (Fig. 10) shows the full frame. A logarithmic curve was used to enhance the water/land contrast and a "notch" was made in the brighter white area to bring these shades into the gray zone again (Fig. 11). The large cloud group over the lower left of the image shows this effect. An enlarged view of part of this frame is shown in Fig. 12 (using the same curve). Finally,

in Fig. 13, the curve is modified so that some of the brighter whites are assigned the value black (Fig. 14). This darkens some of the cloud tops, and changes some of the ice along the south shore of Lake Superior and Keweenaw Bay from white to black.

Discussion

Many other variations on these curves could be tried, but these examples will at least demonstrate some of the possibilities. This is perhaps the most exciting part of the project as you sit at the keyboard of the VIC trying to decide what part of the image to emphasize and what curve to enter to do the job.

While any of the types of APT imagery can be used for these experiments, the polar-orbiting satellites with their real-time APT imagery are best. The GOES and METEOSAT imagery has, in many cases, been enhanced at the command station and further processing may not be helpful. The most useful imagery to work with is probably the Tiros infrared imagery. In these images, the gray-scale level corresponds to temperature. It should be possible to get accurate temperature maps of the ocean



Fig. 13—Photo from Fig. 10, with cloud tops enhanced by the curve in Fig. 14.

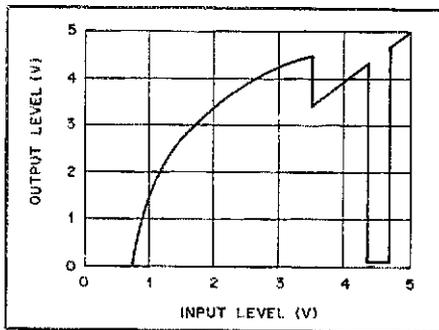


Fig. 14—Logarithmic curve with black assigned to some of the bright whites.

surface as well as cloud tops. I have not yet been able to calibrate my equipment well enough to achieve this.

It is of some interest to compare this method of digital image enhancement with

the alternative of scan-conversion and storage of the digitized image in RAM. The scan-conversion method has received some attention and offers certain advantages, primarily speed. The APT image can be seen quickly, and a low-resolution image can be obtained. With the number of satellites now available, it is certainly convenient to have a scan-converter system to check quickly for activity on the bands. Scan converters have some major limitations, especially when a limited amount of RAM is available for image storage. The most obvious problem is limited resolution; unless only a very small portion of the APT image is to be studied, a great deal of image data is lost in sampling and storage. Second, and equally important, is the loss of gray scale. While the circuits presented here employ 64 gray levels (and could easily accommodate 256), scan converters typically use only 16 gray levels. The final consideration is cost. This entire project is fairly inexpensive, even if a computer is purchased solely for this application.

For me, the flexibility, much improved imagery and low cost of this approach more than make up for the lack of speed. For a quick look the scan converter can't be beaten, but for final hard-copy image quality, the system described here will give much better results.

In spite of being generally pleased with the operation of the unit described here, I have already started a list of possible improvements. First of all, it might be practical to go to a full 8-bit A/D and D/A with 255 gray levels, possibly using a mouse or light pen to enter the curves. Second, I might find some high-speed, single-chip ADCs and DACs to simplify the hardware needed. I also plan to add a sample-and-hold circuit in the analog-sampling section. My final improvement will be to build a photo-drum machine, something like Wendell Anderson's 1965 model. I still want to take advantage of the phototube-

direct printer combination, which really does give excellent results. Then, I can finally straighten out those slightly curved edges on my images. Looks like I'll have to dig out that old *QST* one more time!

Additional Information

Readers interested in obtaining more information about the construction and operation of APT stations may wish to contact Mr. R. W. Popham, Satellite Program Specialist, NOAA/NESDIS, E/ER2, Room 3001, FB4, Washington, DC 20233. Many of the government publications noted in the bibliography are available free of charge from his office. These provide a great deal of useful information.

Interested amateurs may wish to join the Environmental Satellite Amateur User's Group. A quarterly newsletter is mailed to all members. For more information, contact Raul Alvarez, WD4MRJ, 2512 Arch St., Tampa, FL 33607.

Bibliography

- Clark, R. and E. Feigel, *The Wefax User's Guide*, NOAA/NESDIS, Washington, DC: 1981.
 Summers, R. and T. Gotwald, *Ground Stations for High School Science*, Greenbelt, MD: Office of Public Affairs, NASA Goddard Space Flight Center, 1981.
 Vermillion, C., *Weather Satellite Pictures Receiving Stations: Inexpensive Construction of Automatic Picture Transmission Ground Equipment*, Washington, DC: NASA, 1969.

Notes

- ¹W. Anderson, "Amateur Reception of Weather Satellite Picture Transmission," *QST*, Nov. 1965, pp. 11-17.
²G. Emiliani and M. Righini, "Printing Pictures from 'Your' Weather Geostationary Satellite," *QST*, April 1981, pp. 20-25.
³J. Dane Clar, *The GOES User's Guide*, NOAA, U.S. Dept. of Commerce, 1983.
⁴*The Tiros/NOAA A-G Satellite Series: NOAA Technical Memorandum NESD 95*, NOAA, U.S. Dept. of Commerce, 1978.
⁵R. Olsen, "Digital Signal Processing for the Experimenter," *QST*, Nov. 1984, pp. 22-27.
⁶R. Mikel, "A/D and D/A Conversion—An Inexpensive Approach," *BYTE*, Feb. 1981, pp. 312-316.

Strays



QEX: THE ARRL EXPERIMENTERS' EXCHANGE

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I would like to get in touch with . . .

□ anyone with schematic diagram for a 450-MHz repeater manufactured by Communications Co., Inc., of Coral Gables, Florida. Terry Simonds, WB4FXD, P.O. Box 1558, Edgartown, MA 02539.

□ anyone with a schematic diagram or any other service information for an Intertec Super Brain QD Computer Terminal. William L. Hoy, 514 Price St., Charleston, WV 25302.

minor changes. The inside arrangement of the original LGB can be seen in Fig. 2.

Power to operate the module and relay is required only during transmit periods, so it seemed logical to obtain it from the transmit switch. The switch controls the red 12-V pilot light on the TC-1. It is a good idea to use black and red wire for this connection, making sure the black wire goes to the chassis at both ends! The LED lights only when transmitting, and the 5-k Ω potentiometer gives enough control over the signal so you can obtain a perfect picture on the TV set.

How It Works

The monitor signal from the TC-1 is picked up capacitively at its output and is detected to produce the video signal that operates the modulator in the LGB (Fig. 3). The modulator output is on Channel 3, the same as the receiving output of the TC-1 down converter, so the relay feeds either the transmitted or received signal to the antenna terminals of the TV set. The monitor acknowledges that your equipment is working and gives you an idea of the picture quality going on the air. Four of these units are in operation in the London, Ontario area and are considered a must for any ATV station.

Fringe Benefits

The London Amateur Radio Club demonstrates Amateur Radio in shopping malls from time to time. This little device permits the patrons to see themselves on a large-screen TV in living color. This always attracts a crowd. Connect the video output of a color camera through the LGB to a TV set (borrowed from a local merchant), and you have instant attention. In addition, a small item of radio gear, such as a key or circuit board, can be shown larger than life size on the screen and can be accompanied by a talk over the PA system. If the camera has a macro setting on the lens, tiny objects like diodes or capacitors may be shown many times their actual size, and the features pointed out. If you wish to use the audio capabilities of the TV set, connect the microphone or audio signal from the camera mike to the chassis-mount phono connector; the sound will come out of the TV speaker. Be sure to include the audio portion of the circuit connected to pin 3 of the modulator as shown in Fig. 1. The transistor preamp is necessary because the output of most low-impedance microphones is not enough to drive the modulator satisfactorily. Power for the LGB, in this case, can be supplied by a 9- to 12-V battery, or the 9-V dc adapter.

Conclusion

The LGB will save money for ATV newcomers by eliminating the need for a second TV monitor. It may also add a new dimension to Amateur Radio demonstrations. Altogether my project cost \$28 Cana-

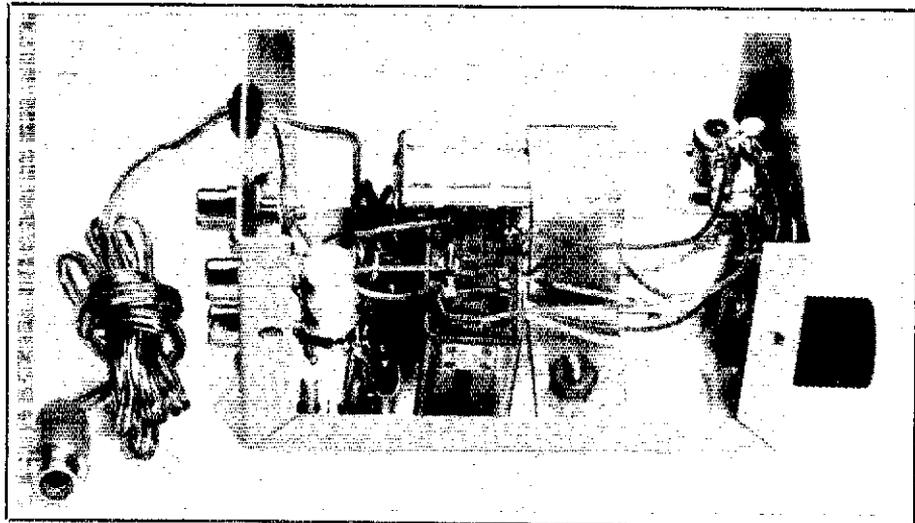


Fig. 2—The LGB with its cover removed. The UM1285 modulator can be seen in the rear, while the 12-V dc relay is seen directly in front. The front half of the box contains the video gain control and LED.

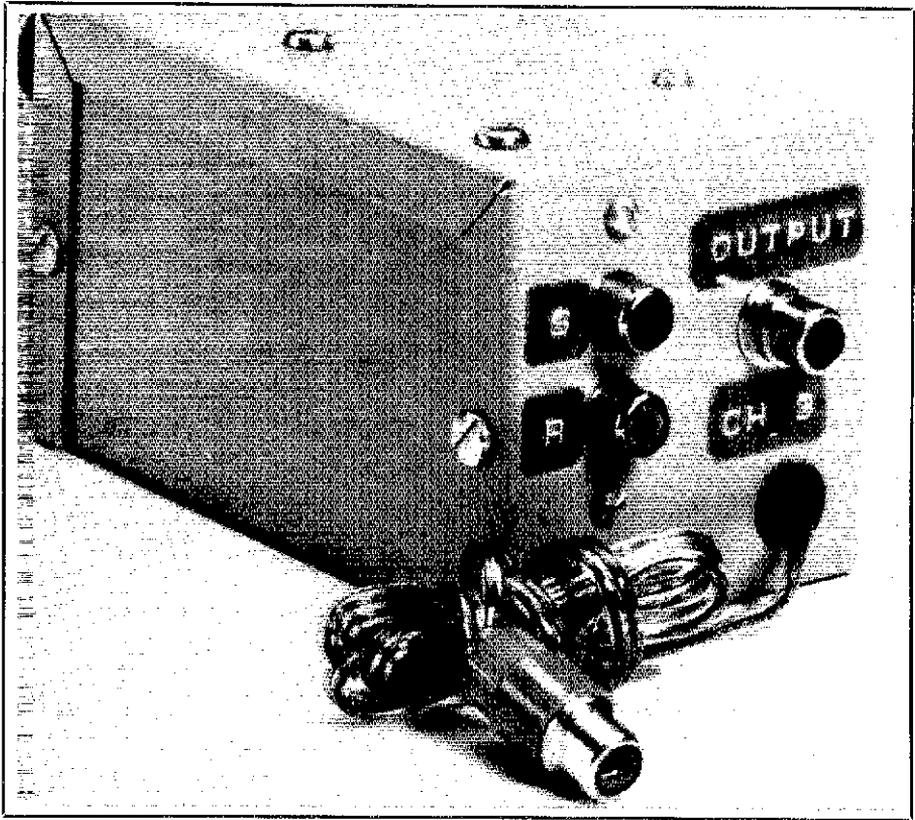


Fig. 3—The LGB shown from the rear displays chassis-mounted phono connectors. The S connector is for the video signal during transmission, and the R is for the output of the down converter when receiving. The jack on the wire goes through a matching connector to 12-V dc, obtained from the red pilot light on the TC-1.

dian currency; of this total, \$11.95 was used toward the purchase of the UM1285 modulator.

Notes

¹P. C. Electronics, 2522 Paxson, Arcadia, CA 91006, tel. 818-447-4565.

²Circuit boards for the LGB may be obtained from P.C. Electronics at \$5 each. QST and the ARRL in no way warrant this offer.

Ced Tanner built his first crystal set in 1921. It wasn't until 1946, however, that he became a licensed operator. A retired high school science teacher, Ced was responsible for introducing electronics classes in the London school system. During his visit to Tasmania in the early 1960s, he also introduced the first electronics course there. Ced enjoys phone on all bands, from 160 meters to 70 cm. His other hobbies include Swiss-glass engraving, playing the organ, wood turning and photography.

A Semi-Kit Receiver for 75/80 Meters

AM broadcast-band receivers are useful as foundation units for ham-band reception. These hints may provide a fun project for you.



By Doug DeMaw, W1FB
ARRL Contributing Editor,
P.O. Box 250, Luther, MI 49656

How about a low-cost receiver for camping, travel or QRP operation? Most of us have a favorite band we like to listen to when away from home, but the inconvenience of carrying a general-coverage receiver or transceiver tends to rule out taking our radio "ears" with us. A small, medium-performance, one-band receiver is not hard to devise, and we need not spend a lot of money to provide a portable "listening post." Many pocket-sized AM radios can be suitably modified and augmented to a useful small field receiver. I have used at least a dozen transistor pocket radios over the years to make small amateur receivers. They are entirely ade-

quate for casual use, but do not provide the frills and high performance of a specially designed homemade receiver.

I wish to dedicate this article specifically to the experimenter who doesn't want to become involved with a major project. The astute builder will certainly think of many improvements that can enhance performance and add features beyond those offered here. This presentation is meant to be a starter for you tinkerers who like to build receivers.

A Low-Cost Mainframe

During a visit to the area Radio Shack store, I noticed a nifty little AM radio kit

for \$12.95 (RS 28-4029). A peek at the schematic diagram and PC board indicated that the basic circuit had possibilities, and ample room existed in the cabinet and on the circuit board for additional small modules. The uncrowded parts layout suggested ease of modification as well. Fig. 1 contains the schematic diagram for the receiver, as rendered by Radio Shack. Note that this radio has a negative-ground bus, and it uses NPN transistors. Many imported pocket receivers use PNP transistors, and they have a *positive* ground. The latter arrangement makes it awkward to add accessories that require a negative-ground bus. The alternative is to design the

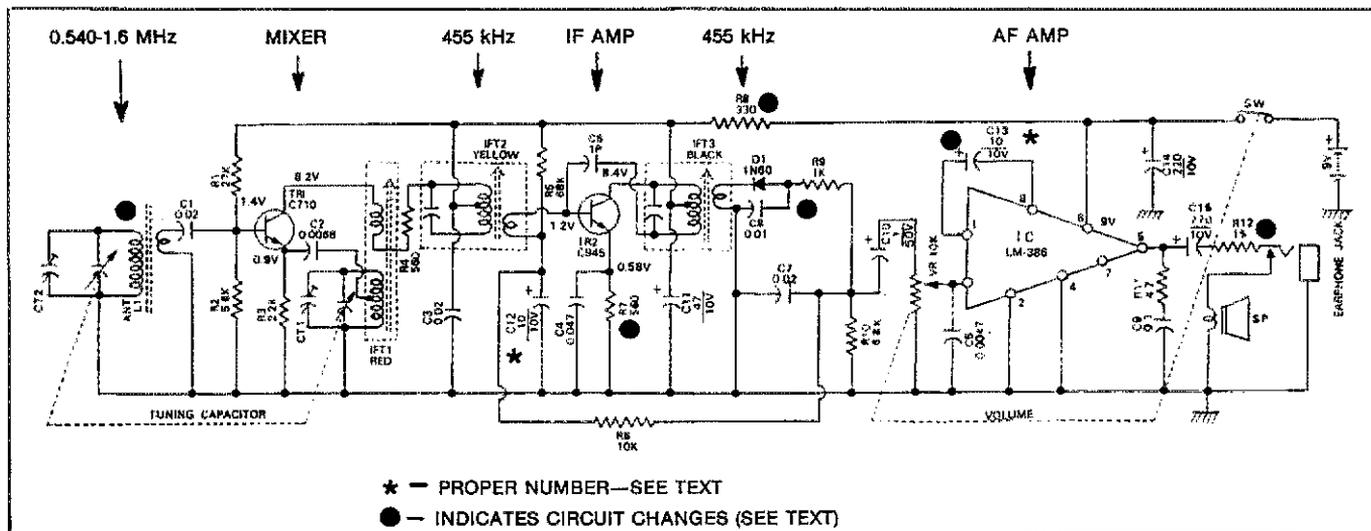


Fig. 1—Schematic diagram of the original circuit of the Radio Shack AM receiver. The symbols and notations used by Radio Shack have been preserved. The black dots represent areas where circuit changes are required, as explained in the text.

add-ons around PNP devices, or arrange the NPN transistors to have a positive-ground hookup. I prefer the easy way out, so I chose the Radio Shack 28-4029.

Design Faults

After assembling the kit, I noted inadequate receiver performance. Our nearest local AM station is 30 miles distant, and it was barely discernible at maximum receiver audio gain, even with my ear against the speaker grill. Some changes were in order to correct this problem and to enhance the frequency response of the audio channel, which was sorely lacking in high-frequency response. The changes I made were simple, and they account for some 15 dB of overall receiver-gain increase.

Warning: The kit diagram and PC-board identifiers are in opposition concerning C12 and C13. Reverse the C numbers on the schematic diagram to correct this.

The changes: Replace R8 with a 100-ohm unit. R7 is changed from 560 to 100 ohms. R12 is deleted and replaced by a jumper wire. C13 (connected between pin 1 and pin 8 of the LM386) is replaced by a 1-k Ω resistor and a 0.05- μ F capacitor in series with one another. Finally, connect a 0.22- μ F capacitor and a 2.2-k Ω resistor in series, and bridge them from pin 8 of the LM386 to ground. After these changes are made, test the receiver again. Weak stations should now be very loud, even with the VOLUME set at mid range.

SSB and CW Reception

We will generalize in this part of our discussion, since many of you will want to use circuits of your choice for the product detector and BFO. Fig. 2A shows a circuit I have used successfully a number of times when modifying AM radios. A trifilar transformer (T4) is used with a two-diode detector (D2 and D3). An RC filtering network is located at the detector output to keep RF energy from the audio amplifier.

The BFO is an LC type, but a 455.7-kHz crystal oscillator could be used for CW reception, and a 456.5-kHz crystal or a 453.5-kHz unit would be suitable for upper- or lower-sideband reception. A 455-kHz IF transformer serves as T5. The turns ratio is not important, but if a black-core unit is available, use it. Avoid red-core transformers from old radios; they are generally oscillator transformers. The BFO of Fig. 2A is adjusted by moving the slug in T5 for the desired CW pitch after tuning in the CW signal for maximum strength. The slug is set for best voice quality when listening to SSB, after tuning in the signal for maximum response in the speaker. A switch and three trimmers could be added to make CW, USB and LSB selectable.

You have the option of keeping the AGC circuit of Fig. 1, or you may disable it, since it is not especially effective to begin with—mainly because it controls only one amplifier stage (TR2 of Fig. 1). To disable it, remove D1 of Fig. 1 after adding the

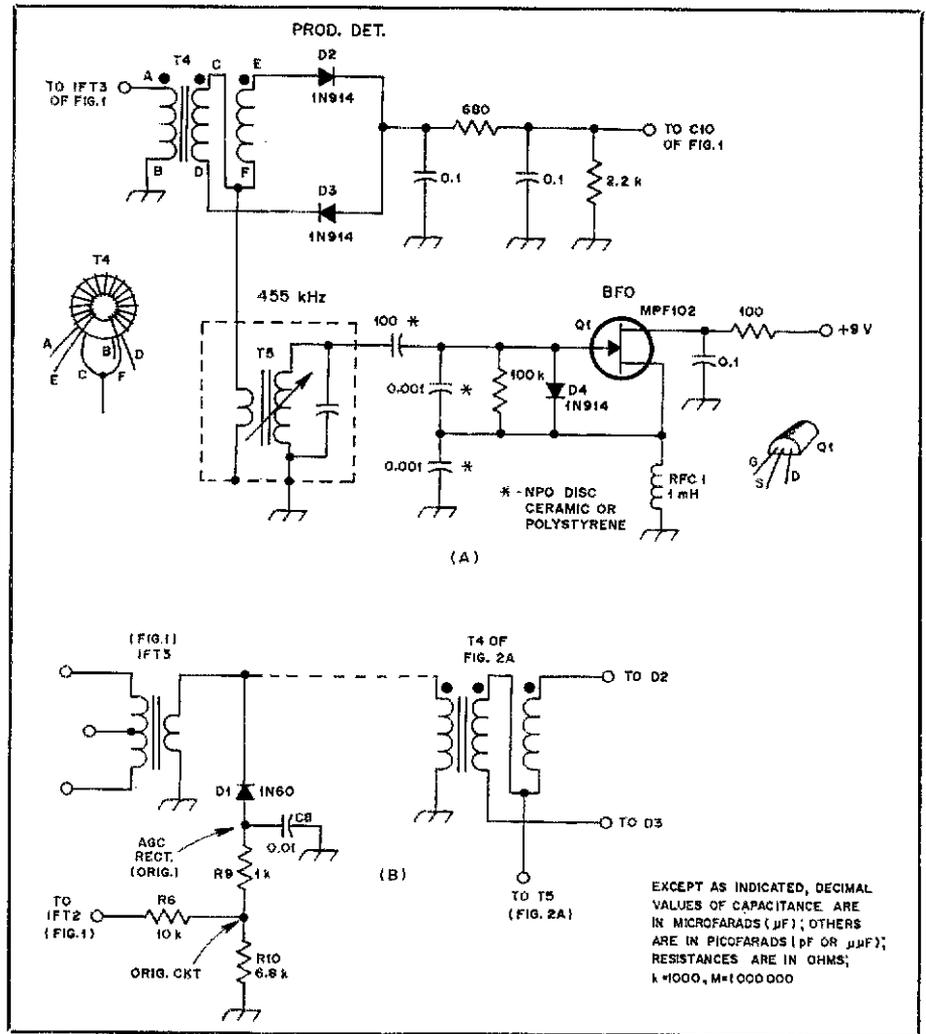


Fig. 2—At A, suggested addition for a BFO and product detector that will permit CW and SSB reception with the AM broadcast-band receiver of Fig. 1. T4 consists of 15 trifilar turns of no. 28 enameled wire on an Amidon Associates FT-50-43 ferrite toroid core (see QST ads). T5 is an IF transformer from a scrap pocket radio (see text). Drawing B shows how to connect the AGC circuit after adding the circuit at A.

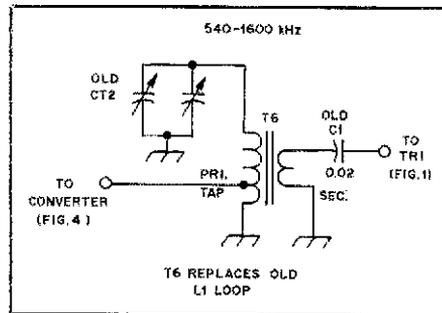


Fig. 3—The toroidal transformer that replaces the built-in loop antenna of the AM receiver. The primary has 90 turns of no. 30 enameled wire (600 μ H) on an Amidon Associates FT-82-61 ferrite core. The primary tap is located 10 turns above the grounded end. The secondary winding has 20 turns of no. 30 enameled wire.

circuit of Fig. 2A, or a similar detector. In the original receiver circuit, D1 functioned as an AM detector and AGC rectifier. Fig.

2B shows how the AGC circuit is used after adding the new product detector and BFO.

Loop Replacement

The built-in loop antenna serves as the mixer (TR1) tuned circuit. Unless you plan to enclose the radio in a metal case, you should remove the loop and replace it with a toroidal transformer (Fig. 3). The loop, if used in an unshielded enclosure, will pick up broadcast stations. This will cause interference problems when you listen to a ham band while using a converter with the receiver. A toroidal transformer or coil is self-shielding, so there should be no significant BC-station pickup.

Receiver Selectivity

The IF selectivity is determined by the two IF transformers (IFT2 and IFT3 of Fig. 1). This provides a wide response (5 or 6 kHz, typically) for obtaining AM fidelity. You will be able to copy SSB with this bandwidth, but it will be hard to separate strong signals when the in-

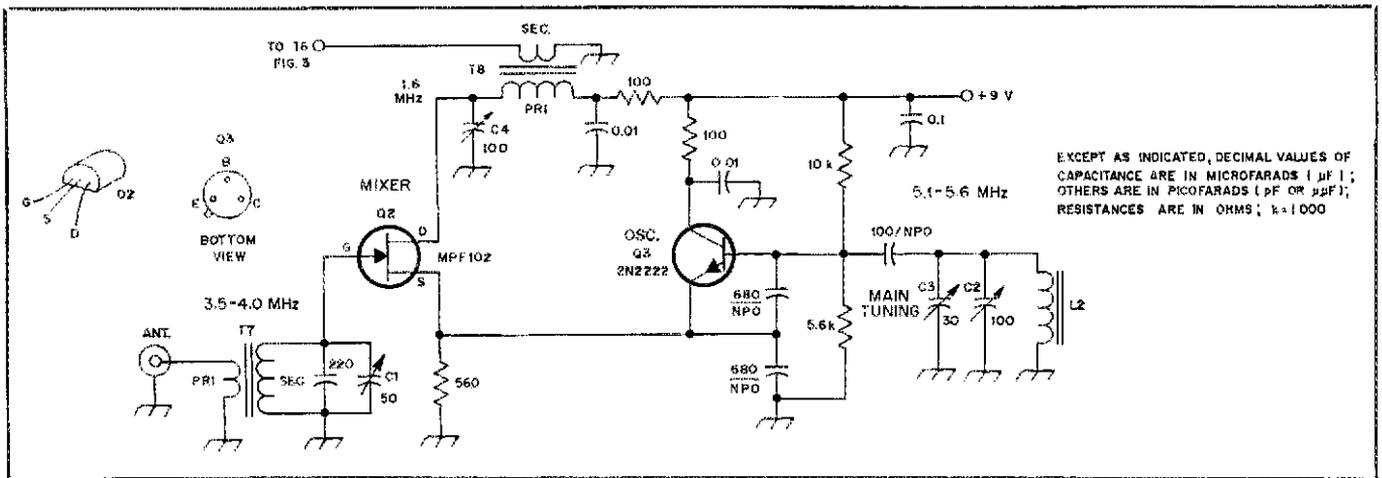


Fig. 4—Suggested circuit for a simple 80-meter converter that has an IF of 1.6 MHz. Fixed-value capacitors are disc ceramic. Resistors are 1/4-W carbon composition.

- C1—Miniature 50-pF variable or trimmer (see text).
- C2—Ceramic trimmer (Mouser Electronics 24AA034 or equiv.)
- C3—Miniature 30-pF variable capacitor.
- C4—Ceramic, polystyrene or mica trimmer.
- L2—Toroidal inductor, 5.6 µH. Use 38 turns

- of no. 30 enameled wire on an Amidon Associates. T50-6 powdered-iron core. Glue turns in place with high-Q cement, such as Q Dope.
- T7—Secondary has 39 turns of no. 30 enameled wire on Amidon Assoc. T50-2 powdered-iron core, 7.5 µH. Primary has

- 5 turns of no. 30 enameled wire over ground end of secondary winding.
- T8—Primary has 42 turns of no. 30 enameled wire (120 µH) on an Amidon Assoc. FT-50-61 ferrite toroid. Secondary has 8 turns of no. 30 enameled wire over 9-V end of primary.

interference level is high. The addition of one or two small, ceramic, monolithic 455-kHz filters in the IF section of the radio will help. Such units are available at low cost.¹ If you wish to spend a few more dollars for an AM radio kit, you may purchase one that contains two ceramic filters. Generally, the circuit of this alternative radio is better than that of the Radio Shack unit. This receiver is the Heath GR-1009, which sells for \$18.95 as a kit. It is roughly the same size and appearance as the Radio Shack kit receiver.

Perhaps you would prefer to simply add a two-pole RC active audio filter for CW reception. If so, circuits can be found in *The ARRL Handbook* and *Solid State Design for the Radio Amateur* (ARRL). The audio filter should be inserted between the product detector (Fig. 2A) and the audio amplifier (LM386 of Fig. 1). If you plan to use headphones for CW reception, you may use the audio filter outboard by plugging it into the receiver earphone jack (Fig. 1). Ideally, it would be used between the product detector and the LM386, but with a low-noise audio preamplifier (2N3904 or similar) between the filter and product detector. A center frequency for the RC active audio filter should be on the order of 700 Hz for CW use. Of course, CW can be received without a CW filter, but it will be hard to separate the signals when there is QRM.

Covering the Ham Bands

Let's assume that we have completed our

¹Part No. CFU4551, \$2.90, from MHz Electronics, 2111 W. Camelback Rd., Phoenix, AZ 85015, tel. 602-242-3037. One-kHz filter bandwidth at 3-dB points, and 6-kHz bandwidth at 40 dB. Other filter bandwidths are available.

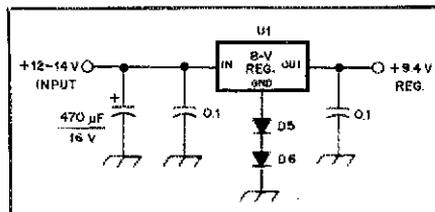


Fig. 5—Arrangement for adding a regulator to permit the receiver to be operated from a 12-V power source. D5 and D6 are 1-A, 50-PRV diodes. U1 is a three-terminal, 8-V regulator.

modifications and additions for the AM-receiver mainframe. Now comes the matter of getting our favorite amateur band converted to the input frequency of the radio.

A tunable converter opens the way to simplicity. This permits setting the converted AM receiver at a fixed frequency, such as 1600 kHz, and leaving it that way. If we use a crystal-controlled converter, which we could, the AM receiver would become the tunable element. The problem this presents is too great a tuning range—roughly 1 MHz. Bandsbread would be poor. The solution to this problem is to place a small, two-section variable capacitor in parallel with CT2 of Fig. 1. This permits us to tune, say, 100 kHz of the amateur band of interest. I have used this technique successfully. You may wish to consider it.

Fig. 4 shows a simple converter circuit I have used a number of times. Its gain and noise figure are adequate for 160, 80 or 40-meter use. I would add an RF amplifier ahead of the mixer for use on 30 meters and higher.

Q2 serves as a mixer that obtains oscillator-injection voltage by sharing a common resistor with its source and the emitter of Q3. C1 is used to peak the converter front end. It can be a trimmer capacitor if you plan to cover only 25 to 50 kHz of 80 meters. If all of the 75/80-meter band will be covered, this trimmer should be accessible with a knob for repeaking across the band.

Q3 is the local oscillator. It is tuned by a panel control, C3. A vernier drive is suggested for tuning large portions of the band. You may use other transistors for Q2 and Q3. For example, a 2N4416 or a 3N211/40673 can be used at Q2. If a dual-gate MOSFET is used, merely tie gates 1 and 2 together and use the device as a JFET. Q3 may be a 2N3904, 2N5179 or any other small-signal device with an f_T of 250 MHz or higher. Don't be afraid to experiment!

More-elaborate converter circuits (perhaps one of your choice) can be used if better performance is desired. The circuit of Fig. 4 is suitable for 1.8, 3.5 or 7 MHz, with suitable modifications. Here is your chance to get involved in experimenting. This circuit is offered mainly as a guideline for developing a converter.

12-V Operation

We must realize that the more outboard goodies we add to the basic receiver, the greater will be the drain on the little 9-V battery. Of course, there are options: We can make a high-current battery pack by combining eight C-size flashlight cells in series, or we may choose to employ a 9-V NiCd battery with a 400-mAh rating.

If you wish to use the receiver with an

ac-operated 12-V power supply, or if the car battery is to be your power source, you may build the circuit of Fig. 5. It contains a three-terminal 8-V regulator, two 1-A 50-V rectifier diodes and some capacitors. D5 and D6 are used to raise the output voltage of U1 from 8 to 9.4 V, approximately. The three capacitors provide filtering and RF bypassing for the regulator.

Another Option

Better performance can be expected from the modified AM receiver if we add a second IF amplifier. Generally, it can be a duplication of TR2 of Fig. 1. If this is done, AGC should be used on the new

stage as well. The additional IF stage will enhance the performance by increasing the overall gain and providing better IF skirt selectivity. An added IF stage would supply the needed gain to compensate for the insertion loss of a 455-kHz crystal filter, should you elect to use one.

Summary

You will find ample room inside the cabinet of the basic Radio Shack "receptor" to add a number of separate modules. You may prefer to place the PC board in a larger metal cabinet. The choice is yours.

This general approach was selected because the major part of the system, in-

cluding the PC board, can be purchased in the complete kit form. Your circuit additions can be fabricated on perf board or on small, homemade PC boards.

Don't expect the same receiver performance you can obtain from your \$800 manufactured amateur receiver or transceiver. This project will, however, lead to acceptable receiver performance for monitoring and nonstringent portable use. Should you develop interesting improvements that pertain to this concept, please consider sharing your achievements with others through the pages of *QST*. The editors will be happy to consider your article for publication. 

New Books

THE JOY OF QRP (Strategy for Success)

by Adrian Weiss, WØRSP. Milliwatt Books, 833 Duke St., No. 83, Vermillion, SD 57069. Paperback, 5¼ × 8½ inches, 151 pages, \$10.95 (U.S.), \$11.95 (foreign).

The author, a longtime dedicated QRPer and low-power columnist for *CQ Magazine*, won the race for producing the first QRP booklet. Although others have been preparing QRP handbooks, Adrian Weiss pushed ahead and crossed the finish line ahead of the dawdlers! His book has a bright yellow glossy cover, and the printed matter inside is bold and printed on easy-to-read paper. Perhaps the excellent English usage and proper application of punctuation can be attributed to the Ph.D in English Renaissance Literature held by the author. I found the book easy to read, and the text is interesting throughout.

Although the volume contains no index, it does have a table of contents. The chapter titles are (1) The Exciting World of QRP, (2) Sharing the Joys of QRP, (3) Planning for QRP Operation, (4) Putting a QRP Signal on the Air, (5) Homebrewing the First QRP Rig, (6) General Operating Techniques, (7) Planning and Operating Specific Types of QRP Activity, and (8) RF Power Measurements.

The list of chapter titles pretty much describes the contents of this book. Emphasis is on operating and the history of QRP, rather than on the practical

application of circuits or design procedures. The book appears aimed at introducing the would-be QRPer to the world of low-power Amateur Radio. The author's history section—respective to the worldwide QRP movement—seems to be well researched and complete. Weiss did his homework in that area of his text, or perhaps he has an unusually accurate crystal ball.

Complete information concerning QRP clubs around the world, QRP nets and QRP contests is provided. This directory section should prove invaluable to those who aspire toward a venture in QRP operating.

The operating section discusses times of day versus band conditions, band selection for best results, antennas for QRP and general operating objectives. This is the area of flea-power operation in which many newcomers fail after having grown used to high-power operation with elaborate antennas.

Another part of the book deals with the use of store-bought QRO transmitters and transceivers. That is, the author describes ways to reduce the power of these rigs for QRP operation.

Chapter 8 is dedicated to RF power measurements. Measuring power at the QRP level is not an easy assignment, owing to the general availability of QRO-only commercial power meters and SWR indicators for amateur-use. He covers the subjects of dc- versus RF-power measurements, RF-power concepts, RMS RF probes and a QRP RF wattmeter. Since many low-power enthusiasts use as little as 50 mW of output power, homemade equipment is needed to set the RF-power level accurately.

I would have no hesitation in recom-

mending WØRSP's book to any amateur interested in QRP operating. In fact, it will provide great reading for nearly any active ham, even if QRP is not presently a hamshack objective.—Doug DeMaw, W1FB/8

Strays

CORRECTION

Gary Engleman, K5HGL, should have received photo credit for the cover of June *QST*. Gary also took the photograph of the RACES station that appears on page 78 of that issue.

I would like to get in touch with...

anyone using Macrotronics M80/M800 cassette software and a TRS-80 Model III 16-kbyte computer. Russ Smith, W6ONK, Box 141, Brownsville, OR 97327.

anyone with a manual for the RCA AR-88 communication receiver and for the Jerrold sweep frequency generator, Model 707, with oscillator unit, Model H-72. Peter Waasdorp, KF6MM, 324 Calle Adela, San Marcos, CA 92069.

anyone with a manual or schematic diagram for an Elmac PR7A or PR8A receiver, manufactured in the late 1940s. Alfred Gillier, VE3KT, 115 Forest Heights Blvd., Willowdale, ON M2L 2K7 Canada.

anyone who has compiled a list of modifications on the Heath SB line, including the HW-100. Luis E. Suarez, OA4KO/YV5, Apartado 66994, Caracas 1061-A, Venezuela.

ICOM IC-471A 70-cm Transceiver

As they say in the world of operating: This radio not only plays, it plays real good! To the UHF uninitiated who may think that two-way work on 432 MHz (70 cm) is like working with optics, the 25-W ICOM IC-471A multi-mode radio can dispel that misconception in a hurry. In fact, readers accustomed to all the operating amenities now expected in HF radios will not be displeased when they sit down in front of this little beauty.

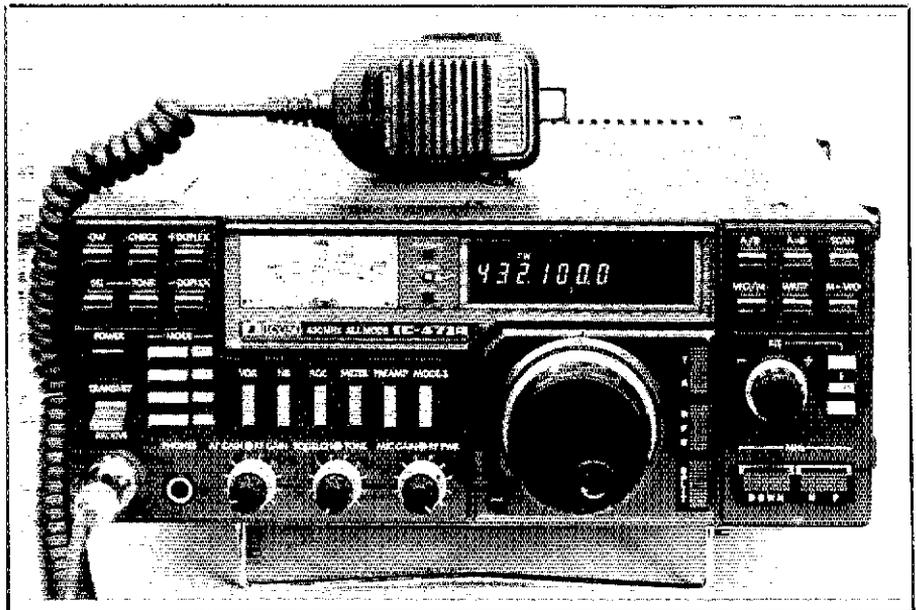
It Works

To put this radio through its paces, two portable operations from an elevation of 3100 feet in the Catskill Mountains of New York were conducted: the UHF Contest (August) and the VHF Contest (September) of 1984. The latter provided fantastic tropo conditions, which permitted numerous DX SSB/CW contacts. Over 200 contacts were made in 50 different grid locator squares as far away as Georgia—enough to qualify for the VUCC award (getting the cards is a bit more difficult, however). I found no difference in convenience and performance when comparing the IC-471A with operating your typical HF radio. Probably one of the truest tests in contest operation is how close you can operate in frequency to a monster-station like W2SZ/1—line-of-sight distance. Conclusion: within 5 kHz, with some discomfort; within 10 kHz, no problem . . . not bad for RF alley. Several inquiries regarding SSB audio quality yielded not only reports that "it sounds great," but also that "it sounds clean"—a glowing tribute when put to the subjective test in the Golden Corridor of the UHF Northeast.

Operating Niceties

The typical dual VFO (A and B) is controlled by a single main tuning knob, which has the good "feel" that amateurs have come to expect of a quality radio. It has absolutely no backlash, thanks to ICOM's unique rotary encoder circuit, which eliminates dial gears. An easy-to-find SPLIT control to the right of the main tuning knob selects the desired relationship of the two VFOs. In the OFF position, one VFO does it all. Pushing the switch delegates one VFO for receive and the other for transmit. Pushing A/B alternately selects either VFO for tuning, while the A=B button instantly equates the frequency and mode. The VFO in use is displayed in red as VFO A or B. It's a very functional arrangement. In a contest situation, this permits operating two portions of the band almost simultaneously, alternating short CQs. It might lead a similarly equipped listener to think you had two radios!

Since stations calling are not always lucky enough to also own a '471A, the receiver incremental tuning (RIT) must be used on occasion to "tune 'em in." The offset increment is nicely shown on the right-hand side of the window, in slightly smaller numerals than the main frequency display. The letters RIT are



ICOM IC-471A 70-cm All-Mode Transceiver, Serial No. 01051

Manufacturer's Claimed Specifications

Frequency coverage: 430.0 ~ 450.0 MHz.
Modes of operation: USB, LSB, FM, CW.
kHz/turn of knob: Not specified.

Frequency display: 7 digit.
Frequency resolution: SSB, 10-Hz steps (automatic 100-Hz steps shift); FM, 5-kHz steps. 1-kHz steps with TUNING RATE switch pressed.
RIT frequency coverage: ± 9.9 kHz from displayed receive frequency.
Transmitter output power: SSB—25 W PEP.
CW, FM—25 W (continuously adjustable from 1 W to max).
Harmonic suppression: Better than 60 dB.
Spurious suppression: Better than 60 dB.
Third-order intermodulation distortion dynamic range: Not specified.
Receiver sensitivity: CW/SSB—less than 0.3 μ V for 10-dB signal + noise/noise; FM—less than 0.3 μ V for 12-dB signal + noise + distortion/noise + distortion.

Squelch sensitivity: CW/SSB—less than 1.0 μ V;
FM—less than 0.3 μ V.
Audio output power: More than 2.0 W.
Color: Two-tone gray.
Size (HWD): 4.3 \times 11.2 \times 10.8 in.
Weight: 12.5 lb without optional internal power supply.

Measured in ARRL Lab

429.9985-449.9984 MHz.
As specified.
USB/LSB/CW: 1.7 kHz, 50 kHz (switchable);
FM: 50 kHz, 250 kHz (switchable).
Light-blue fluorescent, 1/4-in-high digits.

As specified.
As specified (0.5 kHz/turn).
Power output: Max. 31 W on all modes.
75 dB (see Fig. 1).
75 dB (see Fig. 1).
-28 dB (see Fig. 2).
Noise floor (minimum discernible signal) (dBm): -137.
Blocking dynamic range (dB): 104.
Two-tone, 3rd-order intermodulation distortion dynamic range (dB): 76.
Third-order intercept (dBm): -23.
Receiver quieting (μ V for 12-dB signal + noise + distortion/noise + distortion): 0.3 μ V.
Min. 0.16 μ V; max. 0.54 μ V.
2.0 W at 10% total harmonic distortion.

also displayed to eliminate any possibility of confusion. I appreciated the fact that RIT control is not "dinky" as with some HF radios. Regardless of the position of the RIT control, the CLEAR button returns the setting

to zero. It's a slow tuner, with one turn offsetting only 0.5 kHz.

The Tuning Rate Switch, rs, allows a quick QSY by changing the operating frequency readout to increments of 1 kHz on any

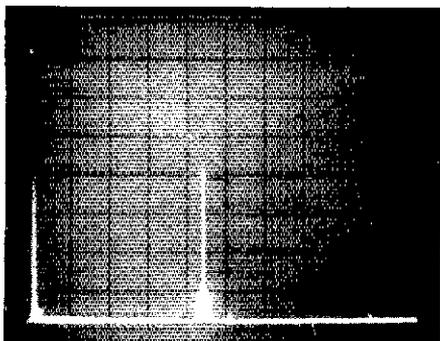


Fig. 1—Spectral display of the IC-471A. Vertical divisions are each 10 dB; horizontal divisions are each 100 MHz. Output power is approximately 30 W at a frequency of 440 MHz. All spurious emissions are at least 75 dB below peak fundamental output. The fundamental has been reduced in amplitude approximately 38 dB by means of notch cavities; this prevents analyzer overload. The IC-471A complies with current FCC specifications for spectral purity.

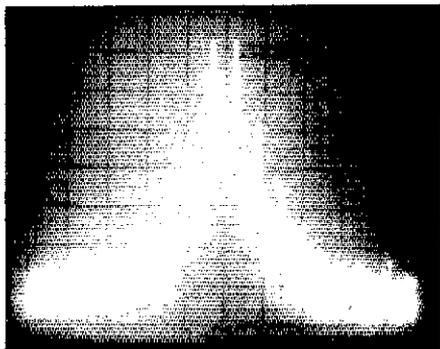


Fig. 2—Spectral display of the IC-471A output during transmitter two-tone IMD test. Third-order products are 28 dB below PEP, and fifth-order products are 42 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The IC-471A was being operated at rated input power on the 70-cm band.

mode, instead of 10 Hz. On FM, it permits tuning in signals that are off from the 5-kHz step frequencies. The UP/DOWN switches allow 1-MHz jumps. On FM, the + or - DUPLEX button allows standard repeater operation, while the CHECK switch allows an instantaneous check of the repeater input frequency. The OFFSET-WRITE allows access to repeaters of any nonstandard frequency separation. The optional microphone has the UP/DOWN tune feature. Although the test model did not come with the optional mast-mounted preamplifier, the front panel has a switch to bring this feature on line, a nice listening feature for weak-signal work.

Wherefore Art Thou, Memory?

Bells and whistles have become a way of life in today's state-of-the-art radios. Not to be outdone, the IC-471A comes complete with 32 memories and a multipurpose scanning feature. It takes a bit of manual-in-hand study, but after a while one gets the hang of it. The user-programmable memory can store any of 32 different frequencies, as well as the mode, and duplex/simplex. The display indicates that MEM is in operation and gives the channel number. The memory channel is

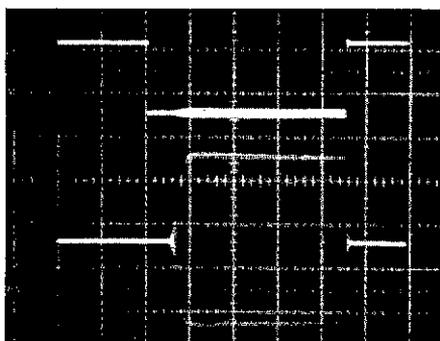


Fig. 3—CW keying waveform of the IC-471A. The upper trace is the actual key closure; the lower trace is the RF envelope. Each horizontal division is 5 ms.

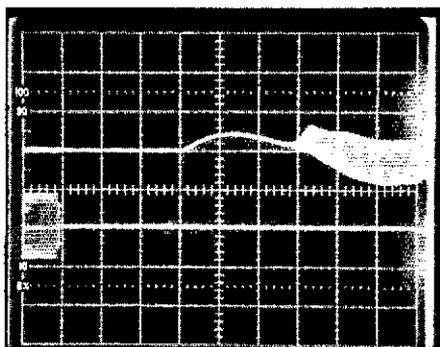


Fig. 4—Receiver recovery (turnaround) time. The lower trace shows the key opening; the upper trace shows receiver audio output. Horizontal divisions are each 20 ms. There is an approximate 120-ms delay before receiver recovery.

selected by the main tuning knob by use of the Dial Function Switch (DFS). Scanning can be programmed in a variety of ways: all programmed memory channels continuously; only channels having a desired operating mode; between two desired memory channels only; and automatic stop scanning in any mode.

Lightweight or Heavyweight?

The '471A is certainly a heavyweight when it comes to operating convenience and capabilities. Some of the features not already mentioned include VOX (semi-break-in on CW), CW side-tone monitor, CW delay control and subaudible tone encoder for FM operation. But it's a lightweight in terms of heft and compactness (that's good!), making it ideal for mobile and portable installation. It weighs a little over 12 pounds, perfect for mountaintop expeditions.

The End

Owners will have to bear with the sometimes difficult syntactic and typographical errors found in the manual. But this problem is minimal and will not lead to any real confusion in operating.

With the many operating activities sponsored on the VHF and UHF bands, 432-MHz capability is a must. For terrestrial propagation potential, some say the band is as good as 2 meters. With a few more radios like the IC-471A, 70 cm could indeed be as popular as 2 meters. You won't go wrong getting there with ICOM's IC-471A.

The IC-471A is available from ICOM America, Inc., P.O. Box C90029, Bellevue, WA 98009-9029, tel. 206-454-8155. Price class: IC-471A, \$800; PS-30, \$260; PS-25, \$100; AG-1 preamplifier, \$90; EX-310 voice synthesizer, \$40.—John Lindholm, W1XX

INFO-TECH M-44 AMTOR CONVERTER

□ If you've had a hankering to get on AMTOR, here's one way: Use an M-44, a terminal or teleprinter, and an SSB station. One advantage the M-44 has over other AMTOR converters is that it will work with Baudot or ASCII terminals; most other converters will work only with ASCII terminals.

The M-44 is housed in a black, 2-1/2 x 10 x 7-3/8-in.-deep cabinet. Two toggle switches—POWER on/off and LIMITER on/off—and 10 LEDs are mounted on the front panel. Three LEDs are used for modem tuning: MARK, SPACE and PEAK. Other LEDs show: (1) the status of the PTT line (XMIT), (2) the status of the M-44 as an information sending station (ISS), (3) when synchronization is established (SYNC), (4) if an auxiliary transmit buffer is in use (AUX), (5) ERROR status (ERROR), and (6) when the current buffer is full (FULL).

On the rear panel are five, 3-conductor, 1/4-in. jacks and a three-pronged, male, ac-line connector; the line cord is detachable. The five jacks are identified only by the numbers 1-5; you have to refer to the instruction manual to discover the function of each.

Inside the cabinet, a single, glass-epoxy, double-sided PC board holds the majority of components. A smaller single-sided board supports the two front-panel switches and the LEDs, and is mounted vertically behind the front panel. The power-supply protection fuse is clip-mounted on the main PC board.

The Manual

An abbreviated description of general AMTOR operation is presented. There's a list of amateur transceivers known to work on AMTOR, too. But remember, this list is not necessarily complete. Hook-up instructions, parts-placement and schematic diagrams, as well as detailed operating procedures are included.

Operation

At first glance, I noticed a few differences between the M-44 and other AMTOR converters I had used before. Missing were most of the status indicators that tell you about the condition of the link. Also, there is the tuning indicator that consists only of three LEDs. I thought it would be a poor indicator, but it turned out that my concern was unnecessary—it's more than adequate for AMTOR operation.

Commands

When power is applied to the M-44, nothing spectacular happens. In fact, absolutely nothing happens! It would be better if the M-44 sent a sign-on message to the terminal to let you know it was functioning properly. If nothing else, the sign-on message lets you know that everything is connected properly between the M-44 and the terminal.

Once the terminal/M-44 connections have been made, it's time to send some commands to the converter. All commands to the '44

must begin with a double slash (//) followed by one or more characters. Using a method such as this has its advantages and disadvantages. The only obvious disadvantage is that the M-44 will not let you send multiple slashes over the radio channel. If you send five slashes at your terminal, the person on the receiving end will not get all five slashes. On the other hand, there are several advantages to using a command structure such as this instead of using control or escape sequences. The first is that it will work equally well for ASCII or Baudot terminals. Also, almost all terminal emulation programs for home computers can generate the slash character. Very few terminal emulation programs can generate all control and escape sequences. AMTOR equipment that requires escape/control sequences has caused a lot of frustration for operators whose terminal programs couldn't generate those sequences.

Signal Tuning

When tuning a signal, the idea is to get the PEAK LED to stay on continuously while the MARK and SPACE LEDs flash with the incoming data. When I first saw this described in the manual, I thought it was really going to be a disaster! I was pleased to find, however, that this tuning display works very well.

Mode-Bc Master

To begin a transmission using mode Bc (FEC), you type //F. The M-44 always sends 40 idle characters to ensure that receiving stations have enough time to synchronize to the transmitter. Forty idles is significantly more than the four suggested by the international standard (CCIR 476-3). This long preamble can get in the way when you try to operate a net on mode B. Following the //F command, any characters typed at the sending terminal will be transmitted in the mode B format. Additionally, after each carriage return/line feed combination, the M-44 inserts a short idle period so other stations can synchronize to the transmitting station in the middle of a transmission. This idle-insertion feature should be included in all AMTOR equipment. To complete the transmission, use //Q.

Mode-A Master

To make a mode-A call, enter the mode-A command followed by the SELCAL of the station with which you want to communicate. For example, //AWWAW would start the '44 calling a station that was using the SELCAL WAW. To allow the other station to transmit data, send the M-44's "over" sequence (""). To break into the sending station's transmission, enter the break command—a double slash followed by a space character.

Mode-A Slave

Before someone can call your station using mode A, you have to tell the M-44 what characters you want to use for a SELCAL. Do this by giving the IDENTIFICATION command. For example, //IABCD tells the M-44 that it should use ABCD for its SELCAL. When it hears that combination, it will switch from standby to mode A and respond.

Mode-Bc Slave and Mode L

The M-44 is unique. When in standby, it can monitor either mode-B or mode-A transmissions without operator intervention. This



is a handy feature, especially for those who like to monitor all the traffic on a frequency instead of copying traffic using only a certain mode.

Unlike many other AMTOR units, the M-44 does not print SELCALs when a station is making a call. This omission is disconcerting.

Bottom Line

The Info-Tech M-44 AMTOR modem should meet the needs of the casual AMTOR user. It is simple to connect to a radio and terminal. Unlike some other units, the M-44's designers took care to ensure that ac-line EMI filtering is provided to help reduce the problem of interference to radio equipment. Discriminating users might want to consider the "multiple-slash-character" limitation and the missing full set of status indicators. The M-44 is available from Digital Electronic Systems, Inc., 1633 Wisteria Court, Englewood, FL 33533, tel. 813-474-9518. Price class: \$300.—*Paul Newland, AD7I*

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

[In order to present the most objective reviews, ARRL purchases equipment "off-the-shelf" from Amateur Radio dealers. ARRL receives no remuneration for items presented in the Product Review or New Products columns.—Ed.]

The following ARRL-purchased Product Review equipment is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and reflect a discount from the purchase price.

Sealed bids must be submitted by mail and be postmarked on or before August 27. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

Please clearly identify the item you wish to bid on, using the manufacturer's name, model number or other identification number if specified. Each item requires a separate bid and envelope. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail of the successful bid. No other notifications will be made, and no information will be given by telephone to anyone regarding final price or identity of the successful bidder.

Please send your bids to Kathy McGrath, Product Bids, ARRL, 225 Main St., Newington, CT 06111.

Info-Tech M107 RTTY modem. Min. bid \$130.

MFJ 1224 RTTY modem. Min. bid \$67.

Mirage Communications B215 2-meter amplifier, s/n 280-684. Min. bid \$167.

TEN-TEC Century/22 CW transceiver, s/n 579-0004, Model 979 power supply (as a package only—see May 1985 QST). Min. bid \$233.

Macrotronics RM1000/RM200 modem (with software for Apple computer, s/n 2566). Min. bid \$100.

Amateur Radio Software

Kantronics AMTOR 64, s/n 36192. Min. bid \$47.

AEA-Soft AMTORTEXT-64, s/n 12. Min. bid \$47.

New Products

COAXIAL CABLE WEATHER BOOTS

□ An assortment of new flexible weather boots for use with BNC and F-type coaxial connectors is being offered by Kilo-Tec. Made of a flexible vinyl material that resists moisture and breakdown from the sun's rays, these boots are designed to keep connections clean and dry. Simply slip the weather boot over the cable before soldering on the connector, then slide the boot over the connector for a good weather seal.

The new boot models pictured are (l-r): Model KTBNC-59 for (F) BNC/RG-59 and RG-8X; Model KTBF-59 for (M) Type F/RG-59 and RG-8X; and Model KTBNC-58 for (F) BNC/RG-58. In addition, several models are provided for use with PL-259 and Type-N connectors, with boots for TNC connectors available on special order.

The boots are available at parts suppliers or direct from Kilo-Tec, P.O. Box 1001, Oak View, CA 93022, tel. 805-646-9645. Kit of six boots, your choice of type, \$8.95 postpaid (California residents add 6% sales tax).—*Bruce O. Williams, WA6IVC*



available) to peak the calibrator signal at a tone you find comfortable.

3) Turn off the calibrator and make contacts. Don't change the adjustments made in step two: Do all tuning with the main tuning knob and tune for peak response to the received signal. This ensures that the transmit and receive signals are on nearly the same frequency.

A second method may be used when the rig has XIT. Adjust the receiver to the calibrator signal without using RIT, but using the main-tuning IF-shift and filter controls. Then, set the transmit signal to the calibrator frequency, with the key down, using only the XIT control.

The object of these adjustments is to make the transceiver transmit on the optimum frequency of the receiver passband. If all transceivers used on CW were adjusted this way, more contacts would be established on the first call, the spectrum use for a contact would be minimized and I could make Field Day contacts at a faster rate!—*Dr. Gerald N. Johnson, P.E., K0CQ, Ames, Iowa*

ELECTRONIC BIAS SWITCHING FOR GROUNDED-GRID AMPLIFIERS

I added electronic bias switching to a home built amplifier I recently purchased. The circuit came from March 1975 *Ham Radio Magazine* (p. 50). I was not happy with the way the relay cycled during SSB operation, so I changed it to follow the antenna-relay switching. This makes the switch action much more positive. As an added benefit, the circuit follows the antenna relay with no delay for break-in keying. Fig. 5 shows the modified circuit. (The only change from the original circuit is the 2N3906 PNP transistor.)

When the relay is operated, it switches on the 2N3906, which supplies current to the first base of the Darlington pair. The measured voltage at point "A" is 20-V dc when the tubes are cut off, and 0.7 V when the transmitter is operating (with two 4-400A tubes). Other amplifiers may have a higher voltage at point "A," but the 2N6308 and TCG191 are rated at 300 V (collector to emitter) and should work for any amplifier. The 2N6308 transistor is rated at 100 W of power dissipation and needs no heat sink for this use.—*Tom Lewis, N4TL, Lauderdale Lakes, Florida*

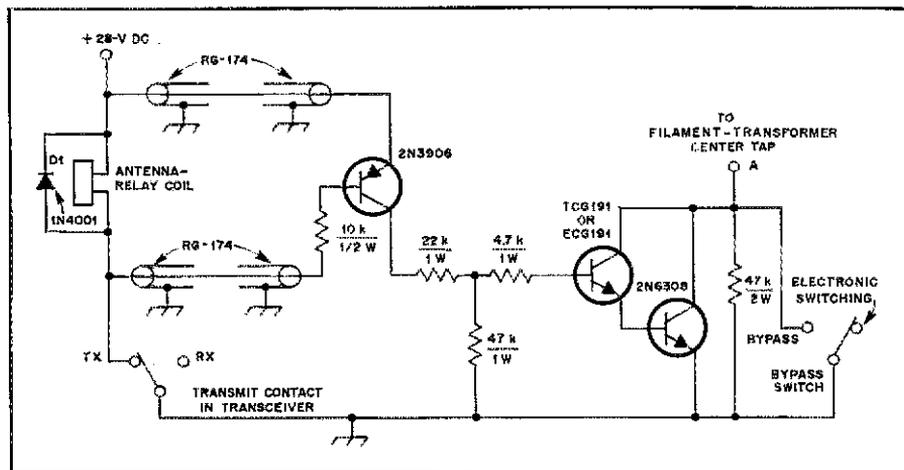


Fig. 5—A schematic of N4TL's electronic bias-switching circuit.

CHIRPLESS BREAK-IN KEYING

The following scheme has worked very well in providing chirp-free keying in a true break-in keying system. The basic idea should work with almost any free-running buffered oscillator, using either a tube or transistor, in an amplifier-keyed transmitter.

Refer to Fig. 6. C is a small padding capacitor chosen to shift the oscillator frequency about 3-4 kHz when the diode switch, D1, is activated by the keying relay or switch. The keying switch can be either normally open or normally closed: It doesn't matter whether the shift increases or decreases the oscillator frequency. Spot the transmitter frequency with the key down. With key up, the oscillator frequency is shifted out of the receiver passband so it cannot be heard. The switching voltage must be pure dc to avoid modulating the oscillator. Follow the usual rules for installing diode switching, and be sure the keying relay or switch switches cleanly. It is extremely important that the switching bias be several times greater than the peak oscillator-tank voltage. It is possible to use an inexpensive 1N914 switching diode with low-level

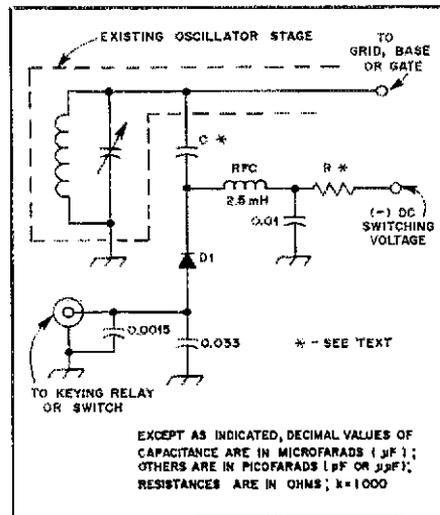


Fig. 6—A diode-switched capacitor, C, is controlled through adjacent components to shift the frequency of a free-running oscillator out of the receiver passband during key-up periods for full QSK operation.

vacuum-tube oscillators if the bias (about 0.6 V) is sufficient. It may be possible to string two or more inexpensive switching diodes in series to increase the effective switching bias for a tube oscillator, provided the propagation delays remain negligible. The switching voltage for a transistor oscillator and a 1N914 switching diode is usually around 12 V with an R of about 10 k Ω . If you need to reduce the voltage across the switching diode, connect the padding capacitor, C, near the ground end of the oscillator coil.

Experiment to find the necessary amount of oscillator shift for your receiver and transmitter. In my case, I found the chirp just noticeable at a shift of 5-6 kHz (a 10-kHz shift was unacceptable) in a tube oscillator operating at 5 MHz. I chose a shift of 3.8 kHz because it allows true break-in keying on a net where both CW and SSB stations participate. The system has no noticeable chirp at keying speeds of up to 30 WPM.—*Berj N. Ensanian, K13U, Eldred, Pennsylvania*

A DX-EDGE® IN TIME

Many DX operators have found the DX Edge, advertised in *QST*, to be useful in chasing new contacts with distant countries. It shows not only areas of light and dark on the surface of the earth, but also the exact shape of the gray line. This helps you choose the best band and propagation path to various locations.

I added another feature to my DX Edge that lets me quickly relate time throughout the world. If we assume that most people keep the same general daily operating schedule, we can guess when the distant ham is likely to operate. A strip of typewriter correction tape added along the top of the DX Edge template (Fig. 7) shows probable operating times (in the morning before work, at lunch and in the evening after work) for other hams. When the template is adjusted to local time, a glance tells me where in the world other hams are likely to be active. When this information is compared with propagation conditions, the result is an increased probability of operating at the best time and listening in the best direction.

Incidentally, gray-line paths are so productive because most hams are home (and possibly operating) at sunrise and sunset! —*Eric Jorgensen, KE6US, Riverside, California*

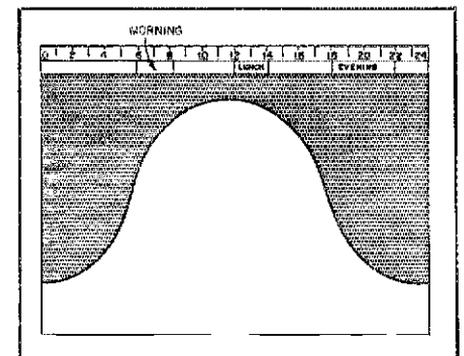


Fig. 7—A typical gray-line template for the DX Edge. KE6US's operating-time indicator strip is shown shaded at the top of the template.

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

COAXIAL-CABLE TRAPS

□ I read with considerable interest the article by KA3BLO in May 1985 QST.¹ I believe the conclusions regarding coaxial traps and resonant reactance² may be misleading on two counts.

First, there are two different ways to connect coaxial traps. The traps in May QST and those in some earlier QST issues use one way. The preferred way is illustrated in an excellent article on the subject by Gary O'Neil, N3GO, in Ham Radio,³ and is shown here as Fig. 1.

Second, the worst-case example for SWR bandwidth, shown in Fig. 3 of May QST, uses the less-preferred construction method plus uses high-capacitance RG-58 cable on the 28-MHz band. Try RG-59 cable for a better 10-meter trap.

I have built and tested several traps on 30, 40 and 80 meters using the method described in Gary's article. The 7-kΩ bandwidth⁴ with a 15-meter trap was increased from about 300 kHz to about 1.5 MHz by using the preferred coax trap connecting method. The resonant impedance was increased from about 11 kΩ to over 40 kΩ.—*Dave Kennedy, N4SU, Mountain View Rd., Rte. 3—Box 100, King, NC 27021*

□ In the article "Optimizing Coaxial-Cable Traps," N4UU presents a method for the design, at any frequency, of the highest-impedance coaxial-cable trap that can be realized.⁵ However, he omits consideration of the fact that the same electrical current flows through both the central wire and the shield in series. As discussed below, the effect of this omission does not affect the trap design procedure, but it does affect the trap impedance calculations.

The wiring arrangement used for the center conductor and shield is shown in Fig. 2. The two windings of n turns each are like a bifilar or parallel-turns winding. Because of this, the magnetic coupling between the windings is practically perfect, and the mutual inductance can be considered equal to the inductance of either winding. This is indicated in Fig. 3 in schematic form.

Each differential distributed capacitor element of Fig. 2, connected across n turns, has the same voltage across it and the same current through it. Therefore, all the elements can be summed into a discrete single capacitor and connected across any n turns, as shown in Fig. 3.

Finally, at the ends of the winding, again

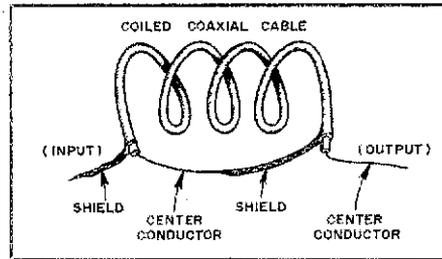


Fig. 1—An efficient method of making connections for a coaxial trap.

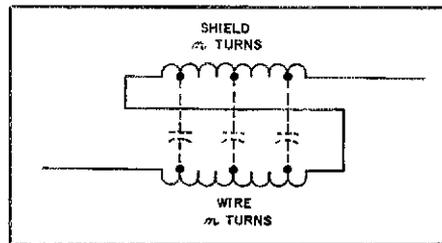


Fig. 2—Schematic diagram of a coaxial-cable trap.

because of perfect coupling, the auto-transformer of Fig. 3 increases the impedance of the capacitor across n turns by a factor of 4. This is represented in Fig. 4 by $C/4$ across a winding of $4L$. This exact-equivalent two-element circuit represents the coaxial-cable trap at all frequencies, even though the capacitance of the cable is distributed along its length. From this circuit, it is evident that the resonant-frequency reactance values given in Table 1 of N4UU's article must be multiplied by 4 before use in Eq. 6, for the parallel LC circuit reactance.—*Mason A. Logan, K4MT, 1607 Monmouth Dr., Sun City Center, FL 33570*

[Editor's Note: It is significant to note that the connections in the traps of note 1¹ are not the same as those of notes 3 and 5. It can be shown that the connections of note 1 are equivalent to L in parallel with C , while the above shows those of notes 3 and 5 to be equivalent to $4L$ in parallel with $C/4$.]

RADIO NOISE

□ A troublesome case of HF radio noise plagued me for several weeks. Monitoring the noise on 14 MHz revealed the following symptoms: (1) a definite peak in noise level was obtained at 190° azimuth, using a three-element quad antenna; (2) the noise occurred only during darkness hours. Once it started after dark, it was on all night until daylight; (3) the noise cycled on and off, with a definite period of about 30 to 50 seconds for either ON or OFF. During ON times, the noise level was 30 to 35 dB above the normal background level, making reception from the southern sector virtually impossible for any but the strongest signals.

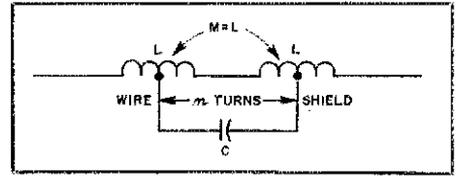


Fig. 3—Equivalent symmetrical lumped-component circuit for a coaxial-cable trap.

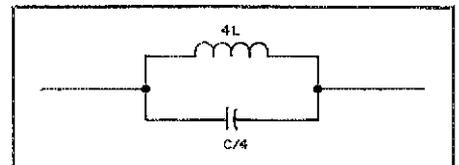


Fig. 4—Elementary transformed equivalent circuit for a coaxial-cable trap.

After determining the above symptoms, I discussed the problem with another amateur in the area, Helmut Wolff, KD5VL. By driving around the area with a portable short-wave receiver, Helmut located the offender—a defective sodium vapor street light about one mile from my antenna. This particular light would come on to provide normal lighting for a period of about 40 seconds, during which no radio noise was emitted. However, after about 40 seconds, the lamp would flicker off. During the OFF time, a dull red glow was visible, and the radio noise was heard throughout the MF and HF bands.

With the pole number of the offending street light identified, I reported the problem to the local utility company, which is responsible for the maintenance of the city street lighting system. The utility people were very cooperative and helpful. Within hours of reporting the problem, I was contacted and advised that the problem (a defective starter board) had been found and corrected. In discussions with the utility people, I learned that particular type of street light uses a sodium-vapor lamp, which has a characteristic yellowish light and operates from 240-V ac. It has a ballast transformer similar to that used with common fluorescent lights. Such street lights are turned on and off by daylight-sensing photoelectric cells.

The symptom that was somewhat deceptive was the regular on-off cycling. It did not occur to me that a defective street light would do this. The beam heading from my antenna to the street light was subsequently determined from detailed maps of the area and was found to be within several degrees of the heading for maximum noise. I am happy to again be able to point the beam southward without the intermittent arcing noise, and I am very appreciative of the help from KD5VL and our utility people.—*John L. Kennedy, W5DJ, 5739 Lindenshire La., Dallas, TX 75230*

¹J. Grebenkemper, "Multiband Trap and Parallel HF Dipoles—A Comparison," QST, May 1985, pp. 26-31.

²Resonant reactance, as defined in the article of note 1, is the reactance of the trap inductor at trap resonance.

³G. E. O'Neil, "Trapping the Mysteries of Trapped Antennas," Ham Radio, Oct. 1981, pp. 10-16.

⁴[That is, the frequency range over which the trap impedance remains greater than 7 kΩ.—Ed.]

⁵R. C. Sommer, "Optimizing Coaxial-Cable Traps," QST, Dec. 1984, pp. 37-42.

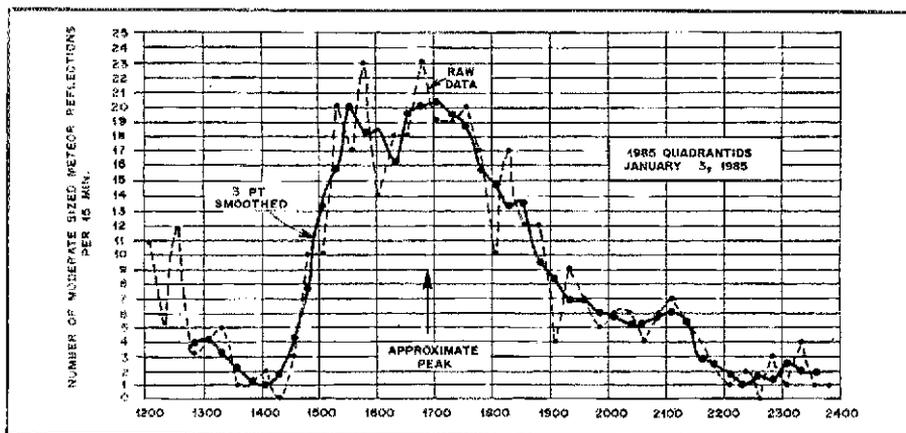


Fig. 5—The display from the W9IP 90.1-MHz "meteor monitor" on Jan. 3, 1985. Times (horizontal axis) are UTC. The "number of meteor reflections" scale is only relative. Experience has shown that meteors of this magnitude almost always provide bursts of 1- to 5-second durations on 144 MHz. Therefore, this graph does not include "pings."

METEOR COMMUNICATIONS

It appears that American VHFers missed a major meteor shower early this year. The Quadrantid shower, which normally peaks sharply on January 3 or 4, was exceptionally rich this year, but nobody was active to take advantage of it. I have a "meteor monitor" consisting of an FM radio, low-noise preamplifier and strip-chart recorder. The radio is tuned to an FM channel that is unoccupied in my area (90.1 MHz). Incoming meteors ionize the atmosphere and provide a propagation path for the many FM broadcast stations scattered across the country. The graph of Fig. 5 displays the sharp peak of the Quadrantid shower at about 1700 UTC January 3.

Perhaps because of the wide variety of "expert" predictions of the shower's peak (and the fact that it occurred on a weekday when most people were at their jobs), the excellent conditions went almost unnoticed. I estimate that at least 100 meteors per hour were usable for 2-meter propagation during the three-hour peak, more than the Perseids in 1984. I listened and called CQ on 2 meters for most of the peak period and heard virtually nothing.

How can we avoid this in the future? One good way is to have a source of accurate information on meteor showers. One such source of up-to-date information is *Astronomical Calendar 1985* by Guy Ottwell (c/o Dept. of Physics, Furman University, Greenville, SC 29613). It describes each shower and contains a wealth of data about solar longitude, past and expected performance, and right ascension and declination values for the radiant. It costs \$10 postpaid in the U.S.

VHFers interested in meteor scatter will find the following showers of particular note this year: Perseids (1300 UTC August 12), Draconids (0300 UTC October 10), Orionids (2200 UTC October 20) and Geminids (1700 UTC December 13). All these showers except the Geminids are associated with comets whose expected closest approach to the sun (or the earth) occurs this year or early next year. This is exactly the condition necessary for major shower activity. (Remember the Leonids meteor storm of 1966?) The Eta Aquarids (which occurred on May 5 this year) and the Orionids are associated with Halley's

Comet. The Perseids comet (Swift-Tuttle) is overdue, and the Draconids comet (Giacobini-Zinner) will be only 29 days away when we pass its orbit. Ottwell's *Astronomical Calendar* says that the Draconids (usually a very unimpressive shower) "... may be the shower of the year."

The year 1985 promises to be very exciting for VHFers who enjoy meteor scatter. Be cautious, however, in accepting anyone's prediction for a peak. Authorities disagree a lot on when a particular shower may reach peak intensity. Be prepared to listen yourself, well before and after the expected peak. Otherwise, you may miss some major opportunities for VHF DX.—*Michael R. Owen, W9IP, c/o Geology Dept., St. Lawrence University, Canton, NY 13617*

TRIMLINE® TELEPHONE INTERFERENCE

One of my neighbors complained that he was experiencing RFI from my 20-meter kilowatt transmissions in his Trimline tone-dialing wall telephone. The interference occurred only when the handset was "on hook" and not being used. The handset earpiece acted as a miniature loudspeaker, causing my demodulated SSB audio to be heard throughout the room. When the Trimline handset was lifted off hook and in use, the interference disappeared.

The local telephone company was unable to resolve the RFI problem with the installation of their 40BA capacitors and 1542A inductors. According to *Bell System Practices*, Section 500-150-100, these components are effective only for signals operating below 10 MHz. The repairman did more harm than good by telling my neighbor that nothing could be done because I was running too much power.

Further attempts, including the use of ferrite beads, 0.01- μ F ceramic capacitors across the line, and microphone and receiver suppressors also proved fruitless. Happily, I can report there is now a solution to the Trimline tone-dialing wall-phone problem. I called the AT&T Consumer Products toll-free line (800-555-8111) and ordered a Z101A RFI filter. This newly designed product costs \$15.95, and consists of a special toroid

mounted inside a modular adapter plate. Without tools, the plate may be inserted between the existing modular wall-mounted receptacle and the wall phone. The filters effectively prevent RF on the telephone drop and house wiring from entering the instrument. They may also be ordered from AT&T Consumer Products, 1800 Hawthorne La., West Chicago, IL 60185.—*Ralph A. Dage, W8PHZ, 8078 Lochdale, Dearborn Hts., MI 48127*

ATARI CW UPDATE

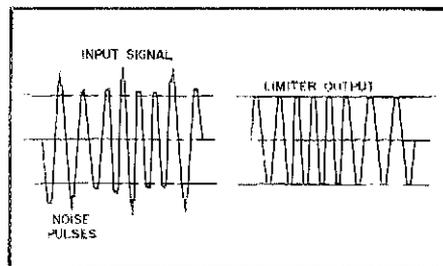
The "ATARI CW Program," February 1985 *QST*, p. 32, works well, but I had to overcome a couple of small problems in order to get it working properly. When using the EASMD Editor/Assembler/Debugger by Optimized Systems Software, the program would not assemble at the location indicated in the article. This was overcome by changing line 270 to read:

0270 PST = \$6000

This causes the program to assemble further down in memory so as not to interfere with the assembler itself. Also, to start the program it is necessary to execute a JMP \$5016 (or, in my case, JMP \$6016). I hope this information will help other *QST* readers.—*Russell J. Gladden, P.O. Box 501, Carbonear, NF A0A 1T0, Canada*

Feedback

Rupert Wood, WB4ZOF, points out that the clipping action of the limiter stage may be difficult to see from the oscilloscope photos of Fig. 2 (Doug DeMaw, "Understanding FM Receivers," June 1985 *QST*, p. 25). The accompanying drawing should show the action more clearly.



Representation of limiter action. Amplitude variations on the incoming signal, left, are "cleaned up," as shown at the right.

In Fig. 1 of the article by Ki Negoro, WA6QJP, "The Radio System Integrator" (June 1985 *QST*, p. 20), pin 14 of U1A should be shown connected to +10 V. Further, all diodes are 1N914 or equivalent except for D24, which is a 1N4003 or equivalent.

In the April Beginner's Bench column (Doug DeMaw, "A Converter for the 24-MHz WARC Band," April 1985 *QST*) the second line on p. 44, left-hand column, should read: "siemens (formerly called *mhos*)..."

Is 160 *Your* Top Band?

With Old Sol on extended holiday, many amateurs have discovered our oldest amateur band—160 meters. But to accommodate different operating interests, it takes cooperation by the users.

By John F. Lindholm, W1XX
Manager, ARRL Membership Communications Services

Perhaps no subject gets the ham juices boiling more quickly than a discussion of operating on the 160-meter band. Top Band is the closest spectrum segment we have akin to the so-called "useless" radio frequencies of the "200 meters and down" cra. If it isn't the historical significance that raises the level of consciousness 3 dB, then it must be that RF fibrillations at 1.8 MHz do funny things to the metabolism—especially after long nighttime exposure!

The purpose of this article is twofold: (1) to serve as a primer for generally accepted 160-meter operating practices, and (2) to revisit the subject of a voluntary 160-meter band plan.

The need for some basic education can be illustrated by a recent observation. KA9XXX was heard calling CQ on 1827 kHz at about 7 WPM at 8 P.M. local time. Europeans were just starting to burst through the noise on the East Coast and Midwest. Unfortunately, the media hasn't done enough to inform newcomers to the band about the DX window (1825-1830 kHz), reserved by convention for DX stations.

Observation number two: a 1 × 2 old-timer is ragchewing on phone on 1811 kHz during DX prime time. When informed by a well-meaning passerby that this segment of the band is usually home for CW signals, a string of expletives ensue, including a few choice comments regarding the parenthesis of the inquirer. Actually, this particular episode was handled a bit more tactfully than most. More often, such an episode resembles the activities of the gendarmerie during a hostage rescue—with no call sign ID, of course. Naturally, the OT doesn't fail to mention that he is within the FCC rules, has been on the same frequency since 1930, and that the League should be nuked for trying to dislodge him. Such conduct indicates that the ARRL band plan published in January 1982 *QST*, p. 51, is due for reevaluation. More about this later.

160-Meter Rebirth

Two things have happened in the past

few years to revitalize 160-meter activity: the availability of full-feature commercial equipment, and the declining sunspot numbers. Many amateurs discovered that the band-switch position just below 3.5 MHz really works. Couple this with the lack of 10- and 15-meter activity, and it becomes clear why amateurs have flocked to the lower frequencies. But not all have found this flood of activity to be desirable. Small wonder. Suppose you had discovered an uninhabited island paradise. Would you want a bunch of Yuppies moving in? Top Band was for years a refuge from the pressure and hype of the higher frequencies. When those bands suffered sunspot anemia, many operators discovered the Top Band hideaway. It was never the same again. But that isn't necessarily bad.

Top Band has carried the tradition of being a "gentlemen's band." With greater occupancy, that tradition becomes more difficult to uphold. Increased activity demands a larger measure of spectrum management. It is understandable for the veterans to yearn for the good old days, for they really had it made. Now the wealth and joy of 160-meter operating must be shared.

Propagation

What kind of propagation can the newcomer to the band expect to find? If working DX or all over the U.S. in the daytime when the maximum usable frequency (MUF) is up around 30 MHz is your idea of fun, then forget 160. Severe absorption makes the band generally useless during the day, except for local distances—similar to 80 meters in the daytime. Top Band is your basic nighttime band: Distances of several thousand miles are possible when conditions are right. Another limiting factor is atmospheric and man-made noise. Because of the greater incidence of thunderstorms during the summer season, winter is far better for working greater distances. Summer QRN can be devastating. Top Band devotees tend to be viewed by other amateurs as weird. Why else would anyone endure hours of listen-

ing to static to all hours of the night (and early morning)?

DXing is strictly a nighttime activity with so-called "gray line" (sunrise and sunset) information probably of more use on this band than any other. For example, when listening at your sunrise, check where on the globe the sun is setting, as this can be an enhanced path. Charts, computer programs and operating aids that will calculate this information for any time of the year are available commercially. The equinoxes can be especially productive in maximizing the gray-line effect.

Reliable ragchew contacts can be conducted on winter evenings pretty much all over the U.S. and Canada. Coast-to-coast contact is best during the early morning hours. Worked All States seekers will find nets devoted to this pursuit around 1850 kHz many evenings.

Antennas

The number-one topic of conversation on 160 is antennas. Great fascination is attached to describing the slightest change that has been made to one's antenna system. Adding two more radials to a system that already uses enough wire to encircle the earth always makes it worthy for an operator to seek additional signal reports. There is need for experimentation with antennas, since the cut-and-dried Yagi approach used on the higher frequencies is simply not practical here. Wires in every configuration abound.

The misconception that inhibits some amateurs from getting on the band is that acres of real estate are a prerequisite. It just isn't so. *The ARRL Antenna Book* will give the reader different options to ponder that don't require annexing the state of Texas to your meager lot in the suburbs. Perhaps the two most common antennas are the inverted V and the inverted L.

The inverted V is a half-wave dipole requiring only a single support—in the middle. The V configuration also takes up less linear space than the conventional dipole. This antenna is favored by those who have a high, single tower (100 ft, for

example). Installed high enough, the inverted V can be a very effective weapon, and it's simple to install. The closer the center feed point is to the ground, however, the less effective it becomes for DX work.

For working DX, Top Band is probably the band where one must give the greatest consideration to an antenna with a significant vertical component. This yields the low angle of radiation needed for DX work. Remember that a horizontal dipole on 160 meters at a height of 40 feet is equivalent to using a dipole on 10 meters 2½ feet off the ground! The inverted L (whose name describes its shape) provides the vertical component needed for DX work. This vertical portion can be conveniently attached alongside even a tower of modest height—50 feet, for example. The horizontal section at the top can be affixed to any nearby support (such as a tree) to provide the required top loading.^{1,2} Any effective vertical system requires radials on the ground. But not to worry; They can be woven around obstacles and then hidden an inch or two below the surface. I've utilized this antenna with a minimum number of radials (six!) on a typical urban lot, with excellent results, both domestic and DX.

Operating Conventions—The DX Window

Many years ago, Stew Perry, W1BB, and his faithful flock of 160-meter DX enthusiasts devised a scheme that would allow the DX stations to be heard between the static crashes. Actually, the greatest impediment to hearing the DX is not atmospheric noise or the limits of propagation at all. It is the QRM caused by those calling the DX station! When copy is marginal (as it often is on 160) one amateur calling out of turn can mess it up for all. Enter the DX window on 1825-1830 kHz—a safe haven for the DX station to transmit on. The receive frequency, usually in the lower 10-kHz segment, is indicated by the DX station. Example: CQ CQ DE G3SZA QX 7 K. This means G3SZA will listen for callers on 1807 kHz. This practice worked well for years and was widely publicized in W1BB's 160-meter newsletter.

But with the declining MUF, voilà, stations with even modest antennas discovered they could not only hear the DX stations but even work them. Split operation was not always necessary to protect the European signals that previously only came up out of the noise on occasion. 599 EU signals were not uncommon, even in the Midwest. Signals sometimes were so good that—egad—DX stations could actually be worked on phone and transceive! To the OTs who had endured years of static phobia, this was heresy.

This raised the problem of the incom-

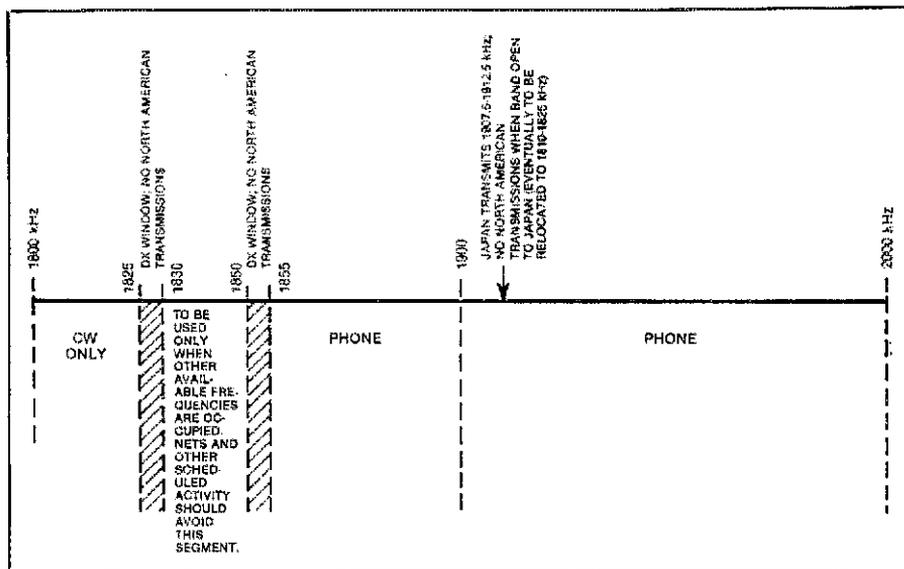


Fig. 1—The present band plan for 160 meters, adopted by the ARRL Board of Directors, has been in effect since December 1, 1981. Member input is now sought to bring this plan up to date.

patibility of phone and CW. Brush fires erupted between the advocates of each mode. With the restoration of full-power privileges and the easing of restrictions on 1900-2000 kHz in 1981—after amateurs had shared the band with Loran since WW II—there were the makings of critical mass: phone vs. CW; DXers vs. ragchewers; high power vs. QRP; higher power vs. everybody. This all had to be sorted out.

The ARRL Band Plan

Effective December 1, 1981, the ARRL Board of Directors adopted a band plan based on member input following a QST solicitation. This plan was, of necessity, a compromise, in recognition of the interplay among different interest groups. It advocated continued protection of the DX window, and partitioned the band into voluntary mode segments—CW on the low end, SSB on the high end. The plan had its critics, to be sure, for the interests of any one group could potentially infringe on those of some other group. In practice, however, the plan was endorsed by the majority of users.

But the ARRL plan suffered from a failing that could not be prevented—stagnancy. While the plan remained fixed, things were happening. Frequency allocations worldwide were changing. Also, with better band conditions, DX stations found less need to be protected by the window. They went transceive, with no great ill effects. Some DX stations even went transceive in the window. Many a stateside station had to wrestle with his conscience before venturing into the forbidden zone. Further, with many more amateurs discovering the band and the burgeoning growth of SSB, interference increased dramatically. Add to this two more recent domestic occurrences:

Docket 84-874, which proposes to allocate the 1900-2000 kHz segment to the radiolocation service, and the FCC Report and Order opening the band to digital modes, FAX, SSTV and NBFM (effective June 17, 1985). Despite the built-in difficulty in staying timely, the ARRL band plan has served the amateur community well because it was a reflection of the reality of the band circa 1981.

Now, some continue to defend certain aspects of the plan vigorously even though common usage and common sense dictate otherwise. Advocating the present plan *in toto* in face of changing "band conditions" is not realistic. An effective band plan must represent the interests of its users. It must conform to certain realities, such as worldwide spectrum allocation. It should not be arbitrary. Therefore, since 160 meters has undergone considerable evolution since the adoption of the 1981 ARRL band plan, an updated plan to recognize those changes is clearly in order.³

Why not Have the FCC Legislate Band Partitioning?

Two separate instances of amateurs requesting FCC-mandated band plans have been documented in QST:

In 1981, W8JI petitioned the FCC for exclusive CW subbands on 160. The FCC denied the request, stating primarily that it wished to avoid the regulatory burden that would result from such partitioning. It is interesting to note that in the 1981 dismissal Order, the FCC stated that ARRL "is soliciting comments on a proposal it has developed for the voluntary partitioning of the 160 meter band."

In 1984, the issue of an FCC-mandated band plan for 160 was revisited, this time by AD8I and KH8AC. AD8I asked for an

^{1,2}Notes appear on p. 48.

exclusive CW subband from 1800 to 1875 kHz, while KH8AC asked for 1800-1825 kHz. The FCC dismissed the petitions, again stating that subbands on 160 would add to its regulatory burden, especially if a redefinition were later required. In its dismissal order of 1984, the FCC said in part:

...establishment of telegraph only subbands would be an inflexible approach to the constantly changing balance between telegraphy and telephony operations... subbands would [also] add to the Commission's enforcement responsibilities... changes in the placement or size of a telegraphy subband as a result of long-term changes in operating habits of amateur operators would require [further] rule-making proceedings.

Thus, the FCC, in 1984, again endorsed voluntary band planning on 160, as it provides continuing flexibility and responsiveness to the needs of the amateur community.

The 1900-2000 kHz Issue

At WARC-79, a decision made the radiolocation service and the Amateur Service coprimary in the band segment 1900-2000 kHz. The FCC has made the Amateur Service secondary to the Radiolocation Service domestically. This action, which has been fought by the ARRL every step of the way, was purely a domestic decision that departs from U.S. WARC policy and violates the ground rules the Commission itself established for its WARC implementation proceedings. PR Docket 84-874, released on September 11, 1984, would allow the Radiolocation Service access to the band segment 1900-2000 kHz.

Related to the radiolocation issue is the Commission's recent favorable action on digital modes. The final Report and Order in this Docket (84-959) warned amateurs

not to construe this as an indication that we can expect a favorable outcome to our protest of the 1900-2000 kHz radiolocation proceeding. Thus, the matter is still pending.

Band Plan Criteria

The purpose of any band plan is not to keep the faithful "in line," but rather to serve as a guide to newcomers who have just discovered the band switch on their TBS-50. The plan should reflect what is happening on the band daily and what users have found, by and large, works. The plan should

- largely separate phone and CW;
- keep ragchewers and DXers from each other's throats;
- preserve the basic DX window concept, but allow greater flexibility for the DX station "to call the shots";
- recognize that during SSB phone contests, SSB will have dominance;
- protect the segment 1907.5-1912.5 kHz for Japanese stations during prime-time DX hours;
- provide a bulletin frequency for W1AW on CW free of the congestion of the lower end;
- recognize that there are many discrete frequencies in Europe occupied by commercial stations that render them unusable for European amateur DX work;
- provide for flexible planning for the 1900-2000 kHz segment without prejudicing our continued need for these frequencies;
- provide for minimum interference usage of digital communications;
- recognize a spot frequency for SSTV/FAX;
- be designed from maximum input by users who will consider the interests of others as well as their own.

W7TJ Band Plan

In April 1984 *QST*, League Lines made

an initial solicitation for member input to modify the ARRL band plan. The ARRL Board's Membership Services Committee has received several inputs. One of the more interesting was from W7TJ. Randy writes: "Thank you for requesting input on 160 meters. There have been many changes... and I feel a new frequency plan is in order. 160 meters has proved to be a very enjoyable but frustrating band. It has the most varied seasonal and fickle propagation. Therefore, a good deal of common sense [is needed]... My plan would alleviate a lot of problems and is [pretty much] adhered to today."

In brief, W7TJ offers a pragmatic approach that seems to meet most, if not all, the criteria. Randy uniquely addresses not only the differences of mode, but also of operating interest. Plus, he has a good feel for the differences between the East and West Coasts. [Some slight editorial changes, which have been made to broaden the scope of the W7TJ plan (shown below), are indicated in italics.—Ed.]

1800-1820 kHz—exclusively CW (*SSB down to 1810 during major contests*).

1820-1840 kHz—worldwide DX Band. North American stations transmit and receive SSB and CW here, exclusive of the "window." Example: Many European stations work transceive at 1830-1840 kHz (CW and SSB). Pacific stations work transceive at 1820-1825 kHz (CW and SSB). Sometimes either European or Pacific DX transmit in the window and receive on 1820-1824 kHz.

1825-1830 kHz—traditional DX window; North American stations do not *initiate* contacts here.

1840-1900 kHz—general SSB ragchew. *1890—Bulletin frequency.*

1900-2000 kHz—general SSB ragchew. Note: Even should this segment become unavailable to U.S. amateurs, this leaves

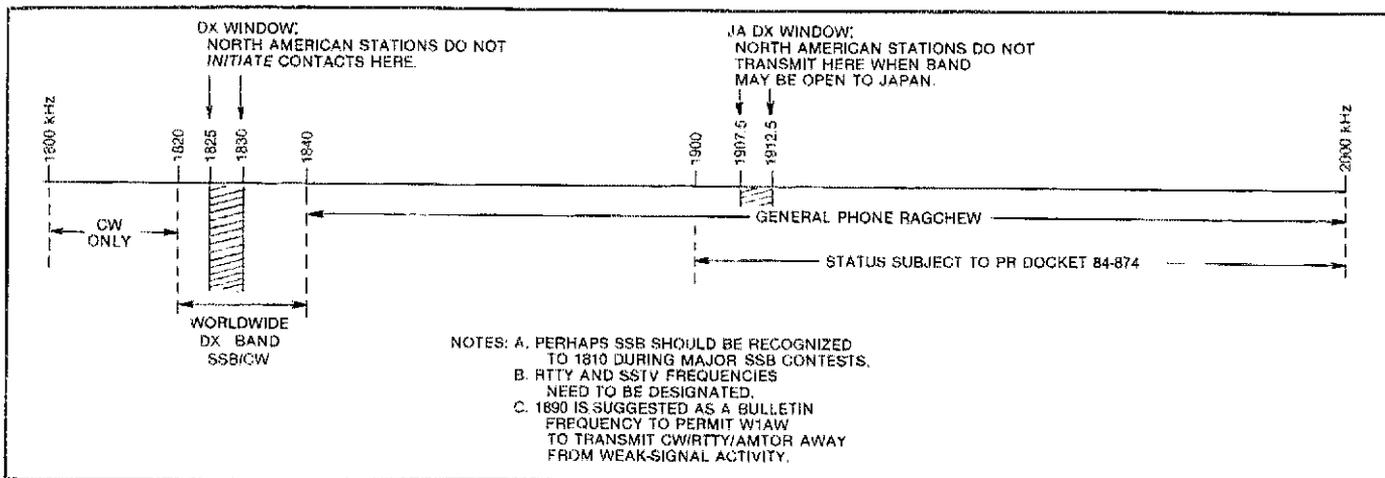


Fig. 2—A band plan proposal by W7TJ that considers the interests of DXers and ragchewers alike, as well as making accommodation for both phone and CW. This plan also recognizes the increased use of on-frequency transceive by DX stations, as well as the differences in operating frequencies used by European and Pacific DX stations. A "home" for digital modes and slow-scan TV, however, remain to be designated.

Table 1

Worldwide Top Band Frequency Allocations

This list shows the frequency allocations on 160 meters. No attempt has been made to indicate mode and power restrictions, which vary considerably with each country. Information was garnered from International Amateur Radio Union annual reports submitted by 84 (of 121) member societies. Some other countries, with or without IARU representation, may give their amateurs access to the 1.8-MHz band. Since this information reflects administering government regulations, these frequencies may apply to several DXCC countries within that jurisdiction. For example: the listing for G (United Kingdom) applies to G, GD, GI, GJ, GM, GU and GW.

Prefix	Country	Frequency (kHz)	Prefix	Country	Frequency (kHz)
A4	Oman	1800-2000	SJ-SM	Sweden	1830-1845
A9	Bahrain	1800-2000	SP	Poland	1750-1800
AP	Pakistan	1800-2000			1810-1830
C3	Andorra	1810-1875	T7	San Marino	1830-1850
C6	Bahamas	1800-2000	TA	Turkey	1810-1850
CP	Bolivia	1800-2000	TG	Guatemala	1800-2000
CT	Portugal	1830-1850	TI	Costa Rica	1800-2000
DA-DP	Fed. Rep. of Germany	1815-1835	U	USSR	1830-1930
		1850-1890	V2	Antigua and Barbuda	1800-2000
EA	Spain	1830-1850	V3	Belize	1800-2000
EI	Ireland	1800-2000	VE, VO, VY1	Canada	1800-2000
F	France	1830-1850	VK	Australia	1800-1866
FO	French Polynesia	1800-2000			1874-1875
G	United Kingdom	1810-2000	VP2M	Montserrat	1800-2000
H4	Solomon Is.	1800-2000	VP9	Bermuda	1800-1825
HB	Switzerland	1810-1850			1875-1900
HK	Colombia	1800-2000	VS6	Hong Kong	1800-2000
HL	Korea	1810-1825	XE	Mexico	1800-2000
HP	Panama	1800-2000	Y2-9	German Dem. Rep.	1810-1950
HR	Honduras	1800-2000	YB	Indonesia	1800-2000
J2	Djibouti	1810-1850	YJ	Vanuatu	1800-2000
J3	Grenada	1800-2000	YK	Syria	1830-1850
JA-JS	Japan	1907.5-1912.5	YN	Nicaragua	1800-2000
K, W, N, AA-AK	USA	1800-2000	YS	El Salvador	1800-2000
LA-LJ	Norway	1802-1850	ZB2	Gibraltar	1800-2000
LU	Argentina	1800-1850	ZL	New Zealand	1803-1857
LX	Luxembourg	1830-1850			1863-1950
OA	Peru	1800-2000	ZP	Paraguay	1800-2000
OE	Austria	1850-1950	ZS	South Africa	1810-1850
OH-OJ	Finland	1820-1845	4S	Sri Lanka	1800-2000
		1915-1955	5B	Cyprus	1800-2000
OK	Czechoslovakia	1750-1950	5N	Nigeria	1800-2000
OY	Faroe Is.	1830-1850	5W	Western Samoa	1800-2000
OZ	Denmark	1830-1850	5Z	Kenya	1830-1850
P2	Papua New Guinea	1800-1866	6W	Senegal	1810-1850
		1874-2000	7P	Lesotho	1800-2000
PA-PI	Netherlands	1825-1850	9H	Malta	1810-2000
PJ	Netherlands Antilles	1800-2000	9M	Malaysia	1800-2000
PP-PY	Brazil	1800-1850	9V	Singapore	1800-2000
PZ	Suriname	1800-2000	9Y	Trinidad and Tobago	1800-2000

a reasonable split of the band by mode. 1907.5-1912.5 kHz—JA window. No North American transmissions during potential openings to Japan.

This plan does not address where RTTY should migrate. There would appear to be two choices. Either the 10-kHz segment from 1800-1810 kHz should be designated as CW/RTTY or some 10-kHz segment further up the band (above 1850 kHz) should be designated exclusive RTTY. A segment 1890-1900 kHz would interface nicely with the above-proposed bulletin frequency. However, there is a significant amount of AM operation on and near this segment that cannot be discounted. This, plus the choice of a single FAX and SSTV frequency, will probably evolve of its own accord.

Further Member Input Sought

The W7TJ proposal provides an excellent point of departure for further discussion. Top Band offers amateurs the opportunity to continue the spirit of

amateur self-regulation. It's a commitment to keep the "gentlemen's band" self-coordinated. The band's greater occupancy presents amateurs with a challenge to do the job ourselves—not to have those in Washington do it for us. The spectrum resource is limited, but the interests of all must be accommodated to the exclusion of none. The cause of peaceful coexistence can be achieved with the cooperation and understanding of all. The "over" is now yours. Please send your best thoughts to the ARRL Board of Directors Membership Services Committee, c/o ARRL Hq., 225 Main St., Newington, CT 06111.

Notes

- ¹J. Lindholm, "The Inverted L Revisited," QST, Jan. 1983, p. 20.
- ²D. DeMaw, "A Remotely Switched Inverted-L Antenna," QST, May 1985, p. 37.
- ³Minute 62 of the Annual Meeting of the ARRL Board of Directors, January 24-25, 1985, is as follows: "On motion of Mr. Frenaye, seconded by Mr. Stevens, it was VOTED that in view of significant changes in the 160-meter band operation (both in regard to frequency/mode allocations worldwide and operating pre-

ferences) since the Board last addressed this matter, that the Membership Services Committee seek member input regarding recommendations for modifying the ARRL Band Plan." 

Srays

I would like to get in touch with...

- anyone with a manual and circuit diagram for an EICO DX-718 Space Ranger receiver. Nate Bushnell, KD0UE, 7175 S. Grant St., Littleton, CO 80122.
- anyone with a schematic diagram and instruction manual for the General Radio Impedance Bridge, Type 1650. Torgny Karlsson, SM7CFQ, Sandormsvagen 7, S-260 41 Nyhamnsläge, Sweden.
- anyone with a manual or a schematic diagram of a Globe Scout Model 40A. Francis C. Nicolau, N1DHB, 658 Dewey St., Bridgeport, CT 06605.

Let's Keep It Leisurely



Learning Morse code is a matter of speed—or a lack thereof.

By F. Paul Kosbab, NF4E
P.O. Box 700747, Tulsa, OK 74170

Ever since Samuel Morse invented the communications device for which his name has become justly famous, the staccato rhythms of Morse code have been music in the ears of some—and a seemingly interminable challenge and struggle to others. But Morse code remains to this day a useful communications tool for commercial and military operators on land and at sea, as well as for radio amateurs around the world.

Learning the code for minimum requirements is easy. Many have done it in a weekend or two. Children and younger individuals seem to have an especially easy time of it: As with learning to speak, they tend to pick up sound patterns easily and naturally. But when it comes to slightly higher speeds, becoming truly proficient in all the letters of the alphabet, numerals and common punctuation marks presents more of a challenge. To accomplish this task, the human ear and brain must work together to perceive, recognize and translate sound elements and code characters of constantly varying length (ranging from one to six dits and dahs per character) into respective letters, words and entire messages. Until this becomes automatic, copying correctly each character and its successor involves a constant shifting of gears within the human brain.

The beginner must learn to perceive and recognize each code character as having a unique rhythm and sound pattern. Second, he or she must learn to follow strings of letters, numerals and punctuation marks, their cadences and sequences, faithfully by ear as they come together to form intelligible words and messages. Finally, and perhaps foremost, the beginner must learn to take it easy and to proceed at a comparatively leisurely pace.

A Matter of Brain Physiology

The reasons for keeping it leisurely may

appear self-evident to some hams, but may turn out to be more complex than immediately realized. As most old hands will tell us, all it takes to master the code is persistence and practice. No doubt it does; but there are a few additional pointers, based on studies in human brain physiology, worthy of consideration.

The human brain is constructed in a peculiar way. Recent theory suggests that between its two principal halves—the large cerebral hemispheres—a certain division of functional labor takes place. According to this theory, the left hemisphere appears to be predominantly responsible for analytic, linear, logical, sequential-process and mostly verbally determined thinking modes. The right hemisphere, on the other hand, deals with more global, *synthesizing* modes of thinking, perceptions of sounds and sights, spatial relationships, hunches and intuitions, and other global correlations.

Learning the code initially—letter by letter, character by character, at a slow, deliberate pace and a widely spaced rate of incoming signals—is mostly a matter of rational, analytic, linear cognition and mental recording. It is a left-hemisphere brain affair, based largely on *sequential* “data processing.”

Synthesizing and correlating whole syllables, words and sentences, however, along with an accurate perception of their meanings, requires a more global, *simultaneous-processing* capacity—more of a job for the right side of our brain.

From this, it follows that to master the code and become truly proficient in its use—being able to copy and send code signals accurately and smoothly at higher speeds, with good understanding of the message contents—*both* sides of the brain must be involved and, in fact, must work in unison.

A highly deliberate (predominantly left-brain) approach seems to be counterproduc-

tive to making this happen. Instead, we should keep the learning process relatively relaxed and uninhibited. By doing so, we give the right and left sides of the brain a greater opportunity to combine their respective functional assets. This, in turn, will permit us to operate mentally in a more efficient fashion while learning the code.

So keep in mind: Easy does it!

Sending Is More Blessed Than Receiving

Once the fundamentals of receiving and sending code signals by ear and straight key have been acquired, most students soon find that increased sending speed comes easier than improving the ability to copy. The reasons are easy to explain. Sending is a more or less predictable affair for the reasonably proficient operator. In his own mind, he is always ahead of the game: He knows in advance what letters, words and phrases he will send next in his transmission. Since sending requires less or no particular cognitive effort, he can send at a relatively faster speed.

The Question of Speed

In this author's humble opinion, speed is not all that important. It's a relative concept. A bicycle rider, while faster than a pedestrian or jogger, is very slow indeed when compared with a racing car. A racing car, compared with a commercial jetliner is, again, relatively slow. It therefore seems futile to talk about speed in absolute terms. It becomes a matter of natural preference and of personal choice what code speed to use for what particular purpose.

If high-speed telecommunications were the only order of the day, we would—and should—use the most expeditious technical means to achieve our objectives in this regard. But we must remember that Amateur Radio is an avocation, a private, noncommercial enterprise and hobby designed for communications with fellow

amateurs in terms other than those applicable to high-speed commercial telecommunications. Therefore, if we talk about code speed in Amateur Radio, we should keep our principal aims and purposes in mind as well.

Copying Behind . . .

If hard-pressed to say what I would regard as the most important secret in mastering the code, I'd say the ability to copy behind: the ability to lean back and let some characters or some words go by, have them safely stored in our immediate, retrievable memory, and not to get panicky or confused if we miss a letter or a word here or there. What it comes down to is overcoming the fear of not being able to retain the auditory memory of two or three characters at one time.

Traditionally, prospective Novices are taught to identify each code character by ear and to write down immediately the corresponding letter, numeral or punctuation mark just heard until this process becomes automatic—the general idea being that the hand writes down what the ear hears. There is no doubt that this time-honored approach has merit, as thousands of hams have learned the code in just this fashion. It works well at relatively slower speeds, but beyond that, some additional copying skills may have to be considered.

. . . And Copying in One's Head

With increasing proficiency in copying the code, most operators will tend to write down less (unless, of course, they are handling serious traffic, where every word and piece of information counts). Generally speaking, routine QSOs are absorbed in such a way that only call signs, names and other vital data are written down, while the rest is copied in one's head.

For the operator conditioned to write

everything down, the transition from one to the other may not be all that easy. If you decide to make the switch, you will have to realize that learning to copy in your head along with copying behind is, in a sense, a new ball game; but I believe most old hands would agree it's worth pursuing.

So, if you want to take the plunge, put away your pencil for a while and start *listening*, preferably to some practice tapes or a variable-speed code trainer. Do not stop at copying single letters, but let each word or code group develop on the internal monitor screen of your mind. For this to happen, I suggest you go somewhat slowly at first. Speed is *not* of the essence here. Neither should you be too concerned about losing a few letters and words in the beginning; it's all part of the ongoing learning process and of establishing a new mental skill. Keep listening, and soon you will notice that incoming code signals seem to slow down, as they begin to parade before your inner eye as meaningful words and phrases. Once this new mental technique is acquired in principle, speed (if you care for it) will easily and naturally take care of itself in a matter of weeks or a few months. I suggest you give it an honest try.

The Bottom Line

So what does it all boil down to for the prospective Novice and relative beginner in this fascinating hobby of ours? I suggest you learn the code thoroughly to begin with, so that *all* letters, numerals, procedural symbols and essential punctuation marks come to mind automatically, without thinking, at the moment the respective code characters are heard. If you want to go on to somewhat higher copying speeds, learn to copy behind and in your head as soon as you can manage. But don't forget that certain data, names and specific pieces of information need to be put down in writing if you want

them to go into the log (or pass your code-proficiency test for upgrading).

Learn to look for whole words, phrases and the *meaning* of messages rather than confining yourself to copying single letters. Find the code speed that "fits your anatomy" at the time—be it 10, 15, 25 or any other number of words per minute; you will always have plenty of company in each of these speed ranges.

As soon as you have reached the limits of what a straight key (and your unaided fist) can do, learn how to use an electronic keyer. It's easier than you think. Once the feel, rhythms and sound patterns of all code characters are firmly embedded in your mind, learning to operate an iambic paddle plus keyer is a snap and, to most newcomers, a pleasant surprise and welcome relief.

Sooner or later, you may want to have an electronic keyboard plus decoder and monitor screen, if you haven't gotten them already. These are great conveniences, but keep in mind that they will not entirely substitute for the fine-tuned ear of a trained human operator, especially under difficult propagation conditions. Being mostly home-based, power-hungry devices, they are not easily made portable or mobile. And they will be of only limited help in getting you through the code-proficiency test for upgrading if your unaided code speed were to get stuck on a lesser plateau. So enjoy, keep CW *fun* and remember: Easy does it!

F. Paul Kosbab, MD, was first licensed as WD4PKT in 1978. He upgraded to Extra Class in 1980, and has maintained a lasting interest in CW, code-practice techniques, ragchewing, DX, languages and functional learning theories. In his medical specialty, Paul is professor and chairman of the Department of Behavioral Medicine and Psychiatry at Oral Roberts University School of Medicine in Tulsa, Oklahoma. 

New Books

BEAM ANTENNA HANDBOOK

by William I. Orr, W6SAI, and Stuart D. Cowan, W2LX. Radio Publications, Inc., Wilton, CT 06897. Paperback, 5 1/4 × 8 1/4 inches, 268 pages, \$9.95.

Orr and Cowan have teamed up again to produce a plain-language booklet that describes all manner of popular Amateur Radio directional antennas with gain. The book is light on mathematics and deep theory. Rather, it emphasizes the "how-to" and "what-to-expect" aspects of antenna building and use. Books of this variety have always been useful and popular to the generally nontechnical ham.

The authors have written 12 chapters. They

are (1) Radiation and Propagation, (2) The Yagi Beam Antenna, (3) The HF Yagi, (4) The Multiband Beam Antenna, (5) The VHF Yagi Antenna, (6) All About Transmission Lines, (7) Matching the Antenna to the Line, (8) How to Build and Install Beam Antennas, (9) Antenna Test Measurements, (10) Beam Antenna System Evaluation, (11) Erecting the Beam Antenna, and (12) Antenna Roundup.

The type size is fairly small in this book, but it remains easy to read because it is on rather white, medium-weight, nonglossy paper. Slightly larger print is used in the captions of the numerous graphic illustrations.

Plain language is used throughout the publication, and there is no suggestion that the authors have talked down to the more experienced antenna designer or builder. It seems obvious that Orr and Cowan were dedicated to imparting knowledge on the general subject of gain antennas, but minus the mile-long (and often unnecessary) design equations.

The illustrations and photographs are clear and to the point. Notations are included with the drawings, where appropriate. It has been said many times that "a picture is worth a thousand words," and that adage certainly applies to the artwork in this booklet.

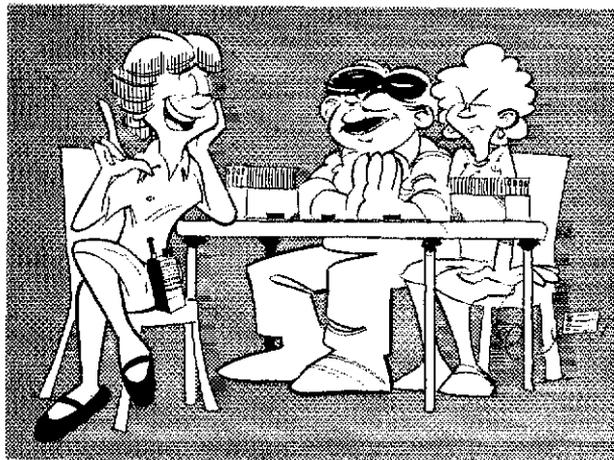
If I were to play the role of devil's advocate, I would fault the book from an experienced designer's point of view: Certain sections struck me as teasers, inasmuch as I hungered for greater design data than is provided. The general Amateur Radio readership does not need or desire this additional information, so the book doesn't really suffer because advanced data was not included. Since it is said that nothing in this world is perfect, I had to dredge up at least one negative remark!

I have no reservations whatsoever in recommending this publication to all active amateurs. It definitely belongs on the shelf with other often-used books that relate to our enjoyable pastime—Doug DeMaw, W1FB/8

Trivia? No; It's Amateur Radio!

Pursuing trivia could be hazardous to your social life.

By Maria L. Evans, KT5Y
1112 N. Rubey St., Macon, MO 63552



Some next Board meeting, the Directors are just gonna *have* to bring up this one. It's right up there with Novice enhancement and PRB-1. Bigger'n volunteer exams, even. What a potentially volatile thing we have here with this trivia-game fad! If we're not careful, trivia games could kill all the good public relations we've worked so hard to get.

I know it sounds weird, but listen up for a bit and let me tell you what happened to me. It all started when my neighbors, Larry and Carol, invited me over to play that trivia game. Well, when I told 'em I'd never played before, it was like I'd taken a marker and had written "sucker" all over my face. They got these little Cheshire-cat grins and said things like, "Oh, you'll like it . . . It'll be so much fun. Heh, heh, heh."

My first question was one on science and technology. Carol goes, "Oh, you'll get this one—it's got to do with your ham radio stuff. What word corresponds to the letter F in the ICAO Phonetic Alphabet?"

"No problem," I replied. "Foxtrot."

Then she started this patronizing stuff. "See, it's not so bad . . . You'll probably do okay, *for a beginner.*"

At this point, you have to realize that Larry and Carol have been at this game since the fad started. They've got most of the questions down, and they're bored silly pitting themselves against each other. They've just been lyin' in wait for some poor fool to saunter into their game and get creamed. But they didn't reckon on the intrinsic value of my hobby. There's all sorts of things you or I wouldn't know, or even care to know, if it weren't for ham radio: not just about electronics, but history, geography, art, sports—you name it.

But back to Larry and Carol. About 15 minutes into the game, they quit that "heh heh heh" stuff and move straight into questioning my integrity.

"What's the easternmost part of the U.S.?"

"Quoddy Head, Maine."

"You've played this before, haven't you?"

"No, Larry . . . C'mon, don't look at me like that.

"How could you possibly know that one?"

"Well, I worked this guy Bob, NIAMG, over in Cherryfield, Maine, a couple of years ago, and he told me . . . Carol, you're gonna cut yourself if you keep twisting that can like that."

That's when they started acting like a pair of rabid varmints. Carol started throwing peanut hulls around and grinding her teeth, while Larry started diggin' through the little cards to get at the questions. Finally, we weren't playing at all—Larry just started yankin' out questions at random.

"What were early telegraphers called?"

"Brass pounders." (Heck, why do you think they call it BPL?)

"What's the southernmost U.S. territory?"

"Well, let's see . . . Hawaii is due west, but just a little south is, eh, American Samoa." (Wish I could work it on 40 meters.)

"Who were the first Space Shuttle pilots?"

"Young and Crippen." (I got the commemorative QSLs from both Goddard and Edwards.)

"Before SOS, what was the international distress signal?"

"CQD." (Good thing that old movie about the *Titanic* used real code instead of faking it like most movies do.)

"The descendants of what literary figure still live today on Pitcairn Island?"

"Fletcher Christian of *Mutiny on the Bounty*" (alias VR6TC).

At this point, Larry was glaring at me with the reddest little pig eyes you ever saw, and just kinda hissed the next question at me: "There's no way your radio stuff can help you with this one. Who is the first woman to become athletic director of an NCAA Division I school?"

"Mary Alice Hill of San Diego State University," I replied, grinning. "You know, it's a funny thing. Ben and I were working the Amateur Radio booth at the Missouri State Fair last summer, and this woman sent a piece of traffic to Mary Alice Hill. It was her sister, and she told us all about her being named director out there. Don't know why I remembered a thing like that . . ."

By then, of course, it was "Here's your coat; what's your hurry." Maybe next Board meeting, someone could move to get one of those "cigarette pack" warnings put on the trivia-game boxes. You know, something like, "Use of this product by Amateur Radio operators could lead to emotional stress and loss of all social contacts."

I learned my lesson the hard way, but these days, when a question like, "What ionospheric layer is directly above the E-layer?" comes up, I just get this Cheshire-cat grin on my face and say, "Gee, I used to *know* that one . . ." I still get most of 'em right, but I know now that it's just not conducive to keeping friends to win *every* game . . .

Strays

I would like to get in touch with . . .

radio amateurs who have served aboard a submarine and are interested in forming a net. Howard Weinstein, K3HW, 15 Lakeside Dr., Marlton, NJ 08053.

QST congratulates . . .

Frances Woolley, G3LWY, of Surbiton, Surrey, England, on being awarded the British Empire Medal by Queen Elizabeth for her work with the Radio Amateur Invalid and Blind Club.

- **Mode L Authorized for U.S. Amateurs**
- **ARRL Elections—Second Notice**
- **FCC Amends ID Rule Again**

Should VECs Maintain Their Own Question Pools?

The FCC has proposed to allow Volunteer Examiner Coordinators to maintain their own question pools used to create examinations for amateur licenses. This maintenance is presently performed by the FCC, and VECs design written examinations by choosing questions from the FCC-issued pool.

If the Notice of Proposed Rule Making (NPRM) in PR Docket 85-196 is adopted as proposed, VECs will be required to publish the question pools, which would contain at least 10 times the number of questions actual-

ly used on each test. VECs would also be required to publish the formula used to design each test (the number of questions from each subgroup in the pool that would be on the test).

Existing rules will allow Volunteer Examiners to design examinations after January 1, 1987. In this Docket, the FCC proposes to speed up the entry of VEs into the exam design process. If the proposal is adopted, VEs would be permitted to design tests using the question pools created by the Volunteer

Examiner Coordinators, or they could use VEC-designed tests. Both VECs and VEs would be required to keep examination designs in confidence.

Comments on this proposal may be filed until August 30, 1985. Formal comment requires the filing of an original and five copies to the Secretary, FCC, Washington, DC 20554.

Copies of the NPRM are available from ARRL Hq. for an s.a.s.e. with 39¢ postage affixed.

ARRL OPPOSES 421-430 MHz REALLOCATION

The ARRL has filed comments in opposition to PR Docket 85-113. In this Docket, the FCC proposes to reallocate the frequencies 421-430 MHz to the Land Mobile Service on a primary basis in areas surrounding Cleveland, Detroit and Buffalo. Presently, the Radiolocation Service has the primary allocation on these frequencies, and the Amateur Service is secondary. The Amateur Service would retain the present secondary allocation if the proposal is adopted. For more on the original proposal, see *Happenings*, July 1985 *QST*.

In most of the world, including Canada, 420-430 MHz is allocated to the Land Mobile Service. Under the terms of Docket 84-960, amateurs close to Canada will not be permitted to use these frequencies unless they first obtain a waiver from FCC. ARRL comments state "The substitution of land mobile operation for Government radiolocation in Detroit, Cleveland and Buffalo is as the difference between night and day in terms of frequency loading."

ARRL suggests that existing amateur television repeaters and repeater control links in the 420-430 MHz band should be grandfathered and protected from new land mobile operation in the band, and that amateur operation on frequencies not used for nongovernment land mobile operation (420-422.1875 and 425.4875-427.1875 MHz) should be elevated to primary or coprimary status in the affected cities to permit future expansion of amateur repeaters and fixed links. In addition, ARRL comments state, "Under no circumstances should the Commission delete amateur operation from the Detroit, Cleveland and Buffalo areas at 420-430 MHz. Such action is unjustified by the terms of the proposed reallocation; it is unnecessary, given the directional, intermittent nature of amateur operation in the band; and it would be highly

disruptive to existing amateur ATV and FM repeater operation."

U.S. AMATEURS AUTHORIZED MODE L OPERATION

Effective immediately, U.S. amateur operators above Novice class are authorized to use the frequencies 1269.05-1269.85 MHz for satellite-uplink purposes. This operation, called Mode L, is used periodically by AMSAT-OSCAR 10; until now, the satellite has been unavailable for Mode L use by U.S. amateurs.

The Mode L uplink frequencies are part of the authorizations proposed in PR Docket 85-23, the "microwave access docket." For more on the original proposal, see *Happenings*, April 1985 *QST*. The ARRL filed a Motion for Interim Operating Authority asking the FCC to allow U.S. amateurs to use the Mode L frequencies while 85-23 was under consideration. FCC granted the ARRL request on June 18, 1985.

SECOND NOTICE—ARRL ELECTIONS

Attention all ARRL members! Nominations are now open for Director and Vice Director in the Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific and Southeastern Divisions for the two-year term beginning January 1, 1986. (For details on the elections in Canada, see *Canadian NewsFronts*, July 1985 *QST*.) From now until August 20 at noon, League Headquarters will accept nominating petitions signed by 10 or more Full members of a Division, naming a Full member of that Division as a candidate for Director or Vice Director.

The ARRL Board of Directors is the governing body of the nonprofit, educational and scientific corporation chartered under the laws of Connecticut as the American Radio Relay League. The Board of Directors is ultimately responsible for all League matters, including deciding ARRL priorities and ser-

vices that will be made available to the membership. There are 16 Directors, who are elected by the membership on a geographical basis. Half of the Directors stand for election in even-numbered years, half in the odd. At the same time Directors are elected, Vice Directors, who can fill in when Directors are unable to serve, are also chosen. For this reason, candidates for Vice Director must meet the same requirements as the candidates for Director.

For a candidate to be eligible for the office of Director or Vice Director, he or she must submit a nominating petition bearing the signatures of 10 (or more) Full members of a Division naming him or her as a candidate for Director or Vice Director. The petition must be received by League Headquarters no later than noon August 20. The candidate must submit information (on a form provided by Headquarters) that will allow the Executive Committee to determine the eligibility of a candidate in accordance with the Articles of Association and By-Laws, and a statement of not more than 300 words setting forth the candidate's qualifications. The statement will be included with the ballot mailed to members, and will be reprinted without content editing; if the statement as submitted exceeds 300 words, the first 300 words will be used. The statement must not contain any derogatory reference to any person or entity. The candidate must also submit an accompanying signed statement certifying that the information is true to the best of the candidate's knowledge and belief. Any willful violation of this statement will be grounds for disqualification by the Executive Committee.

The nominee must (1) hold at least a Technician class amateur license or a Canadian Amateur Certificate, (2) be at least 21 years of age, and (3) must have been licensed and a Full member of the League for a continuous term of at least four years immediately prior to the election. No person is eligible whose business connections are of such a

nature that he or she could gain financially through the shaping of the affairs of the League by the Board, or by the improper exploitation of his or her office for the furtherance of his or her own aims or those of his or her employer. The primary test of eligibility is the candidate's freedom from commercial or governmental connections of such a nature that his or her influence in the affairs of the League could be used for his or her private benefit. The idea behind these rules is to ensure that candidates (1) possess a lasting interest in Amateur Radio and the League, (2) have the legal capacity to make decisions for ARRL and (3) are free from conflicts of interest.

Whenever there is more than one candidate for either office, ballots will be sent to all Full members of the League in that Division who were in good standing on September 10. (You must be a licensed radio amateur to be a Full member.) The ballots will be mailed not later than October 1 and, to be valid, must be received at Hq. by noon November 20. A group of nominators can name a candidate for Director or Vice Director, or both, but there are no "slates" as such—each candidate appears on the ballot in alphabetical order. If a person is nominated for both Director and Vice Director, the nomination for Director will stand and that for Vice Director will be void. A person nominated for both offices does have the option, however, of declining the higher nomination and running for Vice Director. Since all the powers of Director are transferred to the Vice Director in the event of the Director's death, resignation, recall, removal outside the Division or inability to serve, careful selection of candidates for Vice Director is just as important as for Director.

The following form for nomination is suggested; it may be copied onto any paper, or a blank following this form may be obtained from Headquarters upon request:

Executive Committee
The American Radio Relay League
Newington, CT 06111

We, the undersigned, Full members of ARRL residing in the ... Division, hereby nominate ... of ... as a candidate for Director; and we also nominate ... of ... as a candidate for vice director from this division for the 1986-1987 term.

(Signature ... Call ...
City ... ZIP ... Date ...)

Nominees, or indeed any member, may obtain a copy of the Articles of Association and By-Laws, along with a pamphlet outlining the duties and responsibilities of elected League officials.

All ARRL members who are licensed by the FCC or DOC but are temporarily residing outside the U.S. or Canada are eligible for Full membership. Those members overseas who arrange to be listed as Full members in an appropriate Division prior to September 10, will be able to vote this year where elections are being held. Members with APO and FPO addresses should take special note of this provision; in the absence of information received to the contrary, ballots will be sent to them based on their postal address.

Even within the U.S., Full members temporarily living outside the ARRL Division often consider home may have voting privileges by notifying the Secretary prior to September 10, giving their current QST address and the reason that another Division is

considered home. If your home Division is in the Atlantic, Dakota, Delta, Great Lakes, Midwest, Pacific or Southeastern Divisions, but your QST goes elsewhere, please let the ARRL secretary know as soon as possible, but no later than September 10, so you can receive a ballot for your home Division. Canadians temporarily living outside Canada who wish to participate in the Canadian election should write to the CRRL office as shown in Canadian NewsFronts, July QST.

These persons presently hold the offices of Director and Vice Director, respectively, in the divisions conducting elections this year: Atlantic—Hugh A. Turnbull, W3ABC, and George W. Hipsley, K2KIR; Dakota—Tod Olson, K8TO, and Howard Mark, W0OZC; Delta—Clyde O. Hurlbert, W5CH, and Robert P. Schmidt, W5GHP; Great Lakes—George S. Wilson III, W4OYI, and Allan L. Severson, AB8P; Midwest—Paul Grauer, W0FIR, and Richard Ridenour, KB0ZL; Pacific—William J. Stevens, W6ZM, and Kip Edwards, W6SZN; Southeastern—Frank M. Butler, Jr., W4RH, and Evelyn Gauzens, W4WYR.

Petitions need 10 or more signatures of Full members (it is wise to have several more), and are due at Headquarters by noon August 20. If there is only one candidate for an office, he or she will be declared elected by the Executive Committee; otherwise, ballots will be mailed not later than October 1 to Full members of record September 10. To be valid, ballots must reach Headquarters before noon November 20. The new term will begin at noon January 1, 1986.

For the Board of Directors:
July 1, 1985
Perry F. Williams, WIUED
Secretary

BROADCAST RULES CHANGED

The Commission has amended its rules concerning the retransmission of nonbroadcast radio stations by radio and television stations. The FCC said it believes it is no longer necessary to obtain retransmission consent from CB and Amateur Radio stations. In revising the amateur rules, the Commission said amateur stations would be prohibited from being used as remote-pickup or auxiliary-link broadcast service facilities. Such uses of an amateur station as forwarding weather or commuter traffic reports for use in any broadcast context will continue to be prohibited. The FCC indicated that while the rules expressly prohibit all third-party use of amateur facilities for broadcast purposes, emergencies involving human safety or the immediate protection of property may warrant limited use of amateur stations for news- and information-gathering purposes. A rule of reason will apply in such cases.

In 1979, in response to a proposal by the National Association of Broadcasters, the Commission requested input on whether to allow broadcasters to retransmit CB emergency and other public-safety information. Subsequently, Congress modified the provisions of Section 605 of the Communications Act of 1934, eliminating the secrecy provisions for amateur and citizen's band communications. In the context of the U.S. military action in Grenada, questions arose concerning whether the rules permitted retransmission of Amateur Radio communications.

Are You a Lawyer? Amateur Radio Wants You!

Your legal expertise is needed in the Amateur Radio community to help build and maintain the legal foundations for our hobby. The League has initiated a Volunteer Counsel Program, designed to help stem the tide of overly restrictive regulations on Amateur Radio. You can help, if you have an interest in this exciting area of communications law, are a reputable member of the bar of at least one state and are a League member, please contact us. As a Volunteer Counsel, you will be kept well informed about areas of law affecting Amateur Radio. For further information, write to the ARRL Volunteer Counsel Program, 225 Main St., Newington, CT 06111.

If you live in one of the following ARRL Sections, your legal experience is especially needed: North and South Dakota, Arkansas, Mississippi, Maine, Rhode Island, Alaska, Idaho, Montana, Nevada, North and South Carolina, West Virginia, Utah and North Florida.

FCC AMENDS ID RULE AGAIN

In January, the FCC editorially amended Section 97.121 of the amateur rules to clarify that the call sign of another amateur station could be transmitted in some cases—for example, when responding to a general call. David Popkin, W2CC, filed a petition for reconsideration with the FCC, and pointed out that by specifying the circumstances when an amateur station *may* transmit a call sign not assigned to it, the rule now implies that *all other use* of another call sign is unauthorized. The Commission agreed: By Order released May 1, the rule was changed again so it now specifies only that an amateur station must not transmit false or deceptive signals, nor for purposes of identifying the station, any call sign that has not been assigned to it. The modifications made to this rule do not change the basic understanding that when one amateur is a guest at another's station, the control operator may simply use his or her own call sign to ID the operations.

To update your copy of the *FCC Rule Book*, delete paragraph (b) from Section 97.121.

FCC OFFICES ON THE MOVE

Two FCC district offices have announced they are moving to new quarters. Effective June 10, the new address for the *Houston* district office will be Suite 900, 1225 North Loop West, Houston, TX 77008, tel. 713-229-2748.

Effective June 17, the new address for the *Seattle* district office will be One Newport, Suite 414, 3605 132nd Ave., SE, Bellevue, WA 98006, tel. 206-764-3324.

VEC CONFERENCE IN GETTYSBURG

FCC will hold a conference for Volunteer Examiner Coordinators in Gettysburg, says Ray Kowalski, Chief of the FCC Special Services Division. Scheduled for August 9, the theme of the conference will be *Improving the VEC System*.

Kowalski says that he hopes that VECs who attend the conference will share information on ways to increase the percentage of timely filed applications, to decrease the number of defective applications forwarded to the FCC

and to improve the integrity of the VEC program, both real and perceived.

Both Curt Holsopple, K9CH, and Jim Clary, WB9IHH, of the ARRL/VEC, plan to attend the conference.

ILLEGAL CB EQUIPMENT SEIZED

The FCC Field Operations Bureau has initiated criminal prosecution against Fix It Man CB Sales and Service stores located in Millbury, Ohio, and Monteagle, Tennessee, for the marketing of illegal CB radio equipment. U.S. Marshals and FCC field engineers recently raided the two stores and seized over \$18,000 worth of external power amplifiers and transceivers capable of operating on frequencies other than the authorized CB channels. The owners of the stores now face up to a \$10,000 fine and possibly one year in prison.

STILL ANOTHER PROPOSAL FOR 216-222 MHz

LAOAD Radio and Microwave Communications Consultants has filed a detailed petition with the FCC requesting the reallocation of 216-220 MHz to narrowband systems in the Private Land Mobile Radio Services (PLMRS) on a coequal shared basis with the Inland Waterways Communications Service (IWCS). (LAOAD was the Norwegian call sign of the president of the firm.) In addition to the proposal for 216-220, the petition asks the Commission to move one of the present occupants of the 216-220 MHz band now operating under a developmental license, a digital telemetry system known as "OPSEIS," into the segment 220-222 MHz. LAOAD claims that this could be done on a shared basis, since OPSEIS is used by geophysical exploration parties in searching for hydrocarbon deposits beneath the earth's surface, often in remote areas of the country. OPSEIS is a 350-kHz-wide telemetry system—LAOAD proposes to move the system to 220-222 MHz and require the users to give the ARRL 60-days notice before using the system, and to coordinate the geographical location of its use with the ARRL.

LAOAD states that suitable Land Mobile radio voice channels are increasingly difficult to obtain, and acceptable channels for telemetry and low-speed data communications are virtually impossible to license in heavily populated areas. The company's plan for 216-220 MHz includes a detailed listing of proposed frequency assignments with a mixture of 2.5, 5 and 25-kHz-wide channels (the 25-kHz channels are only for Watercom in the IWCS). Of the proposed 1033 channels, 282 would be 5-kHz voice and data pairs, 468 dedicated 2.5-kHz data channels, and one 5-kHz mobile voice frequency. LAOAD states that implementation of ACSSB (amplitude compandored single-sideband) systems in the 216-220 MHz band would greatly speed the changeover to ACSSB systems in other Land Mobile bands, once users became familiar with ACSSB technology.

ARRL filed comments in this proceeding, stating that it would seem that the OPSEIS system would be better suited to sharing with a service that uses fixed-frequency assignments. The League suggested that serious consideration be given to the sharing of two or more high-band (174-216 MHz)

Be a Contributor to the Goldwater Scholarship Fund

Here's your opportunity to thank Barry, K7UGA, for his long-term staunch support of the Amateur Radio Service and to let him know of your appreciation. Send in your contribution now.

If your contribution is \$25 or more, we will list your name and call in QST. If your contribution is \$100 or more, in addition to your name and call appearing in QST, you will receive a signed photograph of the Senator, suitable for display in your ham shack. And for contributions of \$1000 or more, in addition to the above, we'll put your photo in QST.

We welcome all contributions, regardless of size. Please help us achieve our goal of building an endowment sufficient to fund the Goldwater Scholarship in perpetuity. What better way to honor a great amateur, a great statesman and a great human being? Please make your check payable to the ARRL Foundation Goldwater Scholarship Fund, and send to ARRL Foundation, 225 Main St., Newington, CT 06111.

Recent contributors of \$25 or more include: William H. Queen, WA4KJK; Gaiatin Ham Radio Club, in memory of Byron McKinney, W7JRD; Mike D. Williams, KA1MNB; Col. Andrew D. Setlow, N5FRK; R. F. Koste, KE6IV; John H. Thatcher, W7AAJ; A friend; William M. Dean, W4SJ.



Hazard E. Reeves, K2GL, \$2000 contributor to the Goldwater Scholarship Fund.

television channels with this system. "The locations of television transmitters are fixed and widely known, and the distances to protected contours are readily calculable. As no two adjacent channels are in use in the same service area, the 350-kHz bandwidth, low-power requirements of OPSEIS would be readily adaptable to operate on an unused television channel without affecting other spectrum occupants." The ARRL states that the League supports the use of spectrum-efficient technology in the Land Mobile Service to permit that Service to make more effective use of its extensive VHF and UHF allocations.

The comment deadline on this petition, designated RM-4983, was June 13.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the New Mexico, Alabama, Western Massachusetts, Alaska, Santa Barbara, Kansas, Tennessee, Michigan, East Bay and Delaware Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

A petition, to be valid, must contain the signatures of five or more Full ARRL members residing in the Section concerned. Photocopied signatures are not acceptable. No

petition is valid without at least five signatures on that petition. It is advisable to have a few more than five signatures on each petition.

Petition forms (FSD-129) are available on request from ARRL Headquarters, but are not required. The following form is suggested:

(Place and date)

Field Services Manager, ARRL
225 Main St., Newington, CT 06111

We, the undersigned Full members of the ... ARRL Section of the ... Division, hereby nominate ... as candidate for Section Manager for this Section for the next two-year term of office
(Signature ... Call ... City ... ZIP ...)

Any candidate for the office of Section Manager must be a resident of the Section, a licensed amateur of Technician class or higher, and a Full member of the League for a continuous term of at least two years immediately preceding receipt of a petition for nomination.

Petitions must be received at Headquarters on or before 4 P.M. Eastern Local Time, September 6, 1985.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before October 1, 1985. Returns will be counted November 19, 1985. SMs elected as a result of the above procedure will take office January 1, 1986.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning January 1, 1986.

If no petitions are received for a Section by the specified closing date, such Section will be resolicited in January QST. An SM elected through the resolicitation will serve a term of 18 months.

Vacancies in any SM office between elections are filled by appointment by the Field Services Manager.

You are urged to take the initiative and file a nominating petition immediately.

Richard K. Palm, K1CE
Field Services Manager

SECTION MANAGER APPOINTMENTS

In the North Dakota Section, Mike Mankey, WB0TEE, has been appointed to complete the term (until September 30, 1986) of Joseph M. Gregg, KN0A (resigned).

In the Sacramento Valley Section, Glenn Koropp, W6YFW, has been appointed to complete the term (until September 30, 1985) of Ron Menet, N6AUB (resigned).—*Arline Bender, WA1VMC*

Karshi-'84 DXpedition

Between September 3 and 25 last year, nine Soviet radio amateurs and three shortwave listeners participated in an expedition to rare USSR Oblast 049, in Uzbekistan. The operation yielded 8405 contacts, 173 Soviet Oblasts and 112 countries.

The originating team included Alf, UA4WCE; Bill, UA4WF (ex-UA4WBJ); Alex, UA4PFR, from Kazan; and Olly, UA4-095-53, from Izhevsk (renamed Ustinov in honor of the famed Marshal Ustinov, who died recently). Larry, RI8CA (ex-UI8CAJ), accomplished the necessary advance preparations in his hometown, participated in the operation and agreed to the use of his call throughout. Until the very last moment the group departed Izhevsk, they were hoping Larry would permit use of his call since Moscow had allocated them the cumbersome call of UZ4WWE/RI8C.

The gear included a heavy transceiver belonging to Alf, UA4WF's amplifier and UA4PFR's rig. The penalty for the weight really became painful when Aeroflot (the Soviet airline) required an extra tariff for the extra size and weight—so much so, in fact, that the expedition wound up earlier than anticipated and returned to Izhevsk by train.

The group left Izhevsk early on the morning of September 2 and flew to Moscow, changing planes and then leaving for Karshi (a four-hour flight). The trip itself represented a 4000-km voyage. In that same distance, a European could cover many interesting operating spots, such as J5, 6W, 3X, 5T, TZ, 5U, TT and 5A. The Soviet Union is a very large country!

Arriving in Karshi, the four were met by Larry, RI8CA, who was very pleased to welcome them to Uzbekistan; he made the group very happy when he agreed to the use of his call. Baggage in hand, they left Karshi for Mubarek, Larry's home town (located about 100 km northwest of Karshi). Larry had found a good spot for the operation—a TV relay station! Besides the station itself, there was a small shack under the 47-meter tower. The tower was used to support slopers for 160-80-40 meters and 2-element Delta loops for 20-15 meters.

While getting things warmed up, they discovered that UA4PFR's transceiver receiver was more sensitive, so it was delegated as the prime gear; but it, too, presented a problem when it ran hot.

Propagation was almost completely unpredictable, and extremely poor to mainland USA, allowing only 50 W/K QSOs during almost a month of operation (including a few familiar calls: K1K1, N4WW, AA6AA, WØYK and WØZV). During the morning hours in Mubarek (0000-0500Z), not a single U.S. station was worked.

In addition to the starting group, there were numerous guest operators who visited the unusual operation. UA3GEA and UA3GEG from Lipetsk were there during the first week; UV1AA, from Leningrad, visited in the middle of September. During the last week, two operators from the Ukraine showed up: Yuri,



RI8CA about to get underway. Left to right are UA3GEA, UA3GEG (sitting), UA4WF, UA4-095-531, RI8GE, RI8CA (sitting) and UA4WCE.



Alf, UA4WCE, repairing UA4PFR's transceiver.

UB5-080-070, from Cherkassy, and Toly, UB5-065-494, from Kiev. Other operators included UI8GAM, from Fergana; UI8LC and UI8LAO, from Bukhara; and, of course, Larry, RI8CA.

Most of Uzbekistan is in the Kara Kum Desert. Mubarek itself is situated on a vast plain called the Karshi Steppe. During the last few years, the Steppe has been intensively irrigated and developed. The climate is notable for its very long summer with practically cloudless skies and for its short but unstable winter. As the group arrived in Karshi, the temperature was 36°C in the shade. The highest temperature experienced was 43°C in the shade (109°F)! The heat and sun are good for crops of grapes, watermelons and muskmelons. The natives are Uzbeks of the Moslem culture. Mubarek, however, is a very young town, only 10 years old, and not too many Uzbeks live there. However, the diversity of culture is apparent: There are 56 different nationalities residing there.

The expedition ended September 25, when

the group left Mubarek for Volgograd by train, arriving there two days later. They then changed train and went to Kazan, changing trains again for Izhevsk (four days to get home!).

Special thanks to NC5K for helping to coordinate this report on an unusual DXpedition, to Asian Oblast 49.

CEØAE

Father David Reddy, CEØAE, joined the ranks of Silent Keys on June 11, 1985. As W6YO relates, Father Dave found Easter Island "the closest place to Heaven," and chose to be buried there. Father Dave's brother, WB1ELI (from Jacksonville, Florida), flew to Easter Island to conduct the services for this most devoted priest of the Franciscan Order, an avid DXer and one whose jolly smile and New England accent will be long remembered.



CEØAE in 1980, visiting W6YO. Father Dave will be sorely missed. (trnx W6YO)



On May 17, nine new radio amateurs were presented their new licenses by Prince Ra Ad Bin Zeid, JY2RZ, at a meeting of the Royal Jordanian Radio Club. Right to left are JY5DQ, JY5DE, JY5DG, JY5DO, JY5DL, JY5DP, JY5DF, JY5DM, JY5DK and a visitor in the back row. (tnx WB9PUJ/JY9RB)

JY BIRTHDAY DX CONTEST

The Royal Jordanian Radio Club is planning a special DX contest to commemorate JY1's 50th birthday. Although the exact date has not yet been firmed up, it should take place between Oct. 19 and Nov. 3—all bands. A special JY50 call will be authorized. For example, Ammam club station JY6ZZ would be JY50ZZ during the two-day contest. Watch for further details.

PROPAGATION

W6SIY has found that the ability to work DX with a very modest station in these times of poor propagation is a real surprise! Keith really thought that power/big antennas were a necessity. However, starting early this year, he has been chasing DX with 4 W, a dipole and a mini-quad. He is well on the way to 100 countries QRP (and has close to 200 worked with his "high power" of 100 W). W6SIY gives good credit, too, to the

outstanding operators on the other end and relatively good propagation during high-activity contest periods.

Some notes from Keith about the monthly propagation charts are in order: "The charts have been published almost since the last solar minimum. Thus, old *QST* issues from the library can be consulted over a several-year period; just look at the issues for the month in question. These will cover a range of solar flux values, and one of these may be closer to current flux levels than those found in the very latest issue of *QST*. Or, propagation curves could be interpolated between various flux values from different years, again using issues from the same month for comparison."

WIA 75 AWARD

The world's first and oldest radio society, the Wireless Institute of Australia, announces a new award as part of its year-long celebration. The award is available for contacts March 1 through December 31, 1985. To qualify, non-VK hams/SWLs must contact (log) the commemorative station VK75A, contact (log) a ham who has already qualified for the WIA 75 Award (and obtain during the QSO the Award Certificate Number), and contact 75 WIA members (no more than 30 in any one call sign area) and log their WIA membership number. Claims, which should include a log extract of the required contacts and \$2 to cover the certificate and handling and postage costs, should be sent to WIA 75 Awards Manager, Wireless Institute of Australia, 412 Brunswick St., Fitzroy 3065, Victoria, Australia.

FIELD AWARD

The Swedish Amateur Radio Society is offering a new award for confirmations with "fields," as defined by the Maidenhead Locator System, for contacts made on or after January 1 this year.

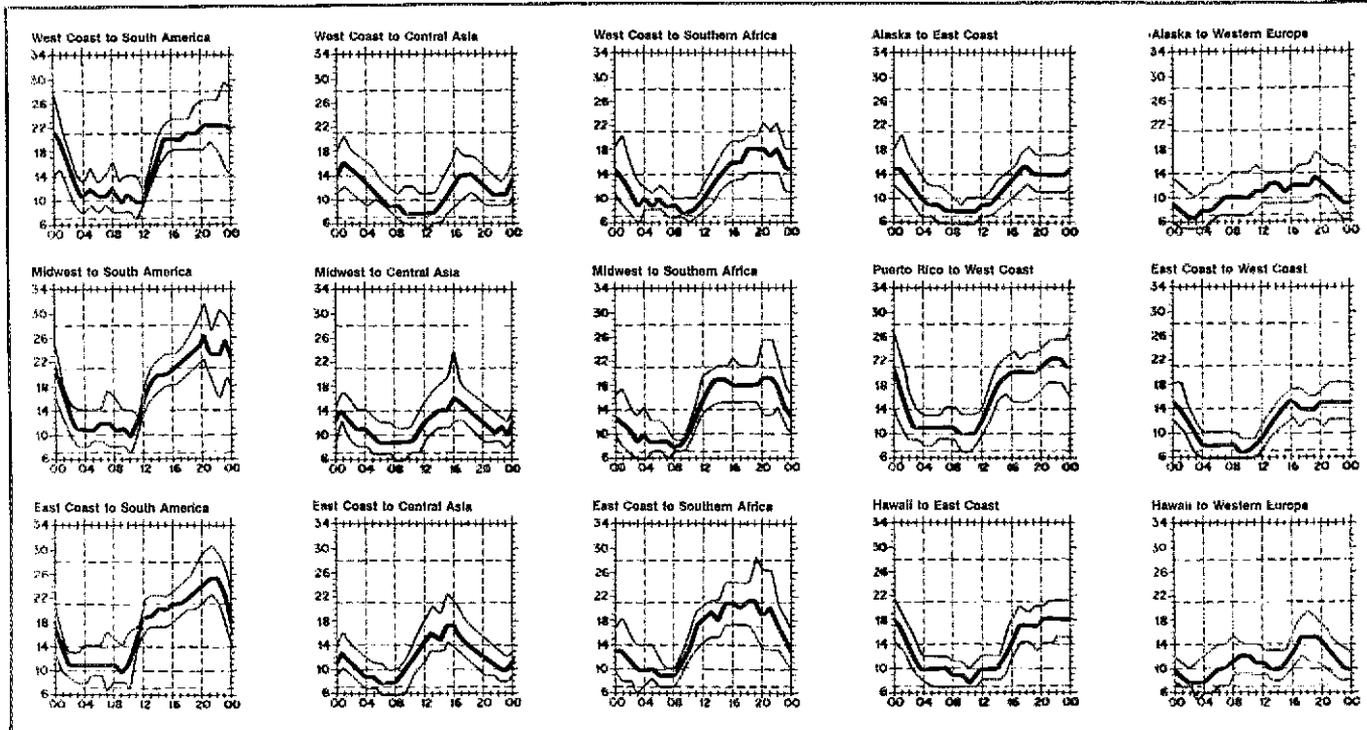
Troster's Tips for Easy Listening

If the DX station seems to be working on his own frequency, unless you have a very big signal (and remember that there are always a lot of stations who have a bigger signal than you do because of power, skip, etc.), you might want to consider moving a bit "off frequency" and hope the crash of the big guns will force the DX station to tune away from his own frequency a bit to find a signal he can copy. Most DX stations now have the capability to do this, and are not completely "rock bound." If your signal isn't much, why fight the big guns? At least, do something different!

More next month from W6ISQ.

The award is issued in four classes: *platinum*, for all 324 fields verified; *gold*, for 300 fields; *silver*, for 200 fields; *bronze*, for 100 fields. All amateur bands/modes are permitted, and only contacts made with stations on the earth's surface will count. Endorsements will not be issued. Contacts shall be verified by QSL cards, or their equivalent, on which it is clearly stated the field or position with such accuracy that the field can be determined. The term "position" refers to latitude and longitude, or to a place name. If there is any uncertainty about a field, the SSA may demand further information. A random sample of individual cards (which must be sent in for checking) will be made.

The application shall be made on a GCR list, verified by the applicant's national diploma manager or other official in the applicant's national Amateur Radio society. The applicant fee is 30 Swedish Crowns, 10 IRCs or \$4 U.S. The application address is Field Award Manager, SSA, Ostmarksgatan 43, S-123 42 Farsta, Sweden.



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



NL7G (left), Alaska DX Association president, with NL7P (sec'y./treas.) at Fresno, prior to going to the Dayton Hamvention, representing the Pribilof "point of view." (W1YL photo)

THE CIRCUIT

□ **DXPO 1985:** This event will take place in Atlanta, Sept. 27-29, at the Lanier Plaza Hotel; reservations via Grover Meinert, KC4BX, 720 Starlight La., NE, Atlanta, GA 30342. (Registration is \$49.50.) Hotel reservations (special DXPO rate): 800-554-8444 (out of state) or 800-282-8222. Premier attractions will include ON4UN, holder of 5BWAZ No. 1 and author of several books (including one on 80-meter DXing); W6OAT, of recent FO0XX Clipperton fame; and the first presentation of the Hensons's 3CI DXpedition.

□ **160:** As of Jan. 1, 1985, the limits of the 160-meter band were changed for Russian amateurs. They have been allotted (on a secondary basis) the segment 1830-1930 kHz: 1830-1860 for CW only, 1860-1900 for CW and

lower sideband, and 1900-1930 for CW, lower sideband and AM.

□ **KG4DX:** WB2CPV served as manager for this station for the period 12/7/82-3/16/85. Bill notes that, after three moves, getting mail has been real crazy. Last chance to get a card from KG4DX for the noted period (but not including contests). Write to Bill Crews, WB2CPV, 1421 Hampton Ridge Rd., Norcross, GA 30093.

□ **OX:** HB9APJ and HB9ASJ will be operating Aug. 2-25; check 7020 7080 14,050 14,180 21,050 21,180 28,050 28,580, plus/minus QRM. Cards via bureau or direct.

□ **Hamfest:** The Central Georgia Amateur Radio Club is planning its 7th Annual Hamfest for Oct. 12-13 with a DX program. Check with CGARC, Box 2585, Warner Robins, GA 31099-2585.

□ **Clipperton:** If you're in Paris on Saturday, Sept. 21, plan to join some well-known European DXers at the 7th International DX Convention of the French Clipperton DX Club. For details, contact Jacques Saget, F6BEE, 34, Rue Maurice Ravel, F-78690, Les Essarts Le Roi, France, tel. (3)041.57.37.

□ **Montserrat:** VP2M through Aug. 5 by KG6IP and WD6M; usual DX windows 10-160, phone/sideband. QSL KG6IP, Russ Mason, Box 481, Culver City, CA 90232.

□ **DX Incorporated:** This is a brand-new group open to anyone with a DX interest, specializing in assisting in the art of DXing and QSLing. It features an attractive membership certificate, monthly newsletter and 2-meter DX alert frequency. Additional information from President Richard Breckinridge, WA9BXB, P.O. Box 1082, LaGrange Park, IL 60525.

□ **OT:** On the occasion of the 150th anniversary of the Belgian Railways, the Belgium PTT is allowing this special prefix for all Belgian hams affiliated with the Belgian Railways Amateur Radio Club.

Strays

QST congratulates...

□ The following radio amateurs on 50 years as ARRL members:

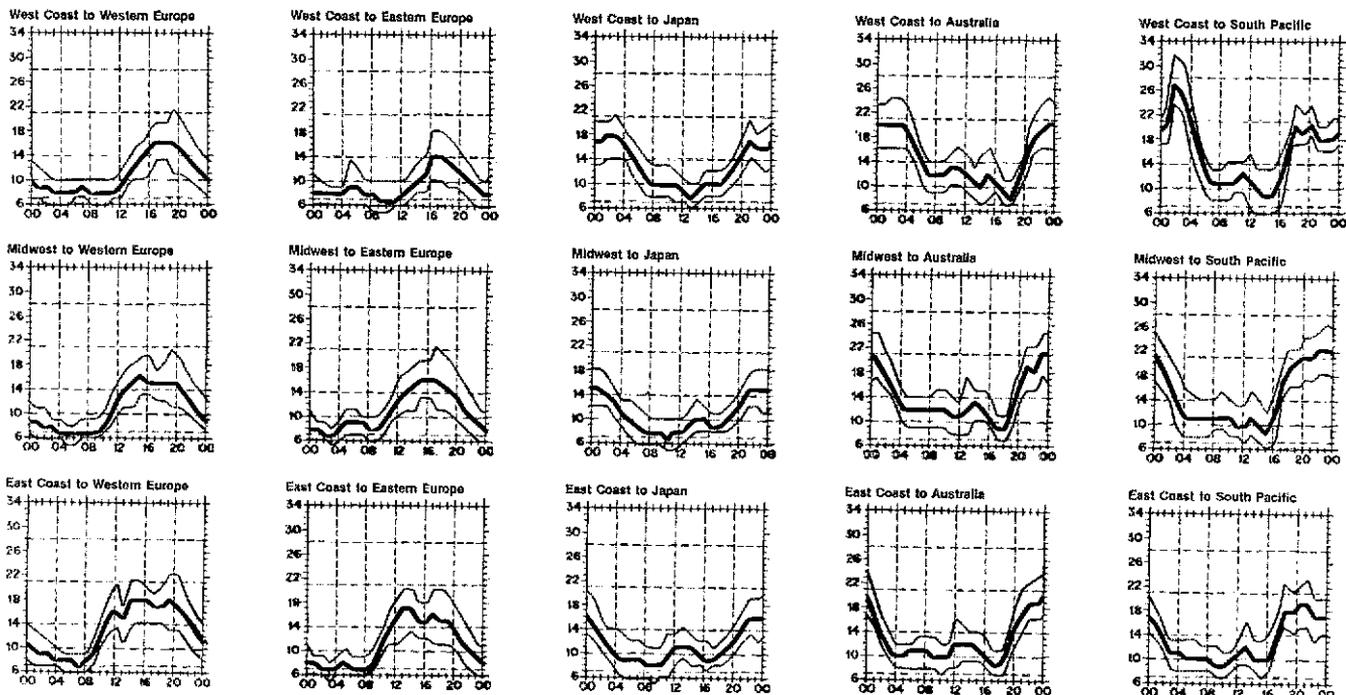
- W. O. Conrad, K4BE, of Winston-Salem, North Carolina
- Robert Dexheimer, W4DIT, of Bradenton, Florida
- William R. Talbott, W8JMH, of Sebring, Florida
- Laurence B. Stein, W1BIY, of Hingham, Massachusetts
- George F. Norton, W4EEE, of Athens, Georgia
- Lester H. Miller, W9OFL, of Waupun, Wisconsin
- Frank D. Sarapo, KB4HSY, of Lauderdale Lakes, Florida
- Harry H. Heinrich, W9KPG, of Green Bay, Wisconsin

I would like to get in touch with...

□ anyone with information on the detection and study, by amateurs prior to WW II, of short-wave radiation emitted by the sun, in particular for the solar maximum of the late 1920s. Woodruff T. Sullivan, III, Dept. of Astronomy, FM-20, University of Washington, Seattle, WA 98195.

□ anyone who has had Islet Cell carcinoma of the pancreas. John M. Adams, W7OTC, 26491 Bluebell St., Sun City, CA 92381.

□ past Purdue University ARC members or alumni who are amateurs. Robert Cromwell, W9YB, Box 507, PMU, West Lafayette, IN 47907.



the lowest curve (optimum traffic frequency, or FOT). See April 1983 QST, page 63, 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 August 16 to September 15, 1985, assume a sunspot number of 16, which corresponds to a 2800-MHz solar flux of 76.

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 May 1 through May 31, 1985. An s.a.s.e. will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed									
CE4BQ/107	GU4WTN/107	JM1GYQ/129	OK3KGW/112	KD2BW/152	N3CSL/103	KB8DZF/122	K7ORK/165	WA8SXM/100	
DA2EBF/102	HB9CWA/103	JA2FQS/109	VY1CW/187	N2ERN/104	K4CGY/104	W6DNY/103	K8CUP/104	KC9FF/175	
DL7ABK/131	I2EAY/121	JE3TAE/115	YO4CBT/105	NB2PJ/110	K4NST/103	WA6TMY/100	N8BDX/103	N10G/101	
EA4CQS/102	I4GHW/195	KL7VZ/199	YU4ELI/100	NE2W/111	KA4KJ/100	WB8FNI/108	W8AKS/104	W0JM/102	
EI4FC/103	I8SNY/207	OK1KPX/106	AK1V/107						
Radiotelephone									
AL7FG/103	EI8EM/101	I0SNY/206	OK1AFZ/102	VY1CW/179	K2RYI/109	W8MEF/107	W7LZA/212	W9IH/104	
DJ1TV/184	F8ZQ/103	I0UAV/115	OK1KPX/100	AK1V/104	W3FME/160	K7ORK/149	N8BDX/101	ND6F/139	
DL9UJ/215	I1NRF/225	JM1GYQ/117	SM6CVX/323	KA1X/233	KF4UB/103	KD7HH/100	W8AKS/103	W8OOO/107	
EA5CGU/153	I4GKX/161	KL7VZ/175	TI2CC/305	KB1JZ/108	WD4ALW/112	W7ETZ/302			
CW									
DL2HBX/103	I2EAY/101	JE3TAE/109	OK1IQ/273	PY1DEA/104	N1CYA/100	AA4DO/101	KA9OKH/107	W0HBH/108	
HB9BQK/101	IK2CIH/108	LA3UL/154	OK2BYL/105	YQ4CBT/105	W1YB/108	WD5DRR/103	W9NNK/101	W8QQN/102	
HL4XM/103	JA1WTI/154	LA7JO/181	OZ5PA/115	KA1X/127	KJ2Y/100	KY7M/153			
160 Meters									
G3XTT/105	UT5AB/102	K1ZZ/101	W2LPE/100	AA4MM/102	K4AQQ/102	N4RJ/101	K5GO/101	W8AH/116 (#100)	
G3ZFC/101	4Z4DX/103	W2JB/103	W3GH/100						
5BDXCC									
JA4OK	K9LJN	KB4I	NA0Y	K8JRK	W4GIO	WB8NBD	K6GXO	W5AS	
N8AAT	K2JT	LZ2KT8	W0RAO	KV4F	G4GED	WX4A	CT4RH	KZ2P	
W6SWM	KD6PY	KW2P	W8JBI	LU2DX	DK7RW	JA1CHN	OH2VZ		

Endorsements

Mixed									
CX4CO/280	G3COJ/285	JA1WTI/315	JQ2MU/308	WA2JBV/330	KF4QD/128	NA5U/205	W7JFO/334	KC9DJ/225	
DJ4WP/228	G3IMK/201	JA2GSQ/132	VE3CE/300	WB2BNJ/313	N4EM/151	WA6SUE/280	AJ8L/188	KD9BG/200	
DJ5PX/177	G3UML/337	KV4FZ/333	K1BV/329	K3GYJ/318	WA4MOG/260	K6JR/330	K8MR/299	N8CPW/280	
DK3SF/322	G4BUE/302	LA1ND/290	K1JO/329	KB3YJ/155	WD4LOK/153	W8CTL/295	N8CKP/177	WA9YZN/254	
DL7CW/331	HB9AQS/157	OE1CP/310	N1APE/182	KE3R/200	WD4R/289	W6VW/207	N8ZA/310	K0GSV/322	
DL9TJ/303	HB9BXE/227	OE1ZOS/130	W1RED/320	W3VT/359	AK5B/294	WA8SIX/260	W8MEP/200	K0VV/291	
DL9YC/282	HL1SX/250	OH2BJG/158	KS2M/181	W3NV/313	K5MC/200	W7EDA/329	W8QID/225	KC8LG/201	
DL06P/138	I2RFJ/289	OK1IQ/305	N2CIC/248	WA3JBN/150	KC5CR/251	K7RDS/315	K9ALP/202	K5CK/KH2/157	
F6DHB/312	I2SM/342	OK1VK/322	W2GA/326	K4BIY/302	N5FG/317	W7BMM/127	K9KK/281	W0LY/322	
F6HWU/201	I0UAV/157	PP5UG/335							
Radiotelephone									
GT3BM/285	G4BUE/283	KV4FZ/329	K1JO/308	W3NV/313	WD5BYZ/132	W7BMM/126	KD8KX/172	KD9CN/182	
DK3SF/318	HB9AQS/176	OE1ZOS/130	N2CIC/248	WA3GLA/132	K6CBL/273	W7BNH/200	W8GMF/344	WA9YZN/185	
DL1BBP/129	HL1SX/250	OK1IQ/285	W2GA/318	WB3AIT/200	K6JR/330	W7EDA/290	K9ALP/157	K0GSV/309	
DL1KB/353	I2SM/342	OK1VK/301	WB2BNJ/312	W4CYJ/272	K6PO/260	W7JFO/334	K9KK/276	KA9NNF/250	
DL8KS/320	I3ADI/324	PA0MA/257	WA2EIJ/200	KC5CR/251	W6MFC/300	KB8MR/299	K9UAA/304	K5PC/KH2/151	
EA1QF/308	I7SCA/336	PP5UG/334	KB3TC/155	N5FG/312	W6NGZ/149	KB8XT/179	K9VTD/147	W0LY/316	
G3COJ/245	JA2GSQ/132	YB3CDL/150	W3FZE/301	NI5D/149	WA6LOD/253	KC8AF/128	KA9PJZ/151	WB0GIW/306	
G3UML/337	KH6OR/347								
CW									
DK9MB/221	JA8RRR/175	K4MF/153	AK5B/219	K6CBL/302	W6PKB/177	K7BLU/129	WA8DXU/130	K9LV/227	
DL3BK/280	K1JQ/290	K4AQZJ/125	K5MC/184	N6DAZ/135	WA6PES/151	K8NA/249	K9LJN/199	WA0GUD/150	
IT9ZGY/203	KJ2O/199	WM4Z/176	N5DEE/254	NG6W/228					
160 Meters									
OK1ATP/126	W2FZY/130								

DXCC Notes

Honor Roll Corrections: Mixed—K1HZ 309/317, W1DK 314/358, W6KTE 315/343, DL3ZI 313/346. Phone—W3DJZ 315/346.

Strays



I would like to get in touch with...

amateurs to participate in a West Coast environmental net. Carter Rose, KD6GN, 33 Merwin, No. 2, Fairfax, CA 94930.

hams who are nuclear accelerator operators. John M. Kielbasa, K9VQC, 3941 W. 66th Pl., Chicago, IL 60629.

Mini Directory

As a convenience to our readers, here is a list of items of particular interest and when they most recently appeared in QST.

Affiliated Club		QSL Bureaus	
Coordinators	May 1985, p. 71	Incoming	June 1985, p. 55
Club Contest Rules	Jan. 1985, p. 72	Outgoing	March 1985, p. 61
License Renewal		QST Abbreviations List	Jan. 1984, p. 53
Information	Jan. 1985, p. 45	Rules, 1985 ARRL UHF	
Major ARRL Operating		Contest	July 1985, p. 75
Events and Conventions		Third-Party-Traffic	
— 1985	Jan. 1985, p. 46	Countries	Oct. 1984, p. 73
MARS Information	July 1985, p. 46		

All letters will be considered carefully. We reserve the right to shorten letters selected in order to have more members' views represented. The publishers of QST assume no responsibility for statements made herein by correspondents.

CLIMBING THE HAM LADDER

□ I just want to say thank you to all the people I have heard on either 7.08 or 14.07 MHz who have been kind enough to QRT or QSY when WIAW transmitted their code practice.

I know that this has been an inconvenience and an annoyance. However, I speak not only for myself, but undoubtedly for many others, when I say thank you.

WIAW is one of the many tools I have used, but nevertheless, one of the most important aids for learning the code. It has helped me understand and comprehend code fast enough to pass my 13-WPM exam on June 8. Again, thank you, all.—*Steve Friis, KASDHR/AA, Albuquerque, New Mexico*

□ In early April, some Amateur Radio friends convinced me to try to upgrade my amateur license to Extra Class. I wrote right away to the League asking for reference and study guides, and received the materials back in the same week!

I also checked QST to see when WIAW was sending code practice. During the five weeks I practiced the code, I found WIAW to always be there at the prescribed time and frequency. This was a tremendous help to me because I tend to memorize code practice tapes, and only fool myself concerning improvement. However, with WIAW, I had confidence in my improvement.

Now to get to the purpose of this letter. I wish to thank the staff at the League for their quick response to my request for reference and study guides, and for the ongoing code practice of WIAW. WIAW is mostly why I was able to pass the code exam. My hope is that the League will always have code practice available for others to use.

A final comment on the VE team that gave the exam. The team was from the Columbus Amateur Radio Association, and they provided a very nice building to take the exam in, were very friendly and saw to it that everything was done properly. With this VE team, the integrity of Amateur Radio is in good hands.—*Bob Scott, WB8JEY/AE, Delaware, Ohio*

USES FOR USED GEAR

□ These remarks are addressed to Amateur Radio dealers as well as the average Joe Q. Ham. I suppose we have all seen on the used shelf of an Amateur Radio store some piece of equipment that could be put to better use in a shack somewhere. Perhaps we have a piece or two in our attic or garage that we haven't been using in the recent past but hesitate to just throw away. Maybe one of our really senior citizens has some neat stuff that will be disposed of in the future. One idea is to put that gear to good use now, providing a service now (and getting a tax advantage) and perhaps helping some youngster get

started down that primrose path we have each delighted in following.

There are many applications for used equipment in each of our hometown areas that are equally deserving of attention. Rigs and associated equipment (and licensed operators) are sorely needed by schools, camps, Courage HANDI-HAMS, Civil Defense, FEMA, DSA, National Weather Service, Fire and Police Departments and our many clubs with active Novice classes. Perhaps your donation of usable and serviceable equipment will be just what is needed to get new hams on line or furnish vital service to the public that will keep this hobby active and thriving.—*Jerry Murphy, K8YUW, Lakewood, Ohio*

SAVE FATIGUE

□ To those who use processing continuously in day-to-day operation, especially in rag-chewing, I say: Please have a little consideration for the other guy's or gal's nervous system. Processing adds distortion. It *must*, by its very nature. This distortion results at some point in what is known as listening fatigue. One will tire of listening to a highly distorted sound much more quickly than from listening to a clean one. If many of you could hear your audio, you wouldn't be proud of it, and you might even be thankful that you didn't have to listen to it for very long. Most of the time, processing simply isn't necessary. Some rigs need processing to raise the average power to an "acceptable" level. But with the processor off, the operator will still get good signal-strength reports and better audio reports, be less prone to splatter, and make just as many contacts. Try it for a week or two, and I think you'll agree.—*Jim Wolff, KD9KV, Belleville, Illinois*

INTERNATIONAL GOODWILL

□ As radio amateurs, all of us have the unique privilege of talking directly to others like ourselves in every corner of the globe. We take this in our stride and enjoy talking with the likes of Sergei in Siberia and Jozef in Poland. We make good friends in many countries, even though we may dislike their governments' policies.

Radio amateurs, unlike any other worldwide fraternity, comprise an international brotherhood for whom national frontiers and geographical divisions are no obstacle to "getting to know you" through free, instant communication at the flick of a switch or the twist of a dial. The potential for goodwill and understanding between nations that lies in our ability to "talk to the world" as individuals as we sit at home is immense.

More and more people, through numerous organizations in many countries, are working to advance the cause of world peace through nuclear disarmament, a nuclear freeze or through conferences and cultural ex-

changes between East and West. I believe that Amateur Radio operators are in a better position than almost any other group to exert a positive influence, without resorting to protest marches or getting involved in politics. I should like to think that each contact between amateurs of East and West could be a real learning experience for both sides, and at least could be more than an exchange of signal reports. Perhaps, too, our QSL cards could convey more information about ourselves, our location or whatever. True, the language barrier tends to inhibit free and easy exchanges, and the solution to that is for more of us to learn some Russian. A good start is to get one of the QSO guides for various languages compiled by amateurs.

Perhaps there is already some East-West Amateur Radio Friendship League devoted to bringing us closer together. If not, perhaps one should be launched, with a newsletter to gather items of interest. And some day, charter flights and exchange visits might allow groups of amateurs to meet face to face.

These are but small beginnings, and it may seem fanciful to suppose that they could ever influence governments in the preservation of peace. But "Great oaks from little acorns grow," and if half a million amateurs took up the cause they could not be easily ignored.—*David M. Adams, VE3HBF, Sutton West, Ontario, Canada*

MAILBOX GROWTH

□ I am concerned with the growth of so-called mailboxes on RTTY and, especially, their untethered proliferation on 20 meters. It appears that everyone who obtains a copy of a mailbox program feels compelled to put it into indiscriminate service within the scant 20 kHz which is "available" by gentlemen's agreement on that band.

The typical new mailbox operator has been observed to call CQ and list his mailbox commands for an hour or more in an attempt to stir up a little "business" for his system. These calls are mainly made with little regard for others, and result in an otherwise enjoyable QSO ending in the confusion of the QRM caused by this needless calling.

I do not advocate that mailboxes are not useful, but I do propose that they have reached the saturation level. Without some regard for the rest of us who do not have a need for their service, these operators are bound to cause hard feelings and eventual abuse of their equipment.

One RTTY publication has suggested that mailbox operators on 20 meters move their services above 14,100 MHz. Most RTTY operators I have talked to agree that this is a viable solution to the problem. I would like to suggest that all mailbox-system operators closely coordinate frequencies and seriously consider making that move.—*Jack Coffee, WD5ELJ, Baton Rouge, Louisiana*



CRRL Officers and Directors

President: Thomas B. J. Atkins, VE3CDM
Vice President and Secretary: Harry MacLean, VE3GRO

CRRL, Box 7009, Station E, London, ON N5Y 4J9, Tel. 519-451-3773
CRRL Outgoing QSL Bureau, Box 113, Rothesay, NB E0G 2W0

Honorary Vice President: Noel B. Eaton, VE3CJ

General Manager: Raymond Staines, VE3ZJ

Directors: G. Andrew McLellan, VE1ASJ
Albert G. Daemen, VE2IJ
Raymond W. Perrin, VE3FN
William A. Gillespie, VE6ABC
William Kremer, VE7CSD

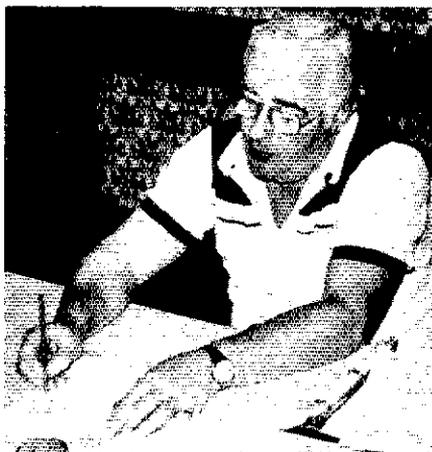
Counsel: B. Robert Benson, Q.C., VE2VW
Suite 1600, 2020 University Ave.,
Montreal, PQ H3A 2A5

Come to the Convention

The Southern Ontario Repeater Team (SORT) is pleased to host RSO-CRRL '85, the 17th annual Radio Society of Ontario Convention combined with the first-ever Canadian Relay League National Convention. When? Friday, Saturday and Sunday, September 27, 28 and 29. Where? City Centre Holiday Inn, London, Ontario.

London, with its population of 250,000, is located in the heart of southwestern Ontario. Once slated to become the capital of Canada, London offers many historical attractions: the old court house, Eldon House and Labatt's 1828 brewery, home of the earliest 807s! London boasts outstanding cultural facilities, a vibrant downtown shopping area and hundreds of tree-lined streets. It's known as "The Forest City." London is a world-class medical centre and the home of the University of Western Ontario. The University campus, covering 378 acres, is well worth a visit to London.

But this year, there's the RSO-CRRL Convention. The convention program will be divided between Saturday and Sunday. Convention Chairman Jim DiZorzi, VE3ZK, and his committee have lined up an impressive array of speakers: VE2VQ on setting up an OSCAR station; VE3CIE on meteor-scatter propagation; VE2DUB on microwaves; W1FB on home brewing and antenna design; VE3ACK on using Smith Charts; VE3OBE on coherent CW; VE3EGO on amateur Telidon; NK6K on packet radio and PAC-SAT; VE3LAT and the CANAD-X gang on (what else?) DX; VE3BMV on contesting; VE3GK on rotatable antenna towers; W1RU and HK3DEU on IARU; VE2YW on



Convention Chairman Jim DiZorzi, VE3ZK, busily organizes RSO-CRRL '85, one of the largest Amateur Radio gatherings ever to be held in Canada. (VE3GRO photo)

Notice of General Meeting

All CRRL members are requested to attend a general meeting. The purposes of the meeting are to update members on developments within CRRL and to vote on proposed changes to the CRRL Constitution. Time: 9 A.M. EDT September 28, 1985. Location: City Centre Holiday Inn, London, Ontario.

Amateur Radio and the Law; VE3OT on teaching licensing classes; VE3GT on public service communications; KA1JGG on the

production of QST; and more. There will also be CW contests and DOC, CRRL, CARF and RSO forums. A Friday night wine-and-cheese party, an extensive partners' program, hospitality suites, cocktail hours, the Saturday night banquet (featuring live entertainment) and a midnight initiation into the Royal Order of the Wouff Hong round out the list of activities available.

Getting to RSO-CRRL is easy. London is located on Highway 401, within easy driving distance for over 12,000 amateurs in Canada and countless amateurs in the U.S. London is served by rail, Air Ontario and Air Canada. Those coming from a distance will be interested in Air Canada's special convention fares. Call the toll-free number, 1-800-361-7585, and mention RSO-CRRL '85. You'll receive a minimum of 20% off your round-trip economy fare to London from any city in Canada or the U.S. served by Air Canada. (Certain advance-purchase conditions may apply.) Staying in London is easy, too. City Centre Holiday Inn, the convention site, offers outstanding accommodations at low, special convention rates.

Of course, if you're coming to the convention—and we hope you are—you'll need registration and hotel reservation forms. Write to RSO-CRRL '85, Box 73, Hyde Park, ON N0M 1Z0. For even faster service, call the Convention hotline at 1-519-471-7691.

We guarantee that RSO-CRRL '85 is going to be a great convention. Whether you live in Victoria, Saint John's or anywhere in between, or whether you live in Canada or the U.S., you won't want to miss it. Plan to join your fellow amateurs at RSO-CRRL '85.

SECTION MANAGER ELECTION RESULTS

Congratulations to Ernie Savage, VE7FB, who was re-elected Section Manager, British Columbia Section, for a two-year term beginning October 1. Ernie ran unopposed, eliminating the need for a balloted election.

CRRL ELECTION NOTICE

Who decides what CRRL, the Canadian Radio Relay League, Inc., will do or not do? You do. As a Full member, you choose the people that represent you on the CRRL Board, the people who will determine the direction that CRRL will take.

The CRRL Board has seven members. Five members, CRRL Regional Directors, are elected on a geographic basis in even-numbered years. The other two members, the CRRL President and CRRL Vice President, are elected at large in odd-numbered years.

This fall, CRRL members will choose a Presi-

dent and Vice President to represent their interests on the CRRL Board for a two-year term that begins on January 1, 1986. Under CRRL By-Laws, candidates for CRRL President and Vice President must (1) reside in Canada, (2) have been a member of the League for a continuous term of four years before the date of nomination, (3) have held a Canadian Advanced Amateur certificate throughout that time and (4) be at least 21 years of age. Further information can be found in the CRRL By-Laws, available on request.

Nominating petitions, to be valid, must carry the signatures of 10 or more Full members of

Under ARRL By-laws, the CRRL President automatically becomes the ARRL Canadian Director and the CRRL Vice President automatically becomes the ARRL Canadian Vice Director. Thus, these elections also determine who will represent CRRL members on the ARRL Board.

the League residing in Canada. It is advisable to have more than 10 signatures. Photocopied signatures are not acceptable. Signatures must be on the petition.

Petition forms are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is suggested:

(Place and date)

The Assistant Secretary, CRRL
Box 7009, Station E
London, ON N5Y 4J9

We, the undersigned Full members of CRRL, the Canadian Radio Relay League, Inc., hereby nominate ... (name and call) as candidate for CRRL ... (President or Vice President) for the next two-year term of office.
(Signatures ... Calls ... Addresses with postal codes ...)

Nominations close at noon EDT August 20, 1985. Eligibility of candidates will be determined shortly after that. If only one eligible candidate

is nominated for an office, that candidate will be declared elected. If more than one eligible candidate is nominated for an office, a balloted election will take place. On or before October 1, 1985, the CRRL Assistant Secretary will send ballots to all those who were Full members of CRRL on September 1, 1985. The ballots will carry a copy of the CRRL By-Laws that govern the election and candidates' statements, up to 250 words in length. Marked ballots will be accepted at the CRRL Headquarters office in London, Ontario, until noon EST November 20, 1985, and will be counted shortly after that. Results will be announced on W1AW, through *CRRL News* bulletins and in *QST*.

The next two years will be important for CRRL. CRRL will need the best possible leadership. You are urged to take the initiative and file a nominating petition immediately.

B. Robert Benson, Q.C., VE2VW
CRRL Counsel and Assistant Secretary

CRRL NEWS

□ Ray Staines, VE3ZJ, is CRRL's new General Manager. Ray, an experienced amateur, is a pro-

fessional accountant and an independent business consultant with a diversified background. He has been closely associated with CRRL in a volunteer capacity for many years. Ray will be located at the CRRL Headquarters office in London, Ontario.

□ The 1985 *CRRL Repeater Directory* is now available. Carefully checked and extensively revised, this is the most accurate, up-to-date listing of Canadian repeaters available. For a copy, CRRL members send a self-addressed, stamped envelope to CRRL, Box 7009, Station E, London, ON N5Y 4J9. Nonmembers please include 25¢ to cover the cost of production.

□ Nominations are now open for CRRL Amateur of the Year. Send your nomination, along with supporting documentation, to CRRL (same address as given above) by September 1. Name of winner, to be chosen by the CRRL Board, will be announced at the RSO-CRRL '85 Convention.

□ The CRRL Board met in Toronto on July 13. Full details next month.

DOC NEWS

□ DOC has accepted a CRRL proposal that a

committee of amateurs, to be named by CRRL and CARF, review all applications for special prefixes before they are issued by DOC. The committee will likely have 4 to 6 members and should be operational by September.

□ DOC has also informed CRRL that an Order-in-Council lifting all power restriction on the Canadian 160-metre band has been passed by the Privy Council and is now waiting for final approval by the Minister of Communications.

SOME FINAL NOTES

□ CRRL has received many inquiries about the Jack Ravenscroft, VE3SR, lawsuit. People want to know, "Is this on the up and up? Is money for Jack's defence really needed?" The answer is yes. By press time, Jack had spent over \$3000 of his own money on the case. If this case is lost, it will open the way for people anywhere in Canada to sue radio amateurs for allegedly creating "interference." Clubs and individuals may help Jack and Canadian Amateur Radio by sending a cheque to the Jack Ravenscroft RF Susceptibility Defence Fund, in care of Ottawa Amateur Radio Club, Box 8873, Ottawa, ON K1G 3J3. □

Making Waves

YOUNG ACHIEVER

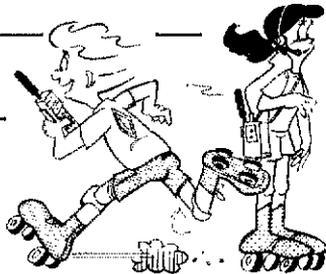
When the 200 voices of the National Junior Honors Choir were raised in song the second week in March this year in Salt Lake City, Utah, one of them belonged to Matt McBride of Williamsport, Pennsylvania. He was chosen as a member of the choir from among about 2000 students nationwide who submitted taped auditions. A sophomore this fall at the Williamsport Area High School, Matt is also known in our great hobby as KT3G.

Matt's Amateur Radio interest goes back to 1981 when, just one month after turning 11, he received his Novice ticket and was issued the call KA3JDD. In November 1983, he upgraded to General class and, in February 1984, he and his mother, Althea, WB3FUR, both upgraded to Advanced class. Matt's call then became KC3MY. In May of 1984, at the age of 13, Matt passed the Extra Class exam and was issued his current call of KT3G.

Matt has been taking piano lessons for several years and has also studied the trumpet. He earns his spending money by mowing lawns in the summer and has several regular babysitting jobs. Matt's dad, Mick, W3ILG, feels that ham radio has exposed Matt to many people throughout the world and made it easier for him to talk to people and better understand life in general.

The equipment used is a Drake C-line and/or a Kenwood TS-120S on the low bands. The antenna for 10-15 and 20 meters is a HyGain TH6DXX up 50 ft. A Delta loop is used on 40 meters, and a W9INN sloper is used for 160, 80 and 40 meters, plus a dipole for 75 meters. Matt has his own ICOM HT, which he received as a gift for passing his Extra Class exam.

Matt also operates 6 meters using a Drake TR-6 and a Raytrack Horizon V1 amplifier (when needed), which runs into a KLM 11-element antenna. As a member of SMIRK (Six Meter International Radio Klub), he operated their contest last June and took first place in Pennsylvania.



Matt is just one of many young people involved in our fine hobby, and we look forward with great pride when they step in as the leaders of our country and hobby. (tnx W3ILG)

LOOKING BACK

The following was written by Ted Rappaport, N9NB, a veteran ham recalling how he got into the hobby and what it means to him now.

When I was 14, I suffered a broken leg in a sandlot football game. The break was severe enough to warrant a body cast. I had to remain immobile for four months, and missed the first semester of ninth grade. Having had an interest in shortwave radio and walkie-talkies, I figured this would be an ideal time for me to learn the Morse code and get the Novice license. I made a cassette tape of the coded alphabet by "beeping" out the characters from an encyclopedia with my voice! I played the tape often and was ready for the 5-WPM test by the time my body cast was removed.

I had noticed two houses on the top of a nearby hill that had unusually large antennas. I suspected that ham radio operators lived at each of the homes. Too shy to knock at the doors alone, I dragged a friend of mine (Tom, now N9NC) with me to confirm my suspicions. We were warmly greeted by Mark, WB9NNO, and his neighbor, Bill, K9IYT. With their helpful coaching, Tom and I passed our Novice tests that same month!

Since that fateful day, Amateur Radio has opened up so many doors to me! As a Novice, WN9QNB, I made several teenaged friends whom I spoke with several times a month on the 15-meter band. Although we communicated

Conducted By Scott Springate, N7DDM
2095 Broadview, Eugene, OR 97404

solely in Morse code, we got to the point where we could recognize each other instantly by our "fists." The next summer, I visited their city and had the opportunity to meet these friends in person. It was quite a thrill! We all knew each other well even though we had never "met" before. We had a tremendous time sightseeing, playing baseball and basketball, and sharing views about our common bond—Amateur Radio.

Also very memorable was our county radio club, the Whitewater Valley ARC. As a teenager, I was respected and encouraged as much (and probably more so) than the adult members of the club. It was fascinating to become good friends with veterinarians, doctors, police officers, engineers and other leaders in the community who just happened to be ham radio operators, too. Not only did I learn a wealth of technical competence in radio and electronics, but I also gained a lot from observing the excellent character and citizenship displayed by the club members.

Indeed, this is a fascinating hobby. Today, over the radio waves, I am still making new acquaintances and renewing old ones. And after 11 years in Amateur Radio, the radio contacts are just as exciting as ever. But some of my most memorable and most exciting times in this hobby happened when I was a teenager.

NET GAINS

Time and time again I have received letters from young people wishing to get a net going for young hams. A while back, I received a letter from Chris Anderson, NK8W, manager of the NHN (National Homework Net). This net has been in operation for about a year now and is still growing. It operates primarily on 40 and 80 meters, with one time period for CW and two for SSB. Most of the members are in the eastern Midwest, with some in Ontario. They are eagerly accepting new members. If you are interested, please contact Chris Anderson, NK8W, 085 Walker Road, T-138, Jackson, OH 45640. □

The Packet Radio Service

During the past 18 months, amateur packet radio has grown at a rapid pace. For example, a year ago, there were five of us on packet radio locally. Today, there are six to seven times that number of active local packet-radio users. Similar growth has been experienced across the country as well as around the world. Packet radio's popularity has been reflected by the introduction of new equipment (terminal-node controllers—TNCs) by a number of ham radio manufacturers.

Much of packet radio's popularity is due to the fact that it is ideally suited for marriage with the home computer. Whereas computers can be adapted to operate in other modes of operation that predated the computer (CW and RTTY), packet radio had been developed with the computer world in mind; it is the radio communications mode of computers.

With the growth of packet radio has come the growth of packet-radio networks. Today, stations on the West Coast can transfer packets between San Francisco and Los Angeles. Their compatriots on the East Coast can transfer packets between Ottawa, Boston and Washington. The metropolitan areas between each coast are becoming linked, too. Where is all this leading? To one of the most important radio networks in the history of our hobby. In Amateur Radio, the bottom line is public service, and our packet-radio network will be able to serve the public better than any other mode has until now.

What does packet radio offer that the other modes of operation being used for public service lack? Packet radio is faster than CW and RTTY and, more importantly, is more accurate than CW, RTTY and voice. In fact, packet radio is perfectly accurate. Whatever is sent at one end is received at the other end. When a packet-radio station sends NEED A SURGEON, you can be sure that the station receiving the message will not have a fish delivered to the originating station.

Network Test

Recently, a group of California amateurs used packet radio to transfer traffic during a simulated emergency, an earthquake that was 8.2 on the Richter scale. The following excerpts are from an account of the event that appeared in a recent issue of *Gateway* (the ARRL packet-radio newsletter). Harold Price, NK6K, is the author.

"The goal was an ambitious one: to move traffic from the State Office of Emergency Services (OES) communications trailer in Los Alamitos to the OES office in Sacramento, 400 miles to the north, using VHF. This required the use of seven digital repeaters . . . The length of most of the paths used in the network (called WESTNET) is 90 miles, with one path of 120 miles and another close to 200 miles . . . soon after the exercise began, we established communications with Sacramento. Unfortunately, it was lost soon after because of a flaky path at the far northern end . . . We interspersed an hour of

attempted reconnects up north with passing traffic around the Southern California area—San Diego, Santa Barbara, Glendale and others. This activity was very successful. After it became apparent that we couldn't stay connected to Sacramento, the goal became to get the traffic as close to there as possible. We sent several CQ messages to San Francisco

. . . and attracted the attention of a ham with file-store capabilities [the ability to receive and save messages for future transmission—Ed.]. We transferred two hours of accumulated traffic in short order to San Francisco through four digital repeater hops. The San Francisco station then transferred the traffic to the Sacramento station through two hops, again with little difficulty. Later in the afternoon, as the paths improved, we were able to transfer traffic directly to Sacramento.

"We learned these lessons during the test: Two teams are needed at the packet position in the communications trailer. One team establishes and maintains the link, and the other enters the traffic on a separate computer system. When a link is available, the data can be moved quickly by moving a disk from the data-entry computer to the computer with the TNC attached. During the "quake," even though two computers were available, message traffic piled up in the in-basket while we were trying to establish a path. Once contact was made with the San Francisco station, it took half an hour to clear the backlog. It would have taken less than five minutes had the data already been entered on disk.

"We also learned that it would have been better if we had planned on an intermediate file relay station part way up the link in the first place . . . Had we sent all traffic to the intermediate station in San Francisco, we could have passed the traffic as it came in, instead of building up a large backlog. Finally, we learned that it was possible to pass traffic a long distance through a large number of digital repeaters provided that we did it the right way."

The experience of NK6K and crew demonstrates that packet radio is a viable way of handling traffic. Once the networks and traffic-handling techniques are fully established, packet radio will do its job of serving the public.

PX: Keeps on Ticking

Although the Timex computer has been defunct for quite a while, its popularity continues. This month's installment of PX reflects its popularity by presenting four programs written for that machine. (By the way, QZX is a monthly newsletter published for Amateur Radio and Sinclair/Timex computers; contact QZX, 2025 O'Donnell Dr., Las Cruces, NM 88001, for more information.)

Program number 78 designs log periodic antennas. It was written by Bob Farnsworth, KB7NV.

Program number 79 was written by Roy Lawrence, W1EFK, to calculate antenna bearings.

Program number 80 is an Amateur Radio log book written by Jose Rodriguez, KP4GA.

Program number 81 allows the Timex to send CW. It was written by R. J. McMahan, K7CD.

To obtain a listing of any PX program, send a business-size s.a.s.e. with 39¢ postage to ARRL, Dept. PX, 225 Main St., Newington, CT 06111. Use a separate s.a.s.e. for each program request and write the PX program number of the desired program at the lower left-hand corner of the s.a.s.e. Please do not send correspondence other than PX requests to Dept. PX.

THE FIRST ON LINE READER SURVEY

What computer do you own? _____

What peripherals do you own?

- Cassette Printer Mouse
 Disk drive Modem Ham interface

What percentage of your computer time is devoted to ham radio applications? _____%

What ham radio applications do you use with your computer?

- CW logging propagation
 RTTY contest logging antenna bearing
 AMTOR contest duping antenna design
 packet awards circuit design

READER SURVEY

The first On Line reader survey is now underway. Its purpose is to find out what computers you are using and how you are using them. Complete the questionnaire in this column and mail it to the address at the upper right-hand corner of this page, or send your responses electronically via CompuServe EasyPlex or HamNet. The results of the survey will be published in a future installment of On Line.



President: Richard L. Baldwin, W1RU
Vice President: Carl L. Smith, W0BWJ
Secretary: David Sumner, K1ZZ
Assistant to the Secretary: Naoki Akiyama, JH1VRQ/N1CIX

Regional Secretaries:
John Allaway, G3FKM
Secretary, IARU Region 1
10 Knightlow Rd.
Birmingham B17 8QB
England

Alberto Shao, HK3DEU
Secretary, IARU Region 2
9 Sidney Lanier La.
Greenwich, CT 06830
USA

Masayoshi Fujjoka, JM1UXU
Secretary, IARU Region 3 Association
P.O. Box 73, Toshima
Tokyo 170-91
Japan

The International Amateur Radio Union — since 1925 the federation of national Amateur Radio societies representing the interests of two-way Amateur Radio communications.

USTTI Course in Amateur Radio Administration

In 1982, through the efforts of the U.S. Government and corporations in the telecommunications field, the United States Telecommunications Training Institute was formed. A not-for-profit corporation, its objective is to provide telecommunications technical and management training for representatives from developing countries. Funded by contributions, USTTI has brought to the USA more than 400 representatives from some 70 overseas countries, providing them with training in a wide variety of telecommunications subjects, such as business management, data communication, broadcasting, broadcasting management and spectrum management.

In 1985, for the first time, a course in Amateur Radio Administration was added to the curriculum. This course, held during the first week of June in Newington, Connecticut, provided insights into the Amateur Service and the Amateur Satellite Service. The applicable frequency bands, international regulatory structure, technical standards and licensing standards were reviewed in depth. Much use was made of the Amateur Radio rules and regulations in the U.S., Canada, the U.K., the Fed. Rep. of Germany, Nigeria and Singapore. In addition, the students received an extensive lecture on Amateur Radio Administration in Central and South America. ARRL staffers contributed excellent discussions on various technical aspects of present-day Amateur Radio, and AMSAT provided in-depth information on the Amateur Satellite Service.

The principal instructor and architect of the course is IARU President Richard L. Baldwin, W1RU. He had invaluable assistance from Alberto Shao, HK3DEU; Paul Rinaldo, W4RI; Chuck Hutchinson, K8CH; Jan King, W3GEY; and Vern Riportella, WA2LQQ. Considerable logistic support was provided by Nao Akiyama, NICIX/JH1VRQ. And, of course, ARRL Executive Vice President Dave Sumner, K1ZZ, made sure that the full facilities of ARRL Hq. were at our disposal. Finally, kudos to Perry Williams, WIUED, the contact man between USTTI and ARRL/IARU in getting the course set up.

The five students in our first Amateur Radio Administration course were Hama Na'ati of Tonga, Cecil P. Shillingford (J73CS) of Dominica, Chang-I Chen of Taiwan, Abdulkadir R. Mbeo of Tanzania and Sarfo Stephen Kwame (9G1KW) of Ghana. Each of these individuals has a responsible position in his government's telecommunications administration. Their response to the course was so enthusiastic that we hope to present it again in 1986.

What advantage is there to IARU in par-



Students and instructor at the USTTI course in Amateur Radio Administration are (l-r) Cecil P. Shillingford (J73CS), Dominica; Hama Na'ati, Tonga; Abdulkadir R. Mbeo, Tanzania; Richard L. Baldwin (W1RU), IARU President; Sarfo Stephen Kwame (9G1KW), Ghana; and Chang-I Chen, Taiwan.



Class in session (l-r): Alberto Shao (HK3DEU), Cecil P. Shillingford, Hama Na'ati (rear) and Chang-I Chen.

ticipating in this course? The IARU is constantly striving to establish a rapport with those individuals who will be decision makers in their administrations and at the next General WARC (which may take place in 1991). We establish this contact by attending all sorts of ITU meetings. As reported in this column last month, W1RU and 9V1RH spent a week in May at an ITU Telecommunications Forum in Singapore. In addition, G3FKM and SP5FM attended an ITU meeting in Geneva this spring and made personal contact with ITU Hq. Similarly, HK3DEU and YN1FI have attended meetings of CITEF, a Region 2 association of telecommunications officials.

All of these contacts are for the primary purpose of convincing those who make international telecommunications decisions that the Amateur Service and, of course, the Amateur Satellite Service are valuable to the welfare of their countries and should, therefore, be supported at a General WARC (where the frequency-allocation table is subject to revision). We used this approach in preparation for WARC-79. We intend to be

similarly successful the next time.

So, we think that the course in Amateur Radio Administration is mutually beneficial. That is, it benefits the students from the developing countries, and it benefits the Amateur Radio Service. The proof will come at the next General WARC.—W1RU



The Japan Amateur Radio League is operating a special Amateur Radio station at Tsukuba Expo 85, which is being held in Tsukuba Science City, Ibaraki Prefecture, until September 16, 1985. Tsukuba Science City is about 25 miles northwest of Narita Airport, and thus about 30 miles northeast of Tokyo. Signing 8J1XPO, the station is QRV on 3.5, 7, 14, 21 and 28 MHz, using the modes CW, SSB, RTTY, FAX and SSTV. Shown are Shozo Hara, JA1AN, President of JARL, and Mrs. Setsuko Yasu, JL1TRH, a local volunteer.

Strays

QST congratulates...

□ the following radio amateurs on 60 years as ARRL members:

- Robert L. Van Osdol, W9ALW, of Morrison, Illinois
- Karl T. Dreher, W0WO, of Denver, Colorado

□ Wayne C. Sellers, WA5YHM, of Palestine, Texas, for being named outstanding alumnus by the College of Communication, University of Texas at Austin.

□ H. T. Blaker, K4KDY, of Berryville, Virginia, on being elected Chairman of the Board of the Radio Technical Commission for Maritime Services.

Want More States on Two Meters? Use Meteor Scatter!

While attending the West Coast VHF Conference held in Sunnyvale, California, in early May, I heard more than once how difficult it is to run up more than a few states on 2 meters from that part of the country. The comments went something like: "The mountains block tropo contacts of greater than a few hundred miles, so only two or three states can be worked via that mode." "Yes, it's possible to catch an E Skip opening once in a while and come up with a few more states, but that's a long shot." "One has to go to moonbounce to climb very high on the standings list." It is true that no one has yet achieved WAS on 2 meters without EME, but many in various parts of the country have worked well over 30 states using terrestrial modes alone.

It is certainly true that the West is not as well blessed with tropo propagation as are these other areas, and that the Western states are farther apart. Aurora is another mode, in addition to tropo, that plays a significant role in the success of many Eastern and Midwest 2-meter operators. Admittedly, the "buzz mode," as it is affectionately known, is quite rare in the Southwestern states, including much of California. However, it can be used productively in the Pacific Northwest. The mode that can be very effective in catching hard-to-get states anywhere in the country is meteor scatter, or MS, as it is referred to for brevity. It is also often dubbed the "ping mode" and its adherents, as "ping jockeys." The normal propagation range for MS extends to about 1200 miles. A circle of that diameter drawn around either the Bay Area or the Los Angeles basin includes all or parts of 16 states. A glance at the 2-Meter Standings box published in last month's column reveals that few 6s report totals approaching this number and those that do have used moonbounce for at least some of their contacts. It would appear, therefore, that many more Westerners could get in the Box with far from shabby state and grid totals.

"But isn't MS for the guy with the kW and big antenna?" goes an oft-asked question. The answer is a definite no! Anyone with a reasonably well-equipped 2-meter station can cash in on the ping mode. About 100 W will do the trick quite well. Yes, as is often the case when attempting to work DX, the more power the better (up to the legal limit, of course). An EME-size antenna system is definitely not required, however. In fact, this is one area in which the bigger the better does not necessarily apply. The larger the array, the narrower the beam and, hence, the smaller the area of sky being looked at for the ionized trails left by meteors entering the atmosphere. Although bursts coming to and from such large arrays might be stronger, their number will tend to be fewer than those intercepted by a smaller antenna system. For this reason, a single Yagi with a gain of about 10 dB or more usually does very well. Another common misconception is that one must be a high-speed CW operator in order to participate. Although that

Table 1
Major Meteor Showers
For the Remainder of 1985

Shower	Peak Time/Day	Approx. Duration	Meteors Per Hour
Perseids	0130Z Aug. 12	4½ days	68
Draconids	1600Z Oct. 9	1.2 hours	42
Orionids	1100Z Oct. 20	2 days	35
Leonids	0245Z Nov. 17	4 days	40
Geminids	2300Z Dec. 13	2½ days	58

was the preferred form of transmission in the early days of the mode when phone meant AM, the current approach in the Western Hemisphere is to use SSB.

Since MS signals normally appear from nowhere and disappear in like manner, it pays to have good frequency accuracy in order to be able to tune in a burst and derive intelligence from it during its frequently short duration. It is best to set up specific schedules with stations you would like to work. While it is true that some experienced ping jockeys get their kicks from making random contacts, the beginner should definitely go the schedule route. One source of potential candidates is the 2-Meter Standings box in last month's column. Most of those on this list have had experience with MS operation. Or, perhaps you know of someone at the right distance in a state you need. The Central States VHF Net, which meets every Sunday evening at 2130 Central Time on 3818 kHz, is also a good place to make schedules.

Although MS contacts can be made at any time, the probability of success is definitely higher during meteor showers, of which there are a number during the year. Some of the normally more productive showers for the remainder of 1985 are listed in Table 1. (Also see Technical Correspondence, this issue.) Beginners are urged to start during one of these showers. One of the best, the Perseids, is coming up in mid-August. Therefore, the time to make arrangements is now. Be sure you both have agreed on the mode—CW or SSB—the frequency and the transmit/receive sequence, as well as the time and duration of the sked. Most schedules are conducted for one hour. It's best to pick a frequency well removed from other activity. This usually means going above 144.250. Certainly, the National SSB Calling Frequency is the wrong place, unless you are particularly adept at picking one station out of a multitude of jabbering voices! Those not wishing to attempt to run schedules during the shower might have fun just listening to 144.200 and other frequencies in the band. You might be surprised at what you can hear!

In order to facilitate exchange of the necessary information to constitute a complete QSO, a special MS operating procedure has evolved. It calls for the most westerly station of the two to transmit for the first and third

15 seconds of each minute, with the other station sending during the second and fourth 15-second period. Initially, only calls are sent. Once one station has identified both his and the other station's call, he begins transmitting calls plus a report. A special reporting system based on the length of the burst rather than the strength of the signal is used. All but the longest and shortest bursts rate an "S2," so that is the report usually heard. This call-and-report sequence is sent until a report is heard from the other station. At that time, "rogers" are sent. When that has been received by the other station, the response is "roger 73" or simply "73," repeated for the 15-second period. This completes the contact. If at any time during these 15-second sequences it appears that a long burst of greater than 15 seconds is taking place, a "break" is sent and a conventional rapid transmit/receive sequence is used for the duration of the burst. On some particularly long bursts, several stations can be worked in rapid succession when the operators are swift enough to realize what is happening.

This discussion has stipulated 2 meters. While the most popular MS band, it is not the only VHF band on which the propagation exists. MS has been successfully worked on 1¼ meters as well as 70 cm. On these bands, however, the bursts are significantly shorter, less frequent and weaker than on 2 meters. Therefore, it is suggested that the mode be tried first on 2 meters. On 6 meters, bursts can be quite long and signals impressively strong. Operators on that band have not standardized on the somewhat rigid transmit/receive sequence commonly employed on 2 meters and higher but, since the bursts on 6 are stronger and last longer, there is less need for a specific structured sequence.

Meteor scatter can be fun as well as productive of new states and grids for anyone, especially those just beginning serious 2-meter operation. Unless one lives right next to a big mountain in the direction of interest, the ping mode represents the best approach short of EME for Westerners to make a good showing in the 2-Meter Standings. As has been stated in this column over the past few months, 1985 may be one of the best years in quite a while to give the mode a try. With the Perseids, August is usually one of the best MS months of the year. All of these factors make now an ideal time for beginning ping jockeys to get in and get their feet wet.

Good luck!

ON THE BANDS

Three happenings provided the major news on the VHF scene between mid-May and mid-June. One was the operation of W6JKV from Belize as V3GE and from Desecheo as W6JKV/KP5. As of this writing, I have not received the details from Jim as how he did, but judging from over-the-air reports and the stir he caused here on the East Coast the Friday evening before the June

1 1/4-Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grid squares worked. For others, call, state, U.S. states worked, call areas worked and grid squares worked. Call areas are the 10 U.S. call areas plus KH6 and KL7, plus each VE and XE call area plus DXCC countries not located within the continental limits of the U.S., Canada or Mexico. In order to make the standings a true reflection of stations currently active on 1 1/4 meters, those not reporting activity within the past two years are subject to being dropped. They will be reinstated upon written presentation of continuing activity. It is not necessary to have worked additional states or grid squares in order to remain in the standings or to be reinstated. Merely indicate that you are still on the band. WAS holders are listed in any case. Compiled June 15, 1985. Deadline for next update is December 10, 1985.

1	W0VB*	MN	13	—	W2CRS	NY	21	—	—	WD4DGF	TN	28	8	52	K5JL	OK	7	4	—	KB9NM	WI	5	4	—
2	W8SD*	SD	—	—	W2PGC	NY	20	9	—	WA4NMA	GA	25	8	—	WA5VJB	TX	7	4	—	KA0Y*	IA	32	11	—
2	WB0TEM*	IA	—	—	K2CBA*	NY	19	7	—	W3IY4	VA	23	10	—	W6NZS	OK	4	2	—	K0DAS	IA	27	10	—
4	K5FF*	NM	14	—	W2DWJ	NJ	15	6	—	KC4EG	KY	23	7	—	WA5DBY	TX	3	1	1	W8PW*	CO	20	8	—
5	W5FF*	NM	13	—	K2DNR	NY	15	6	—	K4LHB	VA	21	9	—	—	—	—	—	K8ALL	ND	17	9	—	
6	WB5LUA*	TX	—	—	K2YCO	NY	14	7	—	WA4CQG	AL	20	—	—	W86NMT*	—	10	6	—	K0TLM	MD	15	5	22
7	VE3EMS*	—	14	—	WA2FGK	NJ	14	6	—	WD4IS	GA	18	7	—	W6WSQ	—	6	4	—	KC0QR	NE	14	4	18
—	—	—	—	—	WA2FUZ	NY	14	5	—	WA4PCS	KY	18	7	—	W4WD7*	UT	37	10	25	KB0R	NE	8	3	8
—	—	—	—	—	W2WW	NY	13	5	19	K4GL	SC	14	6	—	K7N1*	AZ	16	11	—	WA6NOK	MO	6	2	—
—	—	—	—	—	W2SEU	NY	13	5	—	WA4SBC	VA	14	5	—	W7JF	MT	8	5	—	W8ZKG	IA	5	2	—
—	—	—	—	—	WB2EY	NY	12	7	24	WA4MVI*	SC	12	7	—	W7CNK	WA	6	3	—	WA6OLP	SD	4	2	—
—	—	—	—	—	N2BJ	NY	11	5	16	WS4F	GA	12	4	19	K7ICW	NV	4	2	—	KC0W	ND	3	1	—
—	—	—	—	—	WA2YWP	NY	6	2	—	K4CKS	GA	11	2	—	—	—	—	—	W88BK	MI	31	9	55	
—	—	—	—	—	—	—	—	—	—	KC4P	AL	9	2	—	W8IDU	MI	25	8	—	VE3DSS	—	13	7	—
—	—	—	—	—	W3GPY*	PA	40	12	—	WA4LYS*	FL	6	6	6	WA8TX	OH	20	10	—	VE3AIB	—	10	12	—
—	—	—	—	—	K3HZO	MD	22	10	17	WAITING	—	—	—	W88PAT	OH	16	8	—	VE2YU	—	8	3	—	
—	—	—	—	—	N3CX	PA	18	—	—	K4IXC	FL	5	3	—	K8AXU	OH	12	7	—	VE2DFO	—	7	8	—
—	—	—	—	—	W3UJG	MD	15	8	—	—	—	—	—	K8HWW	MI	11	7	—	VE2HW	—	5	2	—	
—	—	—	—	—	W3RUE	PA	14	8	6	W5RCI	MS	30	7	—	—	—	—	—	VE1UT	—	4	1	—	
—	—	—	—	—	W3HMU	PA	14	4	—	K5CM	OK	22	—	—	K9MRI*	IN	34	9	—	XE2BC*	—	2	3	—
—	—	—	—	—	W3IP	MD	13	6	—	W6HN	TX	21	—	—	K9XY*	WI	28	13	—	—	—	—	—	—
—	—	—	—	—	WA3JUF	PA	12	5	—	K5SW	OK	15	7	—	K9HMB*	IL	23	10	—	—	—	—	—	—
—	—	—	—	—	K3IUV	PA	12	4	—	N4JS/5	MS	13	7	—	W89SNR	IL	22	9	—	—	—	—	—	—
—	—	—	—	—	W3XO	MD	9	4	—	N5KW	OK	12	—	—	K9KFR	IN	11	6	—	—	—	—	—	—

*Some contacts via EME
—Information not furnished

contest, as well as the following evening during the contest, he did very well, from the KP5 QTH at least. Unfortunately, however, the Sunday of the contest was a complete washout for him. From V3, I understand he had many contacts across the southern part of the country and some in the Pacific Northwest, but nothing here on the East Coast. I hope to have details of both operations by next month.

The second noteworthy event for the period was the massive and long-lived tropo opening across the Gulf that took place in the last few days in May and the first few in June, affecting all bands from 50 MHz through 1296. The outstanding conditions were caused by a large stationary high-pressure area that also brought record-high temperatures to the area. KC3CL/4 Sarasota, FL noted several Texas 6-meter stations at well over S9 and confirmed the propagation mode to be tropo, not Es. It is unusual for tropo signals to be that strong on 6 meters. Dave says that on 2 meters, he worked 43 grids, 12 of them new, during the four days he was able to be on for the opening. He was also active on 1 1/4 meters as well as 70 cm, and said the latter band was full of signals even at noon on Saturday. All active south Texas 1 1/4 stations plus KB5PX in Louisiana were worked by W3ZR/4, KF4JU, W4ODW and himself. K4PBP along with W3ZR/4 and K4QXX pulled off a real coup, working KE5YD Jal, NM in DM82. It is unusual for tropo to extend so far west into the dryer air that inhabits that part of the country. The distance for these contacts must be on the order of 1250 miles. WA4OFS St. Cloud, FL characterizes the opening as the best tropo session he has experienced in 22 years of hamming. Harry reports both 70-cm and 23-cm activity. On the higher bands he QSOed N5AWA Louisiana; Texas stations W5VDS EM00, WA5VAJ and W5LDV EL29, N5BBO, W5VY and N5BHX EL09, WB5LUA EM13, and W5HN, W5GG and WA5DBY EM12. He also came up with a new state by working W5HTZ in Oklahoma EM15, a distance of about a 1000 miles. One San Antonio station, N5BHX, running just 1 1/2 W from the transverter and who knows how much at the antenna, was worked three times during the four days. A list of 70-cm stations too long to print also went into WA4OFS's log.

W4WSR Jupiter, on Florida's lower east coast, reports what he believes to be the 23-cm terrestrial DX record for continental North America. He had been trying to set such a record with WB5LUA, near Dallas, since hearing AI over a year ago. This huge tropo duct finally made it happen when it moved south of where it had been hanging for three days, and the two stations were

able to hook up over the 1073-mile path at 1100Z June 3. At the time, signals were well over S9. WB5LUA's day in the sun was not to last long, however. WA5TKU joined the QSO and was able to complete a contact with W4WSR, with signal reports of 549 and 529. The distance between these two stations is estimated to be 1112 miles. W4WSR runs 150 W from a Hi-Spec amplifier and two 45-element loop Yagis at 56 feet.

This widespread tropo opening also enabled what may be a new DX record for fast-scan ATV. W5VDS Wimberley, TX, located in the Texas Hill Country between Austin and San Antonio, had been trying for over a year to establish ATV contact with WA4GRK Pinellas Park, FL. On the evening of May 29, after completing a 23-cm QSO with WA4OFS featuring S9 plus 30- to 40-dB signals, Frank decided that the time might be ripe. At 2216 CDT, he hooked up with WA4GHK on 439.25 MHz, both using color and subcarrier audio. The Florida station's audio and color were not received, but the video logo and the operator's countenance were perfectly discernible at a picture quality of P2 to P3. Signals lasted about 30 minutes and then faded. Liaison was maintained via 2-meter SSB during the ATV QSO, with signals well over S9 on that band. It was also noted that during the time the video was copiable, the 439.25-MHz signal was in excess of S9 plus 20 dB, and was usually 15 to 20 dB above that level. According to W5VDS's letter, the distance is 936.9 statute miles. Have any other ATVer's topped this? Equipment at W5VDS consists of a TC-1 exciter and Mirage D-1010 90-W output amplifier. The antenna is an 88-element J Beam, at 56 feet above ground, fed with 7/8-inch Heliax. An ARR GaAsFET preamp is used ahead of a modified UHF tuner, which feeds the TV set. Frank's QTH at 1250 feet above sea level probably helped.

Not all of the tropo during this period was across the Gulf. W0CY Salina, KS reports excellent conditions on both 2 meters and 70 cm on May 30. Jim worked some 31 stations on 2 meters in Kansas, Oklahoma and Texas, with his best DX being KA5MRQ Corpus Christi, TX, a distance of 761 miles. A number of Dallas-area, east Texas and Houston-area stations were also worked. The better part of a dozen Oklahoma and Texas stations were nabbed on 70-cm as well.

Conditions during the weekend of the ARRL VHF QSO Party provided a varied fare and form the third major news event for the period. The 6-meter exploits of W6JKV/KP5 have already been mentioned. Many report working Jim as well as W4UWH/KP2 in the U.S. Virgin Islands.

Numerous Midwesterners report widespread tropo contacts on 2 meters and the higher bands. Nor was long-haul tropo the only propagation mode served up during the contest. W9BOZ writes that E₃ began on 2 meters 20 minutes before the fracas got under way. Worked were New Mexico stations K5MAT, N7AIH and W5FF. During the contest, a good tropo opening to the southeast developed, producing contacts with N4DT, KC4EG, N4VC, WB4NXY, N4AR, WA4VWV, N4HSM and KC4KK. The last jewel in the "triple crown" arrived for Ralph Sunday evening in the form of aurora. On this session, he worked W1VD, W1TKZ and W0SD, along with a long string of 2s, 3s, 8s, 9s, 0s and VE3s. K6PHE reports that 6-meter conditions just before and for the first few hours of the contest were "some of the best for a VHF QSO Party that he has heard." Bob says the band sounded like 20 meters all the way up to 50.7! Stations from all over the East Coast and the Midwest were in with good signals until about 1930Z. Too bad it didn't last longer. Several other Midwesterners give conditions during the contest high marks. K0KYZ, running just 10 W, characterizes tropo conditions on that band as "tremendous," and W0FY agrees. W0CY Salina, KS reports working Indiana via tropo on 2 meters and also hooking up with KX00 in Colorado via E₃. The WB0DRL multioperator operation, consisting of WB0DRL and WA0TKJ, report impressive totals as a result of the excellent conditions. Pete and Dean, operating from EM18 in central Kansas, managed 73 grids on 2 meters, with the best DX being Ohio station W8VP in EN90. On 1 1/4 meters they had 21 grids, with W8VP again furnishing the best DX. Their 70-cm total was 33 grid squares, including N4DT North Carolina EM86 as the best DX. Thirteen grids were worked on 23 cm, including a 440-mile contact with Iowa station W0RAP in EN42. Pete notes that the bands were open to the east for 12 hours, but that N0LL, 100 miles to the north, and KF0M, a like distance to the south, experienced no enhanced conditions during the contest. W0ETT/7, operating from a mountain pass in Wyoming, reports making 199 contacts, including 6-meter exchanges with W6JKV/KP5 and W4UWH/KP2.

The 2-meter E₃ reported by W9BOZ and others during the weekend of the contest was not the first 2-meter E Skip experienced so far this season. There had been one from Southern California to the Pacific Northwest in early May, and information on an E Skip opening is also provided by KD7IY Boise, ID. Mac says that beginning about 2100 local time May 25, nine stations in Oklahoma and Texas were worked from his QTH.

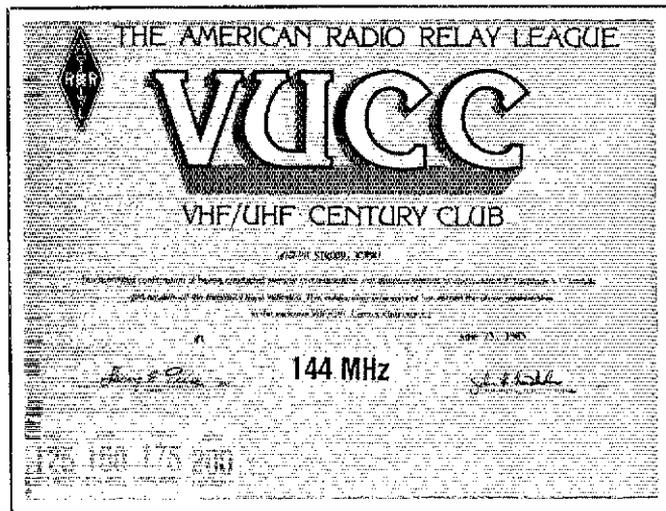
VUCC Goes Microwave

If the new frontier is your gig, you'll be pleased to know that ARRL's popular VHF/UHF Century Club Awards have been expanded to the super-high frequencies (SHF). The VUCC program of collecting grid locator squares was initiated on January 1, 1983, on all the VHF and UHF bands. Since then, the following number of awards have been issued: 50 MHz—73; 144 MHz—48; 220 MHz—6; 432 MHz—24; and 1296 MHz—8.

The program has now been expanded to include the microwaves, with awards now available for qualifiers with the following minimum number of grid locators confirmed: 2.3 GHz—10; 3.4 GHz—5; 5.7 GHz—5; and 10 GHz—5. Contacts are good from January 1, 1983. Endorsements are available in increments of 5. The SHF Century Club has one additional rule: Contacts must be made from a single location, defined as within a 300-meter-diameter circle. An s.a.s.e. with one unit of postage sent to ARRL Hq. will get you the application forms necessary for a VUCC application.

The extensive ARRL contest program on VHF and UHF will help you earn the coveted VUCC award. Upcoming contests are the UHF contest the first weekend in August (see July QST, p. 78), and the September VHF QSO Party (see rules elsewhere in this issue). This is a great way to pick up those elusive grid squares. ARRL is also considering a cumulative activity on 10 GHz that would encourage mountain topping. This would help promote the new SHF award. More on this in an upcoming issue.

Good luck in chasing after those elusive grid squares for award credit!



K9MRI was the first to qualify for VUCC on 2 meters. With endorsements, Joe is now up to 200 grid squares confirmed!

W1AW Schedule

April 28 — October 27, 1985

MTWThFSSn = Days of Week Dy = Daily

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0200, 1300; 2300; TThSSn: 2000; Sn: 0200
	Fast Code Practice	MWF: 2000, TTh: 0200, 1300; TThSSn: 2300, S: 0200
	CW Bulletins	Dy: 0000, 0300, 2100; MTWThF: 1400
	Teleprinter Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Voice Bulletins	Dy: 0130, 0430
EDT	Slow Code Practice	MWF: 9 A.M., 7 P.M.; TThSSn: 4 P.M.; 10 P.M.
	Fast Code Practice	MWF: 4 P.M., 10 P.M.; TTh: 9 A.M.; TThSSn: 7 P.M.
	CW Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Teleprinter Bulletins	Dy: 6 P.M., 9 P.M., 12 P.M.; MTWThF: 11 A.M.
	Voice Bulletins	Dy: 9:30 P.M., 12:30 A.M.
CDT	Slow Code Practice	MWF: 8 A.M., 6 P.M.; TThSSn: 3 P.M.; 9 P.M.
	Fast Code Practice	MWF: 3 P.M., 9 P.M.; TTh: 8 A.M.; TThSSn: 6 P.M.
	CW Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	Teleprinter Bulletins	Dy: 5 P.M., 8 P.M., 11 P.M.; MTWThF: 10 A.M.
	Voice Bulletins	Dy: 8:30 P.M., 11:30 P.M.
MDT	Slow Code Practice	MWF: 7 A.M., 5 P.M.; TThSSn: 2 P.M., 8 P.M.
	Fast Code Practice	MWF: 2 P.M., 8 P.M.; TTh: 7 A.M.; TThSSn: 5 P.M.
	CW Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Teleprinter Bulletins	Dy: 4 P.M., 7 P.M., 10 P.M.; MTWThF: 9 A.M.
	Voice Bulletins	Dy: 7:30 P.M., 10:30 P.M.
PDT	Slow Code Practice	MWF: 6 A.M., 4 P.M.; TThSSn: 1 P.M.; 7 P.M.
	Fast Code Practice	MWF: 1 P.M., 7 P.M.; TTh: 6 A.M.; TThSSn: 4 P.M.
	CW Bulletins	Dy: 2 P.M., 5 P.M., 8 P.M.; MTWThF: 7 A.M.
	Teleprinter Bulletins	Dy: 3 P.M., 6 P.M., 9 P.M.; MTWThF: 8 A.M.
	Voice Bulletins	Dy: 6:30 P.M., 9:30 P.M.

Notes

Code practice, Qualifying Run and CW bulletin frequencies: 1.818, 3.58, 7.08, 14.07, 21.08, 28.08, 50.08, 147.555 MHz.

Teleprinter bulletin frequencies: 3.625, 7.095, 14.095, 21.095, 28.095, 147.555 MHz.
 Voice bulletin frequencies: 1.89, 3.99, 7.29, 14.29, 21.39, 28.59, 50.19, 147.555 MHz.

Slow code practice is at 5, 7½, 10, 13 and 15 WPM.
 Fast code practice is at 35, 30, 25, 20, 15, 13 and 10 WPM.

On Monday, Wednesday and Friday, 1300 through 2100 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2200 UTC they are beamed south.

Code practice texts are from QST, and the source of each practice is given at the beginning of each practice and at the beginning of alternate speeds. For example, "Text is from July 1985 QST, pages 9 and 77" indicates that the main text is from the article on page 9 and the mixed number/letter groups at the end of each speed are from the contest scores on page 77.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Wednesdays at 2230 UTC, an IARU Region 2 bulletin in English and Spanish on 45.45-baud Baudot is sent on the regular teleprinter frequencies, beamed to Central and South America.

W1AW CW and voice bulletins are sent on OSCAR 10, Mode B, when the satellite is within range. Look for CW on 145.840 MHz and SSB on 145.962 MHz.

Teleprinter bulletins are 45.45-baud Baudot, 110-baud ASCII and 100-baud AMTOR, FEC mode. Baudot, ASCII and AMTOR (in that order) are sent during all 1500 UTC transmissions, and 2200 UTC on TThFSSn. During other transmission times, AMTOR is sent only as time permits.

CW bulletins are sent at 18 WPM.

W1AW is open for visitors Monday through Friday from 8 A.M. to 1 A.M. EDT and on Saturday and Sunday from 3:30 P.M. to 1 A.M. EDT, if you desire to operate W1AW, be sure to bring a copy of your license with you. W1AW is available for operation by visitors between 1 and 4 P.M. Monday through Friday.

In a communications emergency, monitor W1AW for special bulletins as follows: voice on the hour, teleprinter at 15 minutes past the hour, and CW on the half hour.

W1AW will be closed on September 2.

Newcomer's Guide to FM Repeating

Did you recently purchase your first VHF or UHF FM transceiver for repeater operation? Whether you are a new Technician or a veteran Extra, if you are getting your feet wet in the FM repeater mode, this (and the next) installment of FM/RPT is dedicated to you.

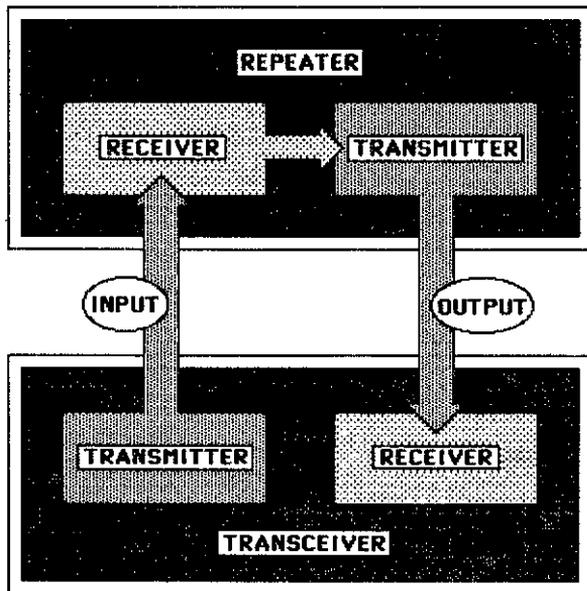
Every repeater user should be familiar with how a repeater works. Users who are not familiar with the workings of a repeater may unintentionally misuse it and interfere with other users. Basically, a repeater is like any other Amateur Radio station. It consists of a receiver, a transmitter and an antenna system. The primary difference is that a repeater's receiver and transmitter are always tuned to different frequencies and are connected together. Thus, whatever the receiver hears (on the repeater's "input" frequency) is sent (or "repeated") by the transmitter (on the repeater's "output" frequency). In most repeater systems, when the repeater's receiver hears a signal (a radio carrier), the carrier is detected by a circuit that is called a "carrier operated relay," or "COR," which turns on the transmitter.

Now let's look at your transceiver. The transmitter and receiver are also tuned to different frequencies. Your transmitter is tuned to the repeater's receiver, or input, frequency so that whatever you transmit may be received by the repeater; your receiver is tuned to the repeater's transmitter, or output, frequency so that whatever the repeater transmits or repeats may be received by your transceiver. When you depress the press-to-talk (PTT) switch on your transceiver, the transmitter's output is connected to your transceiver's antenna, and a signal is transmitted on the repeater's input frequency. The signal is detected by the repeater's receiver, causing the COR to key the repeater's transmitter and repeat the received signal on its output frequency. When you release the PTT switch, your transceiver's transmitter is turned off, disconnected from your transceiver's antenna, and your transceiver's receiver is connected to the antenna to monitor signals on the repeater's output frequency. (The accompanying diagram illustrates this relationship between your transceiver and the repeater.)

To tune the majority of FM transceivers, you move its frequency control to the transmit/output frequency of the repeater you wish to use. Once tuned to that frequency, you can monitor all of the activity on the repeater.

Simplex vs. Duplex

Transmitting through the repeater usually requires the selection of a switch that chooses



The relationship of the repeater's "input" and "output" frequencies and your transceiver. It can be confusing at times, but it's best to get it down pat: When you transmit, your signal becomes the repeater input. Its frequency is changed, either up or down, and is retransmitted on the repeater output. This becomes your transceiver input (receive) frequency.

between the "simplex" or "duplex" mode. In the simplex mode, your transmitter and receiver are tuned to the same frequency; therefore, simplex is not the mode to use for repeater operation. Rather, it is the mode to use when you wish to converse with someone directly—that is, not through a repeater. In the duplex mode, however, your transmitter and receiver are tuned to different frequencies, as required for repeater operation.

The separation between the transmitter and receiver frequencies depends on which band you are using. For example, the standard separation between the transmitter and receiver frequencies on 2 meters is 600 kHz; on 220 MHz, the separation is 1.6 MHz; and on 450 MHz, the separation is 5 MHz. On 2 meters, a repeater with an input frequency of 146.34 MHz will have an output frequency of 146.94 MHz (146.34 MHz + 600 kHz = 146.94 MHz [146.34 + 0.60 = 146.94]). This separation is usually "built-in" to your transceiver, so you do not have to be concerned with separation when tuning.

Transmitting Up or Down?

What you do have to be concerned with is whether the output frequency is higher or lower than the input frequency. For example, in some segments of the 2-meter band, the input frequency is 600 kHz lower than the output frequency (as in our 146.34/146.94 repeater example above), while in other

segments of the band, the input frequency is 600 kHz higher than the output frequency (a repeater with an output frequency of 147.18 MHz will have an input frequency of 147.78 MHz).

How does this concern you? When you select the duplex mode on your radio, you usually also have to select whether your transmitter frequency will be higher or lower than your receiver frequency. In our previous examples, you would have to set your transmitter frequency lower than your receiver frequency to use the 146.34/146.94 repeater. However, to use the 147.78/147.18 repeater, you would have to set your transmitter frequency higher than your receiver frequency. Usually, a switch, often the simplex/duplex switch, designated "+/-", performs this function; the "+" position sets the transmitter frequency higher than the receiver frequency, while the "-" position sets the transmitter frequency lower than the receiver frequency. (The middle position between the "+" and the "-" often selects the simplex mode.)

Now you know how your new VHF or UHF FM transceiver (and the local repeater) operates. In next month's installment of this column, we'll explore operating procedures of the FM repeater mode.

SCORECARD UPDATE

The 15- vs. 20-kHz Scorecard that appeared in the June installment of this column contained an error with regard to the state of Hawaii. The Aloha State should have been listed as rejecting (thumbs down) 15-kHz spacing and as adopting (thumbs up) 20-kHz spacing.

British Columbia has adopted 20-kHz spacing, while all of the other provinces are presently using the 15-kHz-spacing band plan.

Meanwhile, the following areas are considering switching to 20-kHz spacing: Alaska, Alberta, Georgia, Louisiana, Minnesota, New Mexico, northern California, Oklahoma, Puerto Rico and western Pennsylvania.

Thanks to Bill Pasternak, WA6ITF, for this information.

REPEATER LOG

According to reports received in the month of May, repeaters were involved in the following public-service events: 2 weather emergencies, 1 medical emergency, 1 vehicular emergency, 3 fire emergencies, 1 search and rescue, 14 public-safety events, 5 drills/alerts.

The following repeaters were involved (followed by the number of events): WA2NVN 1, WA3BAK 1, WA3JDX 1, WA3PND 1, NS4A 1, KJAN 1, WBSNAA 1, WR6ADZ 1, K6LY 1, W6RHC 1, K8DDG 12, W9RFT 1, W0MXW 3, WB0SBH 1.

1296-MHz Bibliography

It is often difficult for the newcomer to the microwave bands to find sources of information on how to construct equipment. The following bibliography documents most of the 1296-MHz articles published in amateur journals over the last few years. I am sure that the list is not complete, but it should provide a place to start when trying to find information on 1296-MHz systems. If you know of any omissions, please bring them to my attention, and I will print them in this column later.

Most of the articles cited here were published in U.S. journals. To locate copies of these articles, first try your local radio club. In addition, some local or school libraries carry current and back issues of these journals. Back copies of *QST* are available from ARRL Hq. for \$2.75 per copy, and the Technical Department can supply copies of articles appearing in *QST* for a small fee. The RSGB publications cited (*VHF-UHF Manual* and *Microwave Newsletter Technical Collection*) are also available from ARRL Hq., as, of course, is *The ARRL Handbook*. A few items appearing in the German journals *VHF Communication* and *DUBUS* have been included. Both have been distributed in the USA, and you might find microwave-oriented hams who have back issues.

Though, in general, the more recent articles will contain the most up-to-date technology, some of the earlier items are still useful. To pick a few examples, the WB6IOM power amplifier for 1296 MHz in Jan. 1968 *QST* works well, uses easy-to-obtain 2C39 tubes and requires only sheet metal to build. The W1WID/2 Tripler from Sept. 1959 *CQ* also uses a 2C39, is constructed using sheet metal and can produce 10 W+ on 1296 with 20 W+ of 432-MHz drive. The interdigital converters of W2CQH are still in use in many shacks and are capable of yielding excellent results, even if they are somewhat more bulky than more recent microstrip designs. I hope you find something of use in these listings.

Bibliography

Power Amplifiers

- "A Quarter-Kilowatt 23-cm Amplifier," E. R. Angle. *QST*, March 1985, pp. 14-20; April 1985, pp. 32-37.
- "1296-MHz Solid-State Linear Amplifier," D. Mascaro. Mt. Airy VHF Radio Club (Pack Rats) *Cheese Bits*, Feb. 1985, p. 7 (5W); Dec. 1984, p. 7 (300 mW); Nov. 1984, p. 7 (100 mW).
- "1.3 GHz Power Amplifier" (45 W). *RSGB VHF-UHF Manual* (4th ed.), 1983, p. 9.18.
- "Converting AN/UPX-6 Cavities." *Ham Radio*, March 1981, p. 12.
- "Solid State Power for 1296 MHz," J. Hinshaw. *Ham Radio*, Feb. 1981, pp. 30-38.
- "10 W on 23 cm with a Quad of 2N5944," B. Larsen. *DUBUS*, March, 1979.
- "An Inexpensive Power Amplifier for 24 cm Using a 2C39" (35 W), U. Mallwitz. *VHF Communications*, Autumn 1978, pp. 175-185.
- "1270-MHz Video-Modulated Power Amplifier,

- R. J. Stefanski. *Ham Radio*, June 1977, p. 67.
- "A Power Amplifier for the 23-cm Band Equipped with the 2C39 Tube" (35 W). *VHF Communication*, Winter 1976, pp. 222-231.
- "UPX-4 Modifications." *Crawford Hill VHF Club Technical Report No. 13*, Dec. 1972.
- "A Water-Cooled Power Amplifier for 1296 MHz" (100 W). *Crawford Hill VHF Club Technical Report No. 6*, July 1971.
- "A Power Amplifier for 1296 MHz" (100 W), Fisher, Schaible, Schober and Turin. *Ham Radio*, Aug. 1968, pp. 8-17.
- "Cavity Amplifier for 1296 MHz" (120 W), P. Laakmann. *QST*, Jan. 1968, p. 17.

Antennas

- "Alford Slot Aerial for 1.3 GHz." *RSGB Microwave Newsletter Technical Collection*, 1984, p. 13.
- "Antennas for 1.3 GHz (Loop Yagi and Long Yagi)." *RSGB VHF-UHF Manual* (4th ed.), 1983, pp. 9.59-9.62.
- "1.3-GHz Alford Slot Antenna," R. Atkins. *QST*, Sept. 1982, p. 75.
- "Reproducible Quagi Antennas for 1296 MHz," W. Overbeck. *QST*, Aug. 1981, p. 11.
- "The Construction of Large Parabolic Reflectors Using Fiberglass," I. Roberts. *Radio ZS*, Jan. 1981.
- "1296-MHz Loop Yagi Antenna," R. Atkins. *QST*, Oct. 1980, p. 66.
- "Improved Loop Yagi for 1296 MHz." *Radio Communication*, Sept. 1978, p. 783.
- "High-Gain 1296-MHz Antenna," P. Magee. *Ham Radio*, May 1978, p. 74.
- "Loop Yagi Antennas," R. Lentz. *VHF Communication*, Spring 1978, pp. 23-29.
- "Cylindrical Feed Horns," N. Foot. *Ham Radio*, May 1976, p. 16.
- "Loop Yagi for 1296 MHz," M. Walters. *Radio Communication*, Jan. 1975.
- "A Twelve-Foot Stressed Parabolic Dish," R. Knadle, Jr. *QST*, Aug. 1972, pp. 16-22.
- "1296-MHz Yagi," R. Fisher. *Ham Radio*, May 1972.
- "A Circularly Polarized Feed Antenna for 1296 MHz." *Crawford Hill VHF Club Technical Report No. 9*, Dec. 1971.
- "Practical Parabolas," B. Smith. *QST*, June 1971, p. 100.
- "Easily Constructed Antennas for 1296 MHz," D. Vilardi. *QST*, June 1969, p. 47.
- "Quad Helix for 1215-Mc Band," Troeschel. *QST*, Aug. 1963, p. 36.
- "Using the Helical Antenna on 1215 Mc.," Scott and Banta. *QST*, July 1962, p. 14.

Triplers

- "2C39 Cavity Tripler." *RSGB VHF UHF Manual* (4th ed.), 1983, p. 9.10.
- "2C39 Stripline Tripler." *RSGB VHF-UHF Manual* (4th ed.), 1983, p. 9.13.
- "Inexpensive Diode (1N914) Multiplier for 23 cm." *The 1982 Radio Amateur's Handbook*. Newington: ARRL, 1981, p. 7-24.
- "Varactor (BXY37D) Tripler." *RSGB VHF-UHF Manual* (4th ed.), 1983, p. 9.15.
- "Varactor (MA4062D) Tripler." *ARRL VHF Manual* (3rd ed.), 1972, p. 292.
- "Varactor Tripler." 73, July 1965, p. 30.

- "Tripling to 1296" (2C39), W. Taft. *CQ*, Sept. 1959, p. 52.
- "A Tripler for the 1215-Mc Band," R. Robertson. *QST*, July 1955, p. 20.
- Converters, Mixers, Filters and Local Oscillators*
- "A 1.3-GHz Interdigital Bandpass Filter." *RSGB VHF-UHF Manual* (4th ed.), 1983, p. 9.20.
- "The 23-cm Five-Minute Mixer," T. Morzinck. *DUBUS*, April 1980.
- "Compact and Clean L-Band Local Oscillators," P. Shuch. *Ham Radio*, Dec. 1979, pp. 40-47.
- "23-cm Double Converter," P. Brumm. *DUBUS*, April 1979.
- "Clean Local Oscillator Chain for 1296 MHz," P. Wade. *Ham Radio*, Aug. 1978, p. 60.
- "Twin-Diode Mixer—A New Microwave Mixer," J. Dietrich. *Ham Radio*, Oct. 1978, pp. 84-86.
- "Improved Grounding for the N6TX 1296-MHz Microstrip Filter." *Ham Radio*, Aug. 1978, p. 60.
- "Microstrip Bandpass Filters for 1296 MHz," P. Shuch. *Ham Radio*, Dec. 1975, pp. 46-49.
- "1296-MHz Double Balanced Mixers," P. Shuch. *Ham Radio*, July 1975, p. 8.
- "Interdigital Converters for 1296 and 2304 MHz," R. E. Fisher. *QST*, Jan. 1974, pp. 11-15. Also reprinted in the *ARRL Handbook*, 1982-84 eds., pp. 9-24 to 9-28.
- "A Simple and Efficient Mixer for 2304 MHz," L. May and B. Lowe. *QST*, April 1974, p. 15.
- "Interdigital Bandpass Filters for Amateur VHF/UHF Applications," R. E. Fisher. *QST*, March 1968, p. 32.
- "A Crystal-Controlled 1296-MHz Converter," H. Meyer. *QST*, Sept. 1962, p. 11. Also *ARRL Handbook* (1970-72 eds.) and *The ARRL VHF Manual* (1965 and 1968 eds.).

Transverters

- "1296-MHz Transverter," D. Eckhardt. *The 1985 ARRL Handbook for the Radio Amateur*, pp. 32-20 to 32-32.
- "High-Level Mixer for 1.3 GHz" (2C39-10 W). *RSGB VHF-UHF Manual* (4th ed.), 1983, pp. 9.15-9.18.
- "1296-MHz Transmitting Converter," J. Cadwallader. *Ham Radio*, July 1977, p. 10.
- "1296-MHz Transverter," P. Shuch. *Ham Radio*, Sept. 1974, p. 8.

Preamplifiers

- "Low-Noise GaAsFET Preamplifiers for 432 and 1296 MHz." *The 1985 ARRL Handbook*, pp. 32-1 to 32-3.
- "Low-Cost GaAsFET Preamplifier" (3SK97), R. Atkins. *QST*, May 1981, p. 66.
- 1296-MHz NE24483 Preamplifier (Diagram) A. Ward. *QST*, Jan. 1981.
- "23-cm Preamplifier with MGF1400," F. Eichhorn. *DUBUS*, March 1980.
- "Solid-State Microwave Amplifier Design," P. Shuch. *Ham Radio*, Oct. 1976, pp. 40-47.
- "Low-Cost 1296-MHz Preamplifiers" (MRF 901), P. Shuch. *Ham Radio*, Oct. 1975, p. 42.
- "Microstripline Preamplifiers for 1296 MHz," P. Shuch. *Ham Radio* April 1975, p. 12. ~~SEE~~

Affiliated Clubs in Action

Conducted By Leo D. Kluger, WB2TRN
Club Program Manager, ARRL

WHAT'S A CLUB TO DO?

Last month, we looked at a few good programs clubs can use for their meetings. Nothing increases meeting attendance as much as an interesting speaker or activity. Business topics, both old and new, should be deemphasized. Of course, it's a different story if the entire membership is providing communications support for a walkathon or other public-service event. At any rate, here are some more tried-and-true ideas. The contributing club's name is given in parentheses following the idea.

- 1) Invite a speaker from the local power company to discuss line noise: what it is, how to locate it and how to eliminate it (Columbus ARA).
- 2) Contact the National Weather Service (NWS) (in the Blue Pages under the Commerce Department subheading). Arrange for a representative to visit your club. The NWS often has movies to lend, as well (The Miami FM Assn.).
- 3) Hold a packet radio demonstration.
- 4) Plan your club's Field Day activity—or any other operating event. Be sure to check up on the Affiliated Club competition rules for ARRL contests. They're defined in Jan. 1985 QST, p. 72.
- 5) Have a boater describe marine radio equipment—or invite a pilot to describe aeronautical radio gear (Jayhawk ARS).
- 6) Invite a local television staff meteorologist to speak about the region's weather patterns (Kern County ARC).
- 7) Duplexers—what they are, how they're used and why. An ARRL Assistant Technical Coordinator could do a good job on this topic (Rockford ARA).
- 8) Visit a local cable company—tour the "head end" station (QCWA Chicago Area Chapter).
- 9) Radio-controlled (R/C) airplanes—contact a hobby shop to obtain information about the local R/C group. They'll be glad to supply a speaker (The ARC of El Cajon, Inc.).
- 10) Hold a discussion and demonstration on appropriate radio equipment for newly licensed (or newly upgraded) hams (Hollywood ARC).
- 11) Examine lightning—facts and fiction—and what can be done to reduce its effects (QCWA, San Antonio Chapter 38).
- 12) Invite your local ARRL Emergency Coordinator (EC) to explain the Amateur Radio Emergency Service (ARES) (Virginia ARA).
- 13) Hold an annual homebrew equipment night—have club members bring in their construction projects (Warminster ARC).
- 14) Invite an OSCAR enthusiast to speak about satellite operating tips and techniques. Review the equipment necessary to have a good

Newest Affiliated Clubs

We welcome our newest affiliated clubs, whose applications were approved by the ARRL Executive Committee in May:

- Avra Valley Repeater Association, Marana, AZ
- Bass Hill Repeater Group, Wilton, ME
- East Coast Amateur Television, Inc., Melrose, MA
- Hotshots ARC, Crestwood, KY
- Overbrook ARC, Philadelphia, PA
- Palmetto ARC, Hollywood, FL
- Rocky Point Schools ARC, Rocky Point, NY
- Second Area Young Ladies ARC, Stone Ridge, NY
- Sky High ARC, Lecanto, FL
- Southern Piedmont ARC, Clarksville, GA

time with the birds (Two Rivers ARC).

- 15) Contact the State Police. Request a State Trooper to explain proper accident and emergency reporting, followed by a question-and-answer period (Yankee ARC).
- 16) Invite the manager of your call district's QSL bureau to speak about the service. Have him describe a typical card's journey through the system (Victor Valley ARC).
- 17) Have an engineer from the local cable-company speak about cable-system leaks and in-



The Saskatoon Amateur Radio Club sponsors the Wheat Belt Award, given to any amateur contacting members of the club. For details, contact the Awards Committee, SARC, P.O. Box 751, Saskatoon, SK S7K 3L7, Canada.

terference to and from 2-meter amateur operations. The representative can also discuss a realistic strategy for leak notification and repair (Jefferson ARC).

18) "What are Smith Charts and How Are They Used?" can be discussed by an electrical engineering professor from a nearby university (Fox River Radio League).

19) A representative from the Power Company can discuss hazards associated with overhead power lines.



The Milwaukee Radio Amateurs Club recently celebrated 65 years of ARRL affiliation. Shown here are some of the past presidents who attended the Christmas dinner party celebration, and their years in office (l-r): Doug Pavek, W9FDX, 1958; J. Travis Baird, W9VQD, 1967-68; Donald E. Selbel, Ex-9ESE, 1928; David B. DeFebo, WB9BWP, 1982-83; Jack McLeland, W9ATK, 1972-73; William Brossman, W9EQP, 1938; Kenneth Eggert, W9MOT, 1953.

Strays



QST congratulates...

- James B. Brown, N4ETV, of Atlanta, Georgia, on being elected vice president of the Astronomical League.
- James Leitner, Jr., WA6VKL, of Stateline,

Nevada, on being elected Master of F. & A. M. Lodge 707, Lake Tahoe.

- Mike Bellinger, K0UAA, of Kansas City, Missouri, on being named 1984 Ham of the Year by the Heart of America Radio Club.
- Paul B. Weisz, W3INO, of Yardley,

Pennsylvania, for receiving the Society of Chemical Industry's Perkin Medal.

I would like to get in touch with...

- other amateurs interested in mineral collecting. Sam Stewart, KA8NIE, 116 Franklin Ave., Athens, OH 45701.

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

NIASD, Emily H. Olmsted, Lyme, NH
 KA1BMU, P. Joseph Deery, Danbury, CT
 W1LOY, David P. Waite, Topsfield, MA
 W1ONM, Peter Boudreau, Seminole, FL
 K1OXO, J. Victor Krzyzaniak, Contoocook, NH
 K1USQ, Evelyn M. Wallace, Midland, MI
 K1YLB, Moses E. Decell, Saint Albans, VT
 W2ARO, Alfred Dowd, Wayne, NJ
 *W2AVI, William H. Kunzler, Ozono Park, NY
 N2BDB, A. Hughie Stone, Pennsauken, NJ
 WB2CYJ, Frank W. Jastewicz, Vernon, NY
 N2EED, William J. Robinson, Belleville, NJ
 W2GQK, J. F. "Jack" Sterner, Lehigh Acres, FL
 W2MG, William F. Bellow, Rochester, NY
 WB2OWM, Alfred J. Bruns, Sr., Babylon, NY
 W2SK, George Conn, Boonton, NJ
 K2UAN, Don E. Huddleston, Canton, NY
 WA2URB, Sam P. Fontana, Penfield, NY
 W2UZT, Paul Lanini, Rhinebeck, NY
 WB2YHD, George E. Popplewell, Canandaigua, NY
 W3AMC, John S. Naratil, Palmerton, PA
 W3ANY, Andrew R. Gabor, Jessup, MD
 W3EO, Glenn E. West, Bethesda, MD
 KA3FEH, Kenneth F. McGuire, Freeport, PA
 K3GIH, Clarence L. Scott, Hollidaysburg, PA
 WB3HH, George P. Harmansky, Pottstown, PA
 K3HPI, Carroll O. Thieme, Jr., York, PA
 W3HYV, W. Robert Lautenberger, Baltimore, MD
 WB3IGI, John A. LeFevre, East Stroudsburg, PA
 W3IQF, Merl F. Miller, Mount Wolf, PA
 WB4APG, Richard D. "Zeke" Smith, Savannah, GA
 K4BBR, Ronald S. Wilhite, Waynesville, NC
 N4CUD, Eva D. Faith, Sarasota, FL
 N4DNA, Robert R. Mosher, Ormond Beach, FL
 K4CGA, Virginia A. Lane, Estill Springs, TN
 K4GGN, Ralph H. Wickens, Sebastian, FL
 KB4GNU, Margaret L. Bullock, McLean, VA
 K4HCK, John E. Kinsler, Louisville, KY
 W4HNX, James J. Schell, Sr., Winston, GA
 KE4IW, Fred A. Oldham, Griffin, GA
 WA4JLP, Lawrence Manthey, Pompano Beach, FL

K4JRK, Herbert J. Fiddelke, Winter Haven, FL
 KA4KHA, Byron M. Highland, Jr., Southport, NC
 K4KNX, Theresa O. Provost, Riverview, FL
 W4KXP, Blair Madsen, Fort Lauderdale, FL
 W4OC, Felix M. Whitaker, Durham, NC
 W4OIL, George L. Pawley, Sr., Albany, GA
 W4RVF, John W. Harrington, Augusta, GA
 KA4TEB, T. Richard Kelley, Akron, OH
 *K4UY, Robert D. Wahlstrom, Plant City, FL
 K5AVG, Claude B. Stanaland, Tulia, TX
 WA5CGY, Sam T. Ingram, Tulia, TX
 W5FMK, James J. Rabbitt, Albuquerque, NM
 W5GXO, Jesse C. "Jake" Bullock, New Orleans, LA
 KA5HBK, J. Rex Gibbons, Sr., Jackson, TN
 KA5JBF, Walter W. Burgett, Houston, TX
 W5LVL, Owen Blankenship, Greenville, TX
 K5PTL, Homer L. Walker, Irving, TX
 W5QMI, George J. Freund, La Jolla, CA
 KA5QXU, Ivo P. Weber, Albuquerque, NM
 W5RSQ, Robert R. Cope, Marshall, TX
 K5SES, John W. Cardiff, Katy, TX
 W5TRU, George L. Corley, Denison, TX
 W5UCY, Lowell G. Croysdale, Pascagoula, MS
 W6CAX, Alan J. Lyons, Oceanside, CA
 K6EQR, Marion "Boosie" Uhl, Sr., Corning, CA
 K6FN, William L. Pegg, National City, CA
 WA6HLJ, John Scheumack, El Cajon, CA
 N6HZM, Marna L. Petee, Carson, CA
 W6ICM, John S. Fox, San Diego, CA
 KA6INB, Fred R. Zufall, Red Bluff, CA
 WA6SZD, William "Bernie" Figley, Glendora, CA
 KB6WN, Kenneth L. Bowen, Laguna Hills, CA
 W6ZAS, Scott B. Miller, San Diego, CA
 AE7F, Harold A. Heimark, Bremerton, WA
 KA7FUJ, Philip V. Coastelli, Sun City, AZ
 W7HPH, Robert A. Gregory, Eagle, ID
 K7JXC, Leslie J. "Nick" Stuhr, Vancouver, WA
 W7LVJ, Leslie M. Brimacomb, Lewistown, MT
 W7UVR, Leander J. Smith, Kennecook, WA
 *N8BBB, Richard G. Princehorn, Massillon, OH
 WA8BYT, Edward V. Luers, Cincinnati, OH

W8ETK, Harley K. Ball, Canton, OH
 W8IQG, Raymond G. Pollauf, Toledo, OH
 W8LDR, Thomas J. Murray, Canton, OH
 WB8OOH, Thomas L. Gephart, Cambridge, OH
 W8PZT, Festus R. Greathouse, Weston, WV
 W8SL, Dewey D. Emery, Canton, OH
 WD9AIM, Richard F. Whelton, Chicago, IL
 W9AXH, Robert E. Stuart, Indianapolis, IN
 K9DQO, William J. Dres, Palos Heights, IL
 W9DYI, Kenneth F. Clark, Rockledge, FL
 WA9ESW, Edward M. Reid, Milwaukee, WI
 W9LJS, Donald J. Foss, Delray Beach, FL
 W9LWE, Otto H. Terry, Muncie, IN
 K9MOM, Forrest L. Livengood, Wallace, IN
 W9PAK, Benjamin L. Covert, Cary, IL
 W9PVK, Joseph M. Hadfield, Chicago, IL
 W9USJ, John Matazel, Cicero, IL
 N8AOV, Laurence T. McBride, Denver, CO
 KS0B, James L. Potter, Fulton, MO
 KA0DQO, Wallace James, Denver, CO
 N0EIE, George W. Phillips, Poplar Bluff, MO
 *WA0EWC, Duane O. Dahl, Litchfield, MN
 WB0TTI, John T. Alexander, Wheatridge, CO
 K0KDR, Robert R. Dell, Oakdale, MN
 W0RCL, Walter Kerlin, Kerrville, TX
 W0YQX, Cecil A. Peckham, Missouri Valley, IA
 KH6JID, Richard C. Latham, Honolulu, HI
 VE1PA, Derek W. R. Haysom, Lunenburg, NS
 VE7QC, Carl S. Shaw, Creston, BC
 VK3CIF, Peter B. Dodd, Victoria, Australia
 *Life Member, ARRL

In order to avoid unfortunate errors in the Silent Keys column, reports of Silent Keys are 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. ☐

50 Years Ago

August 1935

- ☐ While expanding the 10-meter voice band (at League request), F.C.C. has added some new technical standards to our basic regulations—aimed at keeping modulation and spurious emissions within bounds. You won't need a "scope (though one would be helpful), but watch QST and the Handbook for more detailed info on keeping your signals up to modern engineering standards.
- ☐ Start with this issue's feature by W. C. Lent of General Communications Labs, who outlines how to adjust a 'phone rig for best modulation performance. Then proceed to Jim Lamb's discussion, in simple terms, of the new rules and how you can comply with them. And don't overlook George Grammer's speech amplifier and modulator designed for economy in Class B use with a general-purpose transmitter.
- ☐ Ten-meter activity is increasing by leaps. OA4J brought South America into the picture, and a WAC on that band is a strong possibility soon. Mobile work is also authorized, so you might work some DX from your vehicle.
- ☐ Not to be outdone, 5 meters is taking off on its own—East Coast stations being heard in Michigan and other Midwestern spots. (No one says anything about a peak in the sunspot cycle!)
- ☐ We're "getting the breaks" in new transmitting tubes these days. The latest is a 200-watt pentode, the 803 by RCA de Forest, with a graphite plate element.
- ☐ Iron is becoming practical as a core material for i.f. transformers, reducing the coil sizes and making shielding easier. Alfred Crossley (a consulting engineer) and W9KGM of Hallcrafters both offer useful info on this development to improve our receiving capabilities.

☐ Communications Manager Handy announces a change in word-checking procedures for traffic handlers: We have adopted the "land line" system in which only the text words are counted—no longer are the address and signature included. FEH adds helpful info on the general subject of message handling.

☐ W2BSR bows to many comments from amateurs on his "RST" reporting-system proposal by replacing the 5-point "S" signal-strength scale with the more familiar 9-point range. (It's pure ego on our part.)

☐ W3FX built a deluxe single-signal superhet with turret antenna coil changing and other features so elaborate that a second installment next month will be needed to fill in all the details.

☐ Amateurs in Colorado and nearby states carried on in traditional fashion in providing communication to flood- and tornado-stricken towns following severe storms earlier this summer.

circuits and use of hardware store funnels for radiating horns.

☐ To reduce transformer and choke core weight in a high-power portable supply, W6EI converted 60-cycle commercial power to a much higher frequency, thus permitting easier filtering after rectification. His kilowatt supply delivers 3000 volts yet weighs only 12 pounds.

☐ The inverted-V dipole is simplicity itself, yet effective, especially on 40 and 80 meters. K7GCO provides an account of his construction and successes.

☐ W1YCV points up the inconsistencies in S meter standards, some of which (like the ridiculous "40 db. over S9") seem designed to stroke our egos. His treatise includes a common-sense "calibration" of incoming signal strengths.

☐ As multiple packaging seems to be the fad, K1DRX went all out and combined his electronic key, vacuum-tube keyer, sidetone oscillator and receiver muter in one unit.

☐ W9MWD built a 150-watt 'phone/c.w. rig for 80 through 10 meters for less than \$100. His naming it "SJ-97" means 97 pounds of surplus junk—judiciously selected, of course.

☐ Figuring that an active Novice expects soon to become a General, W1CIP thinks he might as well build an inclusive rig. Mac presents an 80-10 meter transmitter of low cost, easy construction and adequate TVI shielding.

☐ For 5-meter mountaintop expeditions this summer, W1HDQ has built a featherweight beam that dismantles and fits in a golf bag for the long upward climbs.

☐ K2YIB outlines the South Jersey Radio Association's methodical approach in their aim of a top score in the v.h.f. Sweepstakes. Also in the operating field, veteran W2ZX offers some hints for both W/VE and DX stations for more effective QSO procedures.

☐ An ardent collector of telegraph keys, W3WRE describes some of the interesting and historical hand keys she has acquired over the years.—WTRW

25 Years Ago

August 1960

- ☐ In earlier days, a station license was issued for a specific set of gear, giving rise to a problem when a family of two or more amateurs use the same equipment. FCC has now announced a new policy to help clear up the confusion, and condones the multiple-call use of the same apparatus—a fairly widespread practice anyway. But there are caveats to observe when operating portable or mobile with another's gear.
- ☐ To operate on 5650 Mc. you likely need a Klystron, but thereafter you can follow W8DRR's lead in homemade r.f. "plumbing," employment of basic i.f.

Coming Conventions

ILLINOIS STATE CONVENTION

Aug. 25, St. Charles

The Fox River Radio League will again host the ARRL Illinois State Convention in conjunction with its annual hamfest. The various activities featured this year, in addition to the traditional commercial displays and flea market, will be FCC license exams; CW and Antenna-Frequency Contests; displays of special communications modes; an opportunity to talk to ARRL Central Division Director Ed Metzger, W9PRN; lots of food; and a chance to have an eyeball QSO with some of the people you have met only on the radio.

The festivities will start at 8 A.M. at the Kane County Fairgrounds, located on the west side of St. Charles, approximately 50 minutes from the Chicago Loop. Talk-in on 146.94 or the Aurora (81/21) or Batavia (147.66/146.58) repeaters. The St. Charles area has several things of interest to the nonham family members, such as shopping in a nearby indoor mall, an excellent bicycle trail system along the Fox River and many outdoor attractions in St. Charles' Pottowatamie Park, including rides on the river boat, "St. Charles Belle." For more information, contact George R. Isely, WD9GIG, 736 Fellows St., St. Charles, IL 60174.

MIDWEST DIVISION CONVENTION

Sept. 6-8, Omaha, Nebraska

The AK-SAR-BEN ARC will present MIDWEST '85, a convention extravaganza, at the Holiday Inn Convention Center, 72nd and Grover Sts., one block north of I-80 on 72nd St. exit.

Convention events include forums, large exhibitors area, 11,000 square feet of flea-market space, all-day equipment workshop and many other attractions. Saturday evening festivities include a Hawaiian luau and a multiscreen presentation of Prince Maximilian's 1832 Missouri River expedition. This world-accredited photographic documentary will illustrate life along the Missouri as it was in the 1830s. Those not interested in the forums and workshops may enjoy a Saturday noon Upstairs Luncheon Theater lunch, with a live presentation of *Annie Get Your Gun*. Sunday morning VEC exams will round off a convention to remember. Send FCC Form 610 to M. J. Nichols, KB8TR, 1635 Peterson Dr., Omaha, NE 68130. Include a check for \$4 (payable to ARRL/VEC). Walk-ins may be accommodated on a space-available basis.

Write to the AK-SAR-BEN ARC, P.O. Box 34148, Omaha, NE 68134, to obtain preregistration information. Preregistration cutoff date is Aug. 30. Exhibitors and dealers, write for your exhibitors packet.

WEST GULF DIVISION CONVENTION

Sept. 6-8, San Angelo, Texas

Bluejeans and boots will be considered formal attire when radio amateurs convene on the banks of the Concho River for the West Gulf Division Convention/Cen Tex Hamfest.

Headquartered in the San Angelo Convention Center, the event will feature special guests and seminars, as well as an ARRL Forum by Division Director Ray Wangler, W5EDZ. Net and QCWA

August 2-4—Rocky Mountain Division, Jackson, WY

August 3-4—North Florida Section, Jacksonville

August 9-11—Southwestern Division, Long Beach, CA

August 25—Illinois State, St. Charles

September 6-8—Florida State, Melbourne

September 6-8—Midwest Division, Omaha, NE

September 6-8—West Gulf Division, San Angelo, TX

September 21-22—Virginia State, Virginia Beach

September 27-28—CRRL, London, Ontario, Canada

October 12-13—Kansas State, Concordia

October 26-27—Delta Division, Chattanooga, Tennessee

ARRL NATIONAL CONVENTIONS

October 4-6, 1985—Louisville, Kentucky

September 5-7, 1986—San Diego, California

July 10-12, 1987—Atlanta, Georgia

August 19-21, 1988—Portland, Oregon

At press time, Amateur Radio exams are scheduled to be given at these conventions. For other exam opportunities see Hamfest Calendar.

How to Register for Upcoming Exams

Sept. 21-22, Virginia State (Virginia Beach, Virginia): Exams will be given on Sunday, Sept. 22, at 9 A.M., Technician through Extra Class, no walk-ins. Send completed FCC Form 610 and check in the amount of \$4 (payable to ARRL/VEC) to Gary Neal, KE4EX, 305 Dover Rd., Hampton, VA 23666. Cutoff date—Aug. 22.

Oct. 4-6, ARRL National Convention (Louisville, Kentucky): Exams will be given on Saturday, Oct. 5, from 9 A.M. to 6 P.M., Novice through Extra Class, at the Kentucky Fair and Exposition Center. Submit a completed FCC Form 610, copy of present Amateur Radio license (copy of code credit certificate, if applicable) and check or money order for \$4 (payable to ARRL/VEC) to Volunteer Examiner Program, Walter H. Bowman, WD4RAK, P.O. Box 603, Radcliff, KY 40160. Cutoff date is Sept. 5. No walk-ins.

meetings to be arranged. More than 10,000 square feet of floor space for dealers. Walk-ins welcome at volunteer examinations. For more information, contact Noel Johnson, KESNO, tel. 915-653-1112, or John Williams, KCSNL, tel. 915-655-2329, P.O. Box 3751, San Angelo, TX 76902. Preregistration \$6; at the door \$10. Preregistration ends Sept. 1.

Entertainment events will center around restored Old Ft. Concho, where Saturday evening will feature great food, drink, music and street dance, and demonstrations by troopers and frontier artisans. Cost: \$20 per ticket; registration ends Sept. 1.

Sheraton Hotel, 400 Rio Concho Dr., tel. 915-658-2828, and Holiday Inn/Holidome, 333 Rio Concho Dr., tel. 915-655-8151, are located within a three-minute walk of the convention center. Special convention rates—\$52, single or double. Fourteen other nearby hotels also have accommodations. Shuttle buses available for special events. Talk-in on 52, 34/94 or 449.10/4.10.

This event is sponsored by the San Angelo ARC. Preregistration checks should be made payable to SAARC, P.O. Box 3751, San Angelo, TX 76902. Please make hotel reservations direct; ask for "hamfest

rates." Free transportation to and from airport. Y'all come, ya hear?

FLORIDA STATE CONVENTION

Sept. 7-8, Melbourne

The ARRL Florida State Convention/20th Annual Melbourne Hamfest, sponsored by the Platinum Coast ARS, will be held at the Melbourne Auditorium, just off U.S. 1 in downtown Melbourne, with meetings and rooms available at the new Melbourne Airport Hilton. Talk-in on 25/85.

Hours are 9 A.M.-5 P.M. Saturday and 9 A.M.-4 P.M. Sunday. Featured will be FCC exams, commercial exhibits, swap tables, ARRL forum, QCWA, technical, MARS and Net meetings and, new this year, a 2-meter transmitter hunt.

For tickets (\$3 advance, \$4 door), contact PCARS, P.O. Box 1004, Melbourne, FL 32901. For swap-table reservations, limited to two adjacent tables per request, contact PCARS Swap Table Chairman, 2815 S. Cameron, Melbourne, FL 32901. For exam information, send s.a.s.e. marked "Exams" to PCARS at P.O. Box above.

Hamfest Calendar

Administered By Marjorie C. Tenney, WB1FSN
Convention/Travel Coordinator

[Attention: The deadline for receipt of items for this column is the 15th of the second month preceding publication date. Hamfest information is accurate as of our deadline; contact sponsor for possible late changes. For those who send in items for Hamfest Calendar and Coming Conventions: Postal regulations prohibit mention in QST of prizes of any kind and games of chance such as bingo.]

†Alabama (Huntsville)—Aug. 17-18: The Huntsville Hamfest, sponsored by the Huntsville ARC, will be

†ARRL Hamfest

held at the Von Braun Civic Center, 700 Moore St., NW, 10 A.M.-4 P.M. Saturday and 9 A.M.-2 P.M. Sunday. No admission charge. FCC exams by CAVEC; walk-ins, 9 A.M. Saturday, Huntsville High School Cafeteria. Forums, ARRL and DX QSL Bureau booths. New dealers. Flea-market tables \$5. Women's and children's activities. Parking \$2. RV hookups, limited. Alabama Space and Rocket Center Tours available for the family. Talk-in on 34/94. Frank S. Brown, ARRL contact chairman, tel. 205-852-6324 (motels); Alan Forney, dealer chairman, tel. 205-837-5935; Ken Magnent, flea market chairman, tel. 205-883-1084.

Arkansas (Mena)—Sept. 7-8: The 16th Annual Queen Wilhelmina Hamfest will be held at Queen Wilhelmina

State Park on top of Rich Mountain near Mena. Relaxation and ham fellowship for the whole family. Free admission, dealer display, banquet (Saturday night, \$7), camping facilities, tailgate flea market, miniature golf, miniature train ride, wildlife zoo, new playground, ladies tour. Talk-in on 19/79. For additional information, contact John Harris, KC5XK, 5018 S. 9th, Fort Smith, AR 72903.

†California (Pomona)—Aug. 3: Sponsored by the Tri County ARA, from 8 A.M. to 2 P.M., at the Palomares Park Recreation Hall, 491 E. Arrow Hwy. (north side of Arrow Hwy. at Orange Grove, between Towne and Garey). All indoors; food, drink, free parking. Admission \$1. Programs, contests, fun. To register for VEC exams for Novice through Extra Class, mail

completed Form 610 and copy of current license (interim permit not allowed) and s.a.s.e. to TCARA, P.O. Box 142, Pomona, CA 91769, Attn: VEC. No charge—donations accepted. Check-in at 8 A.M.; exams start at 9 A.M. Swap tables: a limited number of 2½' x 8-ft tables available. Must be reserved in advance; \$5 per table. Hall opens at 7 A.M. for table setup only. No personal tables allowed outside or inside hall. Contact Joe Lyddon, WB6UFX, tel. 714-980-4563, for reservations. Advance registration: Make checks payable to TCARA; send check, filled-out registration form and s.a.s.e. to Joe Lyddon, WB6UFX, 6879 Sard St., Alta Loma, CA 91701.

California (Sonoma)—August 11: The Valley of the Moon ARC will hold their fifth annual "ham" breakfast and swap meet at the Sonoma Community Center, 276 East Napa St., from 9 A.M. to 4 P.M. Breakfast served from 9 A.M. to 11:30 A.M.; \$5, all you can eat. Swap tables will be set up from 8 A.M., with spaces renting for \$3 each. There will be 70 spaces, but only 25 tables, so bring your own. Admission is \$1. An open auction will be held at 1 P.M. Displays will include operating RTTY, computer, high- and low-band stations; an ARRL forum; our club/police department emergency communications van; and slide shows and dealer displays. Talk-in on 147.47 simplex and on the local 144.65/5.25 and 13/73 repeaters. To reserve swap spaces or for further information, call Darrel Jones, WD6BOR, at 707-996-4494, or write to 358 Patten St., Sonoma, CA 95476.

Georgia (Madison)—Aug. 24-25: The Confederate Signal Corps, Inc. hamfest will be held at the Holiday Inn, 1-20 at U.S. 441, Saturday, from 9 A.M. to 5 P.M., and Sunday, from 9 A.M. to 2 P.M. Admission \$1. Normal hamfest activities, "Bone Yard," tailgaters. Talk-in on 52 and 3.975 MHz. Motel: call direct to Holiday Inn, Madison, GA (be sure to specify "hamfest rate"). For tables, tickets and general information, call Robert E. Lee Gray, 404-767-8326, or Dave Messex, 404-636-1212.

Illinois (Willow Springs)—Aug. 11: Hamfesters 51st annual hamfest, sponsored by the Hamfesters Radio Club, Inc., will be held at Santa Fe Park, 91st and Wolf Rd., starting at 0500Z. Admission is \$3 in advance and \$4 at the gate. Swappers row, pavilion alley, food, drink. Talk-in on 52. For information and advance tickets, contact Bob Flynn, K9BVV, 5646 So. Parkside, Chicago, IL 60638, tel. 312-581-6922.

Illinois (Danville)—Aug. 24-25: The Vermillion County Area hamfest will be held at the W9MJL clubhouse, Woodbury Hill, Harrison Park West. Setup Aug. 24; hamfest Aug. 25. Hours: Saturday, noon to 10 P.M.; Sunday, 6 A.M. to 3:30 P.M. Admission is \$1 in advance, \$2 at the door. Saturday, 6 P.M., steak cookout; \$5 reservation. No cost for setups or space. Novice and upgrade testing. Talk-in on 22/82. For further information, contact Joe Mayer, KB9GS, 613 E. Kelly, Westville, IL 61883, tel. 217-276-2946.

Illinois (Willow Springs)—Sept. 8: BARS Hamfest '85, sponsored by the Bolingbrook ARS, will be held at Santa Fe Park, 91st and Wolf Rd. Featured will be Amateur Radio; computers and electronics. Doors open 6 A.M. to 4 P.M. Admission is \$2 in advance, \$3 at the door. Dealers and large flea market. Food and drink. Reserved dealer tables (under roof). For further information, contact Ed Weinstein, WD9AYR, 7511 Walnut Ave., Woodridge, IL 60517, tel. 312-985-0527.

Illinois (Carterville)—Sept. 8: The Shawnee ARA hamfest will be held at John A. Logan College. Hours: 7 A.M. to 3 P.M. Admission \$3. New equipment, computers, women's activities, displays, flea market, crafts, FCC exams. Lunch 11 A.M. to 1 P.M. Talk-in on 25/85, 52 and 3.925, 8 to 9 A.M. For further information, write to SARA, 502 W. Kenicott, Carbondale, IL, 62918, tel. 618-437-7586.

Indiana (Angola)—Aug. 4: The Steuben County Radio Amateurs present the 27th Annual P.M. Picnic and Hamfest at Crooked Lake. Picnic-style barbecued chicken, inside tables for exhibitors and vendors, overnight camping (fee charged by County Park). Talk-in on 52 and 81/21. Admission \$2.50.

Indiana (Marion)—Aug. 11: The 6th annual Grant County (Indiana) ARC hamfest will be held Sunday, at the 4-H Fairgrounds. Doors open at 8 A.M., with refreshments, free parking, license exams. Table reservations: \$2 for 8-ft table. Admission is \$2 advance, \$3 at gate. For information/tickets, s.a.s.e. to Brooks Clark, WB9EAP, 2202 South Boots St., Marion, IN 46953.

Indiana (Lafayette)—Aug. 18: The Tippecanoe ARA will hold its 14th annual hamfest on Sunday at the Tippecanoe County Fairgrounds, Teal Rd. and 18th St. The grounds will open at 7 A.M.; tickets are \$3. Large flea market, dealers, fun, refreshments. Talk-in on 13/73 and 52. For advance tickets and additional information, write to Lafayette Hamfest, Rte. 1, Box 63, West Point, IN 47992.

Indiana (Bloomington)—Sept. 1: The 8th annual Bloomington Hamfest will be held Sunday at the 147.78/18 repeater site, 2335 Vernal Pike off SR 37 bypass, from 8 A.M. to 2 P.M. Admission \$2. Food concession available. No charge for setups. Bring your own table. For FCC VE exams, contact Bob Myers, K9KTH, 306 S. Fairview St., Bloomington, IN 47401 (s.a.s.e.), or call 812-332-1105.

Maine (Windsor)—Sept. 7: The Windsor Hamfest, sponsored by the Augusta Emergency Amateur Radio Unit, will be held at the Windsor Fairgrounds, all day. Admission \$1. League officials, flea market, swap tables, programs, entertainment, bean and casserole supper. Camping. Talk-in on 22/82. For further information, contact Ron Dishman, N1CMZ, 37 Marlboro Ave., Augusta, ME 04330, tel. 207-623-8351.

Maryland (Gaithersburg)—Sept. 8: The Gaithersburg Hamfest, sponsored by the Foundation for Amateur Radio, will be held at the Montgomery County Fairgrounds. Admission \$4. For further information, contact Robert C. Moore, N3CKD, 9449 Mayflower Ct., Laurel, MD 20707, tel. 301-776-3571.

Massachusetts (Dalton)—Aug. 11: The Northern Berkshire ARC flea market will be held at the Dalton American Legion, Rte. 9, from dawn until whenever. Admission \$1; women and children free. A few tables available free on a first-come basis. Flea market breakfast and lunch concession provided by the Dalton American Legion. Free overnight camping permitted from 6 P.M. Saturday. Talk-in on 31/91 Mount Greylock repeater.

Massachusetts (Easthampton)—Aug. 25: The Mount Tom VHF Picnic and Annual Meeting of the Northeast VHF Assn. will be held at the Mount Tom State Reservation. With the exception of the brief business meeting, this is an informal gathering of VHF/UHF/SHF experimenters for food and conversation. Nonlicensed family members are encouraged to attend. Modest entrance fee to the reservation, which is most conveniently entered from Rte. 141 at the Holyoke-Easthampton town line.

Michigan (Saginaw)—Aug. 25: The Five County Swap-N-Shop Committee of Michigan, made up of members of Amateur Radio clubs from Bay, Saginaw, Genesee, Lapeer and Shiawassee Counties, will be sponsoring their 9th annual swap-n-shop at the Saginaw Civic Center. Advance tickets are \$2; at the door, \$3. Table rental is \$7/table (tables are 3 ft x 8 ft). There will also be a covered "trunk sales" area at \$3/car. Doors open at 8 A.M. (6 A.M. for dealers). Advance ticket orders and table reservations may be sent to Five County Swap-N-Shop, P.O. Box 2204, Saginaw, MI 48605, tel. 517-777-8683.

Minnesota (St. Cloud)—Aug. 11: The St. Cloud ARC hamfest will be held at the Sauk Rapids Municipal Park on the north edge of Sauk Rapids, off Minnesota Hwy. 15 (Benton Dr.). Displays, demonstrations and trades. Ticket donation, \$3; extra ticket, \$2. Snack counter. Talk-in on 34/94 primary, 615/015 secondary. Contact: SCARC, Box 141, St. Cloud, MN 56302.

Missouri (Springfield)—Aug. 18: The Southwest Missouri ARC hamfest will be held at Lake Springfield Pavilion (opposite Power Plant), starting at 11 A.M. Sunday. Admission \$2. Swapping, CW contest. Bring covered dish. Admission includes WB0PNM famous smoked ham. Refreshments. For further information, contact Ray Goodall, KB0E, 4056 Magnolia, Springfield, MO 65619, tel. 417-883-8093.

Missouri (St. Charles)—Aug. 25: Hamfest '85, sponsored by the St. Charles ARC, will be held at the St. Charles City Hall complex, 200 North 2nd St., rain or shine; it's all under cover. Giant flea market, commercial vendors, women's programs, FCC exams by VECs, food available. Parking, \$1; tickets are \$1 in advance, \$1.50 at the door. Talk-in on 07/67 and 52. Tickets from Denise, WD0CZE, 121 Barkwood Trail, St. Charles, MO 63303.

New Jersey (Oakland)—Aug. 17: The Ramapo Mountain ARC, WA2SNA, presents its 9th annual flea market at the Oakland American Legion Hall, 65 Oak St., 20 miles from the GW Bridge. Talk-in on 147.49/6.49 and 52. Indoor tables \$6.50; tailgating \$3; admission \$1, nonham family members free. For information, contact Tom Risseew, N2AAZ, 63 Page Dr., Oakland, NJ 07436, tel. 201-337-8389 (after 6 P.M.).

New Jersey (Sewell)—Aug. 25: GARC Hamfest, sponsored by the Gloucester County ARC, will be held at Gloucester County College, Tanyard Rd. Doors open 8 A.M. to 4 P.M. (7 A.M. for setup). Tickets are \$2.50 in advance; \$3 at gate. Sellers, \$3.50 per space. VEC testing 9:30 A.M. and 2 P.M. QLF competition, YLRL, flea market, seminars, contests, food and refreshments. Talk-in on 78/18 and 223.06/4.66. For further information, contact Milt Goldman, K3WIL, tel. 609-845-7000; John Fisher, K2JF, tel.

609-589-2318; or Ginny Martin, N2FJM, tel. 609-694-0069.

New Jersey (Old Bridge)—Sept. 8: The OBRA Auction, sponsored by the Old Bridge Radio Assn., will be held at the K of C Hall, Pace St., 7 miles south on Rte. 18 from NJ Tpke. Exit 9. Sellers 8 A.M.; general public 9 A.M.; auction starts at 10 A.M. until finished. No admission charge. Talk-in on 72/12 and 52. This is not a flea market, but an auction.

New Mexico (Alamogordo)—Aug. 31-Sept. 1: The 1st annual Alamogordo Hamfest, sponsored by the Alamogordo ARC, will be held at the Civic Center, from 8 A.M. to 6 P.M. each day. Admission is \$5 in advance, \$6 at the door. Air Force, Army and Navy MARS; NM Roadrunner Traffic Net, ARRL booth, VEC testing. Self-contained campers on site; 200 motel rooms; walking distance to outstanding food. Talk-in on 25/85. For further information, contact Larry L. Moore, WA5UNO, 1830 Corte Del Rancho, Alamogordo, NM 88310, tel. 505-437-0145.

New York (Brewster)—Aug. 17: The Putnam Emergency Amateur League (PEARL) will have its annual Electronics Extravaganza at the J. F. Kennedy Elementary School, from 9 A.M. to 4 P.M. VEC exams, walk-ins on first-come, first-served basis. General admission \$2; tables \$5. For advance table registration and information, contact R. Dillon, N2EFA, RFD 7, Noel Ct., Brewster, NY 10509. Talk-in on 144.535/5.135.

North Carolina (Shelby)—Aug. 31-Sept. 1: The Shelby ARC Shelby Hamfest will be held at the Cleveland County Fairgrounds Saturday from 8 A.M. to 5 P.M. and Sunday from 8 A.M. to 3 P.M. Advance admission \$4; at the door \$5. Flea market, volunteer exams. Talk-in on 28/88. General info: John Ledford, N4GOQ, 3410 Oakcrest Dr., Shelby, NC 28150, tel. 704-482-4507. Dealer info: Steve Roberts, N4FMH, 207 Roberts St., Shelby, NC 28150, tel. 704-482-1276.

Ohio (Marysville)—Aug. 25: The Union County ARC will sponsor the Marysville Hamfest at the Marysville Fairgrounds, from 6 A.M. to 4 P.M. Admission is \$3 at the gate, \$2 in advance. Women and children free. Free equipment auction at 1 P.M. Talk-in on 99/39 and 52. For further information, contact Gene Kirby, WB8JN, 13613 U.S. 36, Marysville, OH 43040, tel. 513-644-0468.

Ohio (Findlay)—Sept. 8: The Findlay RC Hamfest will be held at the Hancock County Fairgrounds Sunday, 8 A.M. to 4 P.M. Advance admission \$3; at the gate \$4. Cutoff for advance tickets is Sept. 1. Tables \$6 each. Flea-market outdoor spaces \$3 each. Various state organization meetings, technical forum, talk-in message center, food vendors, RV parking and picnic area. New location with ample parking and more prime dealer and flea-market spaces. Talk-in on 75/15. For further information, contact Dave Fleming, N8EOZ, P.O. Box 587, Findlay, OH 45840, tel. 419-422-3252(B), or 419-422-8606(H).

Oklahoma (Great Salt Plains Lake)—Sept. 3: The 3rd annual Great Salt Plains (Oklahoma-Kansas state line area) hamfest will be held at the community building on the South side of the Great Salt Plains Lake. This year we will have FCC exams, a covered-dish lunch, free swap tables, refreshments and forums. Bring the family. Talk-in on 90/30. For further information, contact Steven Walz, WA5UTO, Box 222, Cherokee, OK 73728, tel. 405-596-3487.

Pennsylvania (Warrington)—Aug. 11: Hamfest '85, sponsored by the Mid-Atlantic ARC, will be held at the Bucks County Drive-in Theatre, Rte. 611. Hours: 9 A.M. to 4 P.M.; tailgate setup 8 A.M. Admission \$3; tailgate space \$2. Talk-in on 66/06 and 52. For further information, contact Bob Josuweit, WA3PZO, 9 Derwen Dr., Havertown, PA 19083, tel. 215-449-9727.

Pennsylvania (Blossburg)—Aug. 18: The Tioga County ARC will hold its 9th annual hamfest Sunday at Island Park, just off Rte. 15, from 8 A.M. to 5 P.M. Walk-in exams. For more information, write to TCARC, P.O. Box 56, Mansfield, PA 16933. Flea market, dealers, women's activities, park and pool for children, snack bar. Talk-in on 19/79, 52 and CB. Admission \$3; women and children free. For more information, contact Durwood Learn, WB3DKZ, 11 Bryden St., Wellsboro, PA 16901, tel. 717-24-5613.

Pennsylvania (Hershey)—Aug. 25: The 12th Annual Hamfest/Computerfest sponsored by the Central Pennsylvania Repeater Assn., Inc., will be held adjacent to Hershey Park. Gates open at 8 A.M. Admission \$3; children 12 and under free. Large indoor dealer and flea-market area; large outdoor tailgate area. Food and refreshments. Special reduced admission to Hershey Park available for registrants and families. Talk-in on 144.87/5.47 or 52. Further information from Paul McDonnell, N3BKI, 1207 Apple Dr., Mechanicsburg, PA 17053, tel. 717-697-1880 (noon to 8 P.M.).

Pennsylvania (Uniontown)—Sept. 7: Uniontown ARC (W3PIE) will hold its 36th Annual Gabfest on Saturday after Labor Day, on the club grounds, located on the Old Pittsburgh Rd., just off Rte. 51 and the 119 bypass. Talk-in on 645/045 and 144.57/5.17. Free parking, free coffee, free swap and shop with registration. Registration: \$3 each or 2 for \$5. Plenty of good food at our refreshment stand. Further information: Contact UARC Gabfest Committee, c/o John T. Cermak, WB3DOD, P.O. Box 433, Republic, PA 15475, tel. 412-246-2870.

Pennsylvania (Butler)—Sept. 8: The Butler Hamfest, sponsored by the Butler County ARA, Inc., will be held at the Butler Farm Show Grounds at Roe Airport, from 9 A.M. to 4 P.M. Admission \$1; children under 12 free. Plenty of parking; overnight campers welcome. Free outside flea market. Indoor flea market-vendor's space is \$5 per 8-ft table. Overnight accommodations available at area motels. Directions on 96/36. For more information, contact Hamfest Chairman, P.O. Box 1787, Butler, PA 16003.

Texas (Canyon)—Aug. 10-11: The 11th Annual Golden Spread Hamfest, sponsored by the Panhandle ARC, will be held at the West Texas State University Activity Center, 9 A.M.-9 P.M. Saturday and 1 P.M.-7 P.M. Sunday. Advance admission \$6; at the door \$7. Presentation by AMSAT, exhibits, dealers. Motel rooms and trailer/RV spaces available (make own reservations). Talk-in on 34/94 in Amarillo and 52 in Canyon. For further information, contact Guy W. Pigg, KASOFA, 611 NE 13, Amarillo, TX 79107, tel. 806-371-0518.

Vermont (Charlotte)—Aug. 10-11: The annual BARC International Hamfest will be held at the Old Lantern Camp Grounds. Still only \$4 for both days, with children under 12 free. Flea-market space outside \$2; indoor \$5. For overnight camping contact camp grounds. R/C model airplane show. CAN-AM tug-of-war. Talk-in on 34/94, 01/61 and 52. Queries to Roger, WAIOZE, flea-market space info from Bob, WIDQO. Both: Box 312, Burlington, VT 05402.

Washington (Tacoma)—Aug. 17-18: Tacoma Hamfair-1985, sponsored by the Radio Club of Tacoma, will be held at Pacific Lutheran University. Technical seminars, forums, travelogues, and much more. Large flea market. Dinner speaker is Lenore Jensen, W6NAZ. License exams (send Form 610 to W7BUN). Women's activities. Registration \$5. Dinner \$8. Dormitory rooms: \$14 single, \$21 double. RV space \$2/night. Flea-market table: \$15/day, \$20/two days (includes one registration). Register with Grace Teitzel, AD7S, P.O. Box 45079, Tacoma, WA 98445, or call Eva Anderson, WB7QNS, tel. 206-564-8347.

West Virginia (Ripley)—Aug. 10: The Jackson County ARC, Inc. will sponsor a hamfest on Saturday at the Jackson County Junior Fairgrounds, 6 miles west of Ripley, from 9 A.M. to 4 P.M. Admission \$3. Flea market, special activities, food available, free parking. For tickets or more information, contact Les Shockey, WB8SNO, RFD 2, Box 36, Sandyville, WV 25275.

West Virginia (South Charleston)—Aug. 11: The first annual Charleston Area Hamfest and Computer Show will be held from 9 A.M. to 4 P.M., at the South

Charleston Community Center (I-64, exit 54). There will be an all-indoor flea market; food and indoor pool available. Scheduled events include technical and DX forums, ARRL booth and dealers. Dealers setup on Saturday. Admission \$3, flea market \$5. Talk-in on 28/88 and 52. ARRL-sanctioned hamfest. For further information, send s.a.s.c. to Mac McMillian, 2537 Larwood Dr., Charleston, WV 25302, or call 304-346-6006. Dealers contact Terry Sanner, 218 Forrest Cir., South Charleston, WV 25303, or call 304-744-0198.

West Virginia (Bluefield)—Aug. 25: The Bluefield Hamfest, sponsored by the East River ARC, Inc., will be held at the Brush Fork Armory-Civic Center Sunday, from 9 A.M. to 4 P.M. Admission \$4. Seminars, videotapes, lectures. Amateur Radio licensing exams at 9 A.M., Novice through Extra; walk-ins accepted. Bring current Form 610, photocopy of license, check for \$4 payable to "ERARC/VE." Food on premises, dealers, flea market. Talk-in on 144.89/145.49 and 52. For further information, contact Don Williams, WA4K, 412 Ridgeway Dr., Bluefield, VA 24605, tel. 703-326-2411.

[Note: Sponsors of large gatherings should check with League Hq. for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL Hq. for up to two years in advance.]

In Training

Conducted By John Foss, W7KQW
Training Manager, ARRL

INSTRUCTORS' FORUMS PRODUCE MUCH FOOD FOR THOUGHT

ARRL's first two instructors' forums are now history. Attendance at both the Rochester and the Dallas forums was low; nevertheless, the results were encouraging. Perhaps the most surprising result was that instructors attending the Dallas forum disagreed at almost every point with those attending the Rochester forum. From that fact one might assume that there is no preponderance of opinion among either experienced or inexperienced instructors on most major questions. It would be dangerous, however, to draw sweeping conclusions from the observations recorded at only two forums.

The points on which most instructors agree are (1) the existing instructors' guides, although an improvement over their predecessors, need to become even more comprehensive and offer further aid to the instructors, especially questions to be used on periodic quizzes; (2) attendance at instructors' forums is well worthwhile; (3) we must find and publicize new ways of using computers in Amateur Radio, including but not limited to Amateur Radio instruction; and (4) if we continue an instructor-registration program, applicants for registration should be required to fill out a reasonably lengthy application form, take an open-book examination such as is required of VEs, and report each year how many students they have taught, and at what level.

A great many instructors, particularly those at Dallas, favor abolishing the registered-instructor program. These instructors report that they do not receive enough referrals from ARRL Hq. to make the referral process worthwhile. They favor referral instead to the nearest radio club. Their philosophy is that the local clubs know more about the available instructors and their competence than ARRL Hq. can possibly know. Thus, the clubs are in a better position to match applicants with instructors. Most instructors at the Rochester forum, however, favored retention of the registered-instructor program.

The question of establishing an appropriate apprentice-instructor program met with considerable favor at Rochester, but was strongly opposed at Dallas. The Dallas attendees also were strongly opposed to establishing a system of section training coordinators.

More intensive instruction (and instructional aids) in mathematics appeared highly desirable to those attending the forum in Rochester, but not at all desirable to those at Dallas. Rochester attendees also would welcome new and up-to-date audiovisuals, but Dallas attendees generally considered audiovisuals of little value in ham radio instruction.

At both forums, a question arose over having instructor's guides for Advanced and Extra Class courses. Information reaching League Hq., however, suggests that so few such courses are

being conducted that insufficient demand exists for such instructor's guides.

A point raised at Rochester involved the possibility of establishing an instructors' net that would meet regularly on one of the HF bands. Unfortunately, there was insufficient time at Dallas to discuss the possibility. A point raised at Dallas was that future instructors' forums should *not* be held in conjunction with hamfests because there is inevitable conflict in scheduling time with other forums and meetings the instructors also want to attend.

Your League now has more than 7000 registered instructors. But we have many responses from prospective hams who have tried, without success, to contact the instructors whose names we sent them. Either they were unable to locate the instructor, the instructor lived too far away, or, most often, the instructor was no longer interested in teaching. This response probably has squelched the interest of some would-be amateurs.

We must decide soon which way to move on the registered-instructor program. Written comments will be most welcome, but they should be received at League Hq. by the end of September to be fully considered. Whatever major changes in the program are made will take effect in 1986.

Despite the low turnout for the two forums already held, those instructors who attended almost universally thought them worthwhile. Your League will schedule additional forums as finances permit.

Mildred O'Brien—A Special Achiever

Mildred O'Brien, AFA6QT/W6HTS, was recently honored by the Air Force Association for her many years of exceptional work with the Military Affiliate Radio System (MARS). Brigadier General Robert Mortensen, Commander of Fourth Air Force (headquartered in Sacramento, California, and responsible for all Air Force disaster response in the Western states), announced that Mrs. O'Brien was selected to receive the prestigious Special Achievement Award in formal ceremonies at Mather Air Force Base.

A retired civil service employee, Mildred has dedicated the past 32 years to providing shortwave radio contact between isolated military personnel and their families at home. Throughout the years, she has spent a good portion of her retirement check for equipment and its maintenance, and for long-distance phone calls—all for the sake of providing assistance to remotely stationed soldiers, sailors and Air Force personnel. At the same time, she has been deeply involved in the Air Force disaster-response effort, providing command-control communications and humanitarian lifeline communications during numerous natural disasters and military emergencies.

Mildred has been active in the MARS program since 1952. While working as a volunteer support member of the McClellan Air Force Base MARS station, she was instrumental in organizing the relief effort in response to flooding in the Yuba City area in 1954. As the key radio link out of the disaster area, her team was literally the only lifeline of communications for thousands of flood victims, as well as for the extensive military relief force that responded. Soon afterward, Mildred was selected by the McClellan Base Commander as a full-time "employee" at the base MARS radio station, a decision that changed the course of history for Air Force MARS.

Working long hours without compensation, Mildred edited and published a newsletter called *MARSGRAM*. Over the years, this newsletter was expanded and eventually became an official Air Force publication for all worldwide MARS activities.

In 1958, Mildred and a team of emergency communicators from McClellan AFB responded to massive forest fires in the Quincy and Forest Hills, California, areas. Living under field conditions, subsisting on K rations and working around the clock in the communications van, her team maintained command control communications with McClellan during exceptionally difficult and dangerous conditions.

She was one of the few Air Force MARS operators on duty on the West Coast in 1964 at the time of the Good Friday earthquake in Alaska. She immediately picked up the first radio call for emergency assistance and set into motion the extensive Air Force disaster-response effort. She organized continuous radio support, recalled military radio operators and coordinated the response of volunteer teams. She worked around the clock



Mildred O'Brien, AFA6QT/W6HTS, recipient of the Air Force Special Achievement Award.

for eight days and nights, until communications for the relief effort had been fully established. Her teletypewriter operators exhausted the entire military stock of tape and printer paper in northern California during this period.

During one year of the Vietnam conflict, Mildred's station relayed more than 10,000 radiotelephone calls for service personnel and their families. She has been involved as a central communicator in virtually every West Coast disaster and major military emergency in the past 32 years. Since her retirement from McClellan as Base MARS director in 1972, Mildred has continued to be exceptionally active, both on the air as a volunteer radio operator and in person as a mentor, trainer and recruiter for the MARS system. Her radio station in Roseville, California, can be heard almost any hour of the day or night, as she relays both official and morale-welfare messages for Air Force units and personnel. Especially during the holidays, but throughout the rest of the year as well, Mildred's efforts contribute significantly to the well being of service families.

The commander of the Sacramento Air Logistics Center, Major General Dewey K. K. Lowe, joined General Mortensen in congratulating Mildred at the black-tie event. General Lowe thanked her for her "long and faithful service, untiring dedication to humanitarian service and countless achievements through the years. Mildred paved the way for our emergency backup communications systems . . . and when there was no way, she found one!"

Bob Burton, news anchor at KXTV in Sacramento and Master of Ceremonies, read her citation and presented her with a large plaque. In accepting the award, Mildred expressed gratitude to her son, Jay O'Brien, W6GO, for his extensive help with her station's operation and maintenance. She also reaffirmed her commitment to continued service. The halls of Mather Air Force Base will echo the enthusiastic applause of the more than 300 military and civilian guests at this special occasion for many years to come.

Results, 1985 YLRL YL/OM Contest

Phone		OM	
YL			
OH8AA	Gold Cup	OK3CGP	
K0EPE	Second Place	K2LFG	
WB7FDE	Third Place	W1HOZ	
YL Phone		OM Phone	
OH8AA	85,800	OK3CGP	4,339*
K0EPE	83,804	K2LFG	834*
WB7FDE	38,160	W1HOZ	380*
DF8YY	22,080	DL1RA	275*
KC8GM	19,390*	K0ETA	244*
4X4DW	18,756*	W9LNO	244*
EL2EF	15,975	ON4AGO	228*
K6ZFY	15,433	VO3ZR	104
K8ONV/4	9,690*	W8ZT	120
WA8FSX	5,509*	OH1LU	99
OK2BI	4,785*	WA1REI	81
WA4SRD	4,293*	LK1KZ	79*
ON4YL	3,938*	SP8JOE	53*
LZ1JE	3,300*	W7JLC	45*
WA8YFY	2,683*	K43LCF	38
K6SOC	2,320*	SP8EE	31*
N7DHA	2,310	SP7FQI	31*
G4EZI	1,084*	K1TH	25
WA4BQY	1,018*	OK1KZ	20*
V13KS	400*	SP8DVP	20*
DF3BN	300*	YU7SF	20*
PA3CEB	175*	N0FMR	18
WA2NPFY	75*	SP4GFG	15*

CW		OM	
YL			
OH8AA	Gold Cup	W9LNO	
I2RLX	Second Place	W1HOZ	
K8ONV/4	Third Place	K2LFG	
YL CW		OM CW	
OH8AA	34,740	W9LNO	688*
I2RLX	17,040*	W1HOZ	425*
K8ONV/4	10,725*	K2LFG	244*
W8YL	8,190*	VE3KK	240
K6SOC	8,160*	W6ZT	221
CT2YH	7,073*	N0CKC	204
WDBMEV	6,825*	W3EE	168
WA4SRD	6,435*	N0FFZ	143
YUBHZJ	4,553*	W2AAU	132
N7DHA	4,400	K8XU	130
VE7YL	4,300*	W10PJ	101*
WA8YFY	3,649*	N0FMR	100*
VP2VFV	3,469*	W7JLC	100*
N9AIB	1,988*	PY2RRG	64
WA8FSX/7	1,910*	VE8UP	48
OH8CD	919*	OZ7BW	48
DF8UI	725*	W7RD	31*
OZ7YL	693	W8T8F	25
WA2NPFY	630*	JH8JYV	16
K1QFD	480*	JH3AIU	12
V13WI	131*	W3UIU	8
N1DGM	130	YU7SF	8
OH5MX	34*	OK1DLT	5*

*Low power

Note: OH8AA phone by OH8MA, OH8AA CW by OH8YL, V13KS and V13WI by VK3KS, VP2VFV by K1JV.

FAREWELL

It's retirement time! The next YL News and Views will be conducted by a new contributing editor. My sincere thanks to all who have so generously contributed to this column during the past several years, making it a joy and privilege to write.—K1JV

[With this installment of YL News and Views, we bid a fond adieu to Jean. We will miss her, but we do understand that the lure of retiring to Cape Cod, Massachusetts, is too great to resist. During her stints as conductor of this column—from 1963 to 1966 and from 1980 to the present—Jean consistently delivered the quality of material that QST readers have come to expect. For that we thank her. Enjoy your retirement, Jean! —QST Editors.]

Rules, September VHF QSO Party

The rules for the 1985 September VHF QSO Party will be the same as for last year. The multipliers will again be grid squares (aka the 2° × 1° Maidenhead grid-square locators) worked per band. See Rules 4 and 5. Grid-square maps are available from ARRL Hq. for \$1.

Official summary sheets and log sheets are available from ARRL Hq. for an s.a.s.e., and all entrants should send for a set. Good luck from FN31!

Rules

1) **Object:** To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized amateur frequencies above 50 MHz.

2) **Contest Period:** Begins 1800 UTC Saturday, Sept. 14, and ends at 0300 UTC Monday, Sept. 15.

3) Categories:

(A) **Single operator:** One person performs all operating and logging functions.

(1) Multiband.

(2) **Single band:** Single-band entries on 50, 144, 220, 432, and 1296-and-up categories will be recognized both in QST score listings and in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 9, Awards.

(B) **Multioperator:** Multioperator stations must locate all equipment (including antennas) within a circle whose diameter does not exceed 300 meters.

4) **Exchange:** Grid-square locator (see Jan. 1983 QST, page 49). Example: WIAW in Newington, CT, would send FN31. Exchange of signal reports is optional.

5) Scoring:

(A) **QSO points:** Count one point for each complete 50- or 144-MHz QSO. Count two points for each 220- or 432-MHz QSO. Count three points for each 1296-MHz QSO. Count four points for each 2.3-GHz-or-higher QSO.

(B) **Multiplier:** The total number of different grid squares worked *per band*. Each 2° × 1° grid square counts as one multiplier on each band it is worked.

(C) **Final score:** Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score. Example: K3ONW works WA2GBG in FN12 on 50, 144, 220 and 432 MHz. This gives K3ONW 6 QSO points (1 + 1 + 2 + 2) and also four grid-square multipliers. Final score is 6 QSO points × 4 multipliers, or 24 points.

6) Use of FM:

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts.

(B) Use of the national simplex frequency, 146.52 MHz, or immediate adjacent guard frequencies is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting QSOs. The intent of this rule is to protect the national simplex frequency from con-

VHF-UHF-EME LOG									
CALL USED		9/14 1985		50 QSOs per side		432 log sheet 1 of 2			
NI80				Number each new multiplier is worked		ARRL SECTION or COUNTRY OHIO EN80			
FREQ.	MODE	DATE/TIME UTC	STATION WORKED	COMPLETE EXCHANGE		LIST NEW MULTIPLIERS	POINTS		
				SENT	RCVD				
432	AI-A3	1948	W3QIZ	EN80	FN00	FN00	1	2	
		21	K8TL		EM09	EM09	2		
		2020	W3TP		FM19	FM19	3		
		11	W8VP		EN90	EN90	4		
		12	K8HVA		EN80	EN80	5		
		15	W8TTS		EN90				
		24	K8MTE		FN21	FN21	6		
		2150	W8AC		EN91	EN91	7		
		2020	W8RAML		EN80				
		19	W44MVI		EM85	EM85	8		
		23	W8B8KC		EN72	EN72	9		
		27	AA4L		FM07	FM07	10		
		25	W8GYP		EN81	EN81	11		
		29	NA8QT		EM77	EM77	12		
		27	W44LIT		EM65	EM65	13		
		29	K8AMDT		EN80				
		2306	W89NR		EN52	EN52	14		
		16	W4UD		EN	EN50	15		
		13	AA9D			EM57			
		17	K8A9			EN71			
		20	W8A9			EN			
		21	K7			EN			

Properly completed sample log sheet.

test monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.10; 146.49, .55 and .58, and 147.42, .45, .48, .51, .54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the ARRL Repeater Directory may be used for contest purposes.

7) Miscellaneous:

(A) Stations may be worked for credit only once per band from any given grid square, regardless of mode. Crossband QSOs do not count. This does not preclude working a station from more than one grid square with the same call sign.

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent and received.

(C) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(D) Only one signal per band (6, 2, 1 1/4, etc.) at any given time is permitted, regardless of mode.

(E) While no minimum distance is specified for contacts, equipment should be capable of real communications (i.e., able to communicate over at least 1 km).

(F) Multioperator stations may not include QSOs with their own operators except on fre-

quencies higher than 2.3 GHz. Even then, a complete, different station must exist for each QSO made under these conditions.

(G) A station located *precisely* on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs of Technician class or higher using coherent radiation on transmission (e.g., laser) and employing at least one stage of electronic detection on receive.

8) **Reporting:** Entries must be postmarked no later than 30 days after the end of the contest.

9) Awards:

(A) Single operator

(1) Top single operator score in each ARRL Section.

(2) Top single operator on each band (50, 144, 220, 432, and 1296-and-up categories) in each ARRL Section where significant effort or competition is evidenced. [Note: Since the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.] For example, if WBØTEM has the highest single-operator all-band score in the Iowa Section and his 50- and 220-MHz scores are higher than any other IA single op's, he will earn a certificate for being the single-operator Section leader and endorsement stickers for 50 and 220 MHz.

(B) Top multioperator score in each ARRL Section where significant effort or competition is evidenced. Multioperator entries are *not* eligible for single-band awards.

(C) **Disqualifications:** See January 1985 QST, page 72.

Pacific Area Staff Looks to the Future

On April 20, in beautiful San Diego, the Pacific Area Staff of the National Traffic System met to look at present NTS issues and directions the System could take in the future. Developing technologies, such as packet radio, were very much on the minds of these NTS leaders. The meeting also provided ARRL Public Service Manager Mike Riley, KX1B, and Field Services Manager Rick Palm, K1CE, with an opportunity to learn firsthand of current NTS issues. Here is a summary of meeting highlights.

With PAS Chairman Bill Smith, W7GHT, presiding, attendees first turned their attention to the future of NTS and its role in relation to other areas of League volunteer resources. Noted especially was the Gordon Wenz, N6GW, proposal for expanded NTS participation in local, regional and long-range emergency communications. The Wenz proposal is presented in detail in this column in May 1985 *QST*.

Turning to administrative chores, the staff modified its Terms Of Reference to reflect the 1985 Hq. reorganization and other changes within NTS. Palm and Riley spoke at length on the reorganization and its implications for NTS. With the creation of the Field Services Department at Hq. comes renewed commitment to the League's number-one asset—the people within our Field Organization (including NTS).

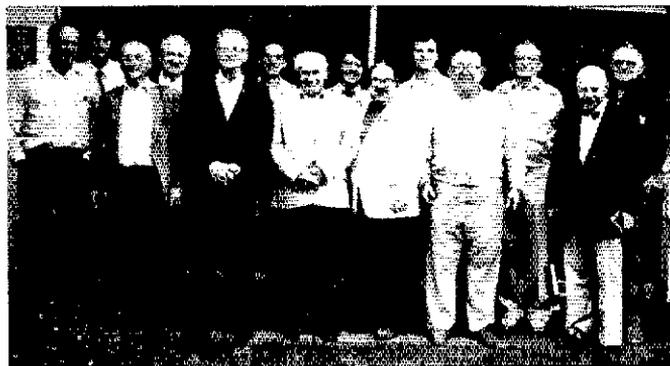
Hank Garretson, W6SX, PAS member-at-large, made recommendations to the staff concerning ways to attract new blood to the National Traffic System. He suggested that the staff look toward promoting more local VHF traffic nets and the inception of traffic-handling seminars on existing nets. The staff agreed that recruitment of new traffic handlers is a top priority to promote a vital

System. W6SX suggested that an NTS slide show be produced by NTS experts in conjunction with Hq. for promotion of NTS and traffic-handling activities.

PenDell Pittman, N0DZA, 12th Region Net/cycle two manager, reported on the Colorado "Emergency Team" concept, in which groups of two amateurs, a technician and a liaison travel to emergency locations for providing point-to-point communications and handling health-and-welfare traffic via NTS. Such a concept would be most useful in sparsely populated areas.

After lunch, San Diego Section Manager Art Smith, W6INI, introduced WA7HRA, KB5MU and WD6FPY for a demonstration of packet radio. The staff discussed the implications of this new amateur technology for the future of NTS. The feeling was that packet message handling will greatly supplement, but will not replace, the National Traffic System. The staff encourages the use of high-speed modes by all traffic handlers.

ND5T, KF7R and N6GW reported that current west-to-east traffic flow was now being handled with dispatch. The staff commended the Eastern Area Staff for initiating Cycle 3. "Further," the report continued, "we most sincerely appreciate the ongoing ef-



Pacific Area Staff members and ARRL Hq. representatives met in San Diego in April to discuss current and future NTS issues.

forts of the EAS to improve the flow of traffic, particularly from the west."

Turning to the ARRL Simulated Emergency Test, the Pacific Area Staff determined that no changes in cycles need occur. N6GW presented some thoughts on the idea that special SET exercises that would limit emergency simulations to certain randomly selected sites be held, and without prior notice. Headquarters will study the issue and report back to the staff and the Volunteer Resources Committee of the ARRL Board.

In sum, the meeting was highly successful, with all attendees displaying a great degree of enthusiasm. It was heartening to witness the discussions of such highly motivated and dedicated people. The National Traffic System is alive and well in the Pacific Area!—Richard K. Palm, K1CE, Field Services Manager

IN SERVICE ...

□ Kansas City, MO—March 10. Members of the Heart of America Radio Club provided medical communications during the St. Patrick's Day Run. The HARC members linked observers, doctors, ambulances and aid stations along the 10-km course. Nine amateurs participated, with K0UAA coordinating the effort and acting as net control during the event. (Mike Bellinger, K0UAA, PIA Missouri)

□ Gretna, LA—March 30. Communications for the Cataouatche District First Annual Cub Scout Cub-O-Ree were provided by Amateur Radio operators. The Cub-O-Ree is a sports event held in conjunction with the Diamond Jubilee celebration of Scouting in the United States. Thirteen Cub Scout packs, totaling 200 members, par-

ticipated in eight events. Amateurs were responsible for logistics and coordination of communications during the all-day event. (Sterling M. Guidry, Jr., WB5WPG)

□ Putnam County, NY—April 28. Twenty-one Amateur Radio operators provided communications during the March of Dimes Walk America. (Patricia A. Ward, N2EPT)

□ York, NE—May 4. Six amateurs provided communications during a fund-raising walk-a-thon for a four-year-old amputee. (John D. Crowdell, WA0BOK, EC York)

□ Rochester, MN—May 4. The Rochester ARC supplied communications during several races sponsored by the Rochester Methodist Hospital. No medical emergencies were reported. Amateurs involved were WD0HEB, KC0ZC and K0KTY, who put over 30 miles on his bicycle

following runners. (Gary Sharp, WD0HEB, AEC Olmsted County)

□ Columbus, OH—May 5. Members of the Central Ohio ARES (COARES) provided communications for two 5-km runs being held in conjunction with the Jesse Owens Track and Field Classic at Ohio State University. Ten amateurs participated. (Robert R. Adams, W8BKO, DEC COARES)

□ Pittsburgh, PA—May 5. ARES of Allegheny County responded to the invitation to furnish communications for the first Pittsburgh Marathon. The ARES group had four months' prior notice. Planning included meeting with the Pittsburgh Marathon officials and assessing their communications needs, then planning the role of the Amateur Radio operators. (William E. Kristoff, Jr., N3BPB)

□ Sheboygan, WI—May 5. A fire in the business section of Sheboygan, coupled with high winds, increased the possibility of an evacuation of residents. The local Red Cross chapter alerted ARES members and requested they stand by to assist during the possible evacuation. The alert was terminated within two hours. (David C. Odekirk, KA9DQK, AEC Sheboygan)

□ Scotts Bluff County, NE—May 6. No warning had been given when tornadoes were spotted rumbling through the county. The SKYWARN net was immediately activated and, within 10 minutes, 20 check-ins had been counted. Four confirmed funnels or tornadoes were sighted by the members of SKYWARN. The warning was terminated after an hour. (James F. Parks, WB0GPM, EC Scotts Bluff County)

□ Columbus, OH—May 9. Members of the Central Ohio ARES (COARES) provided communications for a 5-km run sponsored by the Ohio State Bar Assn. and the American Red Cross. Eight amateurs assisted. (Robert R. Adams, W8BKO, DEC COARES)

□ Beavercreek, OH—May 11. Amateurs in Greene County were asked to provide communications during the Thunder Road Bike-A-Thon. Eleven amateurs participated during this eight-hour event. (Norman E. Meranda, KA8BCD, EC Greene County)

□ York, NE—May 11. Six ARES members provided communications during the Heart and Sole run sponsored by the local American Heart Assn. Amateurs involved were AE0O, N0FYI, WD0EVZ, WA0RMH, KA0NCK, WA0BOK. (John D. Crowell, WA0BOK)

□ South Central Ohio OH—May 11 and 12. Members of the Central Ohio ARES (COARES) provided communications during the annual Tour of the Scioto River Valley (TOSRV), which attracted nearly 5000 bicyclists this year. Three linked repeaters provided communications coverage for the entire 210-mile route. When one of the participants was hit by an automobile, amateurs requested emergency medical assistance. A first-aid team was on the scene within two minutes. An ambulance arrived within five. When the ambulance crew realized the cyclist had severe injuries, a Life Flight helicopter was immediately requested to transport the cyclist to a nearby hospital. A total of 83 amateurs provided communications, which proved to be lifesaving. (Robert R. Adams, W8BKO, DEC COARES)

□ Dade County, FL—May 16. Operation Echo was a massive simulated aircraft-crash drill in the Florida Everglades. Organizations/agencies involved included the U.S. Coast Guard, U.S. Air Force, U.S. Army, commercial airlines, six local hospitals, Miami International Airport, county police and fire departments, emergency-preparedness squads, the Opa Locka Airport Fire Station and Amateur Radio operators. Dozens of "victims" were evacuated by helicopter and ambulance to the various hospitals. The amateurs supplied identification and arrival information from the hospitals to the affected airline. An average of only 17 minutes elapsed from landing time to complete transmission of names and triage tag numbers of the victims to the airline. Various participating agencies, including Federal Aviation Administration observers, lauded the amateurs for their superb communications efforts. A total of 24 amateurs participated in Operation Echo. (Joel Kandel, K14T, TC South Florida)

□ Worthington, OH—May 12. Twelve members of the Central Ohio ARES (COARES) provided communications during two 5-mile runs sponsored by the Central Ohio Lung Assn. and the American Red Cross. One of the participants

required transport to a local hospital. (Robert R. Adams, W8BKO, DEC COARES)

□ Westerville, OH—May 18. The Westerville Bicycle Club and local Red Cross requested the assistance of the Central Ohio ARES (COARES) during two bicycle tours. Fourteen COARES members provided communications as 242 riders participated in the all-day event. (Robert R. Adams, W8BKO, DEC COARES)

□ Olmsted County, MN—May 18. Thirteen ARES members supplied communications during the Diabetes Bike-a-thon. No injuries were reported. (Joe D. Fishburn, K0TTS, EC Olmsted County)

□ Columbus, OH—May 18. Nine members of the Central Ohio ARES (COARES) provided communications during a 7.5-mile Boy Scout hike that commemorated 75 years of scouting in America. One scout was reportedly bitten by a mouse. (Robert R. Adams, W8BKO, DEC COARES)

□ Carmel Valley, CA—May 18. While on a field trip to Chews Ridge, Allan Dunston, KA6IVQ, noticed that one of the cars his group had arrived in was burning. Group members attempted to smother the fire with portable fire extinguishers without success. By now, the brush under and near the car was beginning to ignite. At this point, Allan accessed K6LY/R with his handheld radio, dialed 911 on the autopatch and reported the fire. Minutes later, local Forest Rangers and the rural fire department had the blaze under control. (William E. Webb, NK6H)

□ Delaware County, OH—May 18 and 19. Nine members of the Central Ohio ARES (COARES) provided communications during the Hobie Cat Divisional Sailing Regatta, sponsored by Hobie Fleet 85, the Ohio Department of Natural Resources and the Delaware County Red Cross. Amateurs were stationed in boats along the course. No injuries were reported, with the exception of a few chilled sailors on Saturday (they were treated with chicken soup). (Robert R. Adams, W8BKO, DEC COARES)

□ Granville, OH—May 20-25. The Newark ARA provided volunteer radio-communication services for the National NCAA Division III Track and Field Championships, hosted by Denison University. Over 900 athletes, representing well over 120 colleges, participated in the six-day event. The professionalism of the amateurs was praised by Denison University's Meet Director, Bob Shannon. (Mike Mickelson, KD8DZ)

□ Kennebunk/Biddeford, ME—May 26. For the sixth year, members of the Saco Valley Amateur Radio Service, Blackstrap Repeater Assn. and the Portland Amateur Radio Assn. joined forces for the Maine Coast Marathon, sponsored by the New England College of Osteopathic Medicine in Biddeford. A total of 22 amateurs participated, including WB1CIM as net control. (George A. Moran, WB1FBE, EC Kennebunk)

□ Scotts Bluff County, NE—May 27. Local amateurs involved with SKYWARN were activated when a tornado touchdown was confirmed. The tornado's damage was limited to several high-tension power lines. Ten amateurs were alerted. (James F. Parks, WB0GPM, EC Scotts Bluff County)

□ Smithtown, NY—May 28. Central Suffolk ARES, comprised of the Townships of Brookhaven, Smithtown and Islip, provided medical and logistic communications during the March of Dimes WalkAmerica. Amateurs were stationed at each checkpoint along the 25-mile course. According to reports, Ken Lazowick, KD2AS, performed in an excellent manner as Net Control. (Bill Frisch, KA2JMA, EC Brookhaven Township)

□ Hickory County, MO—May 29. A severe storm developed in West Central and Southwestern Missouri during the evening hours. The local emergency net was activated by EC NF0X. A short time later, N0RB, driving through the storm area, was forced off the road by high winds and minor flooding. His car traveled 200 feet down an embankment, striking two trees and coming to rest against a large rock at the bottom of a culvert. He contacted NF0X via 2-meters and requested help. KB0AL acted as relay for the emergency vehicles rushing to the scene while NF0X and KC0FR proceeded toward the scene. The emergency-extraction vehicle had been deployed earlier to another accident so the two amateurs on scene were joined by N0BLP. The amateurs remained with N0RB and his wife until the authorities arrived. (Harry Bundridge, NF0X, EC Hickory County)

□ Wabasha County, MN—June 8. Amateur Radio operators supplied communications during the Zumbro Zig-Zag, which consists of three races: 5 miles of canoeing, five miles of running and 25 miles of bicycling. Although the temperature reached 101°, none of the participants required medical attention. KC0ZC, N0EUC, K0KTY, N0EKL and K0TTS provided this service. (Joe D. Fishburn, K0TTS, EC Olmsted County)

□ Bristol, CT—June 17. Thirty members of the Chippens Repeater Assn. provided communications and organizational support during Bristol's bicentennial parade. No major problems were encountered during the four-hour event, although several street sweepers were summoned to clean up after the equestrian divisions. (Richard Ladisky, WA1NSJ, Bristol Civil Preparedness Officer)

ARRL SECTION EMERGENCY COORDINATOR REPORTS MAY 1985

Thirty-nine SEC reports were received, denoting a total ARES membership of 20,798. Sections reporting were: AK, ALB, CO, CT, EMA, ENY, EPA, ID, IL, KS, MDC, ME, MI, MN, NE, NEL, NH, NV, OH, ONT, ORG, PAC, SC, SCV, SV, SD, SDG, SFL, SJV, SNJ, UT, VA, WA, WMA, WNY, WPA and WV.

Reports were not received by the following Section Emergency Coordinators: AL, AR, AZ, BC, DE, EBAY, GA, IN, KY, LA, MAN, MAR/NFD, MO, MS, MT, NC, ND, NM, NTX, NYC, NNJ, OK, OR, QUE, RI, VT, SASK, SB, SD, SF, STX, TN, WI, WIN and WY.

SEC monthly reports for August should be received in the Public Service Branch at ARRL Hq. no later than September 12. Reports received after the 12th will be entered as time permits.

Transcontinental Corps May 1985

August TCC reports should be received in the Public Service Branch no later than September 12.

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	108	86.0	440	888

TCC Central	84	90.3	347	708
TCC Pacific	108	87.1	434	—
Summary				
Cycle Four				
TCC Eastern	142	91.6	696	1401
TCC Central	59	95.2	221	462
TCC Pacific				
Summary				

TCC Certificates Issued This Month

N4GHI K3OZ

TCC Roster

W4JL, W4AJTE, W4F4X, N5AMK, N5BT, W5CTZ, W5KLV, K05RQ, W8SOXE, K05RC, W85YDD, KW9J, W9JUU, K08EPY, ND5T, W5JOV, K7BA, K08O, K6UYK, K6YBV, W8INH, V66CHK, KR7L, KF7R, K07EY, W87WOW, K7OVK, K07FE, N0A, W4BOYI, A4AAT, N1AWX, N1BHH, K48CPS, K03F, W42FJJ, W44FTK, N4GHI, W83GZV, K2HMH, K4JST, K8OZ, W8PMJ, K1TQ, W8QHB, W1QY, KW1U, K3BUD, AF8V, N2XJ, W8BYDZ, N5BB, W85CIG, W5GHP, K5GM, K5OAF, N5TC, K5TL, KV5X, KW9J, W89UYU, K89X, W0HI, K5OU, K1BA.

LOZCW MON MOSSB MEOW MOFON NEMOE HBN PHD PTN (MO), IMM MTR (MT), NCEN NCMN CN CSN CNCTN PCTN RARS CFARS THEN PETN M2MEN (NC), NE75 NE40 NCHN NCW NNN WNN NSN NMPN BVARES BRARES CC2MN ENTMARS MN2MN BLARES2 MLARES20 PV2MN PVARC SBARES2 (NE), MCEN GSFM NNN GSPN MSOVP (NH), NJN/E NJN/L NJM NJPN OBTNN STVN220 SJVN MSWWARC SWARN MCN MCN (NJ), NYS1 NYS4 NYS5 N4PON WDN/M WDN/Y WDN/S OCTEN/4 OCTEN/5 CNYTN 6TAR NYSPTEN ESS GNET BSN JCARGN BRVSN MVTN SCVHFTN NCVHFTN NLI/GW BAVHFTN NYS/M (NL), NON OTWNN OPEN ONON OCWA-83 OLZ EATIN STN OLE (OK), OSN WCN OHNN OARESPTN BSN PDXARES LBLARES (OR), EPA EPAEPTN PTTN ATN D3ARES D5ARES D6TRICNTY D6SEN D8ARES PWAJARES MARCIARES MARCTN PFN (PA), KTN OLN OPN OSN OSND OSN2 TIN ARES/ON (ONT), QSN (OUE), CN CSN CNN LC2MN GPD2MN BR2MN YC2MN (SC), TNCWNT TNPNT TNVHFTN RS (TN), TEX TSN TTN DFW NET (TX), BUN UCN DGSN (UT), VTN VSN VSN VNE VNL VLN STAN SVEN SVEN (VA), VTN VSN VSSB VTRFD CAR VTPN GMM CVFM VTFM (VT), EWNT NTN NWSBBN P5TS WARTS WSN (WA).

August section and local net reports should be received in the Public Service Branch no later than September 12.

W86BZQ	W9NXG	66	VE4RO
W7LNE	71	K4VWK	K08OO
K48ODQ	WA6QLA	KB4BZA	KA2OPG
WA1DXT	WA6WJZ	65	KA9EWN
WD0BOX	WA4EYU	WD4NYL	80
76	K05FR	N0EVC	WD4HBP
VE3BDM	K07OVK	K0KDJ	KA1T
N4JRE	VE4IX	64	WA4JTE
KJ9J	K4VHC	KB1PA	N2BFG
W84ADL	W4FMZ	KA7KAJ	59
W88GXT	N0DZA	WA3UNX	N1BYSJT
K4ZN	70	KQ3T	56
W0LAE	K3NNI	W4HON	N5EZMT
75	K2UBX	WD4BSC	52
N0BKE	KA1KTH	K2YAI	N4LFX/T
KB9LT	AK2E	KA4EYA	50
WA0TFC	ND9V	63	W1YOL/T
ND2S	69	KX2T	48
K2YOK	KG2D	VE3GT	KA1HPOT
KB4IV	N10R	WB0WJ	47
74	KN1K	KC3AV	47
KY1E	N7GDW	KR4V	WA2MGV/T
W8FRC	68	KJ1M	N9EJOT
WD9DNQ	KA4YHS	WA3CKA	44
W5KLV	W8DHB	N8DD	KB4EWO/T
K4AKP	W85YDD	62	43
KB9QX	W1KRV	N1BUG	KA9RIU/T
73	WA3DUM	W8OUD	41
WB9PFZ	W3DKX	WA4RNP	KA2COX/T
NT4S	67	KA5PE	40
N5DFC	KB4LB	WA4MNR	40
72	NF8B	61	KA1MAM/T
N4DAS	KA4MTX	N1BGW	KA7TCE/T
WD4ZY	WD4PBF	WD8EB	
AE5I	K8JDI	WB8MTD	
VE2FMW	AA4GL	KA5AZK	

National Traffic System May 1985

August NTS reports should be received in the Public Service Branch no later than September 12.

Net	Sess.	Tfc.	Avg. Rate	% Rep.	% to Area
Cycle Two					
Area Nets					
EAN	31	842	27.2	561	91.4
CAN	31	794	25.8	509	100.0
PAN*	62	798	12.9	478	99.5

Region Nets	Sess.	Tfc.	Avg. Rate	% Rep.	% to Area
1RN	62	498	.8	.039	100.0
2RN	56	194	3.5	.234	69.4
3RN	41	315	10.2	.049	97.0
4RN	62	644	10.4	472	78.1
RN5	62	721	11.6	450	95.8
RN6	61	402	6.6	.324	100.0
RN7	62	674	10.9	623	84.1
8RN	No report received				96.8
9RN	60	354	.6	.304	86.0
TEN	No report received				100.0
ECN	No report received				54.8
TWN	53	151	2.8	.226	74.0

TCC Eastern	108	1328
TCC Central	84	1055
TCC Pacific	108	434

Area Net	Sess.	Tfc.	Avg. Rate	% Rep.	% to Area
EAN	30	198	6.6	.376	65.0
Region Nets					
1RN	31	84	2.7	.023	71.4
2RN	30	194	6.5	.492	91.3
3RN	No report received				90.0
4RN	No report received				63.3
8RN	No report received				33.3
FCN	No report received				43.3

Area Nets	Sess.	Tfc.	Avg. Rate	% Rep.	% to Area
EAN	31	1441	46.5	.322	87.1
CAN	31	729	23.5	.976	98.9
PAN	31	966	31.2	.9415	96.8

Region Nets	Sess.	Tfc.	Avg. Rate	% Rep.	% to Area
1RN	57	800	8.8	.053	93.6
2RN	61	241	3.9	.404	88.9
3RN	No report received				90.3
4RN	62	618	10.0	.041	100.0
RN5	60	586	9.5	.512	90.0
RN6	62	528	8.5	.059	97.0
RN7	62	462	7.5	.704	91.8
8RN	58	425	7.3	.399	90.0
9RN	62	492	7.5	.488	83.0
TEN	62	271	4.4	.350	78.0
ECN	No report received				51.6
TWN	61	353	5.8	.373	84.3

TCC Eastern	No report received
TCC Central	59 683
TCC Pacific	No report received

* PAN operates both cycles one and two.
 † TCC functions not counted as net sessions.
 ‡ Section and local nets reporting (219): AENB ATNM AEND AENX AENW AENY AENV WAEN AENZ (AL), APSN ATN (ALB), BCEN (BC), SCN/SCB SCN/1 SCN/2 SCN/V RTTYV NCN (CA), SEN DEPN DTN (DE), CFRN FMTN GCVTN GN LSSN NFPN SVTN TPTN VEN QFN FMSN GN QFNS FMTN FPTN FAST TPTN FPN SEFTN SWFTN PEN PRVAN SPARC PBTN DEN ENMC (FL), GSN GCN GTN CGVN GSNB (GA), ISN ITN ILN (IL), QIN ICN IRN ITN (IN), KNTN MKPN 3ARES WTEN 11ARES TSTMN KYN 7ARES NKARC KYPON CARN (KY), EMRI EMRIPN EMRISN EM2MN HHTN CITN NEEPN WMPN WMTN WMN (MA), MEPN (MD), AEN MPNS RACES PTN SGN YEAR AFAR (ME), MITN QMN UPN MACS MNN (MI), MSN/1 MSN/2 MSN MSN/RTTY MSPN/1 MSPN/2 MNAMWXNT PAW (MN), CMEN MCARES RRABN ZAEN

Public Service Honor Roll May 1985

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 SM). 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.; (9) Participating in a public service event, 5 points, no max. This listing is available to Novices and Technicians who achieve a total of 40 or more points. Stations that qualify for the Public Service Honor Roll 12 consecutive months, or 18 months out of a 24-month period, will be awarded a special PSHR certificate from HQ.

August reports submitted for this column should be received at ARRL HQ, no later than the September 12. PSHR reports should be listed separately from Section News reports.

222	WF4X	W4ANK	88
K7VW	N4GHI	KA1GWE	WD8OUO
182	AE1T	K2ZVI	KA8VOZ
W7LRB	112	99	KA9CPS
158	WB4WYG	KB4WT	W5CTZ
KD8KY	W7VSE	87	KD8KY
155	AF8V	98	W8BMO
WB7WOW	WB0TED	N4KFU	KA2BHR
151	111	WD4ALY	WB4HRR
WB5SRX	WA4EIC	97	WB2EAG
150	KB1AF	K3JL	KC2TF
K4SCL	W2MTA	96	86
KB0Z	110	WB8JGW	WD4KBW
142	WB1HIH	N5AMK	WA1YNZ
KK3F	KD8RD	K2VX	N3COY
136	WB2VUK	W4CKS	KA9FFO
WA4QXT	109	WD5GKH	KA4BCM
KA3DLY	KJ3E	KT1Q	85
133	NM8I	WD6DOB	WD8KQC
K5CXP	108	84	KR7L
132	KB2HM	W9DM	WB4YQP
W2PKY	WB1GXZ	W1TN	KB7FE
128	N2XJ	KA8OMM	WBQHB
KD7ME	KA2MYJ	94	83
127	106	VE3WM	KA4GUS
VE2CP	WB2OWO	KA8BWM	WB0YH
126	WB2UVE	K0GP	N0CLS
W9YCV	K8CMR	93	KA5SPT
WA2ERT	N8EFB	VE3KK	KA4ERP
123	105	WA1FCD	N7B9W
KT5Y	WF8Q	WD8RHU	82
121	WB6QBZ	W0IKT	WB4VMX
WB8RFB	K7GXZ	92	81
120	KZ8Q	KG4VK	N8EVC
KA0EPY	104	N6AWH	WB2DS
117	W4PIM	91	WD8PAF
KA1EXJ	WB4WII	80	KA7AID
VE4AJE	WB2MCO	K8ND	80
KW9J	103	AA4HT	KJ3T
116	AK1E	KA4HSC	N4PL
KB8I	KA2SPH	N1CPX	K5OAF
KC9CJ	WA4JDH	AL7W	KB4GPN
KC3Y	102	90	79
K4NLK	AG9G	KY4U	WD9FRI
115	KA4SAA	VE3DPO	KA4EYF
WX4H	K2ZM	WA2KQJ	WD0GUF
N4EXQ	101	N8AEG	WA8GMT
114	W9FWZ	89	78
KA0ARP	KB4OZ	W7LG	KL7JUG
KW1U	KD4KK	N9BDL	N1BJV
K4JST	WB8OM	K48KHS	WD9IID
113	100	N4KSO	N6CVF
WA4PFK	KC3LY	KS5V	KF7R

Brass Pounders League May 1985

The BPL is open to all amateurs in the United States, Canada and U. S. possessions who report to their SM 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 the standard ARRL form.

August reports submitted for this column should be received in the Public Service Branch at ARRL HQ, no later than September 12. BPL reports should be listed separately from Section Traffic reports.

Call	Orig.	Rcvd.	Sent	Divd.	Total
W3CUL	801	869	1397	93	3160
WA8HJZ	0	1257	30	781	2088
N0BQP	32	1214	68	750	2064
KA9CPA	26	1230	81	15	1352
KD8KY	477	349	220	57	1103
W3VR	341	289	401	29	1080
K6UYK	58	529	460	7	1054
WF4X	53	452	398	17	920
W9JUU	0	482	386	2	880
KW1U	2	453	337	13	805
KA8CPS	24	283	371	29	707
WA4JDH	2	320	375	2	699
W7VSE	2	354	317	6	679
WB7WOW	5	348	290	9	652
KD7ME	0	295	336	17	648
WX4H	1	297	305	11	615
N4PL	62	241	283	26	612
K0JAN	0	350	31	187	578
KA0CZW	31	256	138	149	574
W8BO	2	250	305	5	562
N5AMK	0	283	207	0	500

BPL for 100 or more originations plus deliveries:

KA8UYR	171
VE2CP	168
KY8Y	151
WD4IO	145
W7LRB	107

Independent Nets May 1985

August reports submitted for this column should be received in the Public Service Branch at ARRL HQ, no later than September 12.

Net Name	Sess.	Tfc.	Check-ins
Amateur Radio Telegraph Society	62	587	247
Central Gulf Hurricane Net	31	169	4587
Clearing House Net	30	108	294
Early Bird Net	31	1011	301
Empire Slow Speed Net	31	80	362
Golden Bear Amateur Radio Net	31	202	1777
Midwest RTTY Net	29	53	207
Mission Trail Net	31	128	1003
North American SSB Net	27	180	36
NYSPTEN	30	52	515
Southwest Traffic Net	31	291	1323
West Coast Slow Speed	31	386	136
75-Meter Interstate SB Net	31	277	433
20SSBN	27	574	354
7290 Traffic Net	52	558	2739

Amsterdam, Netherlands: In celebration of "Sail '85," the Nederlandse Communicatie Vereniging will sponsor station PA6SAI Aug. 1-6 in conjunction with the sailing of ancient vessels from various countries to Amsterdam. Operation will be on all modes on the 80, 40, 20, 15, 10 and 2-meter bands. A special QSL will be available. For more information, contact NCV, Secretariaat afd. Amsterdam, Postbox 5651, 1007 AR Amsterdam, Netherlands.

Fort Eustis, Virginia: "Super Day '85," commemorating the anniversary of the U.S. Army Transportation Corps, will be held Aug. 2. Stations contacting WB4YVE, 1300-1900Z, will be awarded a certificate. Approximate frequencies: phone—7.200 and 14.240 MHz; CW—14.050 MHz.

Olean, New York: The Enchanted Mountain Amateurs will operate WA2TQM on August 3 from the Olean Recreation Center Complex, 1300-2100Z, commemorating the annual Enchanted Mountain Festival. Phone frequencies will be in the lower 25 kHz of the General class bands. Certificate via "Special Events," P.O. Box 668, Olean, NY 14760.

Canton, Ohio: The Pro-Football Hall of Fame Greatest Weekend will include station W8AL Aug. 3-4. Operation will be 1700-2200Z each day. RTTY—14.092 MHz; phone—7.272 14.296 MHz; CW—7.058 14.058 MHz. For an HOF QSL card, send an s.a.s.e. to A. E. Schermerhorn, W8FEC, 505 E. Mohawk Dr., Malvern, OH 44644.

Friendship, New York: Allegany Highlands ARC will operate KW2J 1300-2100Z August 4 in observance of National Friendship Day. Frequencies: CW—3.745 7.145 14.060 21.145 MHz; phone—3.880 7.280 14.280 21.380; RTTY—14.280. Certificate for QSL and s.a.s.e. to P.O. Box 373, Friendship, NY 14739.

Selkirk, NY: The Albany Amateur Radio Assn. will activate K2CT on Aug. 4, from 1600-2200Z, as part of the annual CONRAIL employee open house. Operation will be on the low end of the 20-meter General and 15-meter General and Novice bands. Commemorative certificate for an s.a.s.e. to K2CT, c/o Box 221a, RD 1, Nassau, NY 12123.

Morgan City, Louisiana: The St. Mary AR Transmitting Society, SMARTS, will operate NT5K to com-

memorate the 125th anniversary of the founding of Morgan City and to celebrate Friendship Day. Operation will be 1600-2200Z Aug. 4, on approximately 7.255 and 14.275, and on 146.52-MHz simplex. Certificate for an s.a.s.e. to Jackie Price, KA5LMZ, 708 Front St., Morgan City, LA 70380.

San Jose, California: The San Jose State University ARC will operate W6YL to commemorate the 1985 World Police/Fire Games. Operation will be from 1900Z Aug. 4 to 0700Z Aug. 5, 1900Z Aug. 5 to 0700Z Aug. 6, 1900Z Aug. 6 to 0700Z Aug. 7, and portions of Aug. 7 through Aug. 11. Frequencies: phone—3.870 7.240 14.270 147.555 MHz; CW—7.125 and 14.040 MHz. Certificate for large s.a.s.e. to SJSU ARC, c/o Student Programs and Services, Box 2, San Jose State University, San Jose, CA 95192.

Kansas City, Kansas: The Jayhawk ARS will be operating W9LB in conjunction with the Wyandotte County Fair, Aug. 8-10. Operation will be daily in the afternoons and evenings on Aug. 8 and 10 and all night on Aug. 9, in the center portions of the General phone and CW bands on 80-10 meters and in the center portions of the Novice bands. Certificate available for a QSL and s.a.s.e. to Jayhawk ARS, P.O. Box 4282, Kansas City, KS 66104.

Hay Springs, Nebraska: The Pine Ridge ARC will operate W9FLO from the home of the Monster of Walgreen Lake. Operation will be 1700-2400Z Aug. 10, 35 kHz up from the lower edges of the General class 80-15 meter phone bands. Commemorative QSL for a large s.a.s.e. to N9BUN, H. C. 56, Box 191, Hay Springs, NE 69347.

Brookfield, Illinois: The Chicago Suburban RA will operate station N9BAT from the Brookfield Zoo to celebrate their Annual Country Fair Days. Operation will be 1500-2300Z Aug. 10-11, on phone frequencies 7.250, 14.250 and 146.55 MHz. A special QSL card is available for a QSL and size-10 s.a.s.e. to N9BAT Special Event, P.O. Box 88, Lyons, IL 60534.

Columbia, Missouri: The Central Missouri RA will operate WD9DVG from the Missouri State Fair, Aug. 15-24, on 80, 40 and 20 meters. QSL and s.a.s.e. to CMRA, P.O. Box 283, Columbia, MO 65205.

Chicago, Illinois: The DuPage ARC will operate sta-

tion W9DUP in honor of the 40th anniversary of VJ DAY. Operation will be 1300Z Aug. 18 until 0200Z Aug. 19, from the deck of the submarine U.S.S. *Silverfish*, docked at a war museum alongside Navy Pier. Frequencies will be 7.240 and 14.240 MHz. Submarine QSL card available for an s.a.s.e. to W9DUP, P.O. Box 71, Clarendon Hills, IL 60514.

Finn Creek, Minnesota: The Wadena Area ARC will operate from a two-day folk festival from 1500Z Aug. 24 to 0400Z Aug. 25 and 1500-2100Z Aug. 25. Operation will be on 3.950, 7.250 and 14.250 MHz. Certificate for a large s.a.s.e. via WAARC, c/o Carl L. Noble, P.O. Box 237, Deer Creek, MN 56527.

Waterford, Connecticut: The Tri-City ARC will operate KA1BB from the Waterford I-95 weigh station to promote safe Labor Day holiday auto travel. This is in conjunction with the third annual Stay-Awake Coffee Stop offered by BSA Troop 24, Niantic. Operation will be from 1700Z Aug. 31 through 2300Z Sept. 2 on 3.895, 7.245 and 14.295 MHz. Talk-in on 146.52-FM simplex. QSL via Tri-City ARC, P.O. Box 686, Groton, CT 06340.

QSLing Special Events Stations: To get your QSL or certificate from any of the special-events stations listed here, follow these simple guidelines: (1) After working the station, carefully fill out a QSL card for the QSO. Show the date and time accurately using UTC. (2) Prepare a stamped, self-addressed envelope. If sending for a certificate, use a 9" x 12" envelope if you want an unfolded certificate, or a size 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your s.a.s.e. to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-events stations will often print their cards and certificates after the operation is over so that they will know how many to order.

Note: The deadline for receipt of items for this column is the 15th of the second month preceding the publication date. For example, your information would have to reach Hq. by August 15 to make the October issue. For the convenience of those wishing to operate, please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign (if any) of the special-event station. Requests for donations will not be published.

Contest Corral

Conducted By Edith Holsopple, N1CZC
Assistant Contest Manager, ARRL

AUGUST

3-4

160 Meter SSB Contest, July QST, page 79.

VO-DX Contest, July QST, page 79.

ARRL UHF Contest, July QST, page 78.

6

West Coast Qualifying Run, 10-35 WPM, at 0400Z Aug. 7 (9 P.M. PDT August 6). W6OWP prime, W6ZRJ alternate. Frequencies are approximately 3590/7090 kHz. Underline 1 minute of the highest speed you copied, certify your copy was made without aid and send to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large s.a.s.e. will help expedite your award or endorsement.

10

WIAW Qualifying Run, 10-35 WPM, at 0200Z Aug. 11 (10 P.M. EDT Aug. 10). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Aug. 6 listing for more details.

10-11

European DX Contest, CW, July QST, page 79.

17-18

New Jersey QSO Party, sponsored by the Englewood ARA, from 2000Z Aug. 17 until 0700Z Aug. 18 and from 1300Z Aug. 18 until 0200Z Aug. 19. Phone and

CW are considered the same contest. Work stations once per band and mode. CW QSOs in the CW sub-bands only. NJ-to-NJ QSOs allowed. Exchange signal report, serial number and QTH (county for NJ station; ARRL Section or country for others). Suggested frequencies: CW—1.810 3.535 7.035 7.135 14.035 21.100 28.100 MHz; phone—3.900 7.235 14.280 21.355 28.610 50-50.5 144-146 MHz. Suggested activity schedule: phone on the even hours; 15 meters on the odd hours, 1500-2100Z; 160 meters at 0500Z. NJ stations count 1 point per W/VE QSO and 3 points for DX (include KP4, KH6 and KL7). Multiply by the number of ARRL Sections worked (including NNJ and SNJ; max. 74). Non-NJ stations count 1 point per NJ QSO, and multiply by number of NJ counties (max. 21) worked. Awards. Include an s.a.s.e. for results and mail logs to be received by Sept. 14 to EARA, P.O. Box 528, Englewood, NJ 07631-0528.

KCJ Single-Operator CW Contest, sponsored by the Keymen's Club of Japan, from 1200Z Aug. 17 until 1200Z Aug. 18. Single operator, CW only. All-band and single-band categories. No cross-mode, cross-band, repeater, satellite or multioperator QSOs. Work stations once per band. Exchange signal reports. JA stations also send two-character prefecture code. Others send two-character continent code (AF, AS, EU, NA, OC or SA). Count one point per JA QSO and multiply by the number of different JA prefectures (max. 47) worked per band. Mail entry by Oct. 31 to Nagashima Takayoshi, JA7GAX, 20-6. Kabasawayama, Imozawa, Miyagitown, Miyagi-Pref. 989-32, Japan.

Alaskan QSO Party, sponsored by the Alaska DX Assn., from 0200Z Aug. 17 until 0200Z Aug. 18. Work stations once per band and mode. KL7 stations send

signal report and judicial district. Others send signal report and serial number. Suggested frequencies: phone—3.895 7.260 14.285 21.360 28.660; CW—1.807 3.560 7.060 14.060 21.060 28.060. AK stations count two points per 10-15-20 meter QSO and 5 points per 40-80-160 meter QSO. Multiply by total states, VE/VO provinces and DXCC countries worked per band. Others count 5 points per KL7 QSO on 10-15-20 meters and 10 points on 40-80-160 meters. Multiply by the total KL7 judicial districts worked per band (max. 4 per band). Mail entry by Oct. 1 to KL7AF, P.O. Box 1614, Kodiak Island, AK 99615.

23

WIAW Qualifying Run, 10-35 WPM, at 2000Z Aug. 23 (4 P.M. EDT). See Aug. 6 listing for more details.

24-25

All Asian DX Contest, CW, sponsored by the Japan Amateur Radio League, from 0000Z Aug. 24 until 2400Z Aug. 25. 160 through 10 meters. Entry classes: single op, single band; single op, multiband; multiop, multiband. No cross signal at any given time. Multiops may have a maximum of one signal per band. Exchange signal report and a two-digit number denoting the operator's age. YL stations may send 00. Count 1 point per QSO with Asian stations on 7 through 28 MHz, 2 points on 3.5 MHz and 3 points on 1.9 MHz. Multiply by the number of different Asian prefixes (WPX Rules) worked per band. Note: JD1 stations only on Ogasawara count for Asia. Use separate logs for each band. Mark multipliers the first time worked. Provide a complete summary. JARL Asian Countries list: A4

A5 A6 A7 A9 AP BV BY EP HL/HM HS HZ/7Z JA-JS JD1 JT JY OD S2 TA UA/UN/UV/UW-UZ/RA/RN/RV-RW/RZ9-0 UD UF UG UH UI UJ UL UM V85 VS9M/8Q VU XU XV 3W XW XX9 XZ YA YI YK ZC4 5B4 IS 4S 4W 4X/4Z 7O 9K 9M2 9N 9V and Abu Ail. Enclose s.a.e. and IRC for results. Mail logs to arrive by Nov. 30 to JARL, POB 377, Tokyo Central, Japan.

GARTG World-Wide RTTY Contest, Part 4 (of 5), sponsored by the German AR Teleprinter Group. VHF portion is from 1200Z to 1600Z Aug. 24. HF portion is from 0700Z to 1100Z Aug. 25. Score HF and VHF portions separately. VHF frequencies are 144, 432 and 1296 MHz; HF bands are 80 and 40 meters. No repeater QSOs. Exchange RST, QSO number, name and QTH; VHF add grid locator. Work each station once per band. Count 1 point per QSO; points on VHF are per kilometers worked. Count 1 point on 144 MHz, 2 points on 432 MHz and 3 points on 1296 MHz per kilometer worked. Total of QSO points is the final score. Classes: A—more than 200-W input; B—less than 200-W input; C—SWL; D—VHF. Logs must include all information. Mail to be received within 20 days to Wolfgang Puenjer, DL8VX, P.O. Box 90 11 30, D-2100 Hamburg 90, Fed. Rep. of Germany.

SEPTEMBER

1

Novice Sprint, sponsored by QRP ARC International, 200-0600Z Sept. 1. Work stations once per band. Exchange RST, state or province and membership number (or power output, if a nonmember). Count 5 points per member contact and 2 points per nonmember contact. Suggested frequencies are 3.710 7.110 21.110 28.110 MHz. Multipliers are states and provinces. A state/province may be worked once per band for s/p multiplier credit. Add s/p's separately for each band, 1 point each, then add total of s/p points for all bands to arrive at total s/p multiplier. DX countries count as s/p's. Multiply QSO points by states/provinces worked per band by power multiplier (4-5 W

output, $\times 2$; 3-4 W output, $\times 4$; 2-3 W output, $\times 6$; 1-2 W output, $\times 8$; 0-1 output, $\times 10$). More than 5-W output will be counted as check logs only. Bonus multipliers: If using battery power exclusively, multiply total by 1.5. If using a single element, nonrotatable antenna, multiply by 1.5. If qualified for both of the above, then do not use them; instead, multiply score by 2.5. To that total, add 200 bonus points if all 10 U.S. call districts are worked; add 200 bonus points if 5 Canadian provinces are worked; add 200 bonus points if 5 DX countries are worked. Use of QRP ARC summary sheets (for an s.a.s.e.) is highly recommended for scoring. Mail logs to be received by Oct. 1 to QRP ARC Contest Chairman Eugene Smith, KA5NLY, P.O. Box 55010, Little Rock, AR 72225.

LZ-DX Contest, sponsored by the Bulgarian Federation of Radio Amateurs, from 0000Z to 2400Z Sept. 1. CW only. Work stations once per band. Entry classes: single op, multiband; single op, single band; multiop, all band; SWL. Exchange signal report and ITU zone. Suggested frequencies: 3.510-3.560 7.000-7.040 14.000-14.060 21.000-21.080 28.000-28.100 MHz. Count 6 points per QSO with LZ stations, 1 point per QSO with stations on the same continent (including the same country) and 3 points per QSO with stations on other continents. Multiply by the sum of different ITU zones worked per band (max. 375). Mail logs within 30 days to Central Radio Club, P.O. Box 830, Sofia 1000, Bulgaria.

4

West Coast Qualifying Run, 10-35 WPM, at 0400Z Sept. 5 (9 P.M. PDT Sept. 4). See Aug. 6 listing for more details.

7

Summer Daze Sprint, sponsored by the QRP ARC International, 0200-0800Z Sept. 7. Phone only. Suggested frequencies: 1.810 3.985 7.285 14.285 21.285 28.885 30.385 MHz. No 30-meter contacts. The rest of the rules are identical to the Novice Sprint rules listed under Sept. 1.

8

WIAW Qualifying Run, 10-35 WPM, at 0200Z Sept. 9 (10 P.M. EDT, Sept. 8). See Aug. 6 and 10 listings for more details.

9-15

QCWA Invitational Party, sponsored by the Quarter Century Wireless Assn., from 1200Z Sept. 9 until 2000Z Sept. 15. All bands and modes. Repeaters may be used. No cross-band or net contacts. Work each station once. Exchanges: nonmembers give QSO number, signal report, year licensed, name and call; members give call, name, QSO number signal report, chapter number and state. Nonmembers count 2 points per QCWA member worked; members count 1 point per nonmember worked. There are no multipliers. Plaques and certificates. Keep phone and CW as separate logs. Forms are available for an s.a.s.e. to the sponsor. Mail logs by Sept. 25 to Onie Woodward, W1ZEN, QCWA Activities Manager, 14 Emmett St., Marlboro, MA 01752.

14-15

European DX-Contest, phone, July QST, page 79.
ARRL VHF QSO Party, this issue, page 75.

20

WIAW Qualifying Run

21-22

Can-Am Contest, phone, this page.
Scandinavian Activity Contest, CW.

27-29

Maine QSO Party

28-29

Can-Am Contest, CW, this page.
Scandinavian Activity Contest, phone.

29-30

Classic Radio Exchange

Rules, 1985 CRRL Can-Am Contest

Once again, CRRL is pleased to sponsor the Can-Am Contest. We hope you'll join in the fun this year, whether you're a newcomer to the Can-Am, or have been a part of the action before.

Rules

1) **Object:** For U.S. and Canadian amateurs to work as many stations in as many states and provinces, etc. as possible during the contest period on the 1.8, 3.5, 7, 14, 21 and 28-MHz bands.

2) **Contest Period:** Phone (third weekend in September)—from 1800Z Saturday, September 21, until 1800Z Sunday, September 22, 1985; CW (fourth weekend in September)—from 1800Z Saturday, September 28, until 1800Z Sunday, September 29, 1985. Single-operator stations may take one or two rest periods totaling 4 hours, and operate for a maximum of 20 hours on each weekend. Multioperator stations may operate for the full 24-hour period on each weekend.

3) Categories

(A) Single operator: One person performs all operating and logging functions.

- (1) Multiband
- (2) Single band

(3) QRP: Maximum 10-W input for the entire contest.

(B) Multioperator: Single-transmitter stations using more than one operator or a station

operated by someone other than the licensee of a club station.

4) **Exchange:** Signal report (use RS on phone, RST on CW) plus sequential QSO number (begin with 001) plus multiplier area abbreviation. U.S. amateurs use two-letter postal abbreviations for the 50 states, CN for possessions in the Caribbean, and PC for possessions in the Pacific and Antarctica. Canadian amateurs use NL in Newfoundland and Labrador, NB in New Brunswick, NS in Nova Scotia, PE in Prince Edward Island, SI in Sable and Saint Paul's Islands, PQ in Quebec, ON in Ontario, MB in Manitoba, SK in Saskatchewan, AT in Alberta, BC in British Columbia, YK in the Yukon and NW in the Northwest Territories.

5) **Scoring:** Phone and CW portions are considered separate contests, but phone and CW scores will be combined to determine overall winners. Stations may be worked only once on each band and each mode. U.S.-to-U.S. and Canadian-to-Canadian contacts count 2 points each. U.S.-to-Canadian and Canadian-to-U.S. count 3 points each. Multipliers are the 50 U.S. states plus the Caribbean and Pacific, and the 10 Canadian provinces plus the two Canadian territories and Sable/Saint Paul's Islands for a total of 65 possible multipliers per band (390 multipliers possible on all six bands).

6) **Reporting:** Keep logs in UTC (Z) time. Indicate multipliers only the first time on each band. Check logs carefully for duplicate con-

tacts, correct QSO points and multipliers. Single-operator stations must clearly indicate official rest periods in their logs. Complete entries consist of log sheets, dupe sheets and a summary sheet showing all scoring information, category of entry, operator's name and call, address of station used and operator's signature. Entries with over 200 QSOs must also include dupe sheets for each band. Official log, dupe and summary sheets are available and recommended. Send your request and an s.a.s.e. to CRRL or ARRL Hq.

Entries must be postmarked no later than October 30, 1985. Mail entries to CRRL Can-Am Contest, Box 65, Don Mills, ON M3C 2R6.

7) **Awards:** Certificates for top single operators on both phone and CW in each multiplier area. Top five multioperator stations in U.S. and Canada will receive certificates based on combined phone and CW scores. Trophies will be given to top U.S. single-operator and multioperator stations, and top Canadian single-operator and multioperator stations, based on combined phone and CW scores. Trophy presentations will be made at the 1986 Dayton Hamvention®.

8) **Miscellaneous:** Usual disqualification criteria will apply. Decisions of the CRRL Can-Am Contest Committee are official and final. Further information is available from Contest Chairman Yuri Blarovich, VE3BMV, at the address given in Rule 6.

The ARRL Field Organization Forum

CANADA

ALBERTA: SM, E Roy Ellis, VE6XC—A/SM: VE6AMM. SEC: VE6XC. ST/M/NOY/DEC: VE6ABC. FD activity is being planned once again—don't forget the rubber boots and rain capes. VE6ABC has his RTTY set up and even able to copy W1AW bulletins and such. Come fall there is talk about starting a net. See VE6ABC if interested. We need more tlc on our nets—will you help? If you are unsure about this biz give a listen on Sunday on 3750 Hz at 0830 A.M. local time and VE6AMM will show you how.

MANITOBA: SM, Jack Adams, VE4AJE—SEC: VE4FK. NMs: VE4's L.B. VJ, AFO, TE, ANR. Thanks to Dick VE4HK Director special events (WARC) who continues to demonstrate amateur radio participation. Dick's latest feat with the assistance of VE4ALZ who provided Radio Communications for the girl guide parade May 25. Kelly, VE4AJE, also assisted Dick in the girl guide parade. The parade consisted of 300 guides their leaders, several bands, floats and clowns. Also on May 12, Dick and Kelly provided communications for the Athletes Wear, run for fun, 10 KM race with about 500 runners participating. Thanks folks. Sad news to hear that Harvey VE4HW is now a Silent Key. Traffic net report ARRL/CHRL Evening net 31 sessions 649 QNI, 35 QTC - MTN (CW Net) 30 sessions 137 QNI 34 QTC - WRS 8 sessions 246 QNI no traffic. Traffic: VE4AJE 82, 4TE 32, 4IX 28, 4AFO 27, 4AAD 25, 4RO 19, 4FK 13.

MARITIME-NEWFOUNDLAND: SM, Don Welling, VE1WV—ASM: Aaron Solomon, VE1OC. Brit Fader Roast and Hfx. Metro Flea Market enjoyable week-end for many VE-1 Hams. VE1BSE new EMO co-ordinator Hfx. VE1UB recently retired CBC-TV. VE1WCV visited ZB1AU in S. Africa. Departures from VE-1 include VE1AHV and VE1CZO. Returning Snow Birds incl. VE1LZ, VE1SH, VE1AGU. Reopening illness incl. VE1ADN, VE1AII, VE1ARB, New Responders: VE1DY, Hammond, Plainville. Hfx. 146.085/146.685; Pleasant Ridge 146.10/146.70; Stanley 146.31/146.91. Coming Events: Bicentennial Hamfest, Saint John, N.B. Oct. 18-20. D.O.C. Exam Oct. 16. Silent Keys: VE1PA, VE1SS.

ONTARIO: SM, Larry Thivierge, VE3GT—BM: VE3LT. PGL: VE3AR. SEC: VE3GV. ST/M: VE3BDM. TC: VE3EJO. DECA: VE3GOL, VE3JJA. After the recent devastating tornado swept through parts of the south western portion of the Section, amateur radio played an important role, especially in the Barrie area. Health and welfare queries and traffic were handled on 2 and 75 meters by stations using emergency power. At this writing, details are incomplete however VE3NLLN, EC for the area was deeply involved. The three remaining operational Russian amateur satellites in orbit, TS5, PS7 and RS8 are each active on only two days of the week in order to limit the non-flying power sub-system. One satellite is switched on each day except Wednesday when there is no operation. VE3AJN, manager of the IATN, had a giant shadow cast over her front door when OA4CIT from Lima, Peru, dropped in for a visit—he's 8'7". VE3EJO, our TC, is very eager to expand the assistant Technical Coordinator program within the Section. If you feel you are qualified and have the desire, please contact Syd. I'm sure you'll enjoy working with him. Every club should have an ATC. VE3KIX, relocated to North Bay in the employ of Transport Canada, will be missed in the Ottawa area. If you're in the Guelph area, try and see the Fred Hammond, VE3JC, amateur radio man. It's worth the trip alone. VE3KIV was awarded the OARC's Technical Achievement Award for his entries in the Club's 1985 Homebrew contest. Runners up were VE3JMT and VE3FUB. Humber College has a bulletin board run by VE3OCQ covering amateur radio and short wave listening. The Ontario Trilliums are offering their Trillium award, WVE stations need six points to qualify. VE3CLP is the custodian. VE3CBW is off to Montreal on a three year assignment. New amateurs in the Section are: VE3OZK VE3OYN VE3PAP VE3PAJ VE3PCH. Have you made your reservations for the CHRL/RSO bash in London next month? Traffic: VE3KK 276, VE3DPO 125, VE3OY 113, VE3GT 103, VE3JJA 94, VE3EJO 80, VE3BDM 69, VE3BMM 69, VE3FUB 30, VE3KXB 30, VE3JN 23, VE3WG 21, VE3JSM 15, VE3WV 14, VE3EWD 12, VE3BAJ 7. (Apr.) VE3JSM 49, VE3KXB 11.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EJO. NMs: VE2AL, PLO: VE2YV, TC: VE2ED, NM: VE2EJO. Change of call: VE2FKD is now VE2JK. The QSN is now on its summer schedule and will resume full schedule in September. Felicitations au club VE2CBS, pour avoir fait du Hamfest 85 un succes et un grand nombre d'amateurs ont participes. Traffic: VE2CP 305, VE2BP 56, VE2EC 38, VE2EKC 36.

SASKATCHEWAN: SM, W. C. Munday, VE5WM—SEC: VE5CU. STM: VE5HG. BM: VE5WM. OBS: VE5JA. NMs: VE5EX, VE5NJ, VE5AEM, VE5AEJ, VE5BAF. Net reports: MJARC 2 meter - 30 sessions, 287 QNI; RARA-2 meter - 31 sessions 644 QNI, 5 QTC; PWXN - 31 sessions, 590 QNI; SPN - 31 sessions, 1167 QNI 18 QTC. Hamfest committee members attended ARC meetings at Prince Albert, Saskatchewan and Swift Current. The Stranraer VHF Repeater on 146.430 input/147.030 output is a welcome addition to west central SK. Remember the dates - August 2nd, 3rd, and 4th - Heritage Hamfest '85 in Regina hosted by the Regina Amateur Radio Association, Inc. Traffic: VE5BAF 20, VE5WM 7.

ATLANTIC DIVISION

DELAWARE: SM, John Hartman, WA3ZBI—STM: W3DKX. SEC: W3BQ. PIO: NSDIP. PSHR: K3JL, WA3DUM and W3DKX. The Nanticoke Amateur Radio Club held elections, the new officers are: Pres. Pat WA3FLJ, V. Pres. Carl KC3RY, Sec./Treas. Rich KV3D. The A.W.A.R.E. club will be holding exams on July 13th and on the 22nd. Visit Channel 6 tapes of Larry Ferrarini, KV3MK, Congratulations to Carol, Fred and KAGNOC for their upgrade to Advanced, and Bill, KV3U, on their upgrade to DFN QNI 403 QTC 61 in 23 sessions. DEPN QNI 56 QTC 12 in 4 sessions. SEN QNI 54 QTC 3 in 4 sessions. Traffic: W3PQ 119, W3QQ 74, W3BDUG 53, W3DKX 48, WA3WY

26, WA3DUM 18, WA3ZBI 17, K3JL 12, KA3IXV 8, KC3JM 7, N3AXH 6.

EASTERN PENNSYLVANIA: SM, Jim Post, KA3A—ASM—WA3PZO, KC3LM, KA3JGT, K3ZFD. TC: W3FAF. ACC: KB3NE. PIO: WA3AMQ. DECS: K3ZXC, AA3C, W3EEK, KB3UD, K3MWA, KB3LR, WA3JRL, N3AIA. Name Freq Time Daily QNI QTC Sess EPA 3610 0000/0300Z 487 207 59 EPA/EPTN 3917 2300Z 608 170 31 PTTN 3810 2300Z 241 95 31 ATN 146.67 2000 R W/F 47 10 10 D3ARES 145.37 1930R M 59 7 3 D5ARES 145.865 2100 R S 54 2 4 D5 Tri C. 146.655 2100R 1st W 18 0 1 D6ESN 147.00 2000R Tu/Th 51 0 4 D8ARES 147.300 1900 Tu 51 0 4 PWA/ARES 147.715 2000R Sun 86 3 4 MARC/ARES 147.060 2030R Sun 5 2 4 MARCTN 147.060 2030R MWF 181 35 13

NET NOTES: District 5, EC, N3BF: Reports a met covering Monroe, Wayne & Pike counties, has begun on the 146.655 repeater. Initial session shows promise. Check in on the first Wednesday of each mo on the DE Tri-county net. District 8, KC, WA3JRL: Reports a good job done on the Susquehanna Nuclear Plant emergency drill. Ruth and her group provided communication between the Berwick site and Penna. Pema Headquarters at Hamburg Ctr. The folks in the sixth ARES district responded to a call for communications at the Avco airport when an unfortunate airplane accident took several lives. Many participated. "Job well done" to all. Congratulations to our new affiliated club, the Overbrook ARC, Phila., PA Club officers are K3JR, pres., KM3V, Vice Pres., W3ADI, SEC. News from KNKX that N3COY has been awarded the TCC Eastern Cycle 4 certificate for 1985. The following clubs have renewed their club affiliation for 1985. Hilltoppers Trans Area Mid-Atlantic ARC, C-ARES, Hillsdale ARC, Murgas ARC, Westminster ARC, ARC. The news from W3AMQ, PIO, is that through the efforts of Rep. Gregory M. Snyder 94th District House resolution 109 was passed declaring the week of June 17 as Amateur Radio Week in Penna. Thanks to the C-CARS group for their nice reception on my recent visit. The S.M. had a tour of the QSL bureau and saw first hand why our cards are coming faster than ever. Traffic: N3COY 208, KA3DLY 172, N3CD 159, N3AZW 155, AA3B 125, W3JKX 80, WB3K 79, KB3UD 70, KA3IME 62, KA3JCI 59, K3TC 48, KC3LA 45, W3FAF 42, WA3JZ 41, N3AIV 41, W3AQN 33, WA3CKA 24, W3TWW 22, WA3GLX 14, W3VA 7.

MARYLAND-DC: SM, Karl R. Medrow, W3FA—The MEPPN gave Net Certs to KA3IID, W3JQN and W3VBM. W3GZU got a TCC/Eastern Cycle 4 Cert. KA3HDO of the Goodard ARC was named Atlantic Div "Amateur of the Year." Congrats to you all. W3JPT is already at work on W3ARC 87. K3JR, W3MR and K3CHP send 00 reports, but K3JR is moving. K3CHP is vacationing and W3MR is hard at work! W3ZNV delivered a lot of South County tlc. K3F led the traffic handlers. KC3Y cited KC3AV K1BGT N3DE KK3F KA2MYJ KC3Y WA3YLO and W1DMU for the MSN May Honor Roll. Good job! K3JE has little left to do for his Basement to Ground Floor Shack move. W3LDD has not mentioned DQ lately? WA2ERT takes over the MEPPN reins. KA3EWW is back into the harness. W3FUE says think Vaccations! KA3IID reports the Eastern ARC provided Comm for the Oxford Trifolion again. K3INI has the BEES working for him. K3MR makes the late MDD sessions. W3DDO, WA3VPL and WA2ERT were helpers at the KA3CDQ sponsored Public Event Station-Upper Marlboro. W3YVQ had a busy month earning a living! W3OYV got the works for satellite TV watching. KC3DW is doing yeoman work on the higher nets. W3BFFK has been enjoying local trips in his van! W3FZV has returned from vacationing in JA and DU. N3QA likes staying just put for a while. K3JE has been working with the local EC's helping to organize and increase the coverage with two-meter repeater use. WA3TOY and 18 provided Comm for an Anne Arundel Ridge-A-Bike. W3DFW says K3DMM, K3AFB, W3BMM, K3CAG, W3CXC, KA3DXH, W3FMM, W3BFUM, K3HYE, W3KX and WA3EJ did the summer time in Cumberland. The Md Mobilers with WB8K and WA3TOY W3D9L K3JF N3BCL W3VNM W3CM KB3TJ W8HEI and N3DEV were doing likewise for the Severn River Lions Club. With the Nets, Net/Manager Sessions/Traffic QNI Average. MSN/KC3Y 31/84/97. MEPPN/K3JE 30/151/31. Top Ten: K3JE WA8LI WA2ERT W3DKX K3CF W3FA K3GVX KA3CDQ W3ADUM and KB3NL WR PON/W3BFFK 21/14/10. MDC PON/W3OYV 5/0/11.6. Wicomico ARES/KA3HT 2/1/14. For April MDD/W3PQ 57/225/87. Top Brass: W3FA, W3QQ and K3CF. Traffic: KK3F 447, K3JE 246, KC3Y 199, K3NNI 158, W3FA 125, KC3DW 121, WA2ERT 100, N3QA 81, N3D7E, KA3EWW 67, KC3AV 54, W3ZNV 49, K3MR 29, W3BFFK 18, W3FUE 10, W3YVQ 17, W3DDO 16, KA3IID 16, W3LDD 16. (Apr.) KC3AV 57.

SOUTHERN NEW JERSEY: SM, Richard Baler, WA2HEB—SEC: K2QJL. STM: WB2VUB. ACC: K2JXE. TC: VACANT. SGL: VACANT. PIO: VACANT. BM: WB2VUB. OC: K2JHEB. This month has been tough on the section staff. Our SGL, W2XQ, started a new job with the state government and his position causes a conflict with being the section SGL. As a result, Tom had to reluctantly resign. Our OC, KB2MY was transferred to Michigan and our TC, W2JX, has also moved out of our section. I would like to have these positions filled as soon as possible. An SGL candidate should be a lawyer or have knowledge with the workings of the state government. Needless to say, the TC position should be filled by someone who is technically proficient. A PIO should be someone who has connections or has experience dealing with radio. TV and/or the newspapers. Again, let me stress that these requirements* are not etched in stone. Anyone who is a League member and has a technician or higher class license will be given serious consideration. I would like to announce the appointment of our section's first Assistant TC, Frank Camposano, N2CQ1 of Lakhurst. Frank's speciality will be in the area of Packet Radio. His address is: 164 Brandon Road, Lakhurst, NJ 08733. 73. Traffic: WB2JVB 147, W2JML 39, K2SB 39, WA2MGV 30, KA2COX 10, WA2HEB 1.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—SEC: W2BCH. ACC: N2EEL. PIO: WA2EJ. NMs: K3GK, BM: W2GL. SGL: K2QJ. OOC: WA2ET. STM: OPEN. HAMFESTS: Traffic Picnic Newkay Valley Aug. 10. Trumansburg Aug. 24. HAM-O-RAMA Sept. 14. Chemung Sept. 28. Syracuse Oct. 5. CLUB OFFICERS: RARA K2RJ K2VQ KA2FTV N2DPF: Rochester VHF Group KS2Z K2SPO WA2YTM W2UAD W2E2ELB: Squaw Island K2ZU KA2UDH KA2UQD WA2VUB. CONGRATS: K2GVI Central New York Ham-of-the-Year, KA3HO Atlantic Division Amateur-of-the-Year the "man behind the services" at WA3NAN during Space Shuttle live broadcasts.

NYS/1*	311-136-31	NYS/4*	394-167-31
WDN/1*	282-062-31	JCARCN	485-006-31
Mike Farad	196-037-31	OARCN	061-000-05
NYPON*	757-288-31	Black River	323-004-31
NVSPEN	515-082-30	NYNTN*	300-053-31
ESS	362-080-31	OCTENL*	

OCTENIE*
Q Net 349-003-30 STAR* 010-007-03
WDN/E* 557-118-31 WDN/L* 875-121-31
Blue Line 314-026-31 MVTN 118-004-07
VHF THIN 038-000-04 NYS/5* 398-245-31

*NTS Net. JCARCN had TFC total of 10 (Feb-April). Public Service Honor Roll: KA2BHR KG2D KA2DQA VE2FMQ W2BIDS WA2KQJ W2MTA W2BOWO ND25 K2T KA2UBX K2YAI. KA2BHR did it again, congrats on EXTRA—now you have all the bands! OBS Reports: WB2SRN WA2ZPE. W2MVH sez Sooner hams are FB. New VE Team in Malone area - congrats on 60% pass thru VE upgrades—NCC LEGISLATION PENDING TO "EXEMPT HAMS GEAR FROM SALES TAX." Assembly Bill A1429 (R. Robach) & Senate Bill S1031 (E. Levy) would exempt from New York State sales and use tax all "radio communications equipment purchased by persons holding a valid amateur radio license issued by the FCC for use directly and predominantly in amateur radio communications." If you support this legislation, write your area legislators and ask them to support this. Local clubs, newsletter editors, hamfest committees/chairmen, individual radio amateurs, etc. can help spread the word that this legislation is still alive after four years and could be passed this year. Write your legislator today... N2EEL, CONGRATS to KA2SL and his assistants, Dave Denz W2DVL and Mark Winrock, who helped Walt get on Packet Radio with a voice synthesizer and software, making KA2ASL the first sightless operator on Packet in the Rochester area... W2DUC. THANKS to the Assistant Section Managers listed earlier in this column who have signed-up for another two year hitch! Traffic: W2BOWO 270, W2MTA 208, W2BIDS 205, VE2FMQ 197, W2QIX 109, ND2S 87, KA2BDD 83, WA2KQJ 74, K2YAI 63, KG2D 60, KA2BHR 57, KA2UBX 50, KA2DQA 47, N2EZF 39, W2HYM 34, KX2T 34, W2ZOU 23, AF2K 19, N2FZ 13, N2ZF6 10, KC2BJ 6, K2IUT 4, K2VR 4, W2NAO 2. (Apr.) N2FZ 18. (Mar.) N2FZ 29.

WESTERN PENNSYLVANIA: SM, Otto L Schuler, K3SMB—SEC: WNVAV. STM: AC3N. SEC: WA3JUL. PIO: W3BZJ. SGL: K3HLL. TC: K3R. CO Coord: K3QJ. BM: W3WVA. W3PAG. WNI QNI 235. QTC 13. Sess: 31. WPAFTN QNI 507. QTC 144. Sess. 31. WPA2MTN QNI 454. QTC 66. Sess. 31. NWP2MTN 529. QTC 4. Sess. 29. PFN QNI 181. QTC 97. Sess. 31. K3GT was given a TCC Eastern Area Cycle 4 Certificate for the first quarter of 1985. Congrats. KA3LGI IS NOW N3EKJ. I do not have space to list all the new calls resulting from the VEC groups giving tests, but these teams are doing a fine job. As most know disastrous tornadoes struck a large number of counties in Western Penna. Some towns were virtually wiped out, also farm buildings and large areas of woodlands. In these counties many amateurs provided communications even after telephones were back in service. The Red Cross utilized ops and their equipment to reach areas not easy to contact. My complaint is that not all responded to the call and this is sad. Here in Allegheny County we have 200 enrolled in both RACES and ARES only about 25 responded. I think this is a very small percentage and if we do not have a better response we are in trouble. I wonder how many could have helped especially on the weekend. I know that Beaver County had a much better turnout. Please remember that one of the reasons we have amateur radio is the public service we have rendered—let's help when needed. I don't like to preach but the facts are there and we need a change in attitude in our participation. Have fun with DX, County hunting, etc., but when needed in emergencies be there to aid the victims some day it might be you and your family. Traffic: W3C3D 364, WA3JUNX 57, W3RUL 58, K3SMB 55, KC3JQ 53, W3KMK 51, W3KUN 48, WA3NT 28, K3QM 28, N3EKJ 24, KN3B 23, WNVAV 20, W3MML 17, W3ZX 13, K3LTV 12, KR3P 10, KA3EGE 7, W3TIN 5.

CENTRAL DIVISION:

ILLINOIS: SM, David E. Lattan, W9BEQ—SEC: W9QBH. STM: KB9X. OOC: W9TT. BM: K9ZDN. SGL: WK9PT. PIO: K9IDQ. ACC: W9BSFT. TC: N9RF. ASM: K9ORP.

Net	Freq	Times (Z Wn)	QNI	QTC	Sess.
ILN	3950	0030/0400 Dy	637	297	61
ILN	1100	Dy	280		
ILPN	3915	2230 Dy (X Sn)	435	91	27
NCNP	3915	1300 Dy (X Sn)	319	81	27
IEB	3940	1500 Sn	86	1	4
IARES	3915	2230 1 + 3 Sn	67	—	2
ISN	3905	0000 Dy	563	167	31

Illinois was represented 100% to 9RN by stations K9AZS WA9BFV KA9EVM N9EWT KA9FE K9GZK KZ9I W9INZ KW9J KD9K J9JL WB9NVN W9NXG K9MVE W9BFFB N9TN ND9V KB9X and KC9YN. Illinois was represented 97% to 9DRN by stations KW9J WB9HOT W9NXG W9LWH KA9FE W9SAHO N9EWT W9BFFB WB9NVN K9AZS KC9YN W9IUW K9WPM and WB9WGD. 9DRN was represented 100% to CAND. Illinois stations were WB9HOT W9NXG KW9J W9LWH and KA9FE. Welcome aboard to new PIO K9IDQ. Ben is involved professionally in broadcast journalism in the Springfield area and will no doubt be a great asset to the Illinois ARRL team. If you have an interest in working with the media outlets in your area to keep amateur radio in the news, contact K9IDQ about a Public Information Assistant (PIA) appointment. Special

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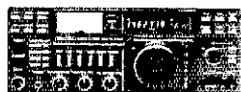
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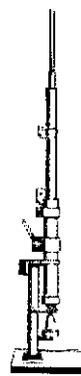
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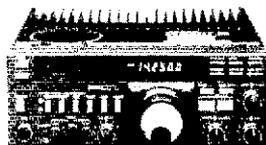
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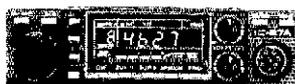


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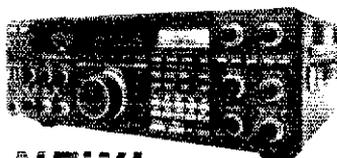
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thanks to SGL W9KPT for suggesting K9IDQ for the job. Ever had your MODEM connection disrupted by the "call waiting" alert tone when receiving a second incoming call while "on line"? An article in the FRRL "ARC OVER" reports that certain electronic telephone exchanges support disabling of the call *70 before placing the call. If you have the call waiting feature and use a MODEM for data communications check with your local telco to see if they support this feature. W9DBO is home from a short stint in the hospital and wishes to pass thanks to the iLN gang for the message they sent while he was in. Welcome back Elmer! That potent 40-meter mobile signal heard from upstate belongs to none other than our own OOC, W9TT, who has recently completed building the KW solid state mobile amp that was featured in the February issue of "Ham Radio". Kantronics Co. EC A9D reports that ARES assisted St. Charles ESDA twice in May, on the 19th for a mock disaster involving a HAZMAT incident, and on May 27th for the Memorial day parade. Arrangements have also been made for an amateur to be present in the EOC during periods of severe weather. On May 18th, Madison Co ARES assisted the Emergency Medical Services in the operation of a drill in which 18 "victims" were transported to 4 area hospitals. EC NA9X and 8 ARES members provided communications between the disaster area and the hospitals. A total of 22 ARES members checked into the net as available for service during the exercise. May 4th was the first of two IL ARES seminars to be held this year as had been decided at the 1984 seminar. McClean Co. EC K9ORP hosted the meeting in the McClean Co ESDA EOC. After introductions and opening comments by SEC W9QBH, the morning session featured presentations by Mr. John Grap of the American Red Cross, and by Mr. Rod Palmer of the National Weather Service. The afternoon session was an informal discussion of internal ARES topics led by W9QBH. One of the topics was the future of PACKET radio use for ARES and NTS applications. K9ORP had a packet station set up in the EOC, and demonstrated its use to those in attendance. Traffic: KW9J 373, W9HLX 244, W9NXG 204, W9RFB 192, W9LU 172, W9JUT 128, K9EVA 87, K9YIN 79, KA9FE 77, NC9T 75, D9V 58, K9BOY 54, K9K 33, NW9W 30, KA9BBV 29, K9QEW 21, W9LNO 19, W9L 12, W9KPI 12, W9KR 12, WA9SD 11, KZ9I 10, W9LDU 10, W9VEY 9, W99TV 7, N9ELU 6, W9HBI 6, W9HQW 6, K9WMP 5, WA9RUM 5.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: W9ZQE, STM: W9LU, SACC: K9TUS, STC: K9PS, SGLC: WA9VOO, SOBC: K9TA, SPIO: K9DIY, SRC: N9WB, SHC: WA9FUD, SOOC: KJ9G, Net Managers: ITN K9DDU, QIN K9J, ICN K9W9, IRN K99SU, VHF W9PMT, IWN KA9ERC. May Net Reports:

Net	Freq.	Time	Daily	UCT	QNI	QTC	QTR	Sess.
ITN	3910	1330/2130/2300			3313	463	2526	92
QIN	3656	1430/0000/0300			627	357	1854	93
ICN	3708	2315			103	46	668	30
IWN	3929	0000			200	126	1224	31
IWN	3910	1310			1833	0	400	31
IWN	VHF	Bloomington			1176	0	310	31
IWN	VHF	Kokomo			1214	0	189	31
IWN	VHF	Ligonier			415	0	415	31

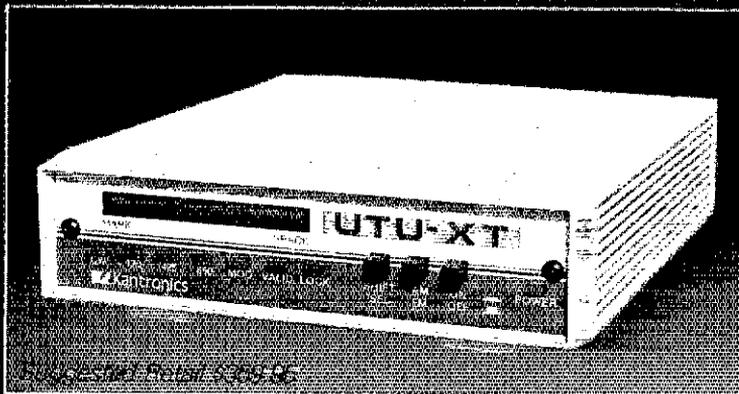
Hoosier VHF Nets for May QNI 5800, QTC 242, Bulletins 80, QTR 4859 in 223 sessions for 21 nets. 9RN cycle four QNI 374, QTC 492, QTR 1008, sess. 62 IN 100% Stns. W9EI, N9HZ, KJ9J, W9JUU, WA9QCF, W99YU, K9WVJ, D9RN 354 messages in 1165 minutes. IN. 80% Stns. K9CGS, W9JUU, N9DWU KA9EIV. CAND 794 messages in 31 sessions. D9RN 100%. Stns. N9DWU, W9LU, AB9A. The following members of the Indianapolis Red Cross Radio Club were recognized for service to The American Red Cross: One Year pin: KC9DQ W9KGE N9BLB KA9G KA9H KA9KNS WA9ZQE N9DQ KA9NW KA9IBU KA9FL KA9FL N9BLM KA9BU KA9ZF WA9M KA9W KA9EIV 63, KA9OCH. Five Year pins: KC9JV W9MOY W9PEV W9BTSV W9AVO W9BZLB W9JHQ W99WK W9JZV N9DXB W9WMT K99HH KA9BSD. Ten Year pins: W9QBB W99CY W9BAWI W99CER N9DAW W9UMH. Fifteen Year pins: WA9VOO WA9FIT K9OUP. Twenty Year pin: WA9FSZ. Congratulations to W9BAOU, Porter County Ham of the Year and to N9DJF Lake County Ham of the Year. Silent Keys: W9SWK, K1TH/9, W9BMDQ all of Fort Wayne. Congratulations to Max Galloway, K9QXA, upon his retirement from the staff of the Indianapolis Chapter of The American Red Cross. Best wishes from your friends and co-workers. "We leave behind a little of ourselves wherever we have been." Traffic: W9JUU 890, K9J 891, W9JZY 203, W9CIE 188, K9DDU 165, W9HZ 114, KA9FO 103, KA9EIV 63, WA9YIF 62, W9EI 60, K9DFK 58, K9WD 55, W9QFG 53, K99HH 53, W9UEM 46, W99PFZ 45, W9UMH 45, W9QCK 38, N9AEI 33, W9BZQE 25, W99HJ 24, W99DDW 22, K9OUP 22, W9PMT 22, K9TB 21, K99D 20, W99CK 18, W9DTG 18, W9BTZ 17, W9BAWI 17, AB9A 17, N9DYC 16, W9URS 12, K99ER 11, N9DGO 10, K9PS 9, KA9JML 9, K9WC 8, K9TKE 8, W99CIV 8, K9CGS 7, K9BRF 6, W9EHY 6, W99VPG 5, W99HR 5, W9XD 5, W9ZGC 5, K9DIY 4, W9BAJY 4, K9SBW 3, N9DHX 3, K9TA 3, WA9JNC 3, K9JDF 1, W9KMY 1, K9SDE 1, W99ART 1, K9C 1, W99DP 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—ACC: KA9FOZ, BM: KA9CPA, OOC: NC9G, PIO: K9ZZ, SEC: W9DAK, SGL: AG9V, STM: W9UTQ, TC: K9GDF. Congratulations to Old Timers' W9UTQ with 65 years and W9ODV with 60 years in amateur radio. Green Bay Mike & Key Club Swafest August 17th. Ashwaubenon Community Center. To start a club, find a club near you, or to get applications for the ARRL Club Challenge dues rebates, get in touch with our Affiliated Club Coordinator KA9FOZ. Check with me if you would like to be an Assistant Technical Coordinator. W9YCV tracked 6 satellites for four years, mostly on CW, to receive No. 134 Worked All States with Wyoming his last state. Les also heard the OSCAR 10 Engineering Achievement Test. Flambeau ARC new Officers: Pres. KA9NOT; V.P. K9CQD; Sec. KW9H; and Activities Dir. AG9S. Racine Megacycle Club helped Red Cross with Lighthouse Run. Happy Birthday W9ZC on August 14th and happy 80th to K9A on August 18th. W9NGT presents severe weather training programs at clubs. W99CQF upgrades to Extra while N9BDL passes Advanced. Exams at Wisconsin Rapids August 24th, contact K9UTQ. K99OC confirmed 306th country. KY9P awarded both-mixed mode and CW DXCCs. Sorry to report Silent Keys W9RIL and N9CUS. BPL to KA9CPA. At the Wisconsin Rapids OCWA meeting, shirt sleeved auctioneer Travis, W9VQD, began to auction an unusually large stuffed paper bag. Quickly, W9QUT shouted "I'll bid five dollars, sight unseen, for that." Surprised, Travis accepted, kept the bag closed and diligently worked prices up to a final bid. The curious OCWA gang demanded to see the contents of the mystery bag. Travis, also inquisitive, reached into the bag, pulled out a sleeve, then the rest of a familiar looking garment. With a bit of trickery

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BWN 3984 6 A.M. WD9ID 1297-1435-27
 BEN 3985 Noon WB9ESM 755-221-31
 WBSN 3985 5:30 P.M. WA9ZTY 747-202-30
 WNN 3723 6 P.M. KA9OBP 119-18-30
 WSSN 3645 6:30 P.M. N9BDL 111-26-31
 WIN-E 6662 7 P.M. W9BICH 233-105-31
 WIN-L 3662 10 P.M. KC9CV 559-89-31
 WPC 3924 5:30 P.M. W9YVC 285-18-31
 N1WTN 3424 8:30 P.M. WJ9SF 437-75-31
 WC1WTN 3181 8:00 P.M. N9DHT 401-48-31

Traffic: KA9CPA 1352, W9YVC 239, WB9YPT 221, K9GDF 205, WA9WYS 176, WD9ID 174, N9BGE 162, W9CBE 157, KC9CJ 141, KA9BHL 104, W9UCL 97, N9DHT 87, W9BICH 86, W9LDO 85, W9IEM 79, N9BDL 79, W9JSF 76, WD9FFI 75, AG9G 76, KA9BG 68, KA9OBP 64, W9DND 61, WA9ZTY 50, K9UTQ 49, KA9BHK 48, WB9ESM 46, W9FDY 43, N9DFC 39, WB9PKL 38, N9B9 36, WB9RGE 34, WA9YVC 31, KA9JYJ 30, K9JPS 28, K9B9 28, K9FHI 27, WB9JSW 26, K9SIF 25, WD9DNG 20, W9ODV 19, KA9RII 19, K9LGL 14, W9UW 10, KY9P 10, W9NGP 8 (Apr.) KC9CJ 6, WD9FFI 3.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr., K0BT—SEC: KA9ARP. STM: K0BCI. It was a pleasure to be among the attendees at the Bemidji and Duluth Hamfests during May. You might want to add a new happening to your yearly hamfest calendar by noting that the first ever "76 Amateur Radio & Computer Swapfest" has been tentatively scheduled for November in Minneapolis. The Twin City FMC is sponsoring this event, listen to MSPN/E for further updates on this or other hamfests, or the Hamfest Calendar in QST. The Brainerd ARC has sold the 147.06 rpt and has assumed control of the 147.03 rpt. The 06 machine was shut down for a number of seasons with better area coverage by Q3 ops of them. Meanwhile, efforts to put a repeater on the air from Blackduck have failed for the present. The Bemidji ARC reports that efforts are underway to secure another site in the area. The new 73 rpt in Bemidji is on the air now. NET NEWS: WD9BAC resigned as WX Net mgr effective June 1, KA9MZA takes over. We are pleased to report that the Arrowhead RAG has moved their Sunday evening HF net to 3929 kHz at 8 P.M. It's nice to see the Statewide Emergency Frequency used by other groups within Minnesota. The Minnesota MSO has changed its operational frequency to 3620 kHz, coordinating it with MSN/RTTY. MSO times are Mon-Fri, 5-7 P.M. and Sat-Sun 8-12 A.M. Access: C1LF MIMSO C1LF. D1R. C4BMM encourages all of you to use it whenever possible. The "Ham of the Month" award for May goes to K19I. Our congrats to him as well as to the following new Novices: KA9UCJ KA9UJY KA9JMR KA9UOZ KA9UPA and KA9UPI. Recent upgrades include, to Advanced: KA9MUY and KA9NBS, to Extra: N9CRO N9GBQ K0H8B and WA9NJR. Good to hear W9KXW back on the air again after undergoing surgery recently. W9SPA has departed on a trip to Norway. Special congrats to KA9ARP who topped the PSHR listings for March! Our deep regrets to family and friends of W9QMC, he became a Silent Key in May. Finally, something to think about from the "CFCM" newsletter "Quarterwaves" and could also apply to this column: If you find mistakes, try to keep in mind that we try to have something for everyone, and some people are looking for mistakes! 73 de K0BCI.

Net	Freq	Time	QNI/QTC/Sess.	Mgr
MSN/1	3685	6:30P	312/95/31	WB9EHI
MSN/2	3685	10:00P	202/47/31	KA9EPY
MSSN	3710	6:00P	262/28/29	KA9ODQ
MSN/RTTY	3620	7:00P	60/7/10	WA9LUT
MSPN/E	3929	12:00P	499/94/31	WB9WVJ
MSPN/E	3929	5:30P	922/149/31	WB9BGS
MIMAMWXNT	3929	8:15P	425/228/25	WB9BAC
PICONE1	3929	9:00A	2520/648/127	WD9BAC

MSSO: 3920 kHz L3B, State Emergency Freq. 3929. Traffic: WA9TFC 306, KA9ARP 270, WB9WVJ 230, KA9EPY 206, W9EHI 161, K19I 103, K0BCI 91, N9CLB 82, KA9ODQ 72, K0BT 66, W9DM 53, WD9BGS 31, KA9JUX 26, K19R 26, KA9AJF 24, N9EWA 24, WD9GUF 23, W9KYG 23, N9JP 21, W9BUKI 21, K0CSE 20, WB9FMI 18, W9HZU 14, K9B9V 14, K9OJ 12, KA9BFF 11, K0CVD 8, N9BY 5, K9BRW 4.

NORTH DAKOTA: SM, Joseph Gregg, KN8A—In case anyone has lost the North Dakota Data Net, it has moved to 3883.0 kHz at 6:30 central time. We have finally gotten away from that dreadful broadcast carrier on 3996.5. Many people feel the move was the best thing to ever happen to the Data Net. The old frequency will still be used as a backup frequency and as the RACES frequency for the state. Participation in net activities is encouraged for all ND hams. It is a good way to get to know people from all over the state. Hopefully everyone has had a nice summer and don't forget, there will still be plenty more thunderstorms August and September can be real active and it pays to keep an eye on the sky.

SOUTH DAKOTA: SM, Fredric J. Stephan, K0BOO—Please help us find a volunteer for the STM position for the South Dakota Section of ARRL. Many thanks to N9BD for helping for an extended period of time above and beyond the call of duty. We can suggest a number of possible hams for the job; hams who are real pros; but you probably know of someone even better; just send me their call and I will contact them. Hope you all enjoyed the Dakota Division Convention this year. Will it be in Eastern S.D. next year? Get ready for the third annual Black Hills Amateur Radio Roundup to be held this Fall. Details later. Good reports for this May came from N9DQ WB9YMB WA9VRE WD9VB W9KLY W9SS WB9CJ WB9CM K9RIM KC9A. Several reports were received from the following nets: BCN, BHN, CCEN, NJO net, CAND, TEN, Walworth County Emergency Net and the S.D. Mom. net. Check with your local or county Emergency Coordinator for help in planning and practicing emergency communications. This season is the time that you are especially needed for public service. For more info and booklets check with our SEC for the ARRL in Mobridge WB9YMB. Any club news lately? Best wishes good hunting DX and in the upcoming BIG contest.

DELTA DIVISION

ARKANSAS: SM: Joel M. Harrison, WB5IGF—SEC: N9BPU. STM: AESL. TC: W9DFO. ACC: AD5M. PIO: KDIV. SGL: W5LQI. REPEATER COORDINATOR: WB5FD. There are several Volunteer Exams scheduled for the near future. If you need a list of the dates and locations, please contact me. Please note my new mailing address as Star Route 3 Box 306, Judsonia, ARK 72081. My new phone number is 729-3301. We are looking for Assistant Technical Coordinators for various areas of the state, if you are interested, contact W5FD or myself. I am sorry

to report the resignation of AD5M as Affiliated Club Coordinator. If you are interested in this position, please contact me. Larry, KB5QL is new OBS for MARC, W5UJU recovering from hospital trip. Traffic: W9OK 57, WD5FCE 22, WB5IGF 16, W5R1T 15, W5KL 8.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—SEC: KA5PFB. ACC: K5DPG. SGL: KDSSL. CO: WB5TPG. TC: N5JM. The Alexandria Hamfest sponsored by the Central Louisiana ARC provided the usual friendly atmosphere for many long winded eyeball QSO's. Bobby, K5MNE received the "Hot Air Award" plaque for cutting the repeater off when anyone tried to rag-cheer. Frank, K5EBC, received the coveted "Blige Pump Award" plaque for his untiring campaign against the evils of ham radio gossip. Rick Hanson, a Canadian whose life was drastically altered by a spine breaking truck accident, traveled across Louisiana from 30 May to 6 June in a wheelchair while embarked on a 25,000 mile 2 year trip around the world. Amateur radio communication support had been requested to coordinate his movements and relay his progress back to Vancouver, Hava off to Kevin, KA5PFB, our Louisiana Section's first and only dedicated ham who did an outstanding job of continuous communications support during Rick's 253 mile wheelchair travel across our state: KA5OAF K5TJF WA5LHL WA5TMH W5SKW W5DKA K5YJX K5K5YV K5EYI KDSSL KA5JPH KA5HLP K5OLP N5GHX W5UDT KA5RGE K5USQ W5D5W W5D5V W5AQTA W5FMO N5GQO W5DJXT N5ATF K5U5O W5K5I N5GLB W5V8A K9UWT K5QBU WA5QMI W5OUD. Well done from the rest of us.

MISSISSIPPI: SM, Paul Kemp, KW5T—SEC: AL7GQ. STM: KB5W. VHF COORD: N5DW. ACC: K05VD. Our sympathy to the families of Silent Keys KH6D and W5G5F. The Hattisburg Radio Club again provided communications for the Special Olympic games held at USM. HARC also active in conducting Novice and upgrade classes. K5OMI assisted an injured motorist on a rural stretch of Hwy 49 with KA5VBE and N5FGX providing communications through the W5AXQ/R in Florence. The 147.72/12 repeater in Hattisburg moved to new location at 300' with improved range. The Vicksburg club has 16 new techs on the air as a result of their first VE session. W5HKW will assume duties as MSBN Mgr July 1. ARES VHF Net began operations on the 147.75/15 K5CMN repeater in Pearl. Net mgr is WD5IKD. Net meets at 8 P.M. local time. KB5W reports MS has been represented 100% on cycle 3 and 4 Region 5 Nets for 13 consecutive months. CAND (W5KLV) 31 sess QTC 794. DRNS (WB5YDD) sess 62 QTC 721. MTK (K5OAF) sess 31 QNI 105 QTC 28. MSBN (K5BET) sess 31 QNI 220 QTC 28. MSBN (W5H5H) sess 31 QNI 1248 QTC 18. MNN (WB4RMV) sess 28 QNI 503 QTC 5. MLEN (K5VWF) sess 4 QNI 78 QTC 0. CAEN (NF5CI) sess 4 QNI 81 QTC 4. Traffic: N5AMK 500, KB5W 484, K5OAF 236, K5TZ 99, W5WZ 60, W5L5G 37, KW5T 17.

TENNESSEE: SM, John C. Brown, NO4Q—ASM/ACC: WA4GLS. OO/AA: W9FZW. PIO: WK4V. SEC: WA4GZO. SGL: WA4GZZ. STM: NG4J. TC: WA4HK. The "Old Timer's Day" special events station in Dickson County had a big success. Had one U.S. Senator and three TN Legislators to visit with them. Seems that the event is getting bigger and better every year. Much good luck for the future and congratulations. Would like to remind all the Tennessee amateurs to keep a watchful eye out as this year seems to be really spawning some real "biggies" as far as violent storms go. If you can not get to the U.S. Weather service, then call the local sheriff's office so that they might pass it on. A reminder: this is to be a time of when we pass on the word where the attendance to one of the many local weather orientation sessions that many of the Clubs about the state are doing a mighty fine job. If usually takes about one and half or two hours and a very valuable service can be rendered to the weather service. It is suggested that all amateurs in the section join in with our local organizations and also include in our many messages going out of the section the Governor's theme, "Homecoming '86. It would seem that there is a very good place to get some GOOD PR for the amateurs of Tennessee. "Check it, You just might have a lot of FUN" as well as doing some public service. Seems the publicity on the various VEs I am seeing is down a bit. "GET THE WORD OUT" so that all that wish to try upgrade or obtain an amateur license can avail themselves. Seems we have about four or five VECs represented in the section. Keep up the fine work and above reproach. The section activity for this period is as follows: LF—Sessions-76, QNI-3878, QTC-113; VHF—Sessions-73, QNI-2116, QTC-698; CW—Sessions-52, QNI-283, QTC-55; RTTY—Sessions-23, QNI-168, QTC-1. Many thanks to all for their reports. Traffic: KA4RSC 170, W9FZW 150, K4WVQ 117, W4DBK 114, W4TYV 39, WB4TDB 36, KE4OI 35, NN4S 35, W4PFP 19, KE4LS 14, W3HET 14, WA4GZQ 7, K4UMW 6, WA4HKU 5, NM4W 4, W4PNS 4, N4KQX 3.

GREAT LAKES DIVISION

KENTUCKY: SM, Rosie Perciful, KA4SAA—Asst. SM: Dale Bennett, WA4JTE. STM: Ray Smith, WB4ZDU. New Appointment: ATC, Wildon Priddy, KA4FKU, Shively, KY. Congrats to our first two ATCs in KY, Jeff, AA4FQ, and Wildon, KA4FKU. HAMFEST: 1985 Central KY ARRL Hamfest sponsored by Blue Grass ARS, Inc. will be Aug. 11 in Georgetown, KY. There will be a KY Net Forum (CW & Fone) from 11-12:30 EDT. Since no net forum in LVL this year, hope all net members will make a special effort to attend this one. We need more help on KY nets again, especially KYN and rps to D9RN and 9RN. Anyone needing info about these nets may contact either WB4ZDU KA4SAA, KNTN 251 7, MKPN 1393 113; KARES 56 1; W7EN 72 8; 11DARES 67 8; T8TMN 578 45; KYN 152 83; TARES 107 2; NKARC 62 2; KYPON 87 5; CARN 145 13. Traffic: WA4JTE 377, WD4BSC 85, KB4OZ 71, KA4SAA 58, KA4BCM 50, WB4ZDU 29, K4KH 23, KA4MTX 22, WA4SWF 18, WA4AVV 17, W4WVQ 16, KA4GBZ 14, K4HOE 13, W4PKX 10, WD4PBF 9, WD4IXS 9, WA4NOG 7, WD4CQF 5, WA4YQ 4.

MICHIGAN: SM, James R. Seeley, WB8MTD—ASM: WA8DHB. SEC: WB8BGY. STM: WD8RHU. ACC: K8SB. PIO: K08K. SGL: N8CNY. TC: W8ZY.

Net	Freq	Time	QNI	Tfc	Sess.	Mgr
M1TN*	3953	1900*	645	337	31	WB8EIB
QMN*	3668	1800*	922	310	97	WB8E
QPN*	3922	1700*	948	157	35	WA8DHB
MACS*	3953	1100*	507	87	31	WB8A
G1NETN	3722	1700*	213	51	56	WB8XK
MNN	3935	1900	811	30	31	K8MSJ
VHF Nets 4 reports			235	19	24	WB8UP

*NTS nets. Times local. **QMN late, 2200; MNN late, 2000; MACS Su, 1300. ARES Net, Su, 3932, 1730. 3932 is MI emer. freq., 1932 alt. Silent Keys, with deep regret: W8OHI,

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AV5	96.00
32-19	89.00
214FB	75.00
ARX2B	35.00
A144-11	46.00
A144-20T	69.00
424B	75.00
AOP	137.00

KLM

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KT34XA	475.00
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432-30LBX	90.00
435-18C	109.00
435-40C	149.00
2M-13LBA	77.00
2M-14C	85.00
2M-16LBX	89.00
2M-22C	115.00

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TH5	385.00
TH7	439.00
EX 14	289.00
14AVQ	69.00
18AVQ	99.00
V2	42.00
V3	40.00
V4	49.00
BN86	19.95

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144SR	42.00
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ROTATORS

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New 2 Meter Multipurpose FM Transceiver



Hand held MT-20A unit for HI/Low 1.5/150 mW use with BA-2 or BA-3 Nicad Rechargeable Battery.

Portable transceiver puts out 10 Watts... Ideal for amateur participation events such as emergencies... athletic events... marathons.

The new MT-20A transceiver can be used as a 10 W portable unit with carrying case, LA-20 Linear Amplifier and rechargeable Nicad Battery.

Easy to read thumbwheel digital switches provide complete coverage of the 2 meter band in 5 kHz steps.

In mobile operation, the MT-20A transceiver provides 20 W output when used with the LA-20 Linear Amplifier and plugged into the vehicle cigarette lighter through an SD-1 adapter.

Use hand held transceiver for all functions... Thumbwheel Frequency Selector... Built-in S Meter... Microphone... Speaker.

For base operation, the MT-20A transceiver provides 20 W output with the LA-20A Linear Amplifier, or can be used with any linear amplifier connected through the SD-1 Adapter.



The new LA-20 2 meter linear amplifier provides 20 W at 13.8 VDC, 10 W with Nicad batteries of stable transmitting power using high performance transistors.

MT-20A

SPECIFICATIONS

General

Frequency	144-148 MHz in 5 kHz steps
Emission type	(F1M)
RF output impedance	50ohm unbalanced (BNC socket)
Power source	8.4V DC (5.5-11V DC)
Current drain	150mA Max. on reception 50mA on reception with no input signal 500mA Max. on transmission

Dimensions/weight

Main unit (without battery pack)	118mm(H) x 80mm(W) x 38mm(D)/250g
Battery pack (Model BA-2/BA-3)	40mm(H) x 80mm(W) x 33mm(D)/120g

Repeater device

1 Built-in
1 -800kHz transmit down shift switch
1 +600kHz transmit up shift switch

Illuminated Dial

Receiver

Circuitry	Double-conversion Superheterodyne
Sensitivity	Better than 1µV for 30dB S/N
Selectivity	Greater than ± 7.5kHz/ -6dB Greater than ± 15kHz/ -60dB Better than -60dB
Image rejection	Better than -60dB
Audio output	200mV (8 ohms)

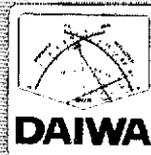
Transmitter

RF output power	High 15W Low 150mW
Modulation	(F1M)
Spurious emission	Better than -60dB
Microphone	Electret condenser Microphone, built-in (Impedance 2K ohm)
YU-1	CTCSS unit optional

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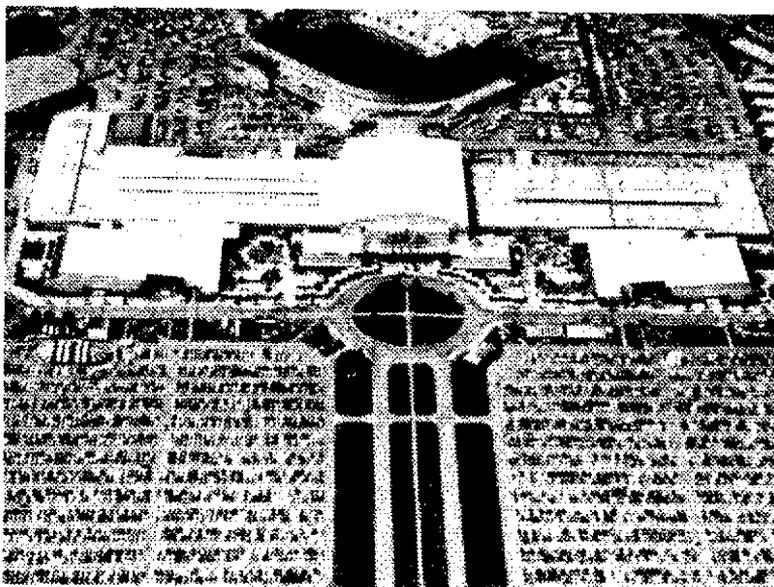
1985 ARRL NATIONAL CONVENTION

October 4, 5, & 6
Louisville, Ky.



On-site paved parking for more than 17,000 vehicles. On-site R-V Hookups available

Details in September 287



Over a quarter of a million square feet — all air conditioned — devoted just to the National Convention

- *Forums for those interested in the cutting edge of electronics technology!*
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- *Forums for traditional radio interests!*
- *Ladies programs Saturday & Sunday!*
- *Convention Hotel just across the street from the Hamfest site!*
- *Easy access to airport and interstate highways!*

Hosted by the Greater Louisville Hamfest Ass'n.

For more information write: GLHA, P.O. Box 34444
Louisville, Ky. 40232
call (502) 368-6657

KA4VQB, SEC W88BGY announces the appointment of WA8MFL as EC for Calhoun County. W8QHB and AF8V have been awarded for their high-level traffic with efforts with TOC/Eastern Cycle 4 certificates. W88BN manager now is K8MSJ. Independent net people, please note: ARRL Net Manager field appointments are, under the established rules, issued only to managers of NTS nets (in MI, those marked with a "*" in the listing above). To me, every net is important, NTS or otherwise, but I can not keep track of everything. So, in the interest of accuracy in this column and for the records generally, when there is a change of officers, please let me or STM W88RHU know. QMN is sponsoring a traffic handlers picnic in Lansing on Aug. 24 at Potter Park, 11 A.M. till 7 P.M. All nets are welcome. Coordination of Volunteer Examiner efforts is an idea whose time has come, especially in the more heavily populated regions. Branchhead of ACC K88B, the SE MI Volunteer Examination Council number of June 9) six clubs and ten individual members. For info, contact K88B or interim treasurer Ray McDonald, W88FF, 29336 Sheeks Blvd., Flat Rock 48134. Traffic: KA8CP6 707 (BPL), AF8V 444, W8QHB 410, W88KQC 262, WA8DHB 223, W88RHU 139, KABVOZ 130, W88OUJO 107, K8GXV 88, W88SIV 74, W88MJB 67, W88SCW 66, W88MTD 57, W88RNQ 51, K8OCP 51, W88EIB 42, K8UPE 38, W88HX 36, K8EQO 32, W88BHP 28, W88URM 28, W88PAF 27, K8BQ 27, W88OI 25, K88OGR 23, W88YQ 22, W88MOF 20, K8HAP 18, K8ZJU 18, W88T 14, W88YZ 14, K88DQ 12, K88MJK 11, W88WJV 10, N88CNY N88R W88VZ 5.

OHIO: SM Jeffrey A. Maass, K8ND—ASM: KF&J. SEC: K8AN. STM: W88MZZ. ACC: K8US. BM: W8ZM. TC: K88MU. OOC: AD8I. PIO & SGL: N88CVK.

Net	QNI	QTC	Sess.	Time(Local)	Freq.	Mgr.
BN	329	194	58	1845, 2200	3.577	W88KFN
BR	204	128	31	1800	3.605	W88EK
B88N	308	341	54	0945, 1915	3.888	N88AKS
ONN	138	24	29	1830	3.777	N88MI
OSN	320	138	31	1810	3.9725	W88MZZ
OSSBN				1030, 1815, & 1845		

OSSN 163 110 30 0846 3.577 KA8JV
O8MN 238 22 31 2100 80.16 W88CTX

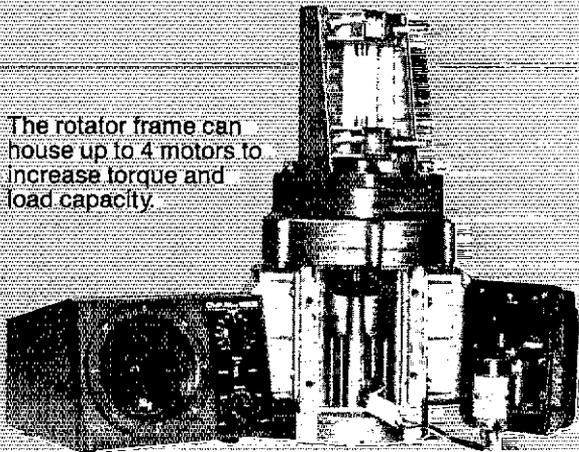
Hampfests: Warren (August 18), Marysville (August 25). The first ARRL Ohio Section Conference and Picnic will be held on Sunday, August 4 from 10 A.M. until 5 P.M. at the Columbus Zoo, at the intersection of State Routes 257 and 750 northwest of Columbus. This will be a family social event combined with an open discussion of issues of interest. We will discuss the state of public service programs in Ohio as well as seeking our hobby in general. Grills will be available and a lot of beer will be provided; pack a lunch, and join us! I can provide advanced sale tickets at \$2.50 per adult (age 12+) and \$1.00 per child (age 2-11), or you may buy tickets at the gate for \$3.75 per adult and \$1.50 per child. Children under 2 are free! Admission includes full access to the world-renowned Zoo, so bring the family! Talk-in will be available on 147.24 MHz after 9 A.M. Contact me for details! The Central Ohio ARES was out in force for the Tour of the Soloto River Valley (TOSRV) bicycling event May 11 and 12, with 83 Amateurs providing administrative and first aid communications for the 4500+ cyclists. Kudos to coordinator W88YJ and to DEE W88KO. The Cincinnati Buckeye Netters originated 189 Amateurs Day messages for the cyclists, using the call KA8YJR. In the Dayton area, DEC W88LC reports that the Farout ARC and the Kettering Medical Center ARC (see last month's column) are cooperating to rejuvenate traffic handling and ARES programs. Congratulations to those assisting with the May 12 Middletown telephone outage, which affected 75,000 people. Amateurs from DARA, the Telephone Radio Amateur Pioneers Society, Farout ARC, Kettering Medical Center ARC, Dial ARC, Miami Valley FM Society, and the Xenia W88RC were involved, providing essential communications services for hospitals, police, and fire officials; see the Public Service column for details. As I write this, the communications efforts following the May 31 tornadoes in Licking County and NE Ohio are winding down, and I should have details by next month. Every club and every individual should be involved in the emergency communication plan of its area—contact your ARES Emergency Coordinator if your club or you are not. We must all work to justify our licenses and the privileges we enjoy in Amateur Radio! Sorry to report K8SMO as Silent Key. New appointments: AA8V and W88OYK ATC; KV8M O8S; N88W O8S; W88HHZ EC Lucas City; W88P8O, EC Fairfield City; W88IOL, EC Huron City. Congratulations! CU at the Zoo!

Local Nets May 1985 (Name QNI/QTC/Sessions): ALERT 80/8/5; BRTN 210/89/31; COARES 142/1/4; COTN 331/385/31; DATN 485/95/31; Highland Area 82/1/4; JGTN 134/29/31; Medina City 316/61/30; RARA 66/1/5; Seneca City ARES 48/3/4; T88RAC 1108/91/41; W88T 257/32/30; Wood City ARC 18/1/2. Traffic: KD8KY 1103, W88B 562, K8JDI 364, KA8YJR 341, W88JGW 293, W88PMJ 292, W88QZ 231, W88JMD 228, W88KFN 211, W88GXT 206, N88MI 204, W88MIO 198, K8ND 182, W88RAO 172, W88GMT 164, N88EFB 160, W88RIB 158, W88MEK 147, K88KHS 140, W88KP 132, KA8HNE 120, W88KWD 119, W88SSI 116, N88PH 113, N88AKS 108, KD8IC 100, KD8KU 95, K8TVG 85, W88CW 82, N88BF 89, N88E 78, N88X 87, W88EK 86, N88GS 80, KA8JT 77, N88VC 75, KD8WH 74, N88X 73, W88KBW 68, K8EF 64, N88EJOT 61, KA8RBQ 61, W88HGH 60, N88GB 58, K8CMR 52, N88K 50, W88DYS 50, KD8XL 50, N88W 49, K8RC 48, N88B 46, K8AN 45, KF8J 45, N2NS 44, W88HHZ 42, KV8Q 42, W88WEG 42, N88O 41, KA8TJ 41, W88DMF 40, W88JYE 38, KA8OQF 35, KV8X 34, W88HL 33, W88MVE 31, W88MRL 25, K8VOY 25, W88ZL 24, K8DXZ 23, KA8JV 23, W88KWC 23, W88CTX 22, N88EK 22, K8LGM 22, W88CSP 20, KA8TNT 20, N88W 20, K8CKY 19, KA8DJZ 19, KD8TF 19, W88IKC 18, A88P 18, N88PN 17, N88FWA 17, W88HED 17, N88M 17, N88GM 16, W88RSM 16, K8AWI 16, N88B 14, W88BHP 14, KA8H 13, KA8B 13, W88R 13, W88HV 12, K8NJO 12, W88EK 11, N88YJ 11, W88AL 10, W88AW 10, K88W 10, W88ZM 8, N88AJU 7, K8BL 6, W88FL 6, KA8M 6, W88NED 6, K8BJU 6, W88TRK 5, W88TSX 5, W88NHV 4, W88NTR 4, K88WH 4, K8WLF 4, W88L 4, N88CJS 3, KA8GT 2, N88M 2, KA8MFG 2, W88OL 2, N88JF 1, K8OZ 1, KA8WJN 1. (Apr.) W88KFN 232, N88X 91, W88HMI 32, W88BWW 31, KA8ICB 16, W88WEG 16.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, W82YUK—STM: W82MCO. SEC: AK2E. ACC & SC: N2BFG, BM: W82EAG. SGL: K82HQ. TC: K82ZO. ATC: WA2VGM, ASM: K2ZM. Nets: AESN QNI-62 QTC-3; GDN QNI-584 QTC-80 EPN QNI-67 QTC-47; NYPON QNI-757 QTC-288; NYSM QNI-311 QTC-138; NYSE QNI-394 QTC-167; NYSI QNI-398 QTC-245; SDN QNI-240 QTC-59; Ulster RACES QNI-20 QTC-1; April Ulster RACES: QNI-47 QTC-5. No reports HVN, SCRN! Club News: Mt. Beacon reports many public

Advanced Multi Torque Antenna Rotator



The rotator frame can house up to 4 motors to increase torque and load capacity.

Each motor is equipped with a Super Wedge and Clutch brake system (Slip clutch type) that works independently from the main frame gear train and protects the rotator mechanism from excessive torque.

The main frame and reduction gear train have been designed to withstand maximum wind loading.

Maximum brake power is 18,300 lbs/in when 4 motors are installed.

Low voltage (24 VAC) motors... Low cost 6-wire control cable... can be installed on the same base as a TELEX unit.

Specifications

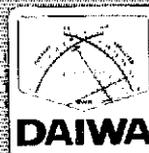
■ Rotator Unit

Rotation time	MR-750E/PE		MR-300E
	60 Hz	58 seconds (60 Hz input)	33 seconds (60 Hz input)
50 Hz	70 seconds (50 Hz input)	39 seconds (50 Hz input)	
Output torque Brake power	1 motor	610 lbs/inch 5,200 lbs/inch	220 lbs/inch 1,700 lbs/inch
	2 motor	1,200 lbs/inch 9,600 lbs/inch	440 lbs/inch 3,500 lbs/inch
	3 motor	1,800 lbs/inch 13,900 lbs/inch	650 lbs/inch 5,200 lbs/inch
	4 motor	2,400 lbs/inch 18,300 lbs/inch	870 lbs/inch 7,000 lbs/inch
Rotation angle	375 degrees		
Permissible mast size	1 1/2 ~ 2 1/2 inch (38 ~ 63 mm) < diameter >		
Control cable	6-wire cable 0.5sq—1.25sq (AWG16/18/20 etc.)		
Continuous running	5 minutes Max. permissible		
Dimensions	15.6" H x 8.43" W x 8.43" D (397 mm x 214 mm x 214 mm)		
Unit weight	16.5 lbs (7.5 kg) < with 1 motor unit fitted >		

■ Controller Unit

	CR-4 (for MR-750E/MR-300E)	CR-4P (for MR-750PE)
Power source	117 V AC (50/60 Hz)	
Power consumption	200 W (with 4 drive motors)	
Motor running voltage	24 V AC	
Dimensions	4.9" H x 7.1" W x 6.9" D (125 mm x 180 mm x 175 mm)	
Weight	9 lbs (4 kg)	
Operation	Manual	Manual/Pre-set

Wind Load	MR-750E/PE	MR-300E
1 Unit	16.1 Sq Ft	5.82 Sq Ft
2 Units	21.5 Sq Ft	11.84 Sq Ft
3 Units	26.4 Sq Ft	17.75 Sq Ft
4 Units	30.0 Sq Ft	23.67 Sq Ft

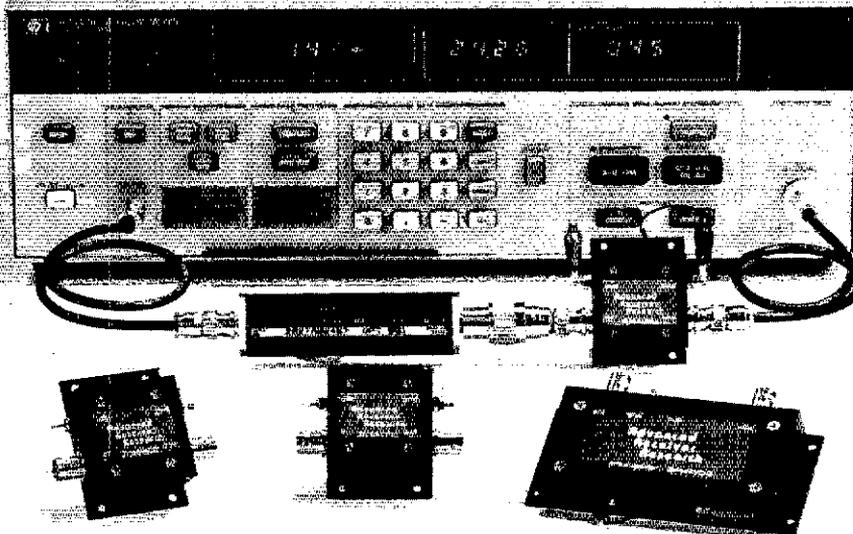


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P28VD	28-30	< 1.1	15	0	DGFET	\$29.95
P50VD	50-54	< 1.3	15	0	DGFET	\$29.95
P50VDG	50-54	< 0.5	24	+12	GaAsFET	\$79.95
P144VD	144-148	< 1.5	15	0	DGFET	\$29.95
P144VDA	144-148	< 1.0	15	0	DGFET	\$37.95
P144VDG	144-148	< 0.5	24	+12	GaAsFET	\$79.95
P220VD	220-225	< 1.8	15	0	DGFET	\$29.95
P220VDA	220-225	< 1.2	15	0	DGFET	\$37.95
P220VDG	220-225	< 0.5	20	+12	GaAsFET	\$79.95
P432VD	420-450	< 1.8	15	-20	Bipolar	\$32.95
P432VDA	420-450	< 1.1	17	-20	Bipolar	\$49.95
P432VDG	420-450	< 0.5	16	+12	GaAsFET	\$79.95

Inline (rf switched)						
SP28VD	28-30	< 1.2	15	0	DGFET	\$59.95
SP50VD	50-54	< 1.4	15	0	DGFET	\$59.95
SP50VDG	50-54	< 0.55	24	+12	GaAsFET	\$109.95
SP144VD	144-148	< 1.6	15	0	DGFET	\$59.95
SP144VDA	144-148	< 1.1	15	0	DGFET	\$67.95
SP144VDG	144-148	< 0.55	24	+12	GaAsFET	\$109.95
SP220VD	220-225	< 1.9	15	0	DGFET	\$59.95
SP220VDA	220-225	< 1.3	15	0	DGFET	\$67.95
SP220VDG	220-225	< 0.55	20	+12	GaAsFET	\$109.95
SP432VD	420-450	< 1.9	15	-20	Bipolar	\$62.95
SP432VDA	420-450	< 1.2	17	-20	Bipolar	\$79.95
SP432VDG	420-450	< 0.55	16	+12	GaAsFET	\$109.95

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service activities with good support from membership. WECA reports new officers/directors N2EQM-VP, Treas. WB2HQK, Pubi-N2BFG, TNG-K2AMU, CTY Lias.-N2SF. Congrats to AC2V being first YL to make 100 contacts with SMs and on 15 CW-wow! Rip Van Winkle ARS reports completion of Novice course with 8 of 9 passing. WARA had discussion of electrical wiring in ham shack. AARA reports new member KA2WGR and had program on Packet. SARA having elections in June. CENR joining with WECA for F.D. Saratoga RACES reports new officers: Pres-KG2H VP-WA2DWU, Treas-KC2KL, Sec-KV2A, board-NB2S KB2PQ N2FEP KA2DXK N2EKT, Ulster RACES reports several activities with OMARC-Run for sight and world hunger walkathon. K2ZM has been awarded TCC/Eastern Cycle 4 certificate for 1985-1m KN1K Dir. TCC/E. Hope F.D. went well for all. Do not forget to send info for ENY newsletter to me. PSHR: W2PKY WB2VUK KA2MYJ WB2MCO K2ZM K2ZVI WB2EAG KC2TF K2HNW AK2E KA2OPG KA2BEG Traffic: KC2TF 222, W2PKY 199, WB2MCO 157, WB2EAG 153, K2ZM 145, WB2VUK 113, WA2MYJ 104, K2ZVI 71, K2HNW 54, K2E 22, WA2YBM 21, N2BFG 20, KA2OPG 18, AA2Y 10.

NEW YORK CITY-LONG ISLAND: SM, John H. Smales, K2IV, ASM/ACC, WB2JAF, SEC, KA2BG, COO, NB2T, TCR/IR: W2JJP, STM, WA2AR, PIO, W2IYX. The following are traffic nets in and around the section:
 NQ CW* 3630 kHz 1900/2200 N2AKZ mgr
 NCVHF 6.745 rpt 1930 m-f K2MT mgr
 BAVHF 6.87 rpt 2000 m-f WB2BNA mgr
 SCVHF 5.37 rpt 2030 m-f W2ZGD mgr
 ESS 3590 kHz 1800 W2WSS mgr
 NYS/M 3677 kHz 1000 WB2EAG mgr
 NYS 3677 kHz 1900/2200 WB2EAG mgr

*Denotes section net, all times are local, please try and help out by checking in whenever possible. LIMARC will sponsor exams on the second Sat. of each month at the N.Y. Inst. of Technology, Rt. 254, Old Westbury for further info contact Bob Reed, WB2DIN, 2370 Valentine Pl. Wantagh, NY 11793. LIMARC also had a very successful flea market, no snow or rain, but again it was indoors and odds were being given on the sprinkler system going on. I am looking for people who would be interested or available to set up a demonstration group, to go to local schools or whatever, and demonstrate what Amateur Radio is all about, please contact me if you're interested. The ARRL has come out with a proposal for an enhanced Novice license, try to get a copy and study it, if you have any comments please contact either/or N2YL and WA2DHF and let them know what's on your mind. AC2F is recovering from an accident, the famous "scup strainer" is missing for now but thank God he didn't lose his eye. Congratulations to K2RZ who came up a winner in the NY State Lotto 48 Kings County RC now has a radio station set up on the Intrepid, contact Jerry Russo, KA2ALT, for further info. The following operators, from Larkfield ARC, took part in the Eagle Hill School Run for charity: WB2QCR, K2LPH, KC2DH, WA2TSN, W2JYD and Net Control K2NQ. KK2T visited England and added another location, Greenwich Observatory, to the Metroplex sticker location list. Tu-Bora has finally received a repeater pair, 222.480 in and 224.080 out, it should be on the air by the time this column is printed. KA2WJU upgraded from tech to advanced. It is with deep regret that we list as a Silent Key Carl Wattermaker, KA2PO. Traffic: K2YK 162, W2GK 40, W2DBQ 34.

NORTHERN NEW JERSEY: SM, Robert Neukomm, KB2VI - ASM, K2RJG, SEC, WB2JUF, STM, W2XD, COO; W2CC, PIO; WB2NOV, TC Oper, ACC; KK2U KY2S, SGL; W2KB, NM; W2CC KB2HM WA2OPY WB2ANK WB2PKG WB2QMP W2RRX W2PSU.

Net	Freq.	Time	Secs.	QNI	QSP
NJM	3695	1000 Dy	31	137	20
NJPN	3950	1800 Dy	34	286	66
		0900 Su			
NJNS	3735	1830 Dy	31	170	58
NJNE	3695	1900 Dy	31	286	166
NJNL	3695	2200 Dy	31	176	11
NJVN	49/49	2230 Dy	31	274	98
		(April - late)		151	76
OBTTN	147.12	2000 Dy	31	364	164
TCETN	147.225	1930 Dy	31	105	25
NJRTTY	147.51	Autostart	150	225	

UPLINK Amateur Radio News - call 201-735-8550. Congratulations to all Upgrades: WA2MBC to General, KA2JUG to Tech, WA2KRZ to Advanced. Also to: WA2BAP, N2EWS, KA2WJT, KA2WJU and KA2WJV, whose new license classes weren't given. And while we are thinking about licenses - Amateur call issued as of May 1 - Extra N2R, Advanced KD2MK, General/Tech N2FMO, Novice KA2YCY. Do you remember when all classes of license has the same type of call? NNJ VE Board (includes 24 accredited clubs) schedule tests the 2nd Saturday of each month at Union College in Cranford, NJ. For more info, contact Carl Felt, N2XJ, 3 Charles Place, Chatham NJ 07928. METROPLEX has organized a group 185 VEs and 6 directors. For test dates, listen on Thursdays at 10 P.M. to 145.45. Hams In Space! Teacher Jeanine Duane, WB2MBW, has been selected as one of 118 semi-finalists for "Teacher in Space" aboard a future Shuttle mission. Carol Perry, WB2MGP - part of an all-ham family - has received a letter from Sen. Barry Goldwater, K7UGA, praising her work in recruiting new young hams. Congratulations, Carol. We need more "Elmers" like you. It is interesting to note that with NMs reporting as many as 56 DIFFERENT QNI, that we have so few PSHRs and RPs. Sorry to have to report the following Silent Keys: Herbert Horowitz WA2HNG, Jim Mazzy W2JUG, Al Newland W1IHW. This report submitted for KB2VI by KA2HNC. Note for the future: Please send all traffic reports to KA2HN, 91 Midland Avenue, Wyckoff, NJ 07481, or via NTS c/o NJVN, TNXI PSHR: KB2HM WB2QMP KA2SPH K2VX N2XJ, Traffic: KB2HM 218, N2XJ 215, K2VX 152, KA2SPH 88, WB2QMP 78, W2RRX 64, W2XD 50, KA2IWS 29, AF2L 29, KA2OIW 9.

MIDWEST DIVISION
 IOWA: SM, Bob McCaffrey, K0CY - STM: K0BX, PIO: N0EBA, BM: K0IR, ACC: WB2QAN, COO: K0DAS, COO: K0DRT. Many thanks to our retiring SEC WA4VWV who is leaving the Section for a better employment opportunity - Good Luck Steve! DECIEC should go to me in the interim. Thanks to all that helped with the RAGERIA Message Relay - A fine job by all. Thanks to the DMRAA for a good State Convention who will be next! DRAC donated \$50.00 to Handi-hams as well as ARRL Library to High School. Kudos to DRAC (Davenport), Central Iowa Hams headed by W0RRG presented a demo to the 4H camp at Madrid. The Governor Day proclamation was attended by the youth of our ham population from Vinton, CR, Humboldt, Ottumwa, Ia City, and Dsm. Thanks for sponsoring those young people. Good time to attract more youth to hamming, and you are the ones that can do it.

Our Very-Hard to Find Components List

Semiconductors

MRF-208	\$12.00	MRF-901	\$ 1.75	MPSH-81	\$ 50	1N6263	\$.75
MRF-240	16.40	MHW-710-1	61.00	MV2205	58	2N2907	.60
MRF-247	34.80	2N5944	10.35	LM3800	1.90	2N4401	1.50
MRF-309	33.81	MC1330P	1.80	LM555CN	1.65	2N5100	1.50
MRF-421	37.00	MC1350P	1.20	LM741CN	.65	2N5192	1.50
MRF-422	41.40	MC1358P	1.25	1N756A	.55	2N5194	1.50
MRF-429	46.00	MC1458P	.65	1N4001	.25	2N5989	2.80
MRF-454	20.00	MC1723G	2.80	1N4148	.30	2N5990	2.80
MRF-644	27.60	MC3405	2.50	1N4997	1.50	2N5991	3.00
MRF-646	29.90	MC76L08CP	.50	1N5400	.35	2N6486	1.25
MRF-648	33.50	MPS-2222	.35	1N5363A	2.00		

Kemet Chip Capacitors

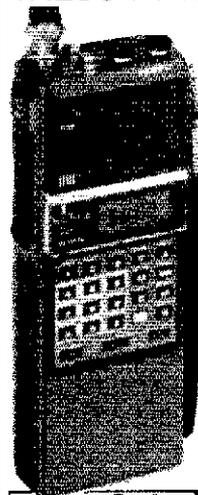
NPO C1210 Size - .50 ea	NPO C1210C Size - .75 ea	NPO C1813 Size - \$1.00 ea	BX C2225 Size
10 pf	75 pf	470 pf	4.7 pf
39 pf	82 pf	560 pf	33µf \$1.90
51 pf	100 pf	680 pf	1µf BX
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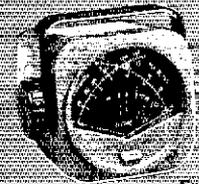
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(Reflected, 4/40 W)

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Power Range:

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200/2000 W

CN-550
144-250 MHz
20/200 W

Frequency Range:
Power Range: Forward
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5 W/50 W

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5 W/25 W

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Power Rating: 1 KW CW (50% duty)

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100W CW (1.8-3.4 MHz)

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Power Rating: 200W CW (3.5-30 MHz)
100W CW (1.8-3.4 MHz)

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10-250 ohm

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Insertion Loss: Less than 0.2 dB

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Frequency: 1.3 GHz
Connectors: N type

CS-401
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Frequency: 800 MHz
Connectors: SO-239

CS-401G
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Frequency: 1.3GHz
Connectors: N type

CS-4
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Frequency: 1.3 GHz
Connectors: BNC type

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0.5-3 W
30 W plus

LA-2065R
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0.5-5 W
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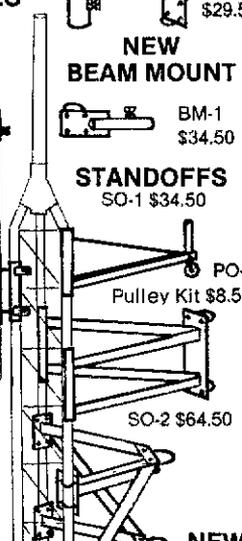
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SO-3

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Mast \$249.50
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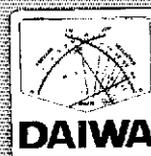
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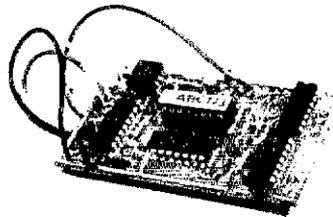
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25 watts	25A	25B	25C	25D	25E	25F
50 watts	50A	50B	50C	50D	50E	50F
100 watts	100A	100B	100C	100D	100E	100F
250 watts	250A	250B	250C	250D	250E	250F
500 watts	500A	500B	500C	500D	500E	500F
1000 watts	1000A	1000B	1000C	1000D	1000E	1000F
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NEOP achieved Eagle Scout. New DSM Officers are K0EGE, WB0GAM, N0COL, W0DB0K, KA0MKV, K0BBG, KA0MM. Many, many new calls and upgrades: N0QJ, N0JY, N0KN, new folks include KA0JUB, KA0JUC, KA0UD, KA0JUE, KA0JUF. New officers in Soo City are WB0YOW, KC0XU, NF0N, WB0WXH.
Net Freq. UTC Dy QNL QTC NMGr
TLON 3660 2330-0300 Dy 287 134 W0YLS
75 Mtr 3970 2300-1730 M-S 2020 139 WB0AVV

Let's see some new faces in our ranks, don't forget Old Threshers!!!! Traffic: WA0AXU 176, W0SS 159, K0GP 112, KA0ADF 92, W0YLS 80, KA0X 76, WA0J 61, W0HTP 61, WB0W 48, WB0JF 46, K0KBL 44, K0JPT 40, A0BD 32, K0BRE 20, K0CY 18, K0CSB 8.
KANSAS: SM, Robert M. Summers, K0BFX—SEC: W0KLT, STM: W0OYH, BM: K0JDD, SGL: N0BLL, ACC: K0BFX, PIO: K0BJM, TC: W0BQM, Net Mgrs are AC0E, RTTY: W0BFC, Phone: W0BZEN, CW: W0MYM, Slow Speed/Novice CW: Welcome to Rick Lucas, W0BQM who has accepted the Technical Coordinator spot. Now we will consider those wishing ATC positions. The Johnson County AR has elected N0FMO as new President; K0RGS, V. Pres.; KA0KKV, Sec. and W0DDCS as Treas, beginning Aug. 1. Many tx to the gang representing KANSAS on the DTRN, W0BCSX, W0BFC, W0HCZ, W0QMT, K0BFX. Anyone wishing to join the traffic circle should contact W0BFC or W0BZEN for more details. The KS RTTY net still building and still having frequency problems. Join in on the newest phase Amateur Radio has brought us! Computerized RTTY. Jim, AC0E welcomes all who have the gear to join in and help get the net really rolling with traffic. Other activity reports for May include: W0BQI QNL 1145 QTC 128, KPN 448/4, KWN 748/4, KJUN 151/4, 1728, C1STN 1820/54, QKS 27/176, QSK-SS QNL 45 QTC 15. I have decided to throw my hat into the ring again and hope you will re-elect me to serve you for another term as your Section Manager. It is a pleasure to serve you. Hope to see a large group at the Midwest Division Convention in Omaha from the state of KANSAS. Traffic: W0BFC 272, W0FIR 218, W0KL 158, AC0E 105, W0OYH 89, KS0J 87, K0BFX 73, W0FDJ 63, W0BZEN 46, NB0Z 30, W0MYM 9, KA0BRI 2, KA0E 2. (Apr.) AC0E 144.

MISSOURI: SM, Ben Smith, K0PCK—The Central Missouri Radio Association is again underwriting the Amateur Radio Station at the Missouri State Fair. This station is one of the best promotions for amateur radio in the state, sending radiogram from the Fair has been very popular with the fair spectators and operating the State Fair Station has been a great experience for many hams. It takes over \$300 and many operators to operate this station. Any club or amateurs that would like to help fund this project please send donations to CMRA, P.O. Box 283, Columbia, MO 65203. Anyone that can help operate contact KTSY or K0PCK. The Fair is August 15 to August 24. ARRL Field appointment of OES goes to KA9HJP, Missouri SEC, W0BTK has organized the state into three zones for ARES organization. The zones are West, East and Central. Each zone will have a zone coordinator who will work under the SEC and the DECs and ECs will report to the Zone Coordinator. K9OCU has been appointed Zone Coordinator for Eastern Zone. More information will come from W0BTK about this plan. Clubs in the Missouri Section were very active this past month providing communications in their communities. The Southwest Missouri ARC supplied communications for Red Cross vehicles assisting in a manhunt in Southwest Missouri. The Mid-MO ARC and the Jefferson City Repeater Club provided communications for March of Dimes "Walk America" day in Jefferson City. The Calaway Amateur League, the Mid-MO ARC and the Central Missouri Radio Association provided communications for the 100 mile Tricathlon. Silent Key reported WA0JYB.

Net	Sess.	QNL	UTC	Day	Time	Freq.	Mgr.
MON	62	324	199	Dly	7:00-8:45	5195	KBSI
MCSSB	31	736	100	Dly	8:00	3,863	KTRY
MEOW	31	577	41	Dly	5:30	3,963	KPCSQ
MOPON	5	38	24	Wed	9:15	222,424,02	AIBO
HBN	23	307	22	Mon-Fri	12:00	3,980	K0RDSQ
PHD	5	117	11	Mon	9:00	146,43	WABKHU
PTN	13	37	9	WTF	9:00	21,114	W0RQD
CMEN	7	150	6	Wed	9:00	146,181,78	K0PCK
MCARES	5	58	2	Thu	9:30	146,52	W0BBLJ
RRABN	28	431	1	Dly	8:00	146,38,79	KA0LLN
ZAEN	6	71	1	Tue	8:00	147,84,24	K0OCL
LOZGJ	5	20	1	Sat	9:00	3,797	W0RLT
LOZGM	5	129	0	Sun	9:00	146,73	W0RTL
LARES	3	44	0	Wed	8:00	146,10,70	W0RHC
JCCCN	5	47	0	Wed	8:00	146,407,00	W0ORI
MTTN	25	106	37	Mon-Sat	8:30	3,370	KA0PGN
SARN	4	47	0	Tue	9:00	146,437,03	W0ENW
ARESS	5	78	3	Thu	9:00	147,852,55	N0BHU
TCN	5	58	0	Thu	9:00	147,09,69	KA0LO
CCAN	5	58	0	Wed	8:30	146,46	K0PCK
IFN	3	28	0	Wed	7:30	147,84,24	W0BSZJ
NEMOE				TTSat	7:30	144,53,53	KA0FTS
SLAN				Mon	8:00	146,31,91	K0WEX
SWMAN				Wed	7:00	146,31,91	W0BNTX
W0SMAN				Thu	8:00	146,07,67	K0CAJ
HCEN				Sun	9:00	3,983	K0BFT
MKSS				as needed	146,22,82		K0UG
LVE				WTF	7:00	3,710	KA0FTS

Traffic: W0BMA 420, KTSY 201, K0SI 188, ND0N 105, A0BD 89, K0PCK 87, K20NP 63, W0BLD 61, K0DSQ 49, WA0YX 46, N0R 42, N0BKE 34, K0OR 31, N0EVC 16, W0OT 6, W0BQJ 2. Section News Administrator's Note: The March Section News report from Missouri did not appear in June QST because of an administrative oversight. We regret the omission.

NEBRASKA: SM, Vern Wirka, W0BQGM—SEC: Jim Santord, N0AII, STM: Jerry Kohn, W0BEGK. It has been a busy diverse weather season in Nebraska with many amateurs participating in weather spotting activities and in some cases providing emergency communications. On the night of May 10, 1985 a tornado damaged several structures in Uica, Nebraska. Through the early morning hours of May 11 and through part of the day KA0B0C W0BPKY W0ZOU KA0RZM and KA0QIB assisted officials with traffic handling through a net conducted on the K0KKV 146.16-76 Mhz repeater. Through the efforts of John Gebuhr, W0BQGM amateurs in the Omaha metropolitan area have access to the conventional and doppler radar systems of a local television station. The fast scan TV LHF repeater system will allow the weather net control operators to see the radar display while conducting weather nets from the existing amateur facilities at the Omaha National Weather Service office. The system will of course, be available to the National Weather Service personnel to assist in their forecasts, watches and warnings. Full details on how to access the system can be obtained by contacting W0BQGM in Omaha. The Midwest Division Convention in Omaha is only a month away, September 6, 7 & 8. The convention will be held at the 72nd and Grover Holiday Inn (located just north of the Interstate 80 and 72nd Street interchange). The indoor flea market will cover 11,000 square feet. Programs on packet radio, lightning protection and a test equipment workshop are

just a few of the activities on the convention schedule. See you in Omaha at the Midwest Division Convention September 6, 7 & 8. Traffic: K0DKM 224, W0BTE 124, K0XY 28, KA0BWM 17, W0BK 8, W0B0X 5.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Robert J. Koczur, K1WGO—STM: K1EIG, SEC: KA1ECL, BM: K3JZJ, ACC: K1M1, CO0RF: KA1ML, TC: W1HAD, PIO: KX1B, SGL: K1AH.

Net	Freq.	Local/Time	QTC	QNL	NM
CN	3640	1900/2000	214	318	K1ER
CPN	3965	1800 M-S	124	324	KA1BHT
NVTN	2288	2130	44	285	WA1EM1
W0N	7818	2030	162	510	WB1GXZ
RTN	1377	2100	44	121	KA1JAN

Greetings and thank you to all for your best wishes during my recent illness. I still have a long way to go but your kindness has helped me so very much. Congrats and continued success to the G.N. report for an outstanding format and a very informative newsletter. Tks to Dan, KY1F, for his activities with AMSAT. Dan plans to visit local schools to share his experience with students with hopes that they may join our ranks, good luck Dan. Congrats again to Mary, WB1GXZ, for another 100% rep. to FRN for May. At this time repeater coordination is a topic of extreme interest and importance to all of us in our section. If you have questions or input that you feel are important contact John Ronan, K3JZJ, or Port Barlow, WA1CF. John and Port are your local repeater. Steve, KA1ECL, has informed me that S.M.1. from New England amateurs on packet is active and seeking interested amateurs to join. Contact K0KA or KE3Z at AFRL Hq. for details. Also from Steve came word that from his many visits to local clubs the interest in ARES has grown. Many clubs have started their own ARES chapters. If you wish to have Steve visit your club please contact him asap. By this time the New England Div. Newsletter should have been received by all on K1K1's mailing list. Please respond to the questions so Tom can bring this information to the next pd. mtg. 73's Traffic: WB1GXZ 415, W1EFW 244, KA1K 13, K1EIR 13, W1WP 80, KA1GWE 80, KA1EIG 65, KA1KTH 54, W1WPR 4, K1EPE 5, N1BOW 52, KA1BHT 43, W1BDN 27, W1Y01 27, W1CJH 14.

EASTERN MASSACHUSETTS: SM, Luck Hurdur, KY1T—ASM: N1BTT & K9HI, OO/AA: KA1KF, SEC: W1A1Y, STM: KW1U, AD: K9W, W1A1Y, W1A1A, TC: W1A1U, NM: Net Mgr: Freq. Time Local/Day QTC QNL
EMRI N1AJJ 3658 1900/2000/Dy 289 323
EMRPN N1BGW 3880 1730/Dy 243 262
EM2M KA1AMR 63/23 2000/Dy 218 462
NEEPN K1BZD 3945 0830/Sn 13 39
HHTN W1CMQ 04/84 2230/Dy 150 459
EMRIS KA1EXJ 3715 1600/2030/Dy 142 285
CITN N1BYS 645/045 1930/Dy 98 278

TCO Director KN1K keeping busy with skeds, and reports 32 certificates issued. Sturdy Memorial Hospital ARC members KF1C and N1BPJ have their RTTY MSO operating on 147.48. Congrats and tks to K1BPA for taking on responsibilities of new district EC for recruitment. Barry will be in touch with many of you regarding emergency preparedness plans within the section. Congrats to new WARS prez N1CPE. WARS provides much in the way of public service communications for such events as Wellesley College walk-a-thons & Charles River road races—FB! My vote for the best club newsletter this month goes to the 1979 "Newsline" edited by WA1DFL. Many upgrades noted lately, including KA1MHS WA1WYA K1VLK & KZ1V. Tech. Coordinator KA1ITJ expresses much enthusiasm for the new ATC program. EMASS was once again in the forefront of things, this time by being the first section to begin taking technical question referrals from the Ho. WA1MFM being the home of so many hi-tech types, it's not surprising that the ATC program has blossomed so well here and yet it certainly is gratifying to see so many willing to assist their fellow amateurs with day to day problems. Div. Director K1K1 spoke at Barnstable Club & answered many questions regarding the direction that the League is taking in coming months. Be sure to get Tom on your club's speaker list! OBS K1BC/packet continues to top the list of bulletin stations, with W1VTX/RTTY running 2nd. Have you expressed your views to your Section Manager or Division Director lately? Traffic: KW1J 805, KN1K 445, KA1EXJ 423, N1E0V 290, N1AJJ 221, WA1TB 178, K1GPP 144, N1B1B 120, WA1FA 119, WA1F 112, W1ZHC 20, W1CE 116, WA1DXT 95, KY1T 87, KA1AMR 78, KA1B0 75, W1CMQ 44, K1BPA 42, KA1EIH 42, N1BYS 40, KY1B 35, N1DDC 24, KA1DJV 21, W1BDN 21, K1BZD 20, WA1FNM 19, KA1KU 16, KE1L 16, KA1LH 12, KA1MAM 12, WA1SNH 10, K1LCC. (Apr.) W1ZHC 117. (Mar.) W1ZHC 24.

MAINE: SM, Cliff Laverty, W1RWG—SEC: K1J7J, STM: AK1W, ACC: KY1C, BM: W1JTH, OOC: W1KX, PIO: KY1E, SGL: K1NIT, TC: K1PV. Comms for 18-mile Handicap Bikathon were provided by KA1JGF, KA1GPP, KY1C, and KY1E. Assistance included minor repairs and first aid. The Irv and Bonnie Grant Hamfest (the old Abbott Hamfest) will be held at St. Albans Snowmobile Club August 10-11. It will still feature K1HHC's blueberry pancakes and W1RWG's watermelon. Don't forget the Bangor Camperama at W1OLQ's on August 23-24. The AFRL registered Windsor Hamfest scheduled for Sept. 7. K1CJZC upgraded to general. Merrymount graduated eight new members and more. See you all at St. Albans. We need ATC's, PIA's, OO's, PSIF's. WA1YNZ 86, K1LJG 78, N1BJW 78, KY1E 74, N1BUB 82. Traffic: W1C0BP/N 114, W1HSO 115, KA1J0J 105, N1BLZ 95, N1BJW 91, W1BMX 66, W1RWG 55, KA1W 46, WA1YNZ 37, K1LJG 32, KY1E 32, W1B1GLH 18, W1GCB 16, KA1KFC 15, KA1AVU 14, W1OTQ 5, KA1FTL 2.

NEW HAMPSHIRE: SM, Robert G. Mitchell, W1NH—STM: W1TN, SEC: W1NH. Good news! Greetings from the Kancamagus Highway, our first camping get-away of 1985. This will be my last column of approximately 20 years. I thank all of you for your help and interest in NH Amateur Radio. Twenty years ago NH was rare on any band, but now it is represented by super operators who do justice to our state and hobby. Many have expressed that I should continue as Section Manager, but feel it is time for some new blood to come in. I will be Bill Burden, WB1BRE, who has been our Public Relations officer plus many other jobs. I ask you to give him the support you gave me which will make the job a bit easier. Again, thanks to everyone. Bad news? I will continue as Assistant Director. Traffic: N1CPX 345, N1NH 203, AK1E 147, W1TN 146, W1QY 126, W1FYR 87, W1B1GXM 60, K8UX 58, K1P0V 55, W1ALE 53, K1M 46, KK1E 41, N4KNW 33, K1UWB 31, N1AKS 29, K1TQY 28, KA1B0 26, N1ALM 22, KA1LW 17, W1LQ 7, K1ACL 7, W1OKU 2.

RHODE ISLAND: SM, John Bob Vota, W1BFDY—Appointments ASM: KY1G, ACC: KW1Z, SEC: KB1G, DEC: W1JFF, AEC: WA1LT, AEC: WA1YDU, AEC: W0B1FE, AEC: W0B1EO, AEC: W0B1CPO, PIO: KA1YML, STM: KA1KML, TC: N1BAG, SGL: KZ1K, NT: SS, KA1JFT, CO0RF: KB1PS, K1HGC, N1BBM, KA1LXM, The Newport

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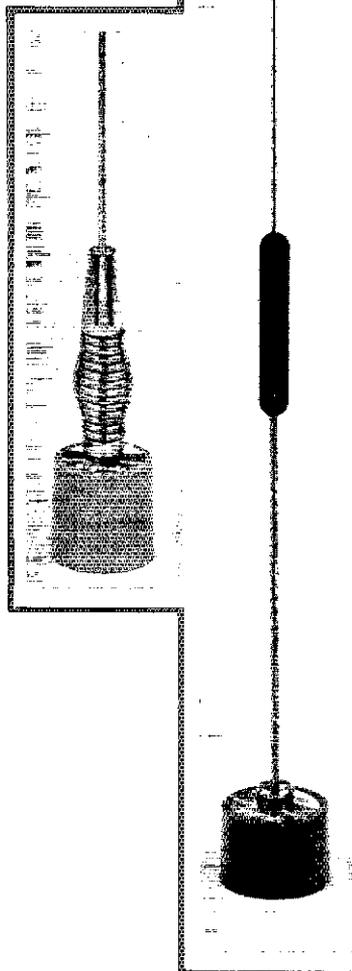
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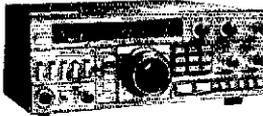


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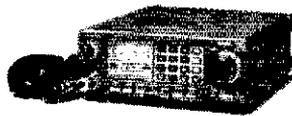
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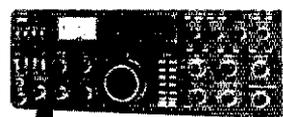
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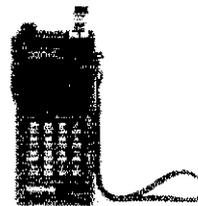


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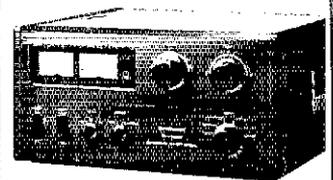
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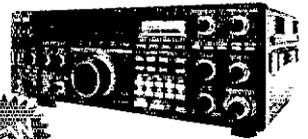


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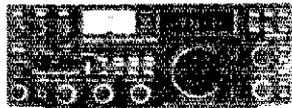
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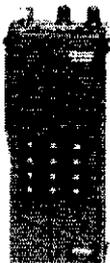
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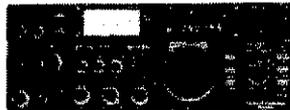
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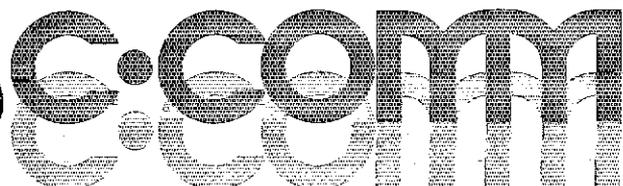
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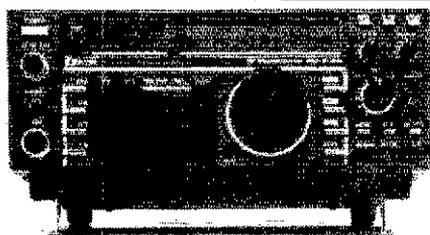
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IC-47A Compact 25w 440 FM, TTP mic	469.00	419 ⁹⁵
UT-16/EX-388 Voice synthesizer	29.95	
IC-3200A 25w 2m/440 FM w/TTP	549.00	489 ⁹⁵
UT-23 Voice synthesizer	29.95	
IC-120 1w 1.2 GHz FM transceiver	499.00	449 ⁹⁵
ML-12 10w amplifier	339.00	299 ⁹⁵

6m portable	Regular	SALE
IC-505 3/10w 6m port. SSB/CW xcvr	449.00	399 ⁹⁵
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
SP-4 Remote speaker	24.95	



Hand-held Transceivers	Regular	SALE
Deluxe models		
IC-02AT for 2m	349.00	289 ⁹⁵
IC-04AT for 440 MHz	379.00	289 ⁹⁵
Standard models	Regular	SALE
IC-2A for 2m	239.50	189 ⁹⁵
IC-2AT with TTP	269.50	199 ⁹⁵
IC-3AT 220 MHz, TTP	299.95	239 ⁹⁵
IC-4AT 440 MHz, TTP	299.95	239 ⁹⁵

Accessories for Deluxe models	Regular	SALE
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50	
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50	
BC-35 Drop in desk charger for all batteries	69.00	
BC-60 6-position gang charger, all batts	SALE 359.95	
BC-16U Wall charger for BP7/BP8	10.00	
LC-11 Vinyl case	17.95	
LC-14 Vinyl case for Dlx using BP-7/8	17.95	
LC-02AT Leather case for Dlx models w/BP-7/8	39.95	

Accessories for both models	Regular	SALE
BP-2 425mah/7.2V Nicad Pak - use BC35	39.50	
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	29.50	
BP-4 Alkaline battery case	12.50	
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50	
CA-2 Telescoping 2m antenna	10.00	
CA-5 5/8-wave telescoping 2m antenna	18.95	
FA-2 Extra 2m flexible antenna	10.00	
CP-1 Cig. lighter plug/cord for BP3 or Dlx	9.50	
DC-1 DC operation pak for standard models	17.50	
LC-2AT Leather case for standard models	34.95	
RB-1 Vinyl waterproof radio bag	30.00	
HH-SS Handheld shoulder strap	14.95	
HM-9 Speaker microphone	34.50	
HS10 Boom microphone/headset	19.50	
HS-10SA Vox unit for HS-10 & Deluxe only	19.50	
HS-10SB PTT unit for HS-10	19.50	
ML-1 2m 2.3w in/10w out amplifier	SALE 79.95	
SS-32M Commspec 32-tone encoder	29.95	

Shortwave receiver	Regular	SALE
R-71A 100 kHz-30 MHz digital receiver	\$799.00	659 ⁹⁵
RC-11 Wireless remote controller	59.95	49 ⁹⁵
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	144 ⁹⁵
EX-257 FM unit	38.00	
EX-310 Voice synthesizer	39.95	
CR-64 High stability oscillator xtal	56.00	
SP-3 External speaker	49.50	
CK-70 (EX-299) 12V DC option	9.95	
MB-12 Mobile mount	19.50	



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• Single-function keys allow easy operation.

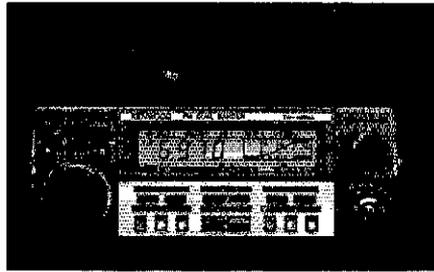
• Two separate antenna ports.

Use of separate antennas is recommended. This simplifies antenna matching and minimizes loss. However, mobile installations may require a single antenna. The optional MA-4000 dual band mobile antenna comes with an external duplexer.

• 10 memories with offset recall and lithium battery backup.

Stores frequency, band, and repeater offset. Memory 0 stores receive and

transmit frequencies independently for odd repeater offsets, or cross-band (2 m/70 cm) operation.



• Large, easy-to-read LCD display.

A green, multi-function back-lighted LCD display for better visibility. Indicates frequency, memory channel, repeater offset, “S” or “RF” level, VFO A/B, scan, busy, and “ON AIR.” Dimmer switch.

• Front panel illumination.

• Programmable memory scan with channel lock-out.

Programmable to scan all memories, or only 2 m or 70 cm memories. Also may be programmed to skip channels.

• Band scan in selected 1-MHz segments.

Scans within the chosen 1-MHz segment (i.e., 144.000-144.995 or 440.000-440.995, etc.). The scanning direction

may be reversed by pressing either the “UP” or “DOWN” buttons on the microphone.

• Priority watch function.

Unit switches to memory 1 for 1 second every 10 seconds, to monitor the activity on the priority channel.

• Common channel scan.

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• High performance receiver/transmitter.

GaAs FET RF amplifiers on both 2 m and 70 cm, high performance monolithic crystal filters in the 1st IF section, provide high receive sensitivity and excellent dynamic range. The high reliability RF power modules assure clean and dependable transmissions on either band.

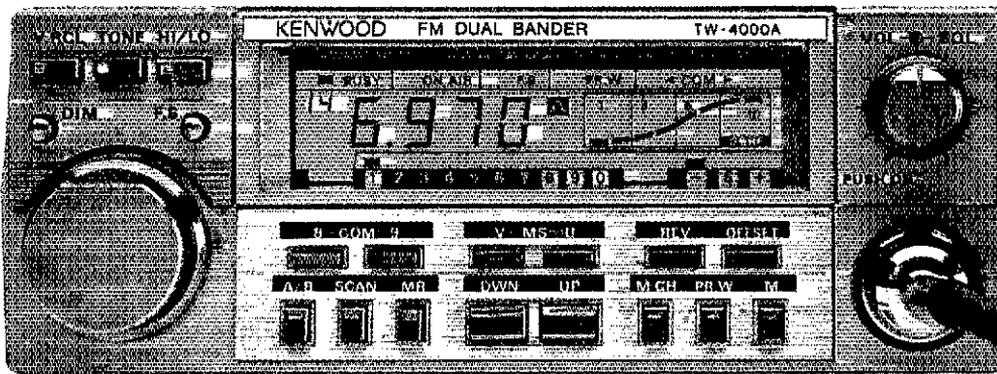
• Optional “voice synthesizer unit”

Installs inside the TW-4000A. Voice announces frequency, band, VFO A or B, repeater offset, and memory channel number.

• Rugged die-cast chassis.

• Repeater reverse switch.

More TW-4000A information is available from authorized Kenwood dealers.



Optional accessories:

- VS-1 voice synthesizer
- TU-4C two-frequency CTCSS tone encoder
- PS-430 DC power supply
- MB-4000 extra mounting bracket
- KPS-7A fixed station power supply
- SP-40 compact mobile speaker
- SP-50 mobile speaker

- MA-4000 dual band mobile antenna with duplexer
- MC-42 UP/DOWN mic.
- MC-55 8-pin mobile mic. with time-out timer
- SW-100B SWR/power meter
- SW-200B SWR/power meter
- SWT-1/SWT-2 2 m/70 cm antenna tuners
- PG-3A noise filter

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation. Antenna (mag mount) is not Kenwood supplied.

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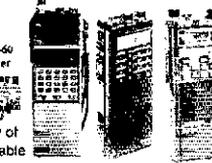
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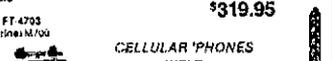
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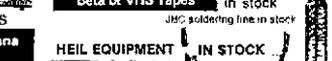
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Radio Club with the DEC. W1JFF carry out weekly emerg. test on the Aquidneck Island Net. The Ocean State Amateur Radio Group did a great job as traffic control and emerg. comm. for the Gaspee Days Parade, June 8, 1985. Tnx guys. The Prov. Radio Assoc. held it's second VE program July 20, 1985 - another job well done. Tnx P.R.A. New officers of the East Bay Wireless Assoc. Pres. KS1J VP/Trea WB1DEZ, Secy. N1BVV, Tnx to WYNE for his service as FI SM. I am stepping down as Pres. of the P.R.A. so not to have a conflict of interest. I hope I can serve all of RI to the best of my ability. Tnx all.

VERMONT: SM, Ralph T. Stetson, KD1R - STM/MB: AETI, SEC: W1CTM, SGL: W1KRV, ACC: Open, TC: Open, ATC: Open, COIA: KD1R. A hearty congratulations to ARRL VE members nationally who have passed their 62.1% of VE Exams in field; next in line is W5YI VE group with 8.7% of Exams completed for March 85 alone. We are fortunate to have both organizations working here in VT. ARRL VE's in Montpelier, Northeast Kingdom, and White River Jct along with W5YI group in Burlington area. There are too many people in each group to single out, but I hope you all keep up the great work. Along these lines KK1U and KA1LJDJ are running cde practice sessions on 28.150 MHz nightly at 9:30 PM. Congrats to K1KJF for recent upgrade to Advanced. Look for WA1HTI MM on Lake Champlain, also N1DFZ on 180. Welcome to WIPOB on joining VE program after his recent upgrade. Also in cude department special all the thanks in VT who helped out in annual March of Dimes Walkathon "85." By now you have seen the Novice proposal. Look at it closely and write to FCC your thoughts. Rumor has it FCC will look kindly at parts of proposal but not all of it so get your two cents in-it counts. Hope by time you read this K1NEI is well again. In a sadder note sorry to report that Gerry KA1AKJ lost her husband our prayers are with you Gerry. NETS MAY VTN 28/98/83: VSSB 31/289/81: VTRFD 4/52/10: CAF 27/699/25: VTPN 4/15/85: GMM 2/7/36/39: CVFM 4/7/85: VSSN & VT2FM off for summer. Traffic: KT1Q 201, AE1T 183, W1KRV 99, N1COB 51, W1OAK 32.

WESTERN MASSACHUSETTS: SM, Don Haney, KA1T - PIO/ACC: K1BE, SEC/SGL: WB1HH, OO/RP: N1GM, STM: W1UD, TC: KA1JJM. Pleased to appoint WB1FSV as new EC Franklin County. Many thanks to WB1HKN for several years of service. Good to see N1DMU very active in traffic. W1BABC provided comm. for Dalton Jon's Marathon on W. Mass bike trails - both on same weekend. Provin Mt. AFA getting new controller for 10/70. CMARA may get "Ask Me About Amateur Radio" bumper stickers. Their Explorer Post has held first meeting. And the annual CMARA picnic is August 11. HCRA had 41 upgrades at May Exams and their Novice classes resulted in 16 new hams. As a follow-on to the novice classes, KA1KRJ and KA1MEW held antenna clinic for the class. KA1KPH has 70 cm repeater on Provin Mt. now. The A.V. repeater xmitr is on the air from Wilbraham on 425.26. PSHR: N1DHU KA1T. Traffic: W1UD 127, KA1T 116, W2SJV 91, N1DMU 81, W1KIK 79, KA1EQ 4B, WB1HH 47, K1LJV 25, WA1OPN 22, WB1FSV 12, W1ZPB 6.

NORTHWESTERN DIVISION

IDAHO: SM, Lem Allen, W7JMH - SEC: KD7HZ, STM: W7GHT, PIO: WB7PF, OO: KUTY, RFI: K7QQP, CLUB NEWS: The Pocatello Club furnished Communications for the March of Dimes, using 2-Meters. It was a very successful accomplishment for relations. The Moscow Club, headed by K6LWS and W7LAFB furnished communications for the Idaho State Games Special Olympics May 31 and June 1. They were assisted by N7GJ KA7JZ KA7KE KA7QE K7MM K7ZN WB7NEZ N7EDG N7JN N7GJV N7IS K7DEJ W7UJQ. ARRL MATTERS: KD7XD is new EC for Boundary County. K7QQP is new head of RFI Dept. PEOPLE AND THINGS: KD7JN has new 430. WA7RUT has new horizontal antenna. W7JMH has daughter and 2 grandchildren visiting from Fairbanks, AK. KD7HZ has new Motor Home. W7GCL had 6 bypasses, doing well at home.

NE REPORTS: Frag. Time Sess. QNI QTC F4RM 383 Lsb 8P Da 31 1833 64 ICD 3950 Lsb 810A M-F 23 926 23 IMN 3835 CW 9P M-F 23 191 69 TV CD 145,44/44 8P Su 4 215 14

GENERAL: Use your Amateur License for your own benefit and the benefit of the community. Get involved. Join ARS, volunteer for public service. Traffic: KA7KA 148, W7GHT 108, W7JMH 74, N7NB 11.

MONTANA: SM, Les Belyea, N7AIK - WA7GGO has stepped down as our PIO after four years of doing a great job. New PIO is N7HAZ who is in the broadcasting business. New Hellgate ARC officers for 85/86 are K7C2O-pres, N7FMW-vp, KA7LEB-sec/ytreas. WA7DEO reports the Missoula RACES was activated for a large warehouse fire, they manned the DES office, Red Cross, and several other evacuation centers. Many members of the Capital City ARC helped with the Vigilante Parade and the Governor's Cup at the stadium in Helena. For the first time ever, in Montana, there was an upgrade session held east of Billings. This was done on Father's Day in Glendive. Up grading in Missoula were K7HP to extra; KA7SHP to adv; N7PFR, KA7SKD, KA7SPI to gen. Net Sess. QNI QTC Mgr. IMN 23 191 69 open MTN 31 1340 124 KF7R MSN 4 89 1 K8PP Traffic: KF7R 196, WA7TUW 34, N7AIK 21.

OREGON: SM, William R. Shrader, W7QMU - STM: W7VSE, SEC: N7CPA, PIO: K07YN, SGL: KA7KSK, STC: N7ENI, ATC: AK7T, OO: N7SC. Upgrades this month: WA7OYC (Extra); N7GYZ K7ZJJ K7IKR N7GOU (Advanced); KA7UMC KA7AV KA7TAM KA7DWW KA7VKI KA7UGX KA8AJY KA7TRL (General); KA7QPS KA7SQC KA7VBP KA7TES KA7UZK KA7RHO KA7GV KA7TGH (Technician). WA7IM was recently promoted to Gas Supply Supervisor for Northwest Natural Gas Co. Congratulations to all and it's nice to see a large upgrading list again. I would like to spend a few words to PAT some real important people on the back. Who are they? They are the many guys and gals who are taking/have taken their valuable time to teach classes, be Elmers, and to assist in the administration of exams through the Volunteer Examiner program. Without their help and expertise Amateur Radio would fall flat on it's face. Just look at the budding statistics, and they will tell you things are progressing in a slow positive direction. THANKS to all of you! For the rest of you G.I. INVOLVED! We still need an interested individual to fill the Affiliated Club Coordinator's slot. If you are interested in a challenging position, this might be it. Contact your SM, W7QMU. Great job at Seaside as usual. Lots of good seminar sessions. Traffic: W7VSE 879, W7FLC 267, W7LRB 258, W7ZB 161,

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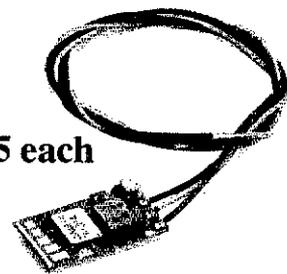


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K7OVK 117, KX7W 87, AL7W 75, N7BGW 55, KA7AID 35, N7FXJ 34, W7MLM 18, W7LNE 15, KX7T 11. (Apr.) W7ZB 18D.

WASHINGTON: SM, Joe Winter, WA7RWK—BTM: K7GXZ. SEC: W6IHH. BM: N7IL. TC: K7UU. PIO/SGL: W7CKZ. OO/Coord: KC7FA. ACC: KD7G.

Net	Freq.	Time(Z)	QNI	OCT	Mgr.
EWTN	146.64/	0030/0430	76	48	WA7CBN
NTN	3970	1900	1065	35	W7UJ
NWSSB	3945	0130	788	41	W7HFN
PSTS	145.33	0030/0430	167	127	W7IEU
WARTS	3970	0100	2921	413	W7SPT
WSP	3950	0145/0445	52	196	W7GB
WARNS	3940	0200	AR NEWS NET	W7CKZ	

HAMFESTS: Tacoma Hamfair Aug. 17-18; Walla Walla HF Sept. 21-22. From the Mike and Key ARC Relay: The club approved a proposal to install and operate a 220-MHz repeater. N7NW reports that the repeater was ordered at the Dayton Hamvention and construction has already begun. Its location will be on Tiger Mountain at an elevation of 3000 ft. The frequency will be 224.12 xmit. and 222.52 rcv. It is expected to be operational by the end of July. The club turned over the full control of the M & K Swap & Shop to W7BUN with the use of the club name left to his discretion. The net is on every Sunday at 10:30 A.M. on 3930 kHz. From W7VWA: Repeater news. K7CR reported that the 53.09 rptr. is operational on Lymon Mt. near Mt. Vernon, good to Tacoma to Naticum. B.G. WA7FUS reports the K7LIE 220-MHz mach. is on the air from Kirland. W7TPF will add a second rptr. at Graham Hill, this one on 224.88. Dave operates the 147.14 rptr. at the 1000' site south of Tacoma. W7FHZ reported that KG7A at Sequim has been coordinated 442,100 for that area. KA7PMC has been coordinated 443,050 for a new rptr. to be located on 3,500' Rattlesnake Mt. near North Bend. It was my pleasure to attend the annual meeting of the Washington Section EC's and RO's in Yakima on May 18th. Much was accomplished to improve ARES emergency and public service communications. S.E.C. W6IHH did a great job handling the meeting. A.C.C. KD7G is busy with Special Service Club renewals, and an SSC application from the Olympia ARES. He reports two other clubs interested in SSC affiliation. If you are not a member of a radio club we suggest you visit one in your area and look into its activities. On April 6, 1985 A Memorandum of Understanding between The Amateur Radio Emergency Service and The Washington State Dept. of Emergency Management was signed by Hugh H. Fowler, its Director, and myself for ARRL's Washington Section ARES. This agreement marks a milestone in relations between the ARES and the WSEEM. It further strengthens Amateur Radio's role in emergency communication in the Section. The work of PIO/SGL W7CKZ and SEC W6IHH in drafting and finalizing the agreement is very much appreciated. Traffic: W6VWV 652, KP7MS 648, KR7J 287, W7G 259, K7GXZ 21, W7GB 107, KR7F 102, N7GDW 75, KS7I 75, NE7B 60, KD7G 58, W7IEU 47, N7DDP 45, K7CTP 22, KD7TJ 19, WA7BBD 18, KA7TCE 18, KD7MW 4. (Apr.) KD7MW 4.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallo, W6RGG—ASM: W6ZF, N6DHN. SEC: W6LKE. STM: N6A. The Benicia ARC had 16 operators at NPG for Armed Forces Day. A Fine Business job! The Hayward ARC is moving forward on their new shack at the Fire Department Training Center. It will be wired for commercial power as well as for their diesel generator. Their current Novice class has 14 students. The East Bay ARC mourns the loss of member WA8DQO. The Livermore ARC welcomes new members WB8DXP, KB6HNN, KB6HMK and KB6HPT. Traffic: WB8DOB 210, W6VOE 116, K6APW 113, WB8UZX 23.

NEVADA: SM, Leonard M. Norman, W7PBV—Effective 1 July Nevada section will have a new SM, see page 8 of QST for Name and Address. Special QSL cards are being printed for HOOVER DAM 50th ANNIVERSARY CELEBRATION, contact Boulder City Radio Amateurs and those who are working on the Hoover Dam Project in September. W8IXD, N7BIH, N7FFP, N7FSG, N7FZG, NK7N and KW7HF assisted in ARRL PR booth at NAB show in Las Vegas. W7PBV has a new home under construction in Boulder City. Many Radio Amateurs assisted in Communications for the Henderson March of Dimes, N9FZG Chairman. Thanks to K7RW, W7BS, K7IGV, K7JK, and the many others who assisted me as SM for the past two years. Traffic: W7PBV 3.

PACIFIC: SM, James Wakefield, AH8CO—Welcome Guam via KB6DVA into Marianna SEC office. Traffic: KC6JIC, VP W1YRM, Sec BBDAAV, KP6AGS and QSL mgr AH2G. On Oscar are W1YRM and KG6DX. KH2 rptrs are 34/94 and 28/88. On Big Island AH8P is relaying via packet on 145.05. On ammonia spill WH6AZI, NH6BO, NH8O and KH6SQ gave service on evacuation in Kahului. Kauai rptrs six new ARES members and KH6S has HF Extra back up after repair of rotor. NH6CX upgraded to Extra. KH6VWG has a new 940S. NH6CH ups to Adv and WH6AZI ups to Gen and sports a new 430S. New hams in Hilo are WH6BDD, WH6BBJ, KB6EYP, WH6BAV and WH6BDE. Helping Hilo ARC through AREC are KH6B, AH8P, and W6ORS. The ARC received a donation of a 1400 watt AC/DC generator. Snow chains in HI ask AH6PJ. Traffic: KH6RQ 44, KH6S 43, KH6H 38, KH6B 2.

SAN FRANCISCO: SM, Bob Smith, N8T—"Club Challenge for the 80's" is in progress nationwide. I hope all the section clubs take advantage of the program for sending their club members to Packet Society classes come to the SF Section, courtesy of KA8ATN, K8TP, and others. Interested? Contact them via 145.01 in the Santa Rosa Area for meeting times, etc. of the Packet Society. DNARC's rptr is up and running on 147.780-147.180 and shows good coverage of the Del Norte and Southern Ora. coast. All the participants in the SF section took advantage of the PUBLIC EXPOSURE for Field Day and were able to demonstrate AMATEUR RADIO to the general public. MARC emergency communications has taken two more steps toward county wide communications: Auxiliary link to western Marin, and two meter simplex freq. for each city. See Nels, N6AQY, for further information. REKA viewed the Clifton DX-expedition slides of KK6X. Jim Hicks. Need a program with a lot of action? Contact Jim for one H— of a fine program. Get well soon to Sam, W8NL, contact via NCN #1 or #2 or write c/o Sabastopol Convalescent Hospital. Traffic: KK1A 256, WB1PT 223, N6FWG 103, W6PW 80, W8GGR 23.

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: W6YAB. STM: N6AWH. TC: W6EXV. ACC: N6ECH. Asst. SMs: W8TRP and K6YK. The following SJV Amateurs won prizes at the 1985 Fresno Hamfest: KB6DK K6EME Adew W6BUJ KBXJ WA6QWP N6JQT W860WI KV6W KA6LNW KA6SRN KA6ACE WA6HSW

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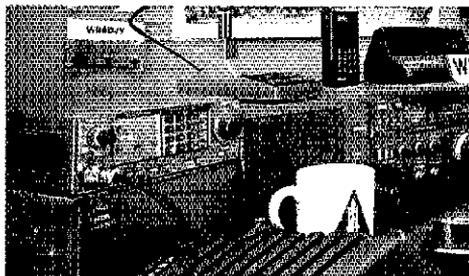
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The 16-key DTMF pad can also be used for direct frequency entry, sub-tone selection, memory address and scan programming. The keyboard is illuminated for night time use.



TR-7950 optional accessories:

- TU-79 three frequency tone unit
- PS-430 power supply
- KPS-12 fixed-station power supply for the TR-7950
- KPS-7A fixed-station power supply for the TR-7930
- SP-40 mobile speaker

- SP-50 mobile speaker
- MC-55 mobile microphone
- MC-46 16-key autopatch UP/DOWN microphone
- SWT-1 2 m, 100 W antenna tuner
- SW-100A/B power meters
- PG-3A noise filter

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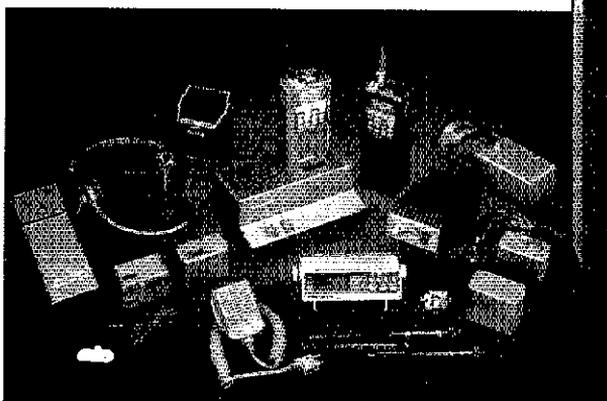
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• 10 Channels

10 memories, one for non-standard repeater offsets.

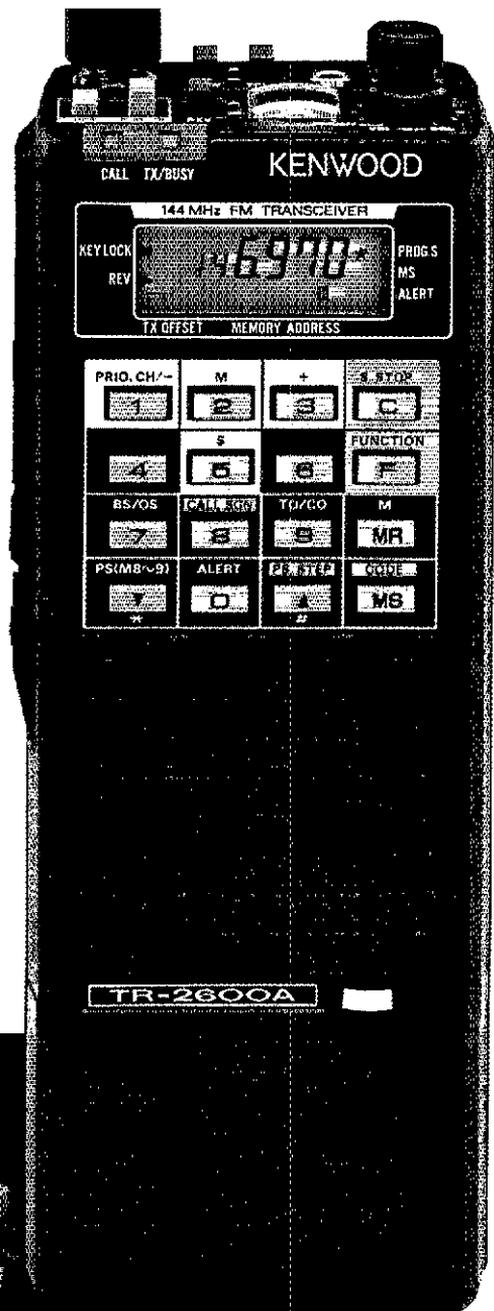
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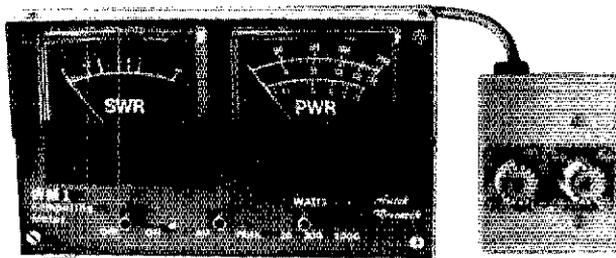
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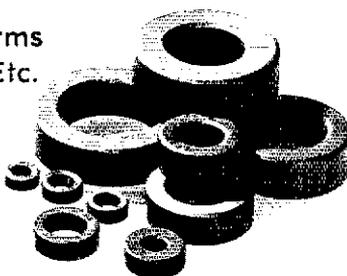
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the ZIA LINK to ABO on 145.41. Sorry to report the passing of W7KR, Flagstaff, AZ, Hamfest July 26, 27 & 28th. Alamogordo to West Sept. Traffic: NDSF 466, W5DAD 134, W5JOW 40, N5EXG 7.

UTAH: SM, Jim Brown, NA7G—NMs: BUN, NA7G, UCN, WA7WIB. Like to work CW, but haven't lately? The Utah Code Net meets you in nets daily at 7:30 P.M. local, and is a slow speed net. Like to run a little faster? Contact Ray, K7HLR, for openings on the Twelfth Region Net (TWN). CW traffic is a good way to get your code speed up, and upgrade via the frequent VE exams we have in Utah. (Tnx, VE's, for your hard work!) W7OCX received the Army MARS award for the operator of the month of May. Traffic: K7HLR 277, WA7KHE 112, WA7JUL 100, WA7WIB 80, W7OCX 10.

WYOMING: SM, Dick Wunder, WA7WFC—Asst. Section Manager: KA7AWS, Steve Cochran. Sect. Emergency Coordinator: W7TVK, Jim Anderson. VE Teams have been busy lately with a better than 50% success in all exams. Recent upgrades that I am aware of are W7TVK and KE7SX to Extra: K9YLI & KA7UTU to ADV; KA7UOE, KA7UOF, KA7UME & KA7SGQ to GEN; WB7RDC, KA7YTS, KA7SOK, KA7HAA, KA7DGW, KA7UOP, KA7KGD to TECH. Congratulations to all and to the VE who administered the exams. The TECH/GEN upgrade class in Cheyenne is continuing thru the summer. KC7AR reports the Wyo. Cowboy Net held 23 sessions with 782 QX1 & 30 QTC. Congrats to Duane on the new call, TNX to Torrington Club for copy of fine newsletter. Traffic: NN7H (WB7NHR) 202, W7HLA 45, W7SQT 22.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph Smith, Jr., WA4RNP—STM: N4JAW, SGL: KA4WVU, BM: KF4VW, CO/RRF: KAELV. The 17th and 18th of this month the place to be is Huntsville for the North Alabama Hamfest. I hope to see you there too. I hope a lot of you are now on 12 meters or 30 meters or both. Sorry to say that "Mike" KAELV has asked me to replace him as the Official Observer/Coordinator for Alabama as he has too many job and personal commitments to continue. Give me a call if you have what it takes to fill this important post. Brass Pounders: WD4JDH Public Service Honor Roll: WD4JDH, W4CKS, KB4GPN, WX4I, WD4NYL, and WA4RNP. Traffic for May: CAND reports 786 messages were passed in 31 sessions with Alabama represented 100% by WD4IXA, W4CKS, WX4I, and NW4X. DRN5 reports 721 messages in 62 sessions with Alabama represented 95% by WD4IXA, WA4JDH, W4CKS, NW4X, WX4I, and W4WJF. 73 Jobs. Traffic: WA4JDH 699, W4CKS 141, NW4X 128, W4ZJY 72, WD4NYL 58, KB4GPN 54, WA4RNP 39, KA4ZP 34, KB4GAP 14, W4WJF 14, W4DGH 12, and WB4TVY 2.

GEORGIA: SM, Eddy Kosubucki, K4JNL—STM: K4VHC, ACC: WA4ABY, BM: WB4IA, CO: W4RZL, PIO: WA4PNY, SGL: W4BTZ, TC: KA4DR. ARRL HQ has just informed me that I have been re-elected as Georgia Section Manager for another two year term. Many thanks to the staff for giving this honor upon me. I promise to continue to strive to make this the best section of the 73. I need ur help & now more than ever. Amateur Radio has changed drastically in the past few years & it's like a new ball game. From my point of view we have to once agn form that unity that we used to have. Without it we might perish. Other services continue to try & take parts of our spectrum away. Our voices need to be heard loud & clear. It doesn't take long to write a letter to our law-makers or FCC to let them know how we feel when a certain issue comes up that concerns us in the hobby. So please let's be heard. I am hoping the time I read this the operator issue in the section has been resolved. I want to thank all who called & wrote me expressing their feelings. This is the way to get things done. I have not appointed a new SEC as of this date & don't know how many of my appointed staff will continue for another term. All of the staff positions are of the utmost importance to make the section function properly. We do need Official Observers in the section as there are only 3. If u care to volunteer to be a FCC approved OO u must be an ARRL member. As u well know we have to do the Volunteer Monitoring. If ur interested write me for the proper form. I am not getting some of the Club Monthly Bulletins. If u are a member of ur club, & see that I am put on the mailing list. Have a nice summer. Traffic: W4PIM 191, K4AKP 78, K4VHC 55, WB4NTW 45, KA4EV 45, W4JWO 38, K4BAI 25, N4UZ 25, W4BIA 22, KF4FG 18, K4N 12, W4HON 10, W9NXC 8.

NORTHERN FLORIDA: SM, Phil, WF4X—ACC: Roy, N4ADI, STM: Ron, WB4GHU, TC: Charlie, N4KF, SEC: Rudy, WA4PUP, CO: Stoney, K4JJE, PIO: Pety, WA4PUO, SGL: John, KC4N, BM: Wimpy, KB4LB. The inspired descriptions that Al, WA4RGO, writes about the outstanding efforts of our Emergency Coordinators during the forest fires that plagued the east coast of Florida, made us want to stand up and cheer, so HURRAH for those amateurs that performed so professionally! Our Tech Coordinator, Charlie, N4KF, is still asking for nominations by clubs, as well as volunteers, to help him as Ass't Tech Coordinators! Remember that sincere interest in helping new amateurs and fellow club members is more important than a Masters or SS in Electrical Eng'g, so let Charlie hear from you. Roy, N4ADI, our Club Coordinator stands ready to help clubs become affiliated as well as to help Affiliated Clubs reach Special Service Club status, and offers the following! Special Service Clubs are SPECIAL: Because they are organized to provide a broad range of Public Service activities, as well as services to the Amateur Community and these are designed to continue over a long period of time, these Clubs receive special recognition! They are listed annually in the Repeater Directory and in the ARRL Newsletter and also in QST when they reach SSC status as well as when they renew it. Also, they receive lists of new Amateurs as well as new ARRL members six times a year to help with recruiting efforts. Further, a special logo is available for use on stationery and certificates as well as hats and vests. In other words SSC status is a matter of prestige! Traffic: WF4X 920, WX4H 815, N4PL 812, WA4OXT 474, WB4ADL 409, WD4HO 366, KD4KK 242, KB9LT 241, KC4VK 194, WA4EYU 157, W4MGO 119, AA4FG 107, AA4HT 107, N4DAS 76, KB4LB 76, N4DY 74, W4QUJ 70, WF4Y 70, N4JAQ 70, KB4FY 68, KB4MH 86, NF40 60, WB4YQP 60, WB4GHU 53, KF4TM 52, KF4U 48, KC4FL 47, WD4HP 43, WD4MLQ 32, WC4D 29, WB4TZ 29, N4GMU 28, WB4AVG 17, WA4PUP 17, NS4C 15, KF4GY 15, WD4EQB 15, N4Q4 17, K4ACQ 13, N4ENL 12, N4ADI 12, W4DTV 10, WB4FY 9, N4JH 6, WBIM 6, WA4PUO 4, WD4HUZ 4, N4AF 1. (Apr.) NF40 561.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SSS, STM: K4ZK, TC: K4C, BM: WA4EJC, PIO: W4WFR, SGL: KC4N, CO: K4ST, W4AFC, Bulletin Manager, is out of the state. Thanks to KF4JA, who compiled the bulletin reports in his absence and reports total



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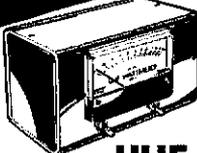
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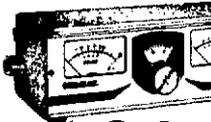
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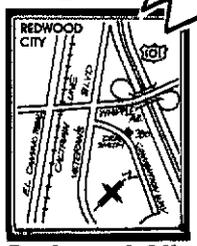
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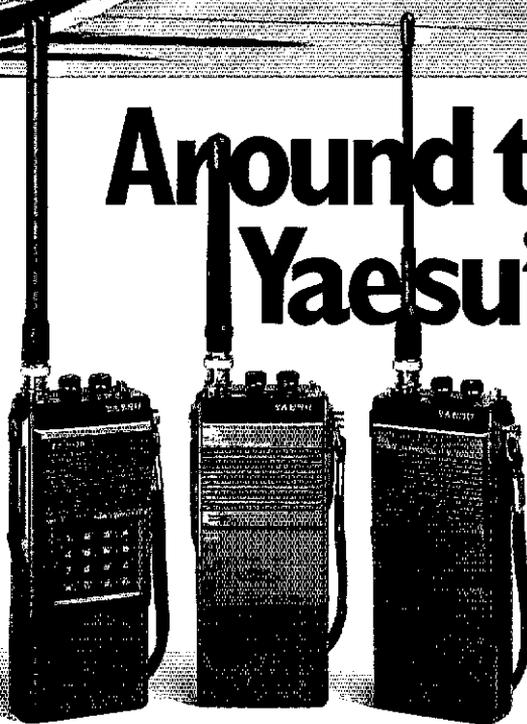
In fact, you'll discover that our VHF/UHF line is as diverse as your operating needs.

So when you want to make your VHF/UHF operation complete, just look to Yaesu for the solution.

For your hand. We're constantly raising the standards in handheld radio technology. And our 5-watt, 2-meter FT-209RH and FT-709R are

no exceptions.

In fact, you won't find a more flexible, easy to use HT design anywhere.



Each rig gives you a battery saver that really helps conserve your battery power.

Two microprocessors make for a wider range of scanning functions. And complete storage capability in each of the ten memory channels.

Even an optional plug-in tone encode/decode module is available.

And best yet, these two high-powered HTs fit very comfortably in your hand, thanks to an ultra-slim and lightweight design.

However, if you're looking for a more basic and inexpensive

handheld alternative, we've got your bases covered too.

We give you a choice of three bands of operation: the FT-203R for 2 meters, the FT-103R for 220 MHz, and the FT-703R for 440 MHz.

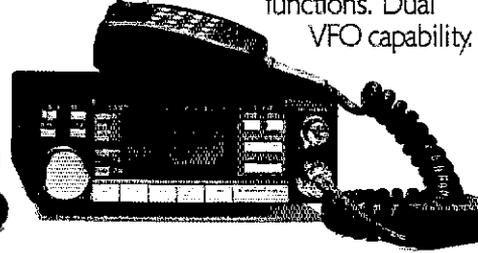
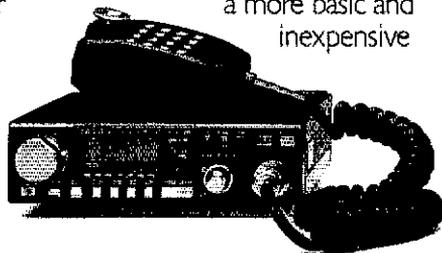
Each of these lightweight rigs features 2.5 watts of power and an optional DTMF keyboard.

Over land. Our two mobiles give you a lot of power in very small packages.

The FT-270RH is a 2-meter, 45-watt rig that conveniently packs its 45-watt punch into just about any small space in your car.

The FT-2700RH is a 25-watt FM dual-bander that lets you operate on 2 meters or 440 MHz. Or combine the two for cross-band, full-duplex, telephone-style operation.

Either way, both rigs are simple to operate. You get ten memory channels. Flexible band-scanning functions. Dual VFO capability.





Around the world. We get you there.

With a clean, uncluttered LCD display for easy readout.

You don't even have to take your eyes off the road to determine your operating frequency and memory channel. An optional voice synthesizer announces them both at the push of a button on the microphone.

Also, an optional plug-in tone encode/decode board is available.



Across the world. We've got the world's most popular link to OSCAR 10, the triband FT-726R.

And talk about DX. You'll be making worldwide contacts in true 20-meter style. With excellent signal quality too.

And better, you can work the world from just about anywhere. Including apartments and antenna

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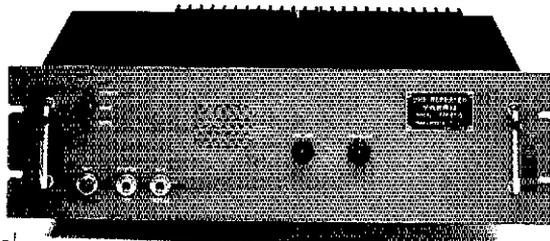
The FT-726R is a 2-meter, 10-watt rig with cross-band capability. To assemble the core of your earth station, simply plug in two optional modules, one for 435-MHz operation, another for cross-band duplex.

You get eleven memories, dual VFO registers, highly versatile scanning functions, and a whole lot

more to make the FT-726R a highly worthwhile investment.

Tie it all together. Finally, if you're looking for a repeater system, we've got just the repeater and intelligent controller that you need.

We'll help fine-tune your system to fit your individual requirements. No matter what they



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What's more, you can rest assured that our repeater system is proven and reliable. In fact, it's been used extensively in both amateur and commercial applications.

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So when you're ready to get out on VHF/UHF, go with

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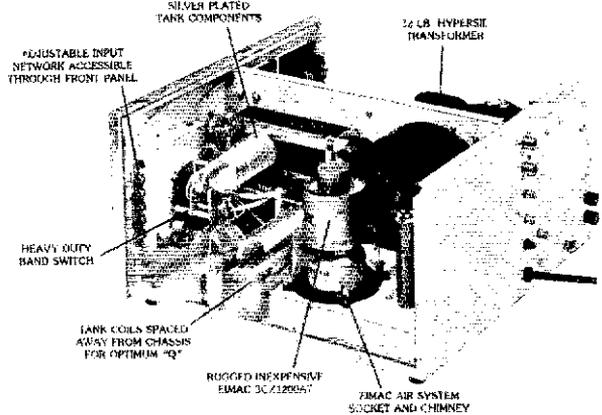
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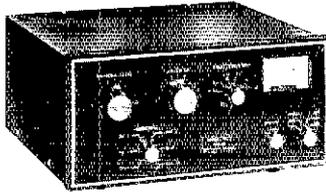
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ATR-10 TUNER

The Ameritron ATR-10 has a unique bandpass network that provides superior harmonic suppression and image rejection. It will safely handle 900 watts of envelope power from 160 through 10 meters. A heavy

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The Ameritron ATR-15 is a 1500 watt "T" network tuner that covers 1.8 through 30 MHz in 10 dedicated bands. Handles full legal power on all amateur bands above 1.8 MHz.

Five outputs are selected from a heavy duty antenna switch. The ATR-15 has a peak reading watt meter, SWR bridge and a dual ratio balun. Size: 6"H.x13 1/4"W.x16"D.



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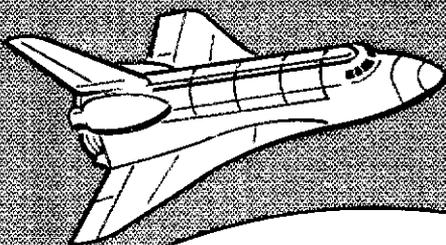


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Expanded frequency coverage (TH-21AT/A).

Covers 141,000-150,995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.

TH-31AT/A: 220,000-224,995 MHz in 5 kHz steps.

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• **Repeater offset switch.**
TH-21AT/A: ± 600 kHz, simplex.

TH-31AT/A: -1.6 MHz, reverse, simplex.

TH-41AT/A: ± 5 MHz, simplex.

• **Standard accessories:** Rubber flex antenna, earphone, wall charger, 180 mAh NiCd battery pack, wrist strap.

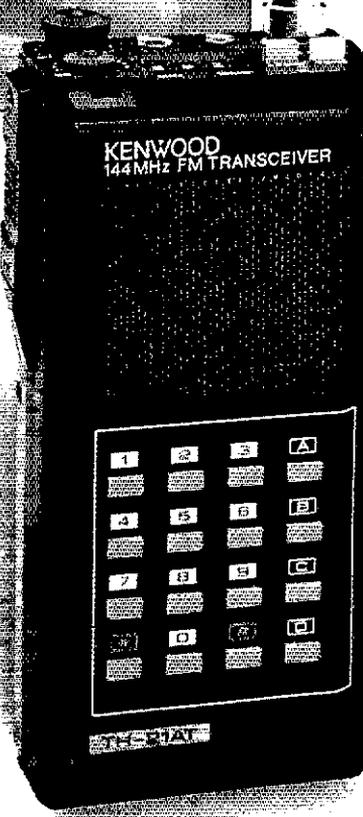
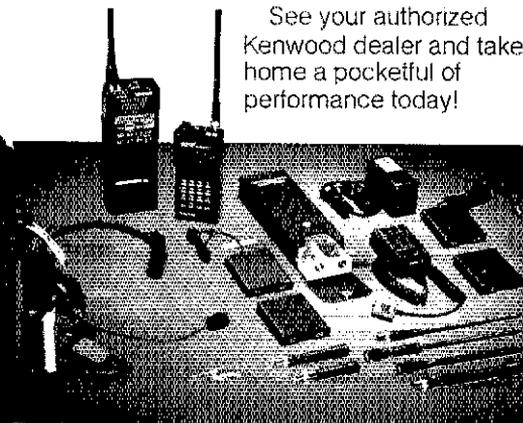
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The rechargeable battery case snaps securely into place. Optional battery cases and adapters are available.

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The high impact case is scuff resistant, to retain its attractive styling, even with hard use.

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Easy-to-operate, functional design.

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- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAh battery
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8** soft case for TH-21A/31A/41A
- **SC-8T** soft case for TH-21AT/31AT/41AT
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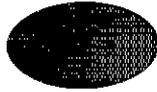
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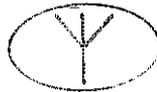
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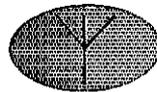
ANTENNA PURSUIT



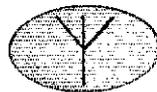
What is a LARAE?



How is Mr. Smith's *other*
chart used?



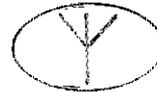
What type of antenna might survive a
nuclear attack?



On what band will you find a crossed-
loop/goniometer antenna useful?



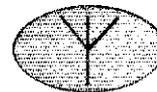
What antenna has a "mystique"
about it?



How do you wire up "Old Spruce?"



What English radio amateur has an
antenna named with his call sign?



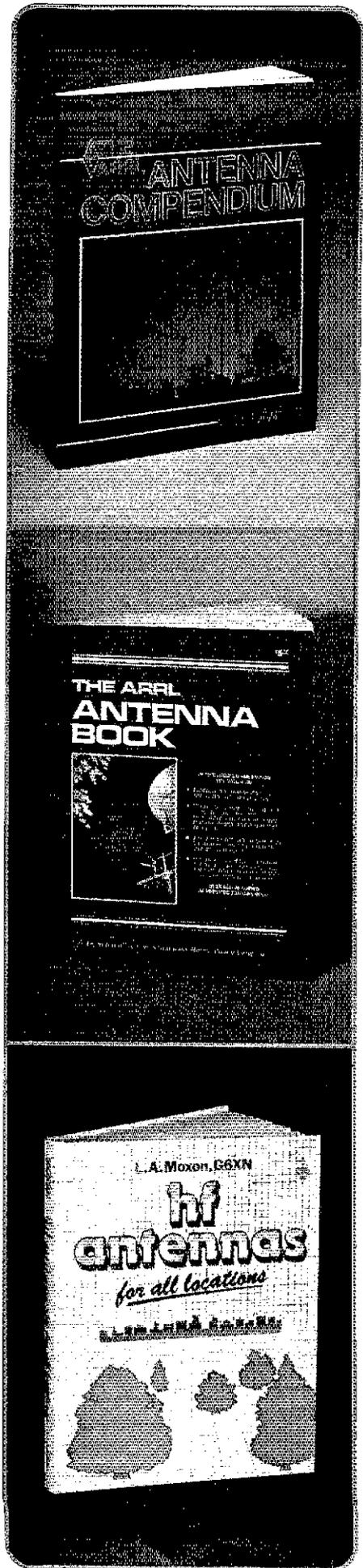
What do baluns do and how do they
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How do you build a W8JF Waveram?

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Because of space limitations in *QST*, we don't have room to run all of the good antenna articles that are submitted. The solution to this problem? **THE ARRL ANTENNA COMPENDIUM!** You'll find 178 pages packed with new material on quads, loops, log periodic arrays, other beam antennas, multiband antennas, verticals, reduced size antennas, plus such interesting topics as: Mr. Smith's "Other" Chart and Broadband Rigs; Available Power, SWR and Loading; Baluns: What They Do and How They Do It; The Horizontal Dipole Over Lossy Ground; and Antenna Polarization. Copyright 1985. Paperbound: **\$10.00** in the U.S., **\$11.00** elsewhere.

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THE ARRL ANTENNA BOOK The best and most highly regarded antenna information available. The 14th Edition contains 328 pages of propagation, transmission line and antenna fundamentals. You can update your present antenna system with practical construction details of antennas for all amateur bands - 160 meters through microwaves. There are also antennas described for mobile and restricted space use. Tells how to use the Smith chart for making antenna calculations and covers test equipment for antenna and transmission line measurements. Over 600,000 copies of previous editions sold. Copyright 1982. Paperbound: **\$8.00** in the U.S., **\$8.50** elsewhere. Clothbound: **\$12.50** in the U.S., **\$13.50** elsewhere.

HF ANTENNAS FOR ALL LOCATIONS by L.A. Moxon, G6XN. An RSGB publication. Contains 264 pages of practical antenna information. This book is concerned primarily with small wire arrays, although construction information is also given on a small number of aluminum antennas. Chapters include: Taking a New Look at hf Antennas; Waves and Fields; Gains and Losses; Feeding the Antenna; Close-spaced beams; Arrays, Long Wires, and Ground Reflections; Multiband Antennas, Bandwidth; Antenna Design for Reception; the Antenna and its Environment; Single-element Antennas; Horizontal Beams; Vertical Beams; Large Arrays; Invisible Antennas; Mobile and Portable Antennas; What Kind of Antenna: Making the Antenna Work; Antenna Construction and Erection. Copyright 1982, 1st Edition, Hardbound **\$12.00**.



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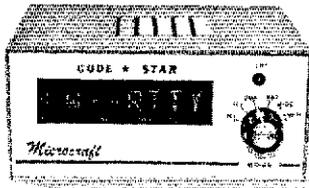
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bulletin activity of 113 bulletins received and transmitted this month. KAZK is also out of the state until August—thanks to WALLA who is compiling the net reports for both the ARRL and Florida Skip. KY8Y and W4PKP both made BPL for March but were not listed in the BPL column in the June issue of QST. This omission has been brought to the attention of headquarters, and congrats to both KY8Y and W4PKP. K4SCJ and his XYL, K4RXU are vacationing in Italy June 2 through June 16. AA4EE, better known as "Call DJ," has been appointed by W4SS as Emergency Coordinator for Broward County, Missa Phil, K4AFZJ will assume duties as manager of QFNS beginning July 1. Congratulations to the Hollywood ARC—they have been renewed as a Special Service Club. Congrats also due the Palmetto ARC which is now an affiliated club. Read in the ARRL SECTION LEADER that Jim Townsend, NS6W, hosted a meeting of ARRL officials in L.A. Jim is ex KB4QW, ex SEC for SFI. Novice Roundup 1985 scores listed KB4ELQ/N and KA8TDI/4N from Southern Florida. K14T, Technical Coordinator for Southern Florida is looking for Assistant TC's—if you are interested get in touch with him via a radiogram. K14T reports that Operation Echo was held in Dade County. It was a simulated airplane crash in the Everglades. The county fire, police, emergency, press, and ambulance, and fire departments all participated. The amateur radio community was asked to participate by the fire department, the organizers of the exercise. The various participating agencies, including the F.A.A. observers lauded the amateurs for their superb communications performance. It was agreed all around that the amateurs had the best communications of all the participating agencies. There were twenty four amateurs involved in the exercise. Congrats to N4JOA who was upgraded to general. WALLA reports 22 phone patches this month. K9EHP reports by radiogram that he is back in Illinois. KA4YHS reported the following episode on twenty meters May 15—Y4JUF in Pearl Harbor, his father K4GIT in San Diego, his grandfather K4ZJ, a ham of 50 years in San Diego, his brother N4AMD in Georgia and his sister WD4FBE in North Carolina were all on frequency at the same time! Three generations of hams! KA4YHS assisted in getting K4GIT up on frequency for the event. N4KB holds a regular sked with W1NJM Sunday nights at 10:30 P.M. on 7023. 73 de W42PK. Traffic: W3CUL 3160, W3VR 1060, KY8Y 396, W44PFK 314, KF4JA 274, K4SCL 269, K4JT 228, WA4EIC 190, K4EUK 188, N4KXN 179, W4NFK 177, KA4GUS 162, WB4WYG 149, KA4NFX 131, K4ZV 120, K4JA 100, KY4U 84, AA4BN 81, KF4RL 53, WD4KBW 46, W4PKP 45, KA4YHS 44, WALLA 40, K5IHH 40, N4ET 35, W3TLV 35, WA4HDI 34, K9ALX 31, K4FQU 31, W4GCK 29, K4BLI 28, K4NH 28, K4ASH 25, W4SS 24, K4JLL 24, W4SMI 20, W4ESH 19, W4MFI 19, K9EHP 14, KD4GR 13, KB4EWO 13, WD9AEP 13, W4WYR 12, K4IRT 12, WD4NXX 12, KB4ELQ 12, W3JIR 11, KA4GDU 10, N4HAS 9, W4DL 9, KB4KB 8, W4F 8, WK4F 8, WA9VND 8, WA2UKE 8, W4MFD 8, K4OVC 6, KA4KDD 5, KB4KAW 4, N4JOA 4, WD4MCC 4, N4KB 2, N4LLZ 2, KY6T 2, WA4YNO 2, N4KNP 2, AA4IF 1. (Apr.) WD9AEP 170, K4JLL 85, N4HAS 72, KM4Y 30, WB2NVJ 26, W4MFD 6, WA4YNO 5.

WEST INDIES: SM, Carlos Flores, WP4J—West Indies Net Slow (WINS) CW daily at 2300Z on 3710 MHz. KP4DJ reports sessions 30, QTC 14, QNI 69. Hello again friends. During the month of May (3 thru 5) the ARES program was in operations due to heavy rains on the island of Puerto Rico flooding various towns washing bridges away and also landslides on roads. ARES supported communications for federal and state government agencies and Civil Defense. NP4CF, NP4F and myself, W4J, coordinated all amateur radio communications at the state capitol Civil Defense in San Juan from the operations control room. Using local repeaters 146.940, 147.090 and 147.195 from Friday thru Sunday 119 stations reported with 49 traffics handled. Outstanding stations that helped greatly were KP4FI, WP4DDF, WP4DSW, WP4EDB, WP4ONB, KP4BOL, NP4MU, NP4HS, WP4CGH and myself are going to take the repeater 145.450 to a new site on the east side of P.R. in Luquillo, in order to have better communications with St. Thomas, St. Croix and Culebra Island. Also repeaters 146.940, 147.090 will be used for ARES. I, as SM, will be meeting with Jerry Bourne, president of St. Croix ARC soon for future activities. Hasta Luego WP4J, SM, WJ. Traffic: KP4DJ 80.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—New appointment: Ass't. SM, K7OMR. Central Az DX Ass'n's newsletter from W8AKH reports reasonable DX success in spite of very poor propagation condx. Congratulations to the AVRA Valley Repeater Ass'n on their recent affiliation. K0TW, Sec'y. AFCA published new FB Arizona Repeater List dated 17 Mar., along with site map of the ZIA Connection linking mountain top two meter repeaters from west of Phoenix to El Paso, Almodoro and Albuquerque on the east. Thanks ARC. The ARRL and IARU inform us that current rates for ham radio license plates are: \$15 initial plates; \$5 for renewal annually, and no charge for xfr. Many Arizona Clubs planning Field Day activities. Mountain top sites appear attractive as escape from desert heat. Good hunting, and above all, have fun. As reported elsewhere W6AM became a Silent Key in May and will not be with us for the SW Divn Convention. We'll all miss Don. Phoenix area has formed a packet radiogroup named Arizona Digital I/O Society. Present VHF activity is on 148.70 Simplex. Contact WB7QGN. Mt. Lemmon repeater, K7OMR moved to 147.6508. Your SM enjoyed month's vacation in Japan. Met JA1CB, Kenwood engineering executive and other JA ham operators with both quantity and quality of JA hams. Over one million licensees there, many being young people with no code licenses operating with ten watt limit above 20 MHz and below 8 MHz on restricted frequencies. Maybe we should re-think "no code?" KB7FE again made PSRR. Congrats. ATEN: QNI 812, QTC 139, Cactus Net: QNI 593, QTC 87; SWN: QNI 190, QTC 155. Traffic: KB7FE 171, W7EP 151, K6LL 150, W7KCM 55, KA7HEV 34, W7KXE 28, WB7CAG 20, N7GQM 20, N7JKM 11, N7GVC 8, K7NMQ 3, K7P0F 3.

LOS ANGELES: SM, John Walsh, N8UK—ASM: N6ZH. SEC: N8UK. ACC: KX7Q. OORFI: K6BMG. On May 8 amateur radio had an opportunity to step out and meet the public. The occasion was Fire Service Day. Los Angeles City Fire Station 88 hosted approximately 7000 visitors who dropped by to see what the fire department has to offer. Along with the people, equipment and exhibiting amateur radio in a fund raising manner, tape displays, handouts, two operating stations and one VHF stations using the call KF8XX made up the amateur exhibit. Thanks to WB8RD, N5BX, KF8XX, KG6FY and N6AXG. It has been many months since the end of the Olympics and the Section has returned to "some kind of normal." During that time public service activities had occupied most

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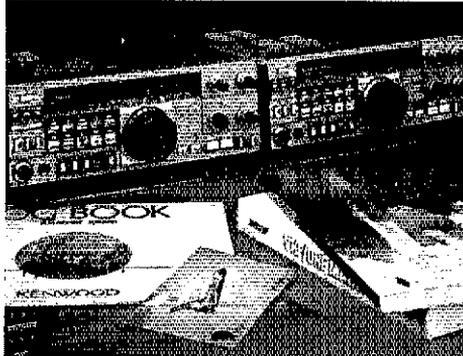
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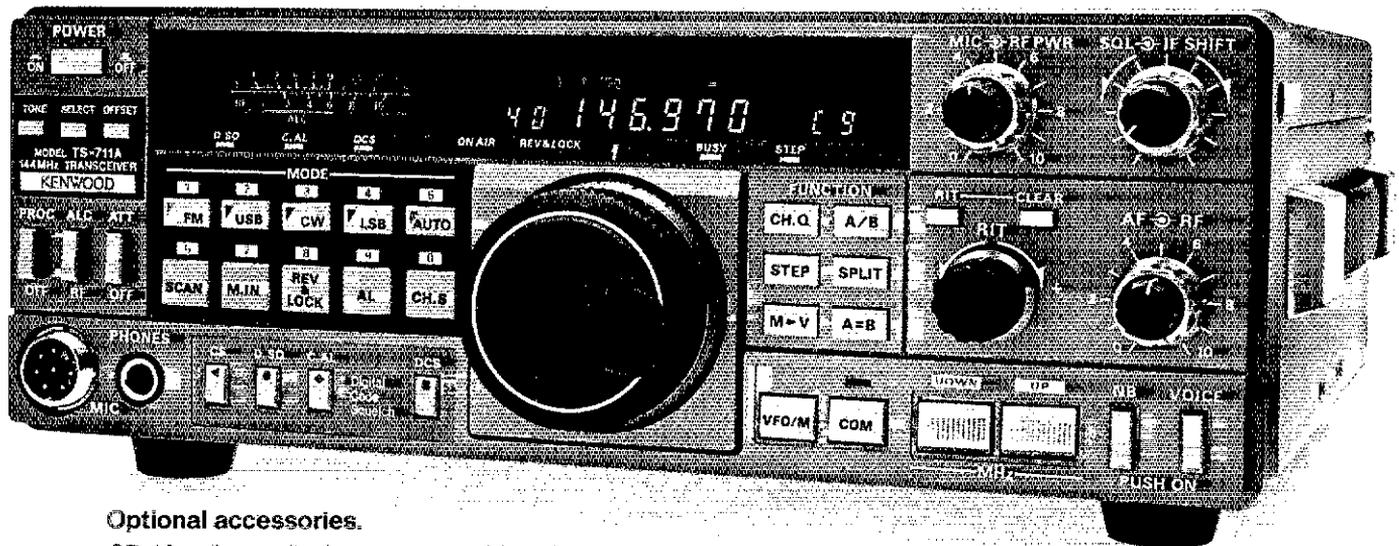
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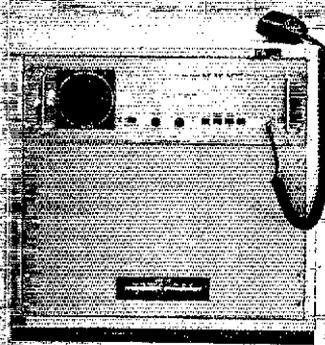
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The IC-04AT and IC-4AT come standard with an IC-BP3 NiCd battery pack, flexible antenna, AC wall charger, belt clip, wrist strap and ear plug. PLUS a wide variety of slide-on battery packs and accessories are available.



The RP-3010 crystal controlled UHF repeater covers from 430-450MHz and includes CTCSS, 3 digit DTMF decoder and CW ID'er.

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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 471H1184

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MODEL PK1

SPECIAL PACKAGE DEAL!!!

Amateurs Only
Includes PK1 installed in cabinet w/ cable set & pwr. supply
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(if purchased separately \$241.85)

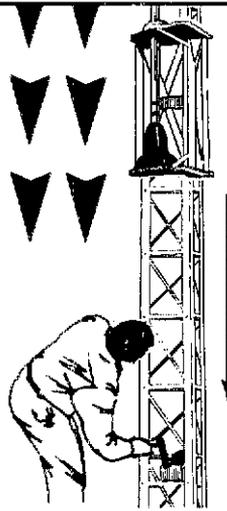
Dimensions: 2.3 X 11 X 5 (inches).
Power Requirement: 12 volts DC at 200 ma.

PK1 - FCC CERTIFIED - wired and tested in cabinet	\$209.95
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of the available time of such stalwarts as AK6Y, WA6LUA, N6ZH, W6ORD, K8EEF, W6BFRM, K8BEX, and the Queen Mary communications crew, and all those who have supported the activity. As we move into a new phase of consolidation we would point to KN6H and the LA Council of Radio Clubs and recognize their effort to make the Council a significant force in area activities. All clubs should note that KX7Q, Section ACC, is contacting many clubs to both encourage and assist them in seeking Special Service Club Status. Don't forget to register for the ARRL SW Division. The Grand Salon is sold out, but there is still room in the Windsor Room. Don't miss out on one of the big ones. We have opening for some great ARRLUL Section appointments. If you have time to help make amateur radio a better hobby, get in touch with N8UK. We hope you had a great Field Day. Traffic: K6UYK 1054, W8INB 457, K8DD 69, WA6OCM 42, W6NKE 11.

ORANGE: SM, Joe Brown, W6UBQ—SEC: Jim, A6EN. STM: Ernie, WA6QCA. PIO: W6BDXT, Joe, BM: George, W6DLX. OOC: Alex, W6RE. SGL: Loren, N6HIQ. TC: Will, A6DDJ. Joe Stord, new PIO an attorney with news media allurement, comes well qualified to do good job for Amateur Radio and the Section. If he agrees to take over the writing of this column, I know his skills will be a valuable asset. John, WA6QMW, is now EC; for VIP/ICDF Riverside, County. With WA6FIE as AEC. These fellows do an excellent job and they seem to swap titles yearly. Cliff is the outgoing EC this time around. PIA: Bill Newbury, WA6MFS, has been doing an excellent job in public relations to amateurs and the public. Spring radio has been getting lots of ink lately for the public services provided by Amateur Radio Operators. AJ, NN6J, won the "Golden Toe" Award. K0CVWA6OPS Fullerton Radio Club April T-HUNT winners. From the desert to bugs, heat, dust (not to mention RF pollution) and mountain chill to shinning sea. Field Day has come and gone, a very serious undertaking indeed. A day of fun and frolic. The Big Event, HAMCOM SW Division Convention aboard The Queen Mary August 9, 10 & 11, 1985. Be there. Your comments are needed by our SW Div Director Fried, WA6WZO on any issue affecting Amateur Radio. Remember, he is the guy who votes in Newington. PSHR, W6FO, W6QBZ, K6BHJK, WA6QCA, KA6BNW (APR).
Fret. Sess. 1st. Trf. NM
SCN/1 3598 7:00 pm 30 342 231 W6FO
SCN/2 3598 8:15 pm 29 257 90 W6FO
SCN/V 146.645 9:00 pm 31 407 392 WA6QCA
RTTY/V 145.12 10:00 am 62 401 168 KA6HJK
Traffic: K6ZCE 251, WA6QCA 244, W6FO 268, KA6HJK 207, W6BQZ 96, N6GOT 94, KA6DNW 68, KA6JGF 38, K6DD 32, N6LNI 21, W6TKV 16, W6NTN 15, W6RE 9, K6CYD 6.

SAN DIEGO: SM, Arthur R. Smith, W8INI—STM: N6GW. SEC: W8INI. PIO: K6GLF. ACC: WA6COE. TC: N6NR. BM: WA6HJJ. The following have been apptd Asst. TCs: WA6CFM (packet), K6GCM (RTTY/AMTOR), K6DQ (RFI), W8HHV (digital), N6JZE (general tech), W6LLO (satellite). New ORS is K65MU. WA8IK is burning up the bands with a Triton IV. Plan your 1986 vacation for San Diego and the ARRL National Convention, Sept. 5-7, 1986. The theme will be "Public Service." Conv Chmn: Walt Hiles, W6JZI. Near 50 years of age, he is the oldest of the Palomares ARC is the oldest, active Amateur Radio club in San Diego County. Meets first Wed., Glendale Federal, E Vista Wy at Anza at 1930. License tests, same location on second Sat, 1000-1600. Club's repeaters on Palomar Mtn, W6NWG, 146.73(-800) and 449.425(-5.0). Break in to message handling on the Club's net (NCTN) each evening at 2000 on 146.73(-). Further info W8HHV, same freq, any time. Affiliated Clubs can earn \$5 for each new ARRL member signed up. ARRL strength is proportional to number of members. Ham radio swap meet first Saturday each month at San Diego Stadium, 0700. NCTN 30 sessions, 113 msgs. ARES 17 CW sessions, 17 clubs, 3 msgs. Traffic: KUGD 10, N6GW 17, WA6IK 13, K6M6 1.

SANTA BARBARA: SM, Byron Looney, K6FI—The outstanding Service Award for Exceptional Work in Emergency Service has been award posthumously to W6PQU by Governor Bakmellan. This is a first for amateur radio. W6JTA new DEC for San Luis Obispo County. DECs needed for Santa Barbara and Ventura counties. W6ZEK and KA6KGF are latest CSTI Earthquake specialists. W6POE reports SMRA active in locating downed aircraft near Ojai. PARC receiving instruction on ICS. This is required for operation in Ventura County Base Camps. Key ARES members in all three counties now receiving IDs from sheriffs. Check with your EC. Hope to see you at SW Division Convention aboard the Queen Mary in Long Beach, Aug 9-11. Support your local repeater! Traffic: N6HYM 64, K6YD 26.

WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—Asst. SMI/ACC: N15V. STM: A6EI. BM: W5QXK. SGL: W5LXP. RFI/WB5JBP. PIO/N5FDL. Ham-Com '85 was a great success, with many informative tech sessions, and a chance to meet and question our new ARRL Pres., Dr. Larry Price. This writer was very impressed with Dr. Price. He is a no-nonsense down-to-earth type of person who seems totally dedicated to the growth and well-being of amateur radio. One gets tired of the political type rhetoric that seems to be the norm in most ARRL gatherings, and it was a breath of fresh air to meet and hear Larry speak and listen to our concerns and suggestions. I hope that each and every league member in our nation will have the pleasure of chatting with him in the future. He leaves the impression that he is a man of action and conviction. Score one victory for amateur radio and our League! P.S.H.R. for May: KA5AZK A6EI KA6SPT KD5FR and N5EZM. The hurricane season is upon us with an active storm almost on cue in the Pacific off Mexico. Let's get ready to help our Gulf Coast neighbors should the need arise. Propagation will be very tough this season—it will require many more stations on HF circuits to get the job well done. Traffic: N5BT 158, KD5SRC 124, KA5AZK 97, A6EI 89, KA5SPT 87, W5QJ 54, KD5FR 41, WB4HML 40, N15V 28, KA5RGC 28, AC6Z 26, K5PC 10, N5EZM 6, N5JQ 1.

OKLAHOMA: SM, Dave Cox, N85N—ASM: K5WG. SGL: W5NZS. TC: W5GMJ. Summer is flying by with records being sent at all hamfests this year. Next up is Ham Holiday/ARRL State Convention, July 28-29, at Lincoln Plaza in Oklahoma City. OIARC of Ponca City is planning a swapmeet on August 1-3. Also the Great Salt Plains Hamfest, Sept. 8. Listen to the nets for details. The ARRL Executive Committee has notified the Green Country Hamfest organizers (BAARC and TARC) that their application to host the 1986 ARRL State Convention has been approved. Planning is already under way for the biggest hamfest ever held in northeast Oklahoma. NC5C, NR5L, K5ENA and WA5KBJ received Director's awards for outstanding service this past year. Great work guys. The

Central States VHF Society annual meeting will be held in Tulsa this year, Aug. 2-3. APPOINTMENTS: ECs—N6G5G, WA5HJA, K5KXL, KA5EFJ; ATC—N5HRA; OOI/AA—KD5RF; AECs—N5WX, W6BOSM, N5EZK, W6SWOW, W5GZF, KA5QXY; OBS—K6SZL. Everyone that participated in WX nets this spring deserves a big hand for an exemplary job. Traffic: WBSRX 258, W5AS 225, K5CXP 139, W5VXU 90, W5OHK 88, W50JUV 68, KD5SQ 68, W5R57 57, KC5OU 56, KA5FUJ 45, W5DIF 42, NR5L 32, N85N 32, W5VLW 28, K5GBM 27, WA5OCG 27, W5VOR 25, WA5ZQA 17, K5CAY 22, W5UHY 11, K5ENA 10, K5MT 9, KA5TTH 5, N5SS 5, KX5W 5.

SOUTHERN TEXAS: SM, Arthur R. Ross, W5KR—SEC: KASKRI, STM: K5QEW, ASM: N5TC. ACC: K5SV, TC: N5AMH, effective June 15. CBS W5KLV reports 5 ARRL bulletins, 5 DX bulletins, 3 CRRL bulletins, 29 satellite bulletins, 5 propagation forecasts given 128 readings on 8 nets. CBS N5DFO reports 4 ARRL bulletins, 2 CRRL bulletins, 4 propagation forecasts, 5 DX bulletins, 9 satellite bulletins given 32 readings on 8 nets. DRN5 Mgr W5YDD reports STX represented 100% by N5DFO W5CTZ W5BEP A W5AFQJ W5KLV KD5KQ W5URN N5EFG N5AMH N5GKM N5CRU KD5CB W5AZ5JY and W5YDD. CAND Mgr W5KLV reports DRN5 represented 100% by STX stations K5GDV W5AZ5JY W55FQJ N5CRU W5BEP A KD5KQ W5KLV W5YDD N5DFO N5AMH N5EFG and W5BMYR. Beaumont ARC reports W5MFK helped WA5VUX re-erect a quad, then he and KA5JUC re-worked and re-installed an antenna for W6BGN, and is now active on a club committee to provide technical and other types of help to local Amateurs. OO Coordinator WA2VIL talked the Mayor of San Benito to declare June 17 thru 23 as Amateur Radio Week. Williamson County ARC had a great picnic, organized by N5CNG, K5FRK, K5VP and W7JYS; the May bulletin included a great piece by N5DDT on tracking and forecasting propagation. Big Bend ARC bulletin THE BARK tells of BBARC's emergency van, of K5FD and W85EGQ working to get the Cactus Intertie System extended east from El Paso to Alpine. Hill Country ARC will hold its first exam session July 6; their bulletin told all hands about cable TVI, coming and going. San Antonio RC has been selected to sponsor the 1986 ARRL State Convention. KYWARN classes by National Fix Svc put the ARC bunch in form to work on the summer storms. N8AYL in El Campo reported on a great emergency preparedness talk by SEC KA5KRI; she also reports that the Golden Crescent ARC has awarded a more Novice Amateurs; the club now working at getting the County Judge to accept Amateur Radio assistance in time of emergency. N5AF reports their VE program had 11 upgrades in February and 6 in April. K5DJC is new editor for Houston ARC HARC NEWS; he reports Houston Ham-Com 85 will be held September 20, 21 & 22. OO Coordinator WA2VIL looking for OO volunteers; his address OK in call book; he has been re-elected NCS for STEB Zones 1 and 4. Traffic: W5KLV 315, W5YDD 288, N5DFO 236, W5CTZ 175, K5SV 180, K5HZR 103, WA2VIL 70, W55FQJ 68, N5GKM 57, W5BEP A 37, W55GKH 28, W5AC 17, KA5PEX 8.

1984-85 Ed. CLOSEOUT!

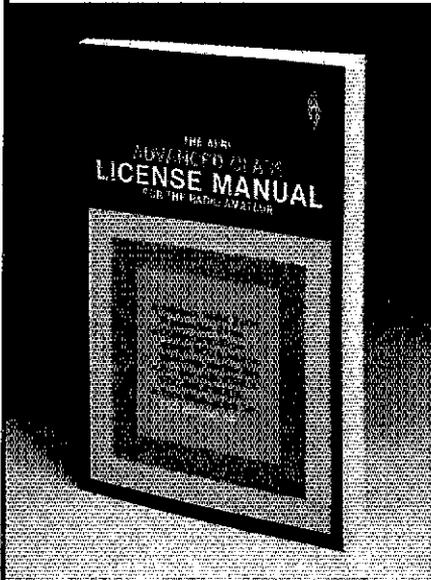
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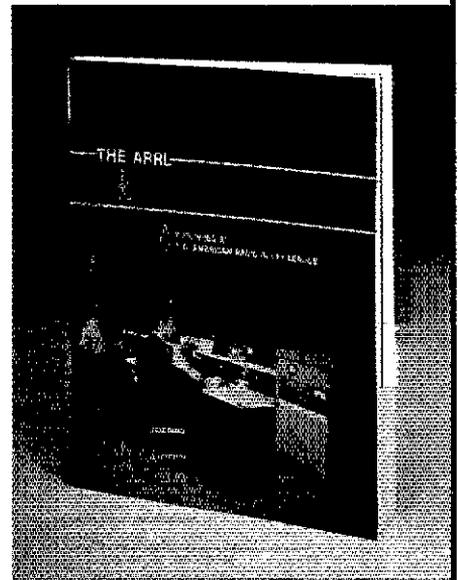
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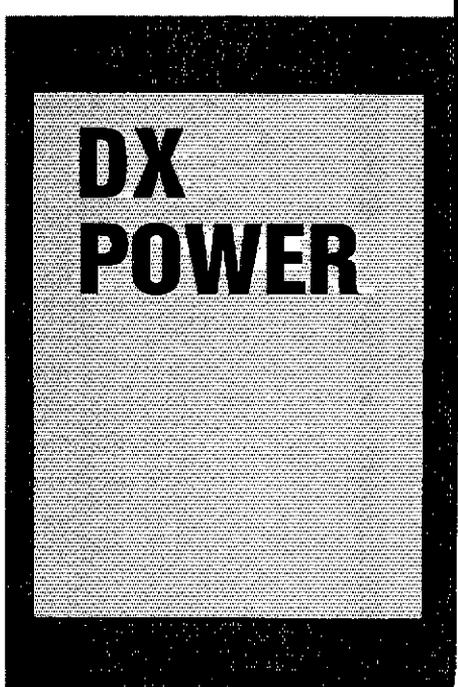
Two new ARRL publications! *The ARRL Advanced Class License Manual* is the second of our new Licensing Series. It is written for study with *The FCC Rule Book* and has the latest 500 question and answer pool. *The 2nd Edition of the ARRL Operating Manual* is heavily revised! It presents up-to-date operating trends and techniques. At your dealer or use the order form elsewhere in this issue.



TWO GREAT DX BOOKS!



The Complete DX'er by Bob Locher, W9KNI is now available from ARRL. Covers all of the important aspects of the DX'er's life both in and out of the pileups: the art of listening; the chase; the capture; the quest for the elusive QSL. Gives advice on equipment and antenna selection. Humorous and educational. \$10 U.S., \$11 elsewhere. 187 pages. Coming soon: *DX POWER* by Eugene Tilton, KSRSG Co-published by ARRL and Tab Books. Watch *QST* for details.



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NEW
1.2 GHz transceiver
TR-50

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TR-50

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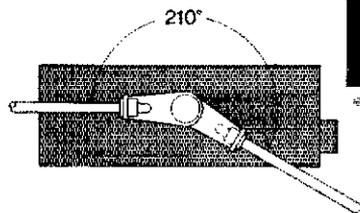
As the Amateur bands become more and more crowded, hams seek higher and higher frequencies to "get away from it all!" Here's a chance to experience "something different"—1200 MHz!

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- 1 watt output
- 5 memory channels
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- Programmable scanning
- 16-key DTMF hand microphone
- 1/4-wave sleeve antenna on an 8-position adjustable mount

- Offset reverse switch
- RIT
- Repeater offset switch (-20 MHz)



• The perfect portable for microwave mountain-topping!



Optional accessories:

- VB-50 Power amplifier (10 watts)
- MB-3 Mobile mounting bracket
- PB-16 NiCd battery set
- TU-6 Sub-tone unit
- MC-55 (8-pin) Mobile microphone with time-out timer
- SWC-4 1.2 GHz directional coupler for SW-200A/200B and SW-2000 meters
- SC-10 soft case

Specifications and prices subject to change without notice or obligation. Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.

Ultra-Compact

TM-201A

2-m FM transceiver.



The Kenwood TM-201A 2-meter transceiver is the smallest and lightest FM unit available!

- 25-watt output, with HI/LO power switch
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- 5 memories plus "COM" channel, with lithium battery back-up
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- External high quality speaker supplied
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- Repeater offset (± 600 kHz and simplex) and reverse switch

Optional accessories:

- IU-3 programmable CTCSS encoder
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- MC-55 (8-pin) mobile microphone with time-out timer

- SP-40 compact mobile speaker
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- SW-200A/B SWR/power meter
- SWT-1 2-m antenna tuner



Optional FC-10 frequency controller

May be easily connected to the TM-201A. Convenient control keys for frequency UP/DOWN, MHz shift, VFO A/B, and MR (memory recall or change memory channel). A green, easy-to-read, back-lighted LCD display indicates transmit/receive frequencies, memory channel number, ALERT, and SCAN.

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NEMAL ELECTRONICS
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RG8/U	\$29.00/100 or 32¢/ft
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RG58/U	12¢/ft
RG59/U 75 ohm	12¢/ft
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RG213/U non-contaminating Jacket	36¢/ft
RG214/U dbl Silver Shield	1.65/ft
RG217/U dbl Copper Shield 5/8" O.D.	85¢/ft
RG223/U dbl Silver Shield (RG58 size)	85¢/ft

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RG58A/U 97% Shield-stranded	12¢/ft
RG59/U 100% Foil 75 ohm	10¢/ft
**Belden No 9913	58¢/ft

ROTOR CABLE & HARDLINE

1/2" Aluminum 50 ohm	1.25/ft
1/2" Corrugated copper (EQ. Helix)	1.59/ft
8 Cond. 2-18, 6-22 burial jacket	19¢/ft
8 Cond. Heavy 2-16, 6-20 burial jacket	36¢/ft

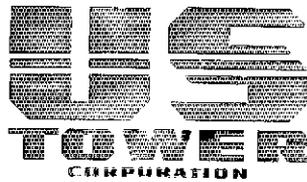
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UG-175/UG-176 Reducer	22¢ ea or 10/\$2.00
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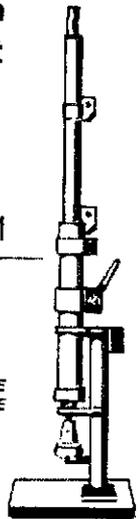
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MA SERIES CRANK-UP MASTS.

Will handle 10 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT		NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE*
	MAX.	MIN.			Top	Bot.	
MA-40	40'	21'6"	2	300	3"sq.	4 1/2"	\$ 735.00*
MA-550	55'	22'1"	3	525	3"sq.	6"	\$1245.00* SALE
MA-770	71'	22'10"	4	925	3"sq.	8"	\$2385.00*
MA-850	85'	23'6"	5	1295	3"sq.	10"	\$3695.00*
MA-850MDP	85' 5 section "QUADRA MAST" with heavy duty motor drive, positive pull down feature (MA-850MDP only).						



Shown w/optional MARB 500C rotor base and antenna

FREE STANDING CRANK-UP TOWERS.

Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT		NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE*
	MAX.	MIN.			Top	Bot.	
TX-438	38'	21'6"	2	440	12 1/2"	15"	\$ 925.00*
TX-455	55'	22'	3	700	12 1/2"	18"	\$1395.00*
TX-472	72'	22'8"	4	1175	12 1/2"	21 1/2"	\$2295.00*
TX-489	89'	23'4"	5	1650	12 1/2"	25 1/2"	\$3995.00*
TX-489MD*	89'	23'4"	5	1980	12 1/2"	25 1/2"	\$5895.00*

* Complete with new heavy duty motor drive unit with dual level and positive pull down feature. Includes limit switch brackets.

FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.

Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT		NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE*
	MAX.	MIN.			Top	Bot.	
HDX-538	38'	21'6"	2	600	15"	18"	\$1195.00*
HDX-555	55'	22'	3	980	15"	21 1/2"	\$2095.00*
HDX-572	72'	22'8"	4	1620	15"	25 1/2"	\$3695.00*
HDX-572MD*	72'	22'8"	4	1820	15"	25 1/2"	\$5495.00*
HDX-589MD*	89'	23'8"	5	2500	15"	30"	\$7195.00*

* Complete with new heavy duty motor drive unit with dual level and positive pull down feature. Includes limit switch brackets.

STANDARD BASES INCLUDED WITH ALL TOWERS

ALSO AVAILABLE: • Motor drives for most towers
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MULTI BAND TRAP ANTENNAS



TRAP DIPOLES:

Model	Bands	Traps	Length	Price
D-42	10/15/20/40	2	55'	\$59.95
D-52	10/15/20/40/80	2	105'	64.95
D-56	10/15/20/40/80	6	99'	109.95

TRAP VERTICALS - "SLOPERS":

Model	Bands	Traps	Length	Price
VS-31	10/15/20	1	12'	42.95
VS-41	10/15/20/40	1	27'	44.95
VS-52	10/15/20/40/80	2	52'	59.95
VS-53	10/15/20/40/80	3	49'	69.95

*Can be used without radials
 *Feed line can be buried if desired
 *Permanent or Portable Use

ALL ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Comes complete with: Deluxe Traps - Deluxe center connector, 14 ga Stranded Copper/Weld ant. wire and End Insulators - Automatic Band Switching - Tuner usually never required - For all transmitters, Receivers & Transceivers - For all class amateurs - One feedline works all bands - Instructions included - 10 day trial!

COAX CABLE: (includes PL-259 connector on each end)

Type	Length	With antenna purchase	Separately
RG-58	50'	\$8.00	\$11.95
RG-58	90'	12.00	15.95

DELUXE CENTER CONNECTOR

- NO RUST Brass Terminals
- NO jumper wires used
- NO Soldering
- Built in Lightning Arrestor
- With SO-239 Receptacle
- Handles Full Power
- Completely sealed, weatherproof
- Easy element adjustments
- Commercial quality



DELUXE ANTENNA TRAPS: Completely sealed & weatherproof - Solid brass terminals - Handles Full power - NO jumpers - NO Soldering - Instructions included.
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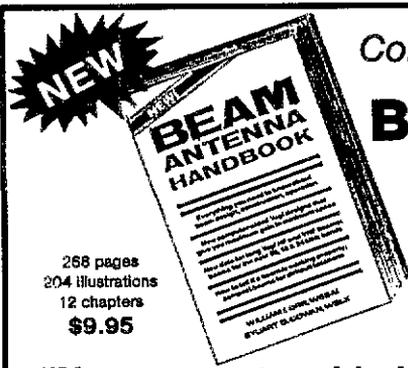
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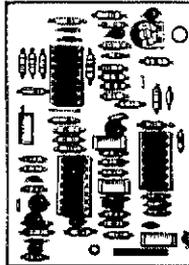
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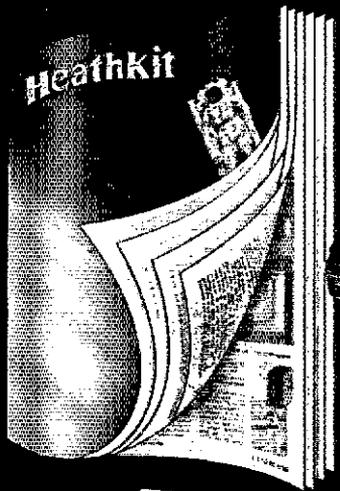
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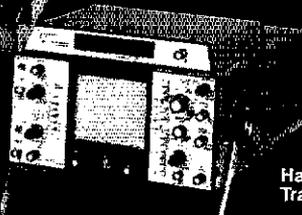
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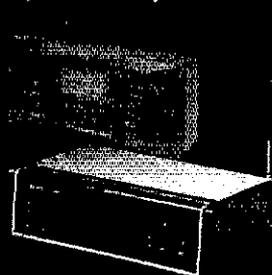
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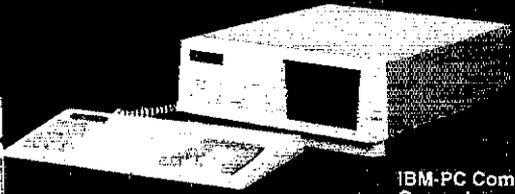


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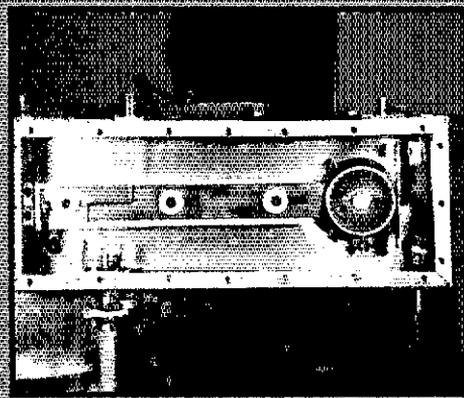
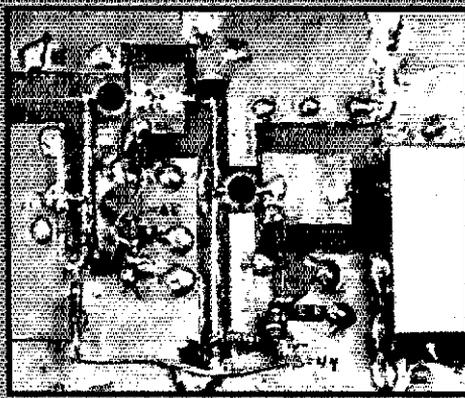
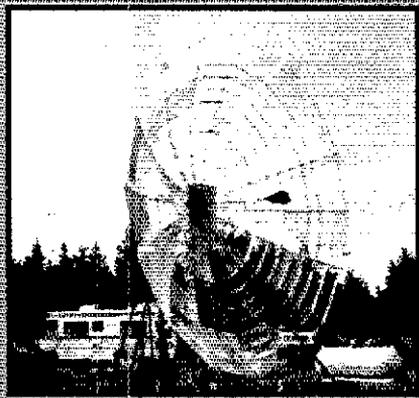
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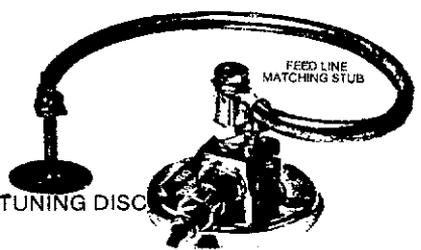
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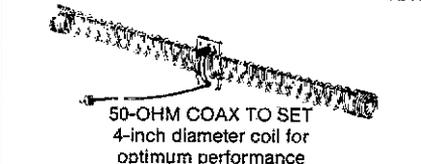
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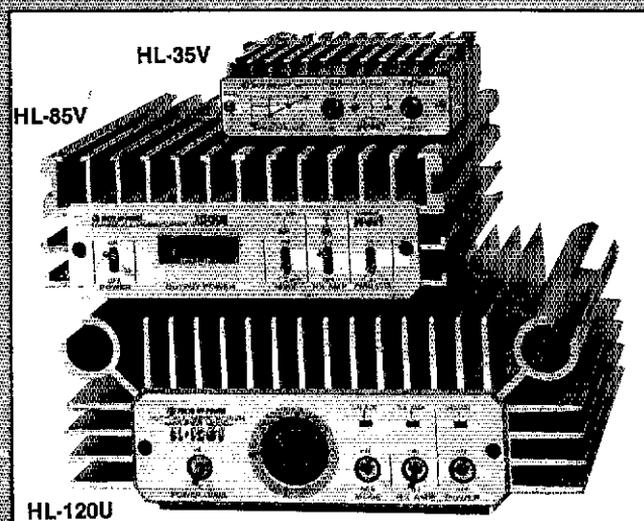
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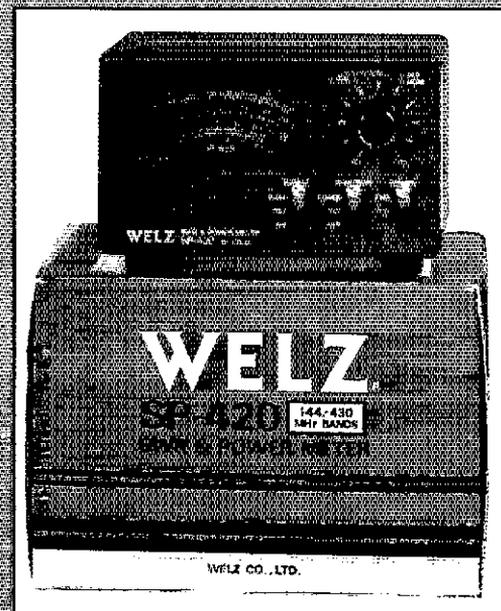
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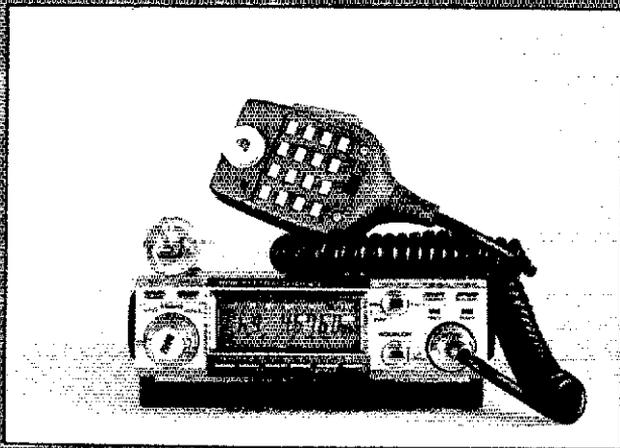
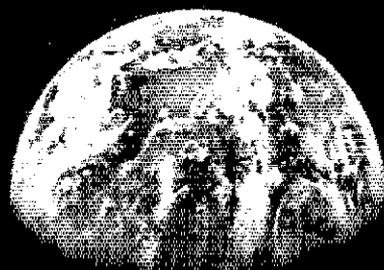


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call must appear in each ad. Mention of lotteries, prize draw-
ings, games of chance, etc. is not permitted in QST advertising.

(6) New firms or individuals offering products or services for
sale must submit a production sample (which will be returned)
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is unknown to us. Check with us if you are in doubt. You must
furnish a statement in writing that you will stand by and sup-
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before their ad can appear.

The publisher of QST will vouch for the integrity of adver-
tisers who are obviously commercial in character, and for the
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Clubs/Hamfests

QCWA Quarter Century Wireless Association is an inter-
national 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, commer-
cial, military, gov't, police etc. invited to join Society of
Wireless Pioneers — W7GAQ/6 Box 530, Santa Rosa CA
95402.

IMRA-International Mission Radio Association Helps mis-
sionaries 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 non-profit
organization of communications people founded in 1925,
invites your inquiries and application for membership.
Write VWOA, Ed. F. Plauler, Jr., Secretary, 46 Murdock
Street, Fords, NJ 08863.

JOIN the Old Timers Club, an international non-profit
organization. If you operated a radio station, commercial,
amateur or Armed Forces 40 or more years ago, and have
an Amateur license at present you are eligible. Join the
real pioneers of ham radio. Write O.O.T.C. 1417
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HAVE A-M capability? Join S.P.A.M. (Society for Promo-
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(S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E.
please).

FIND OUT what else you can hear on your general
coverage transceiver or receiver. Complete information on
major North American radio listening clubs. Send 25c and
S.A.S.E. Association of North American Radio Clubs, 1500
Bunbury Drive, Whittier, CA 90601.

THANK YOU for attending Warren, Ohio Hamfest. See you
August 18, 1985.

MORSE TELEGRAPH CLUB, established 1942, seeks
landline and radio operators interested in telegraphy and
Morse history. 46 chapters USA & Canada. For informa-
tion and sample paper contact W. K. Dunbar, AD9E, 1101
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THE FLORIDA Amateur Digital Communications Association
(FADCA) publishes a monthly newsletter, the FADCA
Beacon, about Packet Radio. Write for a sample copy,
FADCA, 812 Childers Loop, Brandon, FL 33511.

FREE QRP Info Kit. Send S.A.S.E. with two first-class
stamps (U.S.) or three IRCs (DX) to: QRP ARC, P.O. Box
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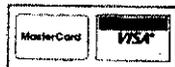
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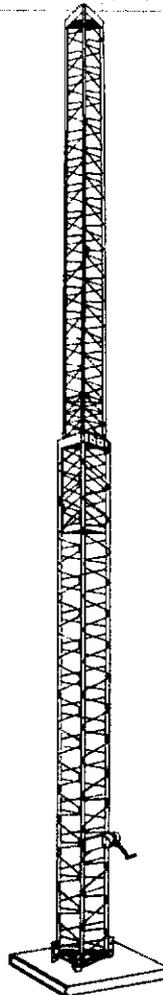
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RG-213/U	\$0.29/ft.
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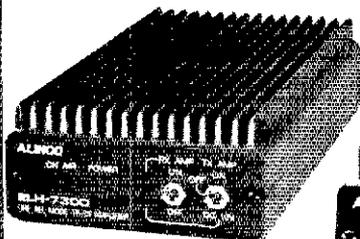
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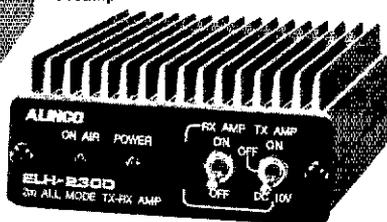
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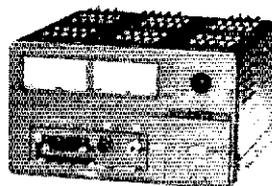
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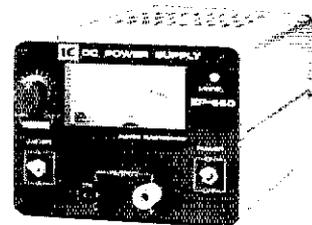


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EP-660 List \$69.00

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Frequency Range	144-148MHz	144-148MHz	440-450MHz
Modes	All Mode (FM SSB CW)	All Mode (FM SSB CW)	All Mode (FM SSB CWI)
Input Power	1W-3W	1W-3W	3W
Output Power	30W	50W	30W
Power Source	DC13.8V/45A	DC13.8V/10A	DC13.8V/7A
RX-PRE-AMP (About)	10dB	10dB	15dB
Input & Output Impedance	50Ω	50Ω	50Ω
Dimension (m/m) (W x H x D)	3.6" x 1.6" x 6.5"	3.6" x 1.6" x 8.5"	3.6" x 1.6" x 7.75"
N/W (About g)	18 oz.	24 oz.	23.5 oz.

Model	(With Two Meters)	(With Dual Meter)	(With Two Meters)
	EP-3030	EP-660	EP-5500
Output Voltage	About 10V-15V D.C. (With Voltage Adjuster on rear side)	About 10V-15V D.C. (With Voltage Adjuster on rear side)	About 10V-15V D.C. (With Voltage Adjuster on rear side)
Output Current	25A D.C. (Continuous) 30A D.C. (Max.) (50% Duty Cycle)	5.5A D.C. (Continuous) 5.5A D.C. (Max.)	50A D.C. (Continuous) 56A D.C. (Max.)
Ripple Voltage	Under 30mV (P-P) (Rated)	Under 30mV (P-P) (Rated)	Under 30mV (P-P) (Rated)
Power Consumption	770VA (Rated)	180VA (Rated)	1,300VA (Rated)
Circuit Protection System	Automatic Current Limiting System shuts down in excess of 30 amps	Automatic Current Limiting System shuts down in excess of 6 amps	Automatic Current Limiting System shuts down in excess of 55 amps
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Weight	19 lbs.	8 1/2 lbs	44 lbs.

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WANTED: old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E. National Ave., Milw. WI 53204.

MANUALS for most Ham gear made 1937/1972, plus Kenwood. Our 1985 catalog is \$1 USA and required for ordering. Over 2,000 models listed, HI-MANUALS, P.O. Box E802, Council Bluffs, IA 51502-0802.

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WANTED: PRE-1923 radios, pre 1940 T.V. Entire collections bought. Top cash paid immediately. Phil Weingarten, 67-61 Alderton St., Flushing, NY 11374, 718-896-3545.

WANTED: radios, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201. 818-242-8961.

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WANTED: OLD tubes, amplifiers, speakers, Western Electric, RCA, Cunningham, DeForest, McIntosh, Marantz. 713-728-4343. Maury, 11122 Atwell, Houston, TX 77096.

WANTED: RADIOS, tubes pre-1937 for my collection. KCSPC, HCR-3, Box 418, Deer River, MN 56636.

WANTED: AN/GRA-71 Burst Transmitter Keyer. Newfused or parts. R Bennett, 1913 Connie Lou Dr., Las Cruces, NM 88001.

WANTED - HARVEY-WELLS Bandmaster VFO. I'll buy transmitter to obtain VFO unit. Tony, WA3GKX, 1705 Ninth Ave., Irwin, PA 15642. 412-864-4293.

WANT COLLINS: Mid-1930s transmitter—202A, 30J, 30FXC, 45A, 45G. State condition and particulars first letter. All offers considered, send SASE for reply. A. N. Gerli, AC1Y, 35 Brookmoor Road, Avon, CT 06001.

WANTED: EARLY telegraph instruments for my collection. Landline keys, spark keys, miniature keys, call boxes, sounders, meters, etc. Any instruments made in California. Pre-1910 books, catalogs, and franks. Larry Nutting, WD6DTC, 5957 Yerba Buena, Santa Rosa, CA 95405.

WANTED: EARLY Hammarlund receivers including HI-Q, Comet-Pro, Super-Pro Series 110, and Scott receivers including Philharmonic series and 26-tube military receiver of early 1940's. Also need: GST's 1933 through 1941. Special Need: May 1935 issue. Roy Nakano, 3471 Butler Avenue, Los Angeles, CA 90066; phone 213-391-4738.

WANTED: RME 45 thru 4350A Receivers. Accessories. Original unmodified. RME literature, catalogs, manuals 1945-1959. Collector, Nick Kaefl, KB4UL, P.O. Box 207, Highland Heights, KY 41076.

ICA PHONE Adapter, Rauland All-American AF Transformers (2) \$4-each; Hallcrafters S-118 rough but works \$10 & ship; Zenith Transoceanic c. 1951 \$30 & ship. Don, KA9FK, 414-921-5508.

KEY COLLECTOR needs pre-1030 bugs, spark keys and pre-1915 landline keys. K5RW, 1128 Midway, Richardson, TX 75081.

WANTED: RACK HRO-7/HRO-60; Pre-WWII 1-kW AM transmitter; transmitter/receiver projects from ARRL/Radio Handbooks especially controlled carrier transmitter. GST prior 1920. Nagle, 12330 Lawyers, Herndon, VA 22071.

FOR SALE Antique: 1926 Atwater Kent radio Model 20 with speaker model B, \$195. Marion Guilds, Lawrenceville, PA 16929, 717-827-2521.

JOHNSON VIKING Valiant. Includes manuals. Absolutely original and mint condition. K8OK, 616-532-5196.

FOR SALE: 1940 Stancor 10P transmitter w/80M coil set \$60, 1941 Millen 90700 VFO \$60, 1949 Hallcrafters SA0B \$40, PPD US48, John Allen, KL7S, 206-548-3285, 17836 8th N.W., Seattle, WA 98177.

WANTED: HALLCRAFTERS, working condition, PS 150-120 AC, Leon, K3ZKQ.

National-NCL-2000-10 to 80 mtr./in. amp-mint with 2 spare RCA-8122 tubes, \$600. Sencore VA-48 in original carton, manuals, etc., like new, \$750. Sal Francione, W1HFL, 203-878-8333.



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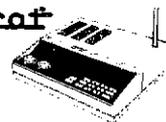
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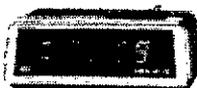
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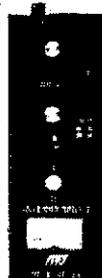


Greatly improves transmitted SSB speech for maximum talk power. Evens out speech peaks and valleys due to voice, microphone and room characteristics that make speech hard to understand. Produces cleaner, more intelligible speech on receiving end. Improves mobile operation by reducing bassy peaks due to acoustic resonances. Plugs between mic and rig. 4 pin mic jack, shielded output cable. High, mid, low controls provide ± 12 db boost or cut at 490, 1170, 2800 Hz. Mic gain, on/off/bypass switch. "On" LED. 7x2x6 inches. 9 V battery, 12 VDC or 110 VAC with adapter, MFJ-1312, \$9.95.

Has front panel sensitivity control. Normal/Reverse switch eliminates retuning while checking for inverted RTTY. Speaker jack. +250 VDC loop output. Exar 2206 sine wave generator gives phase continuous AFSK tones. Standard 2125 Hz mark and 2295/2975 Hz space. Microphone lines: AFSK out, AFSK ground, PTT out and PTT ground. FSK keying for transceivers with FSK input. Has sharp 800 Hz CW filter, plus and minus CW keying and external CW key jack. Kantronics software compatible socket. Exclusive TTL/RS-232 general purpose socket allows interfacing to nearly any personal computer with most appropriate software. Available TTL/RS-232 lines: RTTY demod out, CW demod out (TTL only), CW-ID in, RTTY in, PTT in, key in. All signal lines are buffered and can be inverted using an internal DIP switch. Metal cabinet. Brushed aluminum front. 12 $\frac{1}{2}$ x2 $\frac{1}{2}$ x6 inches. 18 VDC or 110 VAC with optional AC adapter, MFJ-1312, \$9.95. Plugs between rig and C-64, VIC-20, Apple, TRS-80C, Atari, TI-99 and other personal computers. Use MFJ, Kantronics, AEA and other RTTY/ASCII/AMTOR/CW software.

MFJ ANTENNA BRIDGE MFJ-204 **\$79.95**

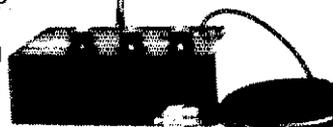
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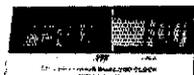
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Built-in 4:1 balun for balanced lines. 1000 V capacitor spacing. Black. 11 x 3 x 7 inches. Works with all solid state or tube rigs. Easy to use anywhere.

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\$139⁹⁵ MFJ's best
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Versa
(+4)

Tuner II. Matches every-thing 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 and 30W).

6 position antenna switch on front panel, 12 position air-wound inductor; coax connectors, binding posts, black and beige case. 10 x 3 x 7 in.

MFJ-940B, \$79.95, 300 watts, SWR/Wattmeter, antenna switch on rear. No balun. 8 x 2 x 6 in. eggshell white with walnut grained sides.
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Optional mobile bracket for 940B, 945, 944, \$5.00.

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Matches coax, random wires 1.8-30 MHz. Handles up to 200 watts output; efficient airwound inductor gives more watts out. **\$49⁹⁵** (+ \$4)

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Run up to 1.5 **\$229⁹⁵**
KW PEP (+ \$10)

and match any feedline continuously from 1.8 to 30 MHz; coax, balanced line or random wire.

Built-in SWR/Wattmeter has 2000 and 200 watt ranges, forward and reflected power. 2% meter movement. **6 position** antenna switch handles 2

coax lines (direct or through tuner), wire and balanced lines. 4:1 balun 250 pf 6 KV variable capacitors. 12 position inductors. Ceramic rotary switch. All metal black cabinet and panel gives RFI protection, rigid construction and sleek styling. Flip stand tilts tuner for easy viewing. 5 x 14 x 14 inches.

MFJ-989 3 KW ROLLER INDUCTOR VERSA TUNER V

\$329⁹⁵ Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs - only 10 3/4"W x 4 1/2"H x 14 7/8"D.

Matches coax, balanced lines, random wires — 1.8 to 30 MHz. 3 KW PEP - the power rating you won't outgrow (250 pf-6KV caps).

Roller inductor with a 3-digit turns counter plus a spinner knob for precise inductance control to get that SWR down to minimum every time.

Built-in 300 watt, 50 ohm dummy load, built-in 4:1 ferrite balun.

Built-in 2% meter reads SWR plus forward and reflected power in 2 ranges

(200 and 2000 watts). Meter light requires 12 VDC. Optional AC adapter MFJ-1312 is available for \$9.95.

6-position antenna switch (2 coax lines, through tuner or direct, random/balanced line or dummy load). SO-239 connectors, ceramic feed-throughs, binding post grounds.

Deluxe aluminum low-profile cabinet with sub-chassis for RFI protection, black finish, black front panel with raised letters, tilt bail.

MFJ-981, \$239.95. 3 KW, 18 position switched dual inductor. SWR/Wattmeter, 4:1 balun.

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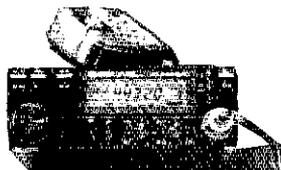
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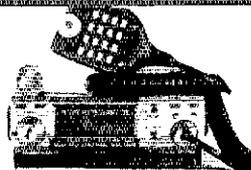
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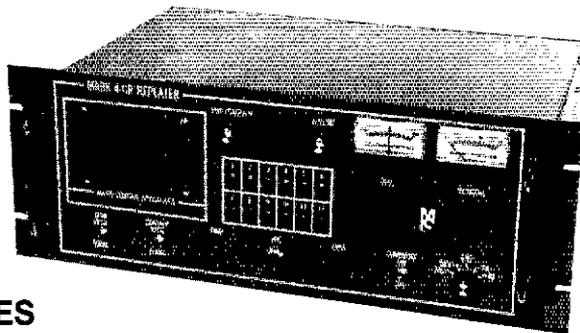
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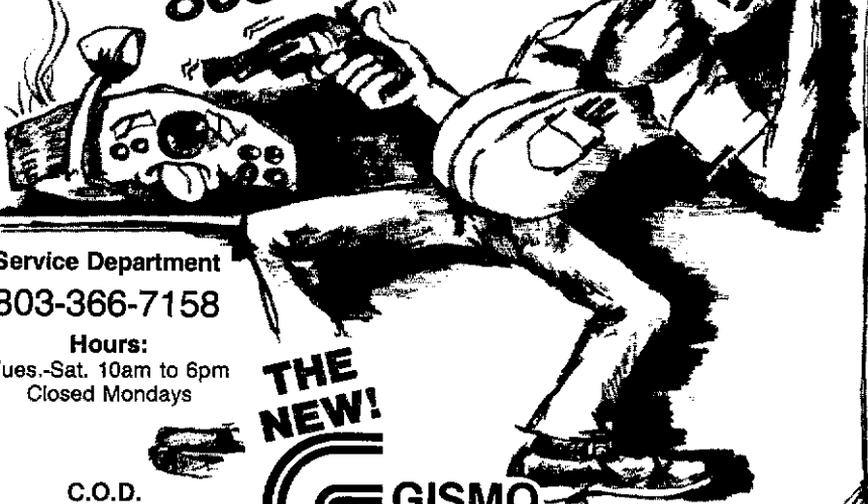
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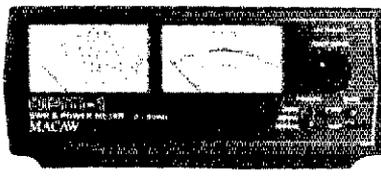
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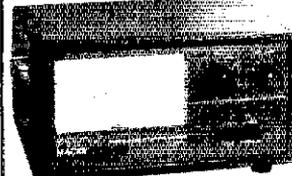


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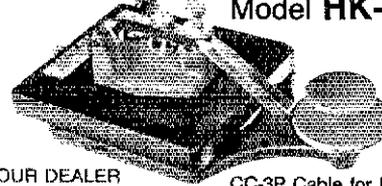
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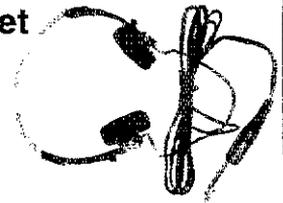
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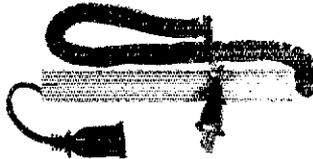
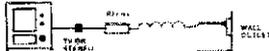
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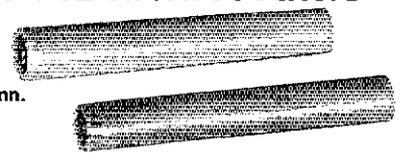
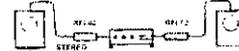
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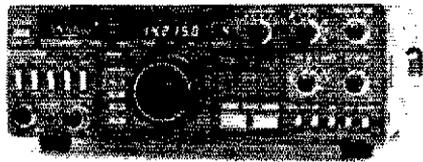
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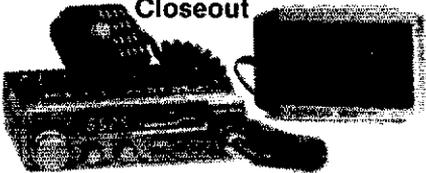
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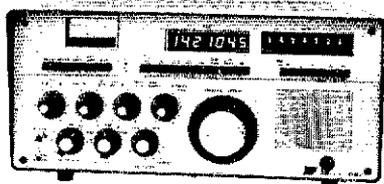
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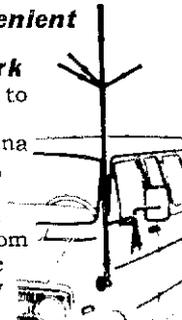
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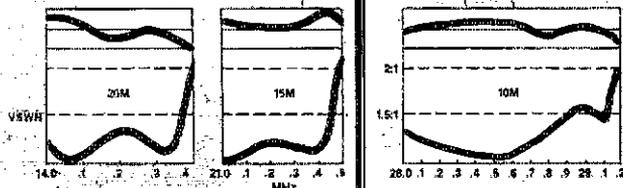
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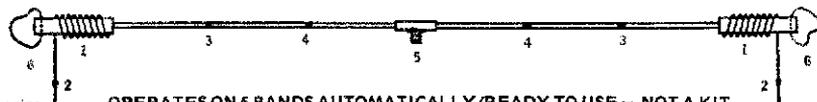
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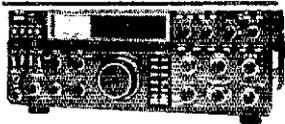
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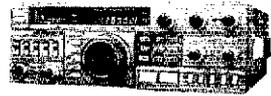
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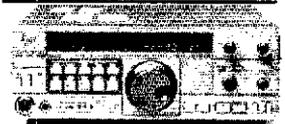
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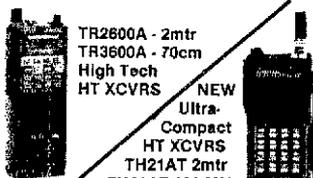
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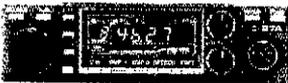
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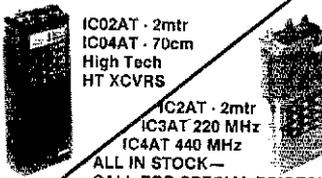
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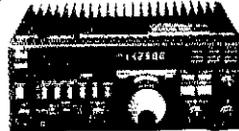
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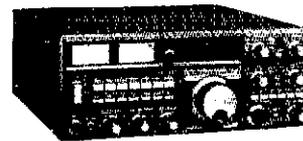
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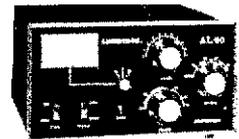
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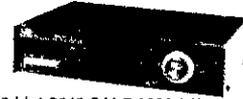
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DON'S CORNER

Will there still be a Kenwood 930 in your future? Our sources say "Yes". Kenwood is still making, shipping, and selling the 930 so those of you who are curious about the future can rest assured that the 930 will go on. Our crack team of computer wizards, still reeling from heavy workload imposed by the Madison Move, is now — even as we speak — finalizing the Madison/Line Computer bulletin board system. Call for information on when the board will be on line — expect it soon, however. Our friends at Cushcraft have announced the new R4 vertical and also announced that they will produce an add-on kit to upgrade their legendary R3 vertical to an R4. Upgrading a good basic design is something most amateurs would like to see more companies consider. More hot news: Cushcraft may also have a 3 el 40M beam shortly. And, finally, one to think about: What famous Japanese amateur radio company is seriously thinking about getting out of the marketplace? Watch next month for the first annual Madison Ad Proofreading Contest. Coming soon to a magazine near you.

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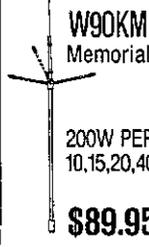
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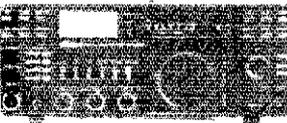
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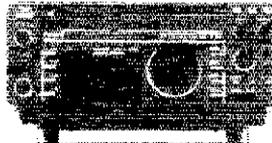
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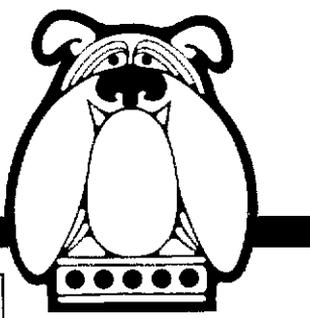
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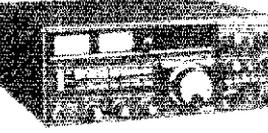
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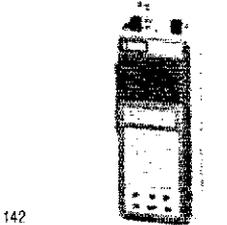
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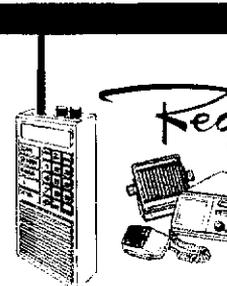
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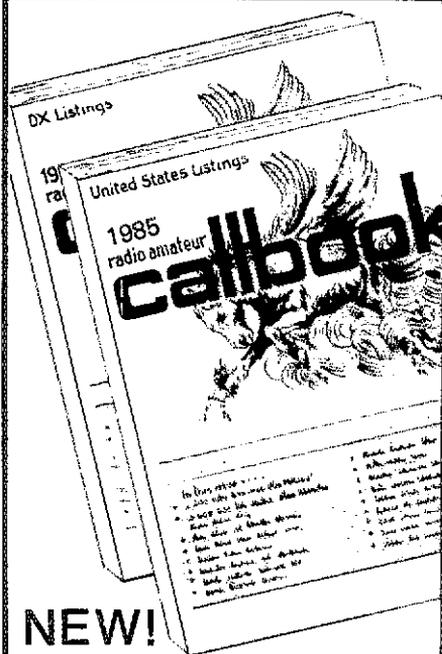


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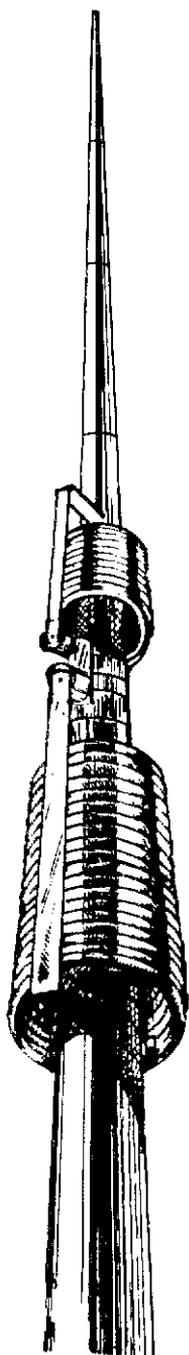
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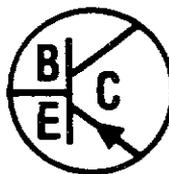
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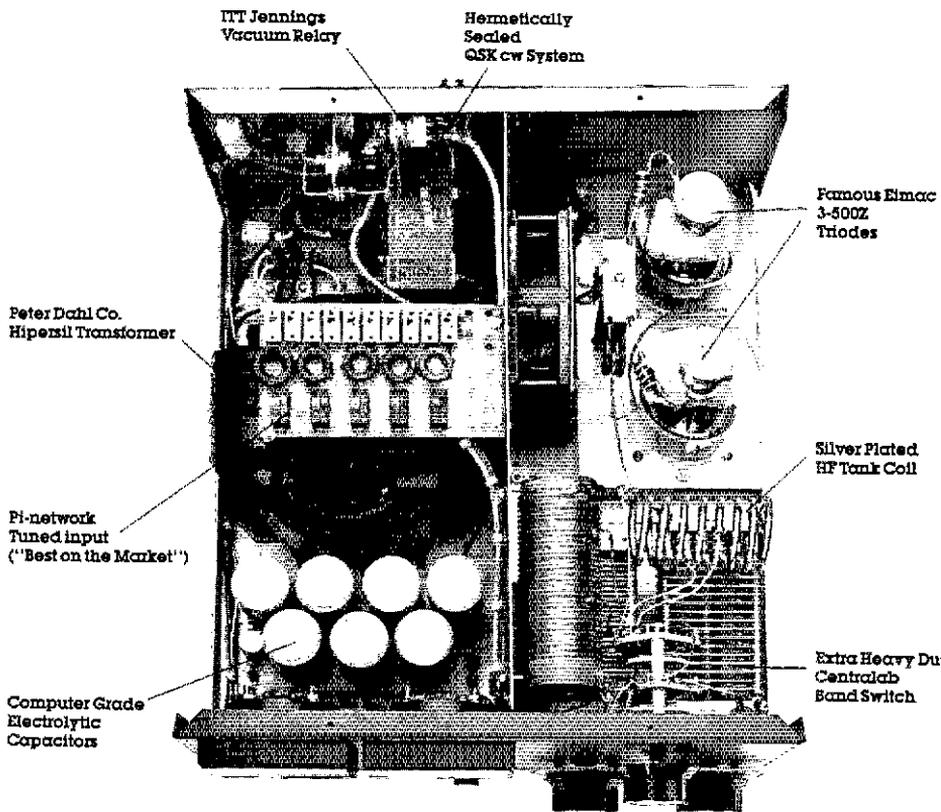
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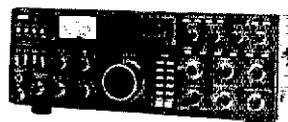


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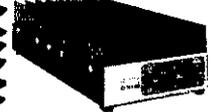


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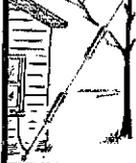
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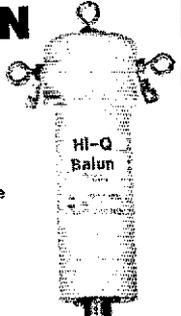


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SD-40	40/15	45'	33.95
Parallel dipoles			
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PD-4010	40, 20, 10/15	66'	37.95
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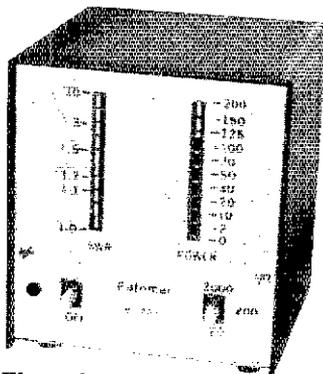
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MULTI-BAND HF ANTENNAS

A3 3-el Tribander	\$219	A4 4-el Tribander	\$289
R3 20/15/10mtr Verts	\$279	A743/A744 40mtr Kit	\$75

HF MONO-BAND ANTENNAS

10-30D	\$.95	10-40D	\$109
15-30D	\$119	15-40D	\$129
20-30D	\$199	20-40D	\$279
40-20D	\$289	D40	\$149

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A50-5	\$.79	617B	\$199
214B	\$.75	3719	\$.95
220B	\$.95	424B	\$.79

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A144-10T	\$.52	A144-20T	\$.59
A147-20T	\$.63	4161B	\$.59
A141MB	\$.29	PS4	\$.69

VHF/UHF FM ANTENNAS

A147-4	\$.29	A147-11	\$.49
214FB	\$.79	228FB	\$219
A449-6	\$.29	ARX2B	\$.39

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Discoverer 2-el 40-mtr Beam. \$339.00

Discoverer 3-el Conversion Kit. \$219.00

EXPLORER-14 SUPER SPECIAL \$329.00

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V2S 2-mtr Base Vertical	\$49
TH5MK2S Broad Band 5-el Triband Beam	\$419
(H7DXS 7-el Triband Beam	\$479
TH3JRS 3-el Triband Beam	\$199
(H2MK3S 2-el Triband Beam	\$179
20SBAS 5-el 20-mtr Beam	\$369
15SBAS 5-el 15-mtr Beam	\$219
10SBAS 5-el 10-mtr Beam	\$149
204BAS 4-el 20-mtr Beam	\$269
54BS 4-el 6-mtr Beam	\$69
66BS 6-el 6-mtr Beam	\$139
18HTS 80-10 mtr Hy-Tower Vertical	\$439
LC-160 160-mtr Coil Kit for 18HTS	\$45
214BS 14-el 2-mtr Beam	\$49
2BDQ 80/40 mtr Trap Dipole	\$69
5BDQ 80-10 mtr Trap Dipole	\$129
BN86 80-10 mtr KW Balun w/Coax Seal	\$22

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KT34XA 6-el Broad Band Triband Beam	\$489
40m-140m Rotatable Dipole.	\$179
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40m-3-el 40-mtr Beam	\$459
40m-4-el 40-mtr Beam	\$649
2m-13LBA 13-el 2-mtr Beam	\$79
2m-14C 14-el 2-mtr Satellite Antenna	\$399
2m-16LBX NEW-16-el 2-mtr Beam	\$399
2m-22C NEW-22-el 2-mtr Satellite Antenna	\$119
432-30LBS NEW-30-el 432 MHz Antenna	\$99
435-18C 435 MHz Satellite Antenna w/CS-2	\$119
432-18LB 16-el 432 MHz Antenna	\$69
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MINI-PRODUCTS HQ-1 \$159

ROTORS

Alliance H073 (10 7 sq ft rating)	\$109
Alliance U110 (3 sq ft rating)	\$49
Telex HAM 4 (15 sq ft rating)	\$219
Telex Tailwhister (20 sq ft rating)	\$289
Telex H0R300 Heavy Duty (25 sq ft rating)	\$519
KLM EL-3000 Moon Tracker Elevation Rotator	\$389
Kenpro KR400 Azimuth Rotator	\$129
Kenpro KR500 Heavy Duty Elevator Rotator	\$159
Kenpro KR600 Azimuth Rotator	\$199
Kenpro KR2000 Heavy Duty Azimuth Rotator	\$379
Kenpro KR5400 AZ/EL Rotor Package	\$259
Kenpro KR5600 Heavy Duty AZ/EL Rotor Pkg	\$329

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Standard 8 cond cable \$.19/ft (vinyl jacket 2-#16 & 6-#22 ga)

Heavy Duty 8 Cond cable \$.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

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10 ft Stack Sections

20G	\$39.50	45G	\$112.50
25G	\$49.50	55G	\$134.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

Foldover Towers	Model	Height	Ant Load*	Price
	FK2548	48 ft	15.4 sq ft	\$899
	FK2558	58 ft	13.3 sq ft	\$949
	FK2568	68 ft	11.7 sq ft	\$999
	FK4544	44 ft	34.8 sq ft	\$1199
	FK4554	54 ft	29.1 sq ft	\$1299
	FK4564	64 ft	28.4 sq ft	\$1399

25G Foldover Double Guy Kit... \$219
45G Foldover Double Guy Kit... \$249

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

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3/16" EHS Guywire (3990 lb rating)	\$.15/ft
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3/8" EE (3/8" Eye & Eye Turnbuckle)	\$6.95
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1/2" EJ (1/2" Eye & Jaw Turnbuckle)	\$10.95
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9901LB Cable End (for 2100/4000 cable)	\$7.95
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Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
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- Dual Bander
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- 25 WATTS

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FT-209RH

- 5 Watts
- 10 Memories
- LCD
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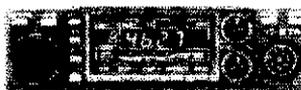
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IC-745 HF Base

- All ham band HF transceiver. 16 memories, 100KHz to 30 MHz general coverage receiver, and adjustable noise blanker and AGC

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- A breakthrough in 2-meter mobile communications! Most compact on the market (5 1/2" x 1 1/2" H x 7" D), contains internal speaker for easy mounting, 25 watts, 32 PL frequencies, 9 memories, scanning and touchtone mic.

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The Yaesu FT-209RH. 5 watts that your batteries can live with.

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We designed our HT with a unique user-programmable Power Saver that puts the rig to "sleep" while you're monitoring and "wakes it up" when the squelch breaks. So you can listen for hours and still have plenty of power to hit those hard-to-reach repeaters when you need to.

With the FT-209RH there's no need to fiddle with knobs when you change from one memory channel to another. That's because you can independently store everything you need in each of the ten memories: receive frequency, standard or non-standard offset, even tone encode/decode with an optional module. And then recall any channel at the touch of a button.

It's easy to hear what's happening on your favorite repeaters or simplex frequencies. Just touch a button and scan all memory channels, or selected ones. Or all frequencies between any two adjacent memories. Use the priority feature to return automatically to your special frequency when it becomes active.

Bring up controlled-access machines with the optional plug-in subaudible tone encoder/decoder, independently programmed from the keyboard for each channel. Listen for tone-encoded signals on selected channels—without having to hear a bunch of chatter—by enabling the decode function.

The FT-209RH, which covers 10 MHz for CAP and MARS use, comes complete with a 500-mAh battery, charger and soft case.

For those who want a basic radio without the bells and whistles, consider the compact, lightweight FT-203R. This economical HT features 2.5 watts of power and an optional DTMF keypad. Most all the accessories for the 209 work with the 203, including an optional VOX headset that gives you hands-free operation that's perfect for public service events.

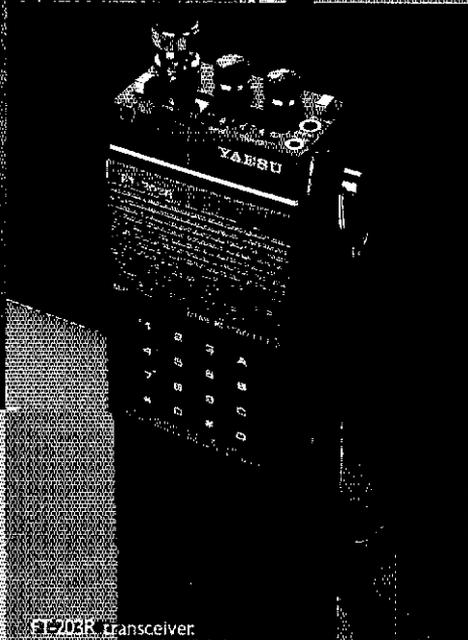
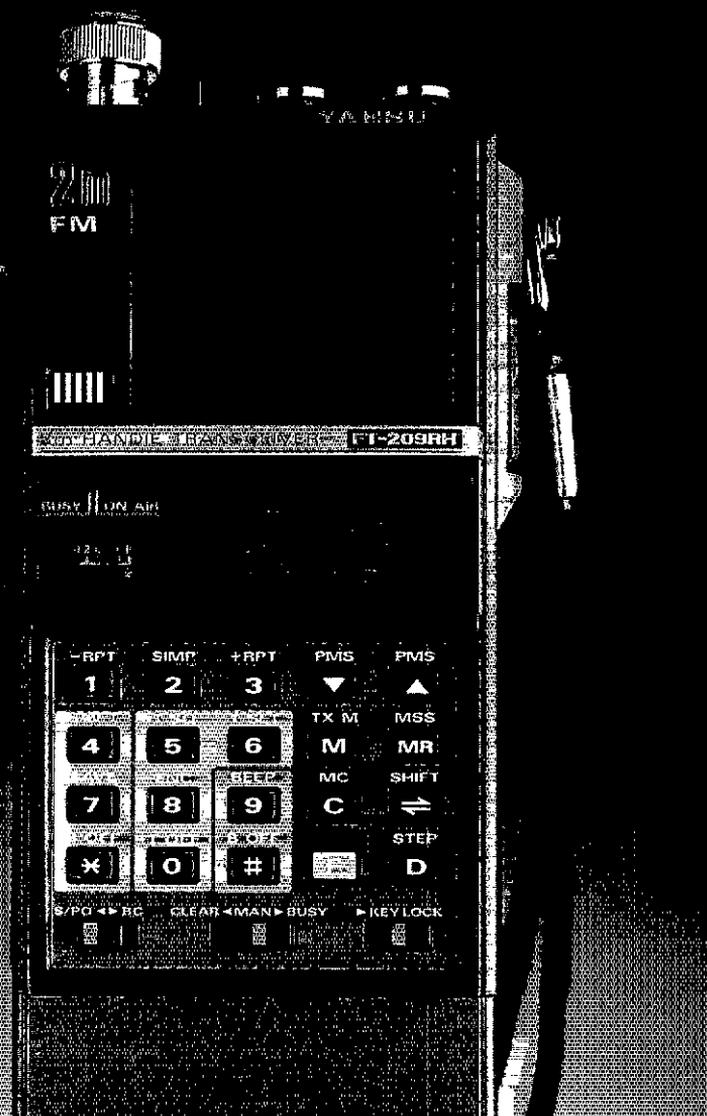
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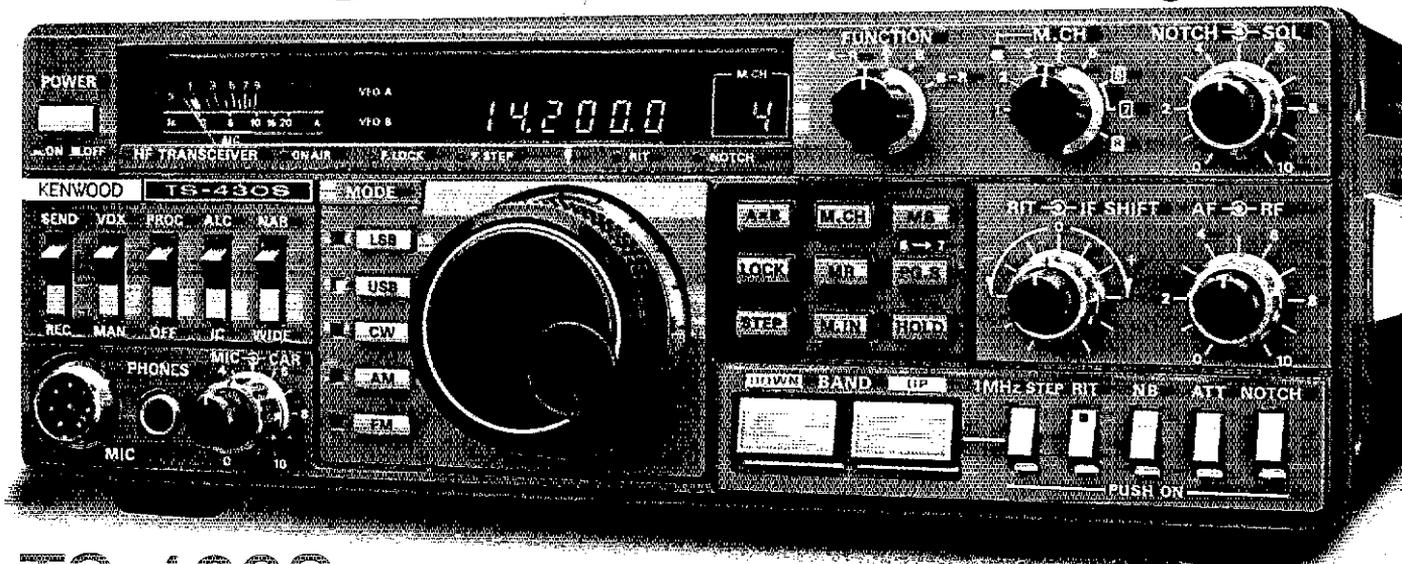
209RH shown actual size.

FT-203R transceiver.

KENWOOD

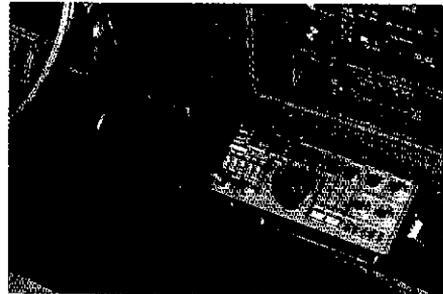
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“Digital DX-terity!”



TS-430S

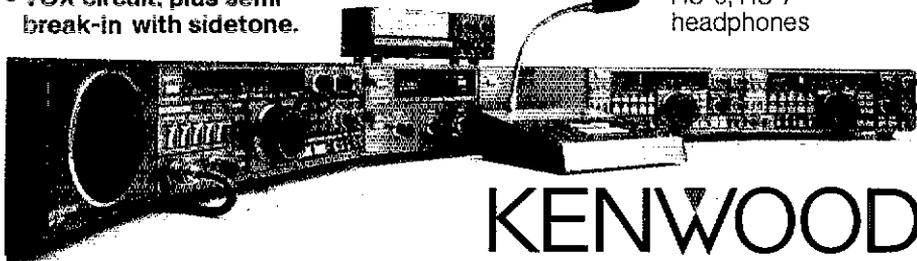
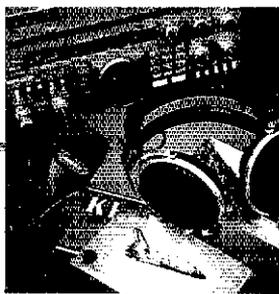
Digital DX-terity—that outstanding attribute built into every Kenwood TS-430S lets you QSY from band to band, frequency to frequency and mode to mode with the speed and ease that will help you earn that dominant DX position from the shack or from the mobile!



- **Covers all Amateur bands**
160 through 10 meters, as well as the new 30, 17, and 12 meter WARC bands. High dynamic range, general coverage receiver tunes from 150 kHz to 30 MHz. Easily modified for HF MARS operation.
- **Superb interference reduction**
Eliminate QRM with the IF shift and tuneable notch filter. A noise blanker suppresses ignition noise. Squelch, RF attenuator, and RIT are also provided. Optional IF filters may be added for optimum interference reduction.

- **Reliable, all solid state design.**
Solid state design permits input power of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.
- **Memory channels.**
Eight memory channels store frequency, mode and band data. Channel 8 may be programmed for split-frequency operation. A front panel switch allows each memory channel to operate as an independent VFO or as a fixed frequency. A lithium battery backs up stored information.
- **Programmable, multi-function scan.**
- **Speech processor built-in.**
- **Dual digital VFOs.**
- **VOX circuit, plus semi break-in with sidetone.**

- Optional accessories:**
- PS-430 compact AC power supply
 - SP-430 external speaker
 - MB-430 mobile mounting bracket
 - AT-130 compact antenna tuner covers 80-10 meters, incl. WARC bands
 - AT-250 automatic antenna tuner covers 160-10 meters, incl. WARC bands
 - AT-230 base station antenna tuner
 - FM-430 FM unit
 - YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters
 - YK-88SN (1.8 kHz) narrow SSB filter
 - YK-88A (6 kHz) AM filter
 - MC-42S UP/DOWN hand mic.
 - MC-60A deluxe desk mic., with UP/DOWN switch
 - SW-2000 SWR/power meter
 - SW-100A SWR/power/volt meter
 - PC-1A phone patch
 - HS-4, HS-5, HS-6, HS-7 headphones



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Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.