QST

devoted entirely to Amateur Radio

January 1987 $3.00

Reaching for the mid-Michigan sky

Page 15

0 843655 9 01

the tempo S-15

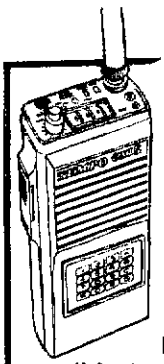
...a no nonsense radio that provides more power, broader frequency range and simplicity of operation

...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)



now available!

...the proven Tempo CS-15, plus three new commercial model 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

Available at your local Tempo dealer or from..

55 YEARS OF SERVICE

Henry Radio

2050 S. Bundy Dr., Los Angeles, CA 90025 (213) 820

Butler, Missouri 64730 (816) 679

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KENWOOD

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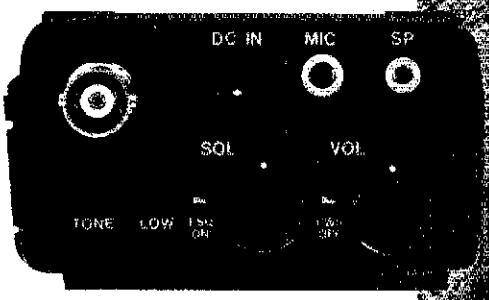
NEW!

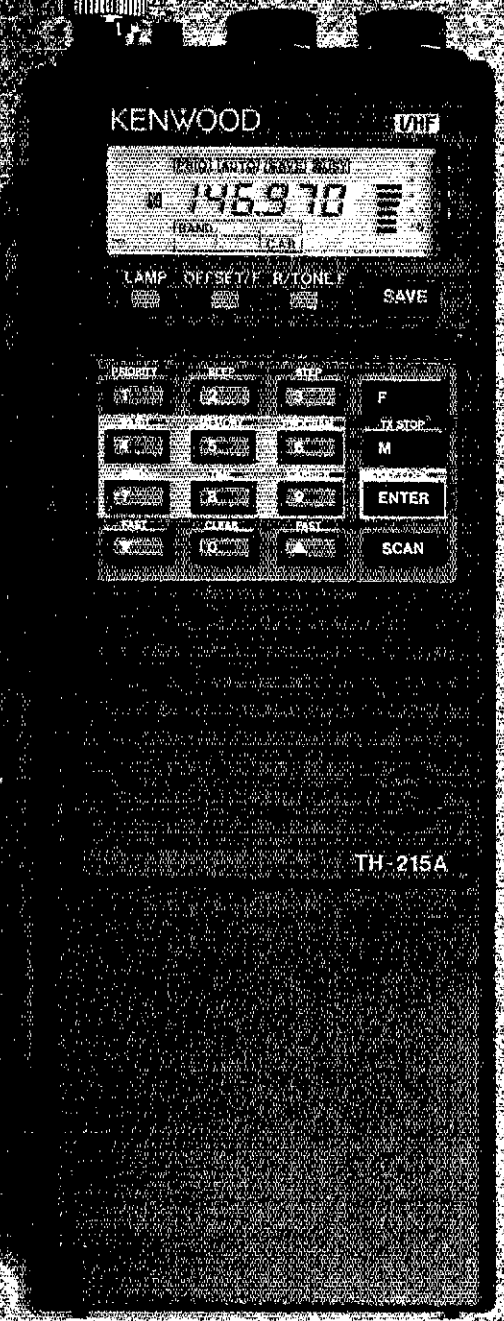
This HT has it all!

TH-215A

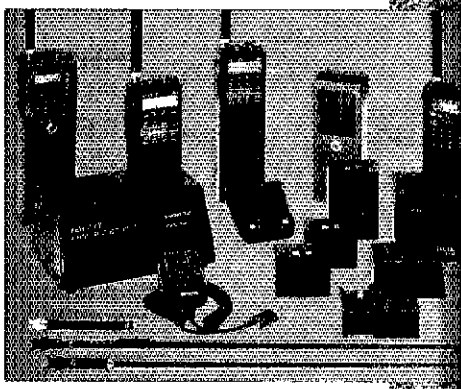
Full-featured 2m Hand-held Transceiver

Kenwood brings you the greatest hand-held transceiver ever! More than just "big rig performance," the new TH-215A packs the most features and the best performance in a handy size. You will want to keep this HT "close at hand" all of the time. And our full line of accessories will let you go from hamshack to portable to mobile with the greatest of ease!





- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS **decoder** optional.
- **10 memory channels store any offset.** Each memory channel can store frequency, frequency step, offset, **reverse switch position,** and CTCSS frequency.
- **Nine types of scanning!** Including new **"seek scan"**— A Kenwood exclusive!
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power save ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts is applied, RF output is 5 W!
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Frequency entry by keyboard or UP/DWN keys.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.
- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm keypad operation.** The beeper has a unique tone for each key. DTMF monitor also included
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, dust caps.



Optional Accessories:

• PB-1: 12 V, 800 mAH NiCd pack for 5 W output • PB-2: 8.4 V, 500 mAH NiCd pack (2.5 W output) • PB-3: 7.2 V, 800 mAH NiCd pack (1.5 W output) • PB-4: 7.2 V, 1600 mAH NiCd pack (1.5 W output) • BT-5 AA cell manganese/alkaline battery case • BC-7 rapid charger for PB-1, 2, 3, or 4 • BC-8 charger for PB-1, 3, or 4 • SMC-30 speaker microphone • SC-12, 13 soft cases • RA-3, 5 telescoping antennas • RA-8B StubbyDuk antenna • TSU-4 CTCSS decode unit • VB-2530: 2m, 25 W amplifier • LH-4, 5 leather cases • MB-4 mobile bracket • BH-5 swivel mount • PG-2V DC cable • PG-3C cigarette lighter cord with 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.

KENWOOD

TRIO-KENWOOD COMMUNICATIONS
1111 West Walnut Street
Compton, California 90220

ICOM IC-751A

CAN YOU HANDLE THIS MUCH TRANSCEIVER?

- **All HF Band Transceiver/ General Coverage Receiver**
- **New Design**
- **100% Duty Cycle Transmitter**
- **105dB Dynamic Range**
- **All Modes Built-In USB, LSB, AM, FM, CW, RTTY**
- **12 Volt Operation**

The new IC-751A top-of-the-line HF base station transceiver is designed for the ham operator who demands high performance. Whether contesting or QSY'ing for pleasure, the 100 watt IC-751A incorporates the best features of the IC-751, plus brings you to the forefront with the following most-asked for additions.

More CW Control. For the CW enthusiast, the new IC-751A includes an electronic keyer unit, QSK rated at up to 40WPM, standard FL-32A 9MHz/ 500Hz CW filter and CW sidetone to monitor your code in RX or TX modes.... great for practice!

All Amateur Band Coverage. Plus general coverage reception from 100kHz to 30MHz. May be easily modified for MARS operation.

Improved Smooth Tuning. The IC-751A features a newly designed tuning knob for velvet smooth tuning.

Added LED Annunciator. For easily identifying if you're using the tuning speed, dial, or band switching functions.

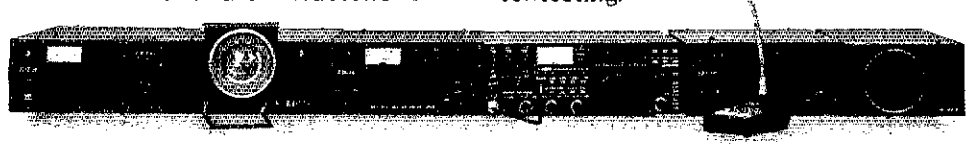
32 Memories. Mode and frequency may be stored in any of 32 memories...all the memory capability that you'll ever need.

More Stable. Even in the receive mode, the IC-751A has a sophisticated thermal sensor to monitor the internal temperature. The sensor automatically activates the cooling fan which gives maximum stability ...critical for contesting.

Newly Designed Features. The IC-751A boasts a number of newly designed features for better performance ...new 9MHz notch filter to drastically reduce QRM, new AGC system, new compressor for better audio and a new AF gain control system to improve control of the CW sidetone volume.

Options Available. Options for the IC-751A include the IC-PS30 external AC system power supply, IC-PS35 internal AC power supply, IC-AT500 antenna tuner, IC-EX309 microprocessor interface connector, SM-8 or SM-10 desk mics, IC-2KL linear amplifier, RC-10 remote controller, SP-7 or SP-3 speakers, IC-EX310 voice synthesizer and GC-5 world clock.

Optional Filters. FL-52A CW 455kHz at 500Hz, FL-53A CW-N 455kHz at 250Hz, FL-63A CW-N 9.0106MHz at 250Hz, FL-33 AM 9.010MHz at 6000Hz, and CR-64 high stability 30.72MHz crystal filter.



ICOM

First in Communications

ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 / 3150 Premier Drive, Suite 126, Irving, TX 75063

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 751A386

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OUR COVER

The place: Ithaca, Michigan. The year: 1982. The action: Ken Adamick, WD8RZE, readies a gin pole at 100 feet during construction of the 180-foot tower designed, cobuilt and owned by John Baublitz, WD8RXP. The story: Page 15. The advice? Don't look down! *(photo by Roger Halstead, K8RI)*

CONTENTS

TECHNICAL

NEWS AND FEATURES

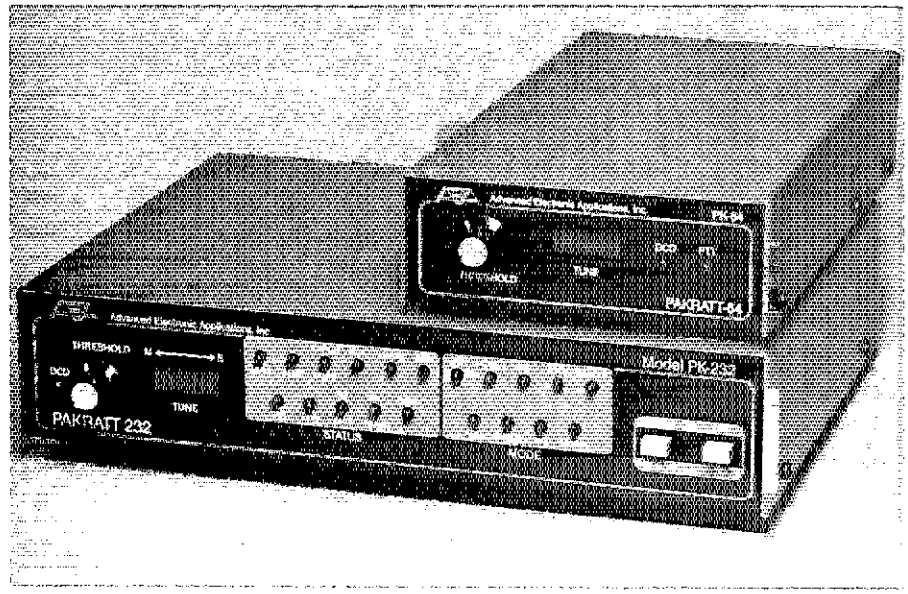
OPERATING

DEPARTMENTS

Or This Inexpensive
It Really Shouldn't Be This Easy

Remember just a few years ago, how it took a roomful of equipment just to work RTTY. And if you wanted more than one mode it took a dedicated computer system costing thousands of dollars. The new AEA Pakratts are proving it doesn't take lots of equipment or money to enjoy working all bands in five different modes.

PAKRATT™ Model PK-64



PAKRATT™ Model PK-232

First, A Good Idea

The idea behind the Pakratt is very simple. One controller that does Morse, Baudot, ASCII, AMTOR, and Packet, and works both HF and VHF bands. Of course the decoding, protocol, and signal processing software must be included in the unit, and connection to the computer and transceiver have to be easy. The unit also has to be small and require only 12 volts, so it will work both in the shack and on the road.

Second, Computer Compatible

It doesn't matter what kind of computer you have, we have a Pakratt for you. The PK-64 works with the popular Commodore 64 or 128, and the PK-232 works with any other computer or terminal that has an RS-232 serial port. The PK-64 doesn't require any additional programs. Simply connect to the computer and transceiver and you're on the air. The PK-232 needs a terminal or modem program for your computer. The one you're using with your telephone modem will work just fine.

Third, Performance and Features

The real measure of any data controller is what kind of on-air performance it gives. While the PK-64 and PK-232 use different types of modems, both give excellent performance on VHF. The optional HF modem of the PK-64 uses independent four-pole Chebyshev filters for both Mark and Space tones, and A.M. detection. The HF option can be factory or field installed.

The PK-232 uses an eight-pole bandpass filter followed by a limiter discriminator with automatic threshold correction. The internal modem automatically selects the filter parameters, CW Fc = 800 Hz, BW = 200 Hz; HF Fc = 2210 Hz, BW = 450 Hz; VHF Fc = 1700 Hz, BW = 2600 Hz.

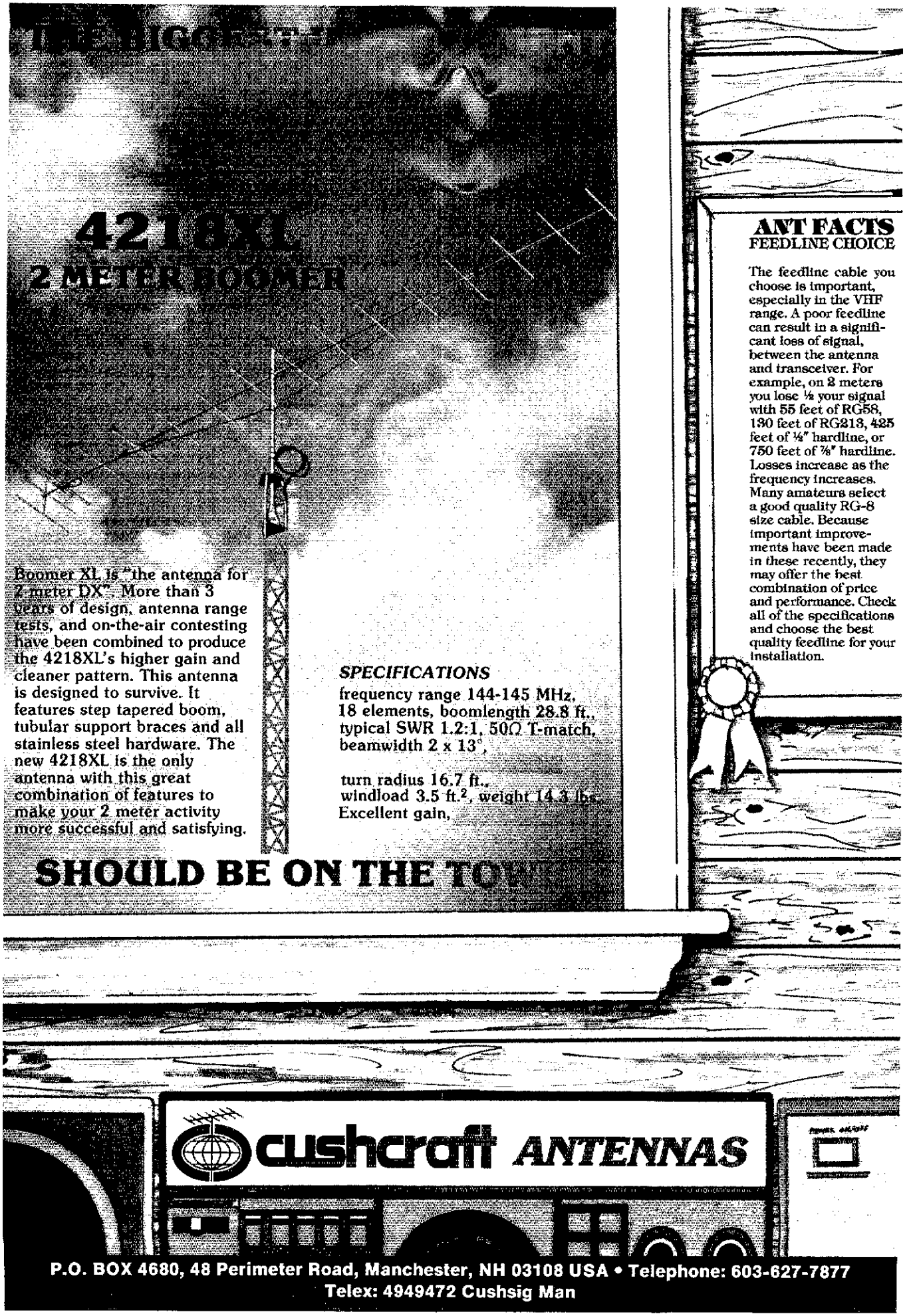
The PK-64 uses on screen indicators to show status, mode, and DCD (Data Carrier Detect) while the PK-232 uses front panel indicators. Both units use discriminator style tuning for HF operation. And that's just the tip of the iceberg. Features like multiple connects on packet, hardware HDLC, CW speed tracking, and other standard AEA software features are included in both the PK-64 and PK-232.

Fourth, AEA Quality and Price

Not many manufacturers like to discuss quality and price at the same time. AEA thinks you want high quality and low price in any product you buy, so that's what you get with the Pakratts. Ask any friend who owns AEA gear about our quality. The people who buy our products are our best salespeople. As for price, the PK-64 costs $219.95, or $319.95 with the HF option. The PK-64A, an enhanced software unit with a longer flexible computer cable, costs $269.95 or $369.95 with the HF option. The PK-232 costs $319.95 with the HF modem included. All prices are Amateur Net and available from your favorite amateur radio dealer. For more information contact your local dealer or AEA.

Prices and specifications subject to change without notice or obligation.

AEA Advanced Electronic Applications, Inc.
P.O. Box C-2160, Lynnwood, WA 98036-0918
206-775-7373 Telex 6972496 AEA INTL UW


4218XL
2 METER BOOMER
Boomer XL is "the antenna for 2 meter DX". More than 3 years of design, antenna range tests, and on-the-air contesting have been combined to produce the 4218XL's higher gain and cleaner pattern. This antenna is designed to survive. It features step tapered boom, tubular support braces and all stainless steel hardware. The new 4218XL is the only antenna with this great combination of features to make your 2 meter activity more successful and satisfying.
SPECIFICATIONS
frequency range 144-145 MHz,
18 elements, boomlength 28.8 ft.,
typical SWR 1.2:1, 50Ω T-match,
beamwidth 2 x 13°,
turn radius 16.7 ft.,
windload 3.5 ft.², weight 14.3 lbs.,
Excellent gain,
SHOULD BE ON THE TOP
ANT FACTS
FEEDLINE CHOICE
The feedline cable you choose is important, especially in the VHF range. A poor feedline can result in a significant loss of signal, between the antenna and transceiver. For example, on 2 meters you lose ½ your signal with 55 feet of RG58, 130 feet of RG213, 425 feet of ½" hardline, or 750 feet of ⅞" hardline. Losses increase as the frequency increases. Many amateurs select a good quality RG-8 size cable. Because important improvements have been made in these recently, they may offer the best combination of price and performance. Check all of the specifications and choose the best quality feedline for your installation.
cushcraft ANTENNAS
P.O. BOX 4680, 48 Perimeter Road, Manchester, NH 03108 USA • Telephone: 603-627-7877
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NEW! ALL-MODE

All-Mode Mobility!

TR-751A

Compact 2-m all mode transceiver

It's the "New Sound" on the 2 meter band—Kenwood's TR-751A! Automatic mode selection, versatile scanning functions, illuminated multi-function LCD and status lights all contribute to the rig's ease-of-operation. All this and more in a compact package for VHF stations on-the-go!

- Automatic mode selection, plus LSB

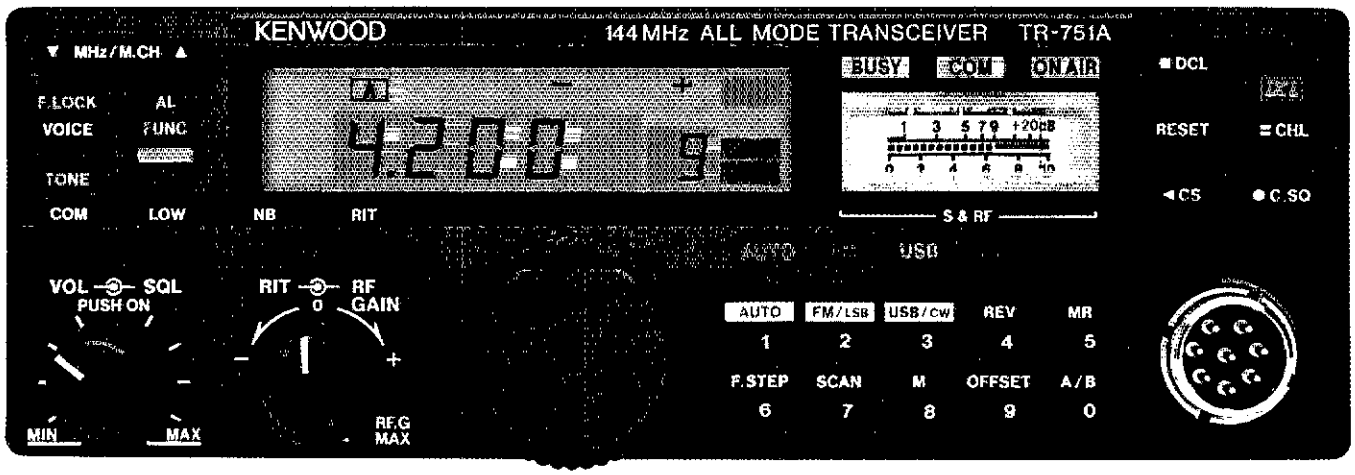
144.0 144.1 144.5 145.8 146.0 148.0 MHz

CW	USB	FM	USB	FM

- Optional front panel-selectable 38-tone CTCSS encoder
- Frequency range 142-149 MHz (modifiable to cover 141-151 MHz)
- High performance receiver with GaAs FET front end
- VS-1 voice synthesizer option
- 25 watts high/5 watts adjustable low
- Programmable scanning—memory, band, or mode scan with "COM" channel and priority alert
- 10 memory channels for frequency, mode, CTCSS tone, offset. Two channels for odd splits.
- All mode squelch, noise blanker, and RIT
- Easy-to-read analog S & RF meter
- Dual digital VFOs
- Semi break-in CW with side tone
- MC-48 16-key DTMF hand microphone included
- Frequency lock, offset, reverse switches
- Digital Channel Link (DCL) option

Optional accessories:

- **CD-10** call sign display
- **PS-430, PS-30** DC power supplies
- **SW-100A/B** SWR/power meter
- **SW-200A/B** SWR/power meter
- **SWT-1** 2-m antenna tuner
- **TU-7** 38-tone CTCSS encoder
- **MU-1** modem unit for DCL system
- **VS-1** voice synthesizer
- **MB-10** extra mobile mount
- **SP-40, SP-50B** mobile speakers
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MC-60A, MC-80, MC-85** deluxe base station mics.
- **MC-43S** UP/DOWN mic.
- **MC-55** (8-pin) mobile mic.

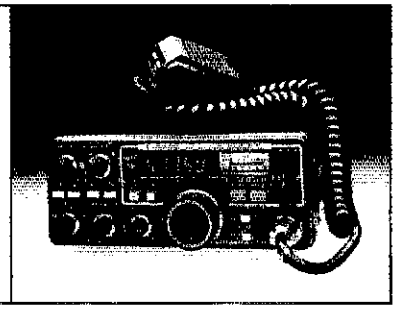


Actual size front panel

TR-9500

70 CM SSB/CW/FM transceiver

- Covers 430-440 MHz, in steps of 100-Hz, 1-kHz, 5-kHz, 25-kHz or 1-MHz.
- CW-FM Hi—10 W, Low—1 W. SSB 10 W.
- Automatic band/memory scan. Search of selected 10-kHz segments on SSB/CW.
- 6 memory channels.



KENWOOD

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1111 West Walnut Street
Compton, California 90220

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.
Specifications guaranteed for the 144-148 MHz Amateur band only

KENWOOD

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70 W/45 W/25 W 3 Choices

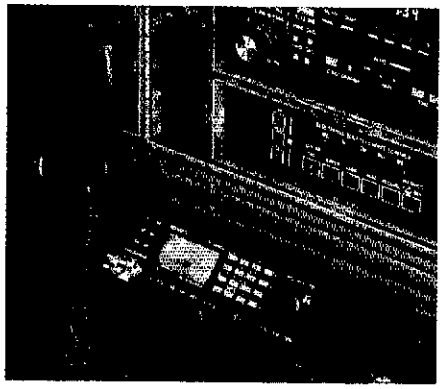
Three Choices for 2m!

TM-2570A/2550A/2530A

Feature-packed 2m FM transceivers

The all-new "25-Series" gives you three RF power choices for 2m FM operation: 70 W, 45 W, and 25 W. Here's what you get:

- Telephone number memory and autodialer (up to 15 seven-digit phone numbers). **A Kenwood exclusive!**
- High performance GaAs FET front end receiver
- 23 channel memory stores offset, frequency, and subtone. Two pairs may be used for odd split operation
- 16-key DTMF pad with audible monitor
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- Center-stop tuning—**a Kenwood exclusive!**

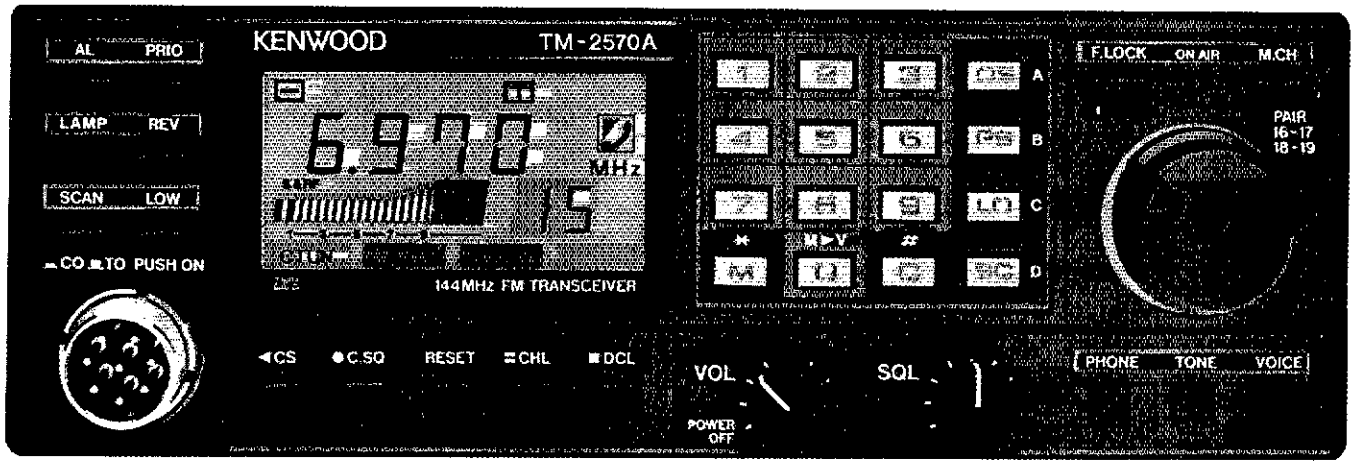


- New 5-way adjustable mounting system
- Automatic repeater offset selection—**another Kenwood exclusive!**
- Direct keyboard frequency entry
- Front panel programmable 38-tone CTCSS encoder **includes** 97.4 Hz (optional)
- Big multi-color LCD and back-lit controls for excellent visibility
- The TM-3530A is a 25 watt version covering 220-225 MHz. The first full featured 220 MHz rig!

DCL Introducing... Digital Channel Link

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Microprocessor control assures fast and reliable operation. The whole process happens in an instant!



Actual size front panel

Optional Accessories

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply for TM-2550A/2530A/3530A
- **PS-50** DC power supply for TM-2570A
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DWN switch
- **MC-43S** UP/DWN mic.
- **MC-55** (8-pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50B** mobile speaker
- **SW-200A/SW-200B** SWR/power meters
- **SW-100A/SW-100B** compact SWR/power meters
- **SWT-1** 2m antenna tuner

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories
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Specifications guaranteed on Amateur bands only

KENWOOD

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

Southwestern Division
FRIED HEYN, WA6WZO, 962 Cheyenne St, Costa Mesa, CA 92626 (714-549-8516)

Vice Director: Wayne Overbeck, N6NB, 900 Avenida Salvador, San Clemente, CA 92672 (714-492-8025)

West Gulf Division
JIM HAYNIE, WB5JBP, 3226 Newcastle Dr Dallas, TX 75220 (214-352-6180) home;
11837 Judd Ct, #114, Dallas, TX 75243 (214-437-1363) business

Vice Director: Thomas W. Comstock, N5TC, 1700 Dominik, College Station, TX 77840 (409-693-1181)

*Executive Committee Member

Section Managers of the ARRL

Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 16 divisions of the League are further arranged into 73 administrative "sections," each headed by an elected Section Manager. Your SM welcomes reports of club and individual activity. ARRL Field Organization appointments are available covering a wide range of Amateur Radio volunteer interests. Whatever your license class, your SM has an appointment available. Check with your SM (below) for further information.

Canada
Alberta — Bill Gillespie, VE6ABC, 10932 68 Ave, Edmonton, T6H 2C1 (403-438-2510)
British Columbia — H. E. Savage, VE7FB, 4553 West 12th Ave, Vancouver V6R 2R4 (604-224-5226)
Manitoba — Jack Adams, VE4AJE, 227 Davidson Ave E, Dauphin R7N 2Z4 (204-638-9270)
Maritime-Nfld — Leigh Hawkes, VE1GA, Box 864, Armdale, NS B3L 4K5 (902-443-6301)
Ontario — L. P. Thivierge, VE3GT, 34 Bruce St W, Renfrew K7V 3W1 (613-432-5967)
Quebec — Harold Moreau, VE2BP, 80 Principale, St Simon Co, Bagot JØH 1YØ (514-798-2173)
Saskatchewan — Gordon Kosmenko, VE5GF, 59 Kowalchuk Cres, Regina, S4R 6W7

Atlantic Division
Delaware — Harold K. Low, WA3WIY, Rte 6, Box 66, Millsboro 19966 (302-945-2871)
Eastern Pennsylvania — Kay C. Craigie, KC3LM, 128 Berkeley Rd, Devon 19333 (215-688-5045)
Maryland-DC — John A. Barolet, KJ3E, 108 Elliott Ct, California, MD 20619 (301-862-3201)
Southern New Jersey — Richard Baier, WA2HEB, 1226 Audubon Dr, Toms River 08753 (201-270-9292)
Western New York — William Thompson, W2MTA, RD 1—Rock Rd, Newark Valley 13811 (607-642-8930)
Western Pennsylvania — Otto Schuler, K3SMB, 3732 Colby St, Pittsburgh 15214 (412-231-6890)

Central Division
Illinois — David E. Lattan, WD9EBQ, RR 1, Box 234, Makanda 62958 (618-529-1578)
Indiana — Ronald J. Koczor, K9TUS, 2512 Glenwood Ave, Fort Wayne 46805 (219-483-1365)
Wisconsin — Richard R. Regent, K9GDF, 5003 South 26th St, Milwaukee 53221 (414-282-0312)

Dakota Division
Minnesota — George E. Frederickson, KCØT, RR #2—Box 352, South Haven 55382 (612-558-6312)
North Dakota — Lois Jorgensen, WAØRWM, Box 55, Abercrombie 58001
South Dakota — Roland Cory, WØYMB, 1010 7th St, W, Mobridge 57601 (605-845-2400)

Delta Division
Arkansas — Joel M. Harrison, Sr., WB5IGF, Star Rte 3—Box 306, Judsonia 72081 (501-729-3301)
Louisiana — John M. Wondergem, K5KR, 600 Smith Dr, Metairie 70005 (504-837-1485)
Mississippi — Paul Kemp, KW5T, 3581 Beaumont Dr, Pearl 39208 (601-939-7612)
Tennessee — John C. Brown, NO4Q, PO Box 37, Eva 38333 (901-584-7531)

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Michigan — James R. Seeley, WB8MTD, 21615-29½ Mile Rd, Springport 49284 (517-857-2013)
Ohio — Jeffrey A. Maass, K8ND, 9256 Concord Rd, Powell 43065 (614-873-3234)

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NYC-Long Island — John H. Smale, K2IZ, 315 Kensington Ct, Copiague 11726 (516-226-4835)
Northern New Jersey — Robert R. Anderson, K2BJG, 69 Page Dr, Oakland 07436 (201-337-9644)

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Kansas — Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Benton C. Smith, KØPCK, 3301 Sinclair, Rte 3, Box 196-A, Columbia 65203 (314-443-5168)
Nebraska — Vern J. Wirka, WBØGQM, 3106 Vinton, Omaha 68105 (402-341-4572)

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Eastern Massachusetts — Luck Hurder, KY1T, PO Box LL, North Eastham 02651 (617-255-2029)
Maine — Clevis O. Laverty, W1RWG, 17 Fair St, Norway 04268 (207-743-2353)
New Hampshire — William Burden, WB1BRE, 11 Briand, Nashua 03063 (603-882-0021)
Rhode Island — John Vota, WB1FDY, 41 Brookside Ave, Centerdale 02911 (401-231-1934)
Vermont — Frank I. Suitor, W1CTM, 727 North Ave, Burlington 05401 (802-863-5907)
Western Massachusetts — R. Donald Haney, KA1T, RD 1—Box 237, Myrick La, Harvard 01451 (617-772-4126)

Northwestern Division
Alaska — James L. Moody, Jr., NL7C, PO Box 102841, Anchorage 99510 (907-694-4077)
Idaho — Don Clower, KA7T, 5103 W. Cherry Ln, Meridian 83642 (208-888-7020)
Montana — L. C. "Les" Belyea, N7AIK, PO Box 327, Belgrade 59714 (406-388-4253)
Oregon — William R. Shrader, W7QMU, 2042 Jasmine Ave, Medford 97501 (503-773-8624)
Washington — Brad Wells, KR7L, 1290 Puget Dr, E, Port Orchard 98366 (206-871-6546)

Pacific Division
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Nevada — Joseph D. Lambert, W8IXD, PO Box 1201, Boulder City 89005 (702-294-0505)
Pacific — Army Curtis, AH6P, PO Box 4271, Hilo, HI 96720 (808-935-8893)
Sacramento Valley — Robert H. Watson, W6IEW, 10994 Clinton Bar Rd, Pine Grove, CA 95665 (209-223-010
San Francisco — Robert Odell Smith, NA6T, 320 Park St—PO Box 1425, Fort Bragg, CA 95437 (707-964-4931)
San Joaquin Valley — Charles P. McConnell, W6DPD, 1658 W Mesa Ave, Fresno, CA 93711 (209-431-2038)
Santa Clara Valley — Glenn Thomas, WB6W, 554 Simas Dr, Milpitas, CA 95035 (408-263-9450)

Roanoke Division
North Carolina — Rae Everhart, K4SWN, PO Box 41, Lexington 27293-0041 (704-249-8734)
South Carolina — James G. Walker, WD4HLZ, Rte 1, Box 5395, Marion 29571 (803-423-3645)
Virginia — Claude E. Feigley, W3ATQ, 135 The Main—RR #1, Williamsburg 23185 (804-253-0658)
West Virginia — Karl S. Thompson, K8KT, 5303 Pioneer Dr, Charleston 25312 (304-776-4352)

Rocky Mountain Division
Colorado — William "Bill" Sheffield, KQØJ, 1444 Roslyn St, Denver 80220 (303-355-2488)
New Mexico — Joe Knight, W5PDY, 10408 Snow Heights Blvd, NE, Albuquerque 87112 (505-299-4581
Utah — James R. Brown, NA7G, 865 Manchester Rd, Kaysville 84037 (801-544-0056)
Wyoming — Richard G. Wunder, WA7WFC, Box 2807, Cheyenne 82003 (307-634-7385)

Southeastern Division
Alabama — Joseph E. Smith, Jr., WA4RNP, 1211 13th St, N, Bessemer 35020 (205-424-4866)
Georgia — Edmund J. Kosobucki, K4JNL, 5525 Perry Ave, Columbus 31909 (404-322-2856)
Northern Florida — Royal V. Mackey, N4ADI, 161 Shell Point W, Maitland 32751 (305-644-5905)
Southern Florida — Richard D. Hill, WA4PFK, 3800 SW 11th St, Ft. Lauderdale 33312 (305-583-6932)
West Indies — Alberto L. Valldejuli, WP4CSG, V-11 19 St, Berwind Estates, Rio Piedras, PR 00924

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Los Angeles — Eugene R. "Bob" Poole, AJ6F, 2059 Reynosa Dr, Torrance, CA 90501 (213-326-2801)
Orange — Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (714-687-8394)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (619-273-1120)
Santa Barbara — Byron W. Looney, K6FI, 6540 Buckley Dr, Cambria, CA 93428 (805-927-8733)

West Gulf Division
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Oklahoma — William E. Goswick, K5WG, 12717 S. 124th E. Ave, Broken Arrow 74011 (918-369-211
Southern Texas — Arthur R. Ross, W5KR, 132 Sally La, Brownsville 78521 (512-831-4458)

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 US and Canada.

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. MCI MAIL (electronic mail system) ID: 215-5052

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-225-2188.

"It Seems to Us ..."

Spectrum Challenges

Last fall, the FCC dismissed a petition that sought to have the top half of the six-meter band reallocated to a new "Public Digital Radio Service" (PDRS). Of course, ARRL had opposed the petition and was joined by others, including broadcasting interests that saw it as a potential source of interference to the adjacent television channel 2. In rejecting the petitioner's arguments, the Commission cited the fact that in the ITU Radio Regulations the band was allocated for the exclusive use of the Amateur Radio Service in North and South America, and no additional or alternative allocation was provided for in the Radio Regulations. Six-meter enthusiasts were joyful that their favorite band had been protected, and amateurs in general were pleased that we had won another round in the never-ending battle to protect the Amateur Radio spectrum.

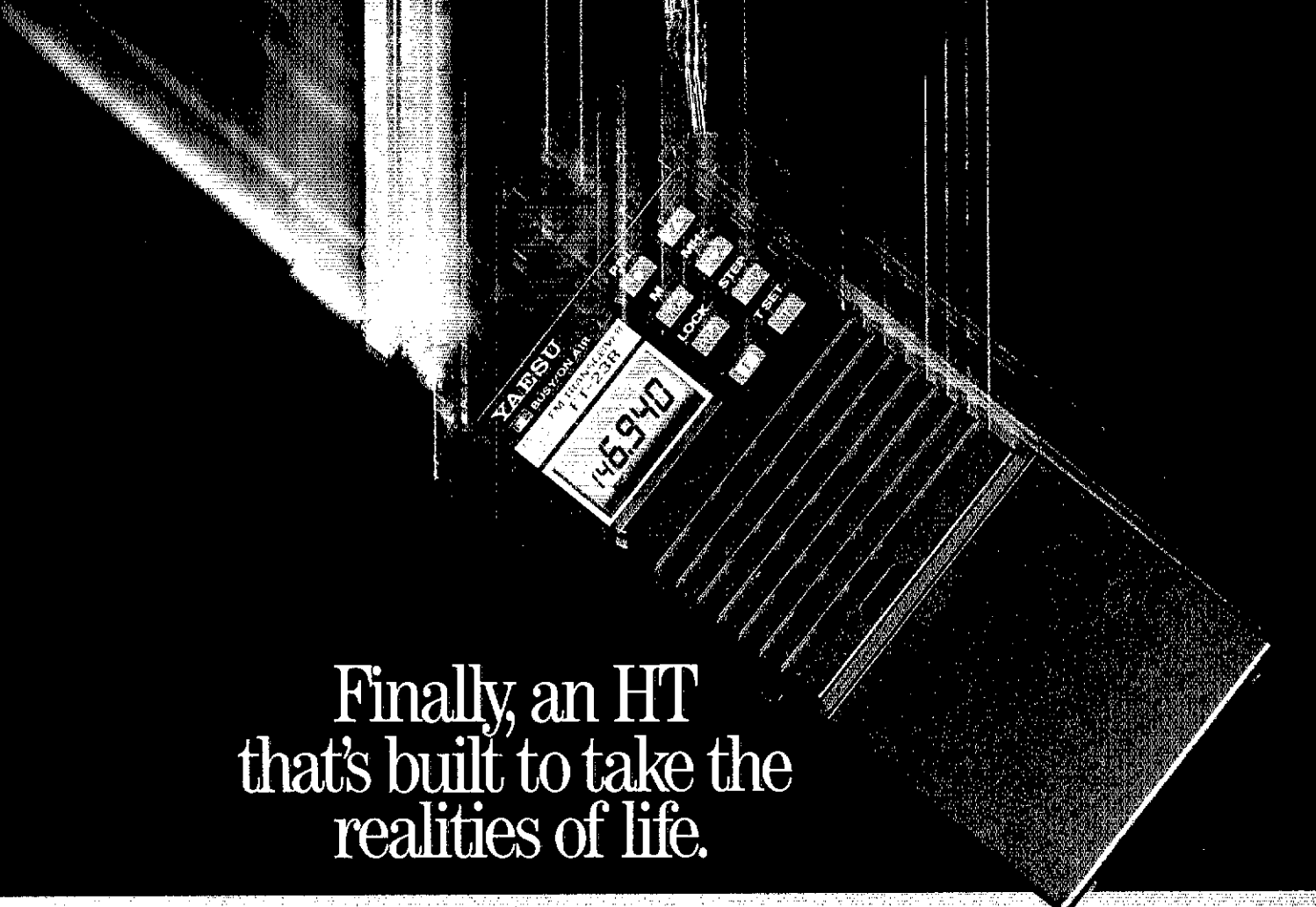
Well, it's good that we won. But let's not let it go to our heads, because this one was easy—and there are far more serious spectrum challenges facing us that will be far more difficult to overcome.

The PDRS petition was submitted by an individual, on the basis of incomplete research. Procedural rules were not followed. Perhaps even more important, the proposal would have required that the US depart from the international Table of Frequency Allocations in establishing the new service. A government can do this if it ensures that harmful interference is not caused to stations in other countries operating in accordance with the Table, but it's virtually impossible to provide this assurance in the case of consumer-level products that move virtually unimpeded across borders—a lesson that was learned the hard way with 27-MHz CB. In much of the world the band in question is used for TV broadcasting, so favorable Commission action on the petition would have set the stage for massive problems in Europe and elsewhere as products made for the US market were brought there and put into use. (Because of its other defects, formal consideration of the petition may not even have reached the point where this was a factor in its denial.)

The other opponents we face are more formidable, and the spectrum they seek is not allocated exclusively to our use. Here are the present and probable future challenges we face:

- The top half of 160 meters. Within the US we're secondary to nongovernmental radiolocation, used mainly in offshore oil exploration. Radiolocation activity here will pick up after midyear, in anticipation of the expansion of the AM Broadcasting band to 1705 kHz several years from now. *QST*s of the past several years chronicle the long battle over this band that has raged since WARC-79.
- The top 50 kHz of 75 meters. At WARC-79 Canada requested a footnote to permit broadcasting in this segment (an allocated use outside the Americas). The one they got is so restrictive that plans to introduce broadcasting in Canada have been abandoned, but the "camel's nose" remains in the tent and the subject may not remain dormant forever.
- The top two-thirds of 40 meters. Used outside the Americas for international broadcasting, it's coveted by broadcasters for reaching audiences in this hemisphere—something a few of them do already, in violation of the Radio Regulations. The trend is toward more "out-of-band" broadcasting above 7300 kHz, something even the US reserved the right to do when WARC-79 failed to come up with additional HF spectrum for broadcasting below 9 MHz. This may ease the threat to our use of the 7100-7300 kHz band, but we could be our own worst enemies if we denigrate the value to the Amateur Service of this band that we fought so hard to retain in 1979.
- 220 MHz. Services coveting 220 have been so numerous in the past dozen or so years, they've almost had to line up and take numbers, like at the supermarket deli counter—and they're still at it. In the meantime amateur activity here has mushroomed, but not as much as would have occurred without the chilling effect of the persistent threats. Permitting Novice operation would provide a big boost to an important band.
- The bands in which the Amateur Service is secondary to other services: 420 MHz through 10.5 GHz. New uses for the radio spectrum are being thought of every day, and while the radio spectrum is a renewable resource (in the sense that it is not diminished with use) it is also finite (ie, at a given time it can only support just so much activity in a given area). Most of the proposed new uses will be accommodated, if at all, in this frequency range because the lower frequencies are already so heavily occupied, and because the higher frequencies are absorbed by just about anything that gets in the way—even some kinds of glass. For decades we've peacefully shared broad bands of frequencies in this range with government radars, an arrangement which has been quite successful for both sides; new sharing partners may not be so compatible, as in the case of aeronautical flight test telemetry at 2310-2390 MHz (they won, we lost). We're in fairly good shape above 10.5 GHz, where most of the amateur allocations are for narrow, exclusive bands adjacent to wider, shared ones, thanks to some farsighted work done at WARC-79.

What's the answer to all these spectrum challenges? If you're looking for an easy solution, there isn't one. Justifying our allocations is a never-ending process, as it must be for every radio service if the most efficient use of this valuable resource is to be made. But every one of us can and should be a part of the solution, in at least two ways: by making sure that our Amateur Radio activity is seen always as being in the public interest, and by supporting the League so it can be a powerful voice for Amateur Radio. Access to the radio spectrum is a privilege that is earned, not a birthright; if it were otherwise, those CB rigs that were under lots of Christmas trees last month would have had a lot more than 40 channels.—*David Sumner, K1ZZ*

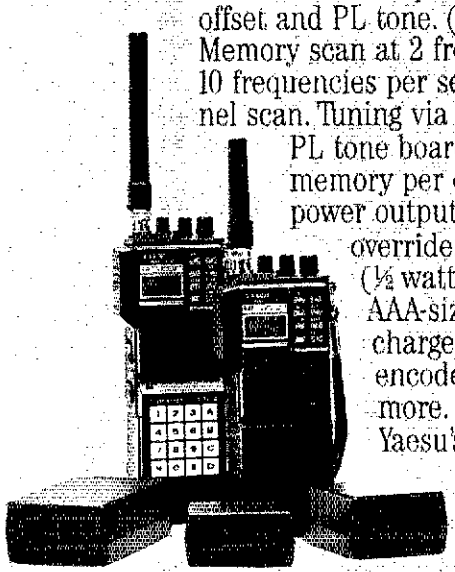


Finally, an HT that's built to take the realities of life.

Let's face it. It's easy to bump, drop, or get rain on an HT. ■ But if your HT is Yaesu's mini 2-meter FT-23R or 440-MHz FT-73R, such mishaps are a lot less worrisome. ■ They're built to last, with rugged aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. Plus, their moisture-resistant seals really help keep the rain out.

Built for the realities of operating. Despite their miniature size, both radios have all the operating capabilities of larger microprocessor-controlled HTs. Yet operating them couldn't be easier. Consider: ■ You get a 7.2-volt, 2-watt battery pack. (Optionally, a 12-volt, 5-watt pack, or 7.2-volt miniature 2-watt pack.) 10 memories that store frequency, offset and PL tone. (7 memories can store odd splits.) Memory scan at 2 frequencies per second. Band scan at 10 frequencies per second. Tx offset storage. Priority channel scan. Tuning via tuning knob, or up/down buttons.

Radios above shown actual size.



PL tone board (optional). PL display. External PL selection. Independent PL memory per channel. PL encode *and* decode. Expanded Rx coverage.* LCD power output and "S"-meter display. Battery saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch (½ watt on low power.) ■ Options available: Dry cell battery case for 6 AAA-size cells. Dry cell battery case for 6 AA-size cells. DC car adapter/charger. Programmable CTCSS (PL tone) encoder/decoder. DTMF keypad encoder. Mobile hanger bracket. External speaker/microphone. And much more. ■ So get the intelligent mini HT that's built for life's realities. Yaesu's 2-meter FT-23R, or 440-MHz FT-73R.

YAESU

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701 (213) 404-2700. Repair Service: (213) 404-4884. Parts: (213) 404-4847.
Yaesu Cincinnati Service Center 9070 Gold Park Drive, Hamilton, OH 45011. (513) 874-3100.

*Modification required. Prices and specifications subject to change without notice. PL is a registered trademark of Motorola, Inc.

UP FRONT in QST

FO-12 Launch Honored: Japan Amateur Radio League President Shozo Hara, JA1AN (right), accepts a plaque from ARRL President Larry Price, W4RA, in recognition of Japan's official entry into the amateur space program. Japan's first amateur satellite, Fuji-OSCAR 12, a joint project of JARL, Japan AMSAT, the Nippon Electric Company (NEC) and the Japanese National Space Agency (NASDA), was launched successfully August 12. The presentation was made October 24, during the 65th anniversary celebration of Radio Club Argentino, host society for the IARU Region 2 Conference. For more information on FO-12 and the OSCAR Program, see the October 1986 Amateur Satellite Communications column in *QST* and the two-part article that appears in last month's and this month's *QST*. *(N1CIX photo)*

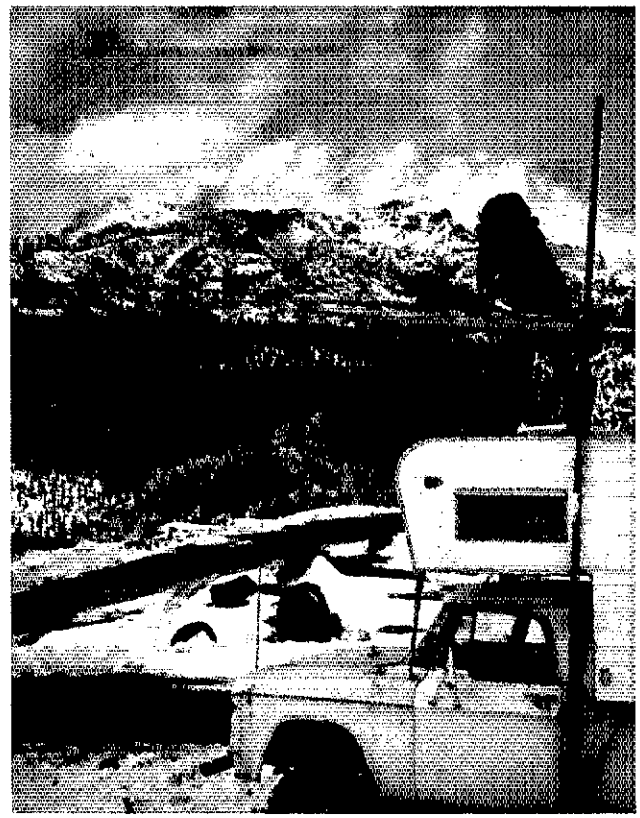
Region 2 Meets: Officers of IARU Region 2 conduct business during the final plenary session of its triennial conference. The October assembly, held in Buenos Aires, Argentina, established many guidelines for national Amateur Radio societies in North and South America to follow for the next three years. For a full report on the conference, see page 38, this issue. *(N1CIX photo)*

FCC Approves Written-Exam Credit

The FCC has okayed the giving of credit to amateurs who pass written elements of exams for license classes above Novice. The effective date depends on federal officials' approval of necessary changes to FCC Form 610. See this month's Happenings for the specific Part 97 Rules changes, and League Lines.

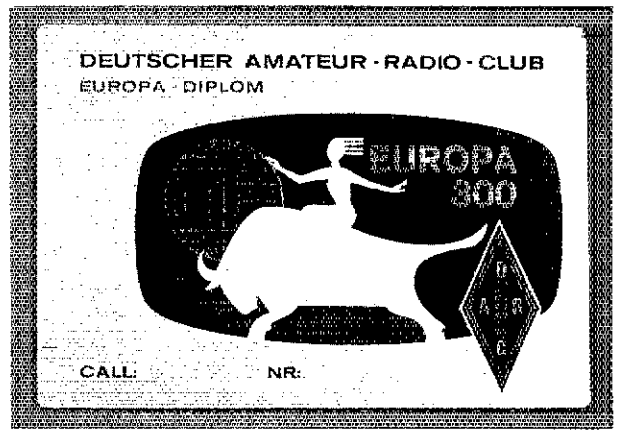
ARRL Board Election Results

League members in the Central, Hudson, New England, Northwestern and West Gulf Divisions have cast their votes for Director and Vice Director, and the ARRL Committee of Tellers has tallied the official results. How did your favorite candidate fare? See this month's Happenings for all the details.

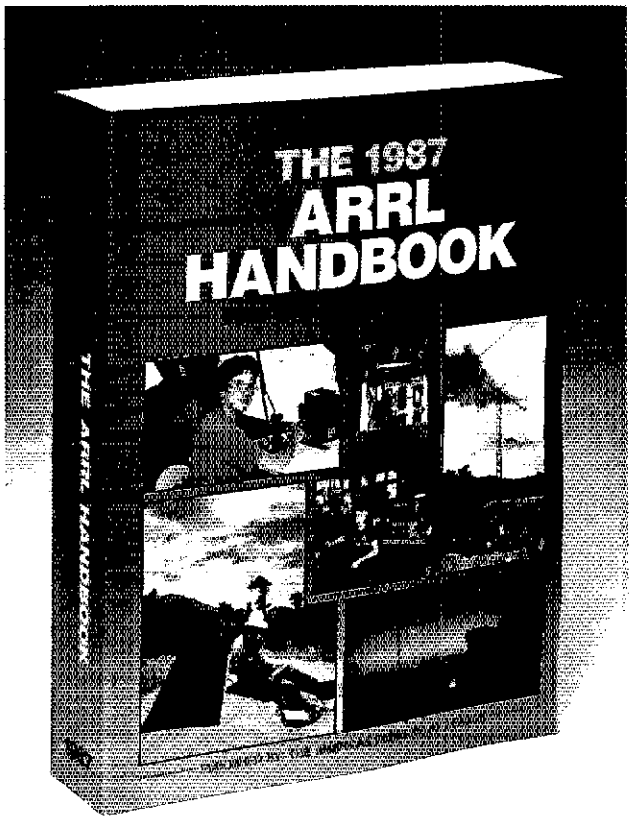


Fantastic View: One of the attractions of the California QSO Party for Golden State hams is the opportunity to put a remote county on the air. Bob Tarone, WA6ZBX (shown here), did just that last September when he returned to his former home of Mono County. His contest site was this 9265-foot vista point overlooking the Minarets area of the Sierra Nevada. Near-zero temperatures, 40-mile-per-hour gusts and some tricky equipment problems couldn't keep Bob from having a good time. Photo courtesy N6BIS, who also provided some QSOs from nearby Madera County.

Ham Radio on the Road: For a number of years, Holton Harris, W1WP, has been part of many public presentations of Amateur Radio. But this past year, he decided to get involved in something special. So he formed the Westport (Connecticut) Amateur Radio Traffic Society, and brought his show on the road to the Norwalk Oyster Festival in September. The crowd was obviously impressed, as six operators handled 940 messages over the course of the event, covering 40 states and two Canadian provinces.



Good DX News: US and Canadian radio amateurs who qualify for the DARC DX Awards, such as this Europa Diplom, don't have to send their QSLs overseas. Ralph Hirsch, K1RH, has been appointed US/Canadian Awards Manager for the Worked All Europe Award, the Europa DX Diplom, the Europa Diplom and the Europa Diplom Honor Roll. All are sponsored by the Deutscher Amateur Radio Club, ARRL's sister society in West Germany. Official application forms (which must be used) for the DARC DX Awards are available by sending $1 (or 3 IRCs) and a business-sized SASE to Ralph Hirsch, K1RH, 172 Newton Rd, Woodbridge, CT 06525.



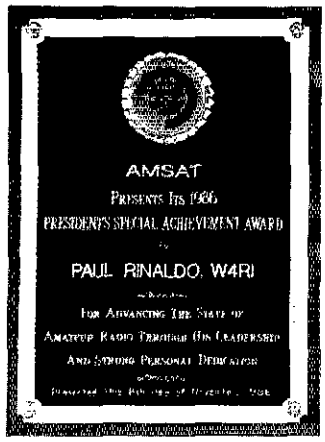
It's the biggest and best *ARRL Handbook* ever: 1232 pages, and no change in price (still $18 for the paperbound edition in the US). As of mid-November, the League had sold more than 5,715,929 *Handbooks*, beginning in 1926. Don't miss out on yours! See page 158, this issue, for ordering information.

Packet Radio Gets Boost

Some new rules for packet radio: Packet stations on 6 meters and above are now allowed to retransmit third-party traffic while under automatic control without the control operator being present. See this month's Happenings for the applicable Part 97 Rules changes.

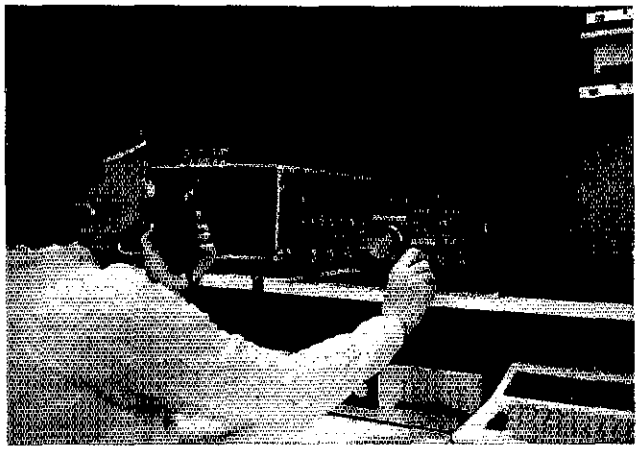
DXCC's 50th: 1987 marks the golden anniversary of the DX Century Club, a prestigious benchmark for measuring DX prowess. Thanks to the efforts of ARRL DX Advisory Committee Chairman John Parrott, W4FRU, DXers can add a little pizazz to their QSLs, stationery or what have you, during the year. These commemorative stickers are available to radio amateurs in quantities of 1000 by contacting the Stephen Fossler Company, 439 South Dartmoor Dr, Crystal Lake, IL 60014, tel 1-800-762-0030. For more on the anniversary, see this month's How's DX? and the article on the Golden Jubilee of DXCC Award on page 60 of September 1986 *QST*.

AMSAT Awards Go To Three Long-Time Achievers: Three hams who have made an outstanding contribution to the amateur space program were honored at the AMSAT annual meeting in Dallas in early November. The President's 1986 Special Achievement Awards went to Dick Daniels, W4PUI, for his "more than a decade in the precision work of building OSCARS"; to ARRL Publications Manager Paul Rinaldo, W4RI, for his "enormous contributions to Amateur Radio"; and to AMSAT Chairman of the Board John Browning, W6SP, for his "outstanding leadership in AMSAT affairs over more than half a decade."



Young Ham of Year Chosen

Shawn Wakefield, WK5P, of Bartlesville, Oklahoma, has been chosen to receive the first Westlink Young Ham of the Year Award. First licensed as a Novice in 1984, Shawn became an Extra Class in March 1986. An Eagle Scout, he has recruited members of his Scout troop to become hams, and is now organizing a ham radio Explorer post. The 16-year-old honor student is a member of the ARRL and the Bartlesville ARC, and is a net control station for local club nets. Congratulations, Shawn!



New Equipment: Yaesu Electronics, Inc recently donated a FT-767GX transceiver for use at W1AW. Here, ARRL Convention Program Manager Bernice Dunn, KA1KXQ, checks its performance on 20 meters. W1AW is available for operation by visitors between 1 PM and 4 PM weekdays. Be sure to have a copy of your operator's license with you. See the W1AW schedule, which appears regularly in *QST* (and in this issue on p 83), for operating information.

"What Are You, a Calculator or a Cordless Phone?" Tom Deeble, KA6SIP, of Pittsburg, California, ran into that question more times than he cares to recall last May at the *San Francisco Examiner* Bay to Breakers foot race. Designed to benefit local charities, the 7½-mile race is also known for its party atmosphere, so Tom decided to enter dressed as his favorite radio, a Kenwood TR-2600A. The winning costume was, alas, an Eiffel Tower, but Tom reports that he made a big impression, both with hams and ordinary folks, many of whom asked him to pose with them. Some specs: Overall height, when worn by KA6SIP—14 feet; weight—26 lb; construction—backpack aluminum frame connected to ½-inch PVC pipe in turn connected to wood frame made of 1 × 2s covered with cardboard; keypad—white foam, painted and lettered; controls—painted foam or cardboard. Tom is already planning his entry in next year's party/race, but he's not quite ready to unveil his 1987 costume.

Register Your Class

Is your club holding a Novice or upgrade course this winter? If you register the class with the ARRL Club Services Department, they'll be able to help direct prospective hams to your club by including yours on our computerized list of classes.

League Lines

ARRL Election results: ***Challengers defeated three incumbent Directors*** on the Board when ballots were counted November 20. Another Director retired and a number of new Vice Directors were also elected or faced no opposition, so this month's Board meeting will have a large number of new faces present. For complete election results see the Happenings column on page 49. The ARRL Board of Directors will meet in Hartford ***January 16-17.*** Now is the time to express your views to your Director. An updated list of Board members can be found on page 8.

Nominations and supporting documentation for this year's ***Hiram Percy Maxim Memorial Award*** must be in your ARRL Section Manager's hands by June 1. The Maxim Award is intended for radio amateurs under the age of 21 whose accomplishments and contributions are of the most exemplary nature within the framework of Amateur Radio. For further information, write to "Maxim Award" at HQ.

Ready to upgrade? The test fee for 1987 is $4.35 if you take a Technician or higher-class exam through an ARRL-affiliated Volunteer Examiner team. Many other Volunteer Examiner Coordinators will also charge $4.35. See Happenings for details.

VUCC Expands. Upon the recommendation of the VHF/UHF Advisory Committee, the popular VHF/UHF Century Club has been expanded to include 24 and 47 GHz, effective January 1. A minimum of five grid squares is needed to qualify. Contacts are good from the start of the VUCC program, January 1, 1983. To ensure fair assignment of initial numbers, applications received between Jan 1 and Jan 15 will be held, with certificate numbers determined by the date (and UTC time) of the fifth contact. Certifying Awards Managers should so note this info on applications. The first five qualifiers for each band will each receive a walnut plaque.

What's new in *QST* in 1987? Check out the new "Club Spectrum" column elsewhere in this issue—it'll be a mountaintop experience (read the column to find out why). Then be on the lookout next month for "Exploring Ham Radio," a column for newcomers and experienced hams alike, dealing with new ham radio methods; it takes out the mystery while leaving in the excitement. Watch for it in February!

FCC has announced that implementation of the new rules regarding the VEC maintenance of the question pools will begin December 31, 1986. When the FCC announced the new rules last August, the effective date was not announced pending the approval of the Office of Management and Budget (OMB), due to certain changes in recordkeeping requirements. This approval has now been secured from OMB. See the October Happenings column for details. The ARRL has filed a petition for reconsideration in this docket, and may file other requests or petitions to delay the implementation date: W1AW and *The ARRL Letter* will carry further details as they develop.

$50 to renew your ham ticket? A private company is sending official-looking literature to amateurs offering assistance with their license renewal, and it is possible some amateurs may think the literature is from FCC. The catch is that the fee the private company charges for this service is $50. Of course, FCC does ***not*** charge a fee to renew an amateur license, and the renewal Form 610 is available free from any FCC field office or ARRL HQ upon receipt of an SASE. FCC or ARRL HQ can also provide answers to any questions you may have about renewing your license, so save your money!

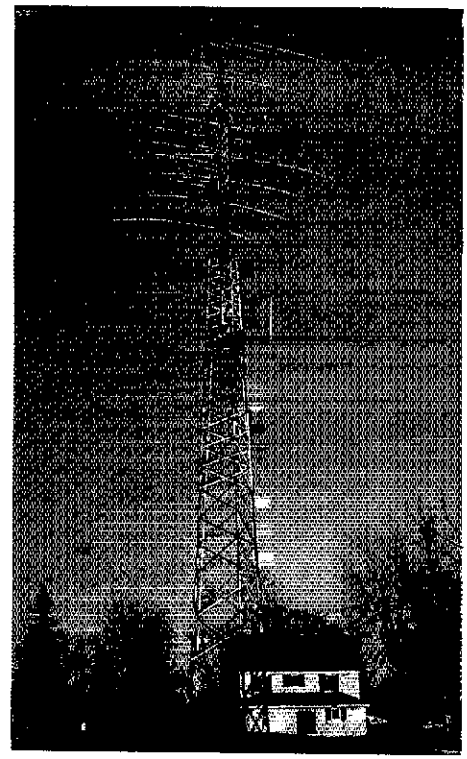
With the close of 1986, it's time to extend ***hearty thanks*** to every ARRL Field appointee for a job well done this past year. Without their hard work in the League's Field Organization, Amateur Radio would be left without a backbone in public service, state government liaison, public relations, technical advancement, information management, clubs and self-monitoring. And, for those who aren't yet a part of the excitement, check out the story on page 46 for information on how ***you*** can make a real contribution to your fellow radio amateurs and the public. Make it a New Year's resolution.

Michael T. N. Fitch has been named Chief of the Private Radio Bureau (PRB), replacing Robert Foosaner, who resigned to take a position in a communications law firm. Fitch has degrees in Electrical Engineering and law. He joined the FCC in 1970, and since 1983 has been the Deputy Chief of the Private Radio Bureau. Fitch attended the 1986 ARRL National Convention in San Diego last September and represented the Commission at the FCC Forum there. As Chief of PRB, Fitch has the responsibility for over 34 Private Radio Services, including the Amateur Radio Service.

Mid-Michigan Skyhook

Maybe you won't be building one of these yourself—but it sure is nice to dream!

By Norman B. Keon, WA8AEG
10732 Riverside Dr
St Louis, MI 48880



WA8AEG photo

Even though there have been actions taken by some local authorities around the country to limit antenna height, I want to assure my fellow hams that there is an area where the city fathers and mothers actually gave their blessing to a tower structure. In the town of Ithaca, near the middle of Michigan's lower peninsula, a building permit was issued to John Baublitz, WD8RXP, for the construction of a *180-foot* tower.

The tower incorporates a base section, similar to a windmill tower, 120 feet high. From the top of this, a rotatable tower, on which the various beam antennas are mounted, extends for another 60 feet. Most hams would trade their souls for either of these towers separately, let alone put together!

It is not uncommon for pileups to develop when WD8RXP is on the air. Hams who have been "reading the mail" have their own questions to ask about the monster tower/antenna system in mid-Michigan. I hope that this article will give them most of the information they would like to know, and a few pictures to boot!

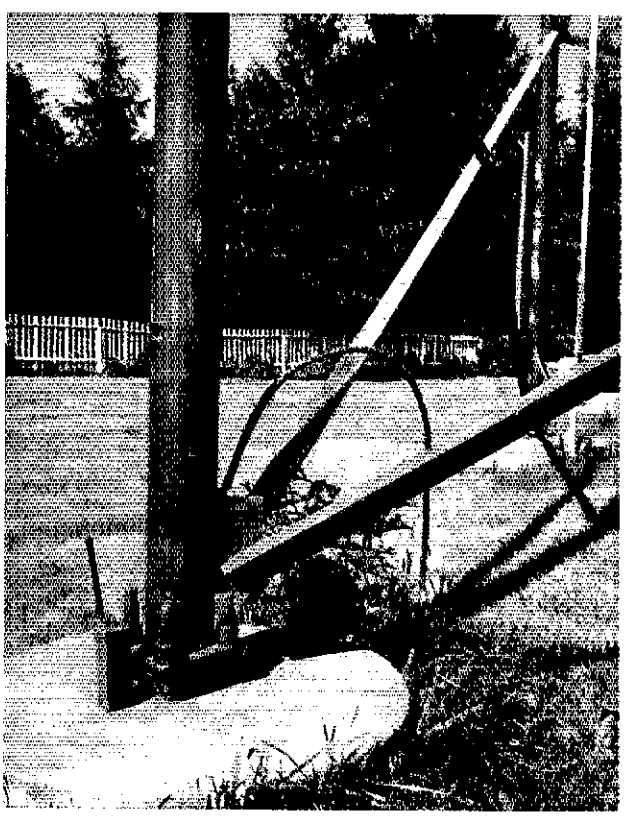


Fig 1—Detail of the base at one leg, with a hand-held transceiver for size comparison. *(photos for Figs 1 through 6 by K8RI)*

Lower Tower

Many months went into planning the structure. Construction, begun in the spring of 1980, was completed in the fall of 1983. The finished 120-foot lower tower is made of six sections, each 20 feet in height. The bottommost section is estimated to weigh 1½ tons, and is secured at each leg by 1¼-inch-diameter bolts in 3½ cubic yards of concrete (Fig 1). Each concrete body is a conic section three feet wide at the top, five feet wide at the bottom and ten feet long. The tower legs start with 5-inch pipe at the base and taper to 3-inch pipe in the top section. Cross braces in the bottom section are made of 3 × 3 × ¼-inch steel angle; these also reduce in cross section with height. Each leg is connected through no. 00 wire to a 10-foot ground rod.

Upper Tower and Rotator

The easiest way to rotate stacked beams is to rotate the whole tower, and this is why the upper tower is designed to be rotatable. This part of the structure is built along the lines of the three-sided towers familiar to many of us. Its legs start out with 3-inch-diameter pipe at the bottom, tapering to 2½-inch pipe at the top. Steel angle is used for cross bracing. The size of the upper tower varies from three feet on a side at the bottom to 18 inches on a side at the top. A 3-inch-diameter mast extends from the top of the upper tower for the attachment of 2-meter beams, and is equipped with a thrust bearing so that it may be set up with its own separate rotator (not installed at present).

Though the entire upper tower is actually 80 feet long, only 60 feet of it extends above the lower tower. The remaining 20 feet are "used up" between the top of the lower tower and the rotator platform. The rotator platform, a sheet of 1-inch steel, is mounted on C-girders at the 100-foot level of the lower tower. On its way down to the rotator platform, the upper tower passes through a 5-foot-diameter ring at the top of the lower tower. This is a thrust bearing, and it consists of 42 rollers running in a track built of 2-inch steel strap. The base of the upper tower is bolted to a round steel plate, which in turn rests on six 6-inch-diameter flanged wheels similar to railroad car wheels. These are mounted in a circle,

Fig 2—The rotator platform is readied on the ground inside the tower base. The round plate rotates the entire upper tower.

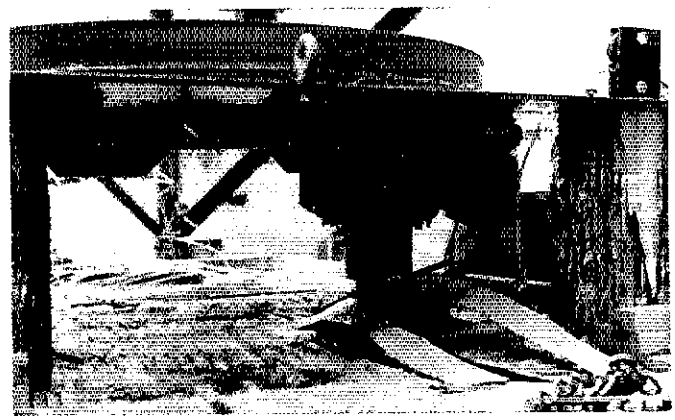


Fig 3—Another view of the rotator platform during preparation, showing the double-reduction gearbox (360:1 ratio) before motor installation.

flanges out, in wells on the rotator platform (Fig 2). A 32-inch-diameter gear fastened to the bottom of the round plate meshes with reduction gearing driven by a 1-horsepower 234-V motor (Fig 3). The entire rotator assembly weighs 1800 pounds.

Wiring and Control Systems

All wiring runs underground from the ham shack to the base of the tower. Separate PVC pipes are used for coaxial cable and electrical wiring. The electrical wiring continues up the side of the tower to the rotator platform in a PVC-pipe conduit (Fig 4).

All wiring to the rotator is no. 12 copper, including the 234-V line supply and five cables for the rotator directional controls. When the rotator control unit in the ham shack is turned on, a relay on the rotator platform is energized, connecting the 234-V line to the motor. The directional controls energize relays, which reverse the motor direction. A selsyn (synchro motor-generator) system indicates antenna azimuth. For convenience, a 117-V outlet is installed at the rotator platform to provide power when servicing is required.

Construction

The size of this tower is enough to boggle anyone's mind, but when it's considered that all construction was done by hand, without the use of any cranes, the feat is even more impressive. All pipes and cross braces were readied on the ground, all welding being done with a dc welder (Fig 5). Since the entire structure bolts together, care had to be taken to make cer-

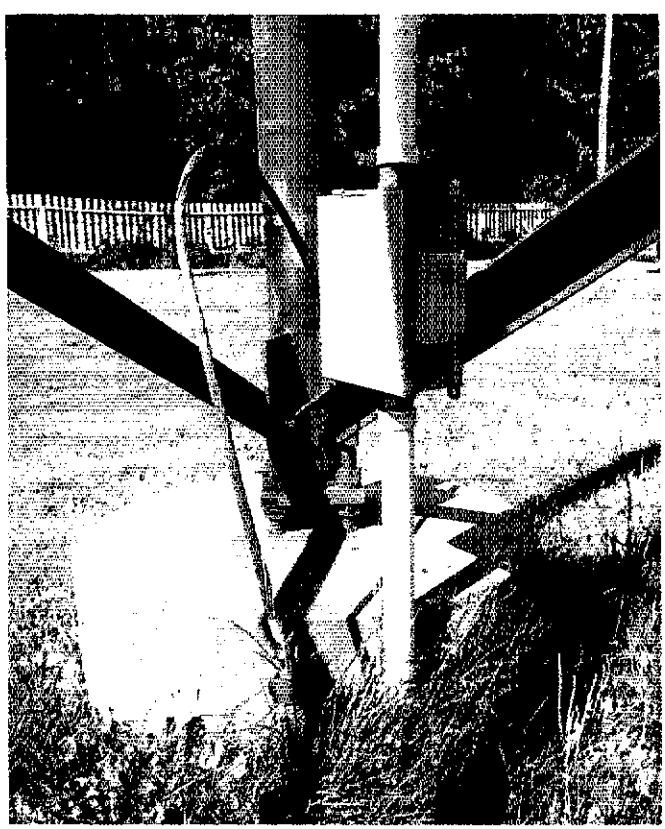


Fig 4—PVC-pipe conduit carries power and control wiring to the rotator platform. Each tower leg is grounded by means of a 10-foot ground rod and no. 00 wire.

Fig 5—John Baublitz, WD8RXP, welds plates to upper tower leg sections.

tain that all cross braces would align properly. With the first 20-foot section of the lower tower in place, three 41-foot gin poles were fastened to the tower, one to each leg, and used to pull up further pieces (Fig 6). The "pulling up" was accomplished with a 500-foot spool of ¼-inch aircraft cable fastened to a 4-wheel-drive vehicle. Pulleys had to be hand-constructed to handle the loads, as well as to be adaptable to different locations on the structure.

While many hams helped in various ways to construct this tower, a special credit goes to Ken Adamick, WD8RZE, who did all of the high steel work and initial antenna mounting, and who, we are certain, now qualifies to build skyscrapers in New York City! It is worthwhile to note that construction would not have been possible at all had it not been for a very understanding XYL, who waited three extra years for a new car (which she now has)!

Antennas

The current complement of antennas (from the top down; see title photo) consists of: Four 11-element Cushcraft 2-meter beams at 190 feet (these are attached to the mast extending from the top of the upper tower); a 6-element KLM 15-meter beam; a 7-element KLM 6-meter beam; a 6-element KLM 20-meter beam; an 8-element homebuilt 10-meter beam and, on the bottom, a 4-element KLM 40-meter beam. All beams below the 2-meter array were originally switched via a Heathkit antenna relay (rewired to 35 V to compensate for long no. 14 wire runs). However, after lightning twice destroyed the relay boxes, direct coaxial lines were run to each antenna.

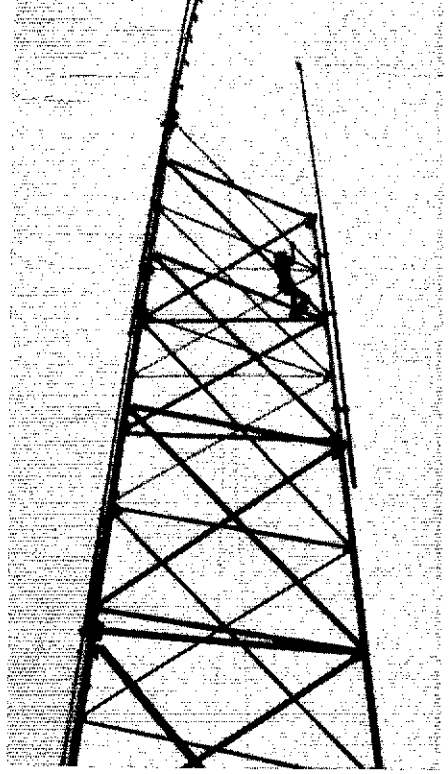


Fig 6—Gin poles are used to haul pieces into place as Ken Adamick, WD8RZE, assembles another section at 80 feet.

A windstorm in the summer of 1984 snapped the boom on the 20-meter beam, damaging the 10-meter antenna below it (the 40-meter beam was not mounted at the time). New antennas, including the 40-meter beam, were subsequently installed by the author, and so far no further damage has occurred. Future plans have not been finalized, but John keeps mentioning something about mounting a 4-element 80-meter quad somewhere up there!

During operation with this antenna system, the stations heard, as well as the signal reports received, are phenomenal. If you hear John on the air, be sure to give him a call. He will be happy to answer any questions you may have about the Mid-Michigan Skyhook!

Some Power-Supply Design Basics

(continued from page 29)

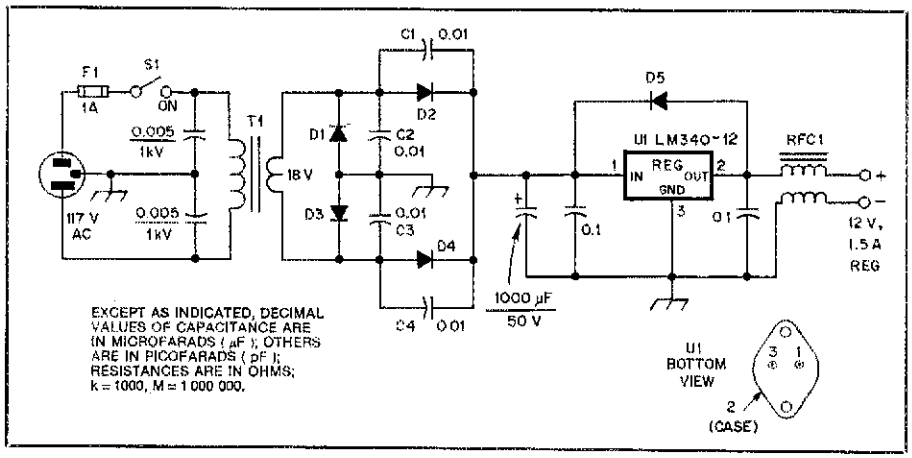


Fig 3—Schematic diagram of a practical 12-V, 1.5-A regulated dc power supply. Components C1-C4, incl, and RFC1 may be omitted if this circuit is not for use with a direct-conversion receiver (see text). Capacitors are disc ceramic except for the one with polarity marked, which is an electrolytic. All diodes are 3 A, 50 PRV or greater. RFC1 has 15 bifilar (parallel) turns of no. 14 enam wire on an Amidon Assoc FT-114-43 toroid core (1.14-inch-OD core with 850 μ_i). T1 has an 18-V secondary at 3 A or greater. U1 is a National Semiconductor Corp 12-V positive regulator in a TO-3 case. D1-D4, incl, may be a full-wave rectifier block (use heat sink here and on U1); see text.

HW-7 and HW-8. The bypass capacitors across the transformer primary winding also aid in keeping RF energy out of the power supply.

I recommend a modular bridge rectifier for D1-D4, inclusive. It should be mounted on a heat sink that is approximately 2 to 3 inches square. A 3-inch-square finned heat sink should be ample for U1.

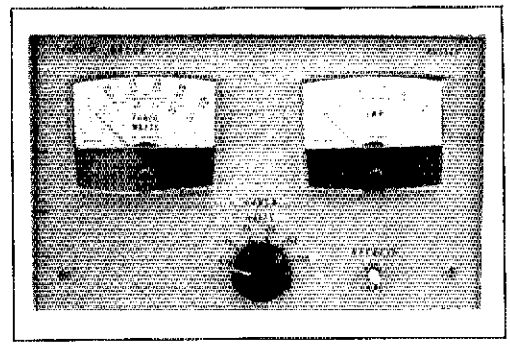
Some Final Thoughts

We have merely agitated the surface in our basic look at power supplies. A lengthy book is needed to cover the subject properly. But, perhaps this article can provide some of the answers you have needed to fundamental questions about power supplies and the ratings of their component parts.

A number of regulated power supplies are described in detail in the 1987 edition of *The ARRL Handbook*. Additional design data may be found in the publication referenced in note 1.

The Tandem Match—An Accurate Directional Wattmeter

This accurate directional wattmeter measures power from 1.5 to 1500 W and SWR over a range from 1:1 to 50:1.



By John Grebenkemper, KA3BLO
Tandem Computers, Inc
2550 Walsh Ave
Santa Clara, CA 94051

This article describes construction of a new type of directional wattmeter that can accurately measure power output and *standing wave ratio* (SWR) over a wide range of power. I originally started working on this project because I was unhappy with the performance of affordable directional wattmeters. The performance of the Tandem Match is as good as, or better than, any commercially available directional wattmeter designed for amateur use.

Most SWR meters are very inaccurate at low power levels because of non-linearities of the detector diodes. This design uses a compensating circuit to cancel the diode nonlinearity. A direct SWR readout provides a handy way of adjusting an antenna matching network for minimum SWR to the transmitter. There is no need for mental gymnastics to guess what the minimum SWR is in the event that transmitter output varies substantially with SWR.

Design Principles

Directional wattmeters for Amateur Radio use consist of three basic elements: a directional coupler, a detector, and a signal processing and display circuit. The directional coupler separates the signal into its forward and reflected components. The ideal directional coupler would provide a signal proportional to the forward and reflected voltage independent of frequency, and could then be used to measure forward and reflected power over a wide frequency range. The best designs today will work over two decades of frequency. If the unit is to operate without being switched, the directional coupler must provide both the forward and reflected voltages simultaneously.

The detector circuit provides a dc output voltage proportional to the ac input voltage. Most directional wattmeters use a single germanium diode as the detector element. A germanium diode is used to minimize the diode nonlinearity at low power levels. The diode nonlinearity will still cause measurement errors in the SWR unless it is compensated before the display circuit. Most directional wattmeters do not work well at low power levels because of this diode nonlinearity.

The signal processing and display circuit computes and displays the SWR. There are a number of ways to perform this function. Meters that display only the forward and reflected power require the operator to compute the SWR separately. Many instruments require that the operator adjust the meter to a reference level while measuring forward power, then switch to measure reflected power with the SWR displayed on a special scale. Several units have been described that directly compute the SWR using analog signal processing circuits.[1-4]

Let's take a brief look at several popular circuits for accomplishing the above functions. I will also compare and describe the circuits used in the Tandem Match. The design specifications used in the Tandem Match are shown in Table 1.

Circuit Description

Directional Coupler Circuits

A directional coupler consists of an input port, an output port and a coupled port. The device takes a portion of the power flowing from the input port to the output port and directs it to the coupled port, but *none* of the power flowing from the output port to the input port is directed to the coupled port. There are several terms that define the performance of a directional coupler

- *Insertion loss* is the amount of power that is lost from the signal flowing from the input port to the output port.
- *Coupling factor* is the amount of power (or voltage) that appears at the coupled port relative to the amount of power (or voltage) flowing from the input port to the output port.
- *Isolation* is the amount of power (or voltage) that appears at the coupled port relative to the amount of power (or voltage) flowing from the output port to the input port.
- *Directivity* is the isolation less the coupling factor.

All of these factors important in determining the performance of a directional wattmeter. Insertion loss should be minimized so that the coupler doesn't dissipate a significant amount of the transmitted power. The flatness of the coupling factor as a function of frequency determines how accurately the directional wattmeter can determine the forward and reflected power over a range of frequencies. Directivity will dictate the minimum SWR that can be measured. A directional coupler with 20-dB directivity will measure a 1:1 SWR as 1.22:1, but one with 30-dB directivity will measure a 1:1 SWR as 1.07:1.

The most commonly used directional coupler for Amateur Radio is the design originally described by Bruene in a *QST* article.[5] See Fig 1. I built a coupler of this type in one of my early attempts to make an accurate directional wattmeter. My measurements of its performance showed that over the range of 3 to 30 MHz, the coupling factor was flat to within ±1 dB, and the directivity was approximately

[1]Notes appear on page 26.

Table 1
Performance Specifications for the Tandem Match

Power range:	1.5 to 1500 W.
Frequency range:	1.8 to 54 MHz.
Power accuracy:	Better than ± 10% (± 0.4 dB).
SWR accuracy:	Better than ± 5%.
Minimum SWR:	Less than 1.05:1.
Power display:	Linear, suitable for use with either an analog or digital meter.
SWR display:	Linear, suitable for use with either an analog or digital meter.
Calibration:	Requires only an accurate voltmeter. No calibrated RF source is required.

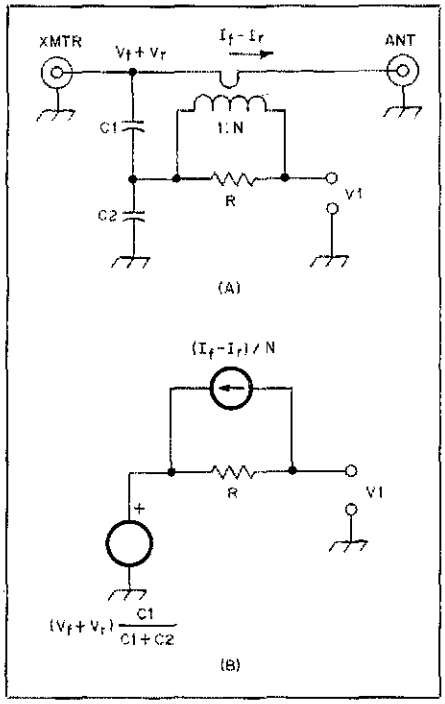


Fig 1—Simplified diagram of the Bruene directional coupler. At A, one of the unidirectional segments. At B, an equivalent circuit.

20 dB. Both of these factors limit the accuracy of this coupler, both for measuring power and determining low SWR. However, it is a relatively simple directional coupler, and it works well over a wide frequency range if high precision is not required.

The coupler used in the Tandem Match consists of a pair of toroidal transformers connected in tandem. This configuration has been used for years and has been described in several articles.[6,7] As long as the coupling factor is 20 dB or greater, this coupler can be used to separate both forward and reflected power. Fig 2 shows this coupler configuration.

I have made a number of measurements of the performance of this type of directional coupler. The particular configuration used in the Tandem Match works well over the frequency range of 1.8 to 54 MHz, with a nominal coupling factor of 30 dB. Over this range, the insertion loss is less than 0.1 dB. Figs 3 and 4 show plots of coupling factor and directivity as a function of frequency. Over the frequency range of 1.8 to 30 MHz the coupling factor is flat to within ± 0.1 dB, and increases to only ± 0.3 dB at 50 MHz. Directivity exceeds 35 dB from 1.8 to 30 MHz and exceeds 26 dB at 50 MHz.

The low-frequency limit of the directional coupler is determined by the inductance of the secondary windings of the transformers. Inductive reactance of the secondary windings should be greater than 150 Ω to avoid excessive insertion loss. The high-frequency limit of the directional coupler is determined by the length of wire used in winding the transformers. When this length approaches a significant fraction of a wavelength, the performance of the directional coupler deteriorates. A 20-dB coupling-factor version of this design should work up to 150 MHz because of the shorter length of wire required in the transformer secondaries.

Detector Circuits

Most amateur directional wattmeters use a single germanium diode as the detector. Germanium diodes are used because of their low forward voltage drop. However, this voltage drop is still significant, and an uncompensated diode detector will underestimate the detected power. A directional wattmeter that directly displays power will usually compensate for the diode nonlinearity by using a meter scale that takes these effects into consideration.

The effect of underestimating detected power becomes worse at lower power levels. Under these conditions, the ratio of the forward power to the reflected power will be overestimated because the reflected power is always less than the forward power. This results in an instrument that underestimates the SWR, particularly as the power level is reduced. A directional wattmeter can be checked for this effect by measuring the SWR at several power levels, as SWR should be independent of power level.

The Tandem Match uses a feedback circuit to compensate for diode nonlinearity. A simplified diagram of the detector is shown in Fig 5. When used with the 30-dB directional coupler, the output voltage of this circuit tracks the square root of the power over a range from 10 mW to 1.5 kW. A comparison between the

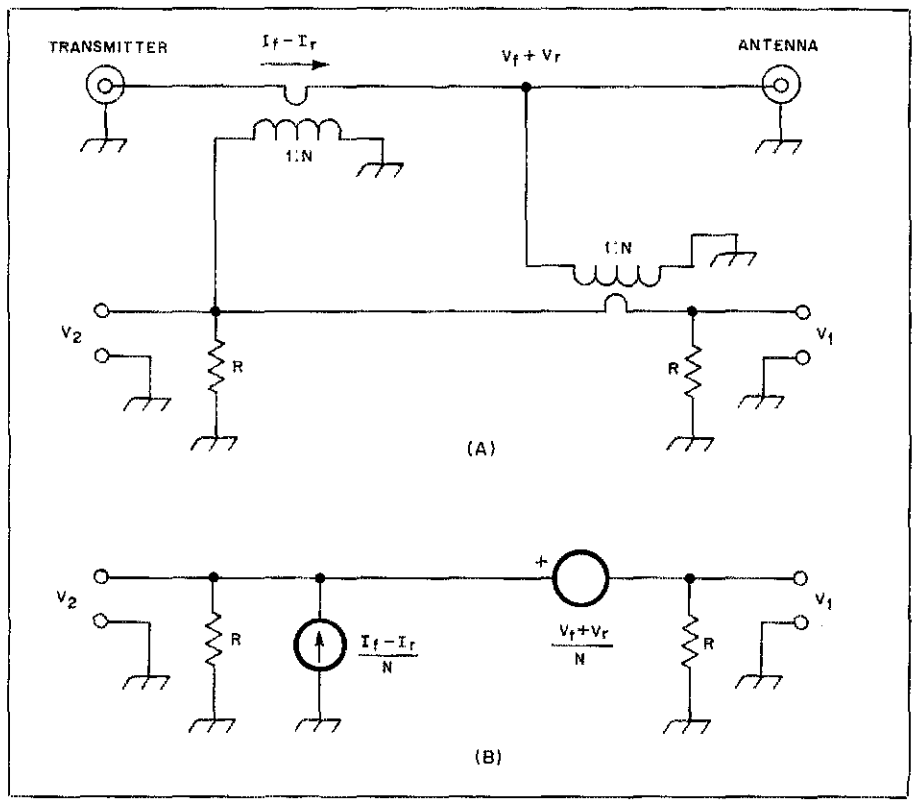


Fig 2—Simplified diagram of the Tandem Match directional coupler. At A, a schematic of the two transformers. At B, an equivalent circuit.

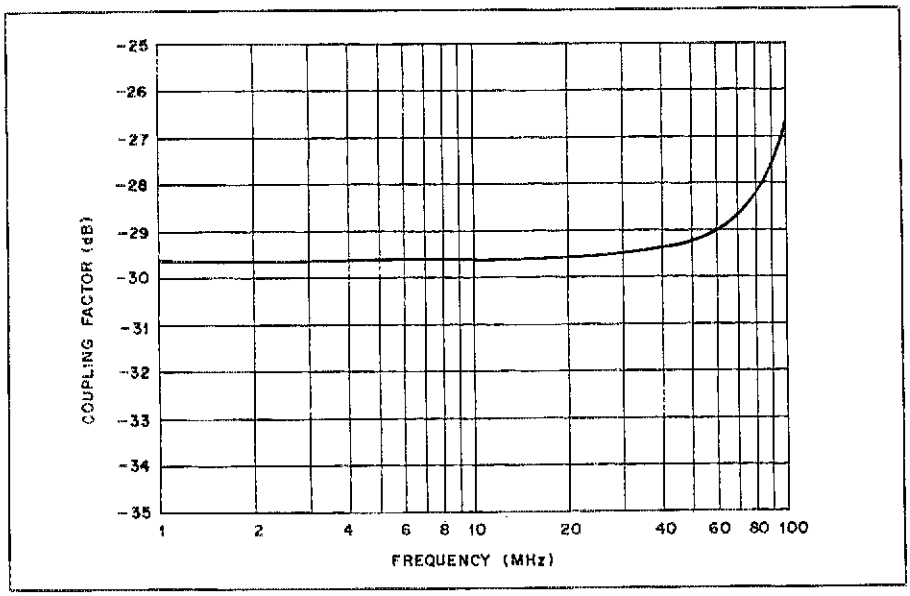


Fig 3—A plot of coupling factor for the Tandem Match directional coupler.

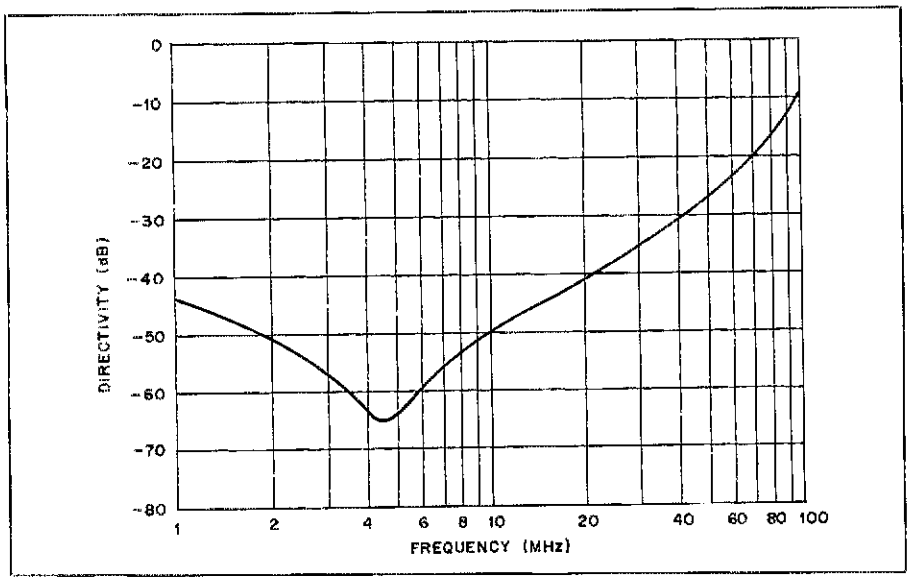


Fig 4—A plot of directivity for the Tandem Match directional coupler.

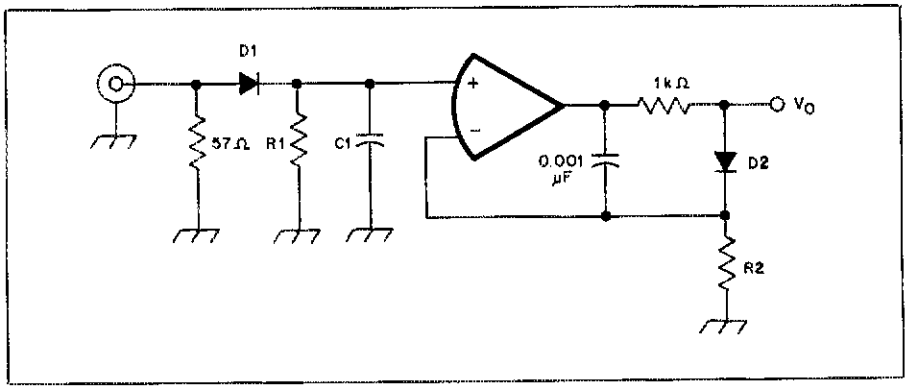


Fig 5—Simplified diagram of the detector circuit used in the Tandem Match. The output voltage, V_o is approximately equal to the input voltage. D1 and D2 must be a matched pair. The op amp should have a low offset voltage (<1 mV), a low leakage current (<1 nA), and be stable over time and temperature. The resistor and capacitor in the feedback path assure that the op amp will be stable.

accuracy of this detector using Schottky barrier diodes and a detector using a germanium diode is shown in Fig 6. The compensated diode detector tracks the peak input voltage down to an input level of 30 mV, while the uncompensated diode detector shows significant errors at peak inputs of 1 V and less.

The circuit uses the voltage across the feedback diode D2 to compensate for the voltage drop across the detector diode, D1. The diodes must be a matched pair. The average current through D1 is determined by the detector-diode load resistor, R1. The peak current through this diode is several times larger than the average current; therefore, the current through D2 must be several times larger than the average current through D1 to compensate adequately for the peak voltage drop across D1. This is accomplished by making the feedback-diode load resistor, R2, several times smaller than R1. The voltage at the output of the compensated detector will be approximately the peak RF voltage at the input.

A computer simulation was used to optimize this ratio. The simulation assumed that the detector diodes were Schottky barrier types and that the detector-diode load resistor was 1 megohm. A ratio of R1 to R2 of 5:1 appeared to be near optimal. A larger ratio resulted in excessive peaking in the low power range, and a smaller ratio resulted in a faster roll off at the lower power levels. Experimental data tended to confirm these results.

Signal-Processing and Display Circuits

The signal-processing circuitry calculates and displays the power measurement and SWR. A block diagram of the Tandem Match is shown in Fig 7. This circuit differs from conventional directional wattmeters in several respects. Most directional wattmeters display the forward power. This measurement is very close to the power delivered into the transmission line as long as the SWR is low. However, as the SWR increases, the forward power becomes an increasingly poor measure of the power being delivered to the load. At an SWR of 3:1, a forward power reading of 100 W implies that only 75 W is being delivered to the load, assuming that the transmission line has no losses. (The reflected power reading will be 25 W.) The Tandem Match directly displays the power being delivered *into* the transmission line. This is the quantity which must be optimized to result in maximum radiated power.

The Tandem Match also directly computes and displays the SWR of the transmission line on a linear scale. The direct display of SWR provides a convenient method of adjusting an antenna matching network. The antenna matching network is adjusted to minimize the displayed SWR. The displayed SWR is not affected by changes in the transmitter output power and the antenna system can be

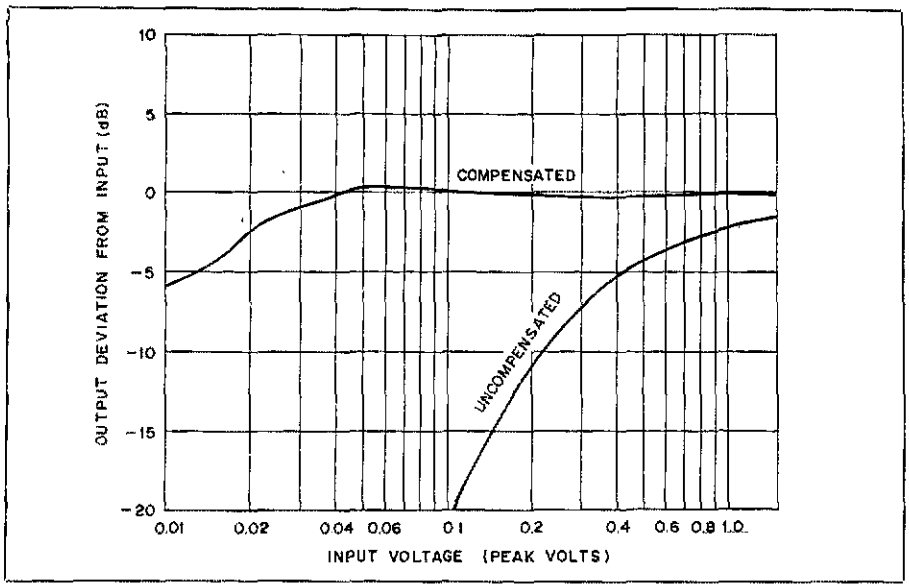


Fig 6—Comparison of accuracy for a compensated and uncompensated diode detector. The top line shows measurement error as a function of peak RF input voltage for the compensated detector using a matched pair of Schottky barrier diodes. The bottom line shows measurement error for an uncompensated 1N34A germanium diode detector. Measurements were made at a frequency of 10 MHz.

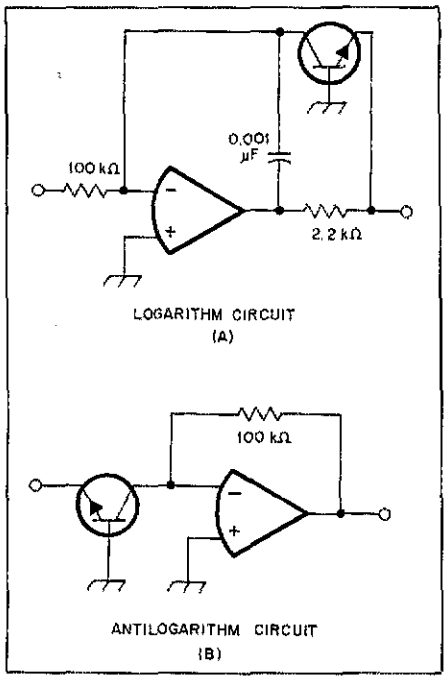


Fig 8—Simplified diagrams of the logarithm circuit at A and the antilogarithm circuit at B.

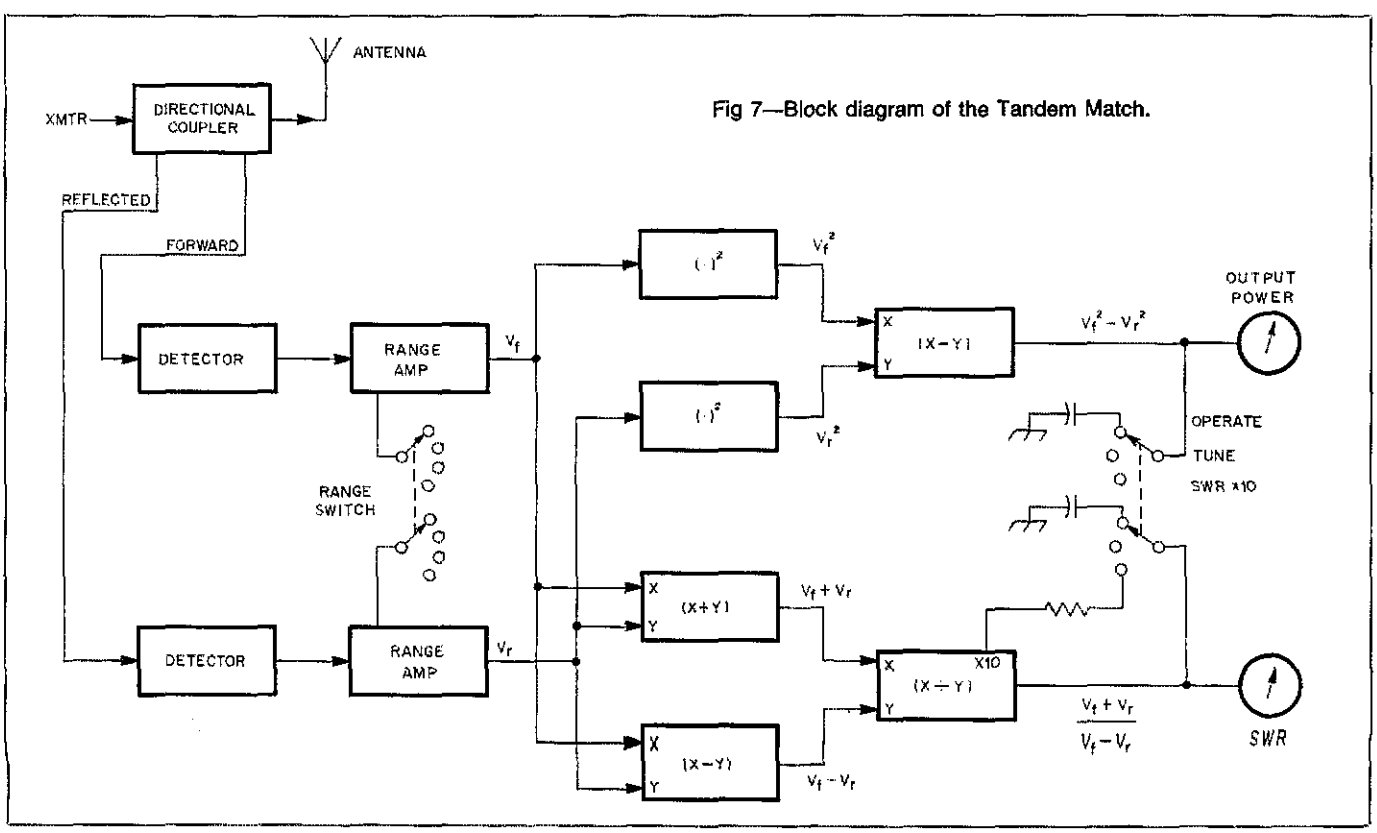
tuned with an output power of only a few watts. People are amazed at how easy it is to tune an antenna system using the direct SWR display from the Tandem Match.

The heart of the signal-processing circuit is the analog logarithm and antilogarithm circuits shown in Fig 8. The circuit is based on the fact that the collector current in a silicon transistor is proportional to the exponential (antilogarithm) of its base-emitter voltage over a range of collector currents from a few nanoamperes to a few milliamperes when the collector base voltage is zero.[3] Variations of this circuit are used in the squaring circuits to convert voltage to power and in the divider circuit used to compute the SWR. With good op amps, this circuit will work well for input voltages of less than 100 mV to greater than 10 V.

Construction

Up to this point, we have examined some of the circuitry of the Tandem Match. The

Fig 7—Block diagram of the Tandem Match.



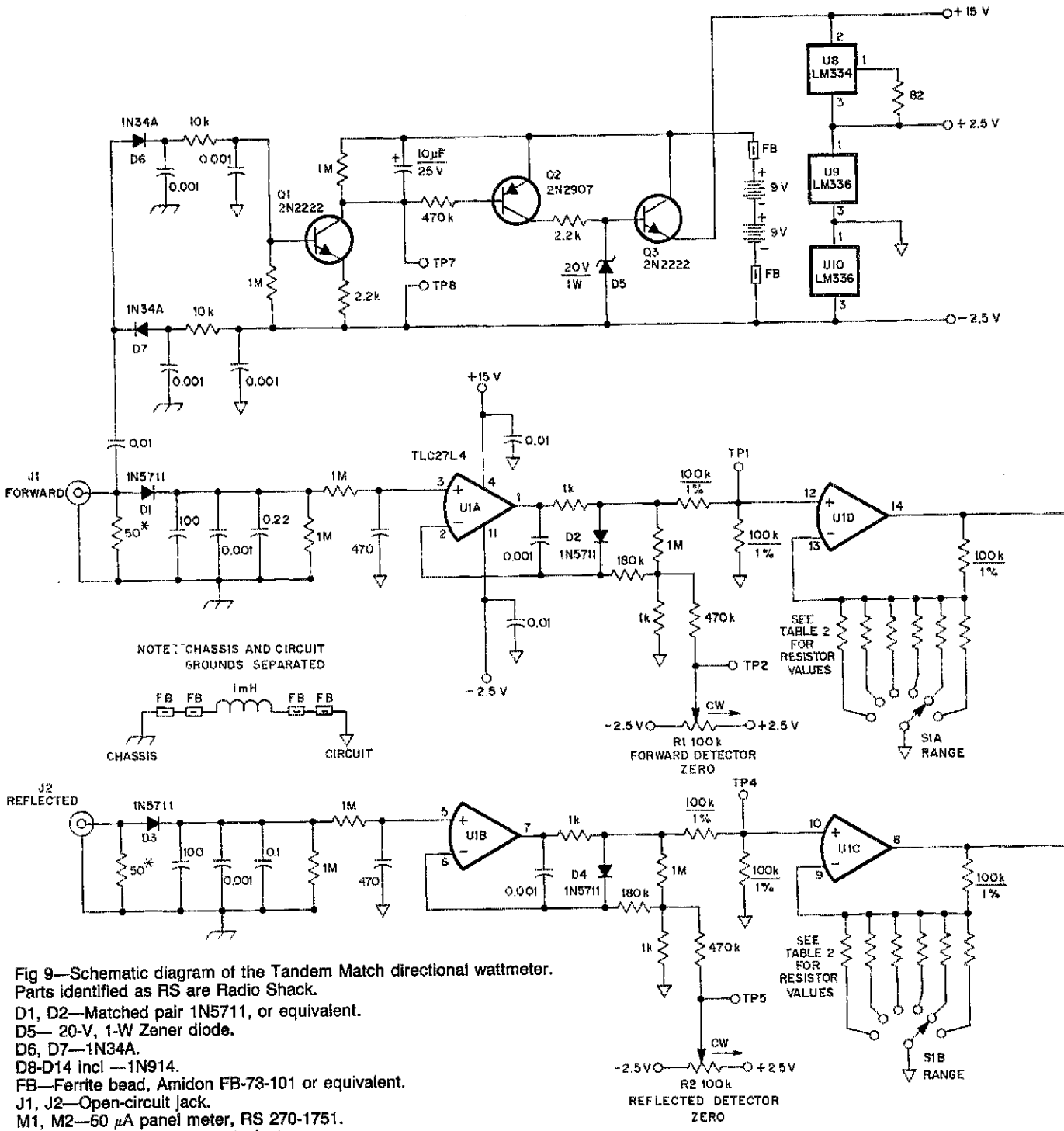
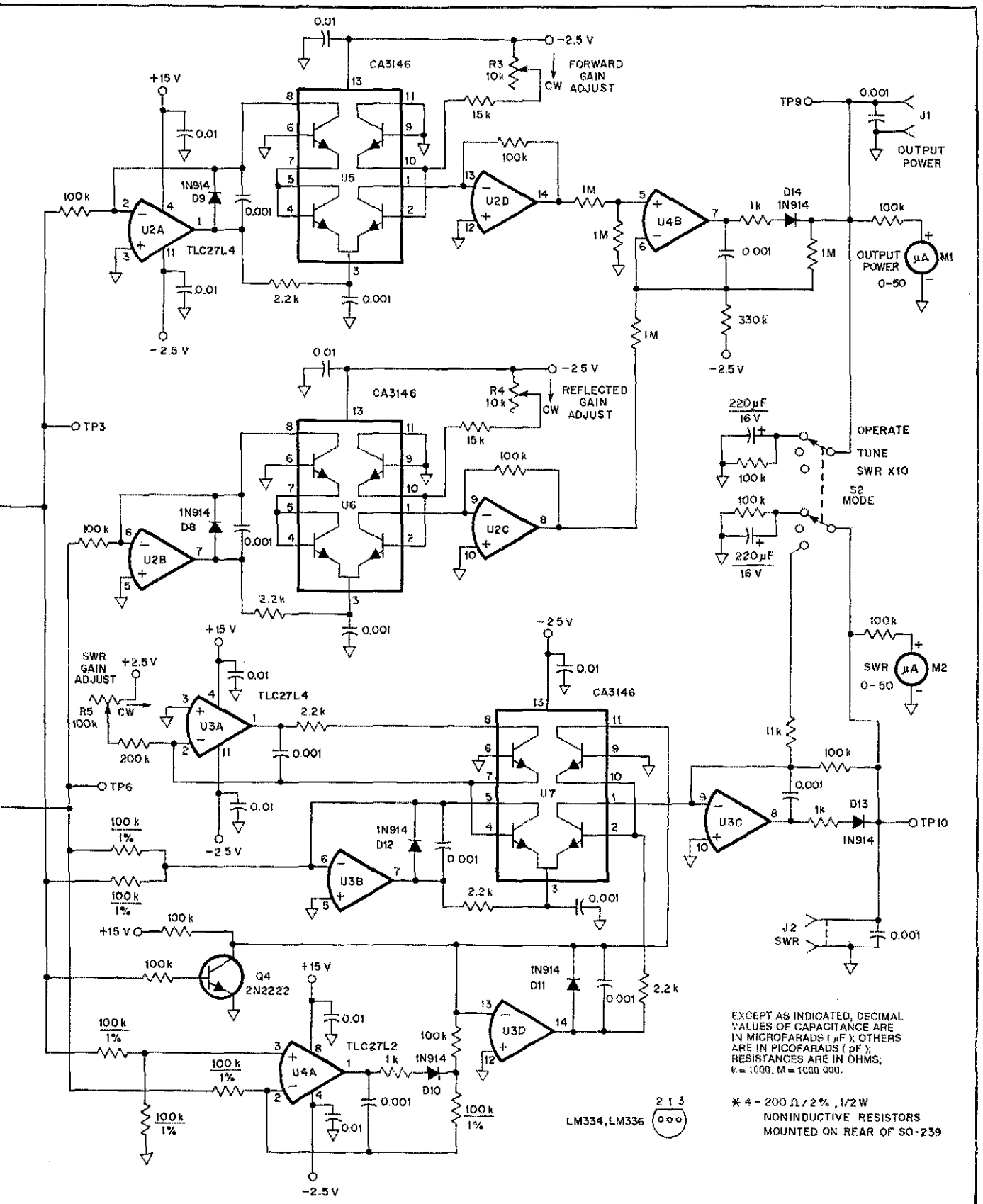


Fig 9—Schematic diagram of the Tandem Match directional wattmeter. Parts identified as RS are Radio Shack.
D1, D2—Matched pair 1N5711, or equivalent.
D5— 20-V, 1-W Zener diode.
D6, D7—1N34A.
D8-D14 incl —1N914.
FB—Ferrite bead, Amidon FB-73-101 or equivalent.
J1, J2—Open-circuit jack.
M1, M2—50 µA panel meter, RS 270-1751.
Q1, Q3, Q4—2N2222 or equivalent.
Q2—2N2907 or equivalent.
R1, R2, R5—100 kΩ, 10-turn cermet Trimpot®.
R3, R4—10 kΩ, 10-turn cermet Trimpot.
U1-U3 incl.—TLC27L4 or TLC27M4, RS 276-1750.
U4—TLC27L2 or TLC27M2, RS 276-1749.
U5-U7 incl —CA3146.
U8—LM334.
U9, U10—LM336.

rest of this article describes the construction and calibration of the unit. The schematic diagram for the Tandem Match is shown in Fig 9. The finished unit is capable of measuring power and SWR as accurately as any commercial directional wattmeter, yet requires only an accurate voltmeter for calibration. I have constructed several versions of both the directional coupler and the detector circuit. They have all performed within their specifications.

The Tandem Match is designed to oper-



ate from batteries and draw very little power. Much of the circuitry is of high impedance, and care must be taken to isolate it from RF fields. The unit should be housed in a metal case. Most of the problems in the initial unit were caused by RF getting into the op amp circuitry.

Directional Coupler

The directional coupler is constructed in its own small, (2¾ × 2¾ × 2¼-inch) aluminum box (see Fig 10). Two pairs of SO-239 connectors are mounted on opposite sides of the box. A piece of copper-clad PC board is run diagonally

across the box to improve the directivity of the coupler. The RG-8X coaxial cable passes through holes in the PC board. The center conductor of the coaxial cable is connected to the center pin of the SO-239 connectors. The coaxial-cable shield is connected only at one end; the other end is open. This is very important—the shield must be connected only at one end or the directional coupler circuit will not work properly. The shield forms an electrostatic shield between the two sides of the transformer. Each transformer consists of 31 turns of no. 24 enamel wire on an Amidon T50-3 iron-powder core. The core is then slipped over the coaxial cable (including both the shield and the outer insulation.) The center conductor forms the primary of the transformer. The transformer is then connected as shown in Fig 10 with the wires running through separate holes in the copper-clad PC board. The secondary leads are twisted together and run to the SO-239 connector on the opposite side.

The directional coupler can be separated from the rest of the circuitry, if desired. In this event, run two coaxial cables from the directional coupler to the detector inputs to carry the forward and reflected power.

I have not used this directional coupler at power levels in excess of 100 W output and don't know if higher power levels will cause the enamel insulation to break down. If this is a problem, Teflon® insulated wire should work at power levels up to the legal limit. The wire size is not important, but the wire diameter, including insulation, must not exceed the size of no. 24 enamel-covered wire. I constructed one directional coupler using no. 28 Teflon-insulated wire, and it worked identically to one constructed with enameled wire.

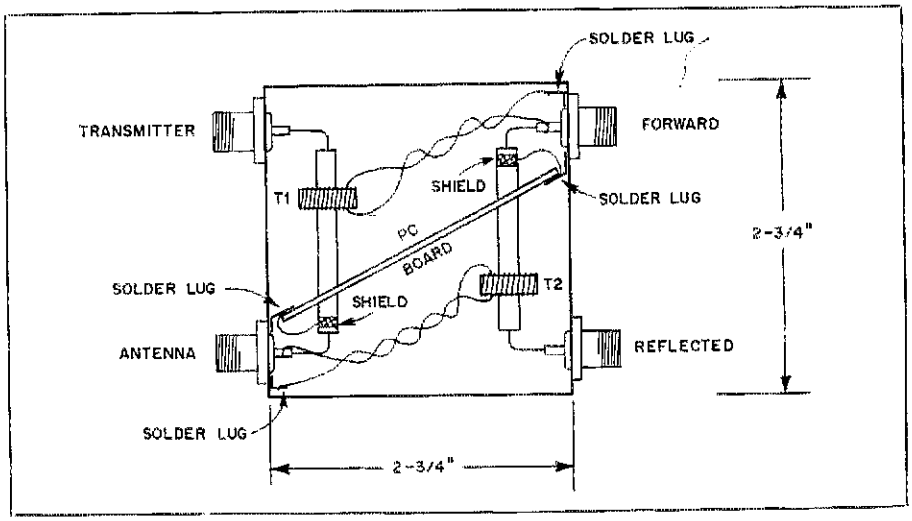


Fig 10—Construction details for the directional coupler.

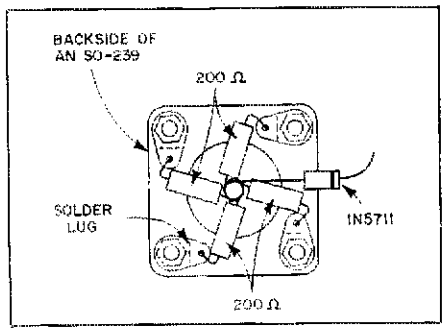


Fig 11—Mounting of parallel load resistors on SO-239 connector. Four 200-ohm resistors are mounted in parallel to provide a 50-ohm detector load.

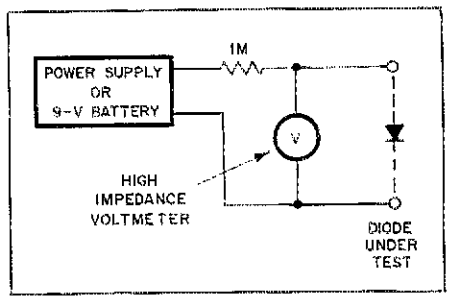


Fig 12—Diode matching test setup.

Detector and Signal-Processing Circuits

The detector and signal-processing circuits were constructed on a piece of copper-clad Vectorbord® . These circuits use two separate grounds. It is extremely important that these grounds be isolated as shown in the circuit diagram. Failure to do this will probably result in RF disrupting the circuit operation because of RF currents flowing on the outside shield of the coaxial cable. The separate grounds prevent this current from getting into the op amp circuitry.

The directional coupler requires good 50-ohm loads. Each load is constructed on the back of a female UHF chassis connector. The load consists of four 200-ohm resistors connected from the center conductor of the UHF connector to each of the four holes on the mounting flange, as shown in Fig 11. The detector diode is then run from the center conductor of the connector to the 100-pF and 1000-pF bypass capacitors mounted right next to the connector. This load and detector combination has been measured to be flat to beyond 500 MHz.

The detector diodes must be matched. This can be done at dc using the circuit shown in Fig 12. The meter must have a high input impedance, preferably 10 megohms or greater. Diodes which have a voltage drop within a few millivolts of each other can be considered matched. I found that diodes from the same batch were already matched.

I used 1N5711 Schottky barrier diodes because they were available. Any RF detector diode with a low forward voltage drop could be used. The important parameters are that the diodes must be a matched pair, the forward voltage drop of the diodes should be less than 300 mV, and the reverse breakdown voltage of the diodes must be greater than 30 V.

Germanium diodes could be used in this circuit, but there will be a degradation in performance. If germanium diodes are used, the resistance values for the detector-diode and feedback-diode load resistors should be reduced by a factor of 10.

The rest of the circuit layout is not critical. However, the lead lengths of the 0.001- and 0.01-μF bypass capacitors should be kept short. The capacitors provide additional bypassing for the op amp circuitry.

The 1N34A diodes form a voltage doubler which is used to detect the presence of a carrier. When forward power exceeds 1.5 W, Q3 is turned on and supplies power to the directional coupler. Power is held on for about 10 seconds after the carrier is last detected. Connecting TP7 to TP8 will force the unit on, even with no carrier present. Regulated references of +2.5 V and −2.5 V are generated by the LM334 and LM336. Using Zener diodes instead of these will significantly degrade the stability and accuracy of the directional wattmeter.

The four op amps in U1 compensate for the nonlinearity of the detector diodes. D1 and D2 must be a matched pair, as must D3 and D4. A RANGE switch selects the power range. The resistor values for the RANGE switch are shown in Table 2. I used a six-position switch because I had one handy. Full-scale input power gives an output at U1C or U1D of 7.07 V. The forward and reflected power detectors are zeroed with R1 and R2.

Forward and reflected voltages are squared by U2, U5 and U6 so that the output voltages are proportional to forward and reflected power. The gain constants are adjusted using R3 and R4 so that an input of 7.07 V to the squaring circuit gives an output of 5 V. The difference between these two voltages is used by U4B to yield an output that is proportional to the power deli-

Table 2
Range-Switch Resistor Values

Full-Scale Power Level (Watts)	*Range Resistor (1% Accuracy) (kilohms)*
1	2.32
2	3.24
3	4.02
5	5.23
10	7.68
15	9.53
20	11.0
25	12.7
30	14.0
50	18.7
100	28.7
150	37.4
200	46.4
250	54.9
300	63.4
500	100.0
1000	237.0
1500	649.0
2000	open

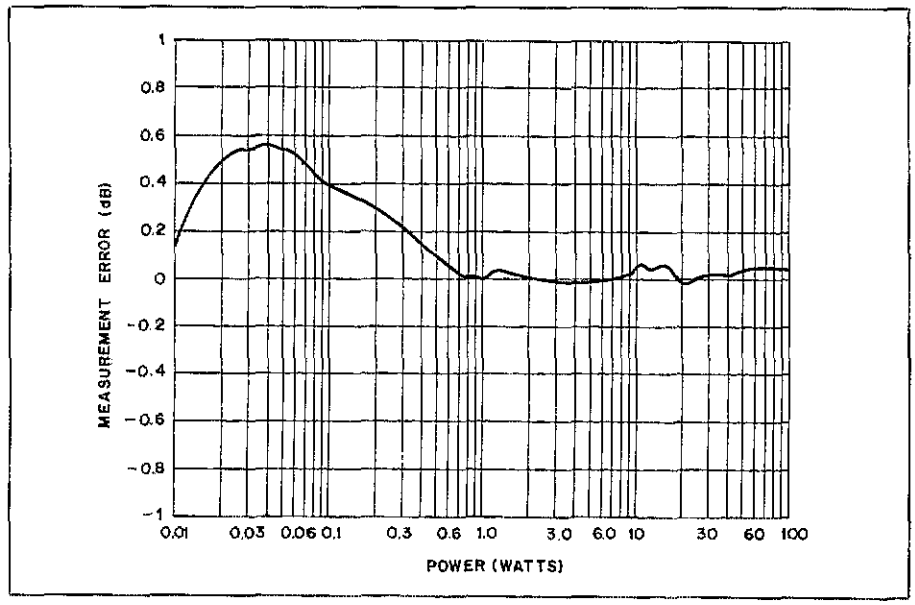


Fig 13—Power measurement accuracy for the Tandem Match. Measurement errors exist primarily in the low-power range.

vered into the transmission line. This voltage may be peak detected to hold and indicate the maximum power that occurs during CW or SSB transmissions.

Computation of SWR from the forward and reflected voltages is accomplished by U3, U4 and U7. When no carrier is present, Q4 forces the SWR reading to zero. This circuit considers no carrier present if the forward power is less than 1 to 2% of the full-scale setting of the RANGE switch. The SWR computation circuit gain is adjusted by R5. The SWR output varies from 1 V for an SWR of 1:1 to 5 V for an SWR of 5:1. The output may be peak detected to hold and indicate the maximum SWR reading during CW or SSB transmissions.

Transistor arrays (U5, U6 and U7) are used for the logarithm and antilogarithm circuits. Using transistor arrays guarantees that the transistors will be well matched. Individual transistors may be used, but the accuracy may be significantly degraded.

A three-position toggle switch is used to select the three operating modes. In the OPERATE mode, the power and SWR outputs are peak detected and held for a few seconds to allow the meters to be read during actual transmissions. In the TUNE mode, the meters display the instantaneous output power and SWR. This mode is used to adjust an antenna matching network. In the SWR × 10 mode, the SWR full-scale reading is increased to 50:1. This mode is handy for adjusting an antenna matching network when one has no idea what the correct setting should be.

An external meter can be used to read both power and SWR values. The output power range is 0 to 5 V, with 0 V representing no output power and 5 V representing the RANGE switch full-scale value. Output voltages above 5 V may be incorrect because of voltage limiting in some of the op amp circuits. The SWR range is also from 0 to 5 V, with 0 V representing no power present, 1 V representing an SWR of 1:1 and 5 V representing an SWR of 5:1. I have used a digital voltmeter to obtain more precise readings than possible with the analog meters. Alternatively, one could incorporate digital panel meters into this unit in place of the analog meters shown in the circuit diagram.

Calibration

The directional wattmeter can be calibrated to its full accuracy using only an accurate voltmeter. A digital voltmeter is preferred, but a good analog meter should also work. All calibration is done with dc voltages. The directional coupler and detector circuits are inherently accurate if they were correctly built. To calibrate the wattmeter, use the following procedure:

1) Set the mode switch to TUNE and the RANGE switch to 100 W full scale or less.

2) Jumper TP7 to TP8. This turns the unit on.

3) Jumper TP1 to TP2. Adjust R1 for 0 V at TP3.

4) Jumper TP4 to TP5. Adjust R2 for 0 V at TP6.

5) Adjust R1 for 7.07 V at TP3.

6) Adjust R3 for 5.00 V at TP9 or full scale reading on M1.

7) Adjust R2 for 7.07 V at TP6.

8) Adjust R4 for 0 V at TP9 or zero reading on M1.

9) Adjust R2 for 4.71 V at TP6.

10) Adjust R5 for 5.00 V at TP10 or full scale reading on M2.

11) Set RANGE switch to most sensitive scale.

12) Remove jumpers from TP1 to TP2 and TP4 to TP5.

13) Adjust R1 for 0 V at TP3.

14) Adjust R2 for 0 V at TP6.

15) Remove jumper from TP7 to TP8.

This completes the calibration procedure. I have found that this calibration is as accurate as using expensive laboratory test equipment. The directional wattmeter should now be ready for use.

Accuracy

Some writers claim that their new gadget performs miracles, but there is seldom any proof to back up their claims. For this article, I was determined to demonstrate that the Tandem Match meets its accuracy specifications when tested with calibrated laboratory test equipment.

I compared the performance of this wattmeter against other well-known directional couplers and laboratory test equipment. The Tandem Match is as good as any amateur directional wattmeter I have tested. I checked the power measurement accuracy against a Hewlett-Packard HP-436A power meter. The HP meter has a specified measurement error of less than ± 0.05 dB. The Tandem Match tracked the HP meter to within ± 0.5 dB over a power range of 10 mW to 100 W, and to within ± 0.1 dB over a power range of 1 W to 100 W. Fig 13 shows the measured performance. The unit was tested only to 100 W because I do not have a transmitter with a higher power rating.

The performance in measuring SWR was equally good. Using the HP power meter and a calibrated directional coupler to compute the SWR, the Tandem Match tracked the test equipment to within ± 5%

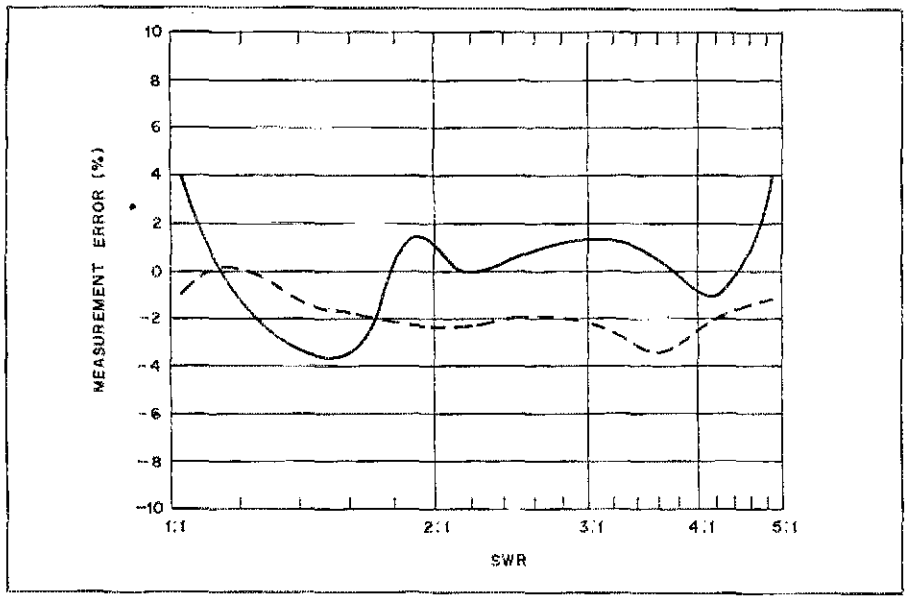


Fig 14—SWR measurement accuracy for the Tandem Match over the range of SWR values from 1:1 to 5:1. Measurements were made at 10 MHz. The dashed line was measured at 8 W forward power; the solid line was measured at 100 W forward power.

for SWR from 1:1 to 5:1. These measurements were made at power levels of 8 W and 100 W. Fig 14 reflects these results.

Operation

Operation of the Tandem Match is straightforward. The unit is connected in the 50-ohm line between the transmitter and the antenna matching network, or antenna if no matching network is used. The RANGE switch should be set for a range greater than the output rating of the transmitter, and the mode switch should be set to TUNE. When the transmitter is keyed, the Tandem Match will automatically turn itself on and measure the power delivered to the antenna and the SWR on the transmission line. If no carrier is present, the OUTPUT POWER and SWR meters will indicate zero.

The OPERATE mode is used to measure the peak power delivered to the antenna and the SWR when CW or SSB is transmitted. The peak detectors in the unit are not ideal, and there could be about a 10% variation from the actual peak power and SWR. However, this mode is convenient for monitoring these parameters during actual transmissions.

The SWR × 10 mode is used to increase the SWR meter range to 50:1. This mode is sometimes necessary for initially adjusting a matching network if the SWR is very high. This range should be sufficient to cover any SWR value that occurs in amateur use. A 50-foot length of RG-8 that is left open circuited will display a measured SWR of 43:1 at 3.5 MHz exclusively because of the loss in the cable. Higher frequencies and longer cables will exhibit a smaller maximum SWR.

It is easy to use the Tandem Match to adjust a matching network. Adjust the transmitter for minimum output power, as long as it exceeds 1.5 W. With the carrier on and the mode switch set to TUNE or SWR × 10, adjust the matching network for minimum displayed SWR. The process is similar to dipping the plate current on a tube-type transmitter. Once the minimum SWR is obtained, the transmitter can be set to the proper operating mode and output power with the Tandem Match set to the OPERATE mode. The peak output power and SWR can then be monitored during operation.

Design Variations

There are several ways in which this design could be changed to enhance operation. The most important would be to add VHF/UHF operation capability. This can be accomplished by designing a new directional coupler that will work above the HF range. The existing detector circuit will work to at least 500 MHz.

For those who desire a low-power directional wattmeter, the directional coupler can be changed to a 20-dB coupling factor by decreasing the turns ratio of the transformers to 10:1. A low-power unit should be capable of measuring output power from 1 mW to about 150 W, and the unit should switch on at about 150 mW. This change should also increase the maximum operating frequency to about 150 MHz. If operation on 160 meters is desired, it may be necessary to change the toroidal core material to obtain sufficient reactance at 1.8 MHz to minimize the insertion loss.

The unit can be made to operate with coaxial cable having characteristic impedances other than 50 ohms. It will be necessary to change the detector terminating resistors to result in the value of the characteristic impedance of the coaxial cable used. Because the detector circuit measures voltage, not power, the range resistors must also be changed to obtain the proper power levels.

The detector circuitry can be used to directly measure low RF power levels in 50-ohm circuits. Power is fed directly to the forward detector, and the power is read from the POWER OUTPUT meter. Over the power range from 10 μW to 1.5 W, the detector is quite linear.

Acknowledgments

I would like to acknowledge the contribution of members of the Tandem Radio Amateur's Club who gave this unit a severe operational test during the 1985 Field Day and made several significant suggestions for improvements. I would also like to thank Mike Brown, WC6S, and Joe Castellano, W6SNV, for reviewing the manuscript and suggesting several clarifications.

Notes

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[2]H. Perras, "Broadband Power-Tracking VSWR Bridge," *Ham Radio*, May 1979.
[3]V. G. Leenerts, "Automatic VSWR and Power Meter," *Ham Radio*, May 1980.
[4]A. L. Bailey, "The Antenna Lab, Parts 1 and 2," *Radio Communication*, Aug and Sep 1983.
[5]W. B. Bruene, "An Inside Picture of Directional Wattmeters," *QST*, Apr 1959.
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• *Under Construction*

Some Power-Supply Design Basics

Part 15: Know your components and how to apply them correctly when designing a ham-shack power supply. Failures can be avoided and performance may be improved by observing some basic rules.

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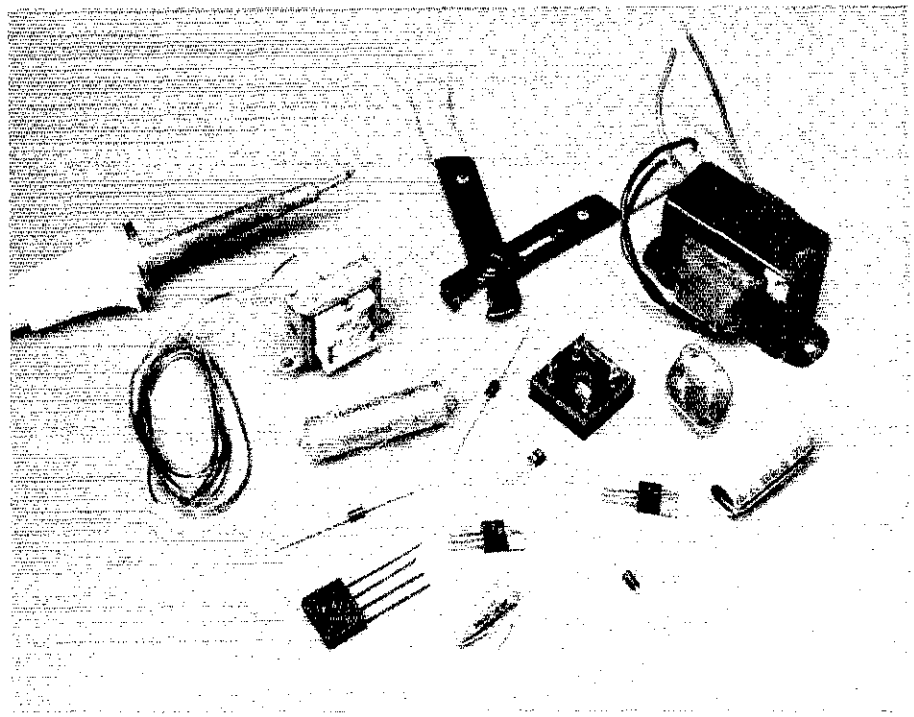


Let's think about power supplies in a practical way. I'll leave the exacting design information in the closet for this discussion. Those of you who want to dig deeper may consult the power-supply chapter of *The ARRL Handbook*, or such references as National Semiconductor's *Voltage Regulator Handbook* (1982). The latter publication contains several power-supply design application notes, along with countless equations for obtaining precise performance results.[1]

Rectifier Circuits

What are our choices for rectifier circuits, and what are the advantages and limitations of the various configurations? Fig 1 shows some of the possibilities we might consider. The most basic hookup we may use is shown at A of Fig 1. Here we have a half-wave rectifier with a single diode (D1) and filter capacitor (C1). The circuit simplicity is appealing, but regulation is very poor and the output ripple is high and hard to filter, compared to other circuits. Peak dc voltage across the diode may rise to 2.8 times the transformer secondary voltage (RMS) under no-load conditions with a capacitor filter. Conversely, the average output voltage, without filtering (under load) will be on the order of 0.45 times the T1 secondary voltage. The high no-load peak voltage, when filtered, results from C1 being charged. This stored voltage is then added to the peak voltage from the T1 secondary. These traits make the half-wave power supply suitable for low-current needs, such as bias supplies, but not for high-current applications.

A better scheme is shown at Fig 1B. Here we find the familiar full-wave rectifier. A center-tapped transformer is required, and the total secondary voltage must be twice that for a full-wave bridge circuit (C) for a specified dc-output voltage. The average output voltage from the diodes is 0.9 times half the RMS secondary voltage of T1. The peak output voltage (when using a capacitor-input filter, C1) is 1.4 times the T1 secondary voltage. Compared to the half-wave rectifier, this circuit requires less filtering because the output-pulse frequency is twice that of the half-wave rectifier. Also, each diode (D1 and D2) needs to accommodate only half the current taken by the load. This is because the diodes operate alternately at half cycles of the ac. The diode of circuit A must handle all of the load current.

Fig 1C shows the more common full-wave bridge rectifier. The principal advantage here is that no secondary center tap is required for T1. D1 and D3, in effect, provide the missing center tap. In this example two rectifiers operate on each half of the ac cycle. The average and peak output voltages for this circuit are the same as for the full-wave rectifier at B. The diodes should be rated for at least half the current taken by the load.

There are times when we need a plus and minus output voltage from a power supply. A simple method for obtaining the two equal voltages of opposite polarity is illustrated in Fig 1D. This dual-complementary rectifier requires a center-tapped transformer with twice the RMS secondary voltage of that for the full-wave circuit at C. You may think of this supply as two

[1]National Semiconductor Corp, 2900 Semiconductor Dr, Santa Clara, CA 95051, tel 408-737-5000.

sections of the full-wave circuit of Fig 1B. The notable difference is that two extra diodes are added (D3 and D4). They are connected for the polarity opposite that of D1 and D2. Peak and average dc output voltage is the same as that for circuits B and C of Fig 1.

Diode Selection

Earlier we discussed diodes that must handle one half the power-supply load current. That is the *minimum* requirement. We need to consider peak currents when choosing our rectifiers. Using diodes that have marginal ratings for the intended application has caused many an amateur to scratch their head in wonderment after witnessing the failure of brand new replacement diodes in a repaired power supply! Be aware that the RMS current flowing into a capacitor-input filter is *two* to *three* times the dc output current. This is because the current is delivered in short pulses. A good rule of thumb (call it empirical if you wish!) is to use diodes rated at no less than twice the output current taken by the load. This allows ample leeway for the surge current of the power supply and has always provided reliability for me.

We must consider also the PIV (peak inverse voltage) or PRV (peak reverse voltage) of the diode we select. Earlier we learned that the peak voltage for a capacitor-input filter can rise to 2.8 times the RMS value of the transformer secondary winding. Therefore, our diodes should have a PRV rating of approximately three times the peak voltage value. If the transformer secondary RMS voltage is 12, the rectifier diodes should have a rating of 36 volts or greater. When building high-voltage power supplies, such as 2 kV, several 1000-PRV diodes must be connected in series in each leg of the rectifier in order to accommodate the high PRV. Equalizing resistors and capacitors are connected in parallel with each diode (as shown in the *The ARRL Handbook*) to equalize the voltage drop across each diode.

Choosing a Filter Capacitor

Amateurs tend to regard the filter capacitor as a casual matter. Why not simply use what is on hand in the junk box? Perhaps a randomly chosen capacitor value will provide adequate results, assuming output ripple is not a major consideration, and if the capacitor voltage rating happens to be sufficient. But what of optimum performance? Well, there is a simple equation we may apply for low current power supplies when we are in doubt about the best type of capacitor to employ:

$$C_{\mu F} = \frac{I_L}{E_{P\text{-}P}} \times 6 \times 10^3 \qquad \text{(Eq 1)}$$

where I_L is the dc load current and E is the desired P-P output ripple voltage at 120 Hz. The P-P ripple voltage may be measured at the regulator output, under normal current load conditions, with a scope.

Using Eq 1, we determine that a 3000-μF filter capacitor is required for a 1-A load current (12-V output), when the desired output ripple (under load) is 2 V P-P. Keep in mind that the values obtained from Eq 1 are based on the assumption that a regulator follows the filter capacitor: The regulator provides additional electronic filtering. The 3000-μF filter capacitor in the foregoing example should have a minimum rating of 36 V.

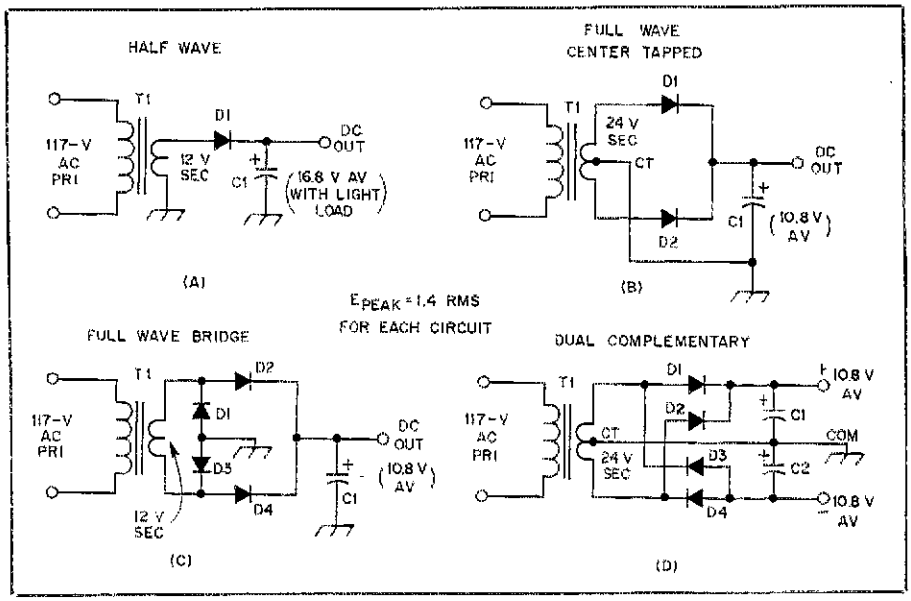


Fig 1—Conventional circuits for power-supply rectifiers. A discussion of these circuits is contained in the text.

How about the Transformer?

A vital consideration when designing a power supply is that of the transformer rating—notably the secondary-current specification. Industrial design calls for some rather complex mathematical gymnastics, but we can follow a practical path when choosing the transformer we need for the job. Let's assume that we are using only the capacitor-input filter scheme, since it is more common and less expensive than the choke-input format. Based on this assumption our transformer secondary-current rating should be approximately 1.2 times the full-load dc current of the supply when using a full-wave, center-tapped rectifier (Fig 1B). Thus, for a 2-A maximum load current the transformer secondary should have a minimum rating of 2.4 A (1.2 times the load current).

If we are using a full-wave bridge rectifier, the T1 secondary current minimum will be 3.6 A for a 2-A load (1.8 times the load current). Some amateurs have tried to use a 2-A transformer for a 2-A load, as an example, only to find that the transformer operated quite warm (even hot!), and the output had substantial ripple under full load. If we take care in selecting our transformers, we will avoid these ailments. Make-do measures and junk-box components are not truly applicable when building a power supply.

Applying Regulators

Modern amateur equipment requires regulated dc operating voltage. The power supplies we have considered thus far are suitable for operating low-current devices or circuits that draw a steady current. When there are changes in load current, it becomes necessary to regulate the output voltage to ensure that the correct and safe operating voltage is present. Furthermore, the power supply should be relatively immune to momentary current overload and short circuiting. Present-day three-terminal regulator ICs offer the foregoing features. Many are capable of shutting themselves down when excessive current flows, which in turn protects the regulator, the attached equipment and the power-supply components.

Four basic considerations exist for selecting a regulator: (1) the maximum required output current; (2) required output voltage; (3) unregulated input voltage; and (4) ambient temperature. When you know the answers to items 1 and 2, you may consult the manufacturer's data sheets and make a device selection. Always choose a regulator that has a power dissipation (P_D) greater than the maximum load current presented by your equipment. Fig 2 shows some simple circuits for three-terminal regulators. The example at A represents a standard fixed-voltage regulator. ICs are available for various standard output voltages at various maximum-current ratings, such as 5 V, 8 V, and so on. They are also available for positive or negative power supplies. Fig 2B shows a typical adjustable regulator of the type that might

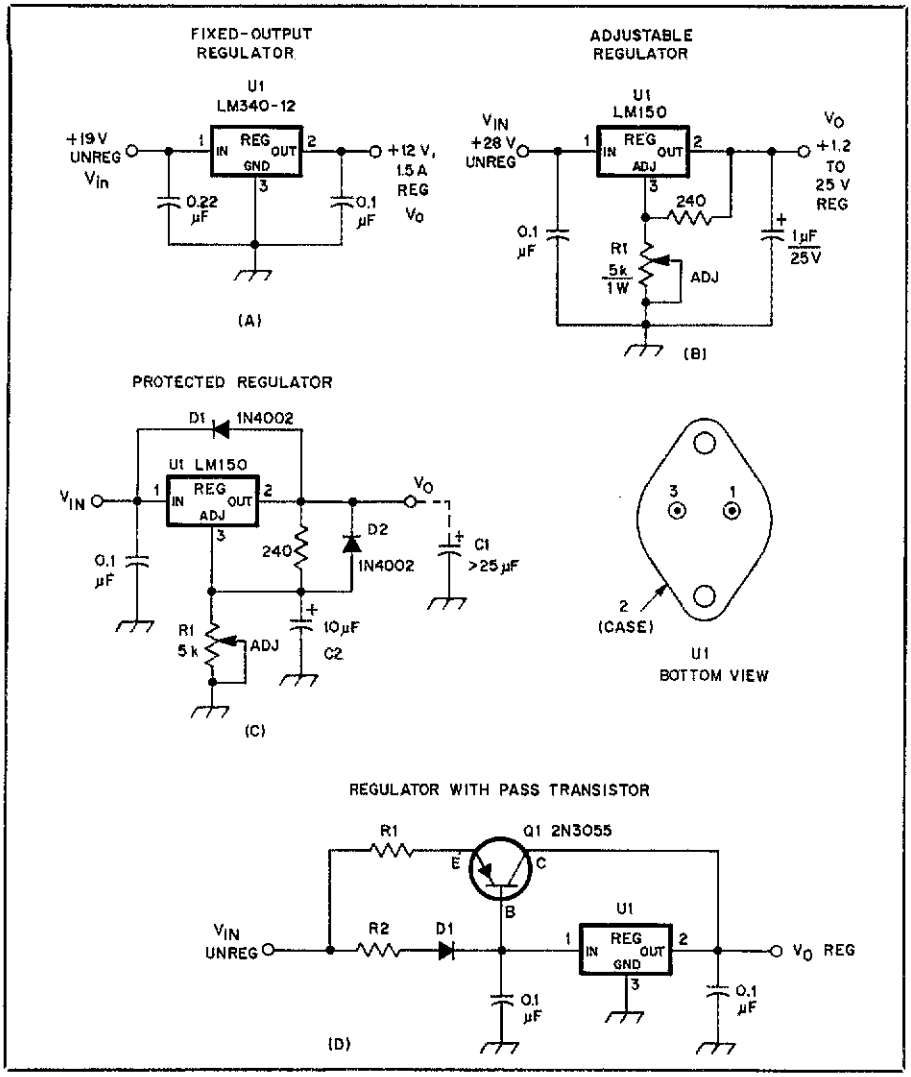


Fig 2—Circuits for three-terminal regulator ICs. These circuits are explained in the text.

be used for a bench supply. An adjustable regulator with protective diodes (D1 and D2) is shown at C of Fig 2. The diodes are recommended when the output capacitance (C1) is 25 μF or greater. This may be the situation when the equipment used with the power supply contains a high-value filter capacitor at the voltage-input terminal. The low internal resistance of the capacitor can cause high-amperage spikes when shorted (in excess of 20 A), and this can destroy the regulator IC. D1 protects U1 against input short circuiting (C1), and D2 protects U1 against output shorting (C2). Under the respective shorting conditions, C1 and C2 will discharge through the IC and destroy it.

We frequently need greater output current than a three-terminal regulator can provide. The solution to our problem is found in the circuit of Fig 2D. Q1 is a wrap-around pass transistor which handles the high current that U1 cannot accommodate. Several pass transistors may be used in parallel to increase the current rating of the regulated supply. Design information relating to this subject may be found in the 1987 edition of *The ARRL Handbook,* page 27-23.

At the start of this section we considered four items in selecting a regulator. No. 3 deals with the unregulated input voltage. Most manufacturers rate their regulators for maximum safe input voltage for fixed-voltage regulators that use ground as a reference. The maximum input-output voltage differential is used for adjustable regulators that do not use ground as a reference. This is sometimes specified as "input-output voltage differential." For example, Fig 2A has a "differential" of 7 V between pins 1 and 2 of the regulator, U1. The greater the input voltage, respective to the regulated output voltage, the higher the power dissipation within the regulator. Unnecessary power dissipation inside the IC requires greater heat sinking in order to keep the regulator within safe ratings. An example of wasted power and increased heat is seen when an input voltage of 25-28 is used for a 12-V regulated supply. A better input-voltage value is 18-19 V.

Item 4 relates to the ambient temperature of the regulator IC. This concerns item no. 3 and the size of the heat sink we employ. Thermal considerations represent a rather exact science that includes the junction temperature of the regulator. Another complex factor is the thermal resistance of the bond between the device and the heat sink. In any event, the regulator IC and the heat sink should never be more than comfortably warm to the touch after a period of full-load current flow. When in doubt, choose a heat sink that is larger than your intuition suggests. Be sure to use a *thin* layer of heat-sink compound (available at Radio Shack) between the regulator IC and the heat sink. The mounting screws should be snug but not too tight. Excessive torque may distort the IC and weaken the thermal bond, and it might even cause internal damage to the IC!

We must also be concerned about the operating temperature of the rectifier diodes. When large currents pass through the diodes, it becomes necessary to use heat sinks to keep the diodes cool. Bridge rectifier modules (four diodes encapsulated in a plastic block) lend themselves nicely to heat sinking. This is not true of plastic encased single diodes. Stud-mount, discrete-diodes are more suitable for use with a heat sink. In any event, the rectifier diodes, under full load, should never become hot to the touch.

A Practical Regulated Supply

Let's assemble the suggestions in this article and apply them in a small regulated supply that is aimed especially at the QRP operator. Fig 3 shows the circuit for a 1.5-A, 12-V regulated dc power supply. The component ratings are based on the guidelines given earlier.

Some additonal parts appear in the diagram of Fig 3. They include C1-C4, inclusive, and RFC1. These units have been added to prevent unwanted common-mode hum in direct-conversion receivers. This malady is caused by RF energy from the receiver local oscillator (radiated by the antenna and power-supply leads) reaching the rectifier diodes. The RF energy is then modulated by 120-Hz energy and re-radiated. It is picked up by the antenna and heard as a hum in the D-C receiver. C1-C4, inclusive, bypass the rectifier diodes at RF, thereby preventing them from acting as mixers or modulators. In effect, the capacitors provide an RF-current short across each diode.

As a further aid in solving the hum problem, we have included RFC1. It is a toroidal bifilar RF choke that prevents RF energy from entering the power supply via the power-supply leads. This preventive measure was first introduced by Wes Hayward, W7ZOI. I have found it to be effective with such transceivers as the

(continued on page 17)

Product Review

Conducted By Bruce O. Williams, WA6IVC
Assistant Technical Editor

Heath HO-5404 Station Monitor

Heath's latest offering in a line of station monitor scopes traces its ancestry over a period of about 23 years.[1] The first of the line was the venerable HO-10, still used in a number of shacks today. Next came the SB-610, much of it a carbon copy of the HO-10 internally, but in the then-new Heath two-tone green cabinet. The SB-614 was the successor to the SB-610, and in addition to again changing the external appearance of the unit, Heath made the transition from vacuum-tube circuits to a solid-state design. I've owned an HO-10 and an SB-610, but missed out on the '614, so I was anxious to get my hands on the '5404 when it was announced.

Why Use a Monitor Scope?

There probably is no better way than using a monitor scope to have a good idea of what outgoing, and to some extent, incoming signals are doing. When operating CW, for instance, you can adjust the monitor to display the output waveform and observe the keyed-wave shaping. No, you can't *see* key clicks (not on a monitor scope, you'd need a spectrum analyzer for that), but the shape of the wave can tell you if the *possibility* of generating clicks exists. On SSB, you'll easily be able to tell if you're "flat-topping" and making yourself unliked by your on-band neighbors. When operating RTTY, you can set up the monitor scope to view the incoming tones from your modem and tune for the well-known RTTY cross pattern. By tapping into your receiver audio output or IF strip, you can monitor (in different ways) incoming signals.

Description

The '5404 is housed in a steel, U-shaped cabinet with a matching top. The front-panel labels and the CRT graticule are all imprinted on a single, adhesive-backed sheet. A single transformer with multiple secondary windings provides the low, medium and high voltages that are required by the scope.

Comparing the SB-614 and HO-5404 schematic diagrams shows that the two scopes are almost identical electrically. The primary difference between the two is the addition of the panoramic adapter circuit to the '5404.

The optional pan adapter (HOA-5404-1) taps into your receiver IF strip. This unit allows you to monitor band activity within selectable ±20-kHz or ±100-kHz segments from the center frequency to which the receiver or transceiver is tuned. Some transceivers provide access to the IF strip for just such a purpose. Heath offers a choice of one of two IFs for use with the pan adapter: 3.395 or 8.830 MHz.

What's Inside

An inside view of the scope is shown in Fig 1. At the top is the 3RP1A CRT, immediately behind which is the shielded compartment that houses the demodulator board and antenna port ATTENUATOR switch. A shaft connects the front panel knob to the ATTENUATOR switch. Although this control is a rotary switch, it does not have a detent, and feels much like a potentiometer when rotated.

The small shielded compartment on the rear panel houses the horizontal and vertical input ATTENUATOR switch and the VERT and HORIZ input phono jacks. Next to that is the pan adapter board mounting location (the pan adapter board is the small board in the foreground). The pan adapter board is mounted on a steel plate that is secured to the rear panel with sheet-metal screws. The power transformer (to the top-right of the pan adapter board) is hidden beneath the pan adapter board when it is in place.

The main board occupies a large portion of the chassis floor. Low- and high-voltage power supply components take up a good portion of the board area.

A gang of seven push-button switches is mounted behind the front panel. The push-button switches are not mutually exclusive types. For some operations, you need to use two or more of the switches.

The seven potentiometers for the front-panel controls (not visible in this view) are beneath the switches. The black object to the top left of the power transformer is a cardboard shield that covers a terminal strip to which the transformer primary leads and fuse are attached.

Block Diagrams

A block diagram of the HO-5404 is shown in Fig 2. Fig 3 is a block diagram of the pan adapter board. There are basically five sections to the HO-5404: the outgoing-signal

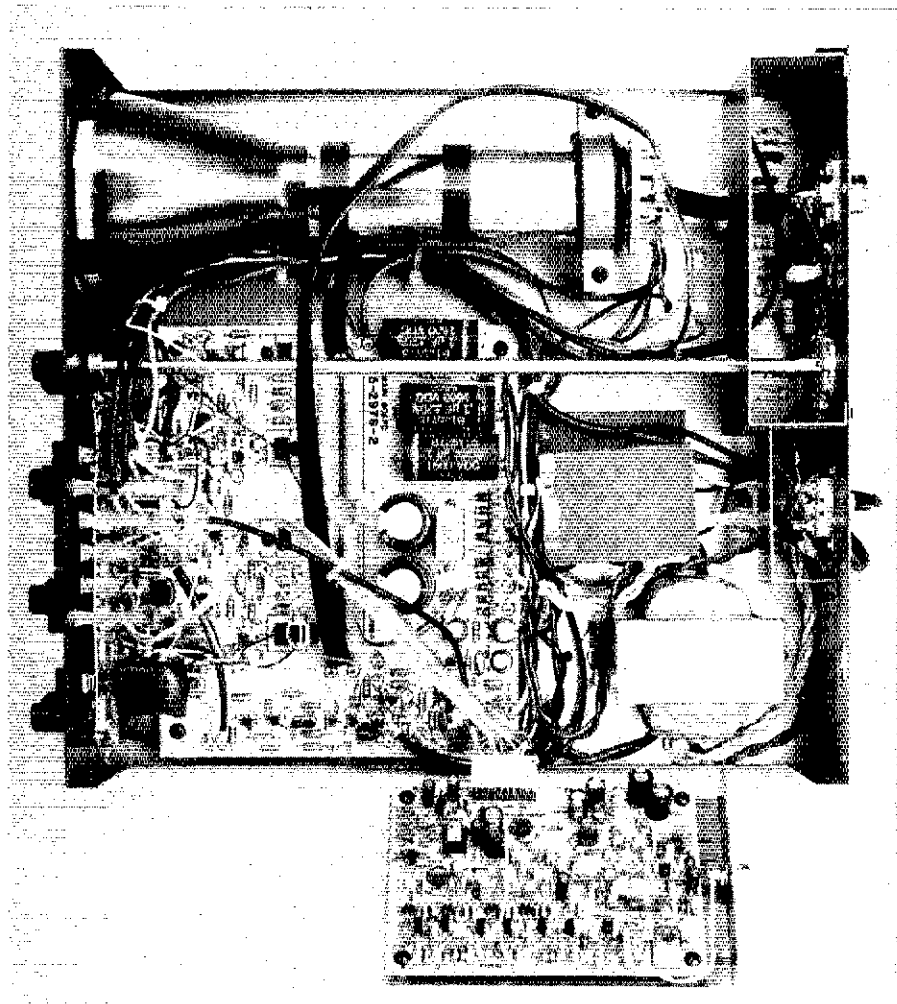


Fig 1—An inside view of the HO-5404. Refer to the text for a "tour" of the scope.

[1]Notes appear on page 33.

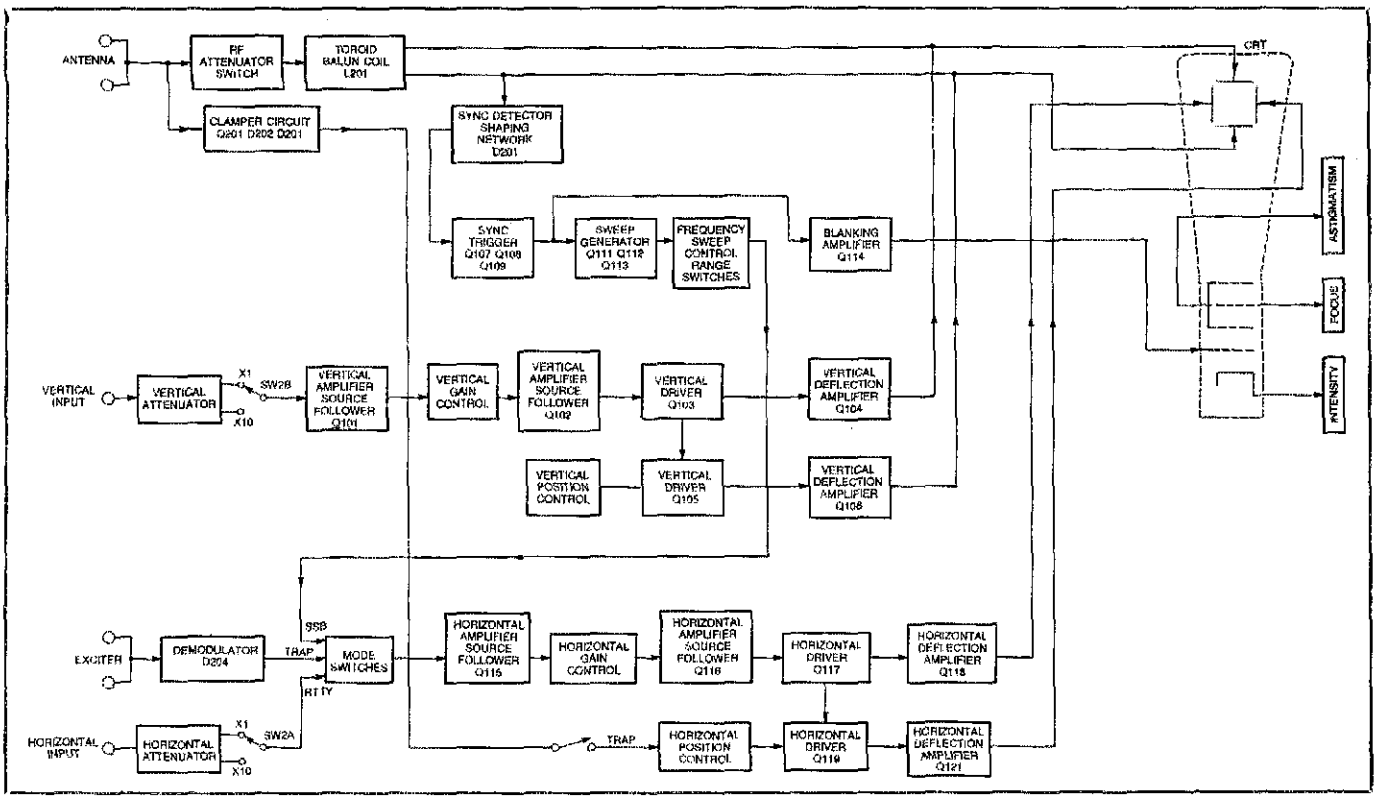


Fig 2—Block diagram of the HO-5404. A brief description is given in the text.

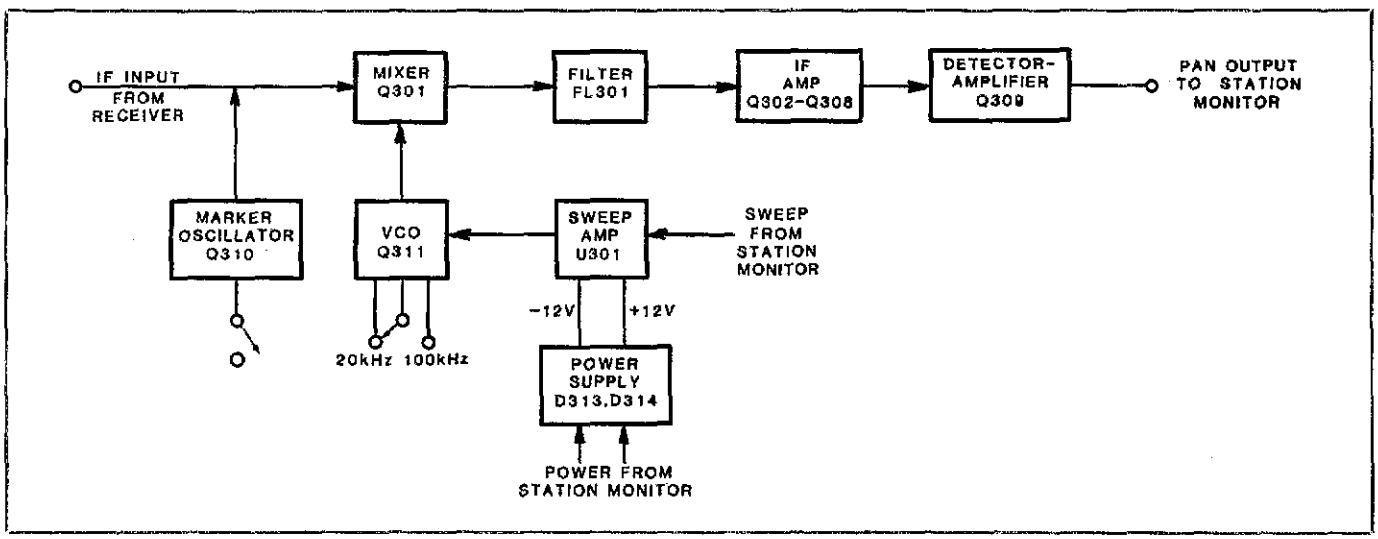


Fig 3—Block diagram of the pan adapter board. A 455-kHz crystal filter is used in the IF strip. One of two IFs (3.395 or 8.830 MHz) can be accommodated during construction by appropriate choice of components.

demodulator, the pan adapter, vertical and horizontal low-frequency input circuits, the main signal-processing circuits and the high- and low-voltage power supplies. The EXCITER and ANTENNA jacks are through connections and are used as tap points to sample the signals applied at those ports. Attenuators for the VERT and HORIZ inputs are switched simultaneously by a DPDT slide switch. A clamper circuit (sampling at the ANTENNA jacks) keeps the CRT from being burned when using the RF trapezoid method of checking amplifier linearity. The clamper does this by moving the trace off the screen when no signal is present.

Kit Assembly

Three errata sheets and two additional components were supplied for correction and addition to the basic kits. Additionally, I found one incorrect item supplied: a 1-kΩ resistor in place of the required 10-kΩ resistor. Since you construct the pan adapter for use at only one IF (3.395 or 8.830 MHz), you'll have some parts left over.

Two circuit boards—the demodulator and main boards—hold most of the components in the '5404. The optional pan adapter adds a third board that sits above the power transformer. The 3RP1A CRT is equipped with a mu-metal shield that is wrapped around the neck of the tube. Shield partitions are provided between the demodulator board and the rest of the circuitry, and another shield covers the ATTENUATOR switch and VERTical and HORIZontal input-jack section.

It took me a total of 12 hours to assemble the basic '5404 and another 3 hours to complete the pan adapter board. Overall align-

ment and testing consumed another five hours. I ran into some difficulty during initial testing of the main unit: The dot on the screen kept dancing around and varying in size. I realized this to be a high-voltage problem and, after a couple of checks, suspected the power transformer as being the culprit. I made a tube from a sheet of paper and placed one end to my ear and the other end near the transformer. Sure enough, an intermittent "bzz-bzz" could be heard, indicating all was not right. I called Heath Technical Service, described the symptoms and requested a new power transformer. The new transformer cured the problem. The rest of the main-unit alignment proceeded without difficulty.

I recommend allowing the scope to warm up for a few minutes before attempting any alignment procedures as there is a noticeable amount of drift during the first 15 minutes or so. When aligning the pan adapter board, one of the procedures calls for centering 100- and 20-kHz marker pips at the center of the screen. The 100-kHz marker pip was relatively easy to locate, but the 20-kHz marker continued to evade me. It took several attempts at the adjustments before I got the 20-kHz marker on the screen. Checking this adjustment over a period of days, I found the centering of the 20-kHz marker to be unreliable: Sometimes it was "on the money," at other times it might be off screen. Using a discarded hair dryer as a heat source and some cooling spray, I learned that the small inductor in the VCO (L303) was quite temperature sensitive. Another call to Heath's Technical Service brought a replacement inductor. The replacement is approximately twice the physical size of the original. After installing the new inductor, I had to go through the alignment procedure once again. Initially, the marker seemed to be more stable, but over a period of days, even with the new inductor, the marker centering was still unreliable. During transport to the ARRL Lab, the markers once again were lost and the setup procedure had to be repeated.

The VCO components are sensitive to hand capacitance, which is not surprising since everything is out in the open. Also, the position of the VCO components relative to each other can affect adjustment. I found that by varying the position of a capacitor (C336) relative to a diode (D312), for instance, I had a vernier control of the pip position.

You must install the enclosure cover so that the perforated portion is above the pan adapter board. Doing so allows you to reach the pan adapter board variable controls with an adjusting tool that you assemble from parts supplied. More than likely it will be necessary to readjust the controls once the cover is in place.

Hookups

Four large pictorial diagrams show you how to hook up the HO-5404 to the rest of your station equipment. The simplest of these hookups is that used for monitoring incoming signals using the audio output of your receiver. You merely connect a pair of wires between the receiver speaker terminals and the VERT jack on the '5404. This shows you what demodulated audio looks like. So many variables can affect what you see (as Heath quite clearly points out), that I'd be quite reluctant to make any sort of judgment regarding signal quality using this procedure.

For transmitter/transceiver connections, two different sets of input/output jacks can be used. If you're running "barefoot" (using just a transmitter or transceiver, no amplifier), you connect the output of the transceiver to one of the ANTENNA jacks and connect the second ANTENNA jack to the antenna circuit. If you want to hook an amplifier into the line and be able to check for linearity using a trapezoid pattern, a different arrangement is used. In this case, the transceiver is connected to one of the EXCITER jacks and the other EXCITER jack is hooked to the amplifier input. The output of the amplifier is connected to one of the ANTENNA jacks and, as before, the other ANTENNA jack is cabled to the antenna circuit.

Because there are specific power limitations for the EXCITER and ANTENNA jack circuits (see the specifications table), be sure to use the correct cabling procedure. If you don't, you're liable to damage the scope and possibly something else.

To display the RTTY cross pattern, the VERT and HORIZ jacks are used. The SPACE channel scope output of your modem connects to the HORIZ jack, and the MARK channel is wired to the VERT jack. Using the '5404 as a crossed-ellipse tuning indicator for RTTY is a better alternative than most LED displays I've seen. But the display is small —¾ × ¾ inch. Whether you see nice, sharp ellipses or "bananas" will depend on the demodulator you're using and the amount of shift: 170-Hz shift will probably look more "bananaish" than 850-Hz shift.

Heath says you can use the '5404 to some extent as a bench oscilloscope. The manual mentions that such applications must not require high sweep frequencies or high vertical amplifier gain. Signal frequencies from 10 Hz to 40 kHz can be displayed. The 10:1 vertical and horizontal input attenuator (controlled by the rear-panel ATTENUATOR switch) is designed to maintain a constant input impedance regardless of the switch position. To use the '5404 as a test scope, you attach a scope probe (not supplied) to the VERT input jack on the rear panel. But don't expect too much from the '5404 in this application—it's not designed to be a workbench troubleshooter.

Comments

I noticed that the trace on the '5404 is much sharper than that of an HO-10 and SB-610. You'll find that the HORIZONTAL and VERTICAL position controls move the spot rapidly across the screen, so work them slowly. If you can't find the spot by rotating the controls during initial adjustment, turn the scope off and watch for the spot to move onto the screen as the power supply dies. (In my case, it invariably came in from the top-right of the CRT.) That will give you a clue as to how to adjust the controls to center the spot.

The combination of the FOCUS and ASTIGMATISM controls allows for fine adjustment of the trace thickness.

I'm not a fan of internally mounted fuses. Sure, you shouldn't have to replace a fuse often, but when you do, it's nice to be able to get at it quickly. With the terminal-strip-mounted fuse, it's a bit of a bother to replace. At least it's not a pigtail fuse, and can be snapped in and out of the holder clips easily.

Because of the way the front-panel ATTENUATOR control is arranged—an undetented switch selection of one of nine capacitors—the attenuation of the signal applied to the ANTENNA jacks is stepped rather than smooth. The control action feels like that of a potentiometer, but it doesn't act like one. Also, you must pay attention to the setting of this ATTENUATOR control during transmit: Heath warns of this. If there is too little attenuation in the line (the waveform amplitude should be within the graticule area), a toroid and a resistor on the demodulator board (L201 and R201) can overheat and may be damaged. With only a bit of experience, however, maintaining a proper setting of the control should be no problem.

Input Power Limitations

According to the manual, care must be taken to minimize the key-down time of 1-kW level transmitted signals passed through the scope. Unfortunately, no specific time limit is given, so you're left to your own guesstimates. Though the manual mentions that 1-kW keyed CW and voice-modulated SSB signals should not present a problem, no reference is made to RTTY signals. RTTY in all its forms has become a popular mode of communication. RTTY operation is a key-down mode with a single average transmission lasting anywhere from 10 minutes to a half hour or more, depending on how talkative the operator happens to be or the traffic being handled. Also, the 1-kW power-*input* limitation of the Amateur Radio service has been surpassed by the 1500-W power-*output* ruling. Again, I called Heath's Technical Service to inquire about the ambiguous key-down time limit. Regrettably, the technician could provide me only with a guess: "about two minutes."

In the ARRL Lab, the HO-5404 survived a 15-minute key-down test with 1-kW of transmitter output power being fed through it. On 15 meters, however, the insulating material in the upper SO-239 ANTENNA coaxial connector started to bubble. It turned out that I'd not securely fastened the connector to the chassis. Once the screws were tightened, the bubbling process stopped, but the two ANTENNA connectors were warm to the touch. The bubbling process reminded me of another situation I'd encountered—with the SA-2040 Antenna Tuner.[2] In the course of testing that piece of equipment, one of the coaxial output connectors melted and burned briefly with a visible flame. Heath replaced the connectors in the '2040 with ones having Teflon® insulation.

There are two ways of monitoring received signals with the HO-5404: Using the audio output of your receiver or connecting to the receiver IF strip. To effectively use the IF strip and obtain believable results, the bandwidth of the IF strip should be about 10 times the modulating (in this case, received) frequency. For a 3-kHz-wide signal, that amounts to a 30-kHz IF bandwidth. If you attempt to monitor incoming signals from a point in the IF strip after the 3-kHz filter, for instance, you can't expect to faithfully reproduce a signal frequency greater than 300 Hz. You must tap off the IF signal at a point between the receiver mixer and the IF filters, where the passband is wider. To take advantage of the ±20-kHz and ±100-kHz viewing

windows theoretically possible with the HO-5404, your receiver passband at the tap point has to be 40 to 200 kHz wide. The IF output of the Lab's TS-820 was found to be about 3 kHz wide; a TS-930's IF output is at 100 kHz.

In the pan adapter package, Heath provides a list of IFs for 25 receivers and transceivers. Two on the list (the HW-9 and HW-99) are deleted in an errata sheet. A few of the rigs on the list have a factory-installed IF connection point. But for many of the rigs, you'll have to make a modification (consisting of a capacitive tap—a small-value capacitor, a length of shielded wire) to bring the IF signal out to a conveniently accessible point; a phono jack on the rear panel, for instance. So, before you purchase this option, think about whether you want to make the modification—on some rigs it's easier to do than on others. Adding the tap may cause some receiver desensitization and require some circuit adjustment. Also, if the tap point is one that is common to transmit as well as receive, transmitter output may be affected. So, you should check receive and transmit operation on all bands before and after the modification is made. In ARRL Lab tests, the pan adapter couldn't cleanly display a two-tone signal fed into it.

The audio-channel method of monitoring received signals merely displays detected audio waveforms. When examining received waveforms, don't be too quick to accuse the received station of having a problem if things don't look "textbook" to you. Your receiver AGC (and the bandwidth of the IF pick-off, for instance) can affect the displayed waveform and present you with an incorrect picture of what the waveform really looks like. Take the time to learn the idiosyncracies of your particular set-up before you criticize anyone's signal. Many factors can affect the presentation you see on the scope, and it takes some practice to really know what you're doing. (Heath provides a series of 44 drawings of scope patterns representative of received and transmitted signals under different modes of operation.)

When connected to a Kenwood TS-820 transceiver in the ARRL Lab, Lab Engineer Zack Lau, KH6CP, noticed that the HO-5404 produced broadband noise in the receiver. The noise is at its lowest level on 160 meters, worst at 80 meters and decreases in amplitude from 40 meters on up, although it is still quite noticeable. The noise is produced by the sweep circuit in the '5404. Another call to Heath's Technical Service revealed that they are aware of the problem. The technician reported that the problem hadn't been pinpointed, nor is it common to all transceivers and receivers. He said that some HO-5404 owners have been able to reduce or eliminate the noise by better grounding.

I think a monitor scope is a useful adjunct to an amateur station. To me, its greatest utility is allowing the station operator a means of checking the transmitted signal. Having the option to monitor incoming signals could be a useful adjunct to station operation.

The HO-5404 is available from the Heath Co, Benton Harbor, MI 49022, tel 800-253-0570. Price class: HO-5404 Station Monitor, $250; HOA-5404-1 Pan Adapter, $100.—*Paul K. Pagel, N1FB*

Heath HO-5404 Station Monitor

Manufacturer's Claimed Specifications	*Measured in ARRL Lab*
Frequency coverage: 160-10 m.	As specified.
Worst case SWR: Not specified.	2.3:1 at 54 MHz.
Sensitivity: 80-6 m, ¼-in vertical deflection at 10 W; 80-6 m, ¾-in vertical deflection for 100 W; 160 m, ¼-in vertical deflection at 100 W.	As specified.
RF power limitations:	
Exciter input (50-75 ohms), 10 to 300 W.	
Antenna input (50-75 ohms), 1000 W.	As specified.
Insertion loss: Negligible.	1 dB at 54 MHz.
Color: Brown	
Dimensions (height-width-depth): 4-3/8 × 11-1/4 × 12-1/8 in.	
Weight: 10.6 lb.	

Notes

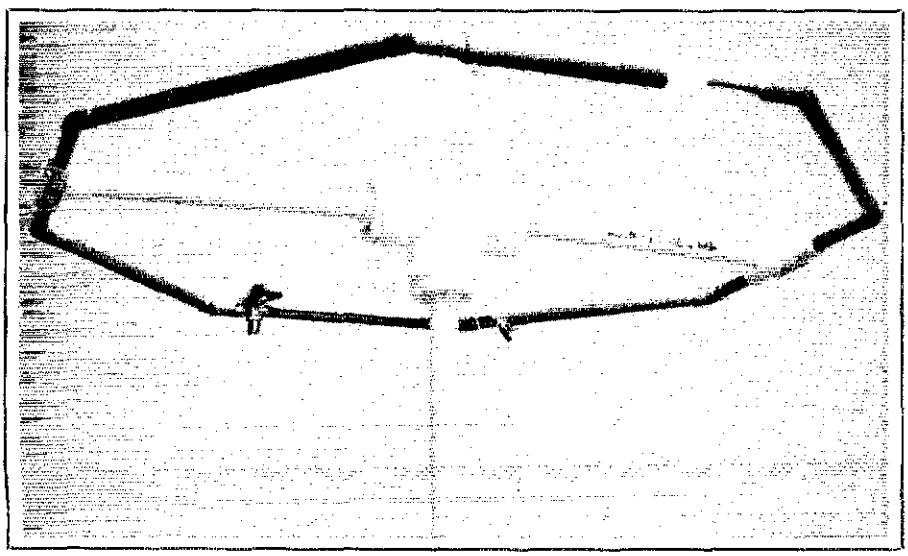
[1]"Heathkit HO-10 Monitor Scope," Recent Equipment, *QST*, Dec 1963, p 58; "Heathkit SB-620 "Scanalyzer," Recent Equipment, *QST*, Apr 1968, p 50; "The Heath SB-610 Monitorscope," Recent Equipment, *QST*, Apr 1972, p 49; "Heathkit SB-614 Monitor Scope," Product Review, *QST*, Jun 1976, p 37.

[2]"Heath SA-2040 Antenna Tuner," Product Review, *QST*, Nov 1980, pp 49-50.

New Products

ADVANCED DESIGN NETWORKS MICROLOOP ANTENNAS

☐ Advanced Design Networks offers small, rugged loop antennas for the 10- through 40-meter amateur bands. Sizes range from 27-in diam for the 10-m version to 108-in diam for the 40-m version. Construction elements are of stainless steel and copper. The insulator in the coaxial capacitor is a special material with a high breakdown voltage and very low losses. The antennas can be mounted vertically or horizontally.



The manufacturer claims omnidirectional coverage with these antennas mounted horizontally, with maximum radiation in the plane of the loop, not through the center. In the vertical mountain position, performance approaches that of a full-size dipole. The manufacturer also points out that this antenna, like any small size antenna, is narrow-banded.

Loop Dimensions

Band (meters)	10	20	15	20	30	40
Diam (inches)	27	30	41	54	81	108

Measured Bandwidth of ADN Microloops

Band (meters)	10	12	15	20	30	40
Center Freq. (MHz)	28.2	24.9	21.2	14.2	10.13	7.2
BW at 1.5:1 SWR (kHz)	46	31	22	13	11	14

Available from Advanced Design Networks, Inc, 8601 66th St North, Pinellas Park, FL 33565, tel 813-544-2596. Price class: 10,12, 15 or 20 m, $83.50; 30 or 40 m, $93.50. —*Bruce O. Williams, WA1VC*

Hints and Kinks

Conducted By Bob Schetgen, KU7G
Assistant Technical Editor

USE THE KENWOOD VFO-520 WITH A YAESU FT-707 TRANSCEIVER

☐ [Editor's note: Although this modification is very specialized, WØZH's setup is a good example of how we can adapt equipment to meet our needs. Those who do not wish to build entire radios can "wet their feet" in home building with simple adapter and connector projects. Also, the use of pill bottles or film cans to house such small circuits is an old idea that bears repeating.]

I recently replaced my Kenwood TS-520 transceiver with a Yaesu FT-707, but kept my Kenwood VFO-520 external VFO. Since the tuning range of the VFO-520 covers the same range as the '707 (5.0-5.5 MHz), my intention was to integrate the two units for split-frequency operation. My goal was to provide the same capability as with the TS-520, but not modify either unit. Except for spotting the two VFOs together, the adapter of Fig 1 accomplishes this goal. Either VFO can be used to control the transmit, receive or transceive frequency. The '707 digital readout displays the frequency of the selected oscillator. RIT operates normally.

First, the VFO-520 was tested to verify operation at 8 V dc from the '707 instead of 9 V dc as supplied by the TS-520. Oscillation is stable, and only a slight (1-kHz) frequency shift was noted. The dial is recalibrated satisfactorily using the '707 marker generator.

The VFO-520 transmit relay operates at 12 V. The Q1/Q2 circuit was added to boost the TX-8V signal (8 V during transmit) from the '707 to 13.5 V. Since TX 8V is around one volt during receive, a Zener diode, D1, was added to give this circuit a threshold of at least 2 V.

The '707 has several LED indicators to display which VFO is in operation. To light the EXT indicator, the '707 must receive 8 V (dc) with the EXT VFO RF signal on J6, pin 7. The Q3/Q4 circuit inverts the logic of VFO-520 pin 8 (8 V dc to power the '707 internal VFO) and provides 8 V to the '707, through RF choke L1, anytime the VFO-520 is oscillating.

A 56-Ω dummy load is also provided for the '707 unused MEMO OUT signal at J6, pins 8 and 3.

The adapter was built using an 8-pin DIN connector to mate with the '707 and a 9-pin tube socket to accept the VFO-520 interconnect cable. The circuit was assembled on a small piece of perforated circuit board and housed in a plastic pill bottle. The socket is installed on the bottom of the bottle. A six-inch wire bundle extends out of the lid with the DIN connector attached to the end. (I have used pill bottles to make several "tweenies" such as headphone and microphone connectors or impedance transformers.)

This approach could also be used to interface other Kenwood VFOs to the FT-707 if the tuning range and switch provisions are similar. If frequency memory and scan features are not necessary, adapting the VFO-520 to the FT-707 is an ideal way to obtain split-frequency operation.—*Myron A. Kern, WØZH, Manchester, Missouri*

REWELD BROKEN TUBE FILAMENTS

☐ Here is a procedure that can sometimes repair broken vacuum-tube filaments. This technique requires some luck, and not all attempts at repair will be successful. This is the story of one successful repair and one failure.

I had a pair of unused 100TH triodes, which would cost about $200, each, to replace. These tubes, and the larger 250TH, have notoriously fragile filaments. Rough handling or extreme temperatures can fracture or shatter the tube filament. In the latter case, repair is possible only by opening the glass envelope, which is impractical without a laboratory. When the filament is only broken in one place, it may be repairable.

In my case, the two 100THs had been stored all winter in an unheated shack on top of a mountain. When first stored, both tubes were in excellent shape. Spring found both filaments broken at the top, where they are normally welded to the filament support stem.

The vacuum in both tubes appeared good.

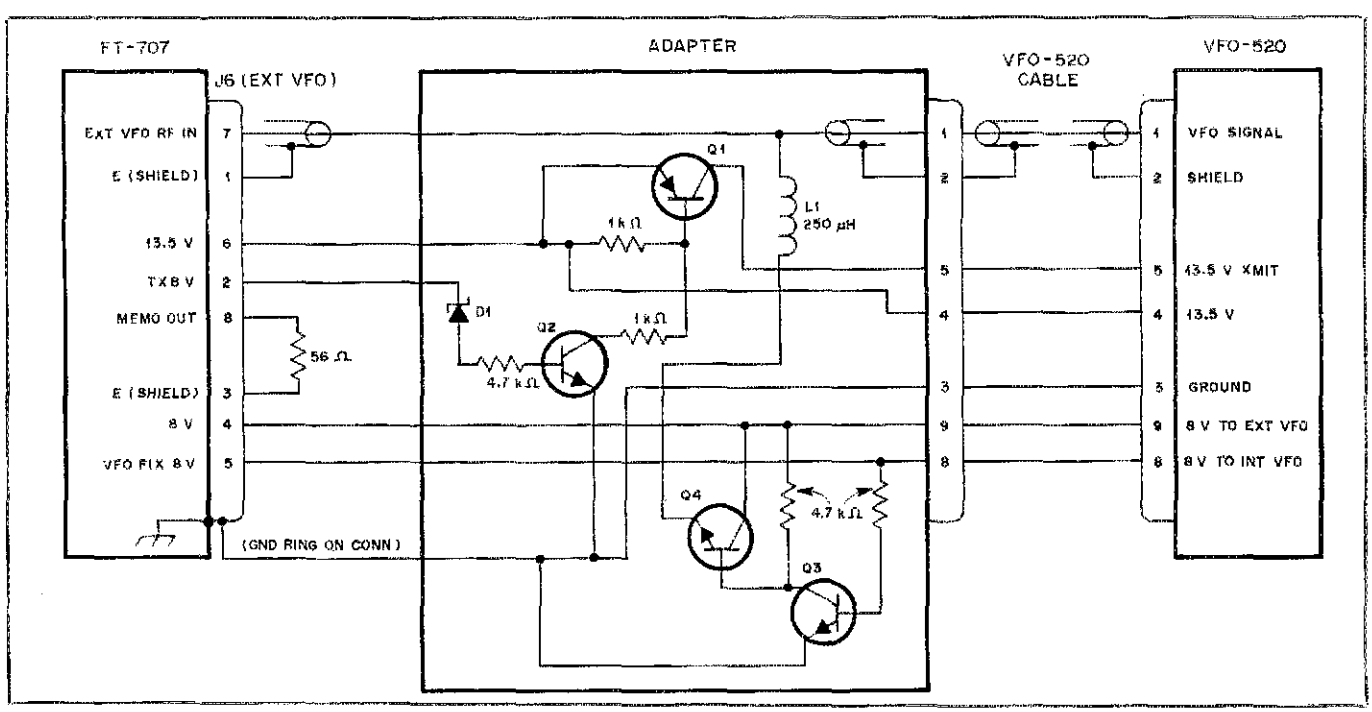


Fig 1—A schematic of WØZH's adapter circuit for the Kenwood VFO-520 and Yaesu FT-707.
Q1—2N3906.
Q2, Q3, Q4—2N3904.
D1—1N761, 5.4-V Zener diode (Zener voltages from 2 to 5 are suitable).
L1—250-μH RF choke (value not critical).

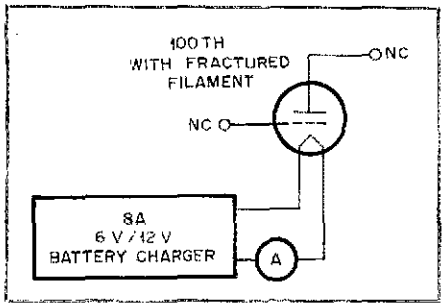


Fig 2—KI3U's setup for repair of broken vacuum-tube filaments.

(A crude check of vacuum in a glass tube is to gently tap it: A tube with good vacuum will ring crisply.) I connected an ohmmeter, set for its highest sensitivity range, across the filament pins of one tube. Next, I tapped the tube envelope at various points with the plastic handle of a light screwdriver. There were several places where tapping on the envelope caused the ohmmeter needle to flick momentarily, indicating that the filament and stem were vibrating into contact. I marked the place where the tapping was most effective with a felt marker.

The actual repair was made by connecting an 8-A, 6/12-V battery charger (set for 12 V) and a dc ammeter to the filament pins (see Fig 2). As I began tapping the tube envelope with the screwdriver handle, bluish-white sparks appeared at the top of the filament. With increased tapping frequency, the filament suddenly lit brightly, drawing more than 8 A. I immediately switched the battery charger to the 6-V position and the current dropped to a steady 5.75 A. After a few seconds, 12 V was again applied for about 1 second, then 6 V with 5.75 A drawn. After 35 minutes, I reversed the charger polarity. (The current had stabilized at 5.6 A.) In reversing the polarity the filament experienced the first shutdown since becoming rewelded. Power was removed after five minutes at reverse polarity. Using a variable ac transformer, I applied power until the filament drew its published current of 6.3 A. At this current, the RMS ac voltage across the filament was 4.0 V. The published voltage is 5.0-V ac (RMS). Nine minutes after applying power, I raised the voltage to 5.0 V. The current read 7.0 A. Three and one-half hours later, I cut all power to the filament for the day.

For the next 30 days, I ran the filament at 6.3 A for 1.5 hours daily to stress relieve the weld. Each time, the filament drew 6.3 A at 4.0 V and 7.0 A at 5.0 V. At the end of the 30-day period, I measured the interelectrode capacitances. The input capacitance was approximately 0.5 pF higher than the published value of 2.9 pF. The other two capacitances were equal to the published ratings. The emission of the filament was also good. (All instruments used had an accuracy of ±2%.)

An attempt to repair a second tube ended in failure. As before, I began tapping the tube while 12 V was connected to the filament pins. Once again, following considerable internal sparking, the filament suddenly lit brightly. I immediately shut off the battery charger and switched to 6 V. By the time I turned the battery charger back on, the filament had cooled. Now, it did not light; the weld had broken. Repeated repair attempts resulted only in a lot of sparking. Eventually, the glass tube cracked.

The critical difference between the successful weld and the failed attempt was that I did not cut power to the filament, but simply reduced the voltage: The filament was not shut off for at least 35 minutes after the initial lighting in the successful repair. In the second case, I immediately cut the power and allowed the filament to cool. I believe this error caused the failure.

Several questions come to mind about this procedure: Since dc welding requires the correct polarity to be applied between the materials to be joined, it is possible that the polarity was wrong in the second case. (I had not written down the polarities.) Perhaps the rewelding would work better with an ac power source. In any case, I believe it is critical to maintain power after the initial relighting. The new weld must be given sufficient heat to become strong.

Tubes such as the 100TH are still manufactured, although primarily as replacements for older equipment. They are antiques, and one might ask, "Is it worth attempting to repair them?" There are probably many antique tubes sitting on shelves with broken filaments that have lots of emission left in them. Some of these tube types have not been manufactured in decades, and may only be put into service through this kind of repair. Furthermore, the amateur may use similar techniques to repair broken filaments in modern transmitting tubes under emergency conditions. Perhaps a suitable transducer (coupled to a variable-frequency audio oscillator) can be used instead of a screwdriver handle to vibrate the tube shell in a controlled manner. High-power transmitting tubes are very expensive, and their filaments do sometimes break prematurely. The type of equipment necessary to attempt repair is certainly present in the average amateur station.—*Berj N. Ensanian, KI3U, Eldred, Pennsylvania*

FAST OFF-THE-AIR TUNE UP

☐ In our crowded bands, it is nearly impossible to tune up on the air without creating QRM for someone. Fortunately, tune up off the air is possible and practical. K4KI described one approach using a simple, home-built bridge in the Dec 1979 *QST*. Another approach is to use an antenna noise bridge

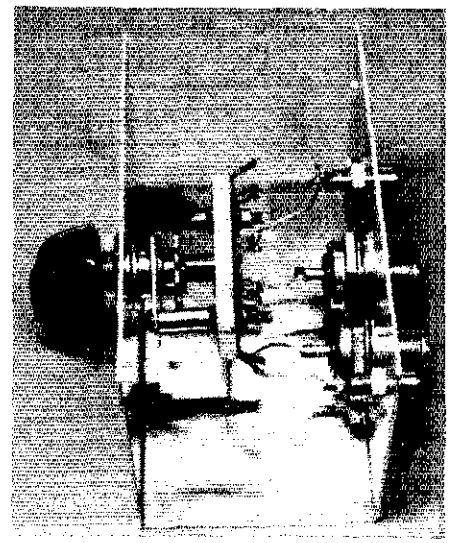


Fig 4—A photo of KØKK's home-built switching arrangement.

(such as those available from Palomar Engineers and MFJ Enterprises) with a Transmatch. Here is how:

1) Insert the bridge in the line between the transceiver and Transmatch.

2) Set the bridge for R = 52 Ω and X_{LC} = 0 Ω, and switch on the noise amplifier.

3) Adjust the Transmatch for a sharp null in receiver noise. (You may need to lower the RF gain.)

4) If you have a radio of broadband design, remove the bridge and you are ready to go. Narrow-band rigs should be tuned into a dummy load, then switched to the antenna. There is no need to check the Transmatch settings with an SWR meter (or repeak your narrow-band final amplifier) on the air. Tuning is perfect every time.

It is not convenient to insert and remove the bridge from the line for each tune up, but you can switch it in and out with a DPDT switch, as shown in Fig 3. You can buy such switches from Barker & Williamson (Model 551A), or build one yourself with a DPDT ceramic-wafer switch mounted in a Minibox (as shown in Fig 4). If you have a narrow-band amplifier, add a standard antenna switch to select either the dummy load or your Transmatch.—*Dick Lamb, KØKK, Iowa City, Iowa* QST

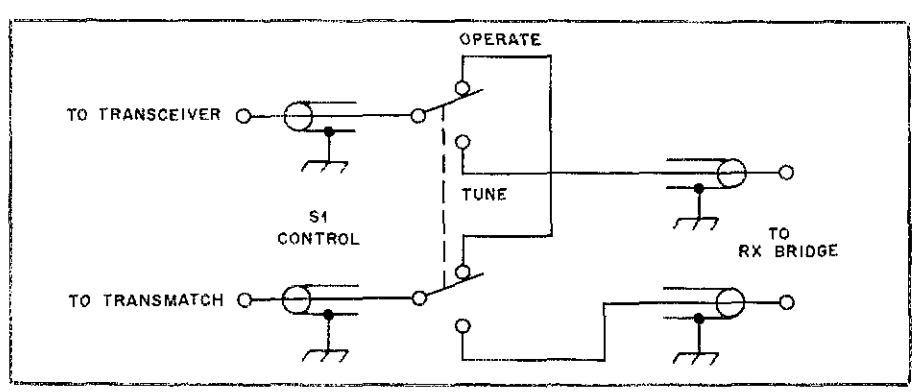


Fig 3—A schematic of the switching arrangement to place a noise bridge in the transmission line for Transmatch adjustment. Do not transmit with the noise bridge in the line!

Technical Correspondence

Conducted By Paul K. Pagel, N1FB
Senior Assistant Technical Editor

POST SCRIPT—SPOTS BEFORE YOUR EYES[1]

☐ The predicted time of the next *solar minimum* is based on the lengths of previous sunspot cycles. Cycle lengths over the last 136 years appear to fall into a bimodal distribution of about 123 months and 140 months. No objective methods are available for determining the length of the current cycle (21), so the forecasters conservatively chose an average length of 133 months (minimum to minimum). Using this value, the minimum smoothed mean monthly sunspot number for the current cycle (21) should occur in July 1987. A cycle length of 140 months would result in a minimum sunspot number in February 1988.

The predicted time of the next *solar maximum* is based on the average time between minimum and maximum, which is about four years. Even-numbered sunspot cycles appear "flat-topped," which means that the precise time of maximum is relatively meaningless. The forecasters predict that the maximum smoothed mean monthly sunspot number of the next sunspot cycle (22) will be reached in mid-1991. Sunspot numbers may be close to the maximum values for two years or more.

The predicted *maximum smoothed monthly mean values* for the next cycle (22) is based on forecaster opinion. The forecasters predict a maximum sunspot number of about 100, plus or minus 10. This implies that the next cycle will be somewhat below average in magnitude, but will not be an unusually "small" cycle. *(Reprinted from the weekly* Preliminary Report and Forecast of Solar Geophysical Data, *17 June 1986, Space Environment Services Center, Boulder, CO)*

MORE ON THE S-P NETWORK

☐ The following material is respectfully submitted as a supplement to Warren Bruene's innovative and thought-provoking article on the S-P network.[2] The approach described here develops the S-P network from a slightly different angle, that of a two-element low-pass prototype, and applies two well-known network transformations.

Fig 1 is a diagram of a two-element low-pass filter. The values of L1 and C2 depend on the type of filter (Butterworth, Chebyshev, and so on), and on the terminating resistance values. Table 1 lists some example values for several different situations and types of filters. These examples are available from handbooks such as Zverev's *Handbook of Filter Synthesis.*[3]

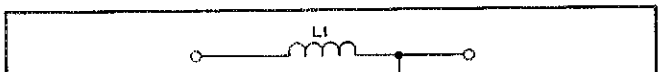


Fig 1

Note that R_L can have a wide range of values, but that a mismatch loss occurs if R_L is not equal to 1 ohm. That is, no significant impedance transformation occurs.

Now, transform this network into a band-pass filter that is resonant at $\omega_0 = 1$, and has the fractional bandwith, Q_B, defined as:

[1]J. Hall, "Spots Before Your Eyes," *QST*, May 1986, p 34.
[2]W. Bruene, "Introducing the Series-Parallel Network," *QST*, Jun 1986, pp 21-23.
[3]A. Zverev, *Handbook of Filter Synthesis (New* York: John Wiley and Sons, 1967).

Table 1
Examples of Normalized Filter Component Values

Type of Filter	R_L	*L1*	*C2*	*L1/C2*
Butterworth	1.0	1.414	1.414	2.0
	2.0	3.346	0.4483	1.5
	5.0	7.707	0.1557	1.2
	Inf.	0.7071	1.414	1.0
Chebyshev (0.1 dB)	1.35	1.638	1.209	1.98
	2.0	3.0538	0.5597	1.709
	5.0	7.426	0.1841	1.367
	Inf.	0.8191	1.391	1.139
Bessel	1.0	2.1478	0.5755	1.236
	2.0	3.565	0.2601	0.927
	5.0	7.688	0.0965	0.742
	Inf.	0.4539	1.362	0.618

$$Q_B = \frac{f_0}{BW_X} = \frac{\text{Geometric Center Freq}}{X \text{ dB Bandwidth}} \qquad \text{(Eq 1)}$$

This filter is shown in Fig 2.

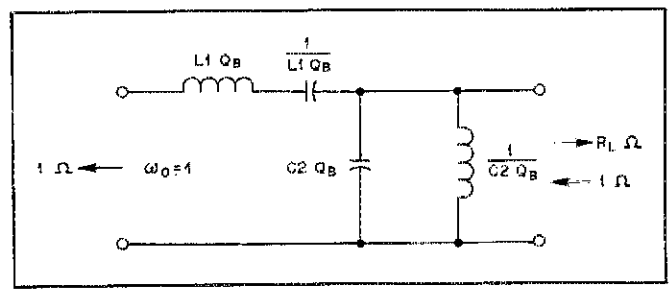


Fig 2

This prototype band-pass filter, when scaled to the desired frequency and impedance level, will be the desired end product. Observe, however, that there is no impedance or voltage transformation within the filter. We want this filter to perform such operations. The vehicle for doing this is the Norton Transformation. It cannot be treated in detail here (see the Zverev reference), but will be illustrated as we use it to derive a design equation. We apply it to the series capacitor in the manner shown in Fig 3.

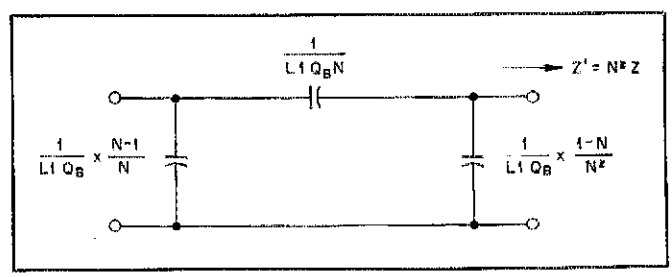


Fig 3

The number represented by N is a voltage step-up ratio (a transformer action). When the pi capacitor network is placed in the filter, all impedances to the right are transformed by the factor N^2, and the voltages are transformed by a factor of N. Note that if N is greater than 1, the capacitor to the right has a negative value. This means that in order to be practical, this negative C must be in parallel with a positive C that is equal or greater in magnitude than the negative C so that the net value of C is positive (or zero). Fig 4 shows the new filter. The values of all the components of the band-pass filter, as modified, are shown. The impedance levels are also indicated.

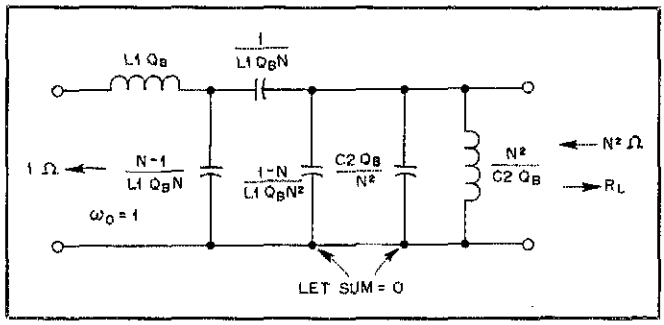


Fig 4

To get the S-P network, let the sum of the negative and positive values of C shown in Fig 4 equal zero, as shown in Eq 2 and 3.

$$\frac{1 - N}{L_1 Q_B N^2} + \frac{C_2 Q_B}{N^2} = 0 \qquad \text{(Eq 2)}$$

From which N is found by

$$N = 1 + L_1 C_2 Q_B^2 \qquad \text{(Eq 3)}$$

When this is done, the final S-P network and its component values are as shown in Fig 5.

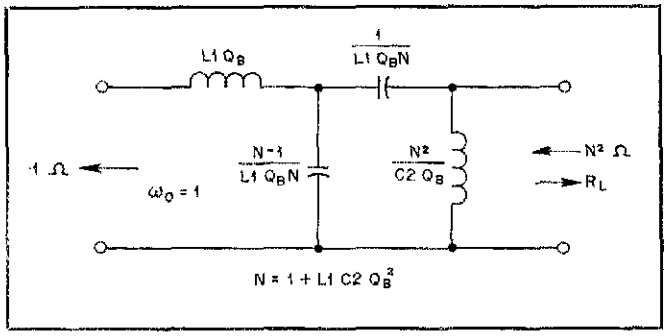


Fig 5

The quantities to be selected are L1, C2, Q_B and N. From Eq 3, we see that for a given filter type (see Table 1), the values of L1 and C2 are fixed. If a certain N is needed, the fractional bandwidth is then determined. Or, if a certain N and Q_B are needed, there may be some L1C2 product available in the handbooks that will work. The resulting passband and stopband shapes may not be what you had in mind, but they may be adequate. Moreover, if we had merely combined the two capacitors of Fig 4 instead of summing to zero, a much wider range of options would be available at the cost of an additional component, which may be undesirable in many situations, for example, in high-power transmitters or servo-tuned systems. Fig 5 corresponds to Bruene's Fig 3. The derivation of Bruene's Fig 1 is similar to this description and leads to the same conclusion (and my design Eq 3) as shown in Fig 6.

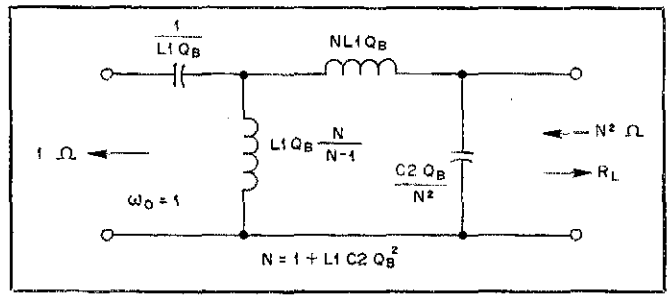


Fig 6

I hope this supplementary material to Bruene's excellent article will add a little to the appreciation that it deserves.—*William E. Sabin, WØIYH, 1400 Harold Dr SE, Cedar Rapids, IA 52403*

COLLINS BALUN UPDATE

☐ In "Balun Transformers in Transmatches," I mentioned the "Collins" balun.[4] A brief description of that balun is found in a publication of the Collins Radio Co, *Fundamentals of Single Side Band,* third edition, dated Sep 15, 1960 (publication number 597-0332-00), p 10-11. [That publication is now out of print.—Ed.]

The most extensive treatment of coreless baluns I've come across is by George Badger, W6TC, in *Ham Radio* magazine.[5] In Part 1, Mr Badger discusses the Collins balun.—*Dick W. Rollema, PAØSE, Marckstraat 5, 2352 RA Leiderdorp, The Netherlands*

[4]Technical Correspondence, Aug 1986, p 39.
[5]G. Badger, "A New Class of Coaxial-Line Transformers," *Ham Radio,* Feb and Mar 1980.

Feedback

☐ Author George Isleib points out an error in "WeatherFAX Gray-Scale Generator," *QST,* Nov 1986, p 24. The voltage at pin 4 of U10 should be − 12 V, not + 12 V.

☐ Please make the following corrections to "Broadband Dipoles—Some New Insights," *QST,* Oct 1986. The caption for Table 4, p 36, should refer to Fig 11, not Fig 13. On p 31, it is stated that a more complex Chebyshev matching network would yield greater compensation. There is an improvement, but the BWIF (Bandwidth Improvement Factor) = 2.28, not 2.8 as author Witt stated. Thus, adding an additional inductor and capacitor to the matching network would yield only a 14% improvement in bandwidth over the network described in the article. Thanks to author Frank Witt for the corrections.

☐ In Fig 1 of "Field Tester for Antennas," *QST,* Mar 1986, a ground connection is missing in the 80-meter output filter. Add a ground symbol at the junction of C22/C23/C24.

Argentina Hosts IARU Region 2

Buenos Aires was the site of the 1986 edition of the triennial meeting of North and South America's Amateur Radio organizations. Here's what the Conference was like, and what was accomplished.

By Larry E. Price, W4RA and David Sumner, K1ZZ
President, ARRL Executive Vice President, ARRL

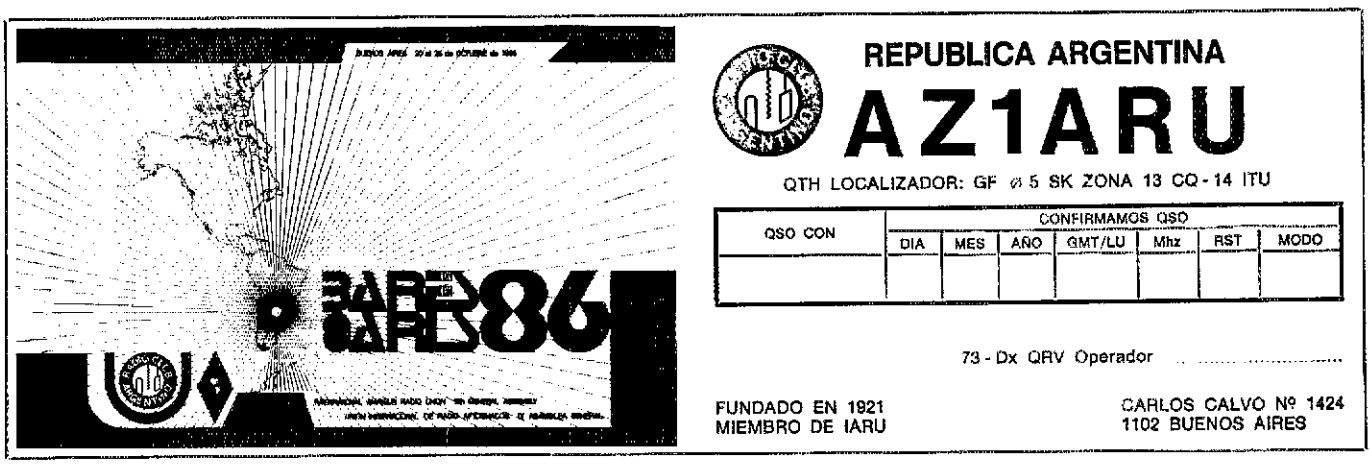
Every three years, the radio amateurs in positions of leadership within their respective national societies in the Americas assemble somewhere in the hemisphere to discuss common problems and try to reach solutions to help defend, advance and promote the Amateur Service. These IARU Region 2 Conferences began in 1964 and have proved to be effective instruments in achieving cooperation and mutual understanding between the 560,000 radio amateurs in the Region. In October 1986, the Ninth General Assembly of Region 2 delegates convened in Buenos Aires, Argentina, hosted by the Radio Club Argentino, for the latest of these weeklong working sessions.

The ARRL delegation consisted of ARRL President Larry E. Price, W4RA; International Affairs Vice President Tod Olson, KØTO; Director Hugh Turnbull, W3ABC; Executive Vice President David Sumner, K1ZZ; and International Programs Manager Naoki Akiyama, N1CIX. The Canadian Radio Relay League was also well represented; a report on behalf of its delegation appears in Canadian NewsFronts in this issue.

Buenos Aires is relatively easy to reach from the United States, though it's farther

Some Actions of the IARU Region 2 Ninth General Assembly, Buenos Aires, 1986

- Endorsed plans formulated by the IARU Administrative Council to prepare for future ITU World Administrative Radio Conferences
- Supported efforts being made through CITEL to conclude an Interamerican Amateur Radio Convention, to permit temporary operation of amateur stations in other countries
- Authorized Region 2 Executive Committee to develop recommendations for changes to the IARU Constitution that might be helpful by way of clarification, without substantive change
- Reaffirmed exclusive right of a member-society to represent IARU to its government
- Adopted a budget for 1987-89, and a formula for assessing dues under which each member-society will pay $.07 per licensed amateur in its country
- Encouraged member-societies to seek regulations that would prevent the sale of Amateur Radio equipment to unlicensed persons
- Asked member-societies to make efforts to reduce interference to satellite uplinks and downlinks from terrestrial FM operations
- Adopted emergency operating procedures, and designated the top 10 kHz of the 20- and 15-meter bands as the initial meeting place for amateurs in time of international emergency
- Adopted AX.25 protocol as the preferred interim standard for packet radio, and invited coordination between ARRL and Region 2 to develop a plan for a packet radio network for Region 2 countries that wish to take part
- Resolved that telephony operation should not be permitted in the 10-MHz band
- Resolved that award credits shall not be given for operating activities conducted on the 10-MHz band, and IARU member-societies in Region 2 shall not sponsor awards or competitions on this band
- Encouraged member-societies to promote the use of 220 and 902 MHz
- Adopted band plans for the 1.8, 3.5, 7, 10, 14, 21, 28, 220 and 430 MHz bands.



This handsome QSL card was made available to all who worked the special-event station associated with the Conference, AZ1ARU.

to the south of the Equator than Atlanta and Los Angeles are to the north. For most of us, it simply meant getting to Miami's International Airport in some fashion and then flying nonstop for another 8 hours until BA's Ezezia Airport was in sight! On stepping off the plane, we were met at the airport by Radio Club Argentino President Carlos Kaufman, LU9CN, and his crew of volunteers, who whisked us through Argentine immigration with a minimum of fuss and bundled us off downtown to the small but comfortable and conveniently located Lafayette Hotel where most of the Conference delegates were housed.

After some much-needed rest, we were ready for the official opening ceremonies on Monday morning. The Conference had the use of fine facilities at the Ministry of Communications, a handsome marble building about three blocks from the hotel. In his opening remarks the Secretary of Communications of the Republic of Argentina, Ing. Juan H. Ciminari, welcomed all the delegates and wished them well in their deliberations. He lauded the contributions of radio amateurs, not only during emergencies but at other times as well, and congratulated the Radio Club Argentino on its 65th anniversary.

With the completion of the opening ceremonies, the real work of the conference began. LU9CN was elected Honorary Chairman, and the Credentials Committee and Electoral Committee were established. Following a short recess, the Credentials Committee reported that 24 member-societies had been accredited to the Conference (see Table 1).

Table 1

IARU Member-Societies Accredited to the Region 2 Conference

Argentina	
Bermuda	
Bolivia	
Canada	
Cayman Islands	by proxy to Canada
Chile	
Colombia	by proxy to Bolivia
Cuba	
Dominican Republic	
Ecuador	
El Salvador	by proxy to Panama
Haiti	by proxy to Dominican Republic
Jamaica	
Mexico	by proxy to United States
Montserrat	
Netherlands Antilles	
Nicaragua	by proxy to Cuba
Panama	
Paraguay	
Peru	
Trinidad	by proxy to Venezuela
United States	
Uruguay	
Venezuela	

Table 2

Region 2 Conference Committees

Committee	*Purpose*	*Chairman*	*ARRL Representative*
A	Administrative Matters	Yamandu Amen P., CX4AA	President Price
B	Technical and Operational	Raul Roji, CX7BY	Int'l VP Olson
C	VHF/UHF/SHF/Satellite	Ron Szama, LU2AH	Exec VP Sumner
D	Financial	Tom Atkins, VE3CDM	Director Turnbull

The usual practice at international conferences is that much of the detail work is done through working groups or Committees that meet concurrently and then report their recommendations back to the full (plenary) assembly. So it is in IARU Region 2. Four important committees were formed, as shown in Table 2. The next 2½ days were consumed by lengthy meetings of the Committees as they studied proposals submitted in advance, in writing, by the various member-societies in Region 2. Information papers were also submitted on behalf of the Region 1 and Region 3 organizations, to advise on decisions taken in those Regions that might bear on Region 2, and on behalf of the IARU Administrative Council, to advise the Conference of resolutions adopted by the Administrative Council. Region 3 had its most recent conference in Auckland, New Zealand, in November 1985; Region 1 met in Cefalu, Sicily, in April 1984 and will be meeting in The Netherlands in April 1987. ARRL had submitted several papers for consideration, dealing with such subjects as 10-MHz contest and awards policy, the rights of member-societies in representing Amateur Radio to their administrations, 160-meter band planning, packet radio, and the venue of the 1989 Conference.

On Thursday, the conferees took a break to permit the Committee officers and the Conference Secretariat to prepare the reports for consideration by the Plenary Assembly on Friday. This normally massive job is compounded at a Region 2 Conference by their being two languages in official use, English and Spanish! This means that everything must be translated, and the translations checked to make sure the same thing is being said in both languages. The Radio Club Argentino, which supplied superlative hospitality throughout the week, arranged for the delegates to be transported by bus to a school for mounted police for a demonstration of horsemanship as only Argentine riders and horses can manage. Afterwards, a fine barbeque luncheon was provided at an Army staff officers' club.

Friday was a very full day. The Plenary Assembly had a large number of recommendations to consider, some of which required extensive debate before the delegates were ready to vote for adoption.

Listening attentively to the opening of the Region 2 Conference are Carlos Kaufman, LU9CN, President of the Radio Club Argentino and Honorary Chairman of the Conference; Region 2 Vice President Fabian Zarrabe, YN3FI; Region 2 Secretary Al Shaio, HK3DEU; and Region 2 President Pedro Seidemann, YV5BPG.

The ARRL delegation discusses a paper submitted to the final plenary session. From left to right: Director Turnbull, International Affairs Vice President Olson, Executive Vice President Sumner and President Price.

Table 3

The IARU Region 2 Executive Committee

Pedro Seidemann, YV5BPG, President
Fabian Zarrabe, YN3FI, Vice President
Alberto Shaio, HK3DEU, Secretary
Thomas B. J. Atkins, VE3CDM, Treasurer

Members-at-Large

Steve Dunkerley, VP9IM
Frank M. Butler, Jr, W4RH
Luis Caamano, HI8LC
Hugo Coscio, CP5EC
Carlos Kaufman, LU9CN

IARU officers observe the work of Committee A. From left to right: Region 3 Secretary Fujioka, Vice President Smith, President Baldwin and Region 1 Chairman v.d. Nadort.

IARU Region 2 has two official languages: English and Spanish. Simultaneous translations were provided during the opening ceremony and plenary sessions.

The discussion was aided greatly by the availability of simultaneous interpretation in both English and Spanish. Native English speakers are in the minority at a Region 2 Conference, and while a number of delegates were fluent in both languages most of us were not. (The presence of Nao Akiyama on the ARRL delegation provided us with bilingual capability, since Nao can speak four languages: Japanese, Spanish, English and French.)

Eventually, all of the business was concluded except for the election of the Executive Committee for the next triennium, and the selection of the site for the 1989 conference. The entire Region 2 Executive Committee was given a vote of confidence by being re-elected. This is not to say that re-election was automatic, for there were challenges (and spirited campaigns) for several posts. When the secret balloting had been completed, however, the entire slate had been returned to office, including ARRL Director Frank Butler, W4RH, who was appointed in 1984 to fill a vacancy on the Executive Committee and was standing for election for the first time.

The final item of formal business was the selection, by secret ballot of the Conference, of the venue of the Tenth General Assembly to be held in 1989. ARRL had submitted a bid to host this conference, inasmuch as this will be the ARRL Diamond Jubilee year. Bolivia, which has a long record of sending very impressive delegations to Region 2 Conferences, also submitted a bid, but when the ballots were counted the United States had been selected. The exact location and date has not yet been determined.

Thanks to the scheduling of an IARU Administrative Council meeting right after the Region 2 Conference, all nine members of the Administrative Council were present for the Conference: IARU President Richard L. Baldwin, W1RU, Vice President Carl Smith, WØBWJ, and Secretary David Sumner, K1ZZ (wearing his ARRL hat); Region 1 Chairman Louis van de Nadort, PAØLOU, and Secretary John Allaway, G3FKM; Region 2 President Pedro Seidemann, YV5BPG, and Secretary Alberto Shaio, HK3DEU; and Region 3 Chairman David Rankin, 9V1RH, and Secretary Masayoshi Fujioka, JM1UXU. Also present as an observer was the President of the Japan Amateur Radio League, Shozo Hara, JA1AN. Attending their first Region 2 Conference were delegations from Cuba (Eduardo Fernandez, CO2BB, and Rafael Fernandez, CO2RX) and Montserrat (Chod Harris, VP2ML).

The success of any meeting depends on the personal chemistry that develops between the participants, and a Region 2 Conference is no exception. In Buenos Aires, several social functions provided the catalyst for a smooth meeting: a reception on Tuesday evening hosted by ARRL in its own name and as IARU International Secretariat, a reception on Wednesday evening hosted by Argentine Foreign Minister Dante Caputo, who happens to be LU2DC, and smaller, more personal affairs in people's homes on the Thursday evening. Most of the English-speaking group was invited to a buffet at the apartment of George Wagner, K5KG/LU6KG, and his wife Kay. George's company recently transferred him to Buenos Aires and he is living on the 30th floor of an apartment building; the view (and the elevator ride!) is quite breathtaking. He's managed to put a tower on top of the building and was in the process of installing a big tribander and 40-meter beam more than 400 feet above the streets of the city when we were there; if you hear a booming signal from LU6KG, you'll know why!

The cover of the October issue of the journal of the Radio Club de Chile featured a cartoon representation of some of the Conference delegates.

The final event in the Region 2 Conference schedule was a gala dinner-dance on board an Argentine naval vessel on Friday evening (and into the wee hours of Saturday!) to mark not only the successful conclusion of the Conference, but also the 65th anniversary of our host society, the Radio Club Argentino. It was a memorable event, and one that reminded the US delegation that there is little enough time for planning before our turn comes three years hence if we are to match the splendid hospitality and organization of Carlos Kaufman and his impressive team of volunteers in Buenos Aires!

OSCAR at 25: Beginning of a New Era

Easy-to-use space communications may at last be on the way. After 25 years as a technical novelty, AMSAT introduces a new generation of satellites. Public service and accessibility are the watchwords.

By Jan King, W3GEY,
AMSAT VP, Engineering
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Last month, we looked at the beginnings and the development of the Amateur Satellite Program from OSCAR 1 through Phase 3. This month, we'll look at the next-generation satellite, Phase 4, and its various transponders and communications possibilities.

In September 1986, Jan King completed a Phase 4 Engineering Study Plan. In it was depicted a preliminary architecture for a two-satellite geosynchronous system that AMSAT believes could be in operation by 1991-1992. The Plan suggested a one year course of study for Phase 4, during which specialists in various technical fields will look at each facet of the design. The design team will then advance the initial concept to a workable preliminary design. If, after the year, the team feels they have a design that meets the objectives, the AMSAT Board of Directors will be asked to authorize initial construction activities.

Working in parallel with the Phase 4 Engineering Study Team, comprising about two dozen experts, will be two other teams: the Ways and Means Team and the Operations and Applications Team. The Ways and Means Team will be looking into ways of developing resources to enable construction of Phase 4. Besides traditional scouting for donations, gifts and grants, these folks will be looking for donations of key resources (like rare skills), donations in kind (of specific hardware needed), and so forth. They will ferret out the $1-million-plus resources necessary to make this program turn real.

The Operations and Applications Team will be looking at two aspects:

1) How to optimize the strawman satellite architecture to the projected needs and capabilities of terrestrial users of the 1990-2000 time frame.

2) How to prepare the user community for the advent of truly easy-to-use satellite communications.

What will Phase 4 be like? How will it be to use? According to the preliminary (strawman) concept, initially there will be two satellites placed in geosynchronous orbits. The coverage areas (footprints) of each are shown in Figs 1 and 2. AMSTAR East would be positioned over the equator at 46.6° west. (AMSTAR is a preliminary designation for AMSAT's Phase 4 satellites.) From there, it would cover everything east to Helsinki and Durban and west to Seattle. AMSTAR West would cover everything from Boston west to Tokyo and central Australia. Although technically difficult, it might be possible to link the two birds (crosslink) in such a way as to enable a two-satellite QSO from, say, Athens to Melbourne.

What's especially attractive about the geosynchronous orbit is that the old bugaboo about tracking is gone completely! You just set your antenna at a given spot in the sky and, essentially, weld it in place. You never have to move it: no computers, no locators, no nothing; just AMSTAR in the sky 24 hours a day, 365 days a year providing the kind of facility

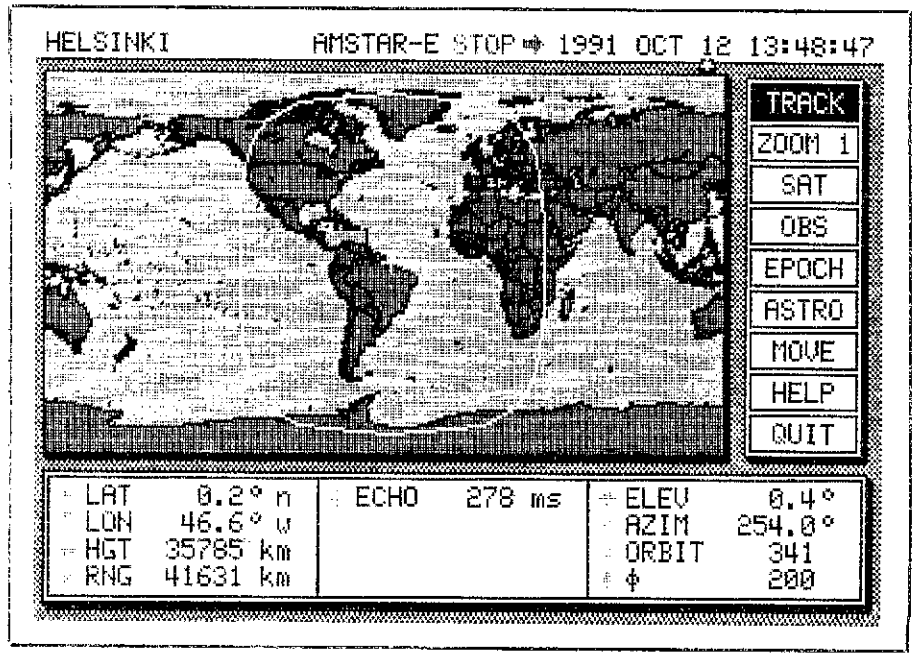


Fig 1—Footprint of AMSTAR East (see text).

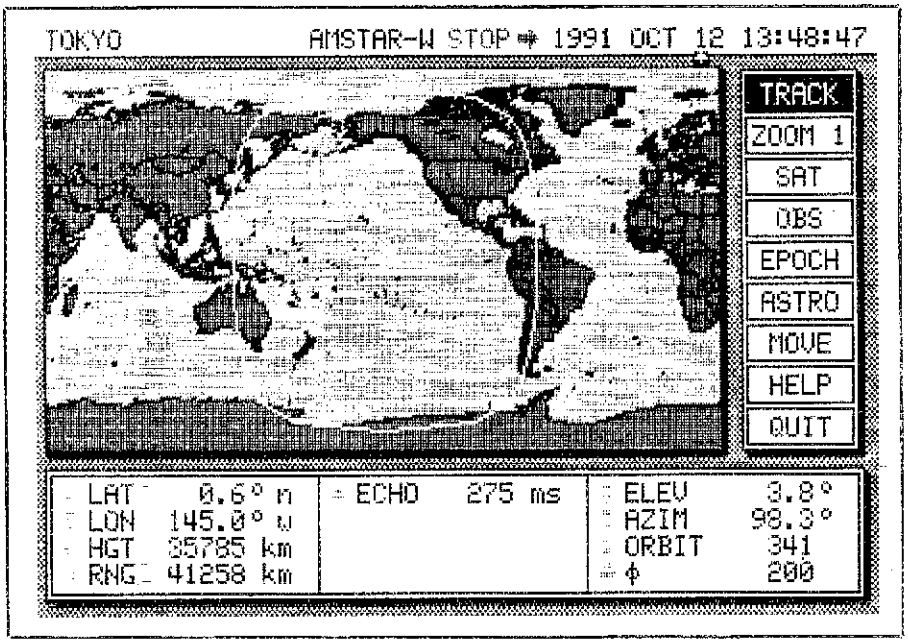


Fig 2—Footprint of AMSTAR West (see text).

emergency communicators and ordinary would-be satellite users have been seeking for years.

What kind of communications services might be enabled by Phase 4? Let's look at the various transponders and examine briefly their capabilities (see Fig 3).

Mode JL

Mode JL is a combination of two modes (J and L) that have been used previously for OSCARs. Mode J (named for JAMSAT, our Japanese colleagues) first flew aboard AMSAT-OSCAR 8 in 1978 in a project sponsored by ARRL. Mode J has recently been reborn with its employment on the new Fuji-OSCAR 12 from Japan. As may be seen in Table 2, Mode J involves a 2-meter uplink and a 70-cm downlink. Mode J is especially popular in Japan because intense 2-meter QRM makes reception of the relatively weak 2-meter downlink of, for example, Mode B (70 cm up, 2 m down) very difficult. On the other hand, the 70-cm downlink is not subject to comparable QRM levels in Japan.

Mode L is a relatively new mode, having flown on AMSAT-OSCAR 10 in 1983 for the first time. With 24-cm uplink and 70-cm downlink and fully 800 kHz of bandwidth, it was designed as a safety valve to absorb anticipated user growth on AO-10's Mode B. That growth eventually did reach a stage where it would have likely spurred Mode L use, except that the Mode L transponder developed sensitivity problems. It was infrequently used for communications and occasionally for experimental purposes.

The combined Mode JL will have its first space test next autumn when the latest Phase 3 satellite, Phase 3C, is launched. With Mode JL, 2-meter and 24-cm uplinks each result in 70-cm downlinks. Given the user equipment shown for Mode J in Table 3, the SSB user can expect an average downlink signal-to-noise ratio (S/N) of 10.5 dB (see Table 4). Mode L users do a little better on average with about 11.3 dB

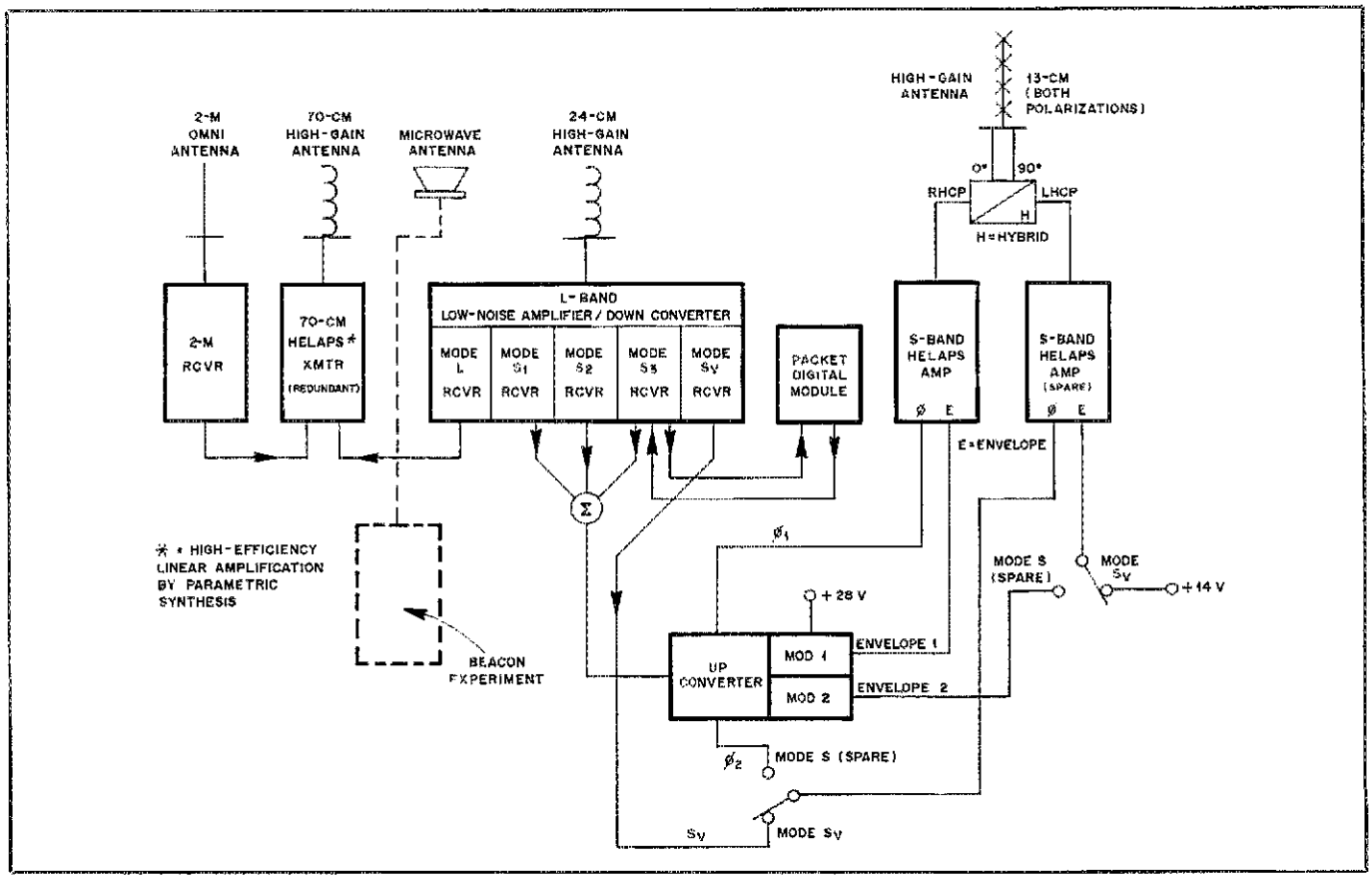


Fig 3—Block diagram of Phase 4's transponders and their capabilities (see text).

Table 2

General AMSTAR System Description, Space Segment

JL Transponder

- High-power linear transponder
- 120-W PEP output
- Mode JL: 2 meters and 24 cm up; 70 cm down
- 500-kHz-bandwidth downlink (approx 175 kHz at 2 m; 325 kHz at 24 cm)
- Global beam coverage, all bands
- Spacecraft antenna gain:
  2 m: 2.1 dBi
  70 cm: 12.5 dBi
  24 cm: 16.0 dBi

S Transponder

- Medium-power linear transponder
- 50-W PEP output
- Mode S: 24 cm (1260 MHz) up; 13 cm (2401 MHz) down

Subtransponders:
S_1: 100-kHz passband for "normal" mode (FDMA) global communications
S_2: 100-kHz passband for 20 voice repeater gateway interconnects (TDMA)
S_3: Packet gateway interconnect; nominally 19.3 kbits/s
S_4: The S_2 transponder used in broadcast mode
S_V: Integrated Services Digital Network (ISDN) transponder; 500 kbits/s

- Global beam coverage, uplink and downlink bands
- Spacecraft antenna gain:
  24 cm: 16 dBi
  13 cm: 16 dBi

Microwave Experiment

- Possible 10-GHz stable source for link tests and equipment alignment

Table 3

Preliminary User Equipment Requirements

Mode J

Receive antenna: 15.0 dBi (on-axis)
Preamp noise figure: 1.0 dB
Feed line + misc loss: 1.3 dB
System G/T: −9.8 dB/K
Transmitter power output: 10 W (avg)
Transmit antenna gain: 13.0 dBi (on-axis)
Feed line + misc loss: 1.3 dB
Transmit EIRP: 20.2 dBW (avg)
(105 W)

Mode L

Receive antenna: 15.0 dBi (on-axis)
Preamp noise figure: 1.0 dB
Feed line + misc loss: 1.3 dB
System G/T: −9.8 dB/K
Transmitter power output: 10 watts (avg)
Transmit antenna gain: 19.5 dBi (on-axis)
Feedline + misc loss: 0.3 dB
Transmit EIRP: 29.2 dBW (avg)
(832 W)

Mode S_1 (General Linear Communications Transponder)

Single dish antenna for TX/RX: 1.5 m (5 feet); dual feed with 50% efficiency.
Receive antenna gain: 28.5 dBi
LNA noise figure: 1.0 dB
Pointing loss: 1.0 dB
Feed line + misc loss: 1.1 dB
System G/T: +4.7 dB/K
Transmit antenna gain: 23.0 dBi
Transmitter power output: 10 W (avg)
Transmit misc losses: 1.3 dB
Transmit EIRP: 30.0 dBW (1000 W)

Mode S_2 (Voice Gateway Interconnect)

Same as S_1 station equipment except:
Feed line + misc receive loss: 0.6 dB
Receive noise figure: 0.7 dB
System G/T: +6.1 dB/K

Mode S_3 (Packet Gateway Interconnect: 19.2 kbits/s)

Same as S_2 station equipment

Mode S_4 (Receive Only Gateway Interconnect-Broadcast Mode)

Same as S_2 station equipment

(Mode S_V and microwave beacon user equipment continue under study at this writing)

Table 4

Link Performance

Mode	Avg Downlink S/N	Peak Downlink S/N	$\frac{E_b}{N_0}$
J	10.5 dB	21.5 dB	12.0 dB
L	11.3 dB	22.3 dB	12.8 dB
S_1	13.4 dB	24.4 dB	14.9 dB
S_2	15.0 dB	33.0 dB[1]	16.5 dB
S_3	—	—	13.2 dB
S_4	21.4 dB	39.4 dB[1]	12.3 dB[2]
S_V	—	—	12.0 dB[3]

[1]ACSSB use assumed; subjective improvement over unprocessed SSB equal to +8dB.
[2]Result obtained if the S_4 Mode were to be used as a dedicated packet link at 32 kbits/s.
[3]At a data rate 500 kbits/s.
[4]The ratio of energy per bit to the reference noise.

S/N ratio on SSB. Peak S/N (the best measure of signal quality in the short term) would be a very respectable 21.5 dB and 22.3 dB for the J and L links, respectively.

Mode S Transponder

Mode S will also fly on Phase 3C next autumn, but it will be a 70-cm to 13-cm version of Mode S and have only limited bandwidth (25 kHz and power of 1.3 W). On Phase 4, however, Mode S will comprise a special 24-cm-up and 13-cm-down transponder, and will provide some truly stunning performance for both voice and digital users of the transponder. The Phase 4 Mode S transponder is envisioned to comprise four subtransponders, each with its own AGC loops and function. Let's look at the function and performance of each of these subtransponders in more detail (refer to Fig 3).

S_1: General Linear Communications Transponder

The S_1 subtransponder will be used for the traditional type of OSCAR communications most users are currently accustomed to. Essentially, there will be 100 kHz of linear transponder passband for the normal Frequency Division Multiple Access (FDMA) use OSCAR users have been employing since AO-6 days. With 100 kHz, there's ample room for about 25 to 35 QSOs, depending on how well they are "packed" or "stacked." If there are three or four individuals per QSO, as there often are in satellite QSOs, about 100 simultaneous users could be accommodated in this S_1 transponder. S_1 performance would average about as good as AO-10 got at its best: S/N of about 13.4 dB. Moreover, under ideal conditions, S_1 could deliver 24.4-dB S/N, peak (see Table 4). In order to realize the specified user S/N, the Mode S_1 user equipment suite (or better) would be required. As seen in Table 3, it consists of a 1.5-m (5-ft) parabolic dish antenna with a dual 24-cm/13-cm feed. A 10-watt average uplink transmitter would produce 1000-watts EIRP using the recommended 23-dB dish gain at 24 cm.

S_2: Gateway Interconnect

The S_2 subtransponder will potentially provide one of the most important services as well as one of the most dramatic. S_2 will be a gateway interconnect transponder. A gateway is simply a portal from one type of network to another. A terrestrial voice repeater can be viewed as a network—a network of users with radios clustered around and interconnected through the repeater. Similarly, the satellite users can be viewed as a network. Interconnection of these networks is accomplished through a gateway. In this context a gateway could be a repeater equipped with an interface to the satellite. That is an uplink transmitter, a downlink receiver and associated interface and control circuitry. Functionally, the gateway serves to extend the repeater user's telecommunication into the satellite's network of users, and vice versa. Ideally, the interface would be transparent; that is, a user in either domain (terrestrial repeater user community or satellite user community) could be totally unaware of the existence of the facilitating gateway. Furthermore, by extension, a terrestrial repeater user linked to the satellite through a gateway could then be further linked through the satellite to a second gateway and its respective user community. Again, if the links were executed properly, users on either end of the dual gateway circuit could be unaware of the extended circuit supporting their QSO.

But there is much more to this gateway arrangement than novelty. Sure, it's amusing to visualize a pair of 2-meter handheld-radio users half a globe apart enjoying a pleasant chat, describing the radically different scenes before them. But because of the very disposition of equipment within the gateway arrangement, gateway operations using combinations of terrestrial repeaters linked via satellite offer an

extremely important approach to emergency communications.

A portable gateway established at a major flood or earthquake site could, for example, link the disaster reaction team to major relief organizations. Support and logistics control could be organized on an unprecedented level. On-scene leaders could communicate instantly with virtually any other QTH in the hemisphere 24 hours a day. A single hand-held radio hiked to a mountaintop airline crash site could communicate directly with state or federal authorities using a gateway on a nearby mountaintop. Establishment of DX communications for local or regional emergency centers could be as simple as implementing the gateway to the continuous coverage satellite(s).

Aside from the unprecedented potential for saving lives and property, gateway facilities would be available for more mundane use between selected repeaters on a daily basis. A limited number of repeater gateways would be authorized access for these routine QSOs when there were no emergency operations underway or if adequate spectrum sharing schemes were to be established. So one age-old fantasy many hams have harbored of having freedom of movement (being mobile or even foot-mobile) while engaging in a DX QSO would be realized simultaneously with the penultimate emergency communications resource!

Moreover, because the real communications "work" involved in communicating the 71,400 km (44,400 mi) or so to/from the geosynchronous satellite is accomplished by the gateway, the equipment burden on the gateway user is reduced to absolute minimum—essentially, only what is needed to communicate over the distance to and from the local gateway/repeater. And that could even be done in some cases with one of those new, ultra-miniature 100-mW hand-held rigs now on the market. For a community of terrestrial repeater users who have an interest in linking their repeater to others across the continent, it makes sense to pool their resources to establish a single gateway for the long-haul to/from the satellite, rather than each individual undertaking the cost. Thus, the gateway users sharing the resource would be, in effect, establishing a Time Division Multiple Access (TDMA) system for communicating with the world outside their local repeater community on a given "channel," one of several FDMA channels available.

Compare this TDMA access to the FDMA access users of the S_1 transponder enjoy. The S_1 FDMA user undertakes his own uplink/downlink burden. It costs him the equipment required to establish the link. For this investment he obtains time-independent use of the S_1 linear transponder, ie, he can use it whenever he cares to. On the other hand, the gateway TDMA user, having pooled the uplink/downlink resource in the form of the gateway equipment, may have to queue up to use the resource, ie, wait until it is free for his use. Thus, he has reduced his personal equipment burden at the cost of time-independent QSOing; he's time-sharing the resource with others.

To establish a gateway QSO, the user could simply pick up his hand-held and tap out a few numbers on the DTMF pad to instruct the terrestrial repeater to enable gateway mode. When the gateway replied with a signal indicating the satellite's Demand Assignment Multiple Access (DAMA) facility had responded, indicating a vacant channel pair was available, the gateway user would then tap out the code for the other gateway repeater he wanted to link to. The DAMA facility would then assign a channel pair to the originating gateway and the target gateway, and the link would be established for a preset time period. Users of the originating repeater would then be in contact with users of the target repeater.

The technology to achieve this type of circuit is not new. It derives straight from the pages of today's terrestrial cellular mobile telephone systems. Amateur Radio implementation of a similar system could be much simpler, however, since much of the redundancy and protection used in cellular mobile radio (to assure privacy and avoid misconnects) could be eliminated. It's obvious the S_2 subtransponder could spur enormous achievements in emergency as well as routine communications.

S_3: Packet Gateway Interconnect

Packet radio is generally acknowledged to be the area in which Amateur Radio is currently experiencing the fastest growth. Nearly 20,000 packeteers are now active, according to some sources. That's probably 10-15% of all active US amateurs. The proportion is expected to grow significantly in the last years of this decade. Local Area Networks (LAN) established around a digipeater hub have been linked to other LANs through VHF, UHF and even HF links. Coast-to-coast connectivity, albeit noninstantaneous, is now a fact. Messages dropped in specific packet-radio nodes often reach an individual destination addressee in a day or less. And they arrive there error-free.

The growth of the terrestrial networks is progressing in a step-wise, part directed, part random pattern. Interconnection between widely separated digipeaters on the East Coast and West Coast and some places in between is now possible. But what if these LANs and groups of LANs could be linked by satellite into a continental or even multicontinental network? That's exactly what the S_3 Packet Gateway Interconnect transponder is about. It could link dozens, even hundreds, of packet gateways together with a high-speed trunk. While our initial calculations were made based on a 19.2-kbits/s data rate, the trunk bandwidth could even be up to 56 kbits/s or more if projected-use estimates indicate more resource is warranted.

Recreational use of the packet gateway transponder would, of course, be part of its mission statement. But there is much more to it than merely the digital ragchew, even the DX digital ragchew. Just as the essential "justifying" rationale for the S_2 voice gateway interconnect transponder is the facility and capacity to provide unprecedented emergency communications capability, so, too, would the packet gateway interconnect transponder open new modes of public service. Today's Amateur Radio communicators are coming to well appreciate the tremendous benefits packet radio has over more traditional modes such as CW and even RTTY. Packet-radio messages are error-free, high-speed and self-documenting. Traffic handling, routing, sorting, etc, can all be automated. The result is often remarkable improvements in traffic throughput, accuracy and, most important, communications effectiveness. Portable packet terminals installed on jeeps, rescue trucks and the like are now appearing in and among forward-thinking Amateur Radio emergency-communications communities.

The S_3 transponder aims to afford the emergency LAN a port to a wider community. As required, the field operations center and even portables could communicate with regional or even national emergency-management centers to communicate status, request specific support and implement actions directed by headquarters via this channel. As with the S_2 voice gateway interconnect, S_3 would be available for recreational use, but earn its keep in providing unique emergency and general public-service communications resources as required.

S_4: Broadcast Mode Gateway Interconnect

S_4 is not a separate transponder, but rather a different mode of employment of the S_2 voice gateway interconnect subtransponder. By reallocating on-board resources, a broadcast capability of notable proportions could be established. As shown in Table 4, nearly 40-dB peak S/N ratio might be obtained using advanced SSB techniques. (Amplitude-compandored single sideband, ACSSB, is one means of achieving this very high level of S/N ratio performance.) That's as good as, and in some cases better than, commercial telephone circuits.

The S_4 Mode might be used for many routine and public-service activities. In routine use, ARRL W1AW bulletins might be sent to groups of terrestrial gateway repeaters. Listeners would use their VHF or UHF hand-held radios to tune in the bulletins on their local repeater. Groups of repeaters could be addressed selectively, say by time zone, by tone-encoded addressing. When a given repeater heard its address on the S_4 Mode downlink, it would interconnect the gateway's downlink receiver to the repeater transmitter to retransmit the audio to the repeater's coverage area. Local repeater operators could, of course, override the linking signal at will with local, manual intervention.

However, in the event of an emergency, groups of repeater gateways could be called up using the tone-activated alert scheme. In this way, news of regional or more general emergencies could be flashed to hundreds, even thousands, of repeaters in

a few seconds. Imagine the improvements in emergency response afforded. When combined with existing emergency communications structures at the regional and state level, the result could be unprecedented effectiveness in response to earthquakes, hurricanes, general tornado activity, sudden flood emergencies, and so forth.

On the more routine side again, the S_4 mode could help unify Amateur Radio by facilitating the teleconference radio net concept, which to this point has relied on terrestrial telephone network linking of a hundred or more repeaters several times per year. Imagine this concept expanded to several thousand repeaters on line. Moreover, the equipment requirements for a S_4 Mode Receive Only (RO) gateway are quite moderate. As shown in Table 3, a 1.5-m dish with a single 2.4-GHz feed, a routine LNA and a mixer to a convenient IF are all that would be required. By the time the S_4 mode flies, one could likely establish an S_4 RO gateway facility for $300 or less!

S_v: The Mode S Video Subtransponder

Advances in digital television and video data-compression techniques suggest to us there may at last be a good mesh between amateur TV (ATV) and OSCAR satellites. Previously, constraints of power and bandwidth have made anything but occasional forays with slow-scan TV (SSTV) impossible on OSCAR. Now, however, using video data compression techniques we believe it possible to include a transponder capable of relaying digital video at the rate of perhaps 500 kbits/s. Commercial and military developments using comparable rates are very encouraging. Thus, we have every reason to believe these leading-edge techniques will be available to advanced amateurs by the time S_v is on line.

A more general view of the S_v transponder is that it is a general-purpose, high-speed transponder and that it could (should) be configured to handle the Amateur Radio equivalent of the Integrated Services Digital Network (ISDN) now being fielded by telecommunications companies throughout the world. If this were done, bulk file transfer could be accomplished at astounding rates. The types of services that could be provided with the S_v transponder beyond these examples are numerous. Distribution of Amateur Radio software, articles and research papers are some examples that come to mind.

Using the S_v transponder as an ISDN facility for digital video, very-high-speed packet, digitized voice, file transfer, some combination of these or some new, presently unforecast mode is a matter for our study teams and the Amateur Radio community to decide. But it seems clear that this area could be as fertile as our collective imagination.

Microwave Experiment

A further module that could be included on board Phase 4 is a microwave-beacon experiment. Much work is being done using narrowband emissions as high as X-band (10 GHz). Imagine having a permanent 10-GHz beacon aboard AMSTAR to align antenna feeds, tweak LNAs and calibrate antenna positioning equipment. Such a field alignment tool might go far in advancing both interest and proficiency in the SHF bands. This experiment continues under study for possible inclusion.

Conclusion

Traditional OSCAR users have been a specialized lot. They have enjoyed many of the occasionally esoteric challenges becoming highly proficient on OSCAR involves. Tracking and figuring access are not bothersome chores but rather part of the fun to this dedicated bunch. But clearly the view of what's fun and what's not depends on one's interest. Certainly, an emergency communicator is less interested in calculating access to a satellite than communicating his emergency traffic! So unless something changes, OSCAR use will remain a special art practiced by a relatively small group of aficionados.

But it is now abundantly clear that the nature of the satellite game is about to change dramatically with the advent of Phase 4. These changes come about from two fundamental causes:

1) Maturation of OSCAR technology and technologists to where the media becomes transparent to the user, whereas previously the medium was in large measure part of the message (or reason for being on OSCAR). Thus, rather than evolve to further refinements of a traditional theme, OSCAR will be revolutionized to become a utility available to virtually anyone who wishes to participate. Acquisition of special equipment and skills will be minimized and, in essence, consolidated in the gateway concept. There, many participants can share the cost burden. The esoteric aspects of satellite communication can be offset and eliminated by more sophisticated engineering than has ever been incorporated. In sum, it is the highest form of the engineering discipline to make the inherently complex seem simple and generally accessible.

2) There is a growing, urgent need to make productive use of our incalculably valuable spectral resources. Where commercial interests see our UHF spectrum quite literally in terms of gigabucks (billions), you must be convinced the pressure to abscond with the heart of our hobby (our frequencies) will become enormous. We simply *must* do better to justify our continued occupancy of the UHF bands, lest we lose them forever. Far from being the sounds of distant cannons, the threat is clear and present. If we don't move now, we could very well face significant challenges for our spectrum at the next World Administrative Radio Conference (WARC)—or even sooner if the FCC opts to change those secondary allocations. An Amateur Radio satellite using key UHF frequencies in providing real, tangible, demonstrable public service on a regular basis is one of the best ways we know to ensure we retain our spectral resources. Building Phase 4 and using it for the general public benefit is not just a further expression of altruism, then, but an element in the preservation of our most valuable resource—spectrum—for decades to come. We *must* make better use of our UHF spectrum soon or it surely *will* be gone!

The challenge of Phase 4 is this: Come to understand the potential for unprecedented levels of public service and technical achievement; develop the plan to implement the system that manifests the potential and wisely manage the powerful resource that results.

Is Amateur Radio up to this challenge? We obviously believe so, or we would not have brought this preliminary vignette to your attention. We sincerely believe Phase 4 will be operational in about five years and that it will forever change the nature of our hobby. To realize its full potential, however, substantial effort must be dedicated to first eliciting suggestions on meshing the strawman system with actual needs of the user community. For example, the operational requirements of the emergency communications community are best known by the emergency communicators. The direction and objectives of the packet-radio activity are best known to the packeteers, etc. Thus, one of AMSAT's main challenges is to "network" (establish working relations with) its system architects and engineers with the user communities.

To that end, AMSAT is briefing leaders in various Amateur Radio communities regarding the nature of the project and progress toward specific goals. Conversely, AMSAT is actively seeking inputs on technical and organizational matters. Would-be participants should understand at the outset, however, that this is a long-term project that will require comparably long-term dedication by the participants. ATVers, microwave experimenters, repeater organizations, emergency communicators, traffic networks, packet-radio users and all those with a long-term interest are invited to share their ideas on Phase 4 and potential applications. Invitations to participate in applications research studies will be issued in 1987 to individuals and groups who may contribute to the program. Expressions of interest may be sent to AMSAT, Phase 4 Program Manager, PO Box 27, Washington, DC 20044. (Please include a business-size SASE if a reply is sought.)[1]

Phase 4 can change Amateur Radio for the better by providing real public service while simultaneously providing space-age telecommunications to a broad cross-section of Amateur Radio. In that sense, it's not something that we would *like* to do, but rather something we simply *must* do!

[1]AMSAT membership is open to the public. Members receive the biweekly newsletter, *Amateur Satellite Report*, and other benefits. Inquire about membership and how to get started in OSCAR by writing to AMSAT.

Join Amateur Radio's Action Team

New technologies mean more opportunity for today's ham in the ARRL Field Organization.

By Richard Palm, K1CE
ARRL Field Services Manager

You're an average ham. You've worked a lot of DX, home-brewed your antenna tuner, made lifetime friends through 2 meters. You've discovered new things like packet radio, but don't know what to do with its great capabilities. Amateur Radio's given you a lot. Want to know how you can give something back to Amateur Radio, use your new packet equipment...*and have fun at the same time?* Look at what some hams are doing with new technologies like packet radio right now:

> Dateline Los Angeles—Official ARRL *Amateur Radio Emergency Service* personnel in Orange County were put to an extreme test on August 31 after an Aero Mexico DC-9 jet on approach to the Los Angeles International Airport collided in mid-air with a Piper Tomahawk in the skies over the suburb of Buena Park. Both aircraft plunged to the ground, killing all passengers and crew, destroying seven homes and killing at least five in those homes. ARES hams stepped in to provide the hub of communications with packet and VHF FM voice operations for Red Cross relief efforts. Ham 2-meter mobile and packet units were dispatched to the disaster scene, bypassing roadblocks to coordinate local communications with Red Cross and other relief agencies. The operators performed like a "well-oiled machine," proving once again the value of predisaster ARES emergency-communications drills.

You could be one of those hams next time there is an emergency near you: a tornado in Kansas, hurricane on the eastern seaboard, earthquake in California, volcano in Washington, flood in Louisiana or fire in Boston. *Participate*...your skills as an official ARRL Field appointee set you apart.

While ARES emergency communication is critical to the amateur community's emergency response, rising to the FCC's public-service mandate to Amateur Radio, it is only one aspect of today's active *ARRL Field Organization*. ARRL *Field appointees* work in *all* phases of Amateur Radio. It is a proud League tradition. League volunteers can serve the public in message handling, expert parades and marathons communications, or fellow amateurs in government liaison, public relations, and the technical arena. League volunteers are organized, trained and ready with the newest Amateur Radio tools. They command a great deal of well-deserved respect not only among their colleagues in the Field Organization, but also by the local amateur community at large.

Each ARRL Section (Sections generally follow state lines) has a *Section Manager* elected by the section's ARRL membership. The Section Manager leads the Field activities in his or her Section, and makes official League appointments.

What Job Is Right for Me?

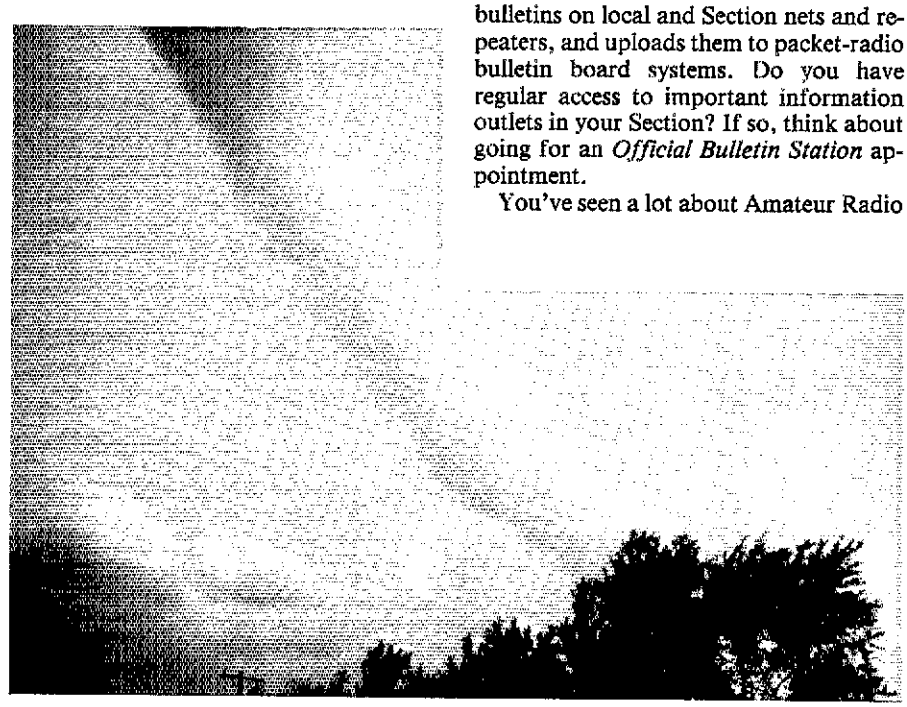
Remember the Mexico City earthquake? It was modern League traffic experts who provided emergency-message communications through packet radio, voice and CW networks for Red Cross, and relieved the anguish of thousands of relatives with messages that loved ones were safe.

Do you download messages from your local packet bulletin board, or handle messages on traffic nets? Then think about an appointment as an *Official Relay Station*. Next time there's a communications emergency, you'll be ready to help.

Official Emergency Stations are equipped with emergency power, so when commercial mains are down, communications are still up. Their operators are trained for organized emergency response, knowing how to handle volumes of messages by digital, voice and CW modes—all while keeping cool heads under pressure.

Disseminating vital news of interest to radio amateurs, the *Official Bulletin Station* transmits official ARRL and local bulletins on local and Section nets and repeaters, and uploads them to packet-radio bulletin board systems. Do you have regular access to important information outlets in your Section? If so, think about going for an *Official Bulletin Station* appointment.

You've seen a lot about Amateur Radio



When tornadoes touch down, wreaking death and destruction, ARRL emergency communicators use emergency power and high-speed digital modes to provide reliable communications for disaster relief efforts.

More and more *Official Bulletin Stations* are employing packet-radio bulletin board stations for conveying important information bulletins to fellow amateurs.

ARRL *Public Information Assistants* often appear on TV news when Amateur Radio makes the evening edition.

on national and local TV lately. Mexico City, Space Shuttles and Field Day provided much media exposure. You can thank a League *Public Information Assistant* for it. Have you got an "in" with local news media? If your shack is photogenic, lending itself well to TV crews doing live spots when ham radio makes the evening edition, then think about applying for a PIA appointment. The active PIA makes sure Amateur Radio is seen in a favorable light by the public. The PIA is often responsible for recruiting neighbors and others in the community into the ham-radio ranks through his or her public relations efforts.

"How do I interface my computer with my new packet TNC?" The *Assistant Technical Coordinator* is the League's technical information fountain for fielding such questions. ATCs also step in to assist with local RFI problems. It's amazing how much a little knowledge about the RF jungle can mean in resolving disputes.

Assistant Technical Coordinators also provide the technical backbone for local emergency-communications plans. It's important that equipment works right in an emergency-communications situation. If you have some technical knowledge you're willing to share with your fellow amateurs, consider an ATC appointment.

Amateur Auxiliary

League *Official Observers* monitor popular amateur bands and send friendly notices to amateurs advising them of signal problems such as distortion, key clicks, hum, chirp or more serious problems such as out-of-band operations. The idea is to save the operator from receiving an FCC citation.

Official Observers are also trained and certified members of the Amateur Auxiliary to the Federal Communications Commission. In addition to the routine monitoring described above, they now play an active role in evidence gathering in serious cases to be brought to the attention of Regional Monitoring Stations and ultimately the FCC. *Official Observers* must pass a test on knowledge of the Amateur Auxiliary program, technical awareness and the FCC Rules. Modern observers have up-to-date equipment to monitor new digital modes.

The ARRL Field Organization

The National Traffic System
Amateur Radio Emergency Service

Official ARRL Volunteers Serving Their Fellow Radio Amateurs And The Public

— A League Tradition —

ARRL Eastern Massachusetts SM Luck Hurder, KY1T, has been one of the most active Official Observers in the country and was instrumental in achieving local Amateur Auxiliary agreements with the Boston FCC Regional Office. He maintains a complete and modern station on Cape Cod.

And Beyond...

After you've done your time on the "line," you may want to consider a "staff leadership" position as part of the Section Manager's immediate cabinet. There are nine Section Leadership positions that oversee the section's activities in Amateur Radio:

•*Assistant Section Managers* assist the Section Manager as generalists or specialists. For example, an ASM can be used by the SM to cover a geographically remote area in the section, visiting clubs there and handling other section business on behalf of the SM. Or, an ASM can serve as section advisor on matters within his or her area of expertise: packet radio, for example. An ASM could be appointed to edit a section newsletter.

•The *Bulletin Manager* is the key information management specialist who oversees *Official Bulletin Station* activity in the Section. Similarly, the *Public Information Officer* coordinates the work of the section's *Public Information Assistants* and is often employed in the media industry. The PIO is often called upon to serve as liaison with news agencies in a disaster.

•The *State Government Liaison* monitors state legislation affecting Amateur Radio, and musters the troops when a position needs to be taken to state decisionmakers. It's a critical job when it comes time to defend our service against overzealous state governments trying to pass unreasonable antenna height, RF radiation and other laws. Many SGLs work in state and local government capacities, and thus have "inside lines" that can help amateurs during the legislative process.

•The *Affiliated Club Coordinator* acts as the SM's ambassador of goodwill to the section's ARRL-affiliated clubs. He or she gives club talks and promotes affiliation among non-affiliated clubs. The ACC is a "people" person representing ARRL in one of the important resources in Amateur Radio—clubs. The successful ACC steers affiliated clubs toward membership in the ARRL club elite—the Special Service Clubs.

•The *Section Traffic Manager* conducts the symphony of *Official Relay Stations* and *Net Managers* to see that traffic flows smoothly through the pipes, including new packet-radio bulletin-board systems and maintaining the section's activity in the National Traffic System—one of the League's oldest and most-famous services.

•The *Section Emergency Coordinator* is the problem solver when it comes to emergency communications, rallying the support of his or her team of *District Emergency Coordinators, Emergency Coordinators, Official Emergency Stations* and registered ARES stations.

•The section's technical oracle, the *Technical Coordinator,* advises section members on just about everything under the solar cell. He/she helps Assistant Technical Coordinators help section hams with their technical questions and RFI problems.

•The *OO Coordinator* advises Official Observers and interfaces with other critical Amateur Auxiliary volunteers to help keep amateur stations' operations clean, and within FCC Rules... and help FCC clean up stations that aren't.

ARES members play a key communications role in support of the Government's National Disaster Medical System—when a disaster strikes, hams provide reliable digital and other communications for hospitals and medical personnel at the airports relaying vital triage information.

When a train carrying toxic phosphorous gas derailed and exploded, sending plumes of the deadly vapors into the skies of Miamisburg, Ohio, recently, ARRL Ohio Section emergency teams swung into action, supplying life-saving communications for on-the-scene disaster relief agencies.

See your local Field Organization recruiter, your Section Manager, for more information on how to become a member of today's active Field Organization. You'll find your SM's name, address and phone number on page 8 of any *QST*. For a free Field Organization information brochure (FSD-300) write to ARRL, 225 Main St, Newington, CT 06111. (An SASE would be appreciated.)

Happenings

Conducted By Phillip Sager, WB4FDT
Manager, Regulatory Information Branch, ARRL

ARRL Election Results

Counting of votes for ARRL Division Directors and Vice Directors took place at Headquarters on November 20, 1986. Newly elected representatives and those who were unopposed will take office January 1, 1987, and will serve two-year terms.

Here are your newly elected representatives, and the vote counts for each candidate:

Central Division

For Director: Edmond A. Metzger, W9PRN—2268; James J. Coleman, KA6A—1887; Bruce B. Woodward, W9UMH—653.

Director Metzger has been reelected to the Central Division post. A former Assistant Director and Vice Director, Ed lives in Springfield, Illinois, and is active in the Sangamon Valley Radio Club. He is an Advanced class operator and, in 1976, won a special award from the Starved Rock Radio Club for his numerous public service activities. Ed served as General Chairman of the Central Division ARRL Convention in 1961 and 1968. He is an OBS, and is a member of ARES and the A-1 Operator Club. He is a life member of the QCWA and a Charter Life Member of the ARRL. As chairman of the League's Administration and Finance Committee, Ed was instrumental in the modification of the budget to give the Board a better understanding of fiscal policies. Ed has been licensed since 1941, and is retired as comptroller of a Midwestern theater chain.

For Vice Director: Howard S. Huntington, K9KM—3035; Kenneth A. Ebneter, K9EN—1732.

Howard returns as Vice Director of the Central Division. Continuously licensed since 1959, he lives in Lake Zurich, Illinois, and is manager of the Engineering Section, International UHF Mobiletelephone Development, at Motorola in Schaumburg, IL. Howard holds a BSEE from Purdue University and an MSEE from the Illinois Institute of Technology. He is past Board Liaison to the Contest Advisory Committee and is Chairman of the Board of the Northern Illinois DX Association. He holds various contest and operating awards, including DXCC. Howard is active as an Amateur Radio speaker for numerous clubs and civic organizations.

Hudson Division

For Director: Stephen Mendelson, WA2DHF—2590; Linda Ferdinand, N2YL—1097; Vincent J. Biancomano, WB2EZG—728.

Hudson Division Vice Director since 1983, Steve was first licensed in 1959 and is a Life Member of ARRL. He served as Board Liaison to the ARRL Public Relations Advisory Committee and is editor of the *Repeater Coordinator's Newsletter*. He is very active in various public service activities, and has been involved with communications for the 1980 and 1984 Olympic Torch runs, the NYC Marathon and Hands Across America. Steve is active in many area radio clubs, including LIMARC.

For Vice Director: Paul S. Vydareny, WB2VUK—2469; Gary J. Ferdinand, W2CS—1960.

Paul has been the Eastern New York Section Manager since 1980. His main interests are public service and emergency communications. Paul has served as a Section Emergency Coordinator and was member of the League's Emergency Communications Advisory Committee. He is active on numerous traffic nets and packet radio Army MARS.

New England Division

For Director: Thomas Frenaye, K1K1 (unopposed).

Tom, elected to his second term as New England Division Director, lives in Unionville, Connecticut. He is presently employed as a Management Information Systems Analyst for Phoenix Mutual Life Insurance, and was an Assistant Communications Manager at ARRL HQ 1977-1981. He holds an MA in political science. First licensed in 1964, Tom holds an Extra Class license. He has several operating awards, including A-1 Operator, 5BDXCC and DXCC Honor Roll. He is former President of the Yankee Clipper Contest Club and a former member of the ARRL Awards Committee.

For Vice Director: Robert B. Weinstock, KN1K—1982; Clevis O. Laverty, W1RWG—1924.

First licensed as WA3IYS in 1967, Bob is an Extra Class licensee and an ARRL Life Member, and holds an ARRL 40-WPM Code Proficiency award. Bob is also an ORS, and presently serves as Eastern Area Director of the NTS Transcontinental Corps. Bob, 32, is a member of the New England Packet Radio Association. He works at the WGBH Educational Foundation and at the Massachusetts Commission for the Deaf and Hard of Hearing in Boston.

Northwestern Division

For Director: Rush S. Drake, W7RM—2523; Mary E. Lewis, W7QGP—1777.

Rush has been on the air for over 52 years, and is a member of QCWA and a Life Member of ARRL. He is an Extra Class licensee, and in 1984 was elected Vice Director of the Northwestern Division. He has served as Board Liaison for the Contest Advisory Committee, and is presently serving as Board Liaison for the DX Advisory Committee. He retired in 1979, after 32 years of marketing in technical sales as a manufacturer's representative.

For Vice Director: William R. Shrader, W7QMU—1908; Bradley Wells, KR7L—1353.

Bill was first licensed in 1951. He is a Life Member of the ARRL and a member of QCWA. He has taught numerous Amateur Radio classes since 1971, and was runner-up for the Herb S. Brier, W9AD, Memorial Instructor of-the-Year award. He has been Section Manager of Oregon since 1981.

Roanoke Division

For Director: Gay E. Milius, Jr, W4UG (unopposed).

Gay returns as Roanoke Division Director, and is an Extra Class licensee. He is a retired attorney and a retired commander in the US Navy Reserve. Gay served as Vice Director of the Hudson Division 1950-51 and Vice Director of the Roanoke Division 1977-80. Licensed since 1940, W4UG is a Life Member of ARRL. Gay has held positions of responsibility in many Amateur Radio clubs and organizations, such as the Washington (DC) Mobile Radio Club, the Virginia Beach ARC and the Virginia Century Club. He was also co-organizer of the Maritime Mobile Service Net. Among his many awards are DXCC Honor Roll (mixed and phone), 5BDXCC, WAC, WAS, Bicentennial WAS, WPX Honor Roll, A-1 Operator Club and a National Certificate of Merit.

For Vice Director: John C. Kanode, N4MM (unopposed).

Returning as Vice Director, John lives in Boyce, Virginia, and does electronic circuit research and development for IBM. An Extra Class licensee, he became an Assistant Director in 1975, and is a former ARRL QSL Bureau manager for W4, K4 and N4 calls. He has served on the ARRL DX Advisory Committee and the CQ Contest Committee. N4MM holds DXCC Honor Roll, DXCC (phone and CW), 5BWAS, 5BDXCC, 6-Meter 600 Club, WAZ and WPX awards. Licensed since 1952, John is a member of AMSAT, QCWA and IARC.

Rocky Mountain Division

For Director: Marshall Quiat, AGØX (unopposed).

A new Director, Marshall is a practicing attorney and a former district judge and state legislator. He served as Vice Director 1982-86. He is a past president of the Denver Radio Club and a member of the ARRL Digital Committee, which deals with packet radio and amateur digital communications, and is a member of the Legal Strategy Committee. A Life Member of ARRL, AGØX was also the legal committee chairman of the 1976 ARRL National Convention.

For Vice Director: Hugh Winter, W5HD (unopposed).

Hugh has been President of the Albuquerque Amateur Radio Club, Caravan Master of the Amateur Radio Caravan Club and President of Road Runner Chapter of QCWA, and has held other offices in several clubs. He is an Assistant Section Manager and Affiliated Club Coordinator of the New Mexico Section, a Director of QCWA 1984-86, and Vice President of the Amateur Radio News Service

1983-85. Hugh retired to New Mexico after working as a consulting engineer in the Broadcasting field, and as a university professor.

Southwestern Division

For Director: Fried Heyn, WA6WZO (unopposed).

Fried, a resident of Costa Mesa, CA, is a high school mathematics teacher. He holds an MA degree in Education. Fried's professional experience includes serving as Production Coordinator at Collins Radio from 1965 to 1968.

An ARRL Life Member, Fried is involved with AMRAD, AMSAT, HANDI-HAMS, MARS and a host of other Amateur Radio organizations. His ARRL awards include a National Certificate of Merit, Public Service Honor Roll, Brass Pounder's League, 5BWAS, DXCC Honor Roll and various contest awards.

Twice a Section Manager, Fried was also Vice Director of the Southwestern Division and an Assistant Director. He holds an Extra Class License, and is active in contests, DXing and net activities.

For Vice Director, Wayne Overbeck, N6NB (unopposed).

Wayne is a resident of San Clemente, CA, and holds a PhD from UCLA and a JD from Loyola Law School. He has written three college textbooks, two of them on communications law. He is a professor at California State University-Fullerton and USC, and a part-time attorney.

Wayne is former chairman of the ARRL Contest Advisory Committee and coordinator of the 1977 and 1980 West Coast VHF Conferences. First licensed in 1957, N6NB holds an Extra Class license. He won the ARRL Technical Excellence Award for designing the "quagi" antenna, was named Radio Amateur of the year at Dayton in 1980, and won the John Chambers Memorial Award of the Central States VHF Society. Wayne has published some 25 articles in Amateur Radio magazines and, before becoming Vice Director, coauthored a book of computer programs for Amateur Radio. He has given approximately 75 talks at clubs and conventions on antennas, VHFing, portable operating, computers and other topics. Wayne has been active in every phase of Amateur Radio at one time or another, and is a Life Member of ARRL and AMSAT.

West Gulf Division

For Director: Jim D. Haynie, WB5JBP—2660; Raymond B. Wangler, W5EDZ —2085.

A new Director, Jim was first licensed in 1971. He has served as President and Vice President of the Dallas Amateur Radio Club, and is Assistant Dallas County RACES officer. He is currently the President of the Southwest Radio Society. He has taught numerous Amateur Radio classes, with over 1500 students becoming licensed. Jim has participated extensively in disaster communications, including Hurricane Alicia and the Mexico and Guatemala earthquakes. He is also a member of AMSAT and the Texas VHF-FM Society.

For Vice Director: Thomas W. Comstock, N5TC (unopposed).

Tom, of College Station, TX, is a Life Member of the League. He teaches at Texas A&M University, and is very active in Amateur Radio public service, having been a member of the Transcontinental Corps, a liaison for NTS region-to-area net, a liaison for section-to-region net, and an NCS of the region and section phone and CW nets. Tom holds the BPL, A-1 Operator Club, Public Service Honor Roll and DXCC (mixed and CW) awards.

ARRL's Honorary Vice Presidents: Thank You!

Any organization's most important resource is people, particularly those individuals who have tirelessly contributed their time and talents over a period of time to making that organization the best it can be. For the ARRL, that distinguished group includes our Honorary Vice Presidents. In tribute to them, particularly for their dedicated service to Amateur Radio and ARRL members as well over the years, we take this opportunity to remind members of these outstanding individuals who have helped place ARRL in the position of leadership it enjoys today.

Dr. R. O. "Doc" Best, W5QKF
Robert York Chapman, W1QV
Charles G. Compton, WØAF
Robert W. Denniston, WØDX
J. A. "Doc" Gmelin, W6ZRJ
John R. Griggs, W6KW
George Hart, W1NJM

NEW RULES ON PACKET TRAFFIC

The FCC has issued its Memorandum Opinion and Order in PR Docket 85-105. It amends the rules to allow packet stations on frequencies of 50 MHz and above to retransmit third-party traffic while under automatic control without the control operator being present.

The Commission said that the nature of packet radio was such that control operators of intermediate retransmitting stations were unable to screen retransmitted messages. It would now be up to other amateur stations who were monitoring the traffic to detect the introduction of messages from nonamateur stations. The Commission noted that "The present packet network ... is vulnerable to unauthorized use. The design of future retransmitting networks should take these matters into account more fully."

The Commission acknowledged the ARRL's comments concerning safeguards in its AX.25 packet protocol. The ARRL had stated that detailed records of packet message transfers and histories of who accessed them were automatically maintained. All messages also include a serial number and the originating station call sign, making it possible to establish a "trail of accountability." These assurances by ARRL were enough for the Commission to provide this exception in its rules.

The Commission deferred any consideration of expanding the exception to packet stations on HF because of the possibility of interference to other stations. The Commission took note of an ARRL study to coordinate a small group of packet radio stations who plan to request a special temporary authority to operate packet stations under automatic control to determine their interference potential. "Organized ... projects conducted by a manageable group of amateur stations such as that planned by ARRL will be helpful in determining any rules necessary to prevent interference to ... amateur operators."

The following are the exact rule changes:

97.80 Operation under automatic control.

(b) No amateur station may be operated under automatic control while transmitting third-party traffic, except an amateur station retransmitting digital packet radio communications on frequencies 50 MHz and above. Such stations must be using the American Radio Relay League, Inc. AX.25 Amateur Packet-Radio Link-Layer Protocol, Version 2.0 October 1984 (or compatible). The retransmitted messages must originate at an amateur station which is under local or remote control.

97.114 Third-party traffic.

(b)(4) Third-party traffic from an amateur station under automatic control, except under the conditions specified in 97.80(b).

WRITTEN EXAMINATION CREDIT

The FCC has issued its Report and Order in PR Docket 86-63, allowing examination credit for written elements passed above the Novice class.

We had briefly discussed this docket in the December Happenings column based on an FCC news release. The release stated that the new rules would go into effect December 1, but in the text of the Report and Order, the date has been moved back to December 15, 1986, contingent upon the Office of Management and Budget approval of the revisions necessary to FCC Form 610.

In the R&O, FCC states: "The present method of first requiring successful completion of the telegraphy examination element reflects the former needs of the FCC when we administered examinations. Under the Volunteer Examiner system, it is clear that there is no reason to disallow credit for a written element passed within the previous year. If VEs find it useful and convenient to administer a written element to an applicant who has failed the telegraphy element or to administer written elements before telegraphy elements, they should be able to do so."

The Commission will also extend examination credit to those awaiting the arrival of their first FCC license, especially those who have passed Elements 1(A) and (2) under the Novice Volunteer Examiner system. Since these candidates usually have no Certificate of Successful Completion (CSCE), they will be given examination credit on the basis of a photocopy of their pending application.

FCC will continue to require submission of a Form 610 before each examination and to require the administering VEs and the coordinating VEC to forward an application

Fighting City Hall?
A Success Story Against Restrictive Antenna Ordinances

Amateur Radio operators in Upper Dublin Township, Pennsylvania were surprised to read that their local governing body of Commissioners had scheduled a hearing to adopt an ordinance restricting the erection of antennas in their suburban Philadelphia community. While the ordinance seemed aimed at residents planning to install satellite "dishes," its broad-brush language would include all types of antennas. Enactment of the ordinance, for example, would have required that transmitting antennas cause no interference to adjacent property owners and limit the resident to one antenna structure on their property. Where several antennas were to be installed, the owner would need to mount them on a common support structure.

Reaction to the announcement was swift, if initially uncoordinated. The author called ARRL HQ requesting its antenna ordinance kit, and he was delighted to have the Regulatory Information Branch respond by volunteering to send the information by Federal Express. Other amateurs made contacts with the Township Manager to introduce themselves and express amateurs' concerns about the ordinance. From these contacts we learned that amateur antennas had been included in the ordinance because of concern that a regulation affecting only one type of antenna might be considered discriminatory if it did not also require other, similar types of structures to be regulated to the same degree. We were encouraged to find that the township officials were receptive and seemed to have an appreciation of Amateur Radio's contributions and empathy for our cause.

The hearing was attended by several dozen amateurs. The president of the Commissioners greeted me by saying that he did not expect a vote to take place on the antenna ordinance that night. "From the information we received from you, I feel sure we are going to have to take this thing back to the drawing board for some changes." In lieu of this information, and since there were several other times on the agenda, local amateurs made a short presentation and volunteered to lend their help in redrafting the ordinance.

A Committee consisting of the author, Ray Gillespie, KB3JW, Section Manager Kay Craigie, KC3LM, and County Communications Director Tom Gibson, W3EAG, met with representatives of the county planning commission. In a meeting that lasted several hours, amateurs were able to offer a number of constructive suggestions, most of which were readily accepted. Negotiation is a process of finding reasonable positions for each side, and we were unable to win the planners over to our view that any antenna height restrictions were undesirable. A compromise was finally reached where we jointly accepted the concept of an ordinance that would contain a 65 foot maximum antenna height.

A few months later the township scheduled a new public hearing on the rewritten ordinance, where it passed unanimously. This antenna case came to a successful conclusion for a number of reasons. A crucial factor was the major premise that a dignified, professional approach would be more successful than any other. Once that decision had been made, the course of our other actions was set and each step along the way seemed to flow naturally.

Too many amateurs have welcomed PRB-1 as a panacea, which it is not. Local governments still have a right to adopt regulations that protect the health, safety and welfare of their citizens, which can result in restrictive ordinances that still comply with PRB-1. Continued vigilance is needed on the part of everyone. The engine driving the current rash of restrictive antenna ordinances is the ubiquitous satellite antenna dish and it is capable of causing mischief for a long time to come.—*E. C. Pressler, Jr, W3ZXV*

only when the candidate has completed all elements required for the license.

The following are the exact rule changes.

97.25 Examination credit.

(b) Upon presentation of a certificate of successful completion of an examination (see Section 97.28(e)) for any examination element examiners shall give applicants for Amateur Radio operator licenses examination credit for any element that has been successfully completed within the previous 365 days. Examiners shall give applicants credit for Element 1(A) or 2 upon presentation of a photocopy of FCC Form 610 which has been submitted to the FCC indicating the applicant has qualified for the Novice operator license within the previous 365 days.

97.28 Examination administration

(e) A certificate of successful completion of an examination will be issued by the examiners to an applicant who successfully completes an examination element coordinated by a VEC under Subpart I. A certificate is valid for a period of 365 days from the date of its issuance.

$4.35 FOR ARRL VEC EXAMS AFTER JANUARY 1

Effective January 1, 1987, the maximum allowable reimbursement for out-of-pocket costs for a volunteer administered Amateur Radio examination will be $4.37. This amount is based on a 1.87% increase in the Department of Labor Consumer Price index between October 1, 1985 and September 30, 1986.

Each volunteer examiner and each volunteer examiner coordinator may be reimbursed by examiners for out-of-pocket expenses incurred in preparing, processing or administering examinations for amateur operator licenses above the Novice class. The amount of the reimbursement from any examinee for any one examination at a particular session, regardless of the number of examination elements taken, must not exceed $4.37.

ARRL VEC will, as in previous years, round this amount to the next lowest nickel and charge $4.35 after January 1.

NTS TRAFFIC TO HQ

Recently, there has been a spate of messages arriving at the W1AW-4 packet bulletin board or via NTS that relate to League business. FCC rules disallow use of Amateur Radio for communication involving the "regular business" of any organization, and that includes the ARRL! While ARRL volunteers, such as officials of the Field Organization, can discuss League affairs with one another on the air, communication with a paid employee of ARRL regarding League business is forbidden. Business traffic, in this context, means not just financial transactions, but *any* activity that an ARRL employee is paid to do, which covers just about everything that is done at HQ. Please exercise discretion when sending messages to HQ. If you have any doubt about the propriety of a message, call or write *instead*.

J. LINCOLN "MAC" McCARGAR, W6EY

"Mac" McCargar, W6EY, passed away on October 26 at the age of 90. He was the Pacific Division Director from 1938 to 1946, ARRL Vice President from 1946 to 1950 and an amateur since 1911. He became proficient in Morse as well as Continental code while railroading with the Southern Pacific. A chief radioman in the Navy in WW I, Mac was the chief in charge of radio on the *USS George Washington* during one of the President Wilson's peace trips to France. He lived in Capitola, California.

FCC DELAYS ITS PAPERWORK

Until the past month or two, we were accustomed to seeing a mimeographed copy of FCC Orders a few days after the adoption of them and the issuance of a news release. All this has changed: In the interest of economy, the FCC now sends these orders by electronic means to the Department of Commerce, where they are then printed out and released. The format is different in appearance, the type seems smaller—and the process is lots slower! From experience so far, it appears we'll have a wait of a few weeks instead of a few days after the news release to receive the actual document.

VICTORY FOR HOME SATELLITE DISH OWNERS

A New York state appellate court has dealt a setback to efforts by local municipalities to ban or restrict home satellite dishes. The four-judge panel of the Appellate Division of the New York State Supreme Court reversed an earlier decision upholding the local zoning board's decision and sent the case back to the local zoning board for another review. The case began when the town of Hempstead refused to grant a permit for a 13-foot-wide dish a family wanted to put in the backyard of their home. The appellate court, citing the FCC ruling on satellite dish preemption, CC Docket 85-87, said that this federal regulation

prevents localities from using local codes to ban or restrict satellite dishes. This is one of the few cases HQ has seen regarding satellite dishes, and its precedent, especially from a large state like New York, should carry much weight nationwide.

REPEATER COORDINATION—THE FCC RESPONDS

In response to a question from an individual about repeater coordination in the Kansas city area, the FCC's Ray Kowalski, Chief of the Special Services Division of the Private Radio Bureau, said "The FCC intends to rely upon state and regional councils to recognize legitimate local coordinators. *The FCC will support their determinations* . . . Revocation of regional and state council recognition of the other local coordinator is *prima facie* evidence that the coordinator no longer has the support of a majority of those eligible to establish repeaters in the area it claims to coordinate. *Stations which operate with illegitimate repeater coordination do so at their peril.*" [emphasis ours]. The FCC further stated that "two active coordinators in the same large metropolitan area which do not take each other's coordinations into account may soon cause repeaters in the area to experience interference. And it is the licensees of these repeaters—not the coordinator—who risk sanctions if interference occurs."

CONSENT AGREEMENT TERMINATES MICHIGAN CASE

On August 28, 1986, a Consent Order became effective, approving a Consent Agreement between Robert J. King of Redford, Michigan, and the Chief, FCC Private Radio Bureau. The Consent Agreement terminated license revocation and suspension proceedings initiated by the FCC relating to the station and operator licenses issued to King. The Consent Agreement was approved by presiding Administrative Law Judge Joseph Chachkin on July 9.

The signing of the Agreement does not constitute an admission by any party of any violation of law, rules or policy. Under its terms, King agreed to make a voluntary monetary contribution of $500 to the US Treasury in recognition of the costs of enforcement efforts that ensure the efficient operation of Amateur Radio repeaters, and agreed not to interfere deliberately with Amateur Radio communications and to endeavor in good faith to operate in compliance with the Commission's Amateur Radio Service rules and the standards of good amateur practice.

The Chief, Private Radio Bureau, agreed that the document served to resolve all issues arising from allegations of violation of the amateur rules by King on or about March 31, 1985, and that no further action would be taken against King or the licenses he holds as a result of those allegations, in this or any other current or future proceeding.

Thus, the proceeding has been terminated with no findings or conclusions reached regarding the alleged violations by King of FCC rules. In seeking approval of the Consent Agreement, the Chief, Private Radio Bureau, noted that King otherwise had an unblemished record with the Commission.

Goldwater Scholarship Fund Contributions

The following have contributed $25 or more to the Senator Goldwater Scholarship Fund:

In memory of Harold C. Anderson, K1NBR, from Robert K. Whitten, WA1PLV; in memory of Richard M. Smith, W1FTX, from the following: Roger E. Corey, W1AX; Joseph A. Moskey, W1JMY; in memory of Robert Little, W1VYS, from Henry J. McDade, W1LMU, and Mr Spencer S. Dodd, W1CS; in memory of Harold Herli, WA7DTX, and George Amos, W7IJA, from Arizona Repeater Association; in memory of William "Herb" Horton from Mr Gus Derdevanis, W6LAS; James L. Vass, III, KI4XI; James M. Webster, W6WZX; the Long Island Mobile Amateur Radio Club, Inc.

SECTION MANAGER ELECTION NOTICE

To all ARRL members in the Nevada, Rhode Island, Northern New Jersey, San Joaquin Valley, Utah, Maryland-DC, New Hampshire, West Texas and NYC-LI Sections: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Incumbents are listed on page 8 of this issue.

To be valid, a petition 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 is suggested:

(Place and date)

Field Services Manager, ARRL
225 Main Street, Newington, CT 06111

We, the undersigned FULL members of the . . . ARRL Section of the . . . Division, hereby nominate . . . as candidate for Section 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 PM Eastern Local Time March 6, 1987.

Whenever more than one member is nominated in a single Section, ballots will be mailed from Headquarters on or before April 1, 1987. Returns will be counted May 19, 1987. SMs elected as a result of the above procedure will take office July 1, 1987.

If only one valid petition is received for a Section, that nominee shall be declared elected without opposition for a two-year term beginning July 1, 1987.

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

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

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

Richard K. Palm, K1CE
Field Services Manager

Call for Special Election in New York City-Long Island Section.

Because of the passing of New York City-Long Island Section Manager-elect Heywood Gerstner, WB2IAP, nominating petitions are hereby solicited pursuant to a special election for Section Manager in accordance with the procedures set forth above. The Section Manager elected as a result of this procedure will take office for an 18-month term beginning July 1, 1987.

West Texas Section Boundaries

ARRL members residing in Texas in the following counties, and to their west, are members of the new ARRL West Texas Section: Wilbarger, Baylor, Haskell, Jones, Taylor, Runnels, Tom Green, Schleicher, Sutton, Crockett and Terrell. The new Section includes the cities of Abilene, Amarillo, El Paso, Lubbock, Midland, Odessa and San Angelo.

Exam Info

NEW FEE FOR 1987

The fee for taking an exam (Technician class and higher) through the ARRL/VEC during 1987 is $4.35, which is below the maximum allowed by the FCC. The ARRL/VEC coordinates hundreds of Amateur Radio exam sessions in every state and in many countries. Printouts of registered sessions are available from the ARRL/VEC for a business-size SASE. All candidates must present their original Amateur Radio licenses (if any) to the Volunteer Examiner Teams at the session before testing (an FCC requirement). Further information on the Volunteer Examiner Program can be found on page 75 of December 1986 *QST*.

How's DX?

Conducted By Ellen White, W1YL/4
19620 SW 234 St, Homestead, FL 33031

DXCC "Fresh Start" Update

Minute 59 of the Second Meeting of the Board of Directors of the American Radio Relay League, Inc (Jul 24-25, 1986) tasks the ARRL DX Advisory Committee with studying DXCC restructuring. In line with that mandate, here's a mid-October 1986 news release (slightly edited) from the ARRL DX Advisory Committee Chairman, John Parrott, W4FRU.

What is wrong with the DXCC? If what I hear is correct, the DXCC has changed from a gentleman's club to a club in which there is little or no trust. Gone is the era of trust and good fellowship within the DX community. Enter almost two decades of red tape, some questionable judgements in applying the DXCC rules and, often, an unrealistic view of how the rest of the world should conduct its Amateur Radio affairs. Somewhere within the present and the past, there must be a middle ground that will yield the sort of DXCC program which will be fair to all and yet remain a test of one's skills and fortitude in the DX world.

The DXCC is not a basket case, and I wish to allay fears that the DXAC is committed to scrapping the present program or that it has an objective slanted toward a "fresh start." That option is just one of many which must be considered, and is perhaps the one least likely to be proposed. The DXAC is committed to recommending changes to those parts of the rules which are the sources of most of the grievances with the DXCC program. Specifically, the country criteria is overdue for an update to reconcile the piecemeal changes which have accrued over the years and to present it in language which is understandable to all amateurs. Accreditation has been and will remain a sticky issue until some realistic ground rules are established which recognize that all countries do not conduct their Amateur Radio affairs in the image of the USA. The DXAC has three subcommittees dedicated to studying these and other areas of the DXCC rules. Your inputs are essential. To date, some of you have recommended "gimmicks" which would diminish the difficulty of the awards program. If this is what the membership wants, let your voice be heard. In the meantime, the DXAC will proceed on the premise that the honor roll is not to be an "instant jackpot," but is reserved for those who have taken advantage of all DX opportunities to catch a new one. Whether it takes a year, five years or a lifetime to reach the top of the awards program is really not a consideration at this time.

Paraphrasing an overseas DXer's comment on our study, "The DXCC is recognized around the world as a prestigious club, and its awards program is the criterion for all countries." We intend to keep it that way.

[Editor's Note: The DXAC solicits your comments, in writing. All mail received is circulated to all committee members. Address your letters to the DXAC, ARRL, 225 Main St, Newington, CT 06111.]

HZ1AB

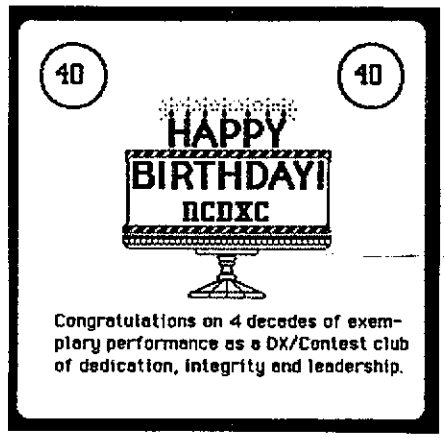
K8PYD shares the exciting news of Hot Ziggity One American Boy's September 23 return to the air.

This was a banner day. Starting at 6 AM, with eight of us on the work team, we moved everything out of storage and into the new location. The station is located in an enlisted military quarters building. We have an apartment, complete with bedroom, living room, kitchen and bath. All of the equipment and operation positions are in the bedroom, and we keep the living room furnished for meetings and the like. We made our first contact around 4 PM local time, a Russian on sideband, operating a Yaesu 902 barefoot. We do not as yet have 220 ac for the SB-220, but hope to have it on the air soon. With any luck we'll also have one of the beams up. We've just erected the Butternut vertical, ran eight radials across the roof and fired up. We hope to put the CL-33 on a stub tower on the roof in a few weeks, and that should improve things. As usual, QSL via K8PYD, Leo W. Fry, 5740 N Meadows Blvd, Columbus, OH 43229.

THE EARLY HISTORY OF THE NCDXC

The October 1986 issue of The NCDXC DXer, *the monthly periodical of the Northern California DX Club, contained a superlative tribute to this outstanding club by newsletter editor W6CF, sections of which were contributed by W6CTL and W6VG. We've reprinted parts of it here.*

It was back in August of 1948 that W6BUY PB and TI conceived the idea of a club strictly for DX men and, on the second Thursday of October 1946, 10 hams got together for the purpose of formulating plans and organizing a DX club: W6s BUY IKQ UPV QLH TT DUB TI EJA AED PB. (W6ITH, though not in attendance at that meeting, is generally regarded as a charter member.) By the spring of 1948, the club had grown to the extent that it was felt that it would be an advantage to print a monthly DX newsletter, the birth of *The NCDXC DXer*. From those 11 original members, the club grew to its present roster of 60.



The objective of the club is to promote cooperation among individuals interested in DX communications. The club activities include presentations and discussions concerning DXpeditions, rare countries, operating habits, propagation conditions, and repeater announcements of upcoming rare ones, outstanding DX speakers and DXpeditioneers. Club membership includes top personalities from every segment of the DX world. The development of lifelong friendships among club members has been a most frequent and happy by-product of its activities. issue contains a picture of the charter members of the club, and laudatory comments from early members, DX editors and the Division Director, KB6ZV. This editor and honorary member of NCDXC joins with a hearty FB! As VE3IPR, editor of the Canadian DX Association's *Long Skip*, so well put it last October: "There are few of us DX types, indeed few Amateur Radio operators worldwide, that have not been touched in some way by this club's activities."

CHINA

JARL's 8th mission to China included a group of amateurs of Gifu City (JA2), a sister-city of China's Hangzhou City (some 150 miles southwest of Shanghai). China operation is proliferating, and additional stations are underway at the Nanjing Institute of Engineering and at the Guanghou Athletic Association. Since Amateur Radio was legislated in the People's Republic of China in early 1982 (with club-station activity), it seems rather timely that we update the station addresses. (Please note, though, that authorization of guest operation is considered on a case-by-case basis.) Direct your inquiries to:

BY1PK, Chinese Radio Sports Assn, 9 Tiyuguan Rd, PO Box 6106, Beijing.

BY1QH, Qing-Hua University, PO Box 2654, Beijing.

BY1SK, Science and Technology Assn, PO Box 2916, Beijing.

BY4AA, CRSA Shanghai Branch, PO Box 205, Shanghai.

BY4AOM, Shanghai Institute of Electronics, PO Box 227, Shanghai.

BY4RB, Zhenjiang Youth Palace, PO Box 413, Zhenjiang.

BY4RN, CRSA Jiangsu Branch, PO Box 2405, Nanjing.

BY4SZ, CRSA Suzhou Branch, PO Box 51, Zuzhou.

BY5HZ, Hangzhou Athletic Assn (no address available at this writing).

BY5QA, Fuzhou Education Center, PO Box 507, Fuzhou.

BY5RA, CRSA Fuzhou Branch, PO Box 730, Fuzhou.

BY5RF, Science and Technology Assn, PO Box 209, Fuzhou.

BY8AA, CRSA Sichuan Branch, PO Box 607, Chengdu.

BY8AC, Chengdu Youth Palace, c/o CRSA Sichuan Branch, PO Box 607, Chengdu.

BY9GA, CRSA Lanzhou Branch, PO Box 12, Lanzhou.

BYØAA, CRSA Xinjiang Branch, PO Box 202, Wulumuqi.

GOLDEN JUBILEE OF DXCC AWARD

As announced in the September issue, 1987 commemorates the Golden Jubilee of our durable DXCC. Thanks to the early reminders by W6CF, the ARRL DX Advisory Committee and your elected ARRL Board of Directors have had time to plan ahead for this historic occasion. It should be a particularly interesting event, in view of current position (low!) of the sunspot cycle! Let's put something back into the "unique ability to foster and enhance international goodwill" aspect of DXing by being particularly courteous in our DXing, and perhaps strive a bit harder to make our contacts of interest to "the other guy" enroute to a new DXCC Award.

THE CIRCUIT

☐ **PY2PA:** Alex joined SKs in early November.

☐ **TA1P:** QSL direct via Ahmet Aybirtek, Box 33, Istanbul 34432, Turkey. (See photo of the first homebrew TA station; ITU Zone 39, Asia Zone 20.)

☐ **VK9MW:** August looks to be the time for a Mellish/Willis operation by K4ADN's group. Ken notes that there is a chance that Jim and Kirsti Smith will be along. Support and about another half dozen operators will be needed. Contact Ken, K4ADN, pronto.

☐ **9Y4VU:** A typo in the November issue, sorry! W3EVW is the manager for 9Y4VU (and *not* the manager for 9Y4VT). Roger's QTH is: Roger Causse, 313 Pontiac St, Lester, PA 19113.

TA1P, the first "homebrew" TA station (see Circuit item).

Ross Forbes, ZK1XE/WB6GFJ, at the rig of ZK1CG on Rarotonga last August.

☐ **BV2A/B:** Good news! Any ham with a valid license can operate Tim's station anytime Tim is there, without any prior approval or paper work. When finished, Tim just mails copies of the logs to the Taiwan Radio Division.

☐ **JARL:** Guests slated to attend the JARL 60th anniversary in Tokyo mid-November included: BV2A/2B DK5ML HL1AUG HL1AUX HL1FM HL11FM HS1GA HS1YL VK3ADW VK3KI ZL1HV ZL2AMJ ZL3QL W1RU W6EJJ W9ZNY.

☐ **FO8:** Effective last September 1, FO8s licensed under 5 years became FO4s, and those licensed longer than 5 years FO5s.

☐ **YO3RF:** Sad news indeed noting the death of this venerable ham in mid-October 1986.

☐ **Conditions:** *KH6BZF Reports* (late October) reported that conditions exploded during CQWW sideband, with many sunspot groups evident. Lee notes that "if" trends like this continue, perhaps we're coming out of the trough of indifferent propagation.

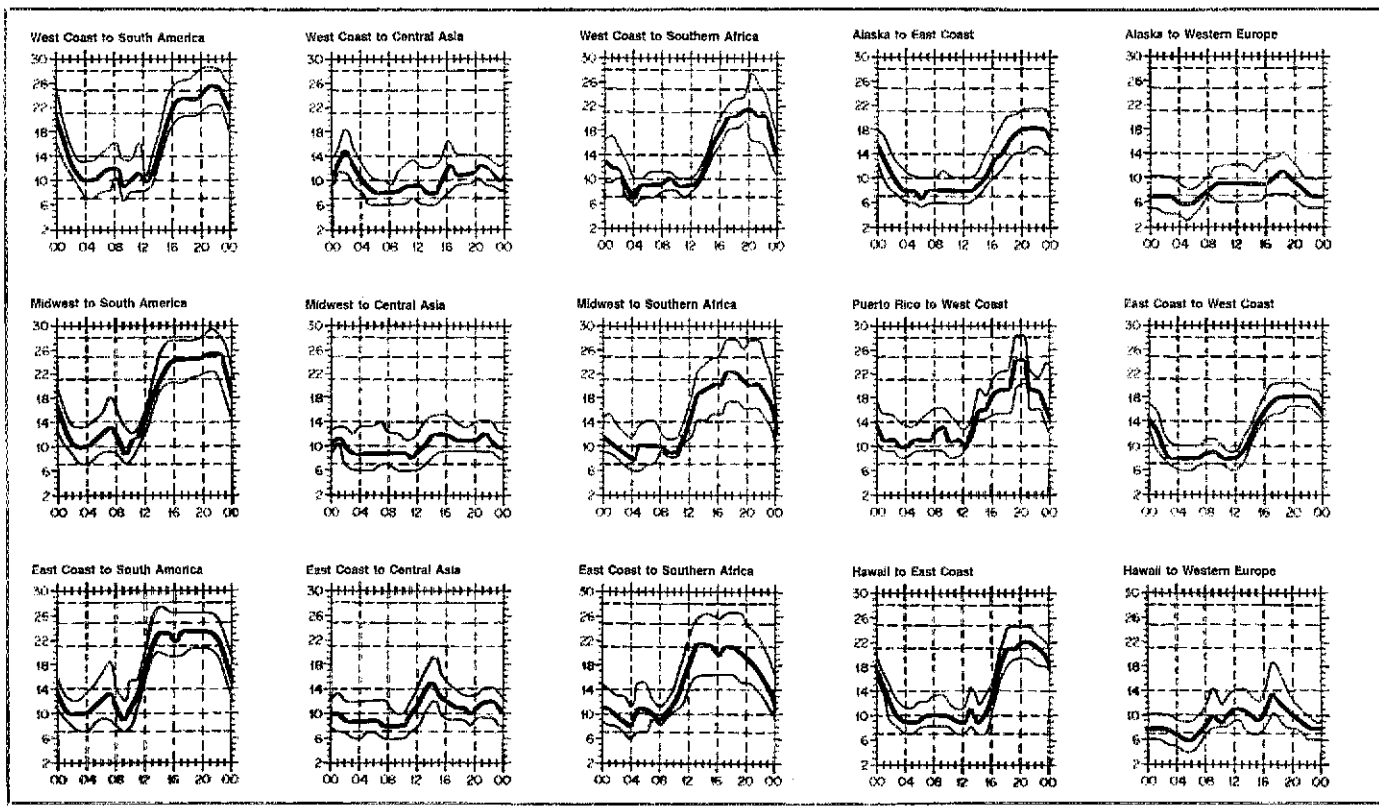
☐ **7P8:** Al, W8MPW, is now handling cards for 7P8DP/DN, Scotty and Melinda from Maseru (ex-C53EK/EU). Al notes with their departure from The Gambia, and that of Tony, C53FG, that there isn't much activity left in C53.

☐ **Honor Roll:** Was it really 25 years ago that the new DXCC Honor Roll went into effect, for the first time taking deleted countries and their effect on overall totals into account?

☐ **DXAC:** The volume of reviewed mail is mind-boggling! As of early October, over 100 separate items of correspondence had been distributed to the DX Advisory Committee! (See lead material.)

☐ **DK7PE:** Rudolf has returned from the South Pacific and is handling the cards for his recent operations: 3D2CW, A35CW, DK7PE/KH8.

☐ **TV6JUN:** This summer, special-events station



When are the bands open? These charts predict this month's average propagation conditions for high-frequency circuits between the U.S. and various overseas points. One chart for East Coast to West Coast is also included. On 10 percent of the days of the month, the highest frequency propagated will be at least as high as the uppermost curve (highest possible frequency, or HPF). On 50 percent of the days of the month, it will be at least as high as the middle curve (maximum usable frequency, or MUF). On 90 percent of the days of the month, it will be at least as high as the lowest curve (optimum traffic frequency, or FOT). See April 1983 *QST*, page 63, January 1977

Troster's Tips for Easy Listening

How Often to Sign

You are the DX station, and you're trying to work as many in that pileup as fast as you can. Good stateside operating practice (and some governments' regulations) say you must sign your call after every QSO. Also, as mentioned before, you may choose to sign every time as a way of indicating "received my report okay."

However, you also might *not* wish to sign after every contact. Some reasons for not signing after every QSO include: (1) Speed things up, more contacts; (2) the whole world already knows who you are. If you've been on Clipperton for three days, most ops will indeed recognize you! (3) If you do not sign, some ops will not call until they can identify your call. So, by not signing you can hold down the QRM level. . . they say.

In fact, it is a reality that a lot of DX chasers don't worry about your call. They hear a big pileup and jump in—for fun! A pileup is an irresistible challenge, something to be conquered. King-of-the-hill, etc. They go by that ancient adage, "work 'em now, worry after." After working you, that old DX chaser will just keep listening until you (or someone else) signs your call—at least every 5 minutes, please! Or, he'll call into his local DX net and ask, "Who was that I just worked on 14,013?" Yes, it is true that sometimes the DX chaser never does know what the call was of the DX station he worked!

But, now *you* are that DX station. Suit yourself about signing. You control the pileup in the way *you* want to generate maximum QSOs.

from Utah Beach in Normandy, France gets confirmed via Andre Morio, F5AM, 632 rue de Carentan, 50000 Saint Lo, France (or via the bureau).

☐ **CQWW:** Akito, JA5DQH (alias NN7S), operated XX9XX, NN7S/VS6 and XX9/VS6 around November's operating special. QSL via JA5DQH.

☐ **Help!:** G4EDG is in need: C9MCN—Jan 5, 1976, 21-MHz CW; D2ACK—May 22, 1976, 21-MHz CW and Jul 30, 1976, 7-MHz CW. Steve Taylor, G4EDG, 80 Nadder Pk Rd, St Thomas, Exeter, Devon, England.

LIECHTENSTEIN

HBØCZS is justly proud of the founding of a national Amateur Radio organization in his country, an organization that has since applied for IARU membership. Only resident operators may now use an HBØ call, with nonresidents identifying with HBØ *before* their home calls. There are 11 resident operators in the country, and a club station—HBØFL. The club has set up their first repeater and is now issuing an award. Contact LARA (Liechtenstein Amateur Radio Assn), Box 103, FL 9493 Mauren, Principality of Liechtenstein.

QSL Corner

Administered By Joanna Hushin, KA1IFO

Here is some information for those of you who would like to QSL a QSL manager or direct to the station location. It is passed along as we receive it and, therefore, may not be accurate. The call sign in parentheses is the QSL manager.

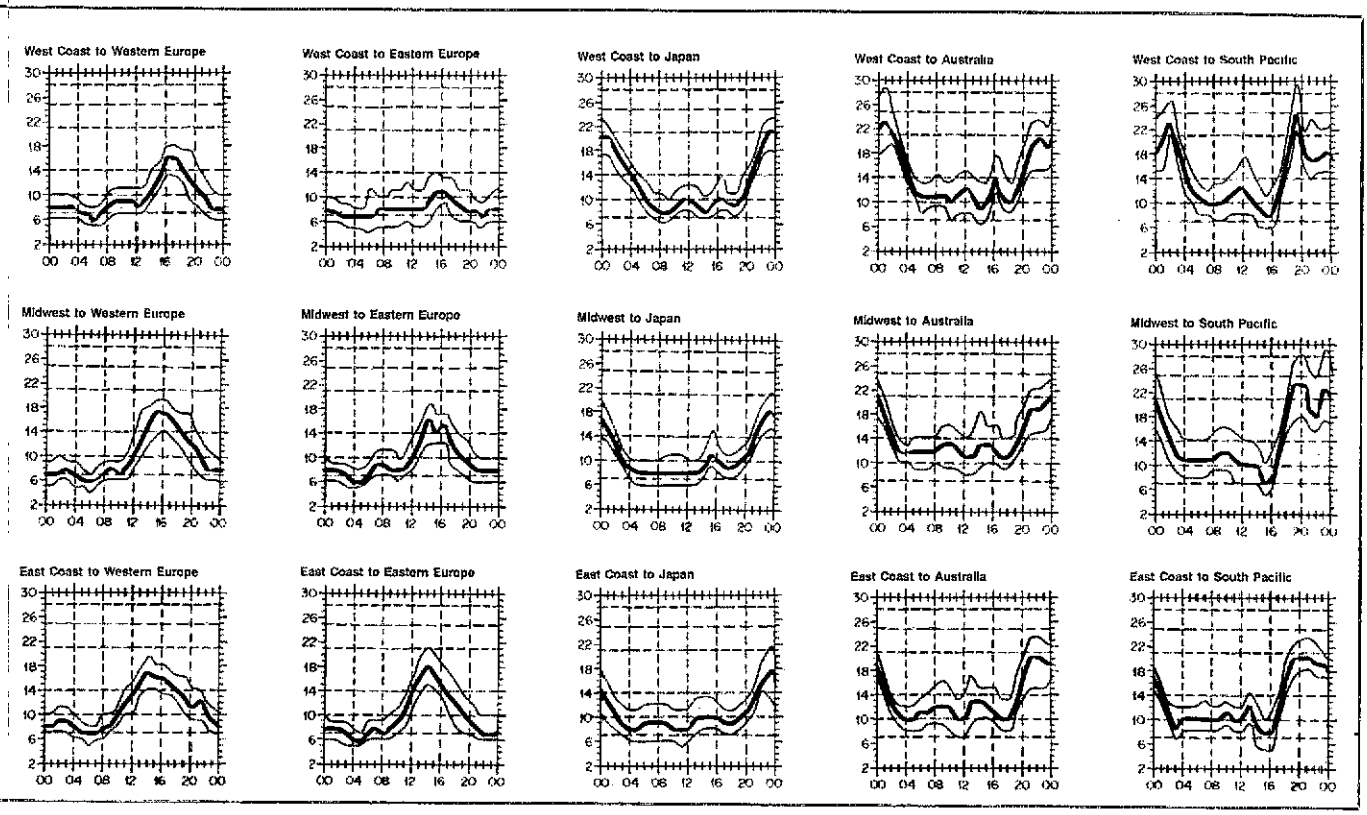
A71AD (5B4TI)
Has new logs
A82BN (N5GAP)
CM5OM Orlando,
PO Box 455,
Mantanzas, Cuba
CR9EU (G3PFS)
CV1D (CX2CS)
GJØ/WM4L (KF4L)
HC8DX (W2KF)
HC8E (HC1QRC)
FOØXA (F6GXB)
FOØXX (YASME)
HC1XM PO Box 197,
Santo Domingo
HC8D (KT1N)
PJ1CU (K7CU)
PJØJ (K4PI)
PJ1B (N2MM)
P40A (KA1XN)
P40P (N4PN)
P40R (K4UEE)
Y34K (Y34K)
VQ9EE (W7LAN)
V22A (WB7RFA) 1986
CQ WW; (N3BHF)
SSB only
YT3T (YU3EIJ)
YU3XU (YU3HAM)
ZD7BW G. Smille,
10 Delemere Rd,
Reigate Surrey
RH2 7RB,
Great Britain
ZF2JX (K1THP)
4M4A (K3OUC)
4U41UN (W2MZV)
8R1X (WI4K)
1986 CQ WW
8R1Z (WI4K)

Special Notes

☐ KE3A is **not** the manager for 6Y5IC.

☐ WA3HUP is **not** the manager for 3A2CZ.

☐ QSL Corner, December 1986 *QST*, p 57, contains information and addresses for the ARRL Incoming Bureau. September 1986 *QST* QSL Corner (page 73) contains information on the operations of the ARRL Outgoing Service. For additional information on bureau operations (Incoming and Outgoing), send a self-addressed, stamped envelope to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.



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 January 16 to Feburary 15, 1987, assume a sunspot number of 10, which corresponds to a 2800-MHz solar flux of 72.

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 5-country increments above 300. The totals shown below are exact credits given to DXCC members from October 1 through October 31, 1986. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

AH2BE/209	HA3GQ/107	JH1EIZ/280	OZ8WW/177	YU3HR/110	N3AM/287	W5FS/278	K8HVT/123	NI9C/110
DF3IS/135	HAØDH/133	JL1CZF/108	PA3DRZ/154	ZB2GW/117	N3DMR/113	W5QNF/167	KS8W/116	NI9O/101
G3MXJ/324	HB9DDZ/111	JR1BVU/243	PY1OL/248	ZS6WB/146	WB3FMA/101	N6NBB/100	N8BCE/102	NJØU/107
G3WLX/100	HLØU/152	JH8UAE/107	SM7LOX/136	NK2T/204	K4DZR/101	W6OSP/277	NJ8O/144	WØLTL/101
HA1KTD/110	JA1THL/110	JA9AVP/129	VS6UA/103	WA2GMC/110	W4TKI/102			

Radiotelephone

CT1AGQ/107	I1WXY/267	OZ8WW/136	SP4LEN/104	YU3HR/104	WA2MZX/102	WJ4S/101	W5QNF/158	K7TUH/100
CT1AWO/104	JA6FGC/128	P29FG/143	VS6UA/101	ZB2GW/116	N4BYV/106	KD5F/108	N6ARS/128	KD9SO/109
HA1UI/105	JA9AVP/129	PY1OL/237	YBØBCA/110	ZL1BEN/104	N4JOS/101	KE5JE/103	W6OSP/126	WB9KOY/151
HLØU/150	KA2CC/162	SM7LOX/118	YC2GHE/118	ZS6WB/146	WB4CKO/261			

CW

G4EDG/227	I1WXY/164	JA6FGC/194	PY1OL/100	OK2DB/262	YB4FNN/102	N3DMR/107	WD8PFI/112	NI9C/110
HB9DDZ/101	JH1HLQ/232	JA7ASD/110	PY5AKW/106	OZ8WW/103	W1EFK/111			

160 Meters

HB9AHL/102	K9AB/100							

Satellite

W1BIH

5BDXCC

K8PYD	DJ2YA	W4OUE	W1UU	OK3KJF	AK1A	KB2RV	HB9CDZ	YBØTK
DK2OY	NP4AT	JN1KEJ	VE3LWJ	KZ4V	PY1OL	W6FAH	HB9CND	SM5HPB
VE2WA	ZP5JAL	JA1GV	K6QM	YU3DTN	JA3HZT	VK6IR	I5ZGQ	AK4N
6W1CK	KØEOU							

Endorsements

Mixed

DJ4LK/325	G3YBH/261	JA3UCO/217	YU3AW/313	WA1URV/307	WA3DVO/313	NT5V/180	W7ALZ/265	K9KA/335
DJ9ON/304	G3YJI/315	JA5THU/297	YU3LF/272	K2OEA/346	WB3AVN/266	W5OSH/289	W7FLD/245	K9MFI/311
DJ9OX/200	G4DDS/302	JA6FGC/301	ZS5NK/181	KC2KK/127	WB3EWB/271	W5PLN/284	W7KSK/127	KD9BG/261
DK5WS/310	G4EDG/260	OK2DB/319	AK1L/272	KQ2O/305	K4DDB/302	W5UN/355	K8ED/309	KS9Y/252
DK6ED/291	G41JW/259	ON4SW/299	K1HMO/312	N2JJ/305	K4NTS/225	WC5I/260	KC8NU/186	W9PIO/316
DK7XX/250	HA9PP/155	OZ8AN/127	KA1LZR/124	W2HAZ/321	KF4BU/160	K6BUU/270	KG8K/201	KD9QB/305
DL1NP/176	I2RFJ/294	SM4EMO/310	KB1HY/226	W2MOF/271	KI4LP/157	K6XN/307	KM8E/226	W9TWM/228
DL2KBS/172	IK7CBN/323	SM6AVM/275	KG1F/220	WA2TMP/176	WA4CTA/310	NZ6N/227	KX8N/225	WB9TIY/299
DL6DK/202	I8MTQ/272	SMØBZH/310	KM1D/314	K3JGJ/295	WB4RFZ/309	W6FAY/244	N8EL/299	ACØS/243
DL7HT/293	I8RFD/310	UA2AO/301	N1AFC/280	KB3OM/280	WU4G/201	W6OMM/319	W8AKS/151	KØVV/297
DLØBT/178	IT9QDS/290	VE3CUI/224	W1BFT/302	N3ARK/299	KF5MY/250	WB6JMS/235	W8QID/250	WØBX/268
EA4CTU/133	IT9TGO/303	VE3GFN/265	W1GVZ/287	W3EE/230	KR5D/285	K7OZ/202	WD8PFI/251	WAØQVC/206
F6BFH/322	JH1WIX/278	VE3NI/301	W1GWA/224	WA3DMH/291	NK5Z/249	KN7N/227	K9JF/332	WAØUWS/295
G2GM/310	JA3HZT/323							

Radiotelephone

CE3DQR/253	EI8AU/250	JA5THU/236	VE3NI/296	K1MIZ/300	AK4T/297	K5TV/323	KY7M/225	KD9EC/188
CP1FQ/268	F6BFH/322	OK2DB/291	VE3RO/250	KG1F/219	K4DDB/288	KF5MY/236	W7KT/227	W9DNE/332
CX2AAL/206	G3YBH/260	ON4SW/267	VE7DX/304	KM1D/302	KI4LP/157	NK5Z/194	W7QN/204	W9FNN/296
CX2CB/228	G3YJI/313	ON5HU/309	VO1AW/256	W1DNZ/328	W4BMJ/294	NT5V/176	W8AKS/150	W9ZX/295
CX7BF/301	I4FAF/299	PY5OC/276	Y81ZN/125	WA1KYW/310	W4LMX/351	W5CRP/261	W8COG/328	ACØS/143
DK5WS/310	IK4DSM/151	SM6AVM/275	ZS5NK/180	WA1URV/306	W4OTS/177	W5PLN/283	WA8OLM/125	KDØIT/137
EA1IY/326	I5ZJK/284	SM6CST/296	5N8ZHN/134	N2ERN/181	WA4CTA/293	WB5INB/179	K9JF/294	NBØC/162
EA4CTU/132	IK7CBN/323	SM6JHO/167	8P6OV/251	W2MOF/265	WA4ETN/130	K6XN/300	K9MFI/300	WAØUWS/280
EA5CIX/237	JA3FYC/260	UA2AO/300	AK1L/264	W3EE/127	WB4RFZ/308	NZ6N/227	KD9QB/305	

CW

DK5XF/225	G4IJW/176	ON4SW/270	AK1L/208	W2HAZ/285	N4NX/307	KR5D/270	K8ZP/189	WB9TIY/203
DK6ED/204	JA2ADY/269	SM4EMO/218	K1ST/275	W2LPV/150	NU4B/125	N5DEE/256	K9MFI/296	ACØS/197
DL7HT/248	JA5THU/254	SM6CST/299	W1BFT/265	N3ARK/256	WA4CTA/252	K6XN/263	KR9O/250	WØHBH/181
EA3AQS/228	OK1MP/301	SM6CVX/273	NA2G/176	W3EE/163	KC5M/243	KC6X/176		

RTTY

I5FLN/231	W3DJZ/201							

160 Meters

N1ACH/146	W1OO/152	W1WAI/126	W3AP/149	AA4MM/135				

MAJOR ARRL OPERATING EVENTS AND CONVENTIONS—1987*

(Check *QST* monthly for updates)

JANUARY

1	Straight Key Night
1	West Coast Qualifying Run
10-12	January VHF Sweepstakes
14	W1AW Qualifying Run (35-10 WPM)
18	*ARRL Hamfest (Richmond, VA)*
22	W1AW Qualifying Run
24-Feb 1	Novice Roundup
24-25	*ARRL Hamfest (Sarasota, FL)*
25	*ARRL Hamfest (Yonkers, NY)*
25	*ARRL Hamfest (Greenville, AL)*

FEBRUARY

1	*ARRL Hamfest (Villa Park, IL)*
4	West Coast Qualifying Run
7-8	*Florida State Convention (Miami)*
12	W1AW Qualifying Run (10-40 WPM)
15	*ARRL Hamfest (Melville, NY)*
15	*ARRL Hamfest (Kansas City, MO)*
20	W1AW Qualifying Run
21-22	International DX Contest, CW
22	*ARRL Hamfest (Vienna, VA)*
22	*ARRL Hamfest (Tallmadge, OH)*

MARCH

1	*ARRL Hamfest (Winchester, IN)*
5	West Coast Qualifying Run
7-8	International DX Contest, phone
7	*ARRL Hamfest (Cave City, KY)*
13	W1AW Qualifying Run
13-15	*Southeastern Div Convention (Orlando, FL)*
14-15	*ARRL Hamfest (Lafayette, LA)*
17	*W1AW Qualifying Run*
20-21	*Michigan State Convention (Muskegon)*
28-29	*Nebraska State Convention (Kearney)*
29	*ARRL Hamfest (Grayslake, IL)*

APRIL

1	West Coast Qualifying Run
5	*ARRL Hamfest (Willingboro, NJ)*
10-12	*Missouri State Convention (Kansas City)*
11	W1AW Qualifying Run
13 (Mon)	144-MHz Spring Sprint
21 (Tues)	220-MHz Spring Sprint
24-26	Dayton HamVention® (Dayton, OH)†
26	W1AW Qualifying Run
29 (Wed)	432-MHz Spring Sprint

MAY

1-3	*ARRL Hamfest (Fresno, CA)*
2-3	*ARRL Hamfest (Baton Rouge, LA)*
7	West Coast Qualifying Run
8 (Fri)	902-MHz Spring Sprint
10	W1AW Qualifying Run
14 (Thur)	1296-MHz Spring Sprint
16-17	*Atlantic Div/New York State Convention (Rochester, NY)*
17	*ARRL Hamfest (Old Westbury, NY)*
17	*ARRL Hamfest (Kankakee, IL)*
17	*ARRL Hamfest (Wrightstown, PA)*
23-24 (Sat-Sun)	50-MHz Spring Sprint
23-24	*ARRL Hamfest (Knoxville, TN)*
25	W1AW Qualifying Run
29-31	*ARRL Hamfest (S Sioux City, NE)*

JUNE

3	West Coast Qualifying Run
8	W1AW Qualifying Run (10-40 WPM)
13-15	June VHF QSO Party
14	*ARRL Hamfest (Willow Springs, IL)*
24	W1AW Qualifying Run
27-28	Field Day

JULY

2	West Coast Qualifying Run
10-12	***ARRL National Convention (Atlanta, GA)***
11-12	*IARU HF World Championship*
14	W1AW Qualifying Run (35-10 WPM)
24-26	*ARRL Hamfest (Topsfield, MA)*
26	W1AW Qualifying Run
26	*ARRL Hamfest (Belvidere, IL)*

AUGUST

1-2	UHF Contest
2	*ARRL Hamfest (Berryville, VA)*
5	West Coast Qualifying Run
7-9	*West Gulf Div Convention (Austin, TX)*
9	*ARRL Hamfest (Willow Springs, IL)*
12	W1AW Qualifying Run
15	*ARRL Hamfest (Springfield, MO)*
22	*ARRL Hamfest (Victoria, TX)*
24	W1AW Qualifying Run
30	*ARRL Hamfest (Bluefield, WV)*

SEPTEMBER

3	West Coast Qualifying Run
10	W1AW Qualifying Run
12	*ARRL Hamfest (Windsor, ME)*
12-14	September VHF QSO Party
20	W1AW Qualifying Run
26-27	*Midwest Div Convention (Des Moines, IA)*

OCTOBER

7	West Coast Qualifying Run
9	W1AW Qualifying Run (10-40 WPM)
9-11	*Southwestern Div Convention (Scottsdale, AZ)*
17-18	Simulated Emergency Test
25	W1AW Qualifying Run

NOVEMBER

5	West Coast Qualifying Run
7-9	November Sweepstakes, CW
14	W1AW Qualifying Run
21-23	November Sweepstakes, Phone
23	W1AW Qualifying Run

DECEMBER

2	West Coast Qualifying Run
4-6	160-Meter Contest
12-13	10-Meter Contest
13	W1AW Qualifying Run
29	W1AW Qualifying Run

*Hamfests/Conventions of record as of November 10, 1986

†Not an ARRL event

License Renewal Information

1) Attach a photocopy, or the original, of your license to the FCC Form 610 (available from ARRL HQ; SASE, please).

2) Mail to FCC, PO Box 1020, Gettysburg, PA 17325. There is no fee.

3) Retain copies of everything, if possible, as proof of filing before expiration. If you file before the license expiration date, you may continue to operate beyond the expiration date and until the new license arrives. After expiration, there is a five-year grace period under which you may still renew without retesting. However, after two years of the grace period has elapsed, you will lose your call sign, and will be assigned a new one. After this five-year grace period is over, you must be reexamined for a new license.

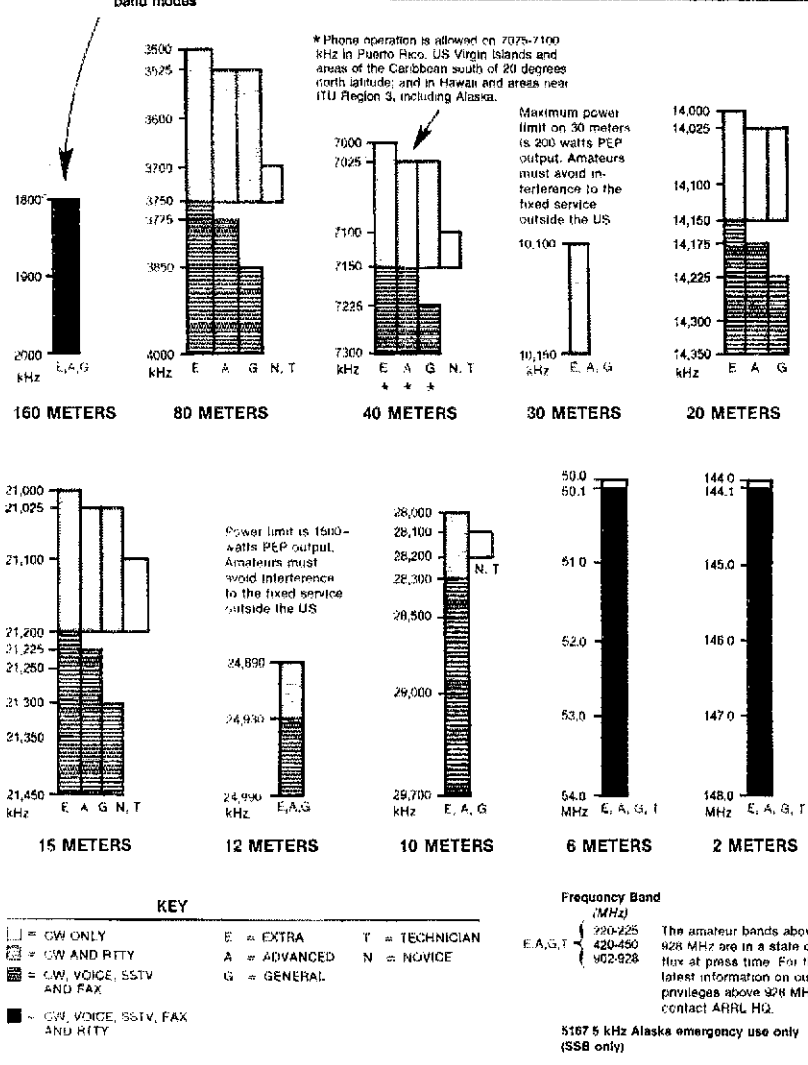
4) Note that the new 10-year-term licenses, which have been issued to all amateur licensees renewing since January 1984, have only a two-year grace period before both the license and call sign expire.

5) You may apply to have your license renewed at any time during the term of the license. FCC suggests the application be made approximately 90 days before expiration.

6) If you are simply modifying your license (change of address, for example), you must fill out a Form 610. Incidentally, your license will also be renewed automatically for 10 years at this time.

7) If you have any questions or problems, drop a note to the Regulatory Information Branch, ARRL HQ.

Amateur stations operating at 1900-2000 MHz must not cause harmful interference to the radiolocation service and are afforded no protection from radiolocation operations; see January 1986 Happenings for details.
The ARRL 160-meter band plan:
1800-1830 kHz: CW, RTTY and other narrow-band modes
1830-1840 kHz: CW, RTTY and other narrow-band modes; intercontinental QSOs only
1840-1850 kHz: CW, SSB, SSTV and other wide-band modes; intercontinental QSOs only
1850-2000 kHz: CW, SSB, SSTV and other wide band modes



Operators with Technician class licenses and above may operate on all amateur bands above 50 MHz. For more detailed information see *The FCC Rule Book*.

US Amateur Power Limits

At all times, power level should be kept down to that necessary to maintain communications. All US amateurs are limited to 200-W PEP output in the Novice segments. On all other segments, with certain exceptions in the 10, 902 and 420-MHz bands, 1500-W PEP output is permitted. (Full-carrier double-sideband AM radiotelephone operations will use old power limits and standards until June 1, 1990.) Present restrictions limit 10-MHz PEP output to 200 W. See December 1984, *QST*, p 61. (Revised as of November 1986.)

The "Considerate Operator's Frequency Guide"

Some frequencies that are generally recognized for certain modes or certain activities (all frequencies are in MHz):

1.800-1.825	CW only
1.830-1.850	"DX window"
3.590	RTTY DX
3.610-3.630	RTTY
3.790-3.800	"DX window"
3.845	SSTV
7.040	RTTY DX
7.080-7.100	RTTY
7.171	SSTV
10.140-10.150	RTTY
14.080-14.100	RTTY
14.100	NCDXF beacon
14.230	SSTV
14.313	Maritime mobile
21.080-21.100	RTTY
21.340	SSTV
28.080-28.100	RTTY
28.200-28.300	Beacons
28.680	SSTV
29.300-29.500	Satellite downlinks
29.520-29.580	Repeater inputs
29.600	FM simplex
29.620-29.680	Repeater outputs

ARRL band plans for bands above 29.300 MHz are shown in the ARRL *Repeater Directory* and *The FCC Rule Book*. This 24-MHz band plan was adopted by the ARRL Board of Directors in July 1985:

24.890-24.920—CW only
24.920-24.930—CW and digital
24.930-24.990—CW, phone and SSTV

The New Frontier

Conducted By Bob Atkins, KA1GT
103 Division Ave, Millington, NJ 07946

2304-MHz BEACON

Dave Hackford, N3CX, has sent in details of a 2304 MHz beacon he and WA3JUF have put on the air. The nominal frequency of operation is 2304.020 MHz. The transmitter runs 1-watt output into 45 feet of 7/8-inch Hardline to a 7-dB-gain Alford slot antenna. The beacon transmits the following identification sequence: 30 seconds key down—DE N3CX GRID FN20; 30 seconds key down—DE N3CX PENNSBURG PA. Dave would like reception reports from anyone who copies the beacon. For a tropo contact when the beacon is heard, call 215-679-7293. Latitude and longitude of the beacon site are 40.3° N and 75.5° W. Dave also comments that the Pack Rats are working on 3450- and 5670-MHz equipment for use in the January contest. The mailing address for beacon reports is David T. Hackford, N3CX, Box 138, RD 2, Pennsburg, PA 18073.

MICROWAVE CLUBS

Sam Popkin, K2DNR, writes to say that the Southern Arizona Microwave Society has been formed. Charter members are KCØW, WA7BBM, KB7CI, WA2RIH and K2DNR. More details can be obtained from Sam Popkin, 550 W Camino de la Reina, Rte 7, Box 366-1, Tucson, AZ 85747.

Sam also sends news (as of the end of September) that he worked KB7CI on 10 GHz for his 8th grid square on that band (KB7CI's 3rd), and he hoped to be up to 10 grid squares by the end of 1986.

MICROWAVE TRANSVERTERS FOR 1296 AND 2304 MHz

Down East Microwave is now the US importer and distributor for a line of microwave transverters produced by LMW Electronics of Leicestershire, England. The product line includes a variety of complete transverters, subsystems and kits for 1296 and 2304 MHz using 144-MHz IFs. On 1296 MHz, the top-of-the-line system claims 6 W out and a 0.8-dB (max) noise figure, with built in Tx/Rx sequencing, remote preamp, output meter and IF attenuator. Price is $489. At the other end of the scale, a 1 W out, 4-dB noise figure kit is available with no Tx/Rx sequencing or preamp for $184.

Similarly, the top-of-the-line 2304-MHz unit with 1.8 W (min) out and a 1.1-dB (max) noise figure goes for $569, while a basic kit producing 1 W out with a 3-dB noise figure costs $229.

More details can be obtained from Bill Olsen, W3HQT, Down East Microwave, Box 1655A, RFD 1, Burnham, ME 04922.

2304 NEWS

Bill Olsen, W3HQT, has sent along some details of his 2304-MHz operation from the Delaware shore after the Pack Rats Hamarama in early October. From FM28, using an LMW Transverter and an indoor(!) 45-el loop Yagi, he worked WB2NPE and N3CX with S9 signals over a 100-mile path. The next day, from Chincoteague Island (FM27), he worked N3CX, WB2NPE and WA3AXV—all with good signals. The best DX was N3CX at a distance of about 170 miles, with signals at S4/5.

10-GHz ACTIVITY

The second leg of the 10-GHz contest was an occasion for much activity on the 10-GHz band. The following report is from the San Bernardino Microwave Society Newsletter. Chuck Swedblom, WA6EXV, is the Editor.

> Conditions for the second half of the 10-GHz Contest were not much better than the first half. Bill, WA6QYR, operated from the Beacon Site at Heaps Peak and reported that the fog was again very heavy and at times made for poor signals. Bill made a total of 24 contacts with 8 stations and a total distance of 2670 km, for a score of 3470. Ed, W6OYJ, operated the second half of the contest from Point Loma. He made a total of 41 contacts with 18 stations, for a final score of 3822. From what I have been able to find out, Ed has the highest score for the West Coast. Dick, WB6DNX, operated from the Laguna Hills and made 7 contacts with 6 stations, for a final score of 883 points. Gary, NN6W, operated the first weekend from Santa Barbara Island and the second weekend from the mainland, for a total of 12 contacts with 9 stations and a final score of 1696 points. Lary, K6HLH, operated from the Antelope Valley both weekends. I do not have his total score. I (WA6EXV) operated the second weekend from the desert area and had a total of 24 contacts with 8 stations, for a total score of 3631. Bill and I both qualified for VUCC during the contest.

Also active were many members of the North Texas Microwave Society (NTMS). Kent Britain, WA5VJB, passed along information that 17 stations were active on 10-GHz, all on wideband (30-100 kHz bandwidth) FM. Fifteen stations used a 30-MHz IF, one used a dual 30/88-MHz IF, and one used only 88-MHz IF. WA5VJB and KD5HM were located on top of a 15-story building in Arlington, Texas (it seems that mountaintops are hard to find in that part of Texas!). The other stations operated from a number of portable sites. The best DX worked was 66 km. WA5VJB made 36 contacts with 15 different stations, and KD5HM made 31 contacts with 13 different stations. According to Kent, seven members of the NTMS are in the process of obtaining or building narrowband equipment for 10 GHz, so watch out next year!

On the subject off narrowband contacts, the following report is from the *RSGB Microwave Newsletter:*

"A remarkable DX contact on 10 GHz (narrowband) was achieved by G3LQR at the end of August (1986). Simon worked SM6HYG over a 924-km path, and the SM signal peaked 40 dBn (ie, 40 dB above the noise level)! This may be the longest path worked from this country. To the editor's knowledge, only the Italians have worked further (with wideband gear!)."

10 GHz narrowband seems to be picking up in the USA now that commercial equipment for the band has become available (SSB Electronics) and device costs are starting to drop. I even blew the dust off my narrowband system and made one contact myself in the contest (with K2GQI, who was using an SSB Electronics transverter)! It is now quite possible to obtain 200 mW+ from power GaAsFETS, and a noise figure of 2 dB is quite achievable. Perhaps soon we will see some home-brew solid-state equipment designs for 10 GHz. If anyone is working on such designs[1] or has already built equipment, I would be pleased to hear from them.

MICROWAVE-DISH FEED

In the February 1981 New Frontier column, I described a simple waveguide dish feed for the microwave bands. This type of feed is often referred to as the "penny" feed because it consists of a metal disk, like a penny, soldered on the end of a length of waveguide. Recently, the efficiency of this feed has come under scrutiny by a number of amateurs in the UK and elsewhere (as reported by the *RSGB Microwave Newsletter),* and it is likely that performance improvements are possible.

G3PFR has analyzed a professional feed of this type designed for use with a dish of f/D = 0.332. From this analysis the differences between the professional feed and the one described earlier are that the disk is larger (1.25 λ vs 1 λ) and thicker (~0.185 λ), and there are two scatter pins (0.08 λ diameter and 0.1-λ long) mounted at the edge of the disk above the centerline of the broad faces of the waveguide. Whether such changes will lead to an increase in efficiency has not yet been determined.

If any readers have experimented with optimization of this type of feed, I would be interested to hear from them. Even if the penny feed is not the most efficient, it is very convenient and easy to build and so its use is still justified for most work. VK5ZO reports that, using a f/D 0.25 dish (focal plane), a dipole/reflector feed gave about 1.2 dB more gain than the penny feed. The extra effort required to construct such a feed could be worthwhile if long-path/scatter work is to be undertaken.

MICROWAVE SOCIETIES

Fred Maberry, N5BBO, has sent in information concerning the formation of the South Texas Microwave Group. The address to write to for more information is Fred Maberry, 5222 King George, San Antonio, TX 78229. The group was active in the 10-GHz cumulative contest, making a total of 16 contacts, with best DX of 19.8 miles. Current capabilities on 10 GHz are wideband FM, but narrowband SSB/CW systems are under development.

[1]The 4th volume of the UHF Compendium (in German) contains an article (which I have not yet seen) titled "2m/10GHz Transverter (SSB/CW) in an IC202 Battery Compartment"! That has to be getting close to the ultimate 10-GHz rig. Now who is going to build one in a multimode hand-held?

On Line

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716
CompuServe ID no. 70645,247

Computer Grab Bag

'Tis the season to party...office party, New Year's Eve party, radio club party, etc. Since it is impossible to give a party within the confines of this column, I will do the next best thing and proffer the proverbial holiday party grab bag—a computer grab bag. 'Tis also the season to give and to receive, so, under the following computer grab bag headings, you may receive information that augments your ham radio computer applications, or you may find others who need your assistance in using their computers in ham radio. In the spirit of the holidays, I hope you will offer your assistance, if you can.

Season's Greetings from the whole WA1LOU family: Laurie, Hayley and Stan.

Apple II

Does anyone run a packet-radio bulletin-board system on an Apple IIc? If you do, contact Jack Bly, KA8D, PO Box 324, Smithville, OH 44677.

Has anyone successfully used a Dovetron MPC 1000R Regenerative Terminal Unit with an Apple IIe for RTTY? If so, please contact H. W. Hitchen, KL7PG, 3931 Brentwood Cir, Anchorage, AK 99502.

Atari

The first four issues of *Ad Astra* have been published by the Atari Microcomputer Network. Each issue contains hardware and software applications for Amateur Radio using the Atari family of computers. For more information, contact *Ad Astra*'s editor, Gil Frederick, VE4AG, 130 Maureen St, Winnipeg, MB R3K 1M2, Canada.

Commodore Amiga

Any readers who have ham radio-related programs or know of on-the-air ham radio nets for the Commodore Amiga are asked to contact Kathy Wehr, WB3KRN, RD 1, Box 193, Watsontown, PA 17777.

Commodore 64 and 128

Super DX EDGE® for the Commodore 64 and Commodore 128 adds some significant features to the DX EDGE: It calculates maximum usable frequency (MUF), great-circle bearings (antenna directions) and distance between any two locations. Also, the program is able to display and automatically update the position of the gray line, and to calculate and display sunrise and sunset times for any location at any time of year. Super DX EDGE is available from XANTEK, Inc, PO Box 834, Madison Square Station, New York, NY 10159.

The following Commodore 64 programs are needed: an American Morse Code program for D. C. Alexander, W8GD, 5953 Whiteacre Rd, Toledo, OH 43615; a terminal program with split-screen and memory buffering to interface with a Kantronics UTU for Chick Aranci, W1UKX, 128 School St, Hamden, CT 06518; a WEFAX map-receiving program for Walter Brossmann, DJ2KC, Leibnitstr 35, 6056 Heusenstamm, Fed Rep of Germany; and any C-64 or C-128 ham-radio application programs for Manos Darkadakis, SV1IW, Box 23051, 11210 Athens, Greece.

The Contester II for the Commodore 64 and Commodore 128 provides complete maintenance of contest log and dupe sheets for 2000 QSOs on an all-band basis or 1000 QSOs per band on as many as six bands. It features the display of a running score, band-by-band QSO and multiplier totals, CW keying at 5 to over 50 WPM with a simple one-IC, one-transistor interface (available as a kit or wired and tested), up to 15 canned CW messages, automatic serial-number generation, automatic tracking of time and date, and single keystroke selection of program functions. Separate contest modules for the ARRL DX, ARRL Sweepstakes, *CQ* WPX and *CQ* Worldwide DX contests are available to tailor Contester II to the specialized needs of these contests. The program and contest modules are available from Winner's Edge Software, 2003 Sarazen Pl, Reston, VA 22091.

Has anyone interfaced a Smith-Corona DeVille III Messenger Electronic typewriter to a Commodore 64? If you have, contact Jeff Howell, WB9PFZ, RR 16, Box 423, Bedford, IN 47421.

KC9YQ has made available a collection of programs for the C-64, including programs that design VHF helix, quad, quagi, Yagi, dipole and vertical antennas, VHF and UHF corner reflector antennas, HF Yagi, quad, quagi, dipole and vertical antennas; programs that calculate VHF and HF antenna gain and antenna matching sections, and programs that print blank log sheets and QSL cards. All this and more for a mere $3 and an SASE disk mailer sent to John Daebelliehn, KC9YQ, 1845 8th St, Moline, IL 61265.

Heath H-89

Members of the Heath Users' Group (HUG) should be aware of HUG's Hamhelp disk for the Heath H-89 running CP/M. It contains a very extensive program for predicting propagation. Contact HUG for the availability of Hamhelp. (tnx *Ray Isenson, N6UE)*

IBM PC

SCORE, the Sweepstakes Contest Operating Results Enhancer, Version 3.0, is now available for the IBM PC. This ARRL Sweepstakes Contest logging, duping and reporting program now adds the following features: automated control of a Kenwood TS-940S and TS-440S transceivers (in addition to the Heath SS-9000), easier input of ARRL Section information, additional contest reporting functions, more flexible call-sign editing, continuously updated time and date display, and more. SCORE is available from MJC Technologies, 3704½ Foothill Blvd, Suite 524, La Crescenta, CA 91214.

If anyone has interfaced a Kenwood TS-440/AT transceiver and an IBM PC, please contact G. Tasso, PU2WVH, PO Box 232, Grand Blanc, MI 48439.

CHOUR handles the IBM PC system time offsets for users of the NE5S Hamcom RTTY/ASCII/CW transceive program (this program is bundled with the AEA series of modems and TUs) where the time offset between local and UTC is negative; that is, when the station is located east of the prime meridian. The program is available in C source code and compiled form for a blank floppy disk and 8 IRCs or for 35 IRCs without a blank disk from Dwight Ernest, KA2CNN, Henry-Arnaud Strasse 4, D-6082 Morfelden-Walldorf 2, Fed Rep of Germany.

If you are looking for a good IBM PC terminal program to use with a packet-radio TNC, try ProComm, a shareware program that is available on various landline BBS. *(recommended by Robert Corbett, W1CH)*

Kaypro 2X

Does anyone have CW and RTTY software for a Kaypro 2X that will run with a Heathkit HD-3030 and a Kenwood TS-430S? Please contact John Stockdale, WB6ABW, 44547 Hanstead Ave, Lancaster, CA 93535.

Radio Shack

Tandy Model 100 and 200 ham radio application programs are needed by Mike Warner, WA7LZQ, PO Box 3340, Ft Stewart, GA 31314.

TRS-80 Color Computer Cocoradio Amateur Radio Disk Package is a collection of "interfaceless" ham radio application programs for CW, FSTV, SSTV, FAX, RTTY, OSCAR, contesting and DX that require no external demodulators for RF-to-audio signal processing. The programs are user-friendly and menu-driven, and are available from SPEC-COM Software™, PO Box H, Lowden, IA 52205-0408.

TRS-80 Color Computer terminal software with split-screen and transmit buffers is needed to interface with a Kantronics UTU-XT by David Johnstone, WB1COB, 19 Margerie St, Torrington, CT 06790.

AEA's TRS-80 Model I CP-1 "MBA" software and documentation, which is no longer available from AEA or its dealers, is needed by Eugene Koeppe, WB9JAB, 3319 N Drake Ave, Chicago, IL 60618.

TRS-80 Models I and III WEFAX receiving program is desired by Lisle Hines, K2QLA, 11 Meadow Dr, Homer, NY 13077.

TRS-80 Model 2 packet-radio software is requested by Tom Taormina, K5RC, 17601 Preston Rd, No. 101, Dallas, TX 75252. Tom also wonders if anyone has converted a Kenwood TR-7500 for packet-radio operation.

TRS-80 Model III RTTY and other ham radio application software is requested by Richard Luce, N3EJH, 660 Henry Ave, Warminster, PA 18974.

Sinclair/Timex

If anyone has interfaced a Sinclair ZX81 to an ICOM IC-551D, please contact Clem Clement, K1GPJ, PO Box 1561, Lewiston, ME 04242.

QZX, The Journal Covering Amateur Radio & Sinclair Computers, is still being published on a monthly basis and is recommended to hams using a Sinclair or Timex computer. If you are interested, write to *QZX* at 2025 O'Donnell Dr, Las Cruces, NM 88001.

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716
CompuServe ID no. 70645,247

New England's 220 Network

Pick up your 220 hand-held transceiver in Providence, Rhode Island and chat with a mobile station north of Burlington, Vermont. Or conduct a 220 QSO with stations north of Montreal from your QTH in southern New England. Or join a six-state roundtable on 220 FM. How is this possible?

A number of years ago, Sergio Marino, KG1C, and Frank Duffy, K1MOQ, decided to establish a network of 220-MHz repeaters that would cover all of New England to promote the use of 220. Today, they have nearly accomplished that goal. With the cooperation of other repeater operators, they have managed to organize a linked 220 FM network that encompasses much of six New England states and parts of adjacent New York State and Quebec Province.

Table 1
New England 220 Network Repeaters

Location	*Call Sign*	*Input (MHz)*	*Output (MHz)*	*Status*
MA, Mt Tom	KG1C	223.02	224.62	Full-time
MA, Needham	KG1C	222.52	224.12	Part-time
NH, Concord	KG1C	223.22	224.82	Full-time
NH, Keene	K1XR	147.975	147.375	Part-time
NH, Mt Washington	N1CGF	443.875	448.875	Part-time
NH, Nashua	KA1DT	147.645	147.045	Part-time
NH, Nashua	KA1DT	222.68	224.28	Part-time
NH, Pack Monadnock	KG1C	222.02	223.62	Hub
RI, Scituate	KG1C	223.08	224.68	Full-time
VT, Essex Junction	K1VT	146.25	146.85	Part-time
VT, Essex Junction	K1VT	444.0	449.0	Part-time
VT, Mt Equinox	WA1ZMS	444.175	449.175	Full-time
VT, Tunbridge	K1MOQ	146.37	146.97	Part-time
VT, Tunbridge	K1MOQ	223.08	224.68	Full-time

Strategic Links

The heart of this network is KG1C's 220 repeater on Pack Monadnock mountain, in south central New Hampshire. From "the Pack," there are 220-MHz links to 145, 220 and 450-MHz repeaters that are strategically located in Massachusetts, New Hampshire, Rhode Island and Vermont. Strategically speaking, there is a link to 450-MHz repeater N1CGF on Mount Washington, New Hampshire, which, at 6288 feet above sea level, is the highest point in New England. (On a clear day, you can see the Atlantic Ocean, 75 miles away, from the top of Mount Washington.) There is also a link to WA1ZMS, a 2-meter repeater on Mount Equinox in southwestern Vermont, which provides coverage into the upper Hudson River valley and Albany, New York metropolitan area. And atop Mount Tom, Massachusetts sits 220-MHz repeater KG1C, overlooking the heavily populated lower Connecticut River Valley.

The network is served by five full-time "normally linked" repeaters and eight part-time "callable" repeaters. The 220 and 450-MHz repeaters are part of the network on a callable or a normally-linked basis, while the 2-meter repeaters are strictly on a callable basis. Callable repeaters join and leave the basic network as commanded by touch tone, while the normally linked repeaters are permanently interconnected. If one normally linked repeater is brought up by a user, all of the other repeaters in the network, the normally linked and active callable repeaters, are similarly brought up. (Refer to Table 1 for a summary of the network.)

As a result, the hardest thing for unfamiliar users to realize is that although they may appear to be using just one repeater, they are activating from five to 14 other repeaters and can be heard throughout New England and the surrounding area. Obviously, good operating practice and knowledge of network policies is important.

Network Operating Practices

In general, long-distance communication is encouraged, while prolonged use of a single node for local communications is discouraged. Users are asked to avoid tying up the network with QSOs when all of the users are on the same node. Brief chats involving just one node or longer QSOs on topics of great interest to listeners in general are all right, but users should not tie up all of New England chatting with a friend across town about items of interest only to themselves when this could be more easily accomplished on simplex or via a local repeater.

Normally, it is good operating practice to have QSOs that consist of brief bursts, often single words. However, on the network it is possible that multiple squelch tails will interfere with the first syllable of the first spoken word. Therefore, a brief pause before uttering that first word is recommended to promote intelligibility.

Users of the network are encouraged to write for a handout that explains the complete operation of the network, including the list of touch tone codes that activate and deactivate the callable repeaters. For a copy, send 56 cents in postage to KG1C (20 Avalon, Needham, MA 02192) or to K1MOQ (Spring Rd, Tunbridge, VT 05077). It will give you the most recent information and puts you on the mailing list for updates. All users are welcome to the network, but because there are stricter operating requirements than on most repeaters, knowledge of the procedures are helpful.

Future Evolution

In the future, there are plans to add nodes in Maine, Cape Cod and the Montreal vicinity. Also, on the wish list are a full-time 220-MHz repeater on top of Mount Equinox to cover the Albany area and a better full-time 220-MHz repeater to cover Burlington, Vermont. Weather observation stations and links to other bands are also in the future.

REPEATER LOG

According to September 1986 reports received, repeaters were involved in the following public-service events: 301 vehicle emergencies, 42 public-safety events, 39 alerts/drills, 20 medical emergencies, 12 fire emergencies, 11 weather emergencies, 1 criminal activity and 1 telephone failure.

The following repeaters were involved (followed by the number of events): NK2W 9, WA2ZWP 3, W4BFB 8, WA4BVW 34, N4CKE 15, WD4JWO 21, WA6BJY 4, W6FNO 299, WT6T 1, K8DDG 11, KD8GL 5, WD8IEL 10, WA8ULB 7.

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*.

Advisory Committee Members	May 1986, p 48
Club Challenge for the '80s Rules	Sep 1986, p 58
Club Contest Rules	This issue, p 81
Frequency/Mode Allocations	This issue, p 58
Golden Jubilee of DXCC Award	Sep 1986, p 60
Hamfest Calendar Rules	Sep 1986, p 84
Ham Radio-Related Landline BBSs	Nov 1986, p 58
International DX Contest Rules	Dec 1986, p 80
January VHF Sweepstakes Rules	Dec 1986, p 79
License-Renewal Information	This issue, p 58
Major ARRL Operating Events and Conventions—1987	This issue, p 57
Novice-Enhancement NPRM	Jun 1986, p 49
QSL Bureaus	
Incoming	Dec 1986, p 57
Outgoing	Sep 1986, p 73
Reciprocal-Operating Agreements	Dec 1986, p 53
Spread-Spectrum Rules	Apr 1986, p 45
Third-Party-Traffic Agreements	Dec 1986, p 53
902-MHz Interim Band Plan	Jan 1986, p 74

The World Above 50 MHz

Conducted By Bill Tynan, W3XO
Send reports to PO Box 117, Burtonsville, MD 20866,
or call 301-384-6736 to record late-breaking information.

A Few Tips for those Upcoming Outings

Last month's column made the suggestion that a lot of fun can be had by leaving our comfortable shacks and taking to the hills for some portable VHF operating. Even for those who have good setups at home, but especially for those who don't, operating away from the regular QTH can be fun and profitable. Like to be rare DX? Maybe it's only a matter of a trip of 100 miles or less to a sparsely populated nearby grid to become a sought-after contact.

While this doesn't seem, at first thought, to be the right time of year to be considering piling the rig into the car and heading for the boonies, warmer times are coming in a few months. In some sections of the country, the weather is perfectly conducive to a little wintertime portable operation. In the colder climates, there are always some who take pride in demonstrating to the rest of us that they can overcome the elements. If you are one of these hardy souls, how about combining a ski trip and a gridexpedition? In either case, the VHF Sweepstakes, January 10 and 11 (see December *QST*, page 79, for complete rules), presents a great opportunity to try a short stint of portable operation. The increased activity that this affair always brings out should ensure plenty of action.

But, let's say that you have decided to give portable operating a try, either in the near future or next summer. What are a few things you should plan to take with you, and how can you make the operation as pleasurable and productive as possible?

First you should decide whether to spend the night or merely venture out for an afternoon and early evening of hamming. If you are planning to stay overnight, where are you going to sleep? Only a few of us can stay at the rig all night long. If you are an old hand at camping out, you obviously know more than I do, so I won't attempt to show you the ropes. If you're not an old hand, maybe you can interest a friend, relative or neighbor who is an experienced outdoorsman into going with you. Chances are, that person may have appropriate equipment. If he or she is not a ham, so much the better. You get to do all the operating, and maybe you can win a new convert to Amateur Radio in the process. If you don't have camping gear, an extensive list of items you'll need appears in "VHF Mountaintopping for the '80s," Mar 1986 *QST*, p 50.

What I can provide are a few handy hints in the radio line to make your mini-DXpedition easier and more enjoyable. First, you must decide what you are going to use for power. The obvious approach is to operate from your car or truck battery. If this is your choice, it's a good idea to take along a fully charged spare battery. I have come close to stranding myself because I ran the battery down too far to start the car. If you are going to use a portable generator, make sure it is in good working condition, and have spare items such as spark plugs and belts on hand. You can buy gasoline and oil for the generator almost anywhere. If you are going quite some distance off well-traveled roads, be sure to take plenty of fuel with you.

Figure out how and where you are going to operate. If you have a station wagon, you can use the tailgate as an operating table. You might also consider bringing along a folding table and chair. For those who plan to operate from inside a car, it's wise to construct some kind of small table that can be used to hold the rig and serve as a writing surface. Another simple approach to help in logging is to use a clipboard. I won't discuss those who are equipped to do their operating from the comfort of a plush van or camper. They are obviously way ahead of me. Often forgotten in the rush to pack is a supply of sharpened pencils. Of course, when you break or wear down your last one, you can always sharpen it with the knife, which I'm sure you remembered to include in your kit.

How much power should you run, and what about the antenna? If a 10-W rig is all you have, by all means use it. After all, if one of the reasons you are going out is to learn what it's like to use a better antenna in a superior location than you are accustomed to at home, you will have a great time observing how much better your 10-W rig does from that super, portable spot you selected than it did from the home QTH. If you do have access to a solid-state amplifier in the 100-W class, so much the better. It will really perk up your signal and let those faraway stations know you're there. If you are using the car battery, however, it might be best to use the amp sparingly. Run barefoot most of the time and turn on the extra power only when it's really needed.

For the antenna, the old rule, the bigger and higher the better, applies. Nevertheless, especially if you are going out by yourself, or you're new at the game, it's best to be a little conservative in this respect. A small Yagi with a 10-foot boom, 15 to 20 feet above ground, is probably an optimum choice. If you have a push-up mast, so much the better. If not, the next easiest solution is to use a few lengths of aluminum or steel TV mast, available at Radio Shack and many hardware stores.

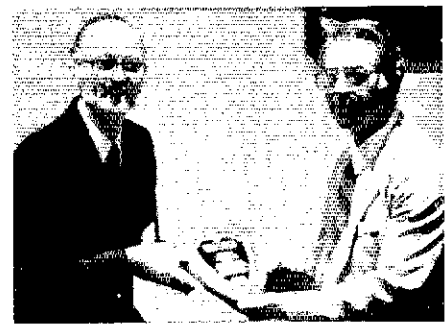
What about a rotator? In my opinion, a rotator for this kind of operation is more trouble than it's worth. For one thing, commercial TV rotators operate on ac power, so you have to be using a generator or bring along an inverter just to power the rotator. Working close to the antenna, the old "armstrong" method is probably the best approach. A trick I have seen work well is to mount a pipe flange on a piece of board, or preferably a metal plate. Position the flange toward one end of the plate rather than dead center. You'll see why later. Then, screw a length of water pipe, large enough to take your mast, into the flange and drop your mast down into the pipe.

How are you going to keep the whole thing from falling over? Of course, you can look for big rocks to put on the corners of the plate, but if you can't find any, you're in trouble. Guying is always possible, but requires a guy bearing on the mast. You can make one with a couple of pipe flanges, the lower one fastened to your mast with a set screw or two. But perhaps the simplest way to keep the antenna up is to drive one wheel of your car onto the plate. Now you can see why I suggested not mounting the pipe flange in the center of the plate.

It's a good idea to take along a map so you can find where you are. It's especially important when operating near a grid boundary to be certain that you know which side of the line you are on. If there are markers around, such is often the case at state lines, note their location with respect to your operating position and antenna. It's a good idea to bring along a camera so you can provide photographic evidence of your location, should someone later question it. Besides, pictures of your outing are always fun to look at later. How about sending one to me? If it is of sufficient clarity and I can find space, I may be able to publish it in a future column, so everyone can share in your DXpedition.

While we're on the subject of your location, be sure to find out who owns or administers the property. Get permission in advance to be there and engage in radio operation. If it is a park area, remember that some parks do not allow camping out at night. Get that, along with any other rules, settled beforehand.

These have been but a few ideas to help make your portable operation more fun and productive. There are many more I am sure you and your friends will come up with. Have a good time and look for W3XO. I may need your rare grid.



Paul Wilson, W4HHK (left), receives the 1986 John T. Chambers Award presented by the Central States VHF Society for outstanding technical contributions to the VHF/UHF art. In the 1950s, Paul held protracted schedules with W2UK, which eventually demonstrated the utility of meteor scatter for completing long-haul contacts on 144 MHz. In 1970, he participated with W3GKP in the first successful moonbounce operation on the 2300-MHz band. He continues to experiment with that mode, as well as terrestrial modes, on 13 cm today. The plaque, was presented by John Fox, WØLER, the Chambers Award Committee Chairman, at the Society's Conference in St Louis, Missouri at the end of July. *(N4MW photo)*

2-Meter Standings

For WAS holders, listing is WAS number, call, state, call areas worked and grids worked. For others, call, state, states worked, call areas worked and grids worked. Call areas are the 10 US continental call areas plus KH6 and KL7 plus each VE and XE call area plus DXCC countries not located within the continental limits of the US, Canada or Mexico. Grids are the Maidenhead designators worked since the VUCC Award was instituted, January 1983. In order to make the standings a true reflection of current 2-meter activity, those not reporting within the past two years are subject to being dropped. They will be reinstated upon presentation, in writing, of continued activity. It is not necessary to show additional states, call areas or grids worked to be reinstated. WAS holders are listed in any case. Compiled November 5, 1986. Updates for next listing must be at PO Box 117, Burtonsville, MD 20866 by May 5, 1987.

WAS Holders

1	KØMQS*	IA	—	—
2	K5CM*	OK	—	—
3	NØJA*	MO	—	—
4	K9HMB*	IL	—	—
5	K1WHS*	ME	—	—
6	WA4MVI*†	(1)	—	—
7	K5JL*	OK	—	—
8	WA9DOT*†	WI	—	—
9	WBØZXU*	IA	—	—
10	K9CA*	IN	—	—
11	WØSD*	SD	—	—
12	WØRRY*	(2)	—	—
13	K5GW*	TX	—	—
14	WB5LUA*	TX	23	—
15	K4GL*	SC	23	—
16	WØVB*	MN	14	—
17	WB5LBT*†	LA	50	—
18	I4PKV*	NC	—	—
19	WØRWH*	MO	23	—
20	W8IDU*†	MI	23	—
21	K1MNS*†	NH	48	—
22	WB9VEN*	IL	—	—
23	K5FF*†	NM	18	—
24	W5FF*†	NM	20	107
25	W7FN*	WA	—	—
26	W1JR*†	MA	34	144
27	WBØQMN*	CO	—	—
28	WB4EXW*	NC	18	—
29	K9KFR*	IN	—	—
30	K3VGX*	PA	—	—
31	SM7BAE*		21	—
32	WA7BJU*	OR	—	—
33	VE7BQH*†		57	—
34	W6PO*	CA	—	—
35	WA3VSJ*	PA	27	—
36	AL7FS*	AK	20	—
37	WBØYSG*	NE	—	—
38	N7NW*	WA	—	—
39	W5LUU*	TX	—	—
40	W4HJQ*	KY	—	—
41	K5UGM*	TX	—	—
42	W5UN*	TX	—	—
43	WA4LYS*†	FL	49	—
44	WA1JXN/7*†	MT	58	—
45	W5JTL*	MS	14	—
46	WAØANH*	MN	—	—
47	WA4NJP*	GA	—	—
48	W5HM*	NM	—	—
49	W7CI*	AZ	26	—
50	N5KW*	OK	13	—
51	WBØTEM*	IA	23	—
52	WDØFOY*	IA	23	—
53	WØRWG*	MO	16	—
54	WB5ERD*	TX	—	—
55	W4WD/7*	UT	—	—
56	KE5C*†	TX	—	—
57	WA4CQG*	AL	—	—
58	WB9CAS*	IL	—	—
59	W2CNS*	NY	28	—
60	Deleted			
61	KØALL*	ND	27	—
62	K9XY*	WI	29	—
63	K1FO*	CT	18	98
64	W4DFK*	VA	—	—
65	WD5CRK*	OK	—	—
66	WB8PAT*	OH	49	39
67	KXØO*†	CO	30	103
68	W7HAH*†	MT	44	149
69	K7KOT*	WA	—	—
70	KB8RQ*	OH	—	—
71	WA7BBM*	AZ	—	—
72	SM2GGF*		—	—
73	KD8SI	OH	—	—
74	K2OS*†	NY	17	—
75	K1GVM*	MA	34	—
76	WA9OZN*	IL	—	—
77	WA6MGZ*†	CA	49	176
78	WD5AGO*	OK	38	—
79	WD4DGF*	TN	36	174
80	VE1UT*	NS	42	—
81	WØRRY/5*	OK (3)	30	—
82	WBØVYV*	IA	—	—
83	W5RCI*	MS	12	—
84	WA2GSX*†	NY	27	—
85	WAØTKJ*	KS	25	171
86	KB7Q*	MT	—	—
87	AB3D*	DE	25	32
88	KFØM*	KS	28	173

WA1OUB*	NH	40	12	145
WA1JOF*	MA	40	19	—
K1PXE	CT	35	13	—
N1AIS	MA	34	12	—
W1AIM*	VT	32	11	72
K1VMI	CT	31	12	—
W1RIL	MA	30	12	—
W1GXT	MA	30	11	—
KA1DHO	MA	29	11	46
W2SZ/1	MA	28	19	154
K5MA/1	MA	27	11	91
WA1AYS	MA	26	10	—
W1QXX*	MA	26	9	81
WA1LOU	CT	25	11	—
KA1BRD	CT	24	11	—
W1HDQ	CT	24	7	—
W2PGC*	NY	49	19	74
K2QR*	NY	45	28	66
WA2PVV*	NY	40	13	—
K2TXB*	NJ	39	—	117
W2RS	NJ	38	13	—
W2BLV	NJ	37	10	—
W2ORI	NY	37	8	—
KE2N	NY	36	13	122
WB2CUT	NJ	36	13	—
NB2T	NY	36	12	40
K2OVS	NY	36	12	35
WA2FGK	NJ	35	11	—
K2GK	NY	34	11	91
N2BJ	NY	34	11	79
W2MPK	NY	31	11	—
W2HRW	NJ	29	—	—
W2DWJ	NJ	27	11	—
KA2BTD	NJ	26	10	—
K2YCO	NY	26	10	—
W2WW	NY	24	10	44
WA2DKB	NJ	23	11	—
KC2KK	NY	17	7	34
WB3JHP*	MD	45	19	—
K3MD*	PA	42	26	112
WA3HMK*	PA	38	14	162
W3CWG	PA	37	12	131
W3XO	MD	37	12	38
W3RUE	PA	37	11	60
K3FX	PA	37	10	130
K3QCQ*	PA	37	8	—
W3IWI	MD	37	—	—
WA3FYJ	PA	36	10	96
W3ZZ	MD	35	12	100
WB3JLK	MD	35	11	45
AE3T	PA	35	11	—
W3CLQ	PA	35	10	—

KB3PD*	DE	34	8	—
W3IWU	PA	32	11	76
K3KEL	PA	32	11	63
WA3DMF	MD	32	11	57
W3OTC	MD	32	11	54
W3LNA	PA	29	8	43
W4ZD*	FL	46	30	132
KC4EG*	KY	41	13	—
WA4PCS	KY	41	11	—
WB4NXY	KY	41	9	125
WS4F	GA	40	14	135
WB4NMA	GA	40	10	—
W4CPZ	SC	39	12	22
WA4DKH	KY	39	11	—
W4HHK	TN	38	9	—
K4KAE	SC	37	13	80
WA4OWC	FL	37	10	—
W4ISS	GA	37	8	—
K4QIF	VA	37	8	—
W5HUQ/4*	FL	36	13	—
W4LNG	GA	36	8	30
N4VC	TN	35	9	126
WA4SBC	VA	34	13	—
W4FJ	VA	34	8	—
W8QXQ/4	GA	33	10	100
W3IY/4	VA	32	8	—
K4CKS	GA	31	11	100
WB4KNF*	TN	31	11	33
W3EP/4	GA	31	10	82
W3ZR/4	FL	30	9	77
K1FJM/4	FL	29	9	—
N4EJW	FL	28	12	76
WA4OFS	FL	27	7	15
WD4AHZ	FL	26	10	95
NA4I	GA	24	10	—
WB4RUA	GA	22	7	69
WD4FAB	FL	22	—	71
NI4Z	FL	21	9	—
K4LFF	GA	19	9	56
W5UWB*	TX	48	15	—
K5UR	AR	48	13	240
K5WE*	OK	47	13	—
K5SW	OK	47	12	192
K5YY	AR	46	15	253
W5HN	TX	42	12	—
KB5MR	OK	40	14	140
W5SXD	TX	40	11	55
WA5DBY*	TX	40	11	—
W5HFV	OK	38	10	—
NR5O	OK	38	9	109
WB5JAR	AR	37	10	—
WA5HNK	TX	36	10	—
AA5V	OK	36	9	—
W5NZS	OK	36	7	97
K5VVV	TX	31	10	—
N5BBO	TX	31	10	—
K5DHU	TX	30	10	50
WA5IYX	TX	27	9	—
W5DFU	OK	26	7	—
N6AMG*		32	37	—
W6XJ*		29	12	—
WB6NMT*		26	13	—
K6PVS*		24	—	—
K6JYO*		23	7	—
K6QXY*		20	14	—
WA6LHD		18	7	54
WA8LLY/6		13	5	19
K6HXW*		13	—	—
N6TX*		9	8	—
K6GAO		9	6	—
N6CA		8	3	—
WA6HXM		6	3	16
W7IUV*	AZ	45	47	129
W7JF*	MT	45	—	—

KB7WW*	OR	32	10	—
WA7ADK	UT	25	7	—
K7ICW*	NV	23	9	—
AA7A	AZ	23	6	59
WA7JTM	AZ	21	6	—
N7EIJ	ID	13	6	—
WA7EPU	AZ	12	6	—
W7IDZ	WA	9	4	30
KBEUR*	OH	41	11	—
NI8O	OH	40	12	146
K8WKZ	MI	39	14	—
K8RZB	OH	39	10	142
WB2DIN/8	WV	36	13	—
W8NJR	OH	33	11	124
W8GAP	MI	30	11	75
KB8SG	MI	29	8	—
W9BOZ	IL	47	21	—
W9UD	IL	45	12	—
NN9K	IL	44	11	155
KB9NM	WI	43	14	—
N9AQ	IL	42	12	171
WB9MSV*	IL	42	12	158
W3EP/9	IN	41	13	105
N9KC	IL	41	11	130
K9SM	IL	36	8	—
W9HAD	IL	33	9	112
KD9JO	IL	31	—	106
W9YCV	WI	30	—	107
N9CUE	IN	27	10	28
N9CEX	IL	26	9	—
K9BQL	IL	23	8	40
WØRT*	KS	48	20	109
WØEMS	NE	48	11	—
KØDAS*	IA	47	13	—
NØLL	KS	46	11	180
WØOHU	MN	45	12	—
KCØQR	NE	43	11	143
WØPN	MN	43	11	52
KØTLM	MO	43	10	157
WØFY	MO	43	10	124
WBØDGF	NE	43	10	85
KMØA	MO	42	11	164
WØRAP	IA	40	10	114
WBØDRL*	KS	39	34	116
KØJS	NE	39	11	125
WØPW	CO	38	9	—
WØIZ	IA	36	11	133
WBØZKG	IA	36	10	—
WAØVJF	KS	34	11	59
WØRWC	IA	34	8	—
NØAJU	NE	32	9	102
WBØYZN	NE	31	11	107
KBØHH*	KS	30	9	116
WBØZAH	MN	29	9	79
WØKEA	CO	29	8	87
WØJRP	MO	27	8	105
KCØOG	NE	25	8	60
KØBTN	NE	20	9	85
KAØKUY	KS	20	6	75
VE1AHM	NB	21	10	—
VE3DSS*		38	12	—
VE3EMS		38	11	—
VE3FKX		35	10	—
VE3DTQ		31	12	—
VE3EQQ*		20	16	—
VE4MA		14	9	—
VE4AQ		11	5	7
VE5LY*		17	9	32
PA2VST*		28	—	—
WA1JXN/C6A		23	28	—
KG6DX*		22	—	67

(1) WAS completed in NC, now in SC.
(2) WAS completed in IA, now in OK.
(3) WAS completed from two locations.
*One or more contacts made by EME.
†WAC
—Information not provided.

ON THE BANDS

6 Meters—One is tempted to begin this section with the same words used to introduce last month's 6-meter section: "Will the wonders never cease?" During the fall of the year and at this low point of the solar cycle, who would have dared to speculate on the possibility of an October opening between Hawaii and the Mainland, much less one producing propagation all the way to the East Coast? That's exactly what happened October 14. W5DZF/4 Miami reports that beginning about 0010Z, he began to hear Al, KH6IAA. Scottie made contact one minute later but continued to hear Al for the next 55 minutes, with signals peaking S9 plus 20 dB just before fading out. From his end, KH6IAA says that the opening lasted about an hour for him as well. It started in California, but soon moved east across Texas and into Florida. Altogether, he worked over 50 stations including eight Floridians. It is not clear what type of propagation caused this opening, but there was considerable magnetic activity at the time. Based on information contained in the weekly solar and geomagnetic summaries published by NOAA, solar activity picked up markedly in the preceding week and remained high for the following week. A few hours prior to the opening, the estimated planetary K Index reached 7. This is not an especially high value, but does indicate a significant level of magnetic disturbance. By way of comparison, the K Index reached 9 during the major magnetic storm that hit last February 8, producing widespread 6-meter openings as well as regular auroral propagation on all bands through 70 cm. Reports I have received also indicate that 10-meter conditions to the South Pacific were quite good that afternoon and evening of October 13-14 over much of the country. All of this points to the possibility that the propagation might have involved the F Layer, at least in part. This is an interesting thought during this low period of the solar cycle. A few days following the 14th, the sun kicked up even more, producing a 245-MHz noise burst of 4000 Flux Units on October 18. By October 23, the 10.7-cm solar flux, measured each day at Ottawa, reached 99. In recent months, it has been running in the neighbor hood of 70. Other tantalizing F2-related tidbits come from KH6IAA and WA5IYX. Al notes that he has been hearing Mainland pagers

(continued on page 79)

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

MORE ON STAMPS AND AMATEUR RADIO

☐ In the October issue, Dick Tesar, WA4WIP, suggested that the way to get a better return of foreign QSL cards is to use commemorative stamps on the mailing. The logic of his argument assumes that the foreign amateur receives the US card and the stamps on it. I have evidence that suggests that the use of commemorative stamps *reduces* the chance that the foreign amateur will receive the card.

For years I corresponded with the late Jack Clarricoats, G6CL, who was an active collector. On each of my letters, I used a combination of commemorative stamps. Jack returned one of my envelopes he had received with the stamps removed. It was logical to assume that there may be even more unscrupulous mail handlers who destroy a letter in order to obtain the stamps on it. Since this incident, I have used the most prosaic stamps possible on any piece of mail that I consider important. If I want to send commemorative stamps, I put them inside the envelope.—*Yardley Beers, WØJF, Boulder, Colorado*

ON THE AIR

☐ I just received my November issue of *QST* and the first article I read was "On the Air—At Last." If you have published a similar article in the past, I missed it. This article was great, and it perfectly reflected the fears and experiences that I had while a Novice and also those which new Novices are now encountering.

I never really had an Elmer when I first began in Amateur Radio so I especially felt the aloneness and frustration of the Novice test and first contact. I hope that you will continue to publish articles of this nature in the future.—*Duane M. Schenone, N2GIY, Toms River, New Jersey*

LOOMIS RETURNS!

☐ This is in reference to "Hertz Strikes Again," Nov 1986 *QST*. Methinks the gentleman doth protest too much!

Without taking sides on any controversy which may exist regarding what Mahlon Loomis may have done, or recognized as the consequences of his actions, I disagree with the assertion in subject letter that he did not at least create electromagnetic waves, whether or not he communicated with them. It is not simply "the difference between ac and dc." What many persons tend to overlook, and I believe that the letter writer, W6HPH, overlooked, is that no dc voltage or current comes into existence instantaneously at its ultimate (constant) value. There is always a transient. Hence, when a dc field or current is being generated there exists, for however short a time, a varying (ac) field or current. Such a current does create an electromagnetic wave.

In fact, W6HPH's letter recognizes that the Loomis apparatus "altered the electric field gradient" and that it was the alteration which was detected.

My understanding of electric theory is that all radiated varying electric "fields" or waves have associated therewith (90 degrees out of phase) corresponding magnetic fields; hence the name: electromagnetic.

I have heard it asserted that Loomis used a high-voltage spark as his source. Such a source would inherently generate ac components with their inevitable associated electromagnetic waves. It has also been suggested that the "galvanometer" he used at the receiving site may have been one which responded to ac.—*Bruce E. Lackey, WB3HAE, Rockville, Maryland*

☐ Who was the "father" (or mother) of radio? Unfortunately, it's most likely that we'll never really know. Every continent has its contenders. These many decades later, we must depend on second, third or ninth-hand information—newspaper coverage, patent applications, legal decisions—to help us answer that question. But the fact is that the published exploits of any contender for the "father of radio" title may just as easily have been predated by the putterings of any number of unknown and unreported experimenters. In all fairness, what about them? How can we be sure? We cannot.

As the saying goes, "A person convinced against his will is an unbeliever still." Perhaps the best we can do is renew our respect for every person known to history who has pushed the limits of what was known about electromagnetism. After all, it is the combined legacy of all of these people—radio amateurs in the purest sense—in which we rejoice each time we ponder, send or receive electromagnetic waves.—*David Newkirk, AK7M, Assistant Technical Editor, QST*

COMPUTERS AND HAM RADIO: THE LINK

☐ Amateur Radio in all its permutations is a wonderful hobby but it is an inappropriate platform for chauvinism. The item in the November League Lines disparaging one ham's attempts to begin a computer hobbyist radio service is a discouraging sample.

Amateur Radio is not a "radio service for computer hobbyists." It is a radio service for radio hobbyists, some of whom happen to be interested in computers. Hams have done an admirable job of getting packet radio working. Once such a system works at a certain level of reliability, though, dissemination should be the next goal. Even if all of the individuals wishing to use packet were interested only in experimentation, much of their fiddling could be done using FCC-approved and factory-sealed circuits. Their research could not legally center on modulation techniques or even on network protocol, but might involve radio-suitable data encryption and could be quite valuable. Such work would be impossible, by statute, on the amateur bands.

Personal computing is without question the currently most important technical hobby, and it is from the ranks of computer users that almost all young electronics hobbyists and aspiring engineers will emerge. Most new electronics hobbyists will never aspire to the ham bands despite their considerable skills. American hams clearly indicated their refusal to welcome these enthusiastic experimenters by demanding code tests for all licenses, but the Amateur Service limited attraction for them anyway. Their retaliation for our poor hospitality may be annexation of our band space—and it may not be a bad move for them or for us.—*David Kazdan, MD, AD8Y, Cleveland, Ohio*

KEEPING PEOPLE IN HAM RADIO

☐ Many of you have helped someone achieve the first step into ham radio. Now you think you're done, right? Wrong! That was only half the battle; now you must keep the newly licensed ham for life.

One of the first things to do is to get them on the air. If necessary, get them started on your rig if they don't own one. Keep them interested by making them use what they have learned. Help your "new" ham find the "niche" into which he will fit. Is he a ragchewer, a traffic handler, a DXer, or a contester? There are so many things to do in our great hobby that one of them is sure to capture your new ham's interest, and keep him a ham for life.—*Matt Penrod, KA2TVX, Moravia, New York*

DENMARK'S CONTRIBUTION TO HAM RADIO

☐ So much is written about Marconi, Hertz and others that we tend to forget two milestones in radio history.

In 1820, H. C. Orsted discovered electromagnetism in Denmark. The original version of his findings, and only known copy in the world, is currently on exhibit in the Houghton Library at Harvard University, with the title "Conflictus Electrici In Acum Magneticam." Another Dane, Valdemar Paulsen, in 1903, designed the world's first arc transmitter which generates CW. As you might have guessed by now, I am from Denmark!—*Bo H. Strandnes, KA1OLM, Derry, New Hampshire.*

Canadian NewsFronts

Conducted By Harry MacLean, VE3GRO
500 Riverside Dr, London, ON N6H 2R7
Tel 519-473-1668

IARU General Assembly Report

CRRL was among the 24 national Amateur Radio societies of North and South America represented at the IX General Assembly of IARU Region 2, held in Buenos Aires during the week of October 20-25. The General Assembly was opened by officials of IARU Region 2 and Radio Club Argentino, and the Argentine Minister of Communications. Then came two days of intensive committee work and one day of writing up reports, followed by a one-day plenary session, at which the recommendations of the committees received final approval.

What were some of those recommendations? (1) That the top 10 kHz of the 15- and 20-metre bands become the initial meeting place for amateurs during time of internaional emergency; (2) that a type of emergency net proliferating in South America, occupying spot frequencies in the amateur bands up to 24 hours a day, 365 days a year, be discouraged in favour of emergency nets that operate only during actual emergencies or for training and practice; (3) that there be no phone operation in the 10-MHz band; (4) that contacts in the 10-MHz band not count for contests and awards; (5) that April 18, the anniversary of the founding of IARU in 1927, become World Radio Amateur Day; (6) that June 17 become World QRP Day; (7) that AX.25 become the interim preferred protocol for amateur packet radio; and (8) that IARU Region 2 work with the ARRL Digital Committee to establish a packet radio network for North and South America.

The General Assembly approved a set of HF band plans, not binding on anyone, but offered as guidelines for North and South America. It also approved three important recomendations initiated by CRRL: (1) a set of guidelines for net operation which includes the concept that nets, while they should be given every courtesy, do not have a right to a particular frequency to the extent that they can interfere with or displace QSOs already in progress; (2) that IARU consider establishing some professionally equipped monitoring stations to increase the effectiveness of the IARU Monitoring System (formerly called Intruder Watch); and (3) that IARU member-societies throughout the world press their communications authorities to concern themselves with the RF susceptibility of nonradio electronic products, and to make manufacturers of such products modify them without charge whenever the products malfunction in an RF field. Yes, that last recommendation was a direct result of the Jack Ravenscroft case.

Two relatively minor items created heated debate. In split votes, the General Assembly approved recommendations (1) that the standard way of dating QSL cards should be year, month, day and (2) that amateurs operating portable in a foreign country should place the prefix of the country before rather than after their own call signs.

The conductor of this column, VE3GRO (left), was the Canadian voting delegate at the IX General Assembly of IARU Region 2, held in Buenos Aires in October. Al d'Eon, VE3AND (right), was the alternate Canadian delegate. *(N1CIX photo)*

Are these general assemblies important? We weren't sure when we went, but now that we've been, we have no hesitation in answering "yes." These general assemblies force representatives of national Amateur Radio societies to look beyond their own narrow concerns. They make it possible to share problems and work out solutions. It really hits home when you work together: Amateur Radio is an international fraternity.

SECTION MANAGER ELECTION NOTICE

To all CRRL members in the Alberta Section: You are hereby solicited for nominating petitions pursuant to an election for Section Manager. Name of the incumbent appears on page 8 of this *QST*. A petition, to be valid, must carry the signatures of five or more Full members of the League residing in the Alberta Section. It is advisable to have more than five signatures. Photocopied signatures are not acceptable. Signatures must be on the petition. Petition forms, FSD-129-C, are available from the CRRL Headquarters office in London, Ontario, but are not required. The following form is acceptable:

(Place and date)

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

We, the undersigned Full members residing in the Alberta Section, hereby nominate. . . (Name and call sign) as Section Manager for this Section for the next two-year term of office.

. . . (Signatures and call signs). . . (Addresses including postal codes)

A Section Manager must be a resident of his or her Section and a licensed radio amateur holding a Canadian Amateur Certificate or higher, and have been a CRRL Full member for a continuous term of two years at the time of nomination. Petitions will be received at the CRRL Headquarters office until 1600 EST 1987 March 06. If only one valid petition is received by that time, the person nominated will be declared elected. If more than one valid petition is received, a balloted election will take place. Ballots will be mailed from CRRL Headquarters on or before 1987 April 01. Returns will be counted after 1987 May 19. A Section Manager elected as a result of these procedures will begin a two-year term of office on 1987 July 01.

If no valid petition is received, the Alberta Section will be resolicited in 1987 July and August *QST*. You are urged to take the initiative and file a nominating petition immediately.

Harry MacLean, VE3GRO
CRRL Secretary

DOC NOTE

☐ DOC will conduct 1987 Amateur Radio examinations on February 11, April 15, June 17 and October 21. File application forms on or before January 14, March 18, May 20 and September 23, or about one month before the date of each writing. Expect multiple-choice questions on the technical portions of all exams.

NOTES FROM ALL OVER

☐ Did you work VE7EXPO? If so, your contact was among the 12,594 contacts—7668 on HF and 4926 on VHF—made by this station, which operated from May 2 to October 13 from Vancouver's World Fair. VE7EXPO's first contact was with K7YFF, and last with British Columbia Section Manager Ernie Savage, VE7FB. In spite of poor band conditions, a noisy RF environment, a noisy physical environment and 3627 visiting amateurs who just dropped by to chat, VE7EXPO operators, five per shift, two shifts per day, managed to work all Canadian provinces, all US states and 85 DXCC countries. Dennis Pekrul, VE7CXN, is handling VE7EXPO's QSL cards. There are lots to fill out, and they will be routed through the QSL bureaus. Please be patient. If you didn't work VE7EXPO, you might be interested in a souvenir QSL card to brighten your shack. Dennis advises that he has a good supply and he'll be glad to send a card to anyone who sends him a self-addressed envelope and a 34 cent stamp.

YL News and Views

Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

W5ZPD, Citizen Extraordinaire

Dedicated to serving her community is one way of describing Cindy Jones, W5ZPD. So extensive are her efforts, talents and devotion in this respect that her neighbors, friends and colleagues recently bestowed upon her the title of Ovilla (Texas) Outstanding Citizen of the Year. Although being Ovilla's honored citizen is a well-deserved accolade, it is but one of many for Amateur Radio and community service that Cindy has received over the years.

Originally from Houston, Texas, where she was first licensed in 1953, Cindy was a member of the Houston Amateur Radio Club (HARC). Not only was she the first woman to serve on the Board of Directors of HARC, she was instrumental in researching and setting up a special exhibit of Amateur Radio artifacts, which became the HARC Museum. Cindy sent mailings asking for support to local amateurs, and the response was overwhelming. "Donations came from all over. These items were given by people who had lovingly cared for them over the years but had enough faith in our club to be able to part with them," recalls Cindy. The radio treasures have since been moved to a special place in Houston's Fine Arts and Science Museum, where the community at large can view the display as well as read a history, compiled and written by Cindy, of the Houston Amateur Radio Club. Cindy served as coeditor of *HARC News*, wrote its press releases and editorials, and became well-known for her column entitled Cindy's Chatter. HARC's Old Timers Night is a special club event, and Cindy has been its chairperson on several occasions.

Houston's highly esteemed medical community was privileged to benefit from Cindy's talent as a traffic handler. The Harris County Medical Society honored her twice with certificates for devoted and expert service in the handling of medical traffic for the Houston area. She served as Net Control of the South Texas Emergency Net as well as Assistant Emergency Coordinator for Harris County, and worked nonstop running phone patches for 24 during the onslaught of Hurricane Debra. For her tireless contributions, Cindy was presented with the Outstanding Award for Civil Defense.

The Houston Rotarians honored W5ZPD for traffic handling concerning a child in Central America. The child was scheduled to go to Houston for heart surgery, and Cindy worked with Houston medical personnel to have all necessary facilities ready when the child arrived. During the child's stay in the hospital, Cindy sent messages to the family, informing them of their son's progress. The child later returned to his family with good health and prospects for a bright future.

Cindy and OM W5QED moved to Ovilla, where Cindy has continued her public-service efforts. She became chairperson of the Planning and Zoning Commission, and was also in charge of the Ovilla Sesquicentennial Celebration.

Cindy Jones, W5ZPD, a YL of many honors.

"Cindy knows how to get things done," say her friends. To thank her, the town appointed her Honorary Fireman, which included her name being placed on a bronze plaque on the flag pole in front of the Ovilla fire station!

With Cindy being in charge of the "Beautify Ovilla Campaign," the citizens were not surprised when her herculian efforts resulted in a new community park with a sign that reads: "Ovilla 1844, Pride in Our Past, Enthusiasm for the Future." The funds required to build the park were the result of Cindy's organizational skills and persistence to get the job done. The city of Ovilla entered the "Keep Texas Beautiful Contest," a statewide beautification campaign held during 1985. The results were profitable: Ovilla (population 1300) received an honorable mention in its population category and shared a portion of the $20,000 in prize money. Cindy and her OM were guests at the Texas Governor's Mansion in Austin at a celebration to honor them and their town. During the summer of 1986, Cindy again went to Houston to accept the award on behalf of the city of Ovilla.

Except for 2 meters, W5ZPD is not as active on the amateur bands as she used to be. Amateur Radio is still a part of her busy life, though, because she finds time to speak before groups about the hobby and encourage others to learn more about it. Being named Ovilla's Outstanding Citizen doesn't mean that Cindy has slowed down. Not at all! With a little campaigning, Cindy may become the first female mayor of Ovilla this spring.

Present and past YLRL officers enjoyed a visit to Dayton (l-r): WI4K, Secretary; WB3EFQ, 3rd District Chairman; WB9TDR, past Secretary; WD8IKC, past *YL Harmonics* Editor; WAØWOF, past President; WD4NKP, YL DXCC Custodian. OMs are K4SB and Neal, son of WI4K. *(photos courtesy WI4K)*

IARU News

Conducted By Richard L. Baldwin, W1RU
HC 60, Box 60, Waldoboro, ME 04572

Africa Telecom 86

Every so often, the International Telecommunication Union sponsors a telecommunications exhibit, generally known as Telecom 79, or Telecom 83, or Asia Telecom 85, and so on. These are exhibits of communications equipment and systems aimed at helping the telecommunications authorities of the world's countries, particularly the developing countries, have a better idea and a broader knowledge of what exotic communications equipment is available in the marketplace. When held in Geneva, which is where the idea of a Telecom originated, they are very large exhibits indeed.

All of the major telecommunications manufacturers of the world are represented at one of the major Telecoms, displaying their wares and "selling" the concepts of advanced systems of communication. Also associated with the Telecoms are technical forums, in which distinguished engineers and scientists present technical papers on various phases of modern telecommunications. The regional Telecoms (Asia Telecom 85 and Africa Telecom 86) were not quite so large, but nonetheless were superb displays of modern communications equipment.

These are displays of commercial equipment used for commercial and government traffic, not equipment ordinarily used in Amateur Radio. Many of the names you are familiar with in Amateur Radio are also suppliers to commercial and government users, although the equipment of many more of the exhibitors are not customarily seen in Amateur Radio stations.

Each Telecom has turned out to be an excellent forum for a display of Amateur Radio, an opportunity to show off the Amateur Service to telecommunications delegates, especially from the developing countries. In each instance, the space for an Amateur Radio stand has been provided gratis by the ITU, and the stand itself has been organized by a local Amateur Radio club or IARU society. On the ITU side, we deal not only with ITU Secretary General Richard E. Butler, but also with the fellow at ITU who has been a prime force in organizing all of the Telecoms so far—Werner Wolther, DL1YJ.

At the most recent Telecom—Africa Telecom 86, held in Nairobi, Kenya during September 1986—the stand was organized by the Radio Society of Kenya. They did an outstanding job. The chairman of the society, Palle Rune, 5Z4EJ, was assisted by a dozen or so members of RSK, some of whom helped in setting up the station, and others who also manned the stand during the entire 10 days of the Telecom. There were operating transmitters on 20, 15 and 2 meters, using CW, sideband, FM and RTTY. Outside, a tribander was mounted on an aluminium tower, which was in turned braced on the bed of a 4-wheel-drive vehicle belonging to 5Z4EJ that which was parked in the courtyard of the Kenyatta Conference Center. Much of the radio equipment was provided by 5Z4RT. Many QSOs were made, but conditions were not the best, largely because of QRM caused by a host of nearby computers.

At Africa Telecom 86 (l-r): ITU Secretary General Richard Butler; Kenya Minister of Transport & Communications, Bw. Magagu; Sam Dimbia, 5Z4DS; Palle Rune, 5Z4EJ, chairman of the Radio Society of Kenya; W1RU; and Lynn Raburn, 5Z4DU.

The station at Africa Telecom 86, with Sam Dimbia, 5Z4DS. Sam works in the monitoring department of the Kenya Posts & Telecommunications Corporation (equivalent to the FCC in the USA), and is an active member of the Radio Society of Kenya.

But even more important than the QSOs from this special-event station was the excitement it created with visitors to Africa Telecom 86. The stand was located in an ideal spot, right on the corridor to the main exhibit hall, which meant that *everyone* who visited the Telecom exhibit had to pass by the Amateur Radio stand. The result was that the stand was always crowded with visitors. The RSK people who manned the stand spent hours and hours explaining Amateur Radio to young and old, delegate and non-delegate. You see, not only were there hundreds of "official" visitors to the Telecom, but it was also open to the public, and we had a slew of young people come by. Everyone who stopped by the stand had an opportunity to watch Amateur Radio in action, to listen to a spiel by one of the RSK members, and to ask questions. Everyone who showed the slightest bit of interest was invited to attend one of the regular monthly meetings at their clubhouse. Subsequent to Telecom, a number of people *have* visited RSK. It just may be that, because of Africa Telecom 86 and because of the classes that RSK sponsors for would-be amateurs, you'll be hearing even more 5Z4 stations on the air.

This is a typical view of the Amateur Radio stand at Africa Telecom 86. It was constantly crowded with visitors who were fascinated by the operating station and who listened attentively to the oral presentations made by various members of the Radio Society of Kenya.

Your scribe was one of those who hung around the stand in Nairobi and watched the proceedings. I was mightily impressed by the work and dedication of the members of RSK and by the enthusiasm the stand engendered. You know, not counting South Africa, there are only 1000 or so amateurs in Africa. If you're a pessimist, you might say that no wonder there has not been a whole lot of enthusiastic support for Amateur Radio at ITU conferences from countries in Africa. But on the other hand, what an opportunity! What a chance for growth! What a future!

QST Profiles

Conducted By Paula McKnight, N1DNB
Editorial Assistant, ARRL

Chuck Towns, K6LFH: "Let's Fly High"

"My favorite amateur activities involve paths that haven't been trod," states Chuck Towns, K6LFH. That isn't a surprising comment from an Amateur Radio original. Chuck was a founding member of Project OSCAR Association, the creative-thinking, far-seeing group that took the concept of ham radio space communications from a "flight of fantasy" to reality with OSCAR I, launched December 12, 1961.

Chuck brought his education (degrees in aerodynamics and electronics), his inventiveness (16 patents) and work experience (rocket propulsion) to the fledgling OSCAR Committee, which first met in 1959. When the committee evolved into the Project OSCAR Association, Chuck became Chairman of the Board of Directors.

Chuck Towns, K6LFH, spearheaded the West Coast group of hams who dedicated their time and talents to make Amateur Radio's first satellite a reality. Chuck holds a model of OSCAR II, launched six months after the pioneer, OSCAR I.

Chuck, you saw the OSCAR program develop from basement to boardroom, so to speak. How did the concept and the name of OSCAR come about?

The name came from Don Stoner, W6TNS, when he was hamming with Fred Hicks, W6EJU. The idle comment made by Don in the *CQ* column he wrote regarding what hams could do if "someone had a spare booster" is also true. Fred is the one who envisioned a Lockheed Agena ride.

What goals were set at the first Project OSCAR meeting?

The only goal established was to place an amateur satellite in space. Now to the myriad of details! For instance, first we had to determine the frequency. We all knew what they were in the States, but what are the limits, if any, in interband use? Any modes of operation forbidden in Outer Slobovia? We assumed CW would be permitted. Our limited knowledge of interband use said that the lower 2 MHz would be okay. We lucked out. Each facet of our challenge had to be put into an international arena, and the books on frequencies and their individual assignments then had to be tackled. We lucked out again because one of the men on the fringe of our group was a specialist in frequency management. He was cornered when he wasn't looking, and we had a volunteer to certify our chosen frequency of 145 MHz.

The men working with Nick Marshall, W6OLO, our engineering manager, now were faced with designing an oscillator that would function at least at 72.5 MHz for doubling to 145 MHz. Remember, in 1960 you could hardly buy a broadcast radio that was all solid state.

As Chairman of the Project OSCAR Association Board of Directors, what were your duties?

My first task was to get Lockheed approval to study a typical AGENA spacecraft to determine where our 10-lb subspacecraft could fit. It wasn't long before I realized this was being made for the Air Force, and that I had better address those people.

Bill Orr, W6SAI, and I got together because we both recognized that a trip to Washington, DC would be wasted if we couldn't define exactly what we wanted! We agreed that a White Paper that would define our immediate needs as well as our future aims had to be created. Bill said he had been thinking along the same lines and had already made an outline. A couple of months later, the Paper was ready for a trip to Washington.

My largest and certainly most time-consuming task was the presentation of the OSCAR concept to the various radio clubs and technical organizations in the San Francisco Bay area. This was a most important duty because volunteers were always needed to keep the ball rolling! This was and is a dynamic community, and, as other technical groups became entranced with our progress even before we launched, my speaking schedule was jammed. Our mailing list and our participants grew, which made everyone's job that much easier.

OSCAR I has the distinction of being the first nongovernmental satellite. Was it difficult getting a launch?

OSCAR was the first nongovernmental, nonmilitary and noncommercial satellite. We beat the multimillion dollar Telstar by a long time. Had we been organized in Longview, Iowa, we would still have been looking for a launch. We were in the right place at the right time. I know the first time I scheduled a meeting with some junior Air Force officers, some of them giggled and one said, "Really, Mr Towns, we have responsibilities to take care of today, and I feel your absurd request is out of order. If you'll pardon us, please!"

What were your reactions upon hearing OSCAR I was up and running?

The launch itself was a great shot. I have been involved with rocketry and satellites since 1945, and I will always stand in awe at a blast-off. This, of course, was a special one, and I was really more excited and emotionally involved than I realized. I was told that I was crying, with tears running off my chin! Those of us at the launch did not get the word that our special tracking station on the South Pole had heard OSCAR 15 or so minutes after launch. We were at the airport to fly back to San Jose and our headquarters and tracking station in Sunnyvale. We got the word of the success of OSCAR in orbit from the pilot while we were flying! My chin was hardly dry, and it started all over again.

What lessons did you learn from OSCAR I that helped with OSCAR II?

The significant item that was immediately acted upon for OSCAR II was the changing of the shape and type of temperature-control striping on the external surface of the satellite. OSCAR I has a few, wide stripes with a different pattern. This was learned from the temperature readings plotted from the time interval of 10 Hls.

The first two OSCARs were ejected from the parent Agena satellite with a very simple hooking device and powered by a compression spring from Sears, costing $1.15. I think Lance Ginner, K6GSJ, conceived this. We were the first auxiliary package to eject from the parent and go our own way. Now, others such as science organizations and universities wanted to put up their own devices. Where do you think the Air Force sent them to get the design of a housing that was completely stress analyzed, mechanically and temperature balanced and, if they could swing $1.15, they would be launched into their own orbit? It was the least we could do!

What are some of your most vivid personal memories of the early days of Project OSCAR?

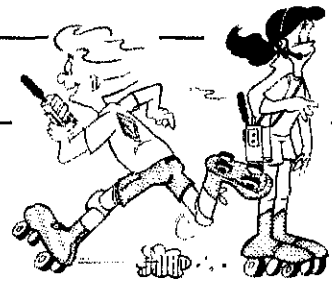
I put high on this memory list the unquestioned support of every commercial concern with which we were involved. First, we got the word out to every company that had a radio club to request volunteers from other organizations. This move worked very well!

Also, I sensed a certain "Something" was riding on our collective shoulders as we worked singly or in groups. If we needed a special part, for instance, the need was broadcast, and the part was in our hands immediately. I was in a hotel elevator in Washington, DC, and three guys get on and start talking about the OSCAR concept. Guess who joined their conversation. We ended up having dinner together, and I ended up with three good friends, one of whom was very helpful with OSCAR II. I was flying back from a few busy days in the Pentagon, and a nice gentleman sits down next to me. I finished my notes and, as I put them away, a copy of the OSCAR White Paper fell on

(continued on page 69)

Making Waves

Conducted By Scott Springate, N7DDM
2095 Broadview, Eugene, OR 97405



Sunspot Cycle

This month's column is written by Martin E. Levin, W6BDN.

In March 1965, the ham shack became the "Baby's room" and W6BDN went QRT.

In 1977, the sunspots were increasing and my son Dan was a teenager. We had moved out of the apartment and into a house. It seemed like a good time for me to try to become a DXer and expose Dan to ham radio.

Living in apartments with very limited antennas had hindered me from ever working any really rare DX. My old gear, carefully stored in plastic bags, emerged from the closet. I added a new Gotham 10-meter beam and HR-1680 to my Heath HX-20. I was like a kid again with a wonderful new toy. Of course, it would have delighted me if my son had become a ham, but I didn't want him to feel any pressure. Dan became very interested, however, as I started to work all those exotic new countries. He took the bait and started studying for his Novice exam.

He also got in some operating time. I have since read that the control operator provisions of Part 97 were never intended to condone pseudo-amateur operations. That's not what the regulations sound like, though. You try arguing with a determined teenager when the rules seem to be on his side. We reached an accord. He would adhere to all the rules and my presence was absolutely mandatory. I also insisted that he make half his contacts by code. Dan agreed. After several training sessions, I was able to move over to the couch and catch up on my reading.

The thrill of DXing had really fired his interest, but the third-party-traffic regulations now blocked his path. According to the FCC rules, as an unlicensed individual, he wasn't permitted to talk to any of those tantalizing Europeans. His interest had been piqued, though, and there was only one course left to him. Diligent study of the code and theory resulted in Dan's receiving the call N6BZA.

We had a great time hunting DX together. Whoever found a new one had the first try. If he was successful, the other got a turn. Sometimes we'd both succeed; sometimes only one would make it. Occasionally we'd get different reports from the DX station—which always amused us. It was amazing how different our Countries List became. I would still occasionally work a new one, only to find that he had already checked it off. We would QSL in tandem when possible. Dan usually operated after school and during school vacations when I was at work. I'd get my chance evenings or weekends when he was out. When Dan realized he couldn't work those DX stations operating in the Advanced class part of the band, and I could, he quickly upgraded.

Dan's ham activities erupted. Fueled by teenage exuberance, he joined the Northern California DX Club, the Northern California Contest Club, the Foothill Amateur Radio Society and the Southern Peninsula Emergency Communications System.

Contesting became one of his major activities. I got to be his maintenance technician, worrying about the gear and TVI. I kept the washcloth (the one on the poor amp blower motor) moist, and scurried madly to get him back on the air when something failed or faulted.

He raised havoc (and vice-versa) with the K6RU multi-multi operation less than a mile away. Cam, K6RU, finally decided that if you can't squelch 'em, ask 'em to join you. He invited Dan to use his station for the ARRL SSB DX test. K6RU, operated by N6BZA, won the California trophy. Dan became a regular participant at K6RU, and I was occasionally able to work a new one during the melee. Everybody was satisfied.

Dan got a job as an Amateur Radio instructor at a New Hampshire summer camp, with the understanding that he wouldn't have to start until after the Field Day weekend. The trauma of his first full summer away from home was eased (for all of us) by our regular 20-meter scheds.

A family vacation gave us a chance to be N6BZA/6Y5 for a few days. It was lots of fun to be DX for a change—although I had to let the contester handle the bigger pileups. Our antenna was a 10- and 20-meter fan dipole, up about 30 feet. It beamed toward Hawaii and North Africa because that's the way the palm trees lined up. Despite these limitations, we made several hundred contacts (even some real DX). The honor of being the QSL manager for this operation was accorded to me, supposedly because my call had been listed in the *Callbook* longer.

The rig we used in Jamaica was a TS-130V Dan had purchased to take to college. It's a fine suitcase rig, but we thought more power might well be useful at times. I designed an 8930-tetrode, 350-watt-PEP-out amplifier for the rig, and told Dan he had to build it. This project created a near disaster in our usually amicable relationship. His construction techniques were primitive and his scheduling was rather leisurely, considering his imminent departure for college. My XYL acted as arbitrator and maintained a reasonable degree of peace. Somehow, the amplifier was completed and working in time.

Dan is now at college. It's nice having the station to myself, but it's also a little lonely. He has his rig with him, but he's inactive. He says, "I'm too busy with other things now, Dad, but it's part of the plan. When the sunspots come back, I'll be back."

NEW OPPORTUNITIES

☐ Anyone want to play Dungeons and Dragons or any other role-playing games over the radio? Are there any young photographers who want to talk about the hobby on the radio? If either of these topics interests you, please contact Carter Griffin, KB2AOG, c/o E. K. Co NJ 160, 343 State St, Rochester, NY 14650.

QST Profiles

(continued from page 68)

the seat between us. It was immediately spotted for what it was, and my new friend was Finley Carter, K6GT, President of Stanford Research Institute! He was an OSCAR member before we landed and Chairman of our Board of Directors by the end of the year. Were these coincidences? That word doesn't explain such propitious events, one after another and another.

At the time, did you have any idea that the OSCAR Program would go as far as it has?

The achievements of the first four OSCARs were within the boundaries we had discussed as we grew in knowledge and technology. New manufacturing techniques of solid-state devices were almost overwhelming and, because we were now well-connected in the community and had proven our abilities, advanced devices were offered to us to act as a Beta test experiment in space. Initially, I don't think any of us could comprehend the technology advancement which occurred in our arena. As each new frequency was reached, a new band of potential operation opened, and new proposals were made by our technical group to investigate. I was much in favor of participating actively in occupying the 450 and 1200 MHz bands in space so we would, at least, have our "footprint" in space at these frequencies, with beacons if nothing else.

After OSCAR I was launched, my speaking assignments grew almost out of reason, which was fine. One question that was always asked at the end of my talk was, "Where do we go from here?" I would then speak of new frequencies, multifrequencies, SHF beacons and then to a set of frequencies for intersatellite communication. This last statement not only started more questions, but even shook up some of my OSCAR crew! As you know, we have now done this, but 25 years ago—pure blue sky!

[For background information on OSCAR I and the amateur satellite program, please check the two-part article "OSCAR at 25" *QST* Dec 1986, p 15 and this issue, p 41. A full-size model of OSCAR I may be seen at the National Air and Space Museum in Washington, DC and in the ARRL HQ lobby.—Ed.]

Club Spectrum

Conducted By Lee Hayford, AH2W
Club Program Manager, ARRL

Trek to Toketie

The following is courtesy of Robert Muller, KC7UH.

The faint tread of the trail soon entered a dense forest of majestic Western Hemlock trees, many of which were over 5 feet in diameter. The morning air was refreshingly cool, especially near an impressive series of noisy, tumbling waterfalls reaching over 200 feet above us into a steep mountain valley. Our bulging packs seemed to get heavier by the minute as we struggled up the steep incline to the top of the white, foaming cascades.

DX Hopes in the Wilderness

Darren, N7FKZ, John, KA7YND, Jim, KA7YNN, Dave, KA7YNO, and Bob, KC7UH, all members of the Cubs Amateur Radio Society of Sedro Woolley High School, an ARRL Special Service Club, headed for a campsite near Pear Lake, elevation 5200 feet, in the Glacier Peak Wilderness Area of Washington State's rugged North Cascade Mountains. Pear Lake, a 10-acre jewel nestled in a glacial cirque surrounded by cliffs, talus slopes and beautiful alpine meadows, was chosen because of its southwestern exposure toward the Pacific Ocean, and its close proximity to excellent fishing for large cutthroat trout in Boulder and Toketie Lakes. We hoped to set a new club DX record for a backpacking portable operation.

Put up That Antenna

About an hour later, amid streams of perspiration and shortness of breath, we were rewarded with spectacular views as the trail angled gently upward out of the forest into alpine meadows interspersed with cliffs and scattered trees. A 300-foot headwall nearly a third of a mile up the valley marked the outlet of picturesque Boulder Lake, almost totally surrounded by jagged slate-gray peaks rising nearly a 1000 feet above the blue water. We climbed this challenging stretch of boulders and sparse vegetation, skirting the southeast shore of the lake over and around huge boulders, and then climbed a 200-foot-steep field to our destination.

Our temporary home, near the outlet of Pear Lake and hovering directly above Boulder Lake, was a camper's paradise. Small, lush green islands of grass dotted the moderately sloping meadows, which terminated in cliffs leading to the lake below. A few stunted trees provided much appreciated shade during the hot August afternoons. We set up the blue, green and rust-colored tents, organized the camp, put up a 20-meter dipole (a major topic of curiosity and concern with our neighbors camped nearby), suspended ingeniously between two trees—all in one hour. We were ready for tons of fun!

Bad Band Conditions, but much Enthusiasm

Late that evening, after eating gourmet dinners ranging from Top Ramen to salisbury steak, we hooked up the Ten-Tec Argosy transceiver to the dipole, and began calling CQ. By 10 PM, after working stations in Washington and Oregon, we had practically given up hope of making any DX contacts. Everyone on the air complained about the poor band conditions. Then it happened! At 10:03 PM, with a whopping 25 watts PEP, we talked for nearly 10 minutes with George, KH6CLV, in Hawaii. Excitement turned to discouragement, however, as we heard no other DX stations for over 40 minutes.

Then, the unexpected happened. On our first night in the bush, we achieved the major goal of the expedition. At times using only 5 watts PEP, we worked Vince, ZL1BMV, in New Zealand. Kevin, KX6BU, in the Marshall Islands soon followed. And to culminate a fantastic evening, John, KA7YND, completed his very first DX contact by working Adrian, VK5CDX/3 in Everton, Australia, using only 25 watts PEP.

2-Meter DX

Picture again this pristine lake bordered on the northwest by imposing Hurricane Peak rising over a 1000 feet above the water into a clear, blue sky. Would this seem to be an ideal location for working a 2-meter repeater on the opposite side of the mountain? Hardly, unless you have enjoyed the thrill of "cliff bouncing" signals out of similar spots. It was exhilarating to work a repeater approximately 40 miles to the northwest using a Kenwood TR2500 hand-held transciver with a Super Stick II telescoping antenna. What a day! With much reluctance, we left this place and went back to camp.

During the next few hours we climbed the flanks of Boulder Peak while working some 2-meter repeaters over 150 miles away, and then returned to camp for yet another gourmet dinner—this time including fresh, fat cutthroat trout.

Darkness and DX

Approaching darkness signaled a return to Amateur Radio. With great anticipation, the Argosy was fired up at approximately 8 PM. The band conditions, unfortunately, seemed even worse than last night's. No signals were heard for over two hours. It was as if radio propagation ceased to exist. Out of the immense void of RF signals came Fred, VK2SID, in Australia. We immediately answered Fred's CQ. Fred had us literally rolling in the heather laughing at his verbal antics. In fact, Fred got us to make so much noise that Darren, N7FKZ, rolled out of the sack at about 10:30 PM and made his first DX contact ever. What a way to begin an HF career! Darren still remembers his initiation into DX. "That guy from Australia, Fred, was a real neat guy to talk to. He was very funny, and it was all I could do to get through a complete sentence without breaking into laughter about our previous exchange."

John Wheeler, KA7YND, with Ten-Tec Argosy and Eagle-Picher gelled-electrolyte 12-volt battery. John and other members of the Cubs Amateur Society of Sedro Woolley High School worked New Zealand with 5 watts while using this station. *(KC7UH photo)*

A Reluctant End

Much later, under a bright, star-filled sky, we fell asleep and relived recent experiences of climbing steep mountain cliffs, feeling the weight of battling cutthroat trout on our fishing lines, and the satisfaction of sending our RF into the far reaches of the Pacific Ocean with little power and a dipole antenna. The sunspot cycle had bottomed out, but our enthusiasm for Amateur Radio soared to new heights. The next morning we went back home with enough memories to last until the next club outing.

Silent Keys

Administered by Nancy A. Slipski

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

N1BAS, Stanley W. Kuzia, Jr, New Milford, CT
WA1DRB, Robert I. Olsen, Newport, RI
W1EIB, Harriet E. Proctor, Middlebury, VT
W1IPA, Weston F. Lant, Bridgewater, MA
W1IU, Herbert W. Butler, Laconia, NH
W1JQJ, Frederick H. Ricker, Harwich, MA
K1KLJ, George W. Wabrek, Sr, New Hartford, CT
W1RON, Harold J. Carter, Stratford, CT
W1WKZ, George D. Cameron, Cranston, RI
WA1ZLK, John H. Schmitt, Watertown, MA
WA2BVY, Edward A. Barnes, Jr, Mineola, NY
W2CF, Roy Neusch, Staten Island, NY
W2CQI, Irving Rosenberg, Far Rockaway, NY
W2DED, Charles B. Hopkins, Cranford, NJ
N2FRR, James Donnelly, Sr, Paterson, NJ
WB2GVI, Ernest J. Sanders, Pleasantville, NJ
K2HAJ, Lewis P. Moore, Pleasantville, NJ
KA2LEY, Leonard R. Friedman, Great Neck, NY
W2MR, Anthony S. Karker, Jr, Haddonfield, NJ
W2NDW, George A. Miller, Sr, East Orange, NJ
K2RSA, Emil T. Bolcar, Clifton, NJ
KA2SCE, Thomas B. Brackin, Mountain Lakes, NJ
WA2TBB, George J. Wayne, Roscoe, NY
WB3AUE, Martin A. Steigelman, Highspire, PA
W3DZ, John W. Callaghan, Hyattsville, MD
*W3EM, Bradley C. Algeo, Jr, Land O'Lakes, FL
WA3FVB, Gus Ferguson, Cheverly, MD
KC3IZ, Lloyd A. White, Fort Washington, MD
W3JI, Howard C. Looney, Bethesda, MD
*W3MW, Frank W. Walker, Traverse City, MI
W3QGG, Anthony J. Mecca, Dunmore, PA
W3QVS, Leonard Kubeja, Erie, PA
K3SMM, George S. Thompson, Shreveport, LA
WA3WRB, LeRoy R. Sheidy, Temple, PA
K4APJ, William R. Smallen, Crossville, TN
K4AUM, Elon N. Allred, Jr, Dillard, GA
WD4AXE, Ward G. Hartsock, Jacksonville, FL
WT4B, Edgar L. Ropke, Bradenton, FL
WA4CYX, Kenneth M. Raupach, Alexandria, VA
N4EUB, Edward R. Marsh, Spring Hill, FL
WD4FQO, Leon G. Whitton, Sarasota, FL
WA4GOF, Howard P. Delp, Jr, Kingsport, TN
N4HZA, Harry B. Roberts, Coats, NC
N4KN, John J. Huey, Sun City Center, FL
K4MLF, William O. Grayson, Mobile, AL
N4OFD, John M. Barrentine, Montgomery, AL
W4PLQ, Henry Ozga, Bradenton, FL
*W4RKB, Edwin J. Lausman, Louisville, KY
K4SWR, Edward B. Lassiter, Four Oaks, NC
KE4TS, Ferris William Polston, Louisville, KY
W4TTB, Kaarlo J. Sandstrom, Clearwater, FL
KF4U, Walter H. Grove, Winter Park, FL
W5ATW, Frank L. Kutzenberger, Waco, TX
N5BCD, Don L. Hardin, Dallas, TX
W5CDG, Paul Kovar, Oklahoma City, OK
KA5CKR, James P. Wilson, Pine Bluff, AR
W5DIJ, Malcolm D. Rains, Pleasant Hill, LA
W5DML, Frank Wilson, Jr, Gonzales, TX
W5GMF, John W. Cavanah, New Orleans, LA
WB5HHU, Wilfred P. Weathers, Sr, Tishomingo, MS
W5HVR, Merrill C. Patneaude, La Luz, NM
W5IOP, Dale S. Brobst, Shreveport, LA
WB5MHF, Florence P. Fineberg, El Paso, TX
WA5OHI, Drury R. Heineken, Albuquerque, NM
K5OKG, O. E. Allen, Webster, TX
WA5PLE, Roland H. Grove, Corpus Christi, TX
NM5W, Harley J. Hall, Fort Worth, TX
WB6ASE, Erwin M. Cowan, Bakersfield, CA
W6BOP, Meade W. Eaton, Aptos, CA
K6BWS, Charles E. Blomquist, Orange, CA
W6CCR, William R. Patton, Portola Valley, CA
KA6CSS, William R. Shepperd, Los Angeles, CA
W6EAU, Kenneth C. Cook, Napa, CA
W6EHO, Eddie Gash, Sacramento, CA
W6EY, J. Lincoln "Mac" McCargar, Capitola, CA.
N6GMN, Laurence H. Richens, La Puente, CA
W6HIY, Harold U. Green, Danville, CA
W6HSW, William H. McKeever, Klamath Falls, OR
K6JTX, Francis M. Lewis, Saratoga, CA
W6ORP, Stuart D. Clayton, San Diego, CA
K6QWD, Lorne R. Johnson, Monrovia, CA
W6SJE, Robert H. Meyer, Fort Bragg, CA
W6TSU, Avery F. Ross, Glendale, CA
W6UFS, William S. Thompson, Costa Mesa, CA
W6USG, Paul T. Brogan, Yuba City, CA
W6WA, Irvin E. Dickinson, Sacramento, CA
K7AII, Byron D. Richards, Silverton, OR
K7CQQ, Merritt E. Shotwell, Twin Falls, ID
WA7DTX, Harold D. Herl, Phoenix, AZ
N7DWJ, Joseph Q. Adams, Toppenish, WA
WA7HAB, Merrilyn S. Cherni, Sheridan, WY
WB7OBO, David E. Smith, Jr, Salt Lake City, UT
K7OPS, Jackson S. Greenough, Hamilton, MT
K8HMR, Trubie C. Farmer, Blumfield, WV
W8JAE, Lawrence E. Marble, Palmetto, FL
W8LAG, Charles Stine, Kirtland, OH
W8RVI, George Barber, Jr, Lincoln Park, MI
W8RYP, Paul N. Edmonds, Perrysburg, OH
W8USM, Wayne L. Vearil, Milford, OH
W8WQP, Donald W. Dancer, Jackson, MI
W9AFO, Robert I. Henning, Shawnee, KS
W9GNY, Robert F. Edwards, Beech Grove, IN
W9KQE, Russell Garrett, Richmond, IN
W9QZI, H. Joe Shock, Anderson, IN
K9TAT, Clarence Elmer Berry, Canton, IL
K9VOZ, Floyd C. Keber, East Alton, IL
NØEDG, Ed A. Schoppert, Brooklyn Park, MN
NØEWD, Roman Ochs, Leavenworth, KS
WBØKWX, James O. Carr, Pierre, SD
*WØLD, Robert M. Smith, Kansas City, MO
KAØQYI, Frank P. Schuna, Sr, St Paul, MN
VE3AKL, John J. Dunham, Mississauga, ON
VE3DDZ, M. E. Mills, Owen Sound, ON
VE3EZG, Joseph Lemaire, London, ON
VE3JN, Len Garrett, Nepean, ON
VE3LPS, Laurence Griffith, Lakefield, ON
*VE3UH, John M. Eaton, Milgrove, ON
VE4TC, Tom Cotter, Birdshill, MB
VE5GT, Stanley Stead, Saskatoon, SK
VE6AEW, John Bidulock, Hairy Hills, AB

*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

January 1937

☐ W9BOE accompanied the Harvard-M.I.T. eclipse (of the sun) expedition to Siberia, making round-the-clock measurements of ionized layer heights. He found time for hamming (with U.S.S.R. okay), which served well for scientific contact back home when commercial circuits were inadequate.

☐ Through SCMs, each state governor is being asked to prepare a message to President Franklin Roosevelt on the occasion of his second inauguration. The Washington Radio Club is handling the organization of an amateur communications setup to ensure rapid handling of this important traffic.

☐ W1JEQ built a final stage for the popular four-band rig (last August *QST*) using the new T55 in the output stage. His design includes power supply and antenna tuner.

☐ The new 807 (h.f. version of the beam power 6L6) inspired W8PNL to try it as a crystal oscillator. With suitable precautions for the crystal, it worked fine.

☐ This month's cover shows clippings of real estate ads, along with a savings bank book, symbolizing many hams looking for more space to put up rhombics like those so successful at W1SZ and W1JPE.

☐ The new 913 one-inch cathode ray tube is used in a nifty oscilloscope that can be built for about $20.

☐ *QST* announces a "How would you do it?" competition, a monthly practical problem. The first seeks a circuit or gadget to avoid burned-out cathode resistors and shortened tube life in a receiver that necessarily must be close to a companion high-power transmitter.

☐ Boulder Dam has shifted its power plant from 50 to 60 cycles, so the Southern California W6s will no longer have that special tone in their c.w. signals.

☐ W4CBD measures tube dissipation with a "pyrometer," which "reads" the extent to which the plate shows color!

☐ W6ITH worked all sections in the November Sweepstakes contest—first time it's ever been done.

☐ I.A.R.U. News this month publishes a proposed countries list, and requests comments from interested DXers.

☐ W3CHO found it impractical to switch bands and reduce power on the big rig when he wished some local 160-meter ragchewing, so he built a neat separate unit using a type 43 modulating the same type in an amplifier.

☐ Relaying engineering data from Aerovox, George Grammer explains why mica bypass condensers need higher voltage (and current) ratings than the power supply in use, because of heating at higher frequencies.

☐ Especially if you're thinking of buying used tubes, the circuit designed by W5CJB will be helpful in checking the emission of doubtful bottles.

☐ *QST* notes the passing of Henry B. Joy, W8IA-W8IO, former president of the Packard Motor Car Co.

25 Years Ago

January 1962

☐ It's up! That odd-looking "breadbox" housing the OSCAR satellite is in orbit saying "hi" around the world on 145 Mc. It is the dawn of a new era in amateur communications.

☐ K2QBW concludes his three-part series on amateur satellites with a look into his crystal ball on how practicable it will be to set up a "spacecom" system that can be useful for everyday amateur communications.

☐ To get sideband input on 6 meters, KØIAX built a converter to switch his 14-Mc. signal to that band.

☐ K8OCO cascaded a series of audio filters to achieve 100-cycle bandwidth at 6 dB. and 360 cycles at 60 dB. down—far better performance than present crystal filters.

☐ The newcomer is often uncertain what antenna is most suitable to start with, so W1ICP discusses the good and bad points of some of the more popular types, both vertical and horizontal.

☐ *QST* pays tribute to Paul M. Segal, W3EEA, retiring League General Counsel, by listing highlights of his 30 years in that post. One pillar is the case of *Whitehurst vs. Grimes*, a Kentucky case determined that amateur radio is interstate communication and, like all interstate commerce, can be regulated only by federal authorities. That victory was back in 1926.

☐ W7BTB achieved increased ruggedness and a smaller turning radius for his multiband quad simply by reducing the element spacing—with no sacrifice of gain.

☐ The popular BC-453 surplus receiver is used as the main tuning element in W6FZA's design of a high-performance tuner that takes the output of any v.h.f. converter at 14 Mc. and bridges it to the 190-550-kc. input range of the command receiver. Improved stability and a slower tuning rate are the main advantages.

☐ The extent of need to protect LORAN navigation signals from interference has apparently changed, so the League is formally requesting a study to see if operating privileges for amateurs in that band may be expanded.

☐ Armin Meyer, W3ACE, a career diplomat of some 18 years, has been appointed the U.S. Ambassador to Lebanon.

☐ Hams often come up with new ideas, and K3QVT provides some basic information about the U.S. patent system to answer the question, "What sort of discovery can I patent?"

☐ Congratulations to the YL News column and its conductor W1QON on its tenth annniversary. —*W1RW*

Public Service

Conducted By Michael R. Riley, KX1B
Public Service Manager, ARRL

Bacon and Eggs for Breakfast

I heard a great story last year which exemplifies the difference between support and commitment better than any I've ever attempted. Those who have heard me speak at the several conventions I had the pleasure of attending last year might remember this tale. I'd like to share it with you.

"A farmer in Kentucky awoke to the rooster's crowing one summer morning and prepared for another day in the fields. As he walked into the kitchen, his wife asked what he wanted for breakfast. "Bacon and eggs," he replied. Within a few minutes, he had a warm plate of scrambled eggs and several crisp slices of bacon sitting on the table before him.

The chicken, by laying the eggs, provided support. The pig, however, made a commitment."

Every person, when using an Amateur Radio license issued by the Federal Communications Commission, accepts a responsibility toward public service and should seriously consider making a personal commitment—not simply providing support.

Now that I have your attention, I'll attempt to answer a few questions those of you not involved with the League's public-service program might have:

"The word 'Commitment' is a vague term. How can I commit myself to the task of serving the public?"

In many ways. Make the effort to check into your local and section-level National Traffic System nets. Offer your services as communicators to nonprofit organizations within your communities. Organize local amateurs into SKYWARN spotters for the National Weather Service. Set up a mall demonstration station and send radiograms for shoppers. Join that active club you've been meaning to join for the past few months. Submit manuscripts for publication in this column. Turn to page 8 of *QST* and offer your services and expertise to your Section Manager for the betterment of your section and Amateur Radio. Though these are but a few examples of how you can get involved, each requires a personal commitment.

"How much of a commitment does the League expect from me?"

No more than you're willing to offer. Your time is a precious commodity. ARRL Leadership Officials are not placed in positions of responsibility and authority simply because they had nothing better to do or because they failed to take one step backward when the call was given for volunteers. They're the League's representatives because they want to be, because they are qualified to hold those posts and because they have made a commitment. Your individual commitment could be more or less than theirs. The League's public-service program isn't looking for "Rambos with radios"; we're seeking a commitment from people such as yourself who enjoy Amateur Radio and want to help their fellow man.

"Why should I make a commitment toward serving the public?"

It's an obligation we incur under FCC Rules. It's also a way of making a meaningful contribution to the welfare of your community. It's also a source of tremendous enjoyment and satisfaction—in other words, it's fun!

What better way can you think of to let your friends, neighbors and communities know that you provide a voluntary communications service to them in time of need and during emergencies? Waiting for "the big one" may not do you any good when an antenna-restriction ordinance is being considered by your local zoning board. Spending a few hours every year providing communications might be well worth the time if you're asked to defend your need for a tower and "unsightly" antenna in your backyard.

It's been said that the best defense is a good offense. I can't think of a better offense than helping your friends, neighbors and communities by using your unique ability to provide reliable communications at no cost whenever there's a need.

"But isn't Amateur Radio a hobby?"

You bet it is! Our hobby, however, is totally dependent on our frequency spectrum. Take away our frequencies and you've taken away our hobby. The League's public-service program allows us to provide organized voluntary communications to others when needed. I assure you that, if our vital frequency spectrum is ever earmarked for commercial or governmental use, the powers that be won't turn solely to amateurs or to the League to help them reach a decision. We have the opportunity (and responsibility) to impress our usefulness on the public now—before our backs are against the wall.

"Well, I've checked into a few nets in my time. I have a recent copy of the ARRL Net Directory *in my shack and I've listened to the local ARES net a couple of times so I know which repeater they monitor. I'm ready for any emergency."*

No, you're not. You might be as well prepared as a volunteer firefighter who has doused a couple of trashcan fires and has a booklet on firefighting in the glovebox of his car. The phrase "practice makes perfect" is paramount when operating under emergency conditions. Seconds can save lives.

If you're willing to make an increased commitment, you'll be placed in a position of authority within our public-service program. If you don't wish to accept the responsibility, you always have the option of saying so.

"Well, I don't think participating in the League's public-service program will make me the consummate emergency-communications operator."

It may not. It will provide you with the opportunity to practice as often as you'd like within an organized framework. The local ARES group may not have the resources that will allow you to instantly become a "walking encyclopedia" of emergency and public-service communication. It will, however, provide you with answers to your questions and a defined ladder of responsibility and accountability during emergencies. Within the League's program, your knowledge of emergency communications is dependent upon your effort.

"Public Service sounds interesting, but I'm an avid DXer."

Great! The League's public-service program grows with diversity. We've yet to see a regulation that states, "When a DXer becomes involved with public service, he must immediately lower his monoband beams to rooftop level and request that a leaky power-company transformer be installed in his backyard!" Your knowledge of propagation and your keen ear for weak signals might prove invaluable during an emergency.

"The League has gotten along well without my help. Why should I participate in public service now?"

Maintaining status quo is not the goal of the League's public-service program. We've seen repeated and determined attempts by others to gain access to our frequency spectrum. The efforts of these commercial users will undoubtedly increase relative to the increased demands of their customers. They could make more money if they had more spectrum. We've all heard the phrase "use it or lose it." We must go one better. We had better use it and let the public know we're using it to their benefit. Otherwise, we might be carrying on a QSO a few years from now on a frequency shared with commercial users—and they'll have priority.

"I needn't worry because the League will fight for Amateur Radio."

Yes, the League will defend the Amateur Radio Service whenever our future is threatened. Let's never forget, though, that our hobby is defined by the FCC as a Service. The FCC expects each of us holding a license to perform a service toward the public in time of need. FCC Rules Part 97.1 needs no interpretation.

"I've always considered volunteering, but I don't have much free time to offer. I may not be able to participate in every public-service activity in my community."

We realize that today's fast-paced world leaves little time for volunteerism. We would hope that you would be available as often as

possible, but if you can't, you have the privilege of making that decision. When you join ARES or participate in a NTS net, simply tell your ARRL Emergency Coordinator or Net Manager that your time is limited. By making this clear at the outset, your availability—and your limits—will be understood.

"All right, I'm interested. How can I make a commitment to the League's public service program?"

We realize we're asking quite a bit, but get up from your comfortable chair on this cold winter's evening and either write a letter to your ARRL Section Manager (listed on page 8) or call him/her now. Discuss your availability, expertise and desire to help. The League is providing the opportunity. You simply have to make a decision. After all, it's not too late to make a New Year's resolution!

We hope that each of you will make a personal commitment toward serving the public as a member of the ARRL Field Organization in 1987 and beyond. Some might say that the future of the Amateur Radio Service depends upon your first step from that comfortable chair today. If you don't take that first step today, we can only ask that you remember this article tomorrow morning while you're eating eggs for breakfast.—*Michael R. Riley, KX1B, Public Service Manager, ARRL*

WECOME TO THE ATLANTIC REGION NET!

Many readers have heard of the International Assistance and Traffic Net (IATN) on 20 meters. It recently was approved by ARRL Field Services Manager as the NTS Atlantic Region Net (ARN). The name has changed, but the purpose remains the same. The ARN provides an essential communications link between NTS and amateurs worldwide.

The ARN is an established net within the Eastern Area. Any formal traffic destined for foreign lands should presently be routed to EAN for relay to ARN.

If you want to get involved with international NTS traffic handling, drop by 14.303 MHz at 1130Z daily. The ARN crew will be glad to talk with you.

PenDell Pittman, NØDZA, Manager Twelfth Region Net, cycle 2 listening to the disscussion during the recent NTS Pacific Area Staff meeting. *(K1CE photos)*

Members of the NTS Pacific Area Staff and observers break away from business for a group photo.

Our congratulations are offered to the members of the new Atlantic Region Net. ARRL expects great things from our newest NTS Net!

PUBLIC SERVICE BRANCH SCORECARD: 1986

Last year, your Public Service Branch increased its efforts toward serving you, our 145,000 members. We didn't solve every problem, right every wrong or please everyone, but we made progress. We intend to redouble our efforts this year to provide administrative guidance and assistance to our 25,000 volunteers nationwide, and to our section-level management teams, and to work more closely with you to recruit those not presently active in the League's public-service program. We will also place a great deal more emphasis on educating and working with our served agencies at the national level.

During 1986:

- Members of the Public Service Branch and Rick Palm, Field Services Manager, attended more than a dozen in-person, section-level meetings to hear the views and concerns of our elected Section Managers and volunteers.
- Cooperation and sharing of information has improved/increased between those developing new communications technologies (such as packet radio) and the Volunteer Resources staff in Newington.
- We developed an emergency-communications training course and presented it to the ARRL Emergency Communications Advisory Committee for its approval.
- The *Marathons and More* public-service communications guidebook will be available within weeks.
- Increased emphasis has been placed on the authority of elected Section Managers and their cadre of dedicated volunteers.
- The new ARES brochure (FSD-25) was widely accepted and put to good use by ARRL volunteers.
- The Field Services Manager and Public Service Manager represented HQ at both NTS Area Staff meetings (Pacific Area and Eastern Area) held last year.
- The Public Service Manager, Mike Riley, was appointed as a member of the Blue Ribbon Committee on Emergency Message Traffic and also as Chairman of BRC Subcommittee Number One. The BRC presented an interim report to the ARRL Board of Directors in the fall and presents its final report within weeks.
- Mike Riley was elected Vice Chairman (and is serving a 3-year term as a member of the Executive Committee) of the National Voluntary Organizations Active in Disaster (NVOAD), which comprises more than 20 national disaster-relief organizations (including the American Red Cross and the Federal Emergency Management Agency). The usefulness of Amateur Radio has been discussed as never before within this group. As an example, a NVOAD Executive Committee meeting was held for the first time at ARRL HQ in May.
- Mike also represented the ARRL at a number of other meetings. He spent a full day touring the American Red Cross national HQ communications facilities and meeting with management to better understand their capabilities and anticipate their needs. He also met with those responsible for the Night Tango exercises which are sponsored by the National Communications System and discussed disaster-relief communications with personnel at the Federal Emergency Management Agency. Later, he attended one of the first organizational meetings of the National Disaster Medical System (sponsored by the Department of Health and Human Services and the Department of Defense).
- New lines of communication were opened with the Radio Amateur Civil Emergency Service (RACES) of California, which is one of the most progressive RACES programs nationwide.
- Sheila Gray; Steve Ewald, WA4CMS; Mike Riley, KX1B—The ARRL Public Service Branch—and Rick Palm, K1CE, Field Services Manager, thank you for all the great work you've done this past year. Without your support and commitment, there would be no ARRL Public Service Program. You are the program! With your continued help, we're determined to serve you even better in 1987.

Field Organization Reports
October 1986

ARRL Section Emergency Coordinator Reports

Twenty-six SEC reports were received, denoting a total ARES membership of 15,085. Section reporting were: AB, EMA, GA, IA, LAX, MI, MN, MO, NFL, NH, NV, OH, ONT, OR, PAC, SCV, SD, SDG, SFL, SK, VA, VT, WI, WMA, WNY, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern				
TCC Central	89	95.60	291	598
TCC Pacific	114	91.94	465	888
Summary	203	93.77	756	1486
Cycle Four				
TCC Eastern*				
TCC Central	54	87.10	364	774
TCC Pacific	121	97.58	124	633
Summary	175	92.34	488	1407

*TCC Eastern operates both cycles 3 and 4.
TCC Certificates issued this month: AE5I AJ5K W5VMP NQ5W WF6O W9EHS KA9RII

TCC Roster

N2IC WB4HML WA4JDH W4JL WA4JTE WN4KKN N5AMK N5BB N5BT W5CTZ N5DFO W5GHP K5GM AE5I W5JOV AJ5K W5KLV KD5KQ K5OAF KD5RC KA5SPT ND5T N5TC K5TL W5TNT W5VMP KB5W NQ5W KV5X WB5YDD VE6CHK KU6D W6EOT W6INH K6LL WF6O K6UYK W6VZT KA7CPT W7EP KB7FE W7GHT NN7H W7JMH W7LG W7LYA KA7MUL KF7R W7TGU W7VSE W9EHS W9FC W9JUJ KA9RII WB9UYU AD0A K0DJ K0EZ KA0EPY KJ0G W0HI N0IA WA0OYI KS0U

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	31	895	31.00	.725	95.2	
CAN	31	504	16.26	.481	100.0	
PAN*	62	1013	16.88	.802	95.6	
Region Nets						
1RN	62	647	10.44	.459	98.4	100.0
2RN	56	203	3.60	.267	64.5	96.7
3RN	31	188	6.10	.400	92.0	93.3
4RN	61	459	7.52	.344	77.9	100.0
RN5	62	651	10.50	.476	87.0	100.0
RN6	55	168	3.05	.266	100.0	95.1
RN7	62	436	7.00	.413	87.8	96.7
8RN	56	323	5.77	.320	84.9	
9RN	62	254	4.00	.310	93.0	100.0
ECN						87.1
TEN	62	416	6.70	.393	83.5	100.0
TWN	58	252	4.32	.340	69.5	95.1
TCC						
TCC Eastern						
TCC Central	89	598				
TCC Pacific	114	888				
Cycle Three						
Area Net						
EAN	31	368	11.87	.735	91.4	
Region Net						
1RN	31	74	2.39	.250	76.0	93.5
2RN	29	247	8.50	.490	91.0	93.5
3RN	19	9	.47	.103	56.1	96.7
4RN						90.3
8RN						83.8
ECN						90.3
Cycle Four						
Area Nets						
EAN	31	1459	47.06	1.375	98.4	
CAN	31	1070	34.50	1.108	100.0	
PAN	31	875	28.20	.866		
Region Nets						
1RN						96.7
2RN	60	267	4.50	.396	81.0	100.0
3RN	53	205	3.86	.319	98.1	100.0
4RN	62	510	8.23	.380	100.0	96.7
RN5	62	705	11.37	.611	100.0	100.0
RN6	62	477	7.70	.660	97.0	
RN7	62	350	5.60	.579	90.8	
8RN	60	463	7.72	.458	92.0	96.7
9RN	62	509	8.20	.510	96.4	100.0
TEN	62	405	6.50	.490	73.6	100.0
ECN	54	133	2.46	.332	74.0	100.0
TWN	62	493	7.95	.277	96.5	
TCC						
TCC Eastern						
TCC Central	54	774				
TCC Pacific	121	633				

*PAN operates both cycles one and two.
TCC functions not counted as net sessions.

ARRL Section Traffic Managers reporting: AL, AR, DE, EMA, EPA, IA, IL, IN, KS, MDC, ME, MI, MN, ND, NFL, NH, NLI, NTX, OH, OK, ONT, OR, ORG, RI, SC, SDG, SFL, SNJ, STX, TN, UT, VA, VT, WA, WIN, WNY, WPA, WVA.

Public Service Honor Roll

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.

614
K3RXK
412
KC9CJ
170
W7LRB
150
N4GHI
146
WB2OWO
142
N4EXQ
136
KA3DLY
134
KA0EPY
KK1A
133
WA4QXT
WB2IDS
129
W9EHS
126
KB4WT
WA4JDH
124
WD4COL
AA4MP
120
WX4H
WB1GXZ
N4JRE
119
W9YCV
117
N5AMK
W0IKT
W2MTA
116
K4NLK
NQ2H
115
K4ZK
NG1A
N3DPF
114
KA1JXH
N3EGF
112
KA4TLC
WF6O
111
VE4LB
N7DHL
N8EFB
110
W9JUJ
WA2SPL
AA4AT
K4JHF
NE2W
109
KT1Q
KA8TIK
W2RRX
NC9T
108
W7JMH
WB2VUK
WD8LDY
K8UQY
107
VE4AJE
N9BDL
W7VSE
WB8JGW
KA0NLI
KZ8Q
106
N3EMD
WA4PFK
K5OAF
KW1U
K4JST
WB6DOB
KD7ME
105
KC4VK
KA2MYJ
ND2S
104
W8FPA
103
W3FA
N2EIA
102
WB2EAG
WA2FJJ
KA2UBD
WB8SIW
101
AG9G
W9CBE
KZ8Q
WD8LDY
KA1GWE
N4KSO
W4ANK
KB5UL
100
KQ3T
W6VOM
KB0Z
99
WD4KBW
WA1JVV
K5MXQ
K9CNP
98
WA1FCD
K2KBT
NR8C
97
KD0CL
96
WD8KQC
WD8RHU
KJ9L
WB8KWC
95
NO0A
KC3Y
KJ3E
94
W4PIM
WB5YDD
WA6WJZ
KN7U
N0FOO
WB4HRR
W4CKS
93
W9DM
W0OYH
K3JL
W3YVQ
92
KV5X
WB4WII
KA4MTX
NN2H
W9HBI
KD8WI
91
VE3DPO
K0GP
AJ5K
WA6ZUD
KC2TF
K2ZVI
90
N1CPX
WD8MIO
89
NO0A
AA4HT
W7GHT
NW7K
88
K0SI
WA4RUE
W5CTZ
KN1K
KB0Z
NT4S
KA5SPT
87
N4KRA
VE3GT
N3COY
WB8SYA
WA9VLC
86
NG2T
W9FZW
85
NJ9S
WB5EPA
N8GJO
K2VX
N8EVC
84
KA9RII
KT9I
WB1CBP
N3AZW
KA8TNT
83
N1BGW
N3COY
82
VE3WM
WB4FDT
NN4I
KA0ARP
WA0TFC
AE5I
WB8RFB
WD9DZU
81
K9ZBM
N6MCY
KA1KML
W5VMP
VE2FMQ
80
VE3WV
W0KK
WA2VJL
AC6Z
K8UQY
KI4BR
WA4CCK
K4IWW
79
WA4EYU
KB1AF
KA1MKJ
78
N2FKA
KJ9J
WA4EIC
K6UXO
W1RWG
N2EQM
K8ND
77
N6CVF
KI4YV
W0FRC
N2XJ
K2YAI
N8AHA
76
N5JHI
N6GGJ
W7LBK
KA8KHS
75
VE3CYR
NT0C
KF4FG
N0CLS
W2PKY
K7CLL
WD8QXT
74
KA4GUS
KA4FZI
N1NH
N7BGW
73
KA0BCB
N1AKS
NJ4L
NF8B
72
WB5FQU
N4PL
KA0SBY
K4ZN
KA4BCM
WB6QBZ
NT8G
W9NXG
71
KA6TGE
70
WA3UNX
K0PCK
W5KLV
N1EDD
KA7AID
N2DXP
KU2N
WB2IKL
N8AEH
69
AI0O
N6AWH
N0DZA
WD0GUF
68
KB4JPN
KB4LB
K0ERM
VE2EDO
WA4RNP
ND0N
NJ8R
N8FWA
N8FXH
67
VE4IX
WB5SRX
WB5J
KA0KPY
KA1KTH
N0GCC
W4FMZ
KE8BE
K8JDI
W8MVE
66
W0OUD
K4BAI
WB2QMP
N2ABA
KC8UZ
65
K4EV
W4HON
WB4HXS/T
KF7R
AA4GL
KB2ATJ
KB5ADE
WB2NLU/T
NK8B
NM8N
64
KA0SLD
W2ZOJ
K8EF
63
KA4YHS
K4MOG
K4VWK
WA4MNR
KA4BZA
WA7VTD
WB2QIX
KA8CPS
WD8KBW
62
VE3GSQ
KA9RNY
W0YMB
WD4ALY
AB0Y
W6NJR
61
WB9PFZ
KA0FSM
N0DPF
KA1LMR
KA0ODQ
N4MMM/T
WA6QCA
WA8DHB
60
K9KTB
W7TGU
WG5S
KA5AZK
57
WD6BZQ
KA5QYV/T
55
WB5VUL/T
51
N2EVG/T
48
KA1HPO/T
45
KA6HJK/T
44
KA2SJG/N
40
KA9CTW/T

Brass Pounders League

The BPL is open to all amateurs in the United States, Canada and US 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.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	778	904	1263	61	3006
N0BQP	—	—	—	—	2215
WB9YPY	0	826	52	536	1414
WA0HJZ	—	—	—	—	1382
N4GHI	100	525	519	44	1188
W3VR	361	298	345	36	1040
KC9CJ	19	452	142	306	919
WA4JDH	0	438	452	5	895
W9JUJ	3	381	376	4	764
KW1U	0	366	261	5	632
N4EXQ	18	303	231	73	625
K0RXK	—	—	—	—	614
N1CPX	—	—	—	—	607
KT1Q	—	—	—	—	589
K0JAN	—	—	—	—	585
KN1K	0	339	212	29	580
WX4H	0	293	273	10	576
WB2IDS	72	215	200	74	561
KA0TXX	—	—	—	—	560
K6UYK	37	254	251	6	548
WB2OWO	86	181	238	40	545
KA2UBD	3	234	295	6	538
W7VSE	1	290	235	6	532
N3AZW	51	206	249	25	531
KA7MUL	—	—	—	—	522
WF6O	0	277	234	11	522
N4PL	82	156	264	18	520
WB5YDD	7	259	200	35	501

BPL for 100 or more originations plus deliveries:

WD8MIO	109

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Telegraph Society	43	425	282
Central Gulf Coast Hurricane Net	31	184	3526
Clearing House Net	31	335	470
Early Bird Net	31	600	—
Empire Slow Speed Net	31	61	348
Golden Bear Amateur Radio Net	31	107	1792
IMRA	28	941	1644
Mission Trail Net	31	80	937
New England Novice Net	21	29	66
NYSPTEN	31	69	668
Southwest Traffic Net	31	227	1489
West Coast Slow Speed Net	31	183	484
20ISSBN	27	720	280
75 Meter Interstate SB Net	31	370	2880
7290 Traffic Net	50	818	2880

Results, 1986 September VHF QSO Party

"VHF/UHF is on the move!"—*W5FYZ*

By Mike Kaczynski, W1OD and Billy Lunt, KR1R
Contest Manager, ARRL HQ Assistant Contest Manager, ARRL HQ

They're number one! The gang at WS4F took advantage of a tremendous tropo duct to take the top multiop slot from W2SZ/1 this time around.

When Clarke steps into the proverbial phone booth to don his operating apparel, he emerges literally a radio amateur superman. The Clarke of whom we speak is Clarke Greene, K1JX, who completed the VHF grand slam in the September contest. That is, he finished first in every major VHF contest in 1986. With competition on VHF a regional matter, we don't usually extol individual efforts. But, we would be remiss if we didn't recognize his primo activities from the W1 Victor David station. It all started in the January VHF SS: first place. The June VHF QSO Party: K1JX winner at W1VD. All this, followed by his latest first-place finish in September. Plus, we have it on good authority that Clarke is the top North American (perhaps world) single-op in *CQ*'s summer VHF WPX contest. Sure, he does it from a well-equipped, strategically located station. But it is his unparalleled operating skill and perseverance (garnered no doubt from years of winning all kinds of HF contests) that have put him at the top of the VHF contest world. Hats off to K1JX, premier VHF radiosport enthusiast!

The September contest was no cakewalk, however, as Rick, WB2NPE, was in pursuit. See the top-ten breakdown.

Winning is also being in the right place at the right time with the right stuff. The WS4F multiop crew were singing "Carolina in the Morning," day and evening of the contest, as a tropo duct snaked its way from an eastern terminus in the Carolinas to all points west. With ten ops on nine bands from 4777-foot Mt Toxaway in western North Carolina (EM85), WS4F rode the tropo crest with multipliers of 114 on two meters and 83 on 70 cm to top multiop honors. Outstanding! Let them tell the story: "Great tropo opening to the west, which lasted pretty well throughout the contest, produced super S9+ signals on 220, 432 and even 1296 MHz from 800+ miles away. Worked NØOY on 1296, about 800 miles away, with Jon running just 10 watts to a loop Yagi held out his apartment window. We even heard Al, WB5LUA, over 800 miles away for at least 45 minutes on 2304. Conditions on the higher bands continued to improve throughout the late evening and early morning hours, rendering sleep out of the question." The good conditions in the Piedmont belt are evident in the superla-

Single Operator—Top Ten

Call	*Score*
W1VD (K1JX, opr)	193,648
WB2NPE	181,104
K5UR	126,637
WA1STO	106,765
AA2Z	84,410
WA2TEO	58,700
WB3JYO	53,084
WB9MSV	50,508
W1JR	47,520
W1RIL	46,610

Multioperator Top Ten

Call	*Score*
WS4F	453,120
W2SZ/1	399,740
K3YTL	395,694
W4BFB	284,349
K9HMB	218,925
K1TR	177,380
W2DRZ	168,328
WD8ISK	154,000
WBØDRL	150,282
W1XX/2	131,868

QRP Portable Leaders

Call	*Score*
K6LMN	6,536
N4IWI	4,725
KT2B	1,863
W4DO	1,650
KA7YOU	1,104
N6NVF	1,079

Call Area Leaders

Single Operator

Area	*Call*	*Score*
1	W1VD (K1JX, opr)	193,648
2	WB2NPE	181,104
3	WB3JYO	53,084
4	W4ODW	33,768
5	K5UR	126,637
6	KI6CG	21,888
7	W7RV	18,772
8	W5UA	30,508
9	WB9MSV	50,508
Ø	WØFY	17,927
VE	VE3DDW	32,430

Multioperator

Area	*Call*	*Score*
1	W2SZ/1	399,740
2	W2DRZ	168,328
3	K3YTL	395,694
4	WS4F	453,120
5	K5JL	74,022
6	WA6IJZ	70,525
7	N7AMA	13,376
8	WD8ISK	154,000
9	K9HMB	218,925
Ø	WBØDRL	154,282
VE	VE3LNX	90,258

Division Leaders

Single Operator

Call	*Score*	*Division*
WB2NPE	181,104	Atlantic
VE3DDW	32,4305	Canada
WB9MSV	50,508	Central
WØXG	10,880	Dakota
K5UR	126,637	Delta
W5UA	3,914	Great Lakes
WA2TEO	58,700	Hudson
WØFY	17,927	Midwest
W1VD	193,648	New England
W7ZSL	8,251	Northwestern
KI6CG	21,888	Pacific
KD8BC	30,828	Roanoke
W5FF	5,684	Rocky Mountain
W4ODW	33,768	Southeastern
W6CPL	21,318	Southwestern
KE5EP	43,179	West Gulf

Multioperator

Call	*Score*
K3YTL	395,694
N8CKH/VE3	3,774
K9HMB	218,925
KCØP	18
W4BFB	284,349
WD8ISK	154,000
W1XX/2	131,868
WBØDRL	150,282
W2SZ/1	399,740
K7ND	13,156
KU6U	29,835
WS4F	453,120
NG4C	3,528
K4CKS	18,810
WA6IJZ	70,525
K5JL	74,022

Top Single-Band Scores

50 MHz

W1VD (K1JX, opr)	7344
WD4MGB	6565
WB2NPE	5670
W3IFM	5535
W8VP (WA8FHF, opr)	5200
WA1STO	5115
K1TOL	4806
WA1VRH	4760
K5UR	4256
N5HHS	4080
W9IP/2	3969
WA1OUB	3420
KA8MRI/9	3280

144 MHz

W5UA	30914
KD8BC	30828
W1VD (K1JX, opr)	25300
K5UR	20790
N5AYD	20748
K1RZ	19224
WA1STO	16224
VE3DDW	15860
WA3FAE	15370
WB2NPE	15350

220 MHz

WB2NPE	4160
W1VD (K1JX, opr)	3456
WB8ERB	3102
WA2TEO	2318
AA2Z	2240
WB2IEY	2000
WA1STO	1836
WA3NZL	1760
WB2QCJ	1640
W1JR	1568
K5UR	1550

432 MHz

K5UR	10672
W1VD (K1JX, opr)	8284
WB2NPE	6976
NI8O	5920
WA2TIF	5152
WB9MSV	4712
WA1STO	3984
K1PXE	3696
AA2Z	3542
WB2DNE	3360
W2VC	3276
W1JR	3212
KØSMI	3200
KE5EP	3132
K3HCE	3100

902 MHz

AA2Z	273
WA1JOF	132
W1RIL	108
WB2NPE	108
W1JR	90
N2SB/3	75
VE3BFM/W1	72
W1QXX	71
K9RO	54
WB1FKF	48
W7PUA	27
WA1TFH	24
K9JU (EN52)	18
K9JU (EN62)	18
K9JU (EN61)	12
WB7UUP	12

1296 MHz

WB2NPE	2352
W1VD (K1JX, opr)	1470
W1RIL	1386
W2VC	1248
NI8O	1125
AA2Z	1089
KE5EP	1050
WA3JUF	990
K1PXE	840
WB5AFY	741
WB3JYO	702
WA1JOF	696
WB1FKF	576
W1JR	567
W2PGC	540

2.3 GHz

WA5VJB	352
WB2NPE	176
W4ODW	144
WA1TFH	72
WA3JUF	64
WB1FKF	60
N2SB/3	48
W1JR	40

3.4 GHz

WA5VJB	36
WA3RMX	4
WA1TFH	4

10 GHz

WA5VJB	8
W6OYJ	4
WB7ABP	4
K5IS	4
WA5BNH	4
W1JR	4
K1KG	4
W7PUA	4

24 GHz

WA5VJB	4
WA1TFH	4

Light

WA5VJB	4

Multiplier Leaders—Single Operator

50 MHz

WD4MGB	65
K5UR	56
K1TOL	54
W8VP (WA8FHF, opr)	50
W9IP/2	49
W1VD (K1JX, opr)	48
N5HHS	48
W3IFM	45
W4OO	42
W5UWB	42
WB2NPE	42
KA8MRI/9	41

144 MHz

K5UR	90
KD8BC	84
N5AYD	84
W5UA	82
WB8DRR	67
WB4JGG	67
NS4W	63
VE3DDW	61
N4AR	61
KAØGGI	59
WA8TJL	58
W1VD (K1JX, opr)	55
K1RZ	54
WA3FAE	53
W8AC	53
KC3CL	51
WB2NPE	50
KØIFL	50
AA4KP	50

220 MHz

WB8ERB	33
W1VD (K1JX, opr)	27
KFØM	26
WB2NPE	26
K5UR	25
WB2IEY	20
AA2Z	20
WA3NZL	20
WB2QCJ	20
WA2TEO	19
W9IP/2	18
W4PSJ	18
WA1STO	18
K2GK	17
W5RCI	17
WB9MSV	16
W2EIF	16
K1PXE	16
KØIFL	16
W1JR	16

432 MHz

K5UR	58
W1VD (K1JX, opr)	38
NI8O	37
WB2NPE	32
WB9MSV	31
W5RCI	29
W2GU	29
WA2TIF	28
NØLL	27
KE5EP	27
KØSMI	27
W2PGC	26
K3HCE	25
N4HB	25

902 MHz

AA2Z	7
WB2NPE	6
N2SB/3	5
WA1JOF	4
W1RIL	4
W1QXX	3
W7PUA	3
K9RO	3
W1JR	3
VE3BFM/W1	3

1296 MHz

WB2NPE	16
NI8O	15
KE5EP	14
W1VD (K1JX, opr)	14
WB5AFY	13
W2VC	13
W2PGC	12
AA2Z	11
K8WW	11
W1RIL	11
WA3JUF	11
K1PXE	10
WØRAP	10
W5RCI	10

2.3 GHz

W4ODW	6
WB2NPE	4
WA3JUF	4
WB5AFY	3
WB1FKF	3
N2SB/3	3
WA1TFH	3

3.4 GHz

WA5VJB	3
WA3RMX	1
WA1TFH	1

10 GHz

W6OYJ	1
WB7ABP	1
K5IS	1
WA5VJB	1
K1KG	1
W1JR	1
WA5BNH	1
W7PUA	1

24 GHz

WA5VJB	1
WA1TFH	1

Light

WA5VJB	1

Multiplier Leaders—Multioperator

50 MHz

WS4F	93
W4BFB	82
WD8ISK	70
W2DRZ	65
K3YTL	65
K9HMB	59
W2SZ/1	51
WBØDRL	50
W1XX/2	47
K5JL	43
WA5S	40

144 MHz

WS4F	114
W4BFB	111
WD8ISK	79
WBØDRL	74
W4TZG	72
K9HMB	71
W2DRZ	68
N4EQT	68
W3KWH	66
K3YTL	64
K5JL	62
N4VC	60
WB4LHD/5	54
W2SZ/1	52
VE3LNX	50

220 MHz

WS4F	37
WBØDRL	35
K9HMB	33
W4BFB	33
K3YTL	32
W2SZ/1	29
W2DRZ	27
WD8ISK	22
VE3LNX	22
W1QK	21
K1TR	21
W1NY	21
N2WM	20

432 MHz

WS4F	83
W4BFB	67
WBØDRL	51
W2SZ/1	42
K9HMB	42
K3YTL	39
W3KWH	39
K5JL	38
W2DRZ	37
VE3LNX	34
N3AKO	33
WD8ISK	31
W1XX/2	30
N9BD/Ø	28
N4EQT	28
W1NY	27
N4VC	26
K1TR	26

902 MHz

K3YTL	15
K3MTK	6
WS4F	5
K9HMB	4
WD8ISK	4
K1WHS	3
VE3LNX	2
K7ND	1

1296 MHz

WBØDRL	31
K3YTL	23
W3KWH	20
W2SZ/1	19
WS4F	16
K9HMB	15
W2DRZ	15
K3MTK	14
K5JL	13
W2DMC	12
W1XX/2	12
WD8ISK	12
WA6IJZ	12
W1NY	10
K1TR	10
VE3LNX	10

2.3 GHz

W2SZ/1	10
K3MTK	3
WS4F	3
K1WHS	3

3.4 GHz

W2SZ/1	7
K3MTK	1
K1TR	1
WD8ISK	1

5.7 GHz

W2SZ/1	7
K3MTK	1
K1TR	1
WS4F	1

10 GHz

W2SZ/1	7
K3YTL	5
WS4F	2
W1TKZ	2

24 GHz

W2SZ/1	6
K3YTL	4
K1TR	1
K3MTK	1

Light

W1QK	1

tive scores of W5UA, KD8BC, K5UR, W4BFB and a host of others.

The WS4F victory is a good omen for VHF contesting. As W4BFB also proved a few years ago, one never knows where Mother Nature's golden wand of propagation will touch down. The Washington-to-Boston corridor will not always produce a winner. Take nothing away from the Eastern VHF establishment, however. It took one heckuva effort to break the W2SZ/1 grip. After all, the Rensselaer boys only *own* the VHF party score record set last June. However, multis beware: K3YTL continues to creep closer to the top. They are a force to be reckoned with, as are several Midwest multis like K9HMB, WD8ISK and WBØDRL.

Out West, VHFers have gone bonkers in putting rare grid squares on the air, not only in the contests, but every weekend. Just a few samples: "We proved that there is a path between New Mexico and southern California by making contact with W5LTR on Mt Whittington (elevation 10,400 feet). We also worked K7GNV on 1296, a distance of 478 air miles." (Tnx WA6IJZ). "Finally, after all these years of operating portable (mostly QRP), you have instituted a QRP Class! This gives the little guy a fairer chance against the mountaintop and home kW stations. It also favors going to rare grid squares which we have hundreds of out here in the West" (Tnx K6LMN). "I now have access to a heated site at the 9000-foot level in the High Sierras. Watch out! (Tnx KB6DRN). And: "This is the first time my 432 score exceeded that of 6 meters. Grid-square expeditioning has really put some non-populated places on the map." (Tnx K7ICW).

Your Contest Branch has produced stat boxes "good and plenty" to illustrate how it's being done. These comparisons can be a valuable aid to upping one's contest score the next time out, like in the January VHF Sweepstakes, January 10-12.

We'll close with the "Most Courageous Ham of the Year" award to KD8BC, who added this postscript to his log: "I'm getting married on Valentine's Day (February 14). My fiancee doesn't know it yet, but the honeymoon will be at Spruce Knob, West Virginia (FMØ8). Burrrr!"—*W1XX*

Soapbox

When we blow it, we blow it big—2 meters was getting into everything. If we were on 2 m, we were off everywhere else! Maybe (as they say in Red Sox territory) next year! (WA1AYS). Conditions were flat to poor. DX past 300 miles was very lacking. Activity on 23 and 13 cm continues to increase at a good pace (W1JR). Six-meter activity seems to be declining. If the trend continues, some multiplier incentive may become appropriate (AC1J). Think I sent /W1 more than my own call sign so guys wouldn't turn away from my station (VE3BFM/W1). This was a tough one with no tropo, but I enjoyed it anyway (W1IUN). Twenty-five years since my last VHF contest. Where are the AM stations? Had fun getting the beam up 2 hours into the activity. See you in June with 432 to boot! (W1GUA). My first portable hilltop operation from

The First Marathon Mobile Grid Hop by WAØTKJ

The idea of this trip began on August 31, when WBØDRL and I were driving back from the microwave conference in Estes Park, Colorado. There are many inactive grid squares to the west of our home grid (EM18), so we decided to activate some of them by use of a mobile station equipped with 144, 220, 432 and 1296-MHz gear.

We immediately started building the framework to hold four full-sized Yagis on top of my Nissan pick-up truck. When the framework was complete, I tested the structure by driving into a 40 mi/h headwind at 65 mi/h. They survived the test just fine, so I was confident they could survive a 1000-mile trip in a day and a half.

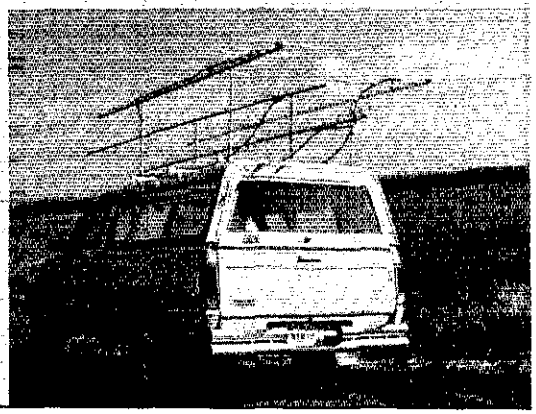
The Thursday evening just before the September VHF QSO Party, Pete and I spent four hours installing the radios and feed lines. Power output and SWR measurements were made on each band. We also made a few QSOs on each band, to ensure good audio and CW quality. Everything was working great!

I left Salina, Kansas on Saturday at 10 AM to make the 150-mile drive to the southeastern corner of EMØ7, where contest operation was started at 1 PM. There was hardly a dull moment from start to finish, except for the 140-mile drive across EMØ6 in northern Oklahoma with the beams all pointing west into nothing but sagebrush and oil wells! Murphy didn't make the trip with me, so all equipment worked without flaw. I even missed hitting any large fowl that crossed my path.

Because of the short time spent in each grid square, I'm sure many contacts were missed. Worry not, because I will repeat this trip again in the future at a much more relaxed pace. This operation would not have been possible without the technical assistance and loan of equipment from Pete, WBØDRL and Loren, KXØO. Thanks, guys!

Grids operated in: 18
Miles driven: 970
Number of QSOs: 275
Bands operated: 144, 220, 432 and 1296 MHz
Total number of elements: 85
Sleeping time: 6 hours
QSOs:
144 MHz— 89
220 MHz— 37
432 MHz—106
1296 MHz— 43

Grids Activated: DM96, 97, 98, 99
DNØØ, 91
EMØ6, Ø7, Ø8, Ø9, 16, 17, 18, 19
ENØØ, Ø1, 1Ø, 11



Jerimoth Hill, RI. Could only put in 4 hours operating time, but lots of fun (KM1X, opr W1AQ). Why do business trips and contests fall on the same weekend? Glad this doesn't happen more often! (W1AIM). When we didn't bring 3 major bands we knew we were in for a learning experience. We really didn't need the temperatures in the 20s and the Sunday night power failure on Mt Equinox! (N1CPE at W1TKZ). After many years of contesting, Murphy finally arrived in Paxton, MA. Lost the RF amp in the 220 receiver Sunday morning and a filament fuse in the 1296 amp! (W1RIL). It was enjoyable to give out FN23 to those who needed it, especially on 1296. Unfortunately, several 23-cm contacts that should have been made easily were rendered impossible by equipment on the other end that was down or disassembled. Also, selection of heavily used sked frequencies where strong local QRM was present made things tough. Please use some common sense when setting up a sked—mountaintoppers have time and power source limitations. Nevertheless, I will try it again next year on 50 through 1296 (KT2B). Reports say the contest was good, with nothing special or out of the ordinary. To me, my first contest in 8 years was very enjoyable. Wish I could have spent more time on the air. Looking forward to next year's contests, starting in January. After a 7-year lapse from ham radio and VHF/UHF, I'm back to stay. During the coming winter I'll be contemplating 1296 this coming spring and summer (WB2CUY). This was my first contest since the AM days in 1960-1965. As a result, I just purchased a transverter for 2 m and am thinking about one for 432 (K2PWG). It's virtually impossible to work anyone on 2-m FM. Everyone uses repeaters for emergencies, so the original logic for dropping .52 is no longer valid today (K3QM). Seems strange to work K1WHS in Maine and he's not even a multiplier. I guess I'll never get used to grids as the multipliers. Bring back sections! (K4BNC). For pea-shooter stations like mine, the Jets game on Sunday became a lot more appealing than the "CQ Contest" routine. At least with 160 W, I'm not responsible for any "halftime TVI"! (KA2IVS). Please try bonus points or increased QSO points on 220 MHz to get more activity (N2WM). We are back and will do better next time (K2DEL). I confirmed my belief that Clarke Greene is no doubt the finest contester in the VHF world today, and I only hope that he stays with it up at W1VD so we have someone to chase. Finally, I learned that multiop contesting is by far more fun and that anyone who plays this game alone is without a doubt—INSANE! (WB2NPE). Great! I like the rule that keeps telephone QSOs out of the contest. Let's keep these contests strictly Amateur Radio (N4MM). First "decent" tropo of the year! The opening appeared to run from the Dallas area to the Smoky Mountains (AA4FQ/5). Conditions were the best I have seen for the September contest. Mountaintop stations from NC and TN were booming in for many hours (NU5F). My big thrill was working WS4F on 432 for a new state (WØJRP). I sure wish we could get more stations on 903.1 MHz. It's nearly as lonely on that band as it is on 2304 MHz (VE3LNX). I flew out to Alberta to reunite with my old contesting partner VE6JW. It was a very humbling experience. We ran kWs and big antennas on three bands and only managed 47 contacts—only four on 6 meters. We did generate a lot of VHF enthusiasm in the Edmonton area, so maybe activity will pick up (WA2TMC). Grid squares have really given new life to VHF/UHF. Water grids in the summer are much more fun than desert grids. FM QSOs should be eliminated (W7IUV). Get rid of Rule 71. It prevented me from notifying known VHF/UHF men of the rare transgulf opening to Florida (W5UWB).

SCORES

Scores are listed by ARRL Section. Within each Section, single-operator scores are listed first and then multioperator scores. From left to right, each line lists: call, score, QSOs, multipliers and bands operated (A—50 MHz; B—144 MHz; C—220 MHz; D—432 MHz; 9—902 MHz; E—1296 MHz; F—2.3 GHz; G—3.4 GHz; H—5.7 GHz I—10 GHz; J—24 GHz; K—48 GHz; L—Light). Among the single-operator stations, the overall Section winners and single-band winners are indicated by bold-faced type for the call sign of the Section winner and for the one letter(s) denoting the bands won. For example, in Connecticut, W1VD (K1JX,opr) is the overall Section winner as well as the single-band leader on 50, 144, 220, 432 and 1296 MHz. AA2Z is the single-band leader on 902 MHz. QRP-portable stations are indicated by an asterisk.

1

Connecticut

W1VD (K1JX,opr) 193,649- 821-182-**ABCDE**
WA1STO 106,785- 645-131-ABCDE
AA2Z 84,410- 509-115-ABCD9E
K1PXE 41,396- 340- 79-ABCDE
K1EM 25,805- 327- 65-ABCD
AB1U 8,010- 107- 45-ABCDE
KB1I 7,785- 184- 34-BD
WA1VRH 4,760- 140- 34-A
WA1NLD 2,900- 145- 20-B
W1BIH 1,728- 83- 18-BD
WA1GTP 465- 31- 15-AB
KA1KOJ 45- 15- 3-B
KH6CP/W1* 24- 8- 3-A
K1KI 8- 4- 2-B
W1QK(+K1s EFI, UOL, KA1s ECL, IAX, KF6AJ, N1ABY, W1NG, WA1WXV, WB8TSL) 91,797- 615-111-ABCDEL
NE1A (+K1SFC,KS1I) 4,290- 143- 30-AB

Eastern Massachusetts

W1JR 47,520- 326- 88-ABCD9**EFI**
K1KG 28,650- 266- 75-ABCD9EI
WA1JOF 24,820- 226- 68-ABCD9EF
WA4PFN/1 24,400- 327- 61-ABCD
WB1FKF 20,184- 208- 58-ABCD9EF
KA1DHO 10,718- 161- 46-ABCDE
W1GXT 10,212- 139- 46-ABCDE
W1QXX 8,979- 138- 41-ABCD9EF
K5MA/1 5,880- 196- 30-**B**
K1VZI 4,488- 124- 24-ABCDE
KX1C 3,640- 101- 26-ABCD
W1AX 3,000- 100- 30-AB
K1TQ 2,523- 66- 29-ABCD
K1OSG 1,411- 83- 17-B
WA2VST/1 496- 62- 8-B
KA1JMX 44- 11- 4-A
WA1AYS (+AJ1E, K1IO, KZ1L, N1DJB) 32,016- 323- 69-ABCDE

Maine

W3HQT/1 14,322- 158- 62-**ABCDE**
K1TOL 4,806- 89- 54-**A**
W1PLX 560- 40- 14-B
N1BUG 528- 33- 16-B
N1DYR 338- 28- 13-B
K1WHS (AF1T, K1MNS, KØZK, KY1K, oprs) 88,205- 552-115-ABCD9EFI

New Hampshire

WA1OUB 26,798- 374- 77-**AB**
AC1J 18,582- 248- 57-**ABCD**
VE3BFM/W1 9,936- 139- 48-ABCD9E
K1FJM 7,460- 141- 46-ABD
WA1TFH 4,620- 71- 28-ABCD9**EFGJ**
W1JSM 2,002- 86- 22-BD
W1IUN 1,460- 68- 20-BD
N1DNC 272- 33- 8-BD
W1GUA 280- 26- 10-AB

Rhode Island

AI1K 3,850- 146- 25-**B**
W3EP/1 2,004- 105- 19-B
W1AQ (KM1X,opr) 1,424- 89- 16-B

Vermont

K1LPS 2,576- 70- 28-**ABD**
W1AIM 280- 18- 14-**ABD**
W1TKZ (KB1s EB, WI, N1CPE, N1EHM, N2AWG, NA1A, NF1Z, WB1BUM, oprs) 24,412- 352- 68-ABDI

Western Massachusetts

W1RIL 46,610- 377- 79-**ABCD9EF**
K1ISW 13,181- 210- 49-ABCD
NE1T 4,524- 145- 29-ABD
KA1CRX 1,140- 76- 15-AB
KA1MUK 1,037- 61- 17-B
WA3EEC 884- 52- 17-AB
K1JG 210- 21- 10-AB
W2SZ/1 (AG1M, K1DH, KA1DZV, KY1H, NC1J, AB2I, K2s TR, WR, KA2s AWG, MXO, QHF, WRG, KJ2B, KU2A, N2s BNY, CJJ, NF2B, NJ2L, W2ARQ, WA2s AAU, SCA, SPL, WB2s KMY, PKO, AK4L, N4FFD, WA8USA, oprs) 399,740-1158-230-ABCDEFGHIJ
K1TR (+K1s BA, EA, K3WM, N1s AFQ, BEM, WA1s PBU, VFJ) 177,380- 988-140-ABCDEFGHIJ
W1NY (AC1T, KA1s KPH, ZE, N1DPM, NC1s B, I, W1KK, WA1UQC, oprs) 120,120- 698-132-ABCDE

2

Eastern New York

WA2TEO 58,700- 440-100-**ABCDEF**
N2BJ 28,728- 289- 72-ABCD**E**
WA2TIF 26,000- 308- 65-**BD**
WA2BAH 7,200- 136- 48-ABCD
WA2ALV 2,204- 67- 29-ABD
KT2B* 1,863- 59- 27-ABCE
W2KHQ 1,254- 66- 19-B
KG2H 897- 41- 17-B
KC2RO 385- 35- 11-B
W1XX/2 (+K1GX, KB9NM) 131,868- 801-132-ABCDEI
W2DMC (K2s MME, SK, KA2s IBV, TQG, N2s BJ, BJG, DL, DLL, DUB, WA2s EHI, FWZ, MEE, WB2s IEE, IYG, oprs) 75,911- 537-103-ABCDE
KC2KK (+KW2D) 2,000- 76- 25-BD

NYC-Long Island

WB2CMI 13,650- 228- 50-**ABD**
WA2SLY 5,260- 176- 30-**B**

K2OVS 4,392- 100- 36-ABD
WB2CUY 3,096- 102- 24-BD
KA2VKD 1,230- 41- 15-D
K2PWG 532- 38- 14-B
WA2EUS 108- 9- 4-E
WB2ZSY 24- 6- 4-B

Northern New Jersey

K3QM 32,544- 388- 72-ABD
K4BNC 32,032- 101- 32-AB
WB2QOQ 12,008- 316- 38-B
AK2F 9,600- 290- 32-BC
W2VC 8,568- 110- 34-DE
N3AHF 6,417- 207- 31-B
N2FGZ 4,256- 132- 32-ABD
K2BJG 2,520- 70- 18-D
KA2IVS 2,466- 137- 18-B
K0DI/2 1,767- 93- 19-B
WA2PNI 1,134- 63- 18-B
WA2ALM 793- 61- 13-B
WB2FTX 680- 34- 15-BCD
N2WM (+KB2BPA, N2s CJO, CJS, WA3WUD) 70,702- 545-108-ABCD
K2DEL (N2s AAM, DXP, GCM, SU, oprs) 952- 56- 17-A

Southern New Jersey

WB2NPE 181,104- 697-178-ABCD9EF
W2EIF 24,637- 270- 71-ABCDE
N2AHN 24,500- 293- 70-ABD
W2HRW 9,879- 251- 37-BD
KA2WKA 6,048- 224- 27-B
KA2MIN 3,528- 98- 28-B
N2GBY 1,320- 66- 20-A
KA2NJF 448- 32- 14-B
K2BWR (+K2ZRJ) 33,201- 242- 93-ABCDE
N2EA/M (+K2BMI, KA2VAD, WA3NFV) 2,256- 41- 24-ABCDE

Western New York

W9IP/2 41,114- 258-122-ABCD
W2PGC 34,800- 223-109-ABCD9E
K2OS 14,352- 208- 69-AB
K2GK 9,145- 114- 59-ABCD
WA2BPE 7,540- 114- 58-ABD
WB2RRK 6,050- 121- 50-AB
NA2A 5,600- 116- 40-BCD
WB2ODH 3,360- 105- 32-B
NA2O 3,348- 71- 36-ABCD
WB2IEY 2,000- 50- 20-C
KU2A 1,738- 49- 27-ABCD
W2WGL 1,734- 69- 26-B
WB2QCJ 1,640- 41- 20-C
K2QIE 1,088- 32- 17-D
K2QR 1,080- 30- 18-CD
KA2IYB 391- 23- 17-B
W2HG 161- 23- 7-B
W2DRZ (+K2s SMN, TXB, KD2TV, N3EYD, W2UCZ, WA2RKO) 168,328- 640-212-ABCDE
N2WK (+KA2HSK, NQ2O, WA2LAQ, WB2MKN) 57,652- 375-116-ABCDE
WB2ELB (+KA1YE) 16,482- 208- 67-ABCE

3

Delaware

KA3KHZ 7,334- 193- 38-B
KA3B 2,400- 100- 24-A

Eastern Pennsylvania

WB3JYO 53,084- 417- 92-ABCDE
N3EAX 24,178- 271- 77-ABD
WA3HMK 11,891- 253- 47-B
WA3JUF 10,763- 127- 47-BDEF
K3JFL 9,396- 261- 36-B
KC3FT 5,184- 192- 27-B
W3CWG 4,323- 131- 33-B
K3KEL 2,730- 91- 30-AB
W3CL 988- 44- 19-ABCD
K3YTL (K3MKZ, KA3EEO, KB3QI, N3s AUP, AVZ, CXB, DAP, WA1MKE, WA3s JWP, JWV, NVS, YON, WB3s DYE, FAA, FYT, IWZ, oprs) 395,694-1143-247-ABCD9EIJ
K3MTK* (KC3QG, WA3s GOV, IAO, IJL, KPP, LBI, QTI, PUL, VVG, WB2YEH, oprs) 94,666- 509-129-ABCD9EFGHIJ
W3LP (K3GZN, W3s GFN, JUZ, WA3CUQ, oprs) 16,968- 214- 56-ABCDE
WA3KEY* (+WA3RXP) 4,750- 100- 38-ABD
NA2T (+KA3IHR, WB3FET) 3,808- 119- 32-B

Maryland-DC

K3HCE 28,303- 278- 83-ABD
K1RZ 23,160- 364- 61-BE
WB2DNE 20,130- 235- 66-ABD
N2SB/3 17,216- 185- 64-ABD9EF
WA3FAE 15,370- 290- 53-B
WA3UJE 9,435- 146- 51-ABCD
K3TC 8,296- 244- 34-B
WA3EOQ 7,650- 170- 45-B
W3IFM 5,535- 123- 45-A
K3AKR 5,499- 119- 39-ABCD
WA3NZL 1,760- 44- 20-C
W3GN 615- 41- 15-AB
KA3CXG 189- 21- 9-B
NN3SI (W4KM,opr) 6- 3- 2-B
N3AKO (+KA1GD, KA3s KDM, NJI, KC3WD, W3EAX) 61,380- 465-104-ABCD

Western Pennsylvania

W3HDH 5,060- 110- 46-AB
KR3C 3,854- 82- 47-AB
W3KWH (KT3L, N3EQP, W3HH, WA3TTS, WB3EML, oprs) 105,792- 448-174-ABCDE
KB3L* (+KA3DLD) 1,100- 55- 20-B

4

Alabama

WA4LIT 9,563- 109- 73-BD
WA4VUG 315- 21- 15-B
WB4NIX (+WA4AUX) 2,331- 63- 37-AB

Georgia

N4JK 6,380- 97- 58-ABD
WD4NAE 3,700- 63- 50-ABD
NA4I 1,632- 43- 34-ABD
KA4CJO 348- 29- 12-B
WB4ZWK (EM83) 45- 6- 5-BC9
WB4ZWK (EM74) 40- 5- 5-BC9
WB4ZWK (EM84) 28- 4- 4-BC9
WB4ZWK (EM73) 18- 3- 3-BC9
K4CKS (+KX4R, WD4JLI) 18,810- 169- 95-ABD

Kentucky

KC4EG 12,300- 116- 82-ABCD
N4AR 10,614- 174- 61-B
AK4U 2,211- 67- 33-B
NA4D 1,836- 51- 36-AB
W4XT 1,802- 53- 34-B
AA4VR 1,400- 50- 28-B
N4EQT (+KA8SSB, N8EZY, WB1ULC, WB8ART) 55,183- 314-139-ABCDE

North Carolina

N5AYD 20,748- 247- 84-B
N2CJP 2,592- 70- 32-ABCD
WS4F (+AA4S, K4MSK, N3AHI, N4HSM, WB4s NMA, TQD, WD4s IIS, JQV, MBK) 453,120- 956-354-ABCD9EFHI

Northern Florida

W4ODW 33,768- 182-126-ABCD9EF
WA4JNE 1,276- 44- 29-AB
W4ZGS 414- 23- 18-AB

South Carolina

KJ4BF 5,618- 85- 53-ABCDE
NB4S 2,592- 72- 36-B
WA4LDU 2,257- 49- 37-ABD
KJ4X 344- 26- 16-BC

Southern Florida

WD4MGB 9,804- 129- 76-AB
W4OO 2,898- 69- 42-A
WD4AHZ 2,349- 66- 27-BD
W4ZD 1,536- 64- 24-B
WD4HHA 1,032- 43- 24-AB
K4DZP 969- 44- 17-BDE
KB4GBS 720- 48- 15-AB

Tennessee

W2GU 16,380- 141- 90-ABD
WB4JGG 10,921- 183- 67-B
NS4W 10,647- 169- 63-B
N4MW 8,092- 88- 68-ABDEF
K4RWP 6,955- 95- 65-ABD
WA4QYK 2,409- 56- 33-ABCDE
W4HHK 1,768- 49- 34-BF
W4BFB (AA4ZZ, K4s JQU, PDY, TP, KA4WYC, KA8APV, KS4S, KU4V, N4KZW, N9CC, PE1AHX, W4NHV, WA3ZOE, WA4s DAZ, UNZ, WB4s PCS, QCS, WD4ABZ, oprs) 284,349- 778-299-ABCDE
N4VC (+WB4KNF) 30,258- 194-123-ABCD
W4TZG (+KA4OAK, KF4OK) 22,950- 221-102-ABC

Virginia

WA4SBC 27,004- 247- 86-ABCD
N4HB 17,496- 187- 72-ABD
N4MM 16,344- 180- 72-ABD
KB4OLM 14,484- 187- 66-ABD
AA4KP 13,950- 279- 50-B
KB4XK 8,694- 118- 63-ABD
N4IWI* 4,725- 105- 45-ABD
K4FTO 4,719- 110- 39-ABD
K4QIF 3,930- 61- 30-DE
WB4BVY 3,596- 116- 31-B
KF4KI 2,300- 100- 23-B
W4DO* 1,650- 58- 25-BD
KB4EUZ 1,347- 50- 23-BD
KB4CMF 602- 43- 14-B
WD4GSM 413- 29- 21-AC
W4KMS 324- 27- 12-B
WB4NFS (+KA4USE, WB4RMT, WD4ECK) 12,582- 216- 57-ABC
N4KEQ (+N4KEZ) 1,975- 63- 25-ABD

5

Arkansas

K5UR 126,637- 430-229-ABCD
AA4FQ/5 3,192- 76- 42-B

Louisiana

W5FYZ 4,928- 112- 44-B
NU5F 3,128- 92- 34-B
WB5YDE 2,475- 75- 33-B
WA5UFH 1,302- 42- 31-A
N5BHO (+W5EW, KJ8X) 23,210- 170-110-ABCDE
WB5LBT (+N4AZI) 9,660- 103- 69-ABCDE
W5HGT (N5s CJL, JBM, WI5K, oprs) 198- 21- 13-BD

Mississippi

W5RCI 27,018- 158-114-ABCDE

New Mexico

W5FF 5,684- 87- 58-ABD
W5LTR 2,580- 62- 32-BD
W5RKS 416- 20- 16-ABD
KN5S 400- 25- 16-AB
KB5GY 320- 20- 16-AB
WA5DJJ 297- 28- 21-AB
NG4C (+KD5HP, N5JHV, WK5C) 9,528- 98- 36-ABD
N5ACP (+N5EPA) 1,071- 42- 21-ABCD

Northern Texas

KE5EP 43,179- 261-111-ABCDE
WA5VJB 15,209- 134- 67-ABCDEFGIJL
WB5AFY 8,850- 76- 50-CDEF
K5IS 8,146- 83- 62-ABCDEI
WB5CGH 4,551- 91- 41-ABD
WD5AFR 308- 22- 14-AB
K7CW (+WI5Q, WA8PYA) 7,755- 102- 55-ABDE

Oklahoma

K5SW 20,352- 149- 96-ABCDE
W5NZS 6,325- 75- 55-ABCDE
N5JJQ 2,336- 73- 32-B
WA8TKJ/m (EM96) 882- 24- 18-BCDE
WA8TKJ/m (EM16) 574- 19- 14-BCDE
KA5ZCW 198- 18- 11-B
WA8TKJ/m (DM96) 153- 9- 9-BCDE
K5JL (+K5CBL, N5DDB, WA5s ETV WCP, WB5DSH) 74,022- 317-169-ABCDE
WB4LHD/5 (+KA5YAI, N4FAC, WA4NVM, WB4OVT) 35,406- 213-126-ABCDE

Southern Texas

N5HHS 24,882- 226- 98-ABD
W5UWB 6,405- 98- 61-ABD
WB5OBS 5,220- 104- 45-BD
W9AGH/5 2,747- 87- 41-AB
WA5IYX 494- 26- 19-A
W5OZI 208- 16- 13-A
WA5S (+KC5FP) 4,743- 82- 51-ABCD

6

East Bay

NR6E 1,050- 41- 21-ABCDE

Los Angeles

W6CPL 21,318- 236- 57-ABCDE
WB6FCS 7,616- 179- 34-ABD
KD6QE 7,375- 295- 25-B
N6NJI 4,710- 128- 30-ABD
K9AKS 1,420- 71- 20-B
N6NVF* 1,079- 83- 13-AB
KE6AR (+KA6WGO, KB6LTY, WA6KCV, WD6s BJS, CGF, DRI) 14,670- 234- 45-ABCD

Orange

K6CH 14,194- 200- 47-ABDE
K6IBY 3,296- 67- 32-ABCD
K6PFW 3,150- 103- 25-ABD
WA6SNN 3,024- 112- 21-BD
KF4AU/6 1,089- 99- 11-B
W6XD 272- 34- 8-AB

Santa Barbara

K6ELQ 168- 14- 4-E
WA6JJZ (+K6VMN, KH6N, N3CFX, N6HBI, NS6X, W6YLZ, WA6s DJS, FPX) 70,525- 489- 91-ABCDEI

Santa Clara Valley

KI6CG 21,888- 287- 57-ABCDE
K6LMN* 6,536- 115- 43-ABCDE
K6KLY 4,448- 103- 32-ABCDE
KU6U (+KG6MW, W6YLL, WD6CHL) 29,835- 312- 65-ABCDE

San Diego

WA6BNH 11,592- 191- 42-BCDEI
N6ND 3,150- 150- 21-B
W6OYJ 2,415- 84- 21-BCDI
WB9LDD 2,060- 103- 20-B
KS6A 2,000- 100- 20-B
KB5MU 1,155- 77- 15-B

San Francisco

WB7ASP 615- 26- 15-BDEI

San Joaquin Valley

KD6XG* 564- 47- 12-B
KB6DRN 351- 27- 13-B
KA6ZVP (WB6s DTA, YBP, oprs) 22,285- 218- 78-ABCDE

Sacramento Valley

WA6IKE 2,492- 78- 28-ABDE
WA6OSX 954- 53- 18-A
KB6JPZ* (+W6SFH, WA6KOD) 3,164- 75- 28-ABCDEI

7

Arizona

W7RV 18,772- 201- 76-ABD
K2DNR 2,726- 70- 28-ABDE
N7CKE 1,846- 61- 26-ABD
WB5FFA 286- 26- 11-B
WB7OHF 143- 13- 11-A
N7AMA (+WA7JTM) 13,376- 180- 64-ABD

Idaho

W7CVJ 91- 11- 7-ABC

Nevada

K7ICW 2,706- 65- 33-ABD
W7LQV 666- 37- 18-AB
W7KYT 600- 32- 15-ABD
NW7O (+N7AGP) 840- 42- 20-B

Oregon

W7PUA 4,253- 101- 29-ABCD9EI
W7JXU 3,192- 92- 28-ABCD
K7HSJ 3,013- 89- 23-ABCDE
W7ZR 1,458- 79- 16-ABD
N7DB 1,320- 88- 20-ABCD
WA3RMX 960- 30- 16-ABCD9EFG
KE7CX 423- 47- 9-B
NR7U 175- 35- 5-B

Utah

WA4GPM 63- 9- 7-B

Washington

W7ZSL 8,251- 186- 37-ABCD
WB7UUP 6,118- 112- 36-ABCD9E
W7FI 2,500- 100- 25-AB
KA7ICT 1,890- 78- 18-ABCDE
KA7YOU* 1,104- 60- 16-ABC
KB7LQ 984- 78- 12-BCD
WA7SOU 869- 66- 11-BD
KT7G 637- 49- 13-AB
WB7ATP 130- 26- 5-B
K7ND (+KA7s SOL, YFC, NF7X) 13,156- 222- 48-ABCD9EF

Wyoming

NN8W/7* (DN71) 6- 2- 1-E

8

Michigan

NR8S 13,545- 175- 63-BD
KB8JI 4,818- 99- 43-ABCD
N8BWG 3,944- 116- 34-B
N8CGY 3,675- 105- 35-B
WB8CPW 2,464- 77- 32-B
WB8AAX 2,325- 75- 31-B
K8NTK 1,984- 64- 31-B
WA8TAQ/8 1,856- 64- 29-B
N8FEH 1,836- 68- 27-B
N8FUJ 1,219- 53- 23-B
N8CSY 608- 32- 19-B
W8CAP 504- 21- 12-D
W8YY 63- 9- 7-B
WB8TGY (+KA8RUO, WA8WPI, WB8BKC, WD8PIB) 1,400- 40- 28-ABDE
K9VV (EN66) (+AJ9W, KA9KDC) 432- 22- 16-ABCD
K9VV (EN85) (+AJ9W, KA9KDC) 48- 6- 8-BCD

Ohio

W5UA 30,914- 377- 82-B
KC3CL 30,264- 278- 97-ABCD
WA8TJL 27,993- 258- 93-ABD
NI8O 12,220- 105- 52-DE
W8AC 7,897- 149- 53-B
K8TL 7,665- 107- 53-ABDE
W8VP (WA8FHF, opr) 5,200- 104- 50-A
WD8LTX 4,128- 88- 48-ABD
K8DW 3,458- 71- 38-BDE
W8HBG 3,360- 120- 28-BD
WB8ERB 3,102- 47- 33-C
WB8TCZ 2,913- 98- 42-ABD
W8DN 2,592- 63- 36-BD
N8CCC 2,379- 59- 39-ABD
KC8XA 2,112- 44- 24-D
WA8SVV 1,066- 41- 26-AB
KE8BN 1,008- 56- 18-B
WD8IFC 476- 24- 17-BD
K8WW 363- 11- 11-E
N8HBF 45- 9- 5-B
WD8ISK (K4JBV, KA8IFC, N8BPB, W9s OEH, VNE, WA3QJX, WA8s OGS, ONQ, WB8s IGY, LUA, oprs) 154,000- 580-220-ABCD9EGI
K3DMG (+NM8K, NT8O) 9,016- 144- 56-ABD

West Virginia

KD8BC 30,828- 367- 84-B
WB8DRR 11,581- 173- 67-B
K8UC 8,294- 110- 58-BD
WB3CHS/8 7,280- 162- 45-B
W4PSJ 900- 25- 18-C

9

Illinois

WB9MSV 50,508- 307-122-ABCD
WB9IIX 33,210- 322- 81-ABCDE
W9JGV 6,384- 148- 43-B
WB9QBU 4,212- 87- 36-BDE
N9AQ 3,400- 100- 34-B
WD9HSY 2,574- 82- 26-BD
KR9G 2,016- 42- 24-D
KA9RQC 1,449- 69- 21-B
N9EOM 900- 30- 10-B
KA8CLP 288- 31- 8-BC
WD9HAK 128- 8- 4-E
K9RO 54- 6- 3-9
K9JU (EN82) 18- 3- 2-9
K9JU (EN52) 18- 3- 2-9
K9JU (EN61) 12- 2- 2-9
K9HMB (+AF9R, K9s GL, NO, PW, KA9CJG, WB4YVO, WB9TIY, WD9s AHJ, IIC) 218,925- 733-225-ABCD9EF
W9XA (+AA9D, N9KC, WB9EEA) 45,402- 333- 94-ABCDEI

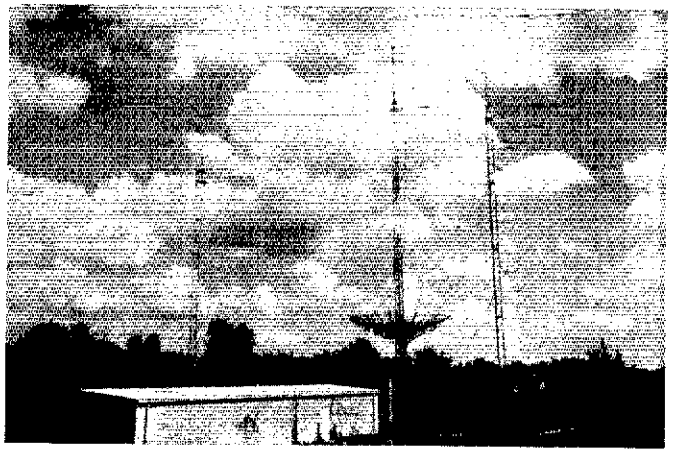
Indiana

KA8MRI/9 23,618- 211- 98-ABCD
K9MMQ 3,920- 98- 40-AB
K9DZS 3,780- 75- 45-ABD
WA4VWV/9 2,720- 80- 34-B
NE9O 1,376- 41- 32-ABD
KA9DZM 1,260- 45- 28-A
N9EUK 672- 32- 21-B
KA9LNV 390- 20- 15-BD
WA9PKL 288- 18- 16-A
W9YB (KA9s CCR, NOF, KC9RG, WB9OLE, oprs) 3,549- 91- 39-AB

Wisconsin

WA9LZM 3,978- 102- 39-AB
WA9KGQ 3,744- 93- 39-ABC
W9YCV 3,737- 90- 37-BD
NN9K 2,014- 53- 38-A
WA1UJU/9 1,971- 73- 27-B
N9EEE 663- 39- 17-B
WA9OKB 612- 51- 12-AB

The QRP portable category was very popular this year. Here, KT2B is working one on 1296



K5JL and crew put in an outstanding effort in the September event.

KD9WZ 351- 27- 13-B
KA9HKL 198- 22- 9-B
W9WI* 4- 2- 2-B
K9VV (EN54) (+AJ9W, KA9KDC)
120- 10- 8-ABCD
K9VV (EN45) (+AJ9W, KA9KDC)
70- 9- 5-ABCD
K9VV (EN55) (+AJ9W, KA9KDC)
50- 6- 5-ABCD
K9VV (EN65) (+AJ9W, KA9KDC)
40- 8- 5-ABCD
K9VV (EN35) (+AJ9W, KA9KDC)
4- 2- 2-B

Ø

Colorado

WØA 3,638- 82- 34-**ABCD**
KAØNNO 1,384- 44- 31-**A**
WØETT 1,319- 77- 38-ABD
WB5JAR/Ø 220- 20- 11-AB
NNØW (DM79) 18- 3- 2-E
NNØW* (DN80) 8- 2- 2-E

Iowa

KØCQ 7,854- 115- 51-**ABDE**
WØRAP 4,556- 80- 34-**DE**
KAØTLJ 3,480- 118- 30-**B**
NØCKN 1,728- 72- 24-B
WAØMWW 1,134- 54- 21-B
WDØGVY 492- 41- 12-B

Kansas

NØLL 15,792- 145- 84-**ABD**
KØSMI 9,639- 93- 63-**BDE**
NØFUJ 7,616- 121- 56-**BD**
NØFFO 5,356- 81- 52-ABD
WØRT 3,690- 66- 45-ABD

NØEQS 2,700- 75- 36-AB
KFØM 1,456- 28- 26-**C**
WAØTKJ/m (DM98)
1,134- 30- 21-BCDE
WAØTKJ/m (DM97)
940- 25- 20-BCDE
NØOY 704- 22- 16-BE
WAØTKJ/m (EM87)
544- 17- 16-BCDE
WAØTKJ/m (EMØ)
364- 16- 13-BCDE
WAØTKJ/m (EM88)
312- 15- 12-BCDE
WAØTKJ/m (DM99)
210- 13- 10-BCDE
WAØTKJ/m (EM19)
200- 11- 10-BCDE
WAØTKJ/m (EM18)
110- 9- 7-BCDE
WAØTKJ/m (EM17)
90- 8- 6-BCDE
WBØDRL (+KØs TLM, WA, KDØYP, KXØO)
150,282- 411-242-ABCDEF

Minnesota

WØXG 10,880- 148- 64-**ABC**D
KBØZQ 6,705- 118- 45-AB**D**
WØVB 4,588- 102- 37-BCDE
WØOHU 1,188- 32- 18-B**DE**
NØHJZ 84- 21- 4-B
KCØP (+KAØCRO)
18- 6- 3-B

Missouri

WØFY 17,927- 147- 91-ABCD
WAØNOK 15,130- 137- 85-ABCD
KØIFL 13,612- 125- 83-BCD
KMØA 12,040- 135- 70-AB**D**

NØFQW 10,557- 134- 69-ABD
KAØGGI 7,906- 134- 59-**B**
WØJRP 7,198- 110- 59-ABD
KØGOB 4,028- 81- 38-BCD
NTØW 1,485- 55- 27-B
WBØSKE 561- 33- 17-B
N9BD/Ø (+KØXC, NJØX)
25,652- 170-106-ABCDE

Nebraska

WDØBQM 900- 33- 20-**ABCD**
WAØTKJ/m (DN90)
408- 17- 14-BCDE
WAØTKJ/m (EN80)
300- 14- 12-BCDE
WAØTKJ/m (DN91)
264- 15- 11-BCDE
WAØTKJ/m (EN81)
207- 13- 9-BCDE
WAØTKJ/m (EN11)
171- 12- 9-BCDE
WAØTKJ/m (EN10)
66- 7- 6-BCDE
WB7VMQ 45- 9- 5-B
NNØW* 24- 4- 2-E

South Dakota

NR5A/Ø 42- 7- 6-B

VE

Maritime-Newfoundland

VE1APA 276- 22- 12-**BD**

Quebec

VE3ASO/2 21,660- 222- 76-**ABCD**
VE2FUT 2,884- 65- 39-ABCD
VE2YB 768- 32- 24-AB

Ontario

VE3DDW 32,430- 315- 94-**ABD**
VE3EYR 6,063- 114- 47-ABC**D**
VE3AQG 3,745- 107- 35-B
VE3FJG 1,020- 51- 20-B
VE3PKN 189- 21- 9-B
VE3LNX (+VE3s ADJ, NSQ)
90,258- 471-147-ABCD9E
N8CKH/VE3 (+WB8KAY)
3,774- 88- 37-BD
VE3SAU (VE3s FHU, OAF, oprs)
1,944- 64- 27-ABD

Alberta

VE6EY 230- 18- 10-**BD**
VE6AFO 136- 12- 8-BD
VE6JW (+WA2TMC)
810- 47- 9-ABD

British Columbia

VE7ASI 945- 37- 21-**ABCD**

DX

W7IUV/mm (DMØ2) (+K7JWA, N7CW)
1,734- 76- 17-ABCD
W7IUV/mm (DM13) (+K7JWA, N7CW)
1,156- 52- 17-ABCD
W7IUV/mm (DMØ1) (+K7JWA, N7CW)
520- 39- 10-BCD
W7IUV/mm (DM12) (+K7JWA, N7CW)
320- 25- 10-BCD

Checklogs

K9VV/m, KØJQA, KB3QM, KD2DX, WA2RQC, WF6J, WZ4K

World Above 50 MHz

(continued from page 63)

around 39 MHz from his Hilo QTH and, from San Antonio, Pat has observed similar stations coming from Argentina in recent weeks. E_s was in evidence the evening following the KH6 opening. WA5IYX reports hearing FM broadcast stations from the Carolinas and Virginia up as high as 107.9 MHz.

And the beat goes on! As this is being written on November 4, W5DZF/4 reports another 6-meter opening, this one most assuredly of the E_s variety. Scottie says that during the afternoon, 8s and 9s were in at his Miami QTH and that about 2000Z, he heard the W2CAP/1 beacon on Cape Cod. Later in the evening, from about 0030 through 0230Z October 5, 2s and 3s were able to work into the southern Midwest, with K5UR Little Rock putting in an especially good signal, according to W3OTC.

2 Meters—KMØA Florissant, MO, near St Louis, reports good success with meteors. Mark says that the Orionids Shower, October 21, brought him a contact with WA7YKM on a 45- to 60-second burst. This was not a new state, but did give him grid number 164. He is looking forward to the various upcoming showers. Another avid ping jockey is WA3HMK Lititz, PA. Chris is actively seeking 2-meter skeds and can be reached at 717-569-3828.

A group of West Coasters must have been clairvoyant and taken the lead material (urging VHFers to get out of their shacks for some portable operation) seriously. WA6IJZ writes in his *West Coast VHFer* that N7CW, K7WA, several others and he set out on a watery gridexpedition aboard a 37-foot sailboat called *The Phoenix*, owned by Ray and Sherilyn Kinney of Tempe, AZ. They had a great time handing out DM13, DMØ2, DMØ1 and DM12 to grid starved 6s under the call W7IUV/mm. Totals were 122 contacts on 2 meters, 8 on 6 meters, 8 on 1¼ meters and 54 on 70 cm. This, combined with the 2-meter operation of the gang headed to Clipperton and the exploits of K6SV/mm have certainly activated many of the waterlogged grids off the California coast.

The Higher Bands—From down east in Maine, W3HQT/1 writes that he too has been getting out of his comfortable shack and visiting neighboring grids, in this case to put 33 cm on the air. Visited so far have been FN53, where W1JR, AA2Z/1, W1RIL, WA1JOF, W1GCI, WB1FKF and W1EJ were worked, and FN55, where AA2Z/1, W1RIL and WA1JOF went into the log. Bill passes along the information that his company, Down East Microwave, has recently taken on a new line of British-built 23- and 13-cm transverters. Those wishing information may write Box 1655A, RFD 1, Burnham, ME 04922.

K2UYH has a complete description, in the October issue of his *432 and Above EME News*, of the 70-cm EME DXpedition to Delaware which K2TXB, KA2VAD and he conducted back in August. Operation was from the QTH of KB3QM and resulted in 32 completed contacts and the 50th state for KAØY, WBØTEM, WØRAP and WØSD. In addition K2UYH was able to complete an EME-only WAS. QSLs should go to KB3QM.

1987 Novice Roundup Announcement

Now that you have your ticket, are you hesitant to get on the air at only 5 WPM? Are you spending hours tuning up and down the dial listening for a CQ that's slow enough to copy? Relax! All new hams, from young to old, are in the same boat of new-ham awkwardness. The Novice Roundup is your chance to dive into the airwaves and find plenty of contacts. If you'd feel more comfortable with a little support, find a ham buddy and jump in together as a multiop station. Or locate an Elmer at your local radio club to help you "break the ice."

Although the Novice Roundup is aimed primarily at Novices and Technicians, the more hams that participate the merrier the fun will be. All amateurs are encouraged to join in. The good news is that *all* Novices and Technicians who enter will earn a handsome certificate. If the rules seem complicated at first glance, try reading them two or three times. You'll want to follow them closely. Feel free to contact us here at ARRL HQ if you have any questions. When you're ready to put your contest entry form and logs in the mail, double-check to make sure all the information is included and your handwriting is legible.

Novice Enhancement

This year's Novice Roundup may be the most exciting event ever, if the Novice Enhancement Proposal, PR 86-161 (see June 1986 *QST*, p 48, for details), takes effect in time for the event. If and when the rules take effect, Novices will be allowed to use all their newly acquired privileges for contest contacts. Please note, however, that contacts made through repeaters will not count for NR credit.

FUN-damentals of the Novice Roundup

The 1987 Novice Roundup lasts an entire week, including two weekends. The event begins at 0001 UTC Saturday, January 24 (7:01 PM EST, 6:01 PM CST, 5:01 MST and 4:01 PM PST Friday evening). The contest ends at 2359 UTC (6:59 PM EST, 5:59 PM CST, 4:59 PM MST and 3:59 PM PST) Sunday, February 1. To keep participants from neglecting other pursuits, participants are limited to 30 hours of operating time at the most (don't forget that listening time counts as operating time). Write to ARRL for your entry forms, and put a bookmark in your *QST* so the rules will be at hand when the forms arrive. Entry forms include three or more (specify quantity) log sheets with room for 100 contacts on each, a summary sheet (one is needed) and a dupe sheet to keep track of the stations you've worked. Run your self-addressed, stamped envelope to the mailbox now, so you'll have the forms in plenty of time to start the Roundup. The address is ARRL Novice Roundup Log Forms, 225 Main St, Newington, CT 06111.

The goal in the contest is to work as many stations as possible, in as many different ARRL Sections and DXCC countries as possible. ARRL Sections are listed on the Novice Roundup entry form and on page 8 of every *QST*. (If you're not sure which Section you're in, write to ARRL HQ.)

Each station you work may be counted only once. Short QSOs work best, so don't discuss grandma's rhubarb pie with another contester or repeat anything unless asked. Here's a typical Novice Roundup QSO:

CQ NR CQ NR DE KA1KBY/N KA1KBY/N K
KA1KBY/N DE KA1KQY/N AR
KA1KQY DE KA1KBY R 579 CT KN
KA1KBY DE KA1KQY R 559 CT KN
KA1KQY R 73 DE KA1KBY/N K

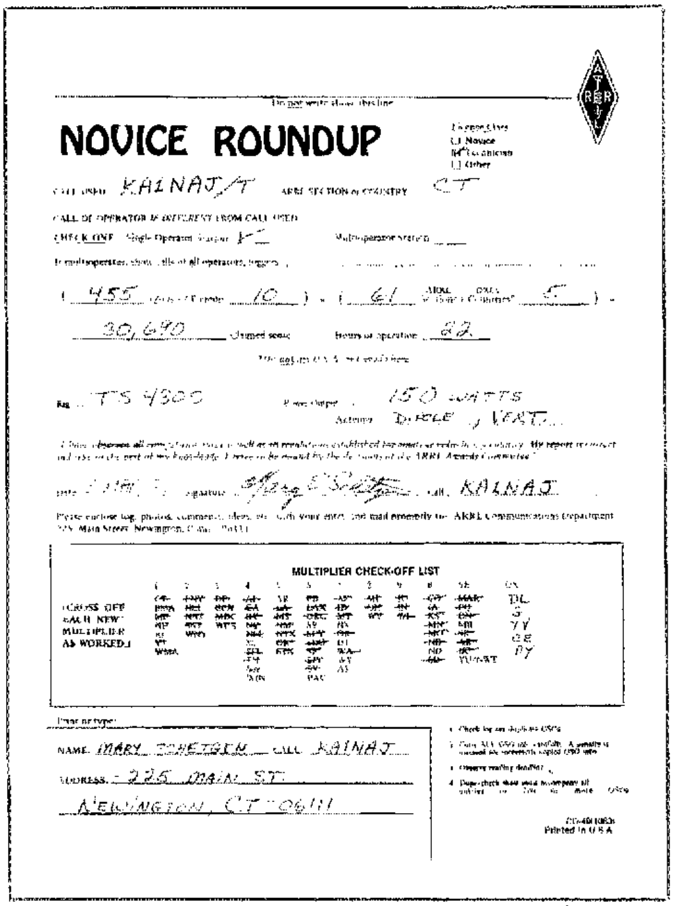
To streamline the QSO, the license class can be dropped after the contact has been established.

Happy contesting!

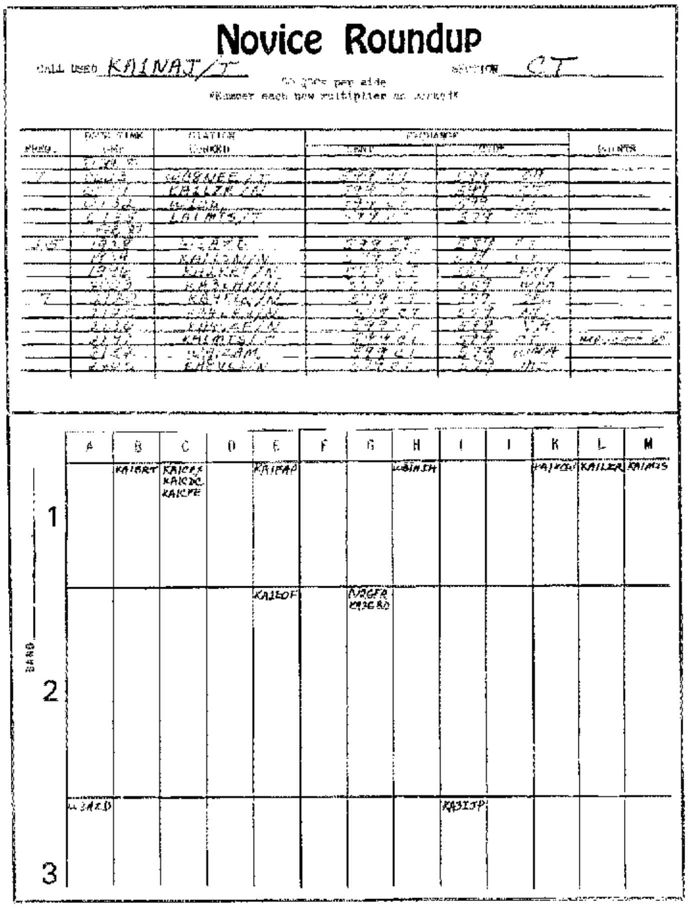
Rules

1) **Object:** For Novice and Technician operators in the United States (and possessions and territories) to exchange QSO information with as many stations as possible on the Novice bands. Others work Novices and Technicians only.

2) **Contest Period:** The week that spans the end of January and the beginning of February, including both weekends. Begins 0001 UTC Saturday, January 24, 1987, and ends 2359 UTC Sunday, February 1. Operate no more than 30 hours. Off-periods must be at least 15 minutes; listening time counts as



NOVICE ROUNDUP
MULTIPLIER CHECK-OFF LIST



Novice Roundup

operating time. Times on and off must be indicated in your log.

3) **Categories:**

(A) *Single Operator:* One person performs all transmitting, receiving and logging functions during the contest period.

(B) *Multioperator:* Single transmitter only. Those obtaining any form of assistance, such as relief operators or logging, during the contest period.

4) **Exchange:** Signal report and ARRL Section or country for DX stations. Novices should send /N and Technicians /T after their call sign so others will know their license class.

5) **Scoring:**

(A) *QSO Points:* Count one point for each two-way QSO. Work each station once, regardless of frequency band. Any authorized modes may be used.

(B) *Multiplier:* Each ARRL Section (listed on p 8), plus VE8/VY1, plus each foreign country.

(C) *Code Proficiency:* Additional points can be earned if you have qualified for an ARRL (not FCC) Code Proficiency certificate. CP credit equals the speed in words per minute indicated on the latest certificate or sticker held by the entrant. For more details on the Code Proficiency program, see Contest Corral, this issue.

(D) *Final Score:* Add your Code Proficiency credit to your total number of QSO points. Multiply that by your ARRL Section/country total for your final score. For example, if you work 100 stations in 31 Sections + 3 foreign countries and you have an ARRL Code Proficiency credit of 10 WPM from W1AW or W6OWP, then your score is 100 plus 10 × total multipliers (31 + 3) or 34, for a total of 3740 points.

6) **Miscellaneous:** Crossband contacts are not permitted. Novices and Technicians work any amateur stations; others work Novices and Technicians only. Contacts made through repeaters (or locally used repeater output frequencies) are not permitted.

7) **Reporting:** Contest forms (log sheets, summary sheet, dupesheet) are available from ARRL HQ for an SASE. Official forms are recommended. Any entry making more than 200 total QSOs must submit duplicate checking sheets (an alphabetical listing of stations worked). Incomplete or late entries will be classified as check logs. Logs should indicate dates, QSO times, on and off times, complete exchange sent and received for each contact, and band. Postmark your entry within 30 days after the contest (March 3, 1987).

8) **Awards:** Certificates to every Novice and Technician entrant who submits a valid entry. Endorsements for top Novice and Technician entrant in each ARRL Section/Division. Non-Novice/Technician entries are not eligible for awards.

9) **Conditions of Entry:**

(A) Each entrant agrees to be bound by the provisions as well as the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

(B) Disqualifications: See below. QST

Club Competition Rules and Contest Disqualification Criteria

The 1987 contest season is upon us. Three of the ARRL-sponsored contests during 1987 include an ARRL-affiliated club competition—January VHF Sweepstakes, February/March International DX Contest and November Sweepstakes. There are a few ground rules to follow to ensure that your club's scores are properly credited (and to ease the log checker's burden). These are detailed below.

From time to time it becomes necessary to consider disqualifying an entry to an ARRL contest. The particulars are listed below. Most of the time the reason is simply that the person submitting the entry was not accurate in copying call signs or contest exchanges. As long as you are careful only to log QSOs when you are sure of the information, you should have nothing to worry about. [The use of standard ARRL contest forms will help to ensure that your score is figured properly and speed up the publication of contest results in *QST*.]

Don't hesitate to call or write if you have a question about the rules listed here or the rules for any particular contest. The time to ask is before the contest, not afterward.

Club Competition

Only ARRL-affiliated clubs may participate in the club competition. A member must be listed in the regular score listings to be counted for a club.

For a club to be listed, two conditions must be met:

1) At least three different entries from members of the club must be submitted.

2) All members wishing to be included in the club scores must indicate the club name on their summary sheet, *and* the club secretary must send a list of all club members eligible to compete for the club and which level (unlimited, medium, local) they wish to enter for *each* competition. Remember to meet the mailing deadline!

There are three levels of club competition:

1) *Unlimited.* Any club submitting 51 or more *entries* is in this class. (One station can submit two entries—one on phone and one on CW in the November Sweepstakes and the DX Contest.) All stations and all operators must reside within 175 miles of the club's center. All members more than 50 miles from the club's center must attend at least 50 percent of the club's meetings to be eligible to submit an entry. If, however, they have not been a member for a year's time, they must have attended at least 50 percent of the meetings since becoming a member. There is no attendance requirement for those members within 50 miles. However, to be considered bona fide, a member must be active in club affairs. Members living outside of 175 miles and/or members operating stations outside of 175 miles may not compete in the club competition. The club must be ARRL-affiliated.

2) *Medium.* Any club submitting 50 entries or fewer falls in this class, except as noted in local club criteria, below. The same mileage and attendance requirements apply as the unlimited class club. The club must be ARRL-affiliated.

3) *Local.* Any club submitting 10 entries or fewer is in this classification. All members must reside within 20 miles of the club's center. There is no attendance requirement. Again, the club must be an ARRL affiliate.

Single- and multioperator station scores may be counted. At a guest-operated single-operator station, both the guest operator and the station licensee must be members of the same club in order to count the score for that club. At multioperator stations, at least 66 percent of the operators must be members of the same club for the score to count for that club.

In conjunction with the 50-percent-attendance rule, the club must hold *at least* four in-person meetings per year. A club's entry classification may be changed if, in the opinion of the ARRL Awards Committee, the club has manipulated its number of entries to fall into a lower classification (eg, if a club with 100 members submits only the 50 highest scores, even if more than 50 of its members wish to compete.)

It is not within the intent of these rules that a club should vote out a member or that a member resign and then be voted back into the club later so the 50-percent-attendance rule can be met.

The highest affiliated-club entry will be awarded a gavel in each category (unlimited, medium, local).

The highest single-operator CW score and the highest single-operator phone score in any club entry will be awarded with a club certificate when at least three single-operator CW and/or three single-operator phone scores are submitted.

Disqualification

If the claimed score of a participant is reduced by 2 percent or more, the entry may be disqualified. Score reduction does not include correction of arithmetic errors.

Score reductions may be made for taking credit for unconfirmed QSOs and/or multipliers, duplicate contacts, and/or other scoring discrepancies.

An entry with more than 2-percent duplicate contacts left in the log or an entry in which more than 2-percent "rubber clocking" (altering the actual time to increase the operating time so that it is greater than the allowable limit) is detected *will be automatically disqualified.*

If a participant is disqualified, he or she will be barred from submitting an entry in the next annual running of that specific contest, eg, disqualification from the 1986 phone SS prohibits submission of an entry for the 1987 phone SS, but 1987 CW SS participation is okay.

The calls of all disqualified participants will be listed in the *QST* contest report.

Any participant on the borderline of disqualification, but not actually disqualified, may receive a warning letter.

For each duplicate contact or miscopied call sign that is removed from the log by HQ, three additional contacts will be deleted as a penalty. The penalty will not be considered part of the 2-percent disqualification criteria.

In all cases of question, the decisions of the ARRL Awards Committee are final. QST

Hamfest Calendar

Administered By Bernice Dunn, KA1KXQ
Convention Program Manager

Attention: The deadline for receipt of items for this column is the 5th 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 (Greenville)—Jan 25: The Butler County ARC is sponsoring their Greenville Alabama Hamfest at the Greenville Recreation Center 8 AM-2 PM. Dealers, swap tables, food included. Free admission. Talk-in 07/67. For info and reservation, call 205-382-5040, 205-382-7911 or 205-382-3496.

Florida (Inverness)—Feb 7: The Sky ARC will sponsor their annual Hamfest at the Citrus County Auditorium located at the County Fairgrounds on US 41, three miles south of Inverness. Advance tickets $2 up to one week before, $3 at the door. Swap table $5 each. Dealers, ham gear, parts, surplus and computers included. Food and free parking. Talk-in on 146.955. For further info, write SHARC, PO Box 572, Lecanto, FL 32661, tel 904-628-5045.

†Florida (Sarasota)—Jan 24-25: The Sarasota ARA is sponsoring their 8th Annual Sarasota Hamfest at the Civic Center exhibit hall, 801 N Tamiami Trail 8:30 AM-4:30 PM Sat and 8:30 AM-3:30 PM Sun. Admission $5 in advance, $6 at the door. Swap tables, dealers displays, ARRL Forum, technical topics and FCC exams. Talk-in on 13/73, 31/91. For more info, write to A. Herrald, AA4AN, 5161 Oxford Dr, Sarasota, FL 34242, tel 813-349-1367 or Tom Grassia, KB4ORO, PO Box 3182 Sarasota, FL 33578, tel 813-351-5559.

†Illinois (Villa Park)—Feb 1: The Wheaton Hamfest 87 will be held at the Odeum Exposition Center. For flea-market tables, call 312-231-7497. Tickets $4 in advance, $5 at the door. For advanced tickets send SASE to WCRA, PO Box QSL, Wheaton, IL 60189. Enclose check payable to WCRA.

Michigan (Southfield)—Jan 25: The Southfield High School ARC is sponsoring their 20th Annual Swap & Shop at the Southfield High School. Doors open 6 AM for exhibitors, 8 AM-3 PM to the public. Admission $3. Reserved tables $20 for two 8-ft tables (paid in advance). Additional reserved tables $10 each. Tables also available at door. Lots of parking and food. For more info, write to Robert Younker, Southfield High School, 24675 Lahser, Southfield, MI 48034.

†New York (Yonkers)—Jan 25: The Yonkers ARC is sponsoring their Electronics Auction at the Lemko Hall, 556 Yonkers Ave, 9 AM-3 PM. Admission $3. Food and parking available. Talk-in on 265/865, 445.15/440.15. For more info, write to Otto J. Supliski, 53 Hayward St, Yonkers, NY 10703, tel 914-969-1053.

†Virginia (Richmond)—Jan 18: The Richmond ATS is sponsoring their Richmond Frostfest at the State Fairgrounds 8:30 AM-3:30 PM. Admission $4 in advance, $5 at the door. Parking and food available. Talk-in on 28/88 and 34/94. For more info, write to W. A. Scruggs, N4DDM, 8430 Abbey Rd, Richmond, VA 23235, tel 804-272-8206.

†Wisconsin (Milwaukee)—Jan 10: The West Allis RAC is sponsoring their 15th Annual Midwinter Swapfest. It will be held at the Waukesha Company Expo Center Forum 8 AM-3 PM. Directions: I-94 to Company J, south to FT, west to Expo. Admission $2 in advance, $3 at door. Tables $3 in advance, $4 at door (4 ft). Electrical outlet $5, as available. Exams given, write for details. Food available. For tickets, info or reservations, send SASE to WARAC Swapfest, PO Box 1072, Milwaukee, WI 53201.

† ARRL Hamfest

Attention Hamfest and Convention Sponsors

ARRL HQ maintains a date register of scheduled events that may assist you in picking a suitable date for your event. You are encouraged to register your event with HQ as far in advance as your planning permits. Note that the hamfest and convention approval procedures for ARRL sanction are separate and distinct from the date register: Registering dates with ARRL HQ does not constitute League sanction, nor does it guarantee there will not be a conflict with another established event in the same area.

We at ARRL HQ are not able to approve dates for sanctioned hamfests and conventions. For hamfests, this must be done by your Division Director. For conventions, approval must be made by your Director and, additionally, by the Executive Committee. Application forms can be obtained by writing to or calling the ARRL Convention Program Manager, tel 203-666-1541.

Coming Conventions

February 7-8
Florida State, Miami

February 14-15
Mississippi State, Jackson

March 13-15
Southeastern Division, Orlando, Florida

March 20-21
Michigan State, Muskegon

March 21-22
Roanoke Division, Charlotte, NC

March 28-29
Nebraska State, Kearney

March 28-29
Kentucky State, Elizabethtown

ARRL NATIONAL CONVENTIONS
July 10-12, 1987—Atlanta, Georgia
July 21-24, 1988—Portland, Oregon
1989—Las Vegas, Nevada

FLORIDA STATE CONVENTION FEBRUARY 7-8, Miami

Programs will include: high-tech Amateur Radio, message handling by packet radio, satellite communications, DX Forum, initiation for the ROWH and legal assistance for adverse zoning regulations. On-site campground with full facilities, $10 per night (no ground tents please.) Hotel rates $45. Registration is $5 before Jan 30, $6 thereafter. Swap tables are $16 each, have power and measure 8 ft × 30 in. For brochure with full details, ticket, table, campsite and hotel reservation forms, write to Dade Radio Club, PO Box 350045, Miami, FL 33135.

Contest Corral

Conducted By Billy Lunt, KR1R
Assistant Contest Manager, ARRL

Dec 31

West Coast Qualifying Run, 10-35 WPM, at 0500Z Jan 1 (9 PM Dec 31). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3590 kHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send it to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

Dec 31-Jan 1

ARRL Straight Key Night, Dec *QST*, p 83.

JANUARY

3-4

10-Meter World SSB Championship Contest, Dec *QST* p 83.

10

15-Meter World SSB Championship Contest, Dec *QST*, p 83.

10-12

ARRL January VHF Sweepstakes, Dec *QST*, p 79.

Michigan QRP Club CW Contest, Dec *QST*, p 83.

Hunting Lions in the Air Contest, Dec *QST*, p 83.

11

20-Meter World SSB Championship Contest, Dec *QST*, p 83.

13

W1AW Qualifying Run, 35-10 WPM, at 0300Z Jan 14 (10 PM EST Jan 13). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send it to ARRL for grading. Please include your full name, call sign (if any) and complete mailing address. A large SASE will help expedite your award or endorsement.

17-18

160-Meter World SSB Championship Contest, Dec *QST*, p 83.

AGCW-DL QRP Winter Contest, Dec *QST*, p 83.

Crazy 8s HF, VHF and UHF Contest, Dec *QST*, p 84.

North Dakota QSO Party, sponsored by the Red River Amateurs, from 0000Z-0800Z and 1600Z-2400Z Jan 17 and 0800Z-1600Z Jan 18. Work stations once per band and mode. Exchange signal report and QTH (county for ND stations; state, province or country for others). Suggested frequencies: phone—1.835 3.905 7.280 14.295 21.380 28.500; CW—1.810 3.540 and 35 kHz up from band edges; Novice— 25 kHz up from band edges. Count 10 points per phone contact, 20 points per CW contact and 50 points per RTTY contact. ND stations add 250 bonus points for working 5 Novices. Multiply by number of states/provinces/countries worked per band and mode. Others multiply by total ND counties worked (max 53). Mail logs by Feb 28

(include a large SASE for results) to Mike Beaton, KDØA, 2267 Flickertail Dr, Fargo, ND 58103.

Texas QSO Party, sponsored by the West Texas DX Assn, from 0000Z Jan 17 until 1800Z Jan 18. Phone and CW. Single operator only. Work stations once per band and mode. Mobiles may be worked again in each county. Exchange serial number and state/province/country (county for TX stations). Score 1 point per phone QSO, 2 points per CW QSO, 5 points per phone QSO with Texas mobile station (non-Texas stations only) and 7 points per CW QSO with Texas mobile station (non-Texas stations only). Texas stations multiply by total number of states/provinces/countries and Texas counties. Others multiply by total number of Texas counties worked (max 254). Suggested frequencies: CW—3.565 3.710 7.065 7.110 14.065 21.065 21.110 28.065 28.110; phone—3.940 7.260 14.280 21.370 28.600. Certificates and plaques. Send logs to be received before Mar 14 to Les Bannon, WF5E, 3400 Bedford, Midland, TX 79703.

HA-DX Contest, sponsored by the Hungarian Radioamateur Society, from 2200Z Jan 17 until 2200Z Jan 18. 80-10 (excluding WARC bands), CW only. Categories: single operator, single band; single operator, multi band; multioperator, multi band (club stations only). Work stations once per band. Exchange signal report and serial number. HA stations will also send a two-letter code corresponding to their location (county). Possible codes: BA BE BP BN BO CS FE GY HA HE KO NG PE SA SO SZ TO VA VE ZA. Count 6 points per HA/HG QSO, 3 points per QSO with non-HA/HG stations on other continents (no points per QSO with own continent). Multiply by sum of HA/HG counties worked per band. Mail entries within 6 weeks to Hungarian Radioamateur Society, PO Box 86, H-1581 Budapest, Hungary.

22

W1AW Qualifying Run, 10-35 WPM, at 2400Z (7 PM EST). See Jan 13 listing for more details.

23-25

***CQ* WW 160-Meter DX Contest,** CW, sponsored by *CQ* Magazine, from 2200Z Jan 23 until 1600Z Jan 25. CW only (phone Feb 20-22). Count 2 points per QSO with own country, 5 points per QSO with another country in the same continent and 10 points per QSO with another continent. Multiply by sum of US states (48), Canadian provinces (13) and DXCC countries (including KH6/KL7). Canadian provinces are VO1, VO2, VE1-NB, VE1-NS, VE1-PEI, VE2, VE3, VE4, VE5, VE6, VE7, VE8 NWT and VY Yukon. Exchange signal report and QTH; W/VE stations also send state/province. Avoid the 1825-1830 and 1907-1912 DX windows. Mail entry by Feb 28 (phone, Mar 31) to Don McClenon, N4IN, 3075 Florida Ave, Melbourne, FL 32904.

REF French Contest, CW, sponsored by Reseau des Emetteurs Francais, from 0600Z Jan 24 until 1800Z Jan 25 (phone 0600Z Feb 28 until 1800Z Mar 1). 3.5, 7, 14, 21, 28 MHz. Single and multioperator. Work French stations, including overseas territories and DA1/2 French military stations. Exchange signal report and serial number. French stations will also send department number. Count 1 point for QSOs with own continent, 3 points for other continents. Multiply by total of French departments per band (Corsica has 2 departments 2A and 2B) FFA (DA1 or DA2)—DOM/TOM. Mail entries by Mar 5 (phone by Apr 5) to Lucien Aubry, F8TM, REF French Contest, 53 rue Marceau, 91120 Palaiseau, France.

24

40-Meter World SSB Championship Contest, Dec *QST*, p 83.

25

75-Meter World SSB Championship Contest, Dec *QST*, p 83.

24-Feb 1

ARRL Novice Roundup, this issue, p 80.

Jan 31-Feb 1

YL-ISSB QSO Party, CW, coordinated by Bill Early, WA9AEA, from 0001Z Jan 31 until 2359Z Feb 1. (Phone is from 0001Z Mar 21 to 2359Z Mar 22.) Frequencies are the General portion of all bands. Single operator, DX-W/K partners, YL-OM teams. Exchange call, signal report, state/province/country, name, ISSB number (if member) and DX-W/K partner. Score 3 points per member QSO within same continent, 6 points per member QSO in different continent, 1 point per nonmember QSO. Member stations only count as multipliers. Multiply by 1 for each DX-W/K partners; YL-OM team; US, VK, ZL, VE state or province; DXCC country. Bonus multipliers: 1 for working 15 or more members on a second band; 2 additional for 15 or more members on a 3rd band. Multiply by 5 for maintaining a dc input under 250 watts throughout contest. Mail logs before April 30 to Bill Early, WA9AEA, PO Box 401, McHenry, IL 60050-0401.

FEBRUARY

1-2

Classic Radio Exchange, sponsored by the Southeast ARC from 2100Z Feb 1 until 0400Z Feb 2. Object is to restore, operate and enjoy older equipment. Exchange name, signal report, state/province/country, receiver and transmitter (homebrew send PA tube) and other interesting conversation. The same station may be worked with different equipment combinations on each band/mode. Suggested frequencies: phone—3.910 7.280 14.280 21.380 28.580; CW—60 kHz up from lower band edges; Novice—20 kHz up from lower band edges. Add the number of all the different transmitters and receivers worked plus the different states/provinces/countries worked per band. Multiply that number by total number of QSOs. Multiply that total by total years old of all your transmitters and receivers used (minimum three QSOs per unit). For transceivers, multiply years old by 2. Mail logs (include SASE for results) to Jim Hanlon, W8KGI, 5560 Linworth Rd, Columbus, OH 43085.

3

West Coast Qualifying Run, 10-35 WPM, at 0500Z Feb 4 (9 PM PST, Feb 3). See Dec 31 listing for more details.

W1AW Schedule

October 26, 1986—April 5, 1987 MTWThFSSn = Days of Week Dy = Daily

W1AW code practice and bulletin transmissions are sent on the following schedule:

UTC	Slow Code Practice	MWF: 0300, 1400; TThS: 0000; TThSSn: 2100; Sn: 0300
	Fast Code Practice	MWF: 0000, 2100; TTh: 0300, 1400; S: 0300: Sn: 0000
	CW Bulletins	Dy: 0100, 0400, 2200; MTWThF: 1500
	Teleprinter Bulletins	Dy: 0200, 0500, 2300; MTWThF: 1600
	Voice Bulletins	Dy: 0230, 0530
EST	Slow Code Practice	MWF: 9 AM, 7 PM; TThSSn: 4 PM, 10 PM
	Fast Code Practice	MWF: 4 PM, 10 PM; TTh: 9 AM; TThSSn: 7 PM
	CW Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Teleprinter Bulletins	Dy: 6 PM, 9 PM, 12 PM; MTWThF: 11 AM
	Voice Bulletins	Dy: 9:30 PM, 12:30 AM
CST	Slow Code Practice	MWF: 8 AM, 6 PM; TThSSn: 3 PM, 9 PM
	Fast Code Practice	MWF: 3 PM, 9 PM; TTh: 8 AM; TThSSn: 6 PM
	CW Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Teleprinter Bulletins	Dy: 5 PM, 8 PM, 11 PM; MTWThF: 10 AM
	Voice Bulletins	Dy: 8:30 PM, 11:30 PM
MST	Slow Code Practice	MWF: 7 AM, 5 PM; TThSSn: 2 PM, 8 PM
	Fast Code Practice	MWF: 2 PM, 8 PM; TTh: 7 AM; TThSSn: 5 PM
	CW Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Teleprinter Bulletins	Dy: 4 PM, 7 PM, 10 PM; MTWThF: 9 AM
	Voice Bulletins	Dy: 7:30 PM, 10:30 PM
PST	Slow Code Practice	MWF: 6 AM, 4 PM; TThSSn: 1 PM, 7 PM
	Fast Code Practice	MWF: 1 PM, 7 PM; TTh: 6 AM; TThSSn: 4 PM
	CW Bulletins	Dy: 2 PM, 5 PM, 8 PM; MTWThF: 7 AM
	Teleprinter Bulletins	Dy: 3 PM, 6 PM, 9 PM; MTWThF: 8 AM
	Voice Bulletins	Dy: 6:30 PM, 9:30 PM

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.

On Monday, Wednesday and Friday, 1400 through 2200 UTC, transmissions are beamed to Europe on 14, 21 and 28 MHz; on Wednesday at 2300 UTC they are beamed south.

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.

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 1986 *QST*, pages 9 and 84," 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 84.

On Fridays, UTC, a DX bulletin replaces the regular bulletin transmissions.

On Wednesdays at 2330 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. The 2300 UTC Teleprinter Bulletin transmission is also beamed south on Wednesdays.

On Tuesdays and Saturdays at 2330 UTC, Keplerian Elements for active amateur satellites will be sent on 45.45 baud Baudot on the regular teleprinter frequencies.

W1AW CW and voice bulletins are sent on OSCAR 10, Mode B, subject to reactivation of the transponder. 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 1600 UTC transmissions, and 2300 UTC on ThFSn. 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 AM to 1 AM EST and on Saturday and Sunday from 3:30 PM to 1 AM EST. 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 PM 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 December 25 and 26, January 1 and February 16.

7-8

Vermont QSO Party, sponsored by the Central Vermont ARC, from 0000Z Feb 7 until 2400Z Feb 8. Stations may be worked three times per band (once each on CW, phone and RTTY). CW and RTTY QSOs must take place in the appropriate subbands. Exchange signal report and QTH (county for VT stations; state, province or country for others). Suggested frequencies: phone—3.910 7.230 14.260 14.320 21.360 28.570 50.110 144.200; CW—3.540 3.720 7.040 7.120 14.040 21.040 21.140 28.040; RTTY—3.620 and 90 kHz from lower band edges. Count 1 point per phone QSO, 2 points per CW or RTTY QSO. Multiply by number of states plus provinces plus DXCC countries for VT stations; others multiply by number of VT counties worked (max 14). 20 point bonus points for working W1BD. Official log sheets available for SASE to sponsor. Mail entry by Mar 1 to D. Loverin, WA1PDN, 50 Liberty St, Montpelier, VT 05602.

New Hampshire QSO Party, sponsored by the NH ARA, from 1900Z Feb 7 until 0700Z Feb 8 and 1400Z Feb 8 until 0200Z Feb 9. Work stations once per band and mode. Exchange signal report and QTH (county for NH stations; state, province or country for others). Suggested frequencies: phone—1.875 3.935 7.235 14.280 21.380 28.580 50.115 144.205; CW—1.810 and 35 kHz above band edges; Novice—35 kHz above band edges. Count 1 point per phone QSO, 2 points per CW/RTTY QSO and 5 points per Novice/Tech QSO. NH stations multiply by total states/provinces/countries worked. Others multiply by total number of NH counties worked (max 10). Count 20 bonus points each for working WB1CAG, WB1FFZ, N1BYQ, WB5DLV, K1RD, W1OC and W1WQM. Logs must be postmarked by Mar 12 (include SASE for results). Send logs to Mt Moriah RS, c/o Bud Valcourt, N1BYQ, 19 Teague Dr, Salem, NH 03079.

8

North American Sprint, CW, sponsored by the *National Contest Journal,* from 0000Z to 0400Z Feb 8 (phone contest 0000Z-0400Z Feb 15). Contests are separate; 80, 40, 20 meters only. Suggested frequencies: CW—3.530-3.550 7.030-7.050 14.030-14.050; phone—3.870-3.910 7.210-7.240 14.260-14.290. For a valid QSO, you must send and receive all of the following information: other station's call, your call, serial number (consecutive starting with 001), your name and state (or province/country). An operator may use only one call sign during the contest. Multiply valid QSOs by sum of states, provinces and North American countries (not W/VE). KH6 is not counted as a state or as an NA country. VE multipliers are Maritimes (VE1, VO1, VO2) and VE2 through VE8 (8 max) Non-NA countries do not count as multipliers. Special QSY rule: Stations soliciting a call by sending CQ, QRZ, etc, are permitted to work only one station in response to that solicitation. They must thereafter move at least 1 kHz before working any other station, or at least 5 kHz before again soliciting calls. Team competition: Each team has a maximum of 10 members as a single-entry unit. Clubs having more than 10 members may submit more than one team entry. To qualify, the name and call sign of each operator (and station operated if a guest op) must be registered with W6OAT. The team information may be contained either in a letter received by W6OAT before the start of the Sprint or in a Western Union mailgram dated at least 24 hours before the start of the Sprint. There are no distance or meeting requirements for a team entry. CW and phone teams are separate. Entries must be received no later than 30 days after the Sprint. Mail CW entries to Rusty Epps, W6OAT, 651 Handley Trail, Redwood City, CA 94062. Phone entries go to Rick Niswander, K7GM, 910 W Claremont, Phoenix, AZ 85013.

11

W1AW Qualifying Run, 10-40 WPM, 0300Z Feb 12 (10 PM EST, Feb 11). See Jan 13 listing for more details.

14-16

YL-OM Contest, phone, sponsored by YLRL, from 1400Z Feb 14 until 0200Z Feb 16 (CW portion will be 1400Z Feb 28 until 0200Z Mar 2). Phone and CW are separate contests. YLs work OMs, OMs work YLs only. Use all bands; no crossband operation. No net contacts or repeater contacts. Work stations once only. Exchange QSO number, signal report and state/province/country. Count one point for each station worked and multiply by the total number of states/provinces/countries worked. Stations running 150 W CW or 300 W PEP SSB or less multiply final score by 1.25. Suggested frequencies: phone—3.940-3.970 7.240-7.270 14.280-14.310 21.380-21.410 28.580-28.610; CW—3.540-3.570 7.040-7.070 14.040-14.070 21.180-21.210 28.180-28.210. Awards. Logs must be received by Mar 31. Mail them to Mary Lou Brown, NM7N, 504 Channel View Dr, Anacortes, WA 98221.

PACC Contest, sponsored by VERON, from 1200Z Feb 14 to 1200Z Feb 15. CW and phone, 160-10 meters. Work PA PB PI stations. Single and multioperator categories. Exchange signal report and serial number. Dutch stations will send report and province (GR FR DR OV GD UT NH ZH FL ZL NB LB). Work stations once per band, regardless of mode. Count one point per QSO and multiply by number of provinces worked per band for final score. Mail logs by Mar 31 to PACC Contest, F Th Oosthoek, PAØINA, PO Box 499, 4600 AL Bergen op Zoom, The Netherlands.

15

North American Sprint, phone, see Feb 8 listing.

20

W1AW Qualifying Run, 10-35 WPM.

21-22

ARRL International DX Contest, CW, Dec *QST,* p 80.

CQ WW 160-Meter DX Contest, phone, see Jan 23-25 listing.

Feb 28-Mar 1

REF French Contest, phone, see Jan 24-25 listing.

Feb 28-Mar 2

YL-OM Contest, CW, see Feb 14-16 listing

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **Feb 1** to make the **April** issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Special Events

Conducted By Billy Lunt, KR1R
Assistant Contest Manager, ARRL

Louisville, Kentucky: The Louisville ARTS will operate W4CN from 1700Z **Jan 3** until 0500Z **Jan 4** to honor the Louisville Cardinals, NCAA basketball champions, and to kick off the 1987 NCAA basketball season. Suggested frequencies: phone—7.250 14.250. Send QSL and SASE (22 cents) via ARTS Club W4CN, PO Box 7391, Louisville, KY 40207.

Santa Fe, New Mexico: The Santa Fe ARC and the Northern New Mexico RC will operate WA5SWV **Jan 10-11** to celebrate New Mexico's Diamond Jubilee and the 75th year of statehood. Operation will be on the 40 and 20 General phone bands and the 40 Novice band. For certificate, send QSL and SASE to New Mexico Diamond Jubilee, 922 Hickox St, Sante Fe, NM 87501.

Sun Valley, California: The San Fernando Valley ARC will operate W6SD **Jan 17-18,** 1500Z-2330Z, in celebration of their 40th year. Suggested frequencies: CW—7.140 14.140 21.140; phone—7.240 14.240. For commemorative certificate, send no. 10 or 9- × 12-in SASE (39 cents) and QSL to W6SD, PO Box 3151, Van Nuys, CA 91407.

Novice, Texas: The North Texas HFA will operate N5NT from 1800Z **Jan 17** until 1800Z **Jan 18** to work Novices from Novice. Operation will be in all the Novice bands. Send QSL to Bob Olney, N5NT, 1331 Northlake Dr, Richardson, TX 75080.

Gulfport, Mississippi: The Confederate Signal Assn of Southern Mississippi will operate a special-event station **Jan 17-18** to commemorate the birthday of Robert E. Lee. Suggested frequencies: 21.150 21.350 28.150 28.350 50.150 144.150 432.150. Send QSL via W. R. Jeffrey, KA4CRT, PO Box 923, Gulfport, MS 39502-0923.

Bellrose, New York: The Hall of Science ARC will operate WB2JSM **Jan 18,** 1500Z-2100Z, in celebration of their 14th anniversary. Suggested frequencies: phone—40 and 20 General phone bands; CW—40 and 15 Novice bands. For a commemorative certificate, send large SASE (39 cents) to Arnie Schiffman, WB2YXB, 81-22 250th St, Bellrose, NY 11426.

Pontiac, Michigan: The Oakland Co ARS will operate W8TNO **Jan 25,** 1600Z-2400Z, to celebrate the 150th anniversary of Michigan. Suggested frequencies: SSB—3.870 7.270 14.270; CW—3.730 7.130. For special certificate, send 9- × 12-in SASE to Oakland Co ARS, 4391 Clintonville Rd, Pontiac, MI 48055.

Mt Clemens, Michigan: The L'Anse Creuse ARC will operate several special-event stations on Michigan's date of admission to the US, **Jan 26,** to commemorate their state Sesquicentennial. Suggested frequencies: phone—10-40 General bands; CW—40 and 15 Novice bands. After **Jan 26,** limited weekend operation will continue until **May 26** on the same frequencies. For commemorative certificate, send list of stations worked and no. 10 or 9- × 12-in SASE to Fred Regan, N8DVO, PO Box 72, Utica, MI 48087.

Marshall Islands: The Kwajalein ARC will operate KX6BU from 0600Z **Jan 31** until 0600Z **Feb 9** to commemorate the 43rd anniversary of the Battle of Kwajalein and Roi-Namur. Frequencies: SSB—14.250 21.350 28.550; CW—7.025 14.050 28.050. QSL and certificate via KX6BU, Box 444, APO San Francisco 96555-0008.

Deadline: The deadline for receipt of items for this column is the 1st of the second month preceding the publication date. For example, your information would have to reach HQ by **Feb 1** to make the **April issue.** Please include the name of the sponsoring organization, the location, dates, times(Z), frequencies and call sign of the special-event station. Requests for donations will not be published.

QSLing Special-Events Stations: To get your QSL or certificate from any of the special-event 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 self-addressed, stamped envelope. If sending for a certificate, use a 9- × 12-in envelope if you want an unfolded certificate, or a no. 10 envelope if folds are okay. Include enough postage for return of your envelope. (3) Mail both your QSL and your SASE to the address listed, or to the address given on the air by the station you QSO. Be patient. Special-event stations will often print their cards and/or certificates after the operation is over so they will know how many to order.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

CANADA

ALBERTA: SM, Bill Gillespie, VE6ABC—A/SM: VE6AMM. SEC: VE6XC, OO: VE6TY, STM/DEC/SM VE6ABC. Northern Alberta Radio Club starts off Fall season with over 60 prospective students sitting in on first lecture on amateur radio. Calgary amateurs provide communications for Scout canoe race. Calgary also organizing for the Cross Canada Olympic Torch Run. As colder weather sets in western Canada, many indoor amateur activities getting under way. Traffic: APSN QNI1208, QTC 2, Informal 88. ATN QNI 215, QTC 58. Personal totals: VE6CHK 137, VE6CPE 31, VE6ABC 15, VE6PZ 2, VE6EO 2.

BRITISH COLUMBIA: SM, H. Ernie Savage, VE7FB—British Columbia Public Service Net, 3729 KHz. 0130Z daily, NM Ford Warner, VE7DDF, reports checkins High 231 Low 133 Total 5545. British Columbia Emergency Net, 3650 KHz. NM Ferdi Wenger VE7EJU. BCEN had a fairly successful month. QNI's have increased despite the various ball games. Low 28 High 41 Total 1125 QTC's 256. In hospital, Bob VE7OQ. George VE7JD. Doc VE7AKG eye operation has greatly improved his seeing. Vancouver A.R.C., President John Coulthard VE7ARR, Vice Allen VE7FRK, Secretary needed. Burnaby A.R.C. held a wake at their old meeting place of years before they pull it down. Thanks to all for the mail and news. Traffic: VE7CDF 241, VE7BNI 213, VE7EJU 169, VE7EJW 93, VE7FME 62, VE7XA 45, VE7ANG 44, VE7FB 29, VE7BZI 12, VE7EGM 2.

MANITOBA: SM, Jack Adams, VE4AJE—Been some time since the Manitoba section appointees have been mentioned by name and call: VE4IX-MAX,-ASM-NM, VE4ANR, Terry, SEC. VE4OO, Walt, STM. VE4ALO, Kelly, TC, PIO. VE4ADP, Ray, ATC. VE4FK, Jim, OO. VE4LB, Charlie, NM. Without the help of these dedicated individuals, it would be next to impossible to maintain a section-thank you very much gang. Had our first taste of snow (Oct 29); now is the time to get concerned about antennas. Net reports: MTN-17 sessions, 120 QNI. 31 QTC. MEPN-31 sessions 1141 QNI, 32 QTC. MMN-31 sessions 751 QNI 39 QTC. WRIN-9 sessions 426 QNI, 2 QTC. Individual traffic: VE4AJE 57, VE4LB 54, VE4TE 32, VE4IX 30, VE4BI 29. Thanks Joe, VE4BI, for your faithful representation with Daytime ten net. Merry Xmas.

MARITIME-NEWFOUNDLAND: ASM, Aaron D. Solomon, VE1OC—H.A.R.C. Bulletin reports two Search and Rescue efforts by the Waverley, N.S. Fire Dep't. S & R assisted in communications by HARC members. Both searches were successful. Hfx.- Dart. Metro amateurs engaged in *Packet Radio* on 146.010 MHz. More details next month. New Calls-VE4AOE now VE1CAA; VE1MY now VE7EKV; VE1BHQ now VE1ZS. Many changes being reported for the new VE-1 Call Book. Advise VE1PQ, VE1FQ, or VE1QM, of any change in QTH, phone no. etc. *Hospital*-VE1QX, VE1CZS. Speedy recovery, OMs. *Visitor*-KA1RFC. *Silent Key*-VE1BUK.

ONTARIO: SM, Larry Thivierge, VE3GT—BM: VE3LST. PGL: VE3AR. SEC: VE3GV. STM: VE3CYR. TC: VE3EGO. After a successful year at the helm of the combined Sections' cw net OQN 1 and 2, NM VE2EDO is stepping down to pursue other interests-thanks Pat for laying the ground work. VE3CYR takes over as interim NM of OQN1 while VE3DCX is the new NM of OQN2. VE3EAM is now zeroing right on frequency with a new IC-751 and a good signal. As one of his final acts as EC for Metro Toronto, VE3LNN accepted the resignation of AEC VE3IOT and appointed VE3ODR as her successor. After six years of "never a dull moment" John is stepping down to take a year's sabbatica from ARES activities. VE3WM reports a successful annual goblin patrol in London. SET activities this year were confined mainly to the local ARES groups areas of responsibility where the action should be in times of emergencies. If there are going to be new repeaters in the Toronto region, they will be on UHF since the VHF spectrum is already fully saturated. This should be a boon for dual band VHF/UHF equipment sales. Upgrades to advanced are VE3ACY and VE3PJK. VE3GFN worked 68 Sections in the cw Sweepstakes using his home-grown software for all logging and duping. Openings on 10 meters have revealed a number of interesting DX beacons. Niagara Peninsula ARC have added one more technican, VE3LWH to assist VE3MFD and VE3CUU in their efforts to keep repeater VE3NRS running smoothly. VE3DKO is now VE6MA. VE3VAL is the new bulletin editor for the Chatham Kent ARC. Girl Guides are running "GOTA" or Guides-on-the Air scheduled for the weekend of February 20-22. The Girl Guides and CLARA are looking for YLs and OMs to invite Guide groups to their Shack for the event. For information and suggestions, send an SASE to VE3GJH. Windsor ARC assisted in providing communications for the Detroit Free Press International Marathon. There were in excess of 50 operators including VE3FWV, VE3FIO, VE3IGI, VE3KGW, VE3HHG, VE3LFX, VE3LFM, VE3LFV, VE3ACY from both sides of the border. Happy 1987. Traffic: VE3FAS 281, VE3GSQ 272, VE3GNW 187, VE3CYR 160, VE3GT 144, VE3DCX 105, VE3DPO 99, VE3ORN 71, VE3BUO 65, VE3WV 52, VE3GFN 45, VE3AJN 41, VE3JSM 38, VE3GOL 33, VE3WG 26, VE3EAM 25, VE3KXD 24, VE3WM 23, VE3BAJ 20, VE3FGU 15, VE3POJ 11, VE3MCO 8, VE3IFP 7, VE3JHA 5. (Sept) VE3KXB 34, VE3WM 16, VE3MCO 12.

QUEBEC: SM, Harold Moreau, VE2BP—STM: VE2EDO. BM: VE2ALE. TC: VE2ED. NM: VE2EDO. Season's greetings to all. New appointment: VE2EMF as ORS. Repeater VE2TA is now on 144.590/145.190. Des amateurs du club VE2VIP (Trois-Rivieres), ont apporte leur support lors du "Grand Meli-Velo" du circuit mini-loto le 17 Aout 1986, VE2's, FJZ, GUO, FJX, DHN and VE2ZZ. A tous meilleurs voeux pour la nouvelle annee. Traffic: VE2EDO 133, VD2BP 47, VE2JN 37, VE2WH 35, VE2EC 29.

SASKATCHEWAN: SM, W.C. Munday, VE5WM—SEC: VE5CU. EC: VE5AQ, VE5FF, VE5HG, VE5ACI, VE5WM. STM: VE5HG. NM: VE5EE, VE5EX, VE5HG, VE5MML, VE5WM. TC: VE5GF. ATC: VE5XZ. BM: VE5WM. OBS: VE5CU, VE5JA. This has been a busy month for ham radio with SET exercise? Halloween patrols? Contests and hamming in general. With the colder weather closing in upon us, fast minute antenna work is being completed. Congratulations to Regina ARA, VE5NN, for their fourth place Canadian finish in Field Day Class 2A. This will be my last report as SM, and I thank the SK hams for their support and co-operation over the past 6 years. Good luck and 73 to all. Traffic: E5KZ 51, VE5WM 10, VE5UX 1.

ATLANTIC DIVISION

DELAWARE: SM, Harold K. Low, WA3WIY—STM: KA3IXV. SEC: K3PFW. EC: KC3TI KC3JM KA3LNK. PIO: WB3DPJ. SGL: AF3R. PSHR: K3JL. Delaware Repeater Asso. held a work party to clean up the 146.73 site. Your dues are needed in all clubs, please support them. FSARC may sponsor the 87 hamfest. SARA has installed new controller on 147.075. N3DOK has been printing SARA news letter, but has now stepped down. Manticoke ARC now has 26 members and is still growing. I hope new club officers will inform me as soon as possible of the new slate. DTN Stations 324 Traffic 54 in 23 sessions. DEPN Stations 47 Traffic 17 in 4 sessions. SEN Stations 50 Traffic 2 in 4 sessions. Traffic: W3QQ 146, WB3DUG 44, WA3WIY 36, K3JL 34, KA3IXV 26, KC3TI 22, W3PVO 20, W3FEG 17, N3AXH 8, KC3JM 7.

EASTERN PENNSYLVANIA: SM, Kay Craigie, KC3LM—ASM: WA3PZO, KO3B, K3ZFD. ACC: KA3A. SEC: WA3PZO. SGL: WA3IAO. STM: KB3UD. PIO: W3AMQ. TC: W3FAF. New year, new Section staff members: Steve Phillips, KO3B, Assistant SM, represents Section leadership's interest in Amateur activities in the northwestern part of EPA. A member of West Branch ARA, he packets on K3RLI PBBS. Steve White, WA3IAO, State Government Liaison, is an attorney who's president of a government relations firm. He's also active in Suburban ARC. Time to get our favorite Novice/Techs psyched for Novice Roundup, so we can have more EPA scores reported in '87 and more operators ready to upgrade. In the Harrisburg area, W3IS will offer Novice and Advanced/Extra classes in February. ARRL sanction for your club's 1987 ham fest has several benefits, costs no more than a few postage stamps, and is simple to arrange; contact KC3LM for how-to info. On the club scene, KC3FO has West Branch's newsletter revived and looking sharp. RF Hill worked the Halloween Patrol again to keep the kids' fun safe. Delmont did comm for Holy Redeemer Hospital's bike-a-thon. Warminster's ARRL night welcomed WA3BC, KC3LM, WA3PZO, and W3FAF. An nual Report forms for clubs will arrive soon; can we make it 100% return in 1987? We're still recruiting Public Information Assistants; your club PR person may already quality. Say, W3ADE is one snappy-looking gent wearing his blue ORS call sign badge. Hope all appointees will own a Field Organization badge so they can cut a sporty figure like Lew! PaPA, the Pennsylvania Packet Assn, is open to packeteers statewide. Contact KB3OM, K3RLI, or W3PYF, KB3UD for info. Owing to unregulation, square waves will be allowed to watch rock videos and dye their hair purple, and binary logic can add another value besides "yes" and "no" called "maybe, if I feel like it." SEC WA3PZO and DEC 9 KB3YS presented Amateur views at a National Weather Service meeting in Wilkes-Barre. KB3OM is now DEC 7. PARA's ATV crew won top ratings from both ARES leaders and Pentagon observers for their video contributions in the recent NDMS drill. Thanks also to the packeteers, especially K3PGB for use of his BBS, plus all the voice ops who did a fine job again. KO3M, also an OBS, is new on the ORS list. Net Managers and ORS's are reminded to report monthly to KB3UD. SECTION NETS, September (QNI/QTC/Sessions): EPA 459/138/60; EPAEPTN 505/126/30; PTTN 284/75/30. LOCAL NETS, September: D6ESN 183/19/9; MARC/ ARES 65/10/4; MARCTN 169/49/13; STARNET 284/75/30. Traffic, September: N3AZW 392, N3COY 135, AA3B 118, W3IPX 116, N3CD 91, KA3DLY 91, KA3IME 66, W4UQ 56, N3DRM 52, W3JKX 44, N3EFW 28, WA3CKA 28, K3EBZ 28, KB3FW 26, WA3QN 24, KU3R 23, K3TX 23, W3KAG 22, KO3M 20, W3CL 16, W3FAF 15, W3VA 9, W3ADE 9, W3HK 4.

MARYLAND-DC: SM, John Barolet, KJ3E— MDC section leaders are: ASM: N3EGF. SEC: K3RXK. PIO/OOC: KC3EK. TC: W3VVN. SGL: KW3X. ACC: KA3DRO. STM: KJ3E. BM: vacant. Now is the time to select and nominate the next MDC Section Manager. Let's have a real election with several candidates seeking the position. See HAPPENINGS in this QST for instructions on nominating the radio amateur of your choice for Section Manager. KJ3E is not a candidate for reelection because he wishes to experience other amateur radio activities. The annual simulated emergency test (SET) was an outstanding success; ARES communication circuits became saturated with formal radiogram traffic, thereby accurately portraying a real communication emergency. WA2WDT reports that 29 Montgomery County RACES/ARES members took part in the SET, and from throughout the MDC section more ARES operators were involved than ever before. Many who took part passed their first formal radiograms, said they enjoyed the test, and couldn't wait until next year. Well, why wait until next year? Plan and execute several mini-SETs, perhaps with adjacent counties, before the next annual SET in October 1987. K3RXK, MDC SEC, is commended for planning and leading the SET in 1986. FLASH: As I wrote this column packet radio reports were received from WB3EFG, Baltimore EC, and KC3EK, PIO/OOC, of the ARES action at a nine-alarm fire in downtown Baltimore. WA3TOY, Anne Arundel County EC, with WB3HBF and W3YVT, first on the scene, alerted the Red Cross and the ARES. Ultimately, 37 ARES operators manned two Red Cross Shelters for 40 evacuees, a Red Cross command vehicle and Red Cross headquarters over a period of 19.5 hours. THE OBSERVATION POST, newsletter for the ARRL Officials Observers, reports increased unity of operation between the Amateur Auxiliary and FCC local offices. The latest issue also included updated guidelines for the OO appointment and the Official Observer Coordinator. A newsletter of the Antietam Radio Association, based in Hagerstown, recounted frequent public-service activities by the busy Washington County group. N3RO's ARRL bulletin reports are well received on three different 2-meter repeaters in Montgomery, Frederick and Washington counties. With the nets:Net/Manager QND/QTC/QNI: MDD/W3FA 63/226/536.W3QQ, KJ3E, K3NNI tops; MEPN/N3EGF 53/521/2234; MSN/KC3Y 31/66/1247. WRPON/WB3FK 21/10/244; FREDCARES/K3RXK 28/182/216; WC2MN/KC3DW 18/68/115; BCN/KA3OFS 4/1/83; PSHR: K3RXK 614, N3EGF 114, W3FA 103, KC3Y 95, KJ3E 94, W3YVO 93. Traffic: K3RXK 449, KJ3E 231, N3EGF 179, W3FA 155, W3YVO 143, KC3Y 115, K3NNI 94, KC3DW 86, NC3Z 80, KT3T 76, KA3T 71, W3LDD 48, N3DE 37, WB3BFK 35, KX3U 35, N3RO 31, W3ZNW 27, W3DQI 22, NB3P 22, WA2WDT 13, KK3F 10, WA3GYW 7, KA3JJN 2.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: K2QIJ. STM: WB2UVB. ACC: K2IXE. TC: KA2RAF. PIO: VACANT. SGL: KA2KMU. BM: WB2UVB. OOC: WA2HEB. ATCs: N2BQT, K2JF and KA2RJA. A very happy and healthy 1987 to you and your families. Why not make a new years resolution to join a local radio club, if you don't belong already? Many of these very devoted groups sponsor repeaters, participate in the various radio contests throughout the year, conduct special event stations, help out in public service and many other diverse things. However, probably the most important thing a club offers is camaraderie; the chance to share a common interest with others. Whether you are a newcomer to amateur radio, or a veteran operator, a radio club offers every one of us something. For the name and address of a club in your area, please contact our ACC, Jim Eckersley, K2IXE. His address is: 10 Hollywood Blvd. South, Forked River 08731. I'm sure you will be glad you did. Until next month, 73. Traffic: N2FKA 59, NG2T 41, W2IML 39, WA2HEB 3.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—ACC: N2EH. BM: W2GLH. OOC: W2AET. PIO: WA2PUU. SEC: KB2KW. STM: W2ZOJ. TC: K2QR. SGL: WB3CUF. Appointments: (ORS) N2EIA NE2W. FIELD DAY RESULTS: (1A Battery) 60 W2CIL; (1A) 16 W2RR, 32 W2SEX; (2A Battery)5 W2LZ; (2A)7 W2FR, 11 W2TZ, 32 K2IQ, 52 W2CKM, 164 W2RCX, 192 NR2B, 203 W2RUI, 208 W2CXV, 211 W2AE, 227 KE2T, 278 W2SB, 341 W2AWB, 347 NC2C, 353 KC2RJ, 366 WA2ZXS, 392 W2SAM, 431 WA2AAZ; (3A)15 K2MP, 24 W2UXC, 36 K2SA, 153 KS2J, 177 NR2S, 247 WB2WXQ; (3A Commercial)2 W2PE; (4A)65 W2OFC; (5A)25 K2QR, 50 W2ZJ; (1B 1 OPER. BATTERY)33 KA2SJG; (1B 2 OPER.)11 K2OC/K9SO. Public Service Honor Roll: N2ABA N3DPF N2EIA N2EVG/T WA2FJJ VE2FMQ NN2H WB2IDS WB2IKL W2MTA WB2NLU/T KU2N WB2OWO WB2QIX ND2S KA2SJG/N KA2UBD NE2W K2YAI W2ZOJ. October BPL: WB2IDS WB2OWO KA2UBD. Net activities for month (Name Frequency QNI-QSP-QND).

NYSEMO	3993	083-004-04	NYSR	3530	030-004-04
NYS/M*	3677	355-176-31	Blueln	93/33	276-042-28
WDN/M*	04/64	353-158-32	JCARCN	10/70	38-005-30
MFN	3925	180-038-31	OARCN	25/85	049-000-05
NYPON*	3913	712-394-31	NYTN	3720	
NYSPTEN	3925	665-070-31	BRVSN	056/855	358-008-31
ESS	3590	348-061-31	CNYTN*	90/30	222-058-30
Q Net	31/91	354-006-31	MVTN	21800	022-045-09
OCTEN/E*	/94	657-091-31	OCTEN/L*	/88	286-081-31
STAR*	13/73	234-071-31	VHF THIN	/64	043-000-04
WDN/E*	57/17	499-224-31	WDN/L*	04/64	482-160-33
NYS/E*	3677	395-247-31	NYS/L*	3677	301-248-31

NTS Net. September Nets: Blueline257-27-26, OCTEN/E 624-91-30, OCTEN/L* 284-59-30.

ARES Net Reports: Champlain Valley ARC SEN. Lewis County ARES/RACES. Novice Classes are being offerd this Fall by Auburn ARA, Fulton ARC and Griffis AFB. Eastern Area Staff of National Traffic System is recommending integration of Packet Radio into the NTS by its request that each section have on Packet Radio Node (station) collecting standard ARRL radiograms in PACGRAM format with daily transfer to the section net(s) by an STM assigned liaison station. In addition, auto forwarding from the Node (station) to other section Nodes within the same NTS Region are encouraged if the liaison station has not picked up the "PACGRAMs" within 24 hours

of entry at the Node (station). SM/STM are encouraged to implement this recommendation by the EAS for a two-year trial period (1987-1988). Further EAS extended the cycle 1 Eastern Area Net Mailbox on forty meters for an additional one year trial in 1987, which will include at least one day assigned to Packet Radio. Net Manager WB4PNY invites additional stations to become active in this endeavour on 7090 KHz at 1130 local time. Traffic: WB2IDS 561, WB2OWO 545, KA2UBD 538, WA2HSB 398, ND2S 253, W2MTA 231, NE2W 231, VE2FMQ 230, N2EIA 229, WA2FJJ 229, WB2QIX 196, N2ABA 182, KU2N 142, NN2H 117, KA2DBD 100, W2ZOJ 90, WB2NLU 85, N2EVG 83, WA2JPB 74, K2YAI 72, AF2K 41, WB2IJH 30, KA2SJG 27, WB2KCT 24, K2IUT 18, K2QR 7.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: WN3VAW. PIO: KC3TO. OOCOR: KJ3Q. SGL: W3DTW. TC: K3LR. BM: KR3P. ACC: AK3J.

NET	ONI	OTC	SESS	KHz	T/D	MAN
WPACW	237	129	31	3585	7:00P	WA3UNX
WPAPTN	No report			3983	6:00P	WA3HLN
KFN	207	67	27	3958	1:00P	N3EMD
PFN	302	133	31	3958	5:00	WA3THT
WPA2MTN	388	86	31	146.28/.88	8:00	KA3BGC
NWPA2MTN	370	34	29	144.53/.45.13	10:00	KC3NY
KSSN	66	22	23	3730	6:30	

With regret I must announce two Silent Keys W3VNE and W3KPJ who was SEC for the WPA for several years. He was very active and loved our hobby. Two Rivers ARC new officers are Pres. KC3HJ, V.P. KA3BNP, Sec. NA3W, Treas. AG3H, Act. Trustees NA3U, KA3JJT, WA3PIB. I have appointed W3DTW to the position of State Government Liaision. He will monitor any events in the state capital and any other events affecting amateur radio and notify us of any restrictions being proposed. Also please notify him of any of these that affect our hobby. We need Assistant Public Information Officers, one in each affiliated club who can work with the PIO and publicize our public service events. We also need Assistant Technical Coordinators, one in each club would be ideal and he or she could assist in many ways the new ops that want advice and assistance in building, etc. ORS are also needed especially wanted in remote areas where only a few amateurs reside. When traffic is received for these areas, it must either be mailed or QTA'ed, please help our nets. The regulars on the traffic nets are very dedicated and could use your help. Traffic: KQ3T 314, W3EGK 281, N3EMD 153, W3OKN 121, WA3UNX 78, W3NGO 70, W3CZW 70, N3AES 63, WB3GUK 42, W3KMZ 37, N3FM 35, W3RUL 35, WA3DBW 30, KC3JQ 28 W3KUN 24, WB3CIS 21, N3EKJ 18, KA3ETC 17, WA3QNT 16, KA3COX 16, KA3EGE 14, K3LTV 8, KC3HR 6, W3SN 6.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ—SEC: W9QBH. STM: OOC: W9TT. BM: K9EUI. SGL: W9KPT. PIO: K9IDQ. ACC: WB9SFT. TC: N9RF. ASM: AA9D.

NET	FREQ	TIMES (2 WIN)	QNI	QTC	SES
ILN	3690	0030/0400 DY	516	166	81
ITN	3705	0100 DY	181	35	27
ILPN	3915	1430 SN	95	3	4
NCPN	3915	1300 DY(X SN)	518	78	27
NCPN	7270	1815 DY(X SN)	264	35	23
IEN	3940	1500 SN	87	6	4
IARES	3905	2230 1+3 SN	63		4
ISN	3905	0000 DY	874	253	32
CTN	147.69/09	0300 DY	556	110	31

Illinois was represented 100% to 9RN by stations KA9BBV, K9CNP, N7DBY W9EHS, KA9FEZ, W9HBI, W9INZ, KD9K, KJ9L, WA7MAD, W9NXG, K9OEW, WB8RFB, NC9T and N9TN. D9RN was represented 100% to CAND. Illinois stations were W9EHS, W9HOT, KA9FEZ and NN9M. By the time this is printed, the November 15th repeater coordination meeting will have come and gone, and hopefully some type of organization will be in operation to support repeater coordination efforts in Illionis. Bob, W9QBH, sent out the invitations to the meeting, and so far he has gotten about 15 of them back as undeliverable. This means that those folks whose letters he received back have moved or had an address change since they last had any contact with the coordinators. If you are the trustee of a repeater you believe to be coordinated, but have not received any mailings in the last year and a half, please write WD9EBQ or call him at 800- 451-2775 so that he can correct your address in the database if your repeater is still in operation as originally coordinated. Congrats to WA7MAD who has jumped into the fray and filled in many of the open NTS slots recently. We are again in need of ops to cover liaison slots, and also 9RN is in need of NCSs so if you are involved in Illinois NTS, get your feet wet up to your neck and ask your NM what slots are open. If you are not into traffic handling yet, checkout ITN, ISN and CTN (times and freqs listed above) as they are good nets to get started on. Come on, we need your help in meeting Amateur Radio's public service commitments. Madison County ARES didn't participate in SET this year! The reason? For eight days they assisted with the evacuation and shelter operation for Chouteau Island and patrolled the levy in the area while providing communications for Madison CO ESDA and Sheriff's Dept, Red Cross, Salvation Army, and the Illinois State Police. Being prepared for such events is what its all about, congratulations to NA9X and his crew for a job well done! Kane Co EC AA9D reports that Kane Co ARES will hold a weekly net starting Monday November 17th at 730 PM local time on the 144.87/145.47 (Elburn) repeater. All area ARES interests are welcome. Morgan Co EC W9OES had an article about ARESs participation in a 100 mile bike-a-thon published in the Jacksonville Journal Courier. Also, on October 30th Morgan Co ARES sponsored a severe weather seminar which was presented by Ray Hughes, Official in Charge of the NWS office at Springfield, and which was attended by ESDA, Police, and Red Cross as well as ARES members. Traffic: NC9T 236, W9HLX 234, WA7MAD 176, W9EHS 170, KJ9L 165, W9HBI 158, KA9FEZ 124, W9NXG 108, K9CNP 104, WB8RFB 93, W9LWH 92, WA9VLC 81, NN9M 63, AA9D 59, W9HOT 59, N7DOY 35, KA9BBV 34, W9LNQ 32, WD9DZU 28, KD9K 26, W9KR 16, WB9TVD 14, KA9CTW/T 9, K9QEW 8, W9VEY/M 8, KD9TK 7, WD9HQW 7, WA9RUM 4, W9IL 2, N9EDK 1.

INDIANA: SM, Ron Koczor, K9TUS—ASM: W9UMH. SEC: WB9ZQE. STM: W9JUJ. ACC: K9TUS. TC: K9PS. SGL: WA9VQO. BM: KC9TA. PIO: K9DIY. OOC: KJ9G. SRC: N9WB. Net Managers: ITN KD9DU, QIN KJ9J, ICN KW9D, VHF W9PMT, IWN KA9ERC.

Net	Freq	Time Daily UTC	QNI	QTC	QTR	Ses
ITN	3910	1330/2130/2300	3391	394	2531	90
QIN	3656	1430/0000/0300	638	302	1175	93
ICN	3705	2315	98	31	506	25
IWN	3910	1310				
IWN VHF Bloom./Kokomo						
Hoosier VHF Nets:		4086	392	6193	200	

APPT: W9EPT, EC St. Joe County; KD9HB, EC Rush County; PIO, KA9LQM, PIA, N9CJT; PIA, K9DIY, Silent Key, K9CWA, Anderson. OO reports rcvd from KB9DE and WA9VQO. Indiana rep. 100% on D-9RN tnx to W9JUJ. Thanks to all the

Dayton Hamvention

April 24, 25, 26, 1987

Early Reservation Information

- **Giant 3 day flea market • Exhibits**
- **License exams • Free bus service**
- **CW proficiency test • Door Awards**

Flea market tickets and grand banquet tickets are limited. Place your reservations early, please.

Flea Market Tickets

A maximum of 3 spaces per person (non-transferable). Tickets (for all 3 days) will be sold IN ADVANCE ONLY. No spaces sold at gate. Vendors MUST order registration ticket when ordering flea market spaces.

Special Awards

Nominations are requested for "Radio Amateur of the Year", "Special Achievement" and "Technical Achievement" awards. Contact: Awards chairman, Box 44, Dayton, OH 45401.

License Exams

Novice thru Extra exams scheduled Saturday and Sunday by appointment only. Send current FCC form 610, copy of present license and check for $4.25 (payable to ARRL/VEC) to: Mark Tessneer, 2859 Homeway Dr., Beavercreek, OH 45385

Slide Show

35 mm slide/tape presentation about the HAMVENTION is available for loan. Contact Dick Miller, 2853 La Cresta, Beavercreek, OH 45324

1987 Deadlines

Award Nominations: April 4
Lodging: April 4
License Exams: April 4
Advance Registration and banquet:
USA - April 11
Canada - April 4
Flea Market Space:
Orders will not be accepted **before** January 1

Information

General Information: (513) 433-7720
or DARA, Box 44, Dayton, OH 45401
Flea Market Information: (513) 223-0923
Lodging Information: (513) 223-2612
(No Reservations By Phone)

HAMVENTION is sponsored by the Dayton Amateur Radio Association Inc.

Lodging Reservation Form

Dayton Hamvention - April 24, 25, 26 1987
Reservation Deadline - April 4, 1987
MAIL TO - Housing, Dayton Hamvention,
1980 Kettering Tower, Dayton, OH 45423-4880

Arrival Date _____
[ ] Before 6 pm [ ] After 6 pm
Departure Date _____
Room: [ ] Single
[ ] Double (1 bed, 2 persons)
[ ] Double Double (2 beds, 2 persons)

Lodging Preference -
See list of Lodging on adjacent page.

1 _____ 2 _____

3 _____ 4 _____

Deposit required - Room deposit must be paid directly to the hotel or motel by date shown on the confirmation form sent to you. Use canceled check for confirmation.

Advance Registration Form

	How Many		
Admission (valid all 3 days)	_____	@ $8.00*	$_____
Grand Banquet	_____	@ $15.00**	$_____
Women's Luncheon			
(Saturday)	_____	@ $7.25	$_____
(Sunday)	_____	@ $7.25	$_____
Flea Market (Max. 3 spaces) *Admission ticket must be ordered with flea market tickets*	_____	@ $23.00	$_____
		Total	$_____

Make checks payable to - Dayton HAMVENTION.
Mail to - Dayton Hamvention, Box 2205, Dayton, OH 45401

*$10.00 at door **$17.00 at door, if available

people who sent in reports on their Halloween Patrol activities. Some thought it a wasted effort if all was quiet; no way! Even if you reported nothing, you performed a valuable public service. If you could parlay that public service activity into publicity in your local newspaper or TV station, so much the better. That way the hobby wins two ways! Thanks, too, to K9SBW and KA9RNY who sent in reports about their Boy Scout JOTA activity. That one is an important seed activity for the future. Indiana Code Net meets daily at 2315 UTC on 3705. This is a beginners net and all are welcome. Bill, KW9D, is NM and reports that participation is growing. Take part and learn the discipline of net operation and message handling while meeting a top-notch bunch of Hoosiers! SSC of the month is North-East Indiana ARC, in Auburn. NEIARC has about has about 35 members and publishes a great monthly newsletter. contact is K9ZBM. Club is active in several public service events, supports the local Red Cross and Civil Defense and supplies ARRL books to the local library. Group operates 2 two-meter repeaters including one for CD. This club covers a generally rural area and shows what a few dedicated people can do. It also proves again that a Special Service Club does not have to be big, just active. Club officers remember that 1987 annual report forms will soon be arriving from Hqtrs. PLEASE return them and maintain your active affiliation. See you all at the January 4 South Bend hamfest. This is one of Indiana's best all indoor events. All Appointees: remember that your League membership must be maintained to maintain your appointment. Station reports for October: W9JUJ 764, W9JZV 275, KJ9J 218, NJ9S 121, W9UMH 115, K9WWJ 102, WA9QCF 56, KB9HH 50, KD9ER 45, WD9IHR 34, K9KTB 32, WB9PFZ 30, N9DTG 25, WD9DWD 25, KW9D 21, K9ZBM 19, W9BTZ 19, W9ZGC 18, WB9AWI 16, KA9RNY 14.

WISCONSIN: SM, Richard R. Regent, K9GDF—SEC: W9OAK. STM: K9UTO. ACC: KA9FOZ. BM: WB9JSW. OOC: NC9G. PIO: K9ZZ. SGL: AG9V. TC: K9GDF. Please let me know the dates for your group's or club's swapfests, picnics, dinners, and special events planned for 1987. I'll promote them in this column, in various newsletters, and will attend them if possible. New officers for Wisconsin Chapter QCWA: Chairman W9FZC; Vice Chairman W9IEM; Secretary W9YCV; Treasurer K9GDF; Directors W9VOW, W9VQD, and K9YHO. Sorry to report Silent Keys W9HDJ and W9HJSF. NK9O of Milwaukee is busy as ATC and QO helping others with wiring and filtering technical problems. Start the new Year right like John, N9ADQ of Milwaukee: help newcomers practice code and study theory to become a ham, and demonstrate the fun of making QSOs. West Allis RAC Midwinter Swapfest January 10th at Waukesha county Exposition Center Forum, Highways J and FT, with Amateur Exams available. See you at the ARRL table. The Novic Roundup begins the end of January, help Novices to learn to operate their stations and get them on-the-air.

HHHBWN	3984	6 A.M.	WD9IID	1211/1281/27
BEN	3985	Noon	KA9RII	621/188/31
WSBN	3985	5:30 P.M.	WB9ESM	633/179/31
WNN	3723	6 P.M.	N9DGL	
WSSN	3645	6:30 P.M.	N9BDL	170/30/30
WIN-3	3682	7 P.M.	WB9BCH	282/194/31
WIN-L	3682	10 P.M.	KC9CJ	126/51/31
NWTN	34/84	6:30 P.M.	NN9Z	378/53/31
WCWTN	31/91	8:00 P.M.	KD9TT	378/53/31

Traffic: WB9YPY 1414, KC9CJ 919, KA9RII 332, W9CXY 296, K9YCV 264, K9GDF 221, W9CBE 125, W9DND 115, N9BDL 98, KA9KLZ 94, WA9WYS 91, KA9BHL 89, N9BCX 88, W9UCL 83, N9AUG 80, WB9ICH 80, WB9RGO 77, WB9ESM 55, AG9S 49, W9IEM 38, K9UTQ 30, W9NGP 26, K9FHT 27, W9ODV 25, WD9DNQ 19, W9BZW 18, WB9NRK 14, KA9RZL 13, W9UW 7. (Sept) KC9CJ 823. (Aug) KC9CJ 829. (Jul) KC9CJ 764.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, Jr., KCØT—SEC: KAØARP, STM: KDØCI. Amateur Radio communications were provided for "Operation Freedom", a two day 70 mile walk around Lake Mille Lacs for POWs and MIAs. Operators participating in the Oct 11/12 events were: KAØAJF/NCS KDØCI KØCRB KAØEVR KAØEXL NØFOO KØOGI KCØQL KAØUTY & KAØYQX. The ARRL Net Directory deadline has come and gone, a bit later than normal. However, if YOUR net is not among the listed, SHAME ON YOU! This directory is published annually by the league as a service to amateurs, listing Minnesota nets as well as the many other nets across the US and Canada on all amateur bands. Be advised, we will refer to ONLY those nets listed in the ARRL Net Directory in times of emergency, something to keep in mind the next time for updating draws near. Listen to MSPN for further info, or contact me for details. NET NEWS: An update from last month, KØOGI is now MNAMWXNT Mgr, not interim Mgr as reported earlier. Activity continues to grow on our CW nets, and our SSB and RTTY nets are also showing increased activity. Our Amateur of the Month for October is Jim Swisher, KAØEPY, and deservingly so. Jim is the editor in chief of the quarterly "MSN Newsletter" and does an outstanding job with it. He is, of course, familiar to you on MSN/1 & 2. Congrats Jim, and keep up the fine work. Recent upgrades include: To Extra KAØSYL, To General KAØYQX. Correction: To Tech KAØVDZ, listed as KAØVDX last month. The 3M ARC get our "Club Salute" this month. The 3M Club Officials are: Pres Ed Andera, WBØENX, VP Jerry Fraser, WØWVO, Sec Al Doree, WBØGMX and Treas Mary Holmes, WØYHE. Club Historian is Jerry Ryan, WAØDCJ, and Duane Jabas, NØBEI is Program Ch'man, as well as Minnesota Section Public Information Officer. 3M ARC Breaktasts are held the second Saturday of each month at Perkins Restaurant off I-94 at the Ruth Street interchange in the Twin Cities. Again, all Station Activity Reports, Public Service Honor Roll Reports and Section Traffic Net Reports must be submitted to me by no later than the fifth day of the new month for the previous months activities. In closing, may God richly bless you all in the coming New Year. 73 de KDØCI.

NET	FREQ	TIME	QNI/QTC/SESS	MGR
MSN/RTTY	3620	6:30P	61/8/11	WAØLJT
MSN/1	3685	6:30P	466/92/31	KAØEPY
MSN/2	3685	10:00P	336/48/31	NCØE
MSSN	3710	6:00P	277/58/31	KAØODQ
MSPN/N	3929	12:00P	408/70/31	WBØWNJ
MSPN/E	3929	5:30P	314/110/31	WDØBGS
MNAMWXNT	3929	6:15P	353/198/21	KØOGI
PICONET	3925	9:00A	4233/404/172	WDØBAC

EMERGENCY FREQ: 3929 BULLETINS: 3685 and 3929 MN/MSO: 3620. Traffic: WAØTFC 352, KAØEPY 278, KDØCL 223, KT9I 217, WDØBAC 179, KAØSBY 152, W9DM 89, NØFOO 79, KØOGI 78, KAØARP 75, WAØONE 72, KDØCI 65, NØCLS 54, WØHZU 49, KAØODQ 42, KCØT 39, KTØR 30, WAØTFC 352, KAØEPY 278, KDØCL 223, KT9I 217, WDØBAC 179, KAØSBY 152, W9DM 89, NØFOO 79, KØOGI 78, KAØARP 75, WAØONE 72, KDØCI 65, NØCLS 54, WØHZU 49, KAØODQ 42, KCØT 39, KTØR 30, WDØBGS 29, KEØFC 28, WDØGUF 25, NØJP 24, KAØAJF 22, KAØKWM 21, NØEWA 18, WØKYG 17, KAØCDC 15, KAØBFP 12, NTØB 8, KCØFT 6, KAØPQW 5, KAØPDM 4. (Sept) KDØNH 25.

NORTH DAKOTA: SM, Lois Jorgensen, WAØRWM—The Grand Forks Club will be giving Exams on January 31, the storm date the following week February 7. This is the only one

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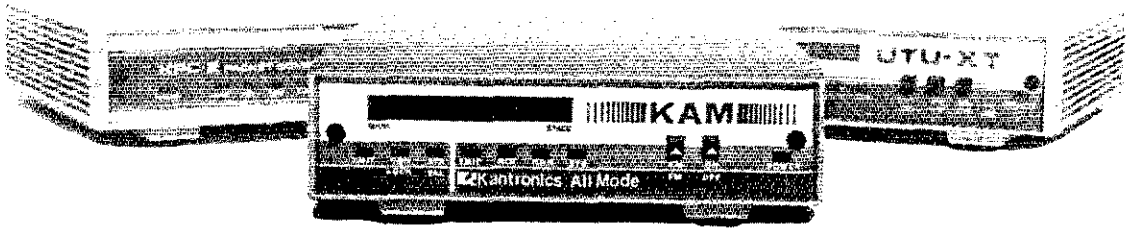

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so far. Congratulations to the Novices, KAØWWR, YAE, YPF and YPG. New Techs are NØHEB, KAØS00, Advance KAØTYC, Extra NØBXT, NTØV prev call was KEØFW.

Net	Freq	Mgr	Sess	QNI	QTC
GOOSE RIVER	1990	WØCDO	4	124	9
DATA	3883	KAØFSM	31	635	22
NORTH FORTY	04/64	NSØH	4	34	0

Traffic: KAØFSM 62.

SOUTH DAKOTA: SM, R. L. Cory, WØYMB—STM: Ole Johnson, NØABE. SEC: Warner Muns, KAØKPY. If you have not already done so please contact your representatives in the state legislature and request support for the legislation that will remove the increased fee of ten dollars for call letter license plates. Most of them don't understand about our service to the public, so don't realize that it is not fair for the state to make money on amateur radio. NØABE has compiled a list of all Packet stations in the state. As new stations come on or any changes are made please contact NØABE so the record can be updated. If nothing comes up, it looks like the 87 Dakota Division Convention will be at Watertown. Traffic: KØERM 277, NØDPF 234, KØZBJ 50, KAØSLD 46, WBØOMF 30, NØABE 19, KAØKPY 16, WØYMB 11, KAØUEN 6, WØHOJ 5.

DELTA DIVISION

ARKANSAS: SM, Joel M. Harrison, WB5IGF—ASM: K5UR. SEC: N5BPU. STM: W9OK. ACC: NI5D. SGL: W5LCI. TC: W5FD. BM: W5HYW. Repeater Coordinator: WB5FDP. The 1987 ARRL Delta Division Convention will be held April 4 and 5, 1987, in Little Rock. Details can be obtained from WA5LUY, Convention Chairman. We want each of you to plan on attending what is going to be the best Hamfest in Arkansas yet. Welcome to new ATCs WD5B and W5IGM. We are in need of additional ATCs in the Section. If you are interested or need additional information on the program, contact TC W5FD. Congratulations to W5KL on receiving a Fellowship in the Radio Club of America. The Arkansas DX Assn. had an excellent annual meeting and banquet in December. More information on ADXA can be obtained from KD5ZM in Pine Bluff. I hope each of you had a very enjoyable holiday season, and I would like to wish each of you the best of 1987. Traffic: W9OK 72, W5KL 10, W5RIT 5.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—Southnet is an informal confederation of packeteers in the states of LA, AL, FL, GA, KY, MS, NC, SC, TN and WV. It offers a way for statewide packet groups to communicate "eyeball to eyeball" and coordinate packet activities. Emile, NE5S, represented the Louisiana Amateur Packet Radio Society (LAPRS) at a recent Southnet meeting in Montgomery, AL, and reports that packet activities are continuing to grow rapidly, outstripping the supply of TNC's. LAPRS now has an introductory VHS cassette on Packet Radio that would make a fine 30 minute club presentation. If you or your club would like a copy or would like to learn more about Packet activities in LA, please contact NE5S or WD5ELJ. The Baton Rouge ARC has 312 members with 206 belonging to ARRL for a fantastic 67%. How about that. Their Sept. monthly RF News has a very fine article on the use of a Noise Bridge to tune an antenna. Those one or two page technical articles seem to get everyones attention. The Southeast LA ARC (Hammond) Hamfest is Jan 17, '87. Mark your calendar. Their monthly newsletter reports the antenna and duplexer for the new 145.130 (-600) machine is being installed and a new sight for the 145.01 digipeater has been secured.

MISSISSIPPI: SM, Paul Kemp, KW5T—ASM: K5QNE. SEC: K4HKD. SGL: AL7GQ. ACC: KC5VD. PIO: KA5VBE. OOC: W5VMC. VHF Coord: N5DWU. BM: AJØX. TC: WB5SXK. Still time to make your plans to attend the Jackson Hamfest and ARRL Mississippi State Convention February 14-15; from all indications, it'll be another great one! Laurel ARC conducted successful November emergency drill built around simulated tornado and utilizing everything from HF to packet. LOTS of repeater work in the news this month. Jackson ARC has replaced 04/64 machine with new 75-watt Motorola, with considerably extended range; 16/76 completely refurbished, and 28/88 rig is next for attention. JARC's digipeater up and running at 170 feet. WB5UNA/R recently renovated on 147.99/39 at Prentiss, while WJ5L has new repeater up at Vicksburg on 145.29/144.69. In Hattiesburg, K5IJX and crew have reworked 145.37/144.77 machine back up and sounding great, with new 440 rig expected to be operating any day. CAND (W5KLV) Sessions 31 QTC 504 (Mississippi represented 100% by N5AMK). DRN5 (WB5YDD) Sessions 62 QTC 651. (Mississippi represented 100% by N5AMK, KT5Z, W5HKW, KB5W, KE5EC, W5ACS and K5QNE). MSBN(WJ5P) Sessions 31 QNI 2160 QTC 40. MMN(WJ5L) Sessions 31 QNI 583 QTC 6. MTN(K5OAF) Sessions 31 QNI 193 QTC 87. GCSBN(W5JHS) Sessions 31 QNI 1153 QTC 18. HAEN(N5GRW) Sessions 4 QNI 93 QTC 0. MLEN(WD5O) Sessions 4 QNI 101 QTC 4. Traffic: N5AMK 417, K5OAP 194, W5WZ 40.

TENNESSEE: SM, John C. Brown, N04Q—ASM/ACC: WA4GLS. OO/AA: W9FZW. SEC: WA4GZQ. SGL: WA4GZZ. STM: NG4J. STC: W4HHK. Our Section Technical Coordinator has been very active again this time finding and identifying two new Russian Satellites. Congrats W4HHK, keep up the good work. Congratulations to WD4Q for a very fine job of locating and assisting in the correction of a repeater interference problem. All persons involved and registering the complaint are very happy about the outcome. Well done, Henry. I might say that the complaint was from outside the section and indicated the problem was coming from inside the section. Fellows and gals, W9FZW is still looking for a few GOOD amateurs to come on board as OOs. We are still expected to do our internal policing. Don't need any like the one that has been giving the morning net control station all the DI. Send your request in to our OO/AA Coordinator. Am also looking for a new PIO and a Bulletin Manager. The last Official Section activity took place with a swapfest and "Old Codger Convention" at Cookeville. A fantastic time was had by all the attendees, there being some 93 in all. The packet activity is still on the rise. At least two of the metro areas of the section have organized themselves and are getting their procedures formulated so that a viable operating condition can exist. At least two or three others need to get going and then therural connecting areas can assist in affecting the intra links for the Section. There is a vital need for this system to insure a vital service can be provided in the event we have an earthquake like Mexico City or the other Central or South American Countries. I am also looking for an overall manager for this activity. Traffic for this time period is a follows: CW Net Honor Roll: KB4UPP N4OSZ WA4CNW W4LVP and NG4J. Congrats to this fine group. Net summary-LF-Sessions 76, QNI 4295,QTC 118; VHF-Sessions 71, QNI 1961, QTC 462; CW-Sessions 43, QNI 221, QTC 71. Station activity: W9FZW 158, W4DDK 119, WA4FMR 103, K4WWQ 59, NN4S-33, W4TYV 19, K4WOP 18, W4TYU 17, W4PFP 14, N4OSZ 10, KB4UQ 9, W4TYU 9 (Sept.), KA5KDB 8 and W4PSN 7. We would like to add yours if your call is not listed above.

GREAT LAKES DIVISION

KENTUCKY: SM, Dale Bennett, WA4JTE—Busy month with the Louisville Hamfest. Enjoyed seeing everyone. Thanks to

Rob, WA3QLS

Katherine, KA3IYO

Paul, WA3QPX

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all those who were at the section meeting Sunday. Thanks to Mike Riley, KX1B, for his assistance at the meeting. Several awards were handed out. NCSs of the Year: KJ4SU/MKPN, WD4CQF/KNTN, N4HZT/KTN, K4VHF/KYN-E, KA4MTX/KYN-L. Outstanding ham for SET 1985 KJ4SU. Outstanding ham for SET 1986 WD4PBS. Net Manager of the Year WB4ZDU. Certificates of Merit to the following: KA4GBZ, K4VHF, WB4ZDU & WA4JAV. Congrats to Glen Foley, KA4MTX, for taking the position of STM. Know you will do a good job, Glen. Nets:

3ARES	6	71	0	KA4BCM
NKARC	4	39	3	KA4RKS
SEKEN	4	23	3	K4AVX
MKPN	31	1344	105	KA4SAA
KTN	31	1050	57	KA4GBZ
KNTN	39	285	81	KB4OZ
KYNE	23	119	23	K4AVX
KYPON	4	57	13	WA4AVV

Traffic: K4VHF 85, KI4QH 53, KA4BCM 42, KA4MTX 29, KJ4HP 24, KI4QB 16, WA4AVV 13, WD4CQF 13, KA4GBZ 13, WA4MXD 13, K4HOE 7.

MICHIGAN: SM, James R. Seeley, WB8MTD—SEC: WB8BGY. STM: WB8SIW. ACC: K8SB. OOC: NJ8S. SGL: N8CNY. TC: W8YZ. I have had several requests to re-institute the periodic printing of MI's "Mini Directory", so here it is, to the best of my current information. I'd appreciate having the blanks filled for the next time I run it.

NET	FREQ	TIME	QNI	TFC	SESS	MGR
QMN*	3663	1800**	858	283	89	WD8KQC
MITN*	3953	1900	596	194	30	WD8EIB
UPN*	3922	1700**	1216	67	35	WA8DHB
GLETN	3932	2100	936	55	30	
MACS*	3953	1100**	487	47	31	K8OCP
MNN*	3722	1730**	—	(n/a)	—	KA8VOZ
WSSBN	3935	1900	—	(n/a)	—	
SEMTN	***	2215	367	176	31	N8AHA
VHF ACTIVITY			1118	10	75	N8EXS

*NTS section nets. **QMN late, 2200; UPN Sun 1200; MACS Sun 0100; MNN late 2000. ***SEMTN on Edison rptr. All times local. All listed nets meet daily. 3932 is MI HF emer. freq. Silent Key, with deep regret: WD8LRT. QMN NM WD8KQC announces the appointment of WB8SYA as air manager for the 1800 Slow net. New officers for MCRC: Pres. NS8F; VP K8SB; Sec'y N8GER; Treas. WA8FRD. There is general agreement that this year's SET did not measure up to our standards. There were local exceptions, of course, but state-wide I have heard numerous complaints, some of which were: poor planning; bad scheduling; insufficient publicity; not enough HF traffic; too much emphasis on packet; lack of leadership presence; etc. By the time you read this an in-depth evaluation of the entire exercise will have been completed and, I sincerely hope, some answers will have been found and some good lessons learned. I'll have more to say on the subject, you can be sure. WA8DHB reports a major milestone for the UPN: three years now for continuous record-setting monthly attendance. Are they going for four? Stay tuned. Traffic (Oct.): W8QHB 405, WB8SIW 174, KA8CPS 138, WD8KQC 117, N8AHA 116, K8GXV 82, WD8RHU 75, N8CNY 72, WA8DHB 53, NJ8R 51, WB8MTD 48, K8UPE 47, W8YIQ 43, W8SCW 41, K8HAP K8OCP 40, WB8SYA NJ8X 35, NT8G 33, K8KMQ 31, W8CUP 27, WB1HX 26, AF8V 21, K8RDN 17, WD8MJB 15, N8EXS 14, WA8MVH 11, W8URM 9, KI8Q K8ZJU 8, W8RNQ 7, KD8LZ 6, W8VIZ W8YZ 5.

OHIO: SM, Jeffrey A. Maass, K8ND—ASM: N8AUH. SEC: WD8MPV. STM: KF8J. BM: W8ZM. ACC: KJ3O. TC: KB8MU. OOC: AD8I. PIO & SGL: N8CVK.

NET	QNI	QTC	Sess.	Time(Local)	Freq.	MGR
BN(E)	235	113	31	1845	3.577	N8EVC
BN(L)	216	160	31	2200	3.577	K8TVG
BNR	270	249	38	1800	3.605	W8EK
BSSN	589	405	61	0945,1900	3.873	K8OZ
ONN	185	38	28	1825	3.708	WD8KBW
OSN	340	117	31	1810	3.577	N8AEH
OSSBN	2468	1366	101	1030, 1615 & 1830	3.9725	WB8JGW
OSSN	164	91	31	0645 M-F	3.577	KA8GJV
				0800 S-Sn	3.577	KA8GJV
O6MN	94	12	14	2100	50.16	WD8CTX
Ohio Section ARES Net				1500 Sun.	3.875	WD8MPV

HAPPY NEW YEAR! I have no VE sessions to list for January as I prepare this column, but I'll have it by the time you read this! If you need to know where a session will be held, contact me at the address/phone listed on page 8 of this QST. With the new year comes the new fee for taking an examination, as specified by the FCC: up to $4.35 (from $4.25) at exams given under the auspices of the ARRL VEC. No ham tests are scheduled for January! I have been advised that the ARRL Convention planned for Sharonville (Cincinnati) in February 1987 has been cancelled due to loss of availability of the facilities. Stay tuned. . . If you've been having problems finding the Ohio Single Sideband. Net (OSSBN) at 6:45 PM, try 6:30. They adjust the start time to allow for poor wintertime propagation on 3.9725 MHz. K8JDI and the Columbiana County ARES guys have been kept busy lately with emergency drills associated with nuclear plants. All reports indicate that they were successful and appreciated in their efforts. I did a six minute interview on WOSU-AM, the public radio outlet in the Central Ohio area. I described what we do as Amateurs and stressed how easy it is to become an Amateur. Did you note the 5- year-old kindergartener in Illinois shown in the November issue of CQ? Do you know anyone who says that getting a ham ticket is too difficult for them? The Greater Toledo Amateur Radio Association has been certified to continue as an ARRL Special Service Club; congratulations! New officers: Toledo Mobile Radio Assn. (TMRA): Pres WD8MXR; VP WD8PKJ; Sec NO8P; Treas KA8BNQ. Toledo Radio Amateur Club: Pres WB8NLS; VP WB8TTQ; Sec KA8BNQ; Treas N8FPH. The Central Ohio ARES handled 9 activities in October and late September: 3 Runs; 2 OSU football games (for Red Cross First Aid); 1 auto race; 1 parade; 1 fund raiser for the Cancer Society; and an evacuation (with Red Cross and Disaster Services Agency) necessitated when the police discovered 600 pounds of decaying dynamite in a public storage locker! An active public service group indeed! New ARRL appointments for October: Official Observer, NT8N; Official Relay Station KA8YXN; and Official Emergency Station KA8SZH. With deep regret I list the following Silent Keys: W8CTO, W8LDK. Elmer Schubert, WB4LW, died October 14 after a long illness. Elmer was an extremely active Amateur in the Cincinnati area, and helped to start many of the vital clubs in SW Ohio (including OH-KY-IN). He was the first Chairman of the Cincinnati hamfest, and was a force working for the good of our hobby over the past sixty years. He will be sorely missed. As this is written, traffic totals for 1986 are behind 1985, but more people are reporting traffic totals monthly: huh? Traffic: K8TVG 432, KV8Q 412, WB8JGW 385, WD8KFN 356, WB8MEK 326, K8ND 317, K8JDI 287, KD8KU 277, W8BO 269, KA8KHS 268, W8PMJ 265, W8EK 258, W8FPA 230, WD8MIO 230, N8EFB 201, WA8EYQ 172, W8QZK 172, WB8DMF 171, N8GEC 157, N8EVC 151, KA8GJV 141, WD8RIB 136, WD8QXT 134, KE8BE 131, KA8CGF 129, KA8D

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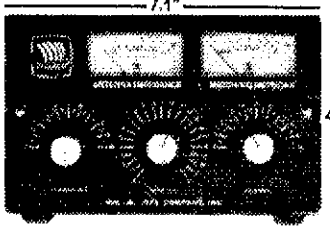

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8267 RG213	55c/ft
8000 14 Ga stranded copper ant. wire	13c/ft
8448 8 conductor rotor cable	33c/ft
9405 Heavy duty 2 16 Ga 6-18 Ga	56c/ft
9258 RG8x	20c/ft
9269 RG-62A/U	16c/ft
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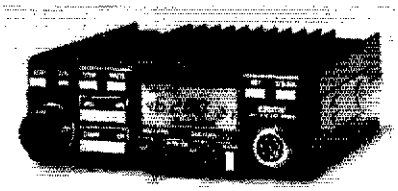

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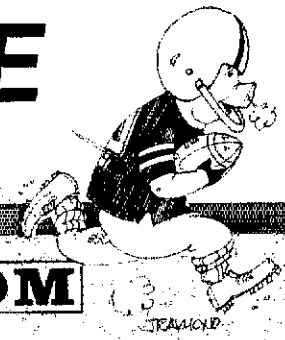

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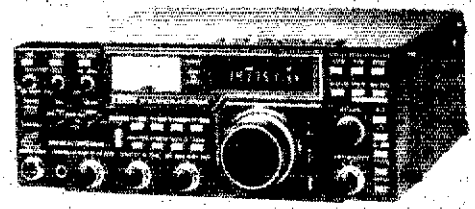

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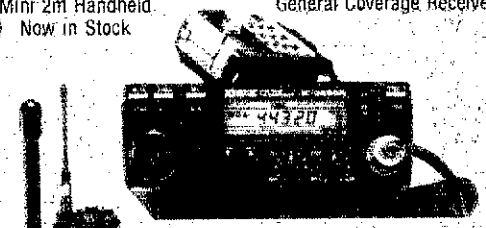

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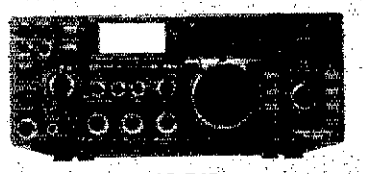

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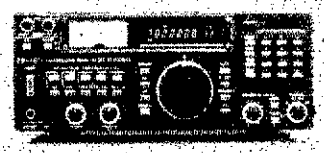

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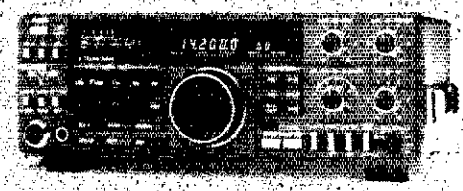

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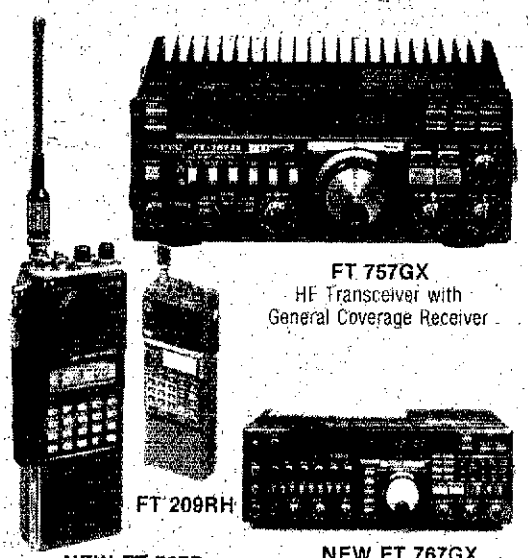

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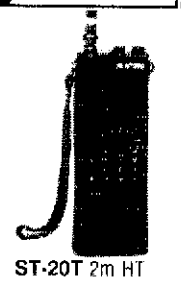
for 60-905 MHz FM/AM/SSB

SANTEC

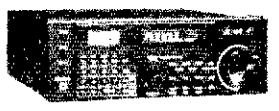


ST-20T 2m HT
ST-400ET 440 MHz HT
ST-200ET 220 MHz HT

KDK
FM240 2m, 25-watt

TEN-TEC

CORSAIR II Model 561



RX-325 Short Wave Receiver

ASK FOR QUOTES ON RADIO/ ACCESSORY PACKAGES

Regency®

SCANNERS

HX1500 55-ch Handheld	229.95
R1075 15-ch, 6-band	109.95

CUSHCRAFT

A3 3-element 10-15-20m	217.95
A4 4-element 10-15-20m	292.95
R3 10-15-20m Vertical	268.95
215WB SSB/FM 2m Boomer	82.95
ARX-2B 2m Ringo Ranger	36.50
4218XL 2m Boomer	103.95
10-4CD 4-element 10m	111.95
15-4CD 4-element 15m	125.95
40-2CD 2-element 40m	296.95
Other Cushcraft models available	CALL

KLM

KT34A 4-element 10-15-20m	Call
KT34XA 6-element 10-15-20m	Call
2m-11X 11-element 2m	Call
2m-16LBX 16-element 2m	Call
432-30LBX 30-ele 440 MHz	Call
Fiberglass mast 5'	Call
Fiberglass mast 7'	Call

MOSLEY

CL-33 3-element Triband Beam	265.95
TA-33 3-element 10-15-20m	239.95
Pro 37 7-element 10-15-20m	485.95
Pro 57 10-12-15-17-20m	465.95
Pro 67 10-12-15-17-20-40m	579.95

HUSTLER

6-BTV 10-80m Vertical with 30m	128.95
5-BTV 10-80m Vertical	108.95
4-BTV 10-40m Vertical	87.95
G6-440 440 MHz Base Vertical	99.95
G7-144 2-meter Base Vertical	115.95
G6-144B 2m Base Vertical	82.95
MO-1/MO-2 Masts	21.50
BM-1 Bumper Mount	14.95

MOBILE RESONATORS	Standard	Super
10 and 15 meter	11.95	17.95
20 meters	15.50	21.85
30 and 40 meters	17.95	25.95
75 meters	19.95	36.95

HY-GAIN ANTENNAS

391S TH7DX 7-ele 10-15-20m	CALL
393S TH5DX 5-ele 10-15-20m	CALL
395S Explorer 14 10-15-20m	CALL
203S 3-element 2-meter Beam	CALL
208S 8-element 2-meter Beam	CALL
214S 14-element 2-meter Beam	CALL
BN86 Beam Balun	CALL
V2S 2-meter Vertical	CALL
V4S 440 MHz Vertical	CALL

MORE ANTENNAS

AVANTI HM 151 36 2m On-glass	32.50
LARSEN LM-150 5/8 Mag Mount	39.95
MINIQUAD HQ-1	149.95
MINIQUAD HQ1-MKII	185.95
BUTTERNUT HF6V 10-80m Vert	119.95
BUTTERNUT HF4B 2-ele Beam	189.95
BUTTERNUT 2MCV5 2m	42.75
VOCOM 5/8-wave 2m Handheld	15.95

ANTENNAS FOR OSCAR

Cushcraft 416TB Twist	59.95
Cushcraft A144101 10-ele	53.30
Cushcraft A14420T 20-ele	76.95
Cushcraft AOP1 Package	149.95
KLM 2m-14C 2m 14-ele Circular	88.95
KLM 435-18C 18-ele Circ Polar	111.19
KLM 2m-22C 22-ele Circ 2m	109.00

Unarco-Rohn

Limited Quantities

Self-supporting towers:

HBX40 40-feet with Base	209.95
HBX48 48-feet with Base	279.95
HBX56 56-feet with Base	349.95
HDBX40 Higher load with Base	259.95
HDBX48 Higher load with Base	339.95

Other RX, HBX, HDBX in stock

Guyed foldover towers:

FK2558 58-feet, 25G	940.00
FK4554 54-feet 45G	1296.00

Other sizes at similar savings.
Foldovers shipped freight paid.
10% higher west of the Rockies

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20G Straight Section	39.95
25G Straight Section	49.95
45G Straight Section	110.95

Complete Tower Packages:

	25G	45G
40'	Call	Call
50'	Call	Call
60'	Call	Call

Each package includes top section, mid section, base, rotor shelf, guy brackets, guy wire, turnbuckles, equalizer plates, guy anchors, cable clamps, thimbles. Ask about substitutions and custom designs. Tower packages are shipped freight collect FOB our warehouse

HY-GAIN TOWERS

HG37SS 37-feet tall	CALL
HG52SS 52-feet tall	CALL
HG54HD 54-feet/higher load	CALL
HG70HD 60-feet/higher load	CALL

Order Hy-Gain tower, Hy-Gain antenna, and Hy-Gain rotor and receive free shipping on all

Ti-Ex

W36 36-feet tall	549.00
W51 51-feet tall	929.00
TM354 54-feet/higher load	1575.00

Shipping not included. Shipped direct from factory to save you money

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8267/U Foam 95% Shield	.24¢ ft
9-wire Rotator 2 #18, 6 #22	17¢/ft
Mini-8 95% Shield	13¢/ft

Cablewave Hardline CALL

ROTATORS

Diawa Rotators available	CALL
Alliance HD73	105.00
Hy-Gain Ham IV	CALL
Hy-Gain Tailtwister T2X	CALL
Hy-Gain Heavy-duty 300	CALL
Kenpro KR500 Elevation Rotator	182.95
Kenpro KR5400 Azmth/Elev'd	299.95

MIRAGE

B23A 2m Amplifier 2-30	120.95
B1016 2m Amplifier 10-160	249.95
B3016 2m Amplifier 30-160	219.95
D1010 10-100 Amp for 430-50	299.95
D1010N UHF Amp/N connectors	299.95
B215 2m Amp 2 in, 150 out	249.95
A1015 6m Amp 10 in, 150 out	269.95

AMERITRON HF AMPS

ATR15 Ant Tuner 1500 watt	Call
ATR10 Ant Tuner 1 kW	Call
RCS8 Remote Coax Switch	Call
NEW AL 1200 1.5 kW Amp	Call
NEW AL80A 1200 watt Amp	Call
AL84 HF Amp 160-15	Call

AMP SUPPLY

LA 1000A 160-15m Amp	Call
LK 500ZBNT HF Amp no tune	Call
AT 1200A 1200 PEP Tuner	Call
LK 500ZB 2.5 kW hipersil	Call

This is a partial list—
IF YOU DON'T SEE WHAT YOU WANT...CALL

DAIWA

LA-2065R 2m Amp, 2 in, 60 out	125.95
LA-2035R 2m Amp with preAmp	74.95

VOCOM AMPLIFIERS

2 watts in, 30 watts out 2m Amp	69.95
2 watts in, 60 watts out 2m Amp	107.95
2 watts in, 120 watts out 2m Amp	169.95
200mW in, 30 watts out 2m Amp	84.95

KENWOOD TL922 2kW CALL

ASTRON POWER SUPPLIES

RS7A	49.95	RS20M	104.95
RS12A	69.95	RS35M	149.95
RS20A	89.95	VS20M	124.95
RS35A	133.95	VS35M	169.95
RS50A	189.95	RS50M	209.95

BENCHER PADDLES

Black/Chrome 41.95/53.95

B & W

375 6-position Coax Switch	24.50
376 5-position Coax Switch	24.50
425 1 kW Low Pass Filter	28.50
593 3-position Coax Switch	25.25
595 6-position Coax Switch	29.95
AP-10 5-band Apartment Antenna	39.95
370-15 All band Dipole Antenna	129.95

—Other antennas in stock—

DAIWA

CN-520/CN-540 Meters	59.95/69.95
NS-660A SWR/Watt Meter	134.95
CN 630 Meter	126.00
CN-720B 2kW HF Watt Meter	120.00
CNW-419 Antenna Tuner 500 W	174.95
CNW-518 Antenna Tuner 2.5 kW	279.95
CN410M SWR/wt mtr 3.5-150 MHz	64.95
CS201 2-position Switch	21.95
CS401 4-position Switch	64.95

TELEX HEADPHONES

Procom 350 ultra light set	58.95
Procom 250 soft phone/mike	72.90
Procom 450 padded phones	35.50
Procom 400 desk mike	49.95
Procom 460 padded phones	37.20
SWI-610 light headphone	8.75
C-610 light headphone	7.95
Others in stock	Please Call

BIG DISCOUNTS

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989 3 kW Antenna Tuner	295.95
962 1.5 kW Tuner switch/meter	189.95
949C 300-watt Deluxe Tuner	129.95
941D 300-watt Tuner swch/meter	89.95
1020A Active Antenna	69.95
202B Noise Bridge	48.95
752B Dual Tunable SSB/CW Filter	79.95
Keyers—407, 422, 484	CALL
Other MFJ products in stock	CALL

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83-1SP PL259 silver	1.10
83-1SP 1050 Nickel PL259	0.75
8261 Type N RG8	2.50
2900 SO239-BNC	2.99
3112 BNC RG59	1.35
312 BNC RG58	1.25
83-1RS Reducer RG58	0.25
83-1RG8 Reducer RG59/mini 8	0.25
8318 UHF panel	0.79

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125, K8CMR 122, K8DHD 120, WD8MPV 106, KD8XL 105, KA8UYM 102, KD8FW 95, W8MVE 94, KA8TNT 92, N8AKS 90, NE8X 90, W8SKP 82, WB8KWC 79, N8FBE 78, NM8N 77, WB8BWY 76, N8FWA 74, WA8DYS 69, WA8FQW 69, WA8HGH 65, KC8UZ 65, N8AEH 63, KD8WI 60, K8EF 58, WB8YFD 57, K8CKY 53, N8HWF 53, WD8KBW 49, WA8SSI 49, NR8C 44, NC8Q 42, KA8OQF 41, KA8DRR 40, WD8IKC 39, W9SWM 39, KC8YV 35, WD8JYE 32, KA8RIX 31, NF8B 29, KA8RBQ 28, K8BXT 27, W8BHL 26, NU8H 26, KC8JV 26, K8LQM 26, N8GOB 25, WA8HED 25, N8AUH 24, WB8HHZ 24, N8FPH 22, W8UQY 22, KC8WH 22, W8WEG 21, W8RG 19, NK8B 18, NK8C 18, WD8CSP 17, N8FFK 17, K8DXZ 16, N8AJU 15, W8ZOL 14, WB8KWD 14, WD8CTX 12, WB8HHP 12, KZ8P 12, KA8SOM 12, KA8YIT 12, WD8ATN 11, N8CJS 11, KE8CV 11, WD8CKK 10, KD8IC 10, K8IOW 10, KA8SZH 10, WB8GDM 9, WD8DKQ 7, KA8RID 7, N8CW 6, N8GIO 6, KA8SON 6, K8VOY 6, NØCB 5, NQ8K 5, N8HIL 4, N8HSU 4, NR8L 4, K8ES 3, N8GSM 3, N8HVP 3, KA8MFH 3, KA8VYT 3, N8DAJ 1, WA8DVB 1, K8EEN 1, NC8F 1, KA8FFK 1, N8GCH 1, N8GLE 1, N8GLM 1, W8HVA 1, NU8I 1, WD8IHH 1, W8JBS 1, K1LT 1, W8LT 1, KA8MFG 1, WD8NED 1, KD8OW 1, KD8PP 1, KA8SDE 1, W8TY 1, W8WWU 1. (Sept.) K8BXT 42, K8DXZ 21, W8RG 2.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—STM: WB2MCO. ASM: K2ZM. SGL: KB2HQ. BM: WB2EAG. TC: KC2ZO. ATC: WA2VGM.

NET	TIME/DAY	FREQ.	MANAGER(NET)
ESS	2300Z	3.590	W2WSS
NYS/E/L	0000/0300Z	3.677	KU2N
NYS/M	1500Z	3.677	WB2EAG
NYPON	2200Z	3.913	WB2IDS
CKN	2330Z	146.34/94	WB2ZCM
HVN	0030Z	144.535/135	KA2MYJ
SCRN	0100Z	147.735/135	KV2U
SDN	0230Z	147.66/06	K2ZVI

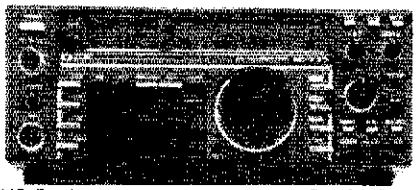
NET REPORTS: (QNI/QSP): Columbia/Greene RACES 46/3 ESS 348/61 HVN 215/78 NYPON 712/394 NYSE 395/247 NYSL 301/248 NYSM 355/176 SDN 290/79. CLUB NEWS: Albany ARA will have their annual Auction and Flea Market at Nov. meeting. CCNR will hear KD2SQ talk on ham radio programs for computers. Orange Cty ARC will be running Novice class starting Jan 8th. Saratoga RACES will have exam session on Dec 13th. Schenectady ARA had auction in Oct. They report new members KA2ZRF KB2AXH W3CUF WA2AFD WB2CXZ WB2BEJ KB2AXI KA2NKO KB2AKC. WARA heard various members talk about new equipment. WECA heard from directors and officers. Albany RACES provided Comm for fall Tricentennial Festival, KA2s MBA SKG, N2FBD, WA2s CJO OAD YBM WD2AJS. Putnam ARES helped with MDMS drill with WA2s AWG MPQ KC2TF N2EGS. I still need help-ACC and OO and RFI coord. Merry Christmas, Happy New Year and Happy Hannukah to all. OCT PSHR: NQ2H WB2VUK KA2MYJ WB2EAG KC2TF K2ZVI N2EQM W2PKY KB2ATJ. Traffic: WB2EAG 258, KC2TF 220, WB2VUK 139, W2PKY 125, KA2MYJ 117, NQ2H 108, K2ZM 86, K2ZVI 54, N2EQM 51, KB2ATJ 25, KA2TQW 19, K2HNW 8.

NEW YORK CITY-LONG ISLAND: SM, H."Woody" Gerstner, WB2IAP—ASM: K2IZ. ASM: W2ML. ACC: KA2RGI. SEC: KA2LAD. OOC: NB2T. TC/RFI: WA2YNH. STC: K2MT, SGL: WA2HYS. PIO: KA2WIJ. The following are traffic nets in and around the section:

NLI*	3630 kHz	1900/2200	WB2EUF mgr
NCVHF	6.745 rpt	1930 m-f	K2MT mgr
BAVHF	6.67 rpt	2000 m-f	K2YQK mgr
SCVHF	5.37 rpt	2030 m-f	W2GZD mgr
ESS	3590 KHz	1800	W2WSS mgr
NYS/M	3677 KHz	1000	WB2EAG mgr
NYS	3677 KHz	1900/2200	WB2EAG mgr.

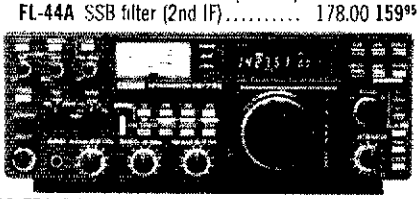
*Deontes section net, all times are local, please try and check in whenever possible. I wish to thank all the section appointees as well as station appointees for all the assistance they have given us in the past few years. My sincerest thanks and deepest appreciation to John, K2IZ, for all the help and assistance he has given me over the past several years. Without him none of this would have been possible. Remember LIMARC's indoor hamfest Feb. 15th at the Electrician's Hall, Pinelawn Rd., Melville. Many thanks to all the people who made the NYC Marathon a success. WA2DHF had everything running smoothly. The one thought that should be in everyone's mind is that we are there, performing a service for the public, and we are there when we are needed. LIMARC will continue conduct examination sessions on the second Saturday of the month at the N.Y. Inst. of Technology, Rt 25A, Old Westbury, in Salten Hall, Rm 2. Applicants are reminded to bring 2 forms of I.D., original and a copy of their FCC license, check for $4.30, made payable to ARRL/VEC, 2 pens/pencils and a caculator for the math questions. For further info contact John Smale, K2IZ, 315 Kensington Ct., Copiague, NY 11726 Kings County RC runs a weekly net on the 146.73 repeater, each Thursday at 2000 local, for its members and nonmembers alike. WA2PIV was awarded a certificate of merit for outstanding service to the Amateur community in the NYCLI section. The presentation was made by WB2IAP. WB2CUW is the new membership chairman for LIMARC. Don't forget, LIMARC runs "Bunny" hunts the 3rd Thursday of the month, and they hold CW practice all other Thursdays at 2000 local on 146.85. Please continue to send all activities reports, club newsletters and any other info for the column to John, K2IZ. Please try to get them in by the 1st of the month. Remember there is a 2-month lag time for any info in this column. Traffic: K2YQK 173, W2GKZ 71.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—Section level leadership officials are: ASM (VE liaison): N2XJ, ASM (FO Info): N2BFG. SEC: N2FOZ, STM: KA2HNQ, OO/AAC: KA2BZS. ACC: KY2S. PIO: WB2NQV. SGL: W2KB. TC: K2BLA. and BM: N2CXX. Within ARES DECs in each of our twelve counties. Bergen N2BMN, Essex WB2HVF, Hudson W2KB, Hunterdon N2EP, Middlesex (Open), Monmouth W2ZEE, Morris WB2VUF, Passaic K2SE, Somerset WA2UZT, Sussex KX2O, Union W2NKD, and Warren WA2VUY. At the local level ECs (40). Within Traffic handling NMs (6) listed below. The backbone of our Field Organization is our Station Appointees: ATCs (3), OBSs (11), OESs (73), OO/AAs (5), ORSs (31), and PIAs (3). Total (196). This is our NNJ Section Field Organization as it exists as of 11/01/86. These numbers on the surface look good but much more is needed. As an example a DEC is needed to organize ARES activity in Middlesex county where no ECs or OESs currently exist. Although EC/OES appointee totals are up, distribution is not even. Part of this problem is that although many amateurs are active in emergency communications we have not signed them up in ARES. This problem also exist among traffic handlers. Many more amateurs are active on our net's than we have as ORS appointees. Where in our NNJ Field Organization do you think you could help? Why not contact one of the applicable leadership officials listed above to dis-



HF Equipment	Regular	SALE
IC-735 HF transceiver/SW rcvr/mic	999.00	849.95
PS-55 External power supply	199.00	179.95
AT-150 Automatic antenna tuner	445.00	359.95
FL-32 500 Hz CW filter	66.50	
EX-243 Electronic keyer unit	56.00	
UT-30 Tone encoder	17.50	

IC-745 9-band xcvr w/.1-30 MHz rcvr	1049.00	899.95
PS-35 Internal power supply	199.00	179.95
EX-241 Marker unit	22.50	
EX-242 FM unit	44.00	
EX-243 Electronic keyer unit	56.00	
FL-45 500 Hz CW filter (1st IF)	66.50	
FL-54 270 Hz CW filter (1st IF)	53.00	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-44A SSB filter (2nd IF)	178.00	159.95



IC-751 9-band xcvr/.1-30 MHz rcvr	1399.00	999.00
IC-751A 9-band xcvr/.1-30 MHz rcvr	1649.00	1399
PS-35 Internal power supply	199.00	179.95
FL-32 500 Hz CW filter (1st IF)	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-33 AM filter	35.25	
FL-70 2.8 kHz wide SSB filter	52.00	
RC-10 External frequency controller	39.25	

Other Accessories:	Regular	SALE
IC-2KL 160-15m solid state amp w/ps	1999.00	1699
PS-15 20A external power supply	169.00	154.95
PS-30 Systems p/s w/cord, 6-pin plug	299.00	269.95
OPC Opt. cord, specify 2, 4 or 6-pin	10.00	
MB Mobile mount, 735/745/751A	24.50	
SP-3 External speaker	61.00	
SP-7 Small external speaker	49.00	
CR-64 High stab. ref. xtal (745/751)	63.00	
PP-1 Speaker/patch	159.25	149.95
SM-6 Desk microphone	44.95	
SM-8 Desk mic - two cables, Scan	78.50	
SM-10 Compressor/graph EQ, 8 pin mic	136.25	124.95
AT-100 100W 8-band auto. antenna tuner	445.00	389.95
AT-500 500W 9-band auto. antenna tuner	559.00	489.95
OPC-118 Adapts AT-100/500 to IC-735	16.00	
AH-2 8-band tuner w/mount & whip	625.00	549.95
AH-2A Antenna tuner system, only	495.00	429.95
OPC-137 Adapts AH-2/2A to IC-751/745	16.00	

ICOM

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Other Accessories - continued:	Regular	SALE
GC-4 World Clock (Closeout)	99.95	59.95
GC-5 World clock	91.95	

6-meter VHF Portable	Regular	SALE
IC-505 3/10W 6m SSB/CW portable	549.00	489.95
BP-15 AC charger	14.00	
EX-248 FM unit	55.50	
LC-10 Leather case	39.50	

VHF/UHF base multi-modes	Regular	SALE
IC-551D 80W 6-meter SSB/CW	799.00	699.95
EX-106 FM option	140.00	126.95
BC-10A Memory back-up	9.50	
IC-271A 25W 2m FM/SSB/CW	859.00	759.95
AG-20 Internal preamplifier	64.00	
IC-271H 100W 2m FM/SSB/CW	1099.00	969.95
AG-25 Mast mounted preamplifier	95.00	
IC-471A 25W 430-450 SSB/CW/FM xcvr	979.00	869.95
AG-1 Mast mounted preamplifier	99.50	
IC-471H 75W 430-450 SSB/CW/FM	1399.00	1169
AG-35 Mast mounted preamplifier	95.00	

Accessories common to 271A/H and 471A/H	Regular	SALE
PS-25 Internal power supply for (A)	115.00	104.95
PS-35 Internal power supply for (H)	199.00	179.95
SM-6 Desk microphone	44.95	
EX-310 Voice synthesizer	46.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	14.00	
UT-15S UT-15S w/TS-32 installed	92.00	

VHF/UHF mobile multi-modes	Regular	SALE
IC-290H 25W 2m SSB/FM, TTP mic	639.00	569.95
IC-490A 10W 430-440 SSB/FM/CW	699.00	599.95

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25W 2m FM w/TTP mic	429.00	379.95
IC-27H Compact 45W 2m FM w/TTP mic	459.00	399.95
IC-37A Compact 25W 220 FM, TTP mic	499.00	439.95
IC-47A Compact 25W 440 FM, TTP mic	549.00	489.95
PS-45 Compact 8A power supply	139.00	129.95
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, UP/DN mic	429.00	379.95
IC-28H 45W 2m FM, UP/DN mic	459.00	399.95
IC-38A 25W 220 FM	459.00	399.95
IC-48A 25W 440-450 FM	459.00	399.95
HM-14 TTP microphone	55.50	
UT-28 Digital code squelch	37.50	
UT-29 Tone squelch decoder	43.00	
HM-16 Speaker/microphone	34.00	
IC-3200A 25W 2m/440 FM w/TTP	599.00	499.95
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	37.00	
AHB-32 Trunk-lip mount	34.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	20.18	
Larsen PO-MM Magnetic mount	19.63	
RP-3010 440 MHz, 10W FM, xtal cont.	1229.00	1099
IC-120 1W 1.2 GHz FM Mobile	579.00	499.95
ML-12 1.2 GHz 10W amplifier	379.00	339.95
IC-1271A 10W 1.2 GHz SSB/CW Base	1229.00	1079
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	115.00	104.95
EX-310 Voice synthesizer	46.00	
TV-1200 ATV interface unit	129.00	119.95
UT-15S CTCSS encoder/decoder	92.00	
RP-1210 1.2 GHz, 10W FM, 99 ch. synth	1479.00	1299

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Hand-helds	Regular	SALE
IC-2A 2-meters	279.00	249.95
IC-2AT with TTP	299.00	259.95
IC-3AT 220 MHz, TTP	339.00	299.95
IC-4AT 440 MHz, TTP	339.00	299.95
IC-02AT 2-meters	399.00	339.95
IC-03AT for 220 MHz	449.00	399.95
IC-04AT for 440 MHz	449.00	389.95
IC-u2A 2-meters	299.00	269.95
IC-u2AT with TTP	329.00	289.95
Accessories for u2A/T	Call	
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	459.00	399.95
A-2 5W PEP synth. aircraft HT	599.00	499.95

Accessories for IC series	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	74.25
BP-8 800mah/8.4V Nicad Pak - use BC-35	74.25
BC-35 Drop in desk charger for all batteries	74.50
BC-16U Wall charger for BP7/BP8	20.25
LC-11 Vinyl case for DIx using BP-3	20.50
LC-14 Vinyl case for DIx using BP-7/8	20.50
LC-02AT Leather case for DIx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	47.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	37.50
BP-4 Alkaline battery case	15.25
BP-5 425mah/10.8V Nicad Pak - use BC35	58.50
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	11.50
CP-1 Cig. lighter plug/cord for BP3 or DIx	13.00
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	23.25
EX-390 Bottom slide cap	5.50
MB-16D Mobile mtg. bkt for all HTs	24.50
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	34.95
HH-SS Handheld shoulder strap	16.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	23.25
HS-10SA Vox unit for HS-10 & Deluxe only	23.25
HS-10SB PTT unit for HS-10	23.25
ML-1 2m 2.3w in/10w out amplifier	SALE 99.95
SS-32M Commspec 32-tone encoder	29.95

Receivers	Regular	SALE
R-71A 100 kHz-30 MHz, 117V AC	$949.00	799.95
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FL-32 500 Hz CW filter	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-44A SSB filter (2nd IF)	178.00	159.95
EX-257 FM unit	42.50	
EX-310 Voice synthesizer	46.00	
CR-64 High stability oscillator xtal	63.00	
SP-3 External speaker	61.00	
CK-70 (EX-299) 12V DC option	12.25	
MB-12 Mobile mount	24.50	
R-7000 25 MHz-2 GHz scanning rcvr	1099.00	969.95
RC-12 Infrared remote controller	67.25	
EX-310 Voice synthesizer	46.00	
AH-7000 Radiating antenna	89.95	(12)

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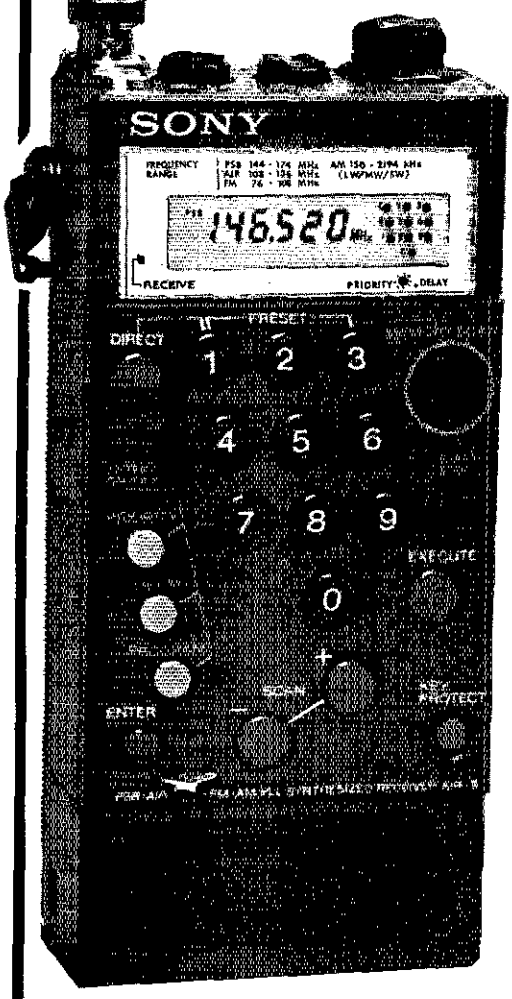

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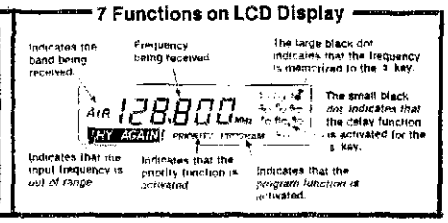
The Air-8 measures 3⅛" × 7⅛" × 2", and weighs just 21 oz. This is truly a sturdy little companion that will give you years of dependable performance wherever you go.

6 Frequency Bands

Band		Frequency range	Tuning interval
PSB		144 - 174 MHz	5 kHz
AIR		108 - 136 MHz	25 kHz
FM		76 - 108 MHz	50 kHz
AM	SW	1601 - 2194 kHz (1603 - 2194 kHz)	1 kHz
	MW	530 - 1600 kHz (531 - 1602 kHz)	10 kHz (9 kHz)
	LW	150 - 529 kHz (150 - 530 kHz)	1 kHz

7 Functions on LCD Display



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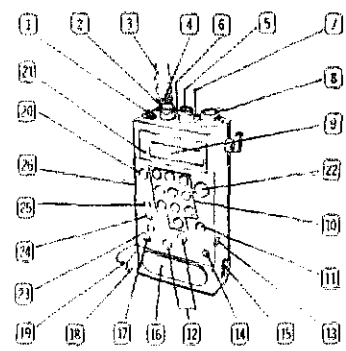

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cuss it, then if you feel you want to join our Field Organization ask him or her to contact me for your appointment. Congratulations to the following who were newly licensed or upgraded during October sessions conducted by: NNJ VE Board, Bergen ARA, Ocean/Monmouth ARC, and Old Bridge RA: Novice: G Multer, T. Szkutnik, T. Kletur, S. Palumbo, and P. Soderman. Technician: KB2ABC, KB2GBO, KA2NUW, KB2AUQ, KB2BNR, KA2YRM, WB2UFC, B Billack, B Nichols, S Keetom, and KA2ZDX. General: KB2AHC, KB2AMH, KA2BOJ, H Potter, KB2AXV, WB2CLJ, KA2IBV, KA2NXA, KB2BCB, S Reynolds, KB2ASG, KA2WJY, and R Perry. Advanced: WB2JJO, N2DTI, N2AJR, N2FIS, K2VNW, N2EQY, N2FPL, and KA2ZVI. Extra KA2ZZO, W2ESH, W2PKC and WB2TJD. Please note: NJVN/E schedule has changed to 1930 hours. October Data:

Net	Mgr.	Freq	Time	Sess	QNS	QSP	QNI
NJM	W2RRX	3695	1000	Dy	31	71	79
NJPN	W2CC	3950	1800	Dy	35	100	411
NJN/E	AG2R	3695	1900	Dy	25	163	224
NJN/L	AG2R	3695	2200	Dy	25	48	138
OBTTN	WB2QMP	147.12	2000	Dy	31	133	266
TCETN	KA2SPH	146.685	1930	Dy	Not Rec.		
NJVN/E	WB2FTX	146.895	1930	Dy	19	1	102
NJVN/L	WB2ANK	146.49	2230	Dy	30	98	236
NJSN	WB2PKG	2735	1830	Dy	31	38	189
NJPTN	(PBBS)	145.01	WA2SNA-1 and WB2GWD-O				

NNJ Amateur Radio Public Info Line: 201-735-8550
SAR/PHSR: N2XJ 104/77 N2DXP 115/70, W2CC 14/, WB2QMP 115/66, W2RRX 150/109, W2XD 18/, K2VX 54/85.

MIDWEST DIVISION

IOWA: SM, Rollin Sievers, WBØAVW—SEC: KDØBG, STM: KCØXL. OOC: WØVX. ACC: WBØQAM. BM: KØIIR. PIO: NCØW. TC: KØDAS. SGL: AKØQ. Barb, KBØOZ, of Mason City has been appointed director of the 3900 Club. The Davenport Radio Amateur Club will sponsor a Zero District QSO party on March 14-15, 1987. The DRAC's Hamfest '87 will be at Masonic Temple Sun. Feb 22, 1987 in Davenport. The Cherokee "Nugget" will combine with Sioux City "Kerchunk". WØPDT writes an excellent newsletter for Nugget. Have heard several comments praising the Archie comic book from the League was saddend to hear of the passing of Andy, WØDSP, who was an active ham and also was a popluar commercial radio announcer. There are 1480 ARRL League members in the State.

NET	QNI	QTC	FREQ	TIME	DAY	MGR
75 Meter Noon	1081	76	3970	1830	Dy	WBØJFF
ITEN 4 sess.	87	6	3970	2330	Sun	KDØBG
TLCN 62 sess.	204	132	3560	0030	Dy	WØYLS
W. Cen. ARES	150	0	147.69	8:30	M-TH-F	KØCNM

DTEN: 416 messages handled in 62 sess. at rate of .393. Ia represented 94% by stations WØHTP/40 KØIPT/39 KCØXL/34 WAØAUX/2 KAØJRQ/2 KAØNCW/1 NØCKD/1. Traffic: KØGP 142, KCØXL 97, WØYLS 97, KAØADF 90, KAØGSA 65, NØAEF 48, W4JL 41, WBØJFF 33, WBØAVW 28, WØBW 16, KØBRE 14, KØEVC 11, KAØVBA 6. There are several new calls checking into the traffic nets, WELCOME. Best wishes for a Happy New Year.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NOBLD. STM: WØOYH. Net Manager KSBN/KPN, WOFRC. Net Mgr QKS, WBØZEN. Ks RTTY Mgr, KAØCUF. District Emergency Co-Ordinators are WØORG, WBØYJT, and WOEB. STATE Govt Liaision is NØBLD. Tech. Coord is WBØNQM. Bulletin Mgr, KØJDD. ACC, KØBXF and Manager of QKS-SS is WØMYM. Packet Radio is coordinated for KS by WDØBRZ and the WX NET by WBØHOZ. Most all of the conventions and hamfests are over for the year of 1986. For those of you not getting a chance to par-take in '86, start now to consider making a few in 1987. Net reports for August are as follows: KSBN QNI 980 QTC 115. KPN 408/26. KWN 760/648. KMWN 598/574. CSTN 2001/86. QKS 200/58. QKS-SS 35/9. Ks RTTY net QNI 20 and QTC 2. For all who check into the 75 mtr nets—THE KS QCWA NET is now meeting on Saturday mornings on 3920 KHz at 7:30 AM following KMWN. We also welcome back GENE WBØZEN as NM of QKS. SEPTEMBER net activity: KSBN QNI 1045/QTC 152. KPN 347/10. KWN 842/680. KMWN 576/517. CSTN 1765/24. QKS 201/44. QKS-SS 44/18. For those of you wishing to copy the ARRL bulletins on RTTY, try 7093 KHz daily 1600z—100 wpm via NØGCC. TAKE YOUR TURN AT BEING A NET CONTROL STATION. WE MIGHT NEED YOU IN AN EMERGENCY!!! Traffic: NØGCC 226, WØFIR 164, WØFRC 139, WØQBK 121, WBØYH 101, WØHI 75, KØBXF 62, WAØHOZ 62, WØFDJ 57, NBØZ 46, WØQMT 37, WØMYM 19, WØCHJ 10, WØPB 9.

MISSOURI: SM, Ben Smith, KØPCK—The 1987 officers of the Kansas City chapter of the QCWA are: Pres., KØORB, VP., WØAIB and Sec. KØBRO. On Oct. 12 the Heart of America ARC provided communications for the Church World Services Community Hunger Appeal CROP Walk. There were around three thousand walkers. The amateur operation was orginized by WØAIB. Other amateurs assisting were: KBØUH KØORB WØCKN WDØEIG KAØSXY KØUAA KDØAJ WAØVBX WAØITU WBØRHR and WAØMBG. The Jefferson Barracks Amateur Auction will be held March 13, 1987. The St Charles ARC operated a special event station at the Scout Jamboree, Oct. 18. Operating the station were: WB5VDE KCØPP and KAØIKU. Newly elected officers of the Kansas City ARC are; Pres. NØFTT VP. KAØE, membership Sec. KCØWX, recording Sec. KAØJLN, Tres. KØYLY and board members KIØA, WAØITU, KØMZZ and WØRXD. The Kansas City ARC 144.81/145.41 repeater is back on the air. It is an open repeater and is located in the Southern Kansas City area. The amateurs of Missouri had a very busy October being involved in Public Service activities. On Oct. 1 and 29 amateurs assisted the State Emergency Management Agency with state wide Earthquake drills. During the floods several amateurs provided communications for the Red Cross damage assessment teams. Silent Key, WAØGYS. NET REPORTS:

Net	Sessions	QNI	QTC	NM
MON	62	349	203	KØSI
MOSSB				
MEOW	32	611	133	KPDSQ
HBN	23	300	24	KØDSQ
MTTN				
RRARSBN	29	341	10	KAØLIN
SMARCN	4	61	1	KDØJD
ST.LARES	4	256	3	KØWEX
LOBK	27	413	0	WØRTL
LOFM	5	108	1	WØRTL
MOFO	5	43	10	AIØO
SARN	4	42	0	WØENW
ZAEN	4	72	7	NOØE
ARES	5	52	2	NØFOW
CMEN	6	79	2	KØPCK
J.C.CC	6	40	6	WBØDZX
TRI CO	6	66	2	KAØILO
PHD	4	107	11	WAØKUH
HAARC	5	89	1	KØRWL

Traffic: KØSI 160, NQØG 142, NDØN 140, WØBMA 140, KØPCK 134, AIØO 127, K9OCU 92. KØORB 83. WAØYJX 81. NTØC

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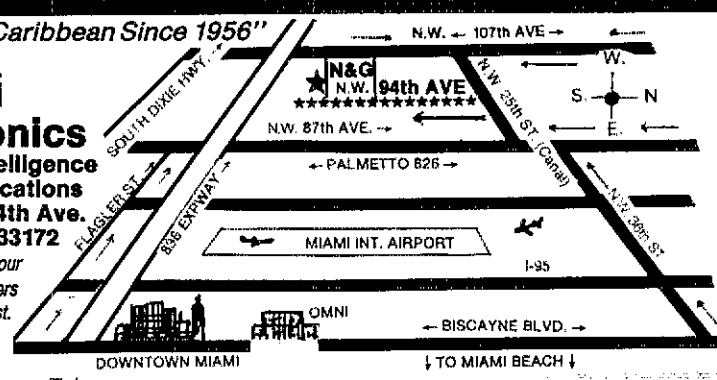

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AL-1500 with 8877 tube - full legal output with 65 watts drive.

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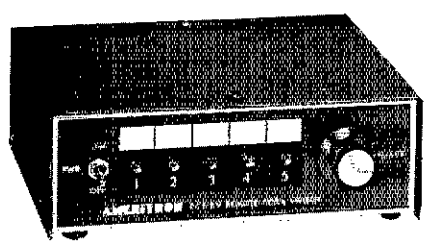

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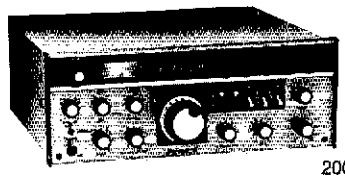

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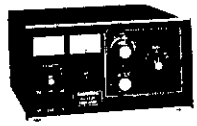

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RG-59/U (8241)	0.14
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74, KØDSQ 59, WØOUD 53, WAØHTN 51, KT5Y 48, NØSS 46, WBØCJB 10, WAØKUH 9.

NEBRASKA: SM, Vern Wirka, WBØGQM—STM: Jerry Kohn, WDØEGK. The New Nebraska Section Emergency Coordinator is Michael Ruhrdanz, NØFER, of Lincoln. His address is 1251 Dakota, Lincoln, Nebraska 68502. The phone number is 402-421-2894. Nebraska Emergency Coordinators should note the address and send in their monthly reports to NØFER, also another new appointment in the section, Dennis Wing, KCØGF, of Grand Island, is the new Hall County Emergency Coordinator and District Emergency Coordinator for central Nebraska. KCØGF continues to serve in the capacity of official observer and as a member of the amateur auxiliary to the FCC's field operations bureau. KCØGF replaces Ken Noel, AJØA, who has relocated to the Omaha area. Two digipeaters have become operational in the Nebraska panhandle, with a third one planned for the near future. The first operational digipeater, KA3IDN-2, is located ten miles north of Bushnell with tower space being provided by KAØBWN and NOØA. The second digipeater, AGØN-1, links the Scottsbluff area to the KA3IDN-3 system. According to AGØN-1 the two new digipeaters provide a link to Cheyenne, Wyoming via KA3IDN-1 and into Colorado via WØHJX-1. The third panhandle digipeater is planned for installation in the Scottsbluff area for a better link toward the east and also in the hopes of encouraging more packet activity in the Ogallala and North Platte areas of Nebraska. Traffic: KØDKM 156, WØKK 86, KAØKPT 59, KAØBCB 46, WADØOK 34, WDØEGK 21, NOØA 15, WDØCRD 11, WBØGMQ 11, WBØGQM 5, WØWZR 4, KØTUH 4, WØNIK 4.

NEW ENGLAND DIVISION

CONNECTICUT: SM, John T. Ronan, K3ZJJ—

NET	SESS	QNI	QTC	MGR
CN	59	341	294	K1EIR
CPN	32	387	187	KA1BHT
RTN	32	248	94	KA1JAN
WESCON	36	496	267	WB1GXZ

Congratulations to all that participated in the 1986 SET! Special recognition goes to K1EIC, our STM, and KA1EC, our SEC, for organizing this event. The 1986 SET was expanded to include the ARES Nets and to utilize CPN as the central state-wide net for coordinating all other net activities. CN was utilized as the gateway for traffic into and out of the State and packet radio was used for large volume welfare traffic. Participating ARES Nets and DEC's were Dist. 1 KU1Q; Dist. 3 KB1VM (with KB1H); Dist. 4 NA1O; Dist. 5 NA1SA; Dist. 7 K1NGL; Dist. 8 N1DCS (with KB1ZC) as well as Milford ARES with K1UWV as EC. KA1BHT did an outstanding job as NM for CPN which was on the air continuously. (In a real emergency tune to CPN frequency 3.965 MHz.) WCN logged in the heaviest volume of traffic scoring 326 points. Congratulations to WB1GXZ, the NM, and the skillful members of WCN! RTVN, with KA1JAN as NM, did a fine job for Eastern Connecticut. CN with K1EIR as NM and W1WP handled a large volume of simulated welfare messages which were delivered to each Red Cross chapter in the State. We have met with KA1SJ, Communications and Warnings Officers of the State Civil Preparedness. For the 1987 SET, we are planning to involve all levels of State Civil Preparedness and possibly other agencies such as the Red Cross. The first Connecticut Station meeting was held at the Boxboro Hamvention with 35 in attendance. An excellent discussion was held on Section issues and goals. We are fortunate that ARRL Field Services Manager, K1CE, has accepted an appointment as NM of NVN. K1CE will do an excellent job of bringing NVN back to life! SARC did an outstanding job of providing communications and traffic control for the Valley Shore YMCA Apple Core Marathon. Congratulations to KA1BHT (President/Organizer), N1SA(NCS), KA1LDB (President RASCN), N1AMD, N1CWD, N1DIO, KA1GDN and WA1YCE. Congratulations to ECARA which scored First Place for Field Day in New England and seventh in the country for Category 4A. KB1H was FD Chairman. The second annual Connecticut TSARC meeting was held Nov. 15 at Bridgeport Univ. Thanks to host W1BHZ and TSARC V. Pres. N1DCS. Traffic: KA1MDM 376, WB1GXZ 348, W1EFW 225, K1EIR 203, KA1MKJ 153, W1EDD 144, KA1GWE 115, WB4FDT 94, KA1BHT 89, W1WP 58, KB1ZC 56, KY1F 44, K1AQE 28, W1YOL 24, W1FAI 22, W1BDN 17, N1DOW 8, W1CUH 4, W1QV 4.

EASTERN MASSACHUSETTS: SM, Luck Hurder, KY1T—ASM: K9HI. SGL: K3HI. OO/AA: KA1KF. SEC: KB1PA. PIO: K1HLZ. BM: KB1AF. STM: KW1U. TC: KA1IU. ACC: KA1KCU.

NET	MGR	FREQ	TIME(LOC)/DY		QTC	QNI
EMRI	N1AJJ	3658	1900/2200	DY	177	239
EMRIPN	N1BGW	3880	1730	DY	189	176
EM2MN	KA1AMR	145.23	2000	DY	218	324
NEEPN	K1BZD	3945	0830	SN	4	40
HHTN	NG1A	04/64	2230	DY	153	488
EMRISS	N1CVE	3715	1600/2030	DY	65	157
CITN	KB1AF	745/045	1930	DY	154	290

Quite a month for the EMASS Official Bulletin Stations - Bulletin Manager KB1AF reports that an astounding 341 bulletins were handled, with packet stations W1ZHC N1DH and K1BC topping the list. Nice work! Emergency Coordinators K1PNB and W7RCP report increased ARES activity in their areas, and other ECs throughout the Section are noticing the interest in ARES capabilities that the CD people are suddenly showing. Do you know who your town's CD Director is? Are you sure of what procedures you would follow in a communications emergency in your area? Does your town even have an Emergency Coordinator? Cape Ann ARA making plans for January General class, while a number of other clubs in EMASS are continuing with their excellent series of volunteer exam sessions. TCC Director (and EMA Section Traffic Manager) KW1U enjoyed weekend in Williamsburg, Va, at NTS Eastern Area Staff meeting. Among the topics of discussion was that of how to better integrate NTS traffic and the packet radio system. Congrats to Public Service Honor Rollers NG1A, KW1U, WA1FCD, KN1K, N1BGW and KB1AF! October traffic: KW1U 632, KN1K 580, N1BGW 360, KB1AF 269, WA1FCD 257, NG1A 197, N1BGG 169, W1CE 159, K1GRP 148, KY1T 138, K1ABO 120, KA1AMR 118, W1ZHC 104, N1AJJ 87, K1BA 81, KA1ON 61, K1SEC 53, KA1EID 48, K1BZD 45, N1BYS 30, KA1KCU 30, W1DMH 26, N1EGN 25, KA1LIH 25, KA1EDY 21, N1DDC 18, WA1FNM 14, K1LCQ 13, KA1LIH 10, WB1GIA 9, N1DVI 7, WA1SNH 5, KT1K 4. Welcome aboard, and a BIG "Thanks!" to W1CE for taking on the position of Assistant Section Traffic Manager for packet. Have you expressed your opinions to your SM & Division Director lately? Now's a good time!

MAINE: SM, Cliff Laverty, W1RWG—ASM: W1KX. SEC: KA8UVQ. STM: AK1W. ACC: KY1C. BM: W1JTH. OOC: W1KX. PIO: KY1E. SGL: K1NIT. TC: K1PV. Pine State Amateur Radio club has elected new officers: Howie Soule, K1CZ, pres; Ron Sirois, KW1Q, vice pres; Bob Stairs, K1TQK, secy/treas; directors-N1DQX N1BWI N1CZJ KA1CVS WB8DKS W1YTQ K1AG. Editors-KA1BWG and N1CFL. Hamfests for 1987 scheduled: Feb 28 at Poland by Andy Club; June 6 and 7 at Bass Park (Bangor) by Pine State; Sept 12 at Windsor by Augusta EARU. The Maine Public Service Net (MPSN) under the direction of KA8UVQ, SEC, poses a topic

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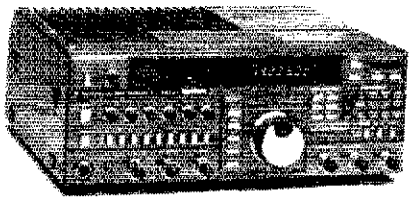
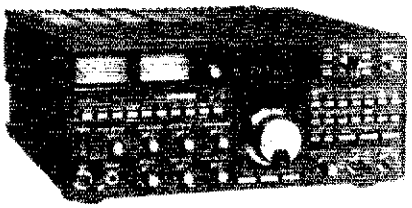
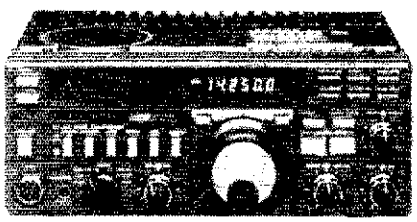


HF Equipment	LIST
FT-767GX 160-10m xcvr/.1-29.99 MHz Rcvr	$1895.00
6M/767 6m module	179.95
2M/767 2m module	179.95
430/767 430-440 module	219.95
440/767 440-450 module	219.95
FT-ONE Xcvr/Rcvr/4 filters/RAM/FM	2859.00
KY-ONE Keyer unit	50.00
DC-ONE DC cable	15.00



FT-980 9-band CAT Xcvr/SW Rcvr	$1795.00
SP-980 Speaker with audio filter	99.95
SP-980P Speaker/patch	99.95
FC-757AT Automatic ant. tuner w/memory	359.00
FAS-1-4R Remote antenna selector	79.95
E-980 Interface cable; FT-980/757AT	46.50
XF-8.9HC 600 Hz CW filter (1st IF)	50.00
XF455.8MCN 300 Hz CW filter (2nd IF)	59.95
KY-ONE Keyer unit	50.00
FIF-65 Computer interface; Apple IIe	69.95
FIF-80 Interface; NEC PC-8001	119.95
FIF-232C for VIC-20/TI/most RS-232	79.95
FRB-1 External relay box	20.00
GC-980 General coverage kit	14.95



FT-757GX 9-band Xcvr/SW Rcvr/mic	$995.00
FP-757HD Heavy duty supply with fan	249.00
FP-757GX Compact power supply	235.00
FP-700 Power supply	209.95
FRB-757 External relay box	10.00
FC-757AT Automatic ant. tuner w/memory	359.00
FAS-1-4R Remote antenna selector	79.95
MMB-20 Mobile mount	25.95
FIF-65A Interface; Apple IIe	59.95
FIF-232C for VIC-20/TI/most RS-232	79.95
GX Turbo/F01 Software; Apple II	59.95
GX Turbo/C01 Software; C64/128	89.95
GX Turbo/V01 Software; VIC-20	89.95

FT-757GX accessories - cont.	LIST
FTV-700 Transverter w/no module	175.00
2M/FTV 2m module only	189.00
6M/FTV 6m module only	139.00
70 cm/FTV 430 module only	255.00
Misc. accessories	LIST
SP-102 Speaker with audio filter	$ 99.95
SP-102P Speaker/patch	99.95
MD-1B8 Desk microphone	89.95
MH-1B8 Mobile microphone	24.95
YS-60 1.8-60 MHz 2kw PEP wattmeter	$ 84.95
YS-500 140-520 MHz 200w wattmeter	69.95
YH-55 Lo-Z headphones	21.95
YH-77 Lightweight headphones	21.95
FF-501DX Low pass filter	34.95

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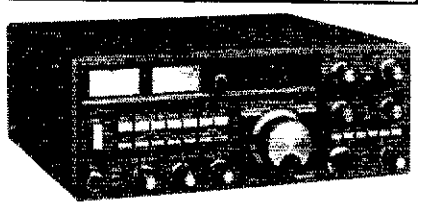

VHF/UHF equipment	LIST
FT-726R VHF/UHF Xcvr w/2m, ITP mic	$1095.00
HF/726 10-12-15m unit	289.95
6M/726 6m unit	269.95
430/726 430-440 MHz unit (OSCAR)	329.95
440/726 440-450 MHz unit (FM band)	329.95
SU-726 Satellite duplex module	129.95
XF-455MC 600 Hz CW filter	69.95
DC-726 DC cable for FT-726R	10.05
FTE-36 Tone board for FT-726R	58.00
AD-2 50w 2m/440 duplexer	34.95
FT-290R MKII 25w 2m FM/SSB xcvr	579.95
FT-690R MKII 10w 6m FM/SSB xcvr	569.95
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NC-26B Wall Charger for FBA-8	16.95
CSC-19 Soft case	10.00
MH-10F Speaker/Microphone	27.95
MH-10E Hand Microphone	21.95
FTS-7 Encoder/decoder	49.95
FT-270RH 45w 2m FM Xcvr w/ITP mic	439.95
FT-2700RH 25w 2m/440 FM w/ITP mic	599.95
FTS-8 Encoder/decoder	49.95
FVS-1 Voice synthesizer	31.95
AD-2 50w 2m/440 duplexer	34.95
FT-770RH 25w 440 FM xcvr w/ITP mic	479.95

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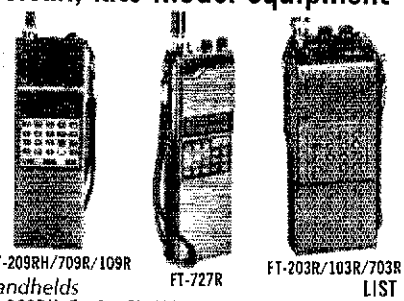

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FT-109R 220 FM HT/TTP/batt/cgr	379.95
FT-709R 4w 440 FM HT/TTP/batt/cgr	359.95
FT-727R 5w 2m/440 FM HT/TTP/batt/cgr	499.95
FT-23R 2.5w 2m HT	269.95
FT-23R/TTP 2.5w 2m HT w/TTP	299.95
FT-73R 2w 440 HT	279.95
FT-73R/TTP 2w 440 HT w/TTP	314.95

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FT-203R/TTP 2.5w 2m FM HT/batt/cgr/TTP
FT-103R/TTP 2.5w 220 FM HT/batt/cgr/TTP
FT-703R/TTP 2.5w 440 FM HT/batt/cgr/TTP

Acc. for 09-series/03-series/FT-727R	LIST
FBA-5 Alkaline battery holder	14.95
FNB-3 425ma 10.8v batt (comes w/03 series)	49.95
FNB-4 500ma 12v batt (comes w/09-series)	59.95
FTS-6 Encoder/decoder; 09-series	49.95
FTS-7 Encoder/decoder; 03-series	49.00
LCC-6 Leather case w/top cover; 09-series	39.95
MH-12A2B Speaker/microphone	39.95
NC-9B Wall charger for FNB-3	9.95
NC-15 Desk quick charger/AC ps	89.95
NC-18B Wall charger for FNB-4	9.95
MMB-21 Mobile bracket	14.95
PA-3 Mobile adapter and charger	39.95
TA-2 2m 19" telescoping whip ant	11.95
WB-3 Waterproof baggie for HTs	29.95
YH-2 VOX headset	26.95

FRG-9600 FRG-8800

Receivers	LIST
FRG-8800 150 KHz-29.999 MHz Shortwave	$599.95
FRA-7700 Indoor active receive antenna	59.95
FRT-7700 Antenna tuner	64.95
FRV-8800 118-174 MHz VHF converter	129.95
FIF-232C Interface; VIC-20/TI/RS-232	79.95
FF-5 500 KHz low-pass filter for VLF	20.00
DC-8800 DC kit	3.50
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IF YOU CAN'T REACH US ON TWO METERS, WHY NOT GIVE US A CALL ON 10 METERS (29.60 MHZ)

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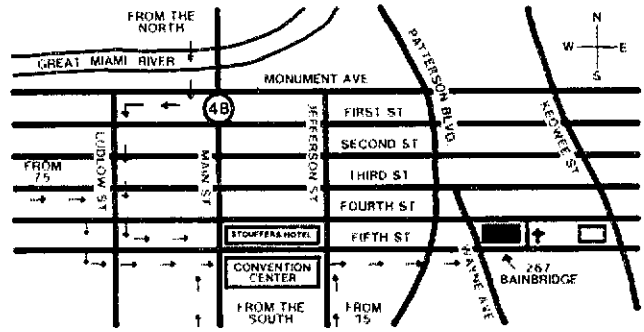
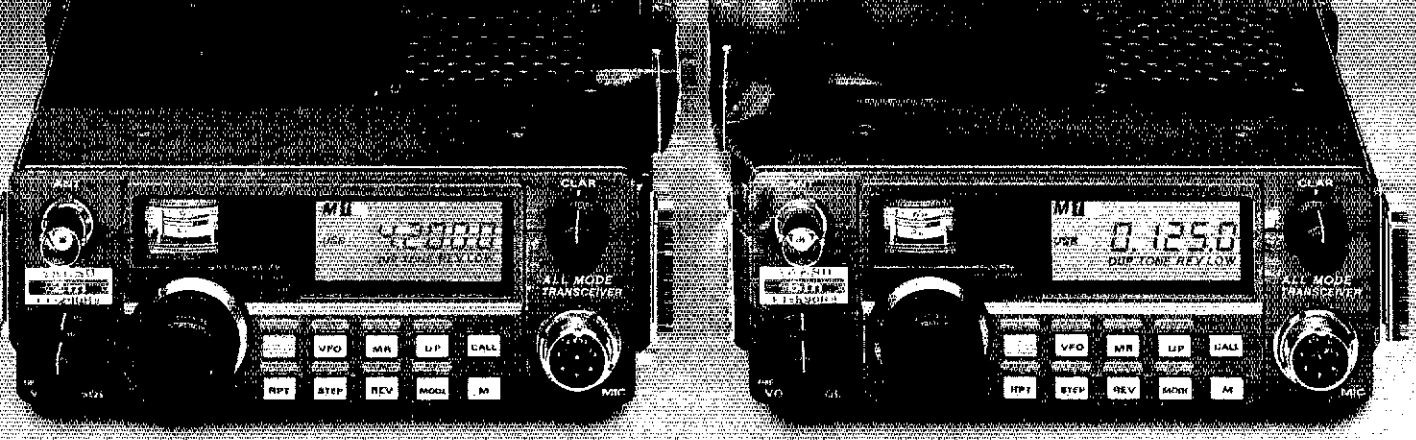
PLENTY OF FREE PARKING JUST SOUTH OF THE BUILDING. HOLY TRINITY CHURCH IS THE LANDMARK YOU SHOULD LOOK FOR. IT'S LOCATED ON THE N.E. CORNER OF FIFTH AND BAINBRIDGE.





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for comment and discussion each Sunday at 1400z on 3940 kHz. Although it is organized as a forum for ECs, all amateurs are welcome to check in and join in the discussion. Traffic: KA1AVU 265, WL1ISO 234, ND1A 166, WB1CBP 109, AK1W 106, KA1JPR 49, W1RWG 49, W1KX 42, N1BJW 28, W1JTH 26, KA1KFC 12, KA1ODT 12, WA2ERT 10, W1VEH 8, WA1YNZ 6, W1OTQ 6, KA1JOJ 4. PSHR WB1CBP 84. Send in reports by the fifth.

NET	SESSIONS	CHECKINS	TRAFFIC	MANAGER
Sea Gull	27	951	184	K1GUP
PineTree	31	301	116	ND1A
CMEN(Sept)	9	174	9	W1WCI
RACES	4	51	7	W1RWG
Arcostook Emer	4	56	0	WA1YNZ
N1AHH-PBBS		752	297	N1AHH

Keep your contacts clean!

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—ACC: KI1M. STM: W1TN. Looking over the inputs from around the section for Oct, my conclusion is that this is one of the busiest months! We began with the Deerfield fleamarket and the ARRL booth. Saw many familiar faces in the excellent weather. Steve Place and Lee Hayford from ARRL Hq visited the Nashua Club meeting and got a chance to meet many local hams, reports club president KA1LDF. The Boxboro convention was great fun and we hosted a hospitality suite for the section on Sat AM. About 30 visitors including KE1E and dad W1DZZ. Attended several good seminars including the Amateur Aux meeting. Three more new hams grad from the NARC Novice class reported by instructor KA1LDS. KI1M and I attended an organizing meeting of hams interested in starting a new club in the Greenville area. Organizers KA1CYU, W1FJH, and KA1IDP have done an excellent job getting started with about 25 hams turning out. A good start! I've received several club newletters and their content shows just how busy it really is! CNHARC did a March of Dimes Walkathon in Laconia, ran a successful raffle and is working on a Packet LAN. GBARA heavily involved in SET and DEC K1ACL attended NHVOAD meeting in Concord. PCARC has Novice class with 9 students and instructor KA1NUF, and KB1YJ proposing to add Packet to the club station. Remember, if you don't see anything about your club, maybe I'm not getting your newletter?! Congrats to new section appointee ATC WA1YKL. A1 W1VTP has been appointed as an assistant coordinator for NESMC. WB1GXM reports many hams active on SET including state CD station. On the traffic front, we had 98% participation in FRN this month. Congrats to all the tfc handlers! For the club newletter editors-exchanging newletters with other clubs can be revealing. You may find common interests and projects or get ideas for monthly programs. Try it!! Traffic: NHN 265, GSFM 190, GSPN 179, MSOVTP 49, N1CPX 607 BPL, N1NH 320, W1PEX 253, KK1E 161, W1FYR 145, K6UXO 120, K1PQV 119, WA1FHB 118, KA1LMR 107, W1TN 98, WB1GXM 96, W1ALE 94, NE1J 89, K1TQY 81, WA1YZN 71, N1AKS 69, KA1GOZ 63, KI1M 30, KV1S 12, KA1HPO 10, W1LQQ 6, N1DQA 6. (Sep) KV1S 90.

RHODE ISLAND: SM, John (Bob) Vota, WB1FDY—New officers of the Fidelity Amateur Radio club, Pres. K1POM, V.Pres. K1KHX, Sect. W1MB, Tres. WA1UHT, Gud Luck to all the new officers. Congrats to the BVARC on the Special Event Station and Public Relations operation which they set up, a total of 31 people signed up for their Novice Classes that they will run the first of the year. BVARC membership up to 44 members. Good going, BVARC. Anyone interested in running for R.I. SM can get an application from the SM; he now has a few on hand. Let's give someone else a chance. Traffic: KA1KML 215, PSHR 81; KA1JXH 287, PSHR 114; W1EOF 217; WA1CRY 51. Welcome to Amateur Radio, John Tyson, a New Novice from Warwick. CU on the Bands John.

VERMONT
SM, Frank I. Suitor, W1CTM—ASM: KD1R. STM: AE1T. SEC: W1KRV. PIO: WA1YOY. TC: W1AIM. N.E. ARRL Convention held in Boxboro, Mass. on 10/18-19 with Super Wx, facilities, displays & presentations on a wide variety of subjects. The VY best (slightly biased viewpoint-hi) was by our own W1AIM (Chip) who gave an excellent presentation on his 2 DXpeditions to St. Pierre (FP8). Other presentations on DXCC, USSR travel, tower construction, and ARRL activities were available. This was my 1st trip to Boxboro and I recommend that all of u try to make the next one. Some VTers in the crowd included AE1T, WB2JSJ, KA1NRR, W1AIM, and N1BYC. While some of us were playing at Boxboro, others were at home involved with SET. SEC W1KRV (Joe) reports that 3 VTN sessions were run on Sat and 4 on Sun which were coordinated with CVARC/BARC ARES Simulated Emergency Nets. Amateur Radio Emergency Service (ARES) volunteers are still needed so pse contact W1KRV for details/applications. Official Field Day results have confirmed the first place performance (2A) of Silicon Jct. RC. Congrats to Mitch (WB2JSJ) and all the ops for this outstanding achievement. Three upgrades resulted from the CVARC VE Session on 10/18—K1BKK (A), KA1OVJ (G), and KA1OUP (T). A new ham also emerged—Bill Wallace—who passed the tech exam and is also now the new sec'y for the Twin State ARC. In addition, 2 Novices are welcomed to our hobby—KA1OVS (Dick), KA1OWK (Steve). The next CVARC VE Exams are scheduled for 1/1745 contact K1HKI. A new repeater from Mt. Mansfield is now on the air (145.47 down 600.) The call is K1VT/R and is open to regular amateur use—contact is WB1BWV (Jon). I am psed to announce the new section PIO is Al Murray (WA1YOY). His experience and ability will result in a lot more PR for ham radio in VT. Section clubs are requested to appoint a club PIO and contact Al for more info. BARC reports a landslide election—congrats to Ben Lamb (K1AUE) on his election as BARC president. Norwich Univ student N1AMR (Mike) has been awarded an ARRL foundation scholarship. A new VE team has been started by GMWS (Rutland)—contact WB1HHG. Results of K1KI survey shows this column ranks 16th of 35 QST items read by U. I hope to improve this showing. For all u QCWA members—the Twin State Chapter Net is on Suns@ 0830L at 3897 kHz. All VT ops should plan to be on the air to support the Feb 7 and 8 VT QSO Party. Our own KT1Q (Bert) has been appointed NM for 1RN/CY2—Nice going Bert! October Traffic Report: KT1Q 589, WA2SPL 375, WA1JVV 154, AE1T 126, W1KRV 97, K2KBT 94, N1DHT 70. October net report: VTN 36/268/263, CVFMN 4/84/12, TSEN 4/68/7, CARN 27/708/44, HHN 14/101/2, GMN 27/426/35, VTPHN 4/71/5. Good winter DXing.

WESTERN MASSACHUSETTS: SM, Don Haney, KA1T—OO/RFI: N1CM. PIO/ACC: K1BEL. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1UD. A busy late fall season for N8BARC with Foliage Parade, VE Exams, comms for clean-up of area rivers, and overnight search for two Scouts who had wandered off after a hike. The boys had been working on their merit badge. Enjoyed the program and banquet at New England DXCC in Concord, Ranging from China to Uganda to Earthwatch to Bob Locher, W9KNI. It was a great day. WA1PLS repeater on 220 expected to be up soon for the Provin Mt. area. HCRA has had a very interesting series of antenna articles in their newsletter. Hope you all have a 1987 filled with good propagation, new friendships made on the air, enjoyable

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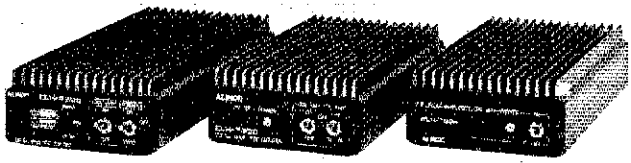

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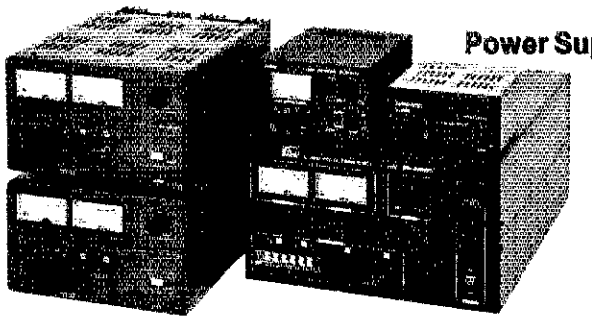

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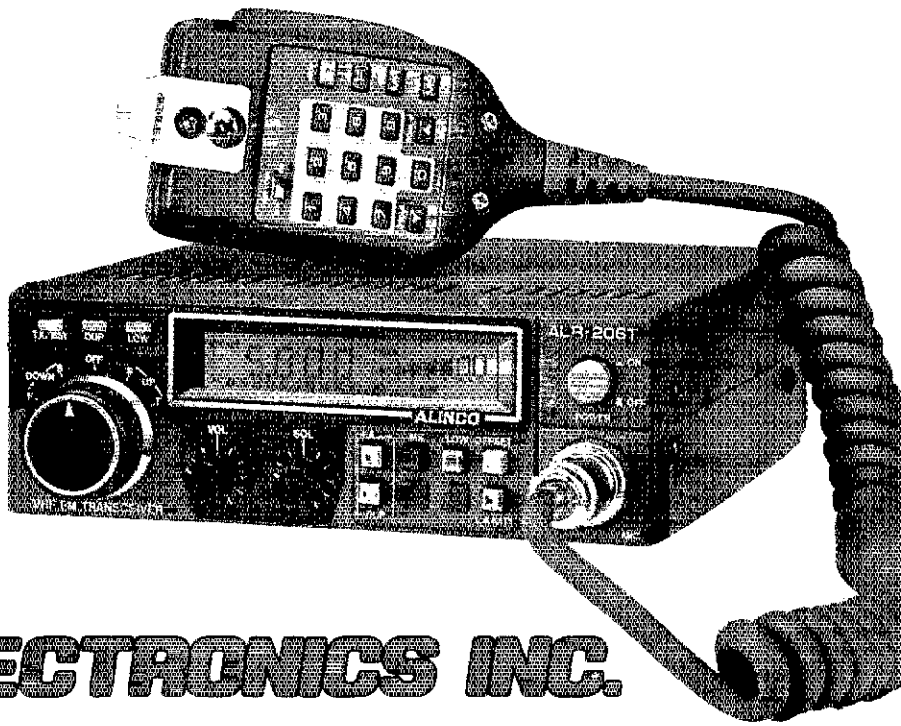

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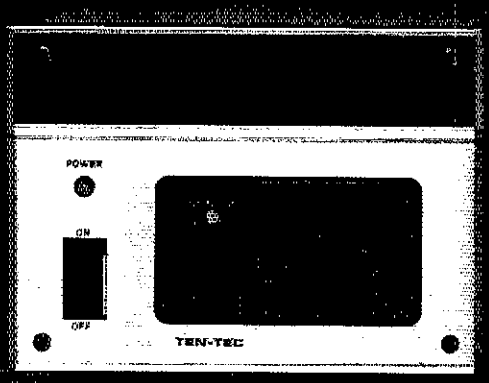

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CORSAIR II HF TRANSCEIVER, Model 561 . . . $1345
Receiver performance that only a permeability tuned oscillator can deliver . . . superb signal to noise ratio, outstanding adjacent signal rejection. Three, frequency tuning rates using dual range offset tuning. QSK with a changeover time of 30 ms or less for superior CW or AMTOR operation. Twelve position band switch for operation on all nine HF bands, from 1.8 to 30 Mhz, plus 40 Khz overshoot on band edges.

RECEIVER
Sensitivity: 0.25 µV for 10 dB S/N ratio.
Selectivity: 16 pole crystal ladder filter, 2.4 kHz bandwidth, 1.6:1 shape factor at 6/60 dB. Three position, mode independent, switch selects standard 2.4 kHz, optional 1.8 kHz, 500 Hz or 200 Hz filters.
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PLUS: Built-in antenna pre-amp, spot button, selectable AGC fast, slow and off and much more.

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RF Output: Broadband, solid state, self tuning with 85-100 watts, all bands.
Built-in Iambic keyer. Speed adjustable 8-50 WPM with 40 character programmable memory.
Multi-meter: Reads Ic, Power out, SWR, speech processing level.
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PLUS: Rear panel connectors for station control, AFSK, QSK, phone patch, auxiliary antenna, PTT, standard CW key, and more.
POWER REQUIRED: 13.8 VDC, Base or mobile at 20 A.
Size: HWD 5.25" x 15.25" x 15".

REMOTE VFO, Model 263 . . . $219
Uses the same PTO design as the CORSAIR. Adds complete TX/RX

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Model 222 Mobile Mount, w/quick release $27.50
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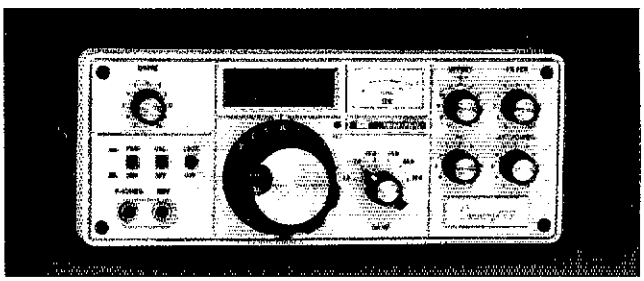

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Put the fun back into hamming. This is a top notch, 50 watt, CW transceiver. Features found in only the best rigs are included. Full break-in QSK, excellent RX selectivity on CW (also tunes LSB/USB) and 100% solid state circuitry. Broadband "no tune" RF amp. Operates 80, 40, 30, 20, 15 and the lower 500 KHz of 10 meters. Power required, 12 to 14 VDC at 6A. Size HWD 4" x 10" x 10.5". Weight 6 lbs. Great for portable, mobile or base station operation.
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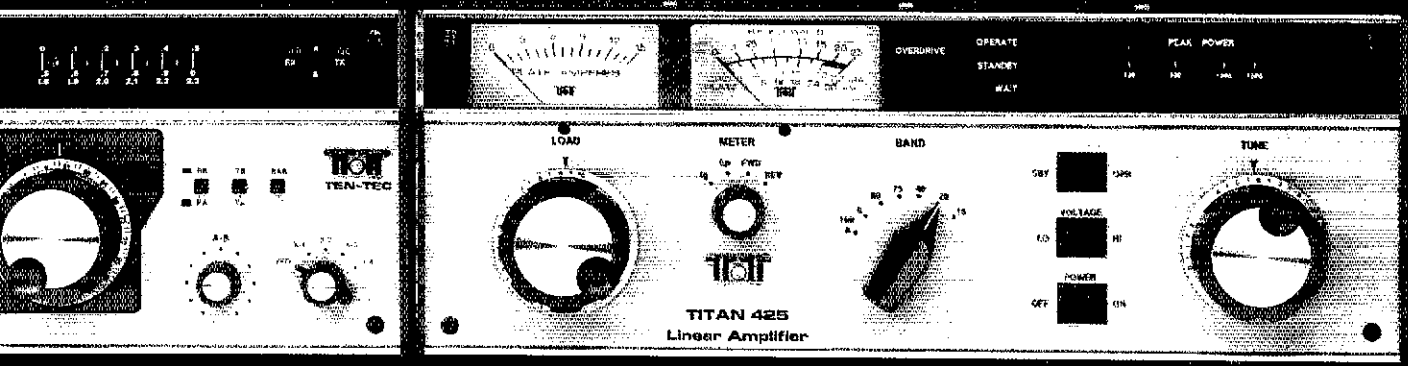

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frequency control. Front panel switch selects, CORSAIR transceive, 263 transceive, CORSAIR TX/263 RX, 263 TX/CORSAIR RX. You can also listen to both frequencies simultaneously. A balance control is provided for priority adjustment. Also makes provision for Xtal control. Connects to CORSAIR with cables provided. Size is HWD 5.25" x 7.5" x 12".

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"BOOM BOX" EXTRAORDINAIRE! Remoted power supply makes possible, this compact, desk top linear amplifier. Puts out a solid 1500 watts SSB and CW, 1000 watts continuous power on RTTY, AMTOR or SSTV. Lightning fast QSK for "break-in" CW and super AMTOR performance.

RF DECK
Drive power: 80 watts typical.
Four LED status indicators, including "overdrive" warning.
Hi/Lo plate voltage switch.
Metering: Full time plate current meter. Multi-meter, selectable for plate voltage, grid current, power out or reflected power.
Vernier drive, tune and load controls.
Peak power indicator: Ultra quick 10 element LED bar-graph display.
Amplifier tubes: Two Eimac® 3CX800A7, ceramic, external anode, air cooled triodes in grounded grid circuit. Plate dissipation, 1600 watts.
Frequency coverage: 160, 80, 40, 20 and 15 meter bands plus 18 and 24 MHz standard, 10 meter kit supplied upon proof of authority to transmit.
Size and weight: HWD 5.25" x 15.25" x 15", 17 lbs.

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Primary power: 220-250 VAC @ 20 amps, maximum.
Conservatively designed for cool operation under full load using a Ten-Tec, tape wound, Hypersil® transformer.
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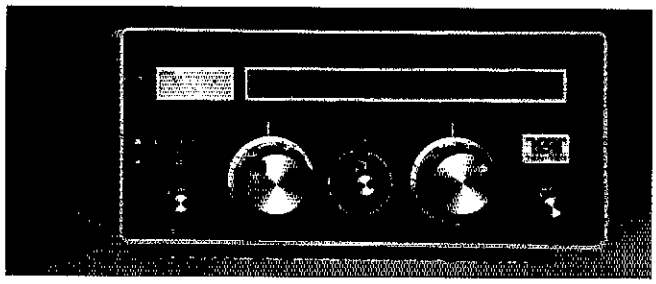

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club activities, and new amateurs. In amateur radio we learn, we serve, we compete, we chat, but most important of all we enjoy. Happy New Year.

NORTHWESTERN DIVISION

ALASKA: SM, Jim Moody, Jr., NL7C—SEC: KL7JIM. STM: KL7T. TC: AL7L. NM: KL7GID, KL7AF, KL7JKW. DEC: AL7AC, KL7WM, KL7JFT. On the 9th of October, KL7JKW and KL7LA noticed that the valley rivers were rising rapidly. As the rivers continued to rise, WB7SFO set up a communications center in the Wasilla EOC to assist the borough authorities in damage assessment along the Parks Highway and areas on either side of the highway. KL7JKW, KL7LA, KL7IPM, KL7IPN and other local hams spent many days relaying reports of damage and people's locations to the EOC. At the peak of the flooding and after, hams were providing communications from Anchorage Red Cross Hq, the emergency centers at Willow, Susitna Valley, and Talkeetna operating both on two meters and HF. KL7GID controlled the HF net on 3920 to communicate with areas that are not accessible on VHF. In the Seward area two Novices set up an emergency station to provide communications from that area to the authorities in Anchorage. Approximately 75 hams devoted a majority of their time and equipment to assisting the local authorities in providing aid in these floods, and they deserve all the praise we can give them.

IDAHO: SM, Don Clower, KA7T—SEC: N7BI. STM: W7GHT. OOC: WB7CYO. I attended the Nov. meeting of the Magic Valley ARC at Twin Falls on 11/5. The Twin Falls club has a very active membership and is very active in the community. Special tnxs to N7GUC & WB7CYO for their hospitality. N7BI is conducting an ARES net on 3.990 at 0230z each Mon. Please feel free to check in and if you are not an ARES member write N7BI to obtain a membership form. N7GIV, Jerry, is the new EC for Ada county. Special Tnxs to Walt, K7CXG, who has been the Ada county EC for a job well done. Tnxs to all who participated in the SET, the Idaho section did a very good job. 73s PSHR: W7GHT, W7JMH, NW7K, N7DHL.

Net	FQ-Time	Ses	QNI	QTC
Farm	3937 8p Da	31	2067	52
Id Cd	3990 810 a M-F	No	Report	
Imn	3635 9p Da	33	365	102
Nw Tn	146.38/98 730p Da	31	866	38

Traffic: W7GHT 204, N7DHL 191, W7JMH 84, NW7K 28.

MONTANA: SM, Les Belyea, N7AIK—SEC: W7LR. STM: KF7R. ACC: KA7MAH. BM: K7KCR. PIO: N7HAZ. ASM & TC: KØPP. SGL: W7JMX. Sorry to report the following SK's K7SMS, WA7DWN. Upgrades reported from the Missoula area were; To extra-KE7SU, to adv.-WB7AGG, to gen.-KA7YJQ. Montana ranks number 6 in the nation with the fewest hams. Section Manager candidates are KØPP and KF7R, ballots will be mailed from ARRL Hdq. the first of the year. Members of the Yellowstone ARC handled Christmas messages from the Rimrock Mall for the fifth consecutive year. K7VIC from Columbia Falls is the first person in the 7th Call District to earn a DXCC Certificate on 160 Meters, congrats. PSHR-KF7R.

NET	SESS	QNI	QTC	MGR
IMN	33	365	102	WA7GQO
MSN	4	53	2	KØPP
MTN	31	2031	152	KF7R

Traffic: KF7R 54, N7AIK 22.

OREGON: SM, William R. Shrader, W7QMU— ASM:KZ7T. STM: W7VSE. SEC: N7CPA. PIO: KC7YN. SGL: KA7KSK. STC: N7ENI. ACC: KB7CC. OO: N7SC. RFI: AK7T. Upgrades: KA7ZLO, KA7ZHP, KA7ZHO, (Novice); KA7ZDD, KA7YKR, KA7YLC, KA7ZAR, KA7ZIK, KA7UMH, KA7ZRP, KA7ZEX (Tech); KA7ZFN, KA7ZIN, KA7YCD (Gen); N7DCS (Adv); WA6FMO, KE7SJ, N7FPA, N7FCA, W7KLE, KA7KCX (Extra). Congratulations. Noteworthy is the 440 mHz link from Portland thru Grants Pass with future plans to link with the Bay area. KC7K, N7FWL, WA6YSM, and WA6NWP are the ones that are involved. If you are copying W1AW bulletins on RTTY or on Computer let Ron Magnus WA7GFE know by radiogram or letter. We as a group need to work harder to encourage young people to get interested and involved in Amateur Radio. Get your club to sponsor a program in the local schools. A demonstration and short film will get it going. Follow up with a novice class especially for those kids interested. A video tape, 16 minute edited version of a Ham's Wide World designed for this, is available to anchor the program. A blank VHS tape to W7QMU from your club will get a copy. Get something going in your area! Happy New Year 1987, lots of good things in store for us! Traffic (Oct/Sept): W7VSE 532, N7ELF 116/226, N7BGW 91, W7ZB 71/95, W7ODG 46, KA7AID 40, W7HLF 28, AL7W 8, W7LNE 8/25, N7DRP 0/34, KA7EEE 0/6

WASHINGTON: SM, Brad Wells, KR7L—STM: KD7ME. TC: W7BUN. ACC/ASM: KC7PH. SGL: KD7AC. OOC: N7IL. ASM: KD7G. Congrats to Tom, KC7PH, on becoming the new manager of the NWSSB net. Look for the article, "Trek to Toketie" by Bob Mullen, KC7UH, in the "Club Spectrum" column this issue. Contest news: Not a bad show from this Section in the December 10-Meter contest considering it's the bottom of the sunspot cycle. New faces and "old timers" both active in the 160 meter contest and enjoyable for all. Get ready for the VHF SS this month and the DX contests in February and March. Who will be the first from Washington Section to receive the "Golden Jubilee of DXCC" award? Qualification period: January 1 to December 31, 1987 and no QSLs required. Application forms from HQ or your local club. This Section is looking for a few good operators to take on ARRL station appointments as Official Bulletin Stations, Public Information Assistants, and Official Observers. The qualifications vary with each appointment. The benefits are many: low pay, long hours, and, occasionally, some public or even private recognition for a job well done. Station appointees are the real unsung heros in Section affairs. Contact me and request form FSD-187 to get all the information and a job application. Clubs: Issaquah ARC meets first Thursday at 7:30 PM, Community Hall, 185 E. Sunset Way, Issaquah. Contact N7GGW for further info. Mount Baker ARC meets second Tuesday at 7:00 PM, Air National Guard Building, Bellingham Int'l Airport, Bellingham. Contact NX7D for more info. Western Washington DX Club meets the second Tuesday at 6:00 PM, Lake City Elks Club, NE 145th and Lake City Way NE, Seattle. Contact N7TT for additional info. Museum or Mausoleum? Send your comments to the Northwest Division Director and League HQ on their proposal to spend several million $ for a radio museum. The entire staff wishes each and every one of you the very best for this new year. A very special thanks to all the operators who spent their time handling the load of Christmas traffic last month. The following reported traffic handled in October: K7AJT, W7APS, WA7CBN, W7GB, N7GDW, N7GGJ, K7GXZ, W7IEU, W7IGC, KR7L, W7LBK, KD7ME, KD7MW, K7OLX, K7SUX, KA7VEE, WA7YEN.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASST SM: W6ZF, N6DHN. EC: W6LKE. STM: K6APW. OO COORD: NY6Z. Welcome to our new Technical Coordinator, N6AMG. Joel brings to the job a broad background in communications including Satellite, EME, Contesting and Construction. NEARA had 12

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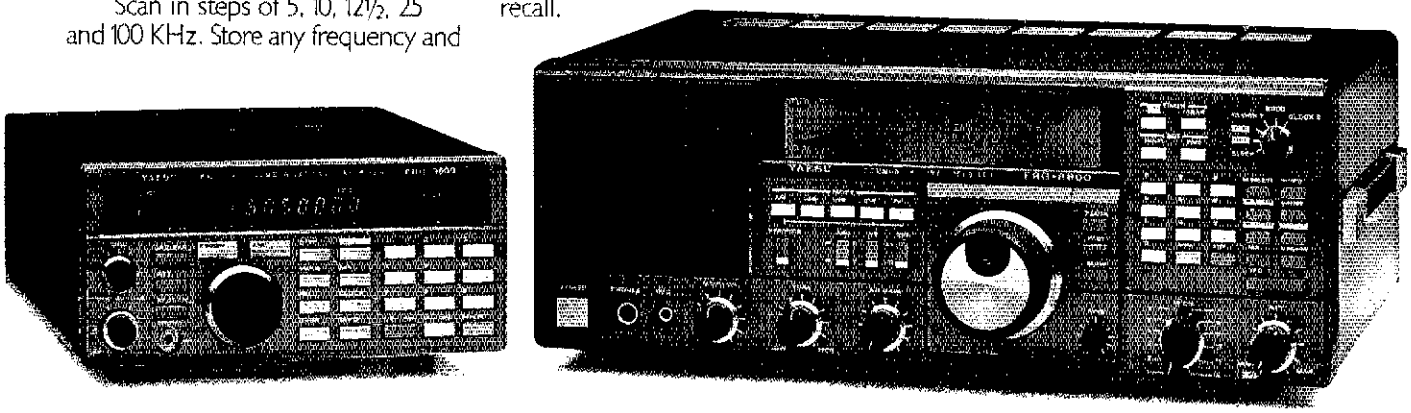

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And they'll rave about its full-featured performance and highly attractive price.

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Prices and specifications subject to change without notice.

members providing communications for the Annual Whaleboat Races. They welcomed new member KB6NXK. LARK's novice class has 9 future licensees in attendance. Their newsletter, "THE LARK", is edited by K2BIO and features columnar format with very readable print. HARC is again running a *novice class. Their "CHEWED RAG" features new editor* N6DOC. BARC has re-instituted the Club Breakfast on the third Saturday of each month. Meetings are on the second Wednesday, and nets are each Monday on 146.565 and 442.750 at 8 PM MDARC has scheduled their 1987 classes for novice through extra starting Feb 16. Instructors will be *WW6H, N6LFN, KI6HO, N6LQB and KT6Y. More info is* available on their weekly net, Monday at 7:30 P.M. on 147.66/06. Traffic: W6VOM 192. WB6DOB 59. WB6UZX 50.

NEVADA: SM, Joe Lambert, W8IXD—Two new ECs appointed: W6JBB in Fallon, KE7LL in Tonopah. Congrats to W6DIK, recently elected president of Western Agricultural *Society. Military hams transferred: KA7PUV to Plattsburgh* AFB, N4EGH to Pentagon—we miss them! So. Nev. ARES held first SET—a big success and very instructive. WA7JUO is close to WAS & WAC on 2 mtrs. Running eight 215WB'all SNARS provided communications for Western States Racing Assn. motocycle race. 14 operators participated. K7ICW made over 300 contacts from the UN station in N.Y. (AU1UN) during the 41st birthday during which it used the special callsign 4U41UN.) Congrats Al. Many So. Nev. hams have volunteered to make HAM/WEST a real success. This was the ARRL Nevada Section Convention which featured KB6ZV, Pac. Div. Dir. Contact WB5PTO re OBS appts., K7ICW re ATC jobs.

PACIFIC: SM, Army Curtis, AH6P— ASM: KH6BZF. *STM:* KH6HIJ. SEC: KH6B. ECs: Hawaii-WH6BDH; Kauai-KH6S; Maui-KH6H; Oahu-KH6NP. Aloha and hafa adai to all of the Pacific. Good participation on all islands for the annual SET. If we learned from it, it was all worthwhile. 94 is finally back on the air, thanks to the efforts of KH6KL and a little help from his friends. Thanks Pat. KH6UZ now the net manager for the 7290 afternoon net. Check it out. BIARC had a lot of fun with a weekend outing to Kaimu Beach. 4 rigs were set up, all on 12 volts. KH6GP, KH6AF, and KH6TR all recently in Hilo Hospital. Traffic: KH6S 65, KH6H 40, W6ORS 4.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—STM: WA6WJZ. SGL: N6IG. ACC & TC: W6RFF. SEC: KJ6R. DEC North: KF6KJ. DEC Sierra: KA6GHI. SECTION NET: First Sunday each Month, 8 PM, on 146.085, input up, Yuba/Sutter repeater WD6AXM/R. Net Control-W6IEW or W6RFF. Congratulations to the Yolo Amateur Radio Society for being recipients of the Outstanding Small Club in the Pacific Division Award for 1986. This is the second year in a row that a Sacramento Valley Section Club has received that award. Also, congratulations Sierra Foothills ARS for achieving Special Service Club status-the second one in the Section. How about some of the other, very active clubs? Note that Ron Wenstrom, KJ6R, has been added to the list of Section officials as Section EC. Unfortunately, by the time you read this, Ron will probably have been transferred to Southern California and the post will again be vacant. Thanks Ron, for all your work in the floods last spring and for organizing the Sacramento Emergency council. Good wishes in your new spot. Replacing Ron as Sacramento County EC is Jim Pearce, N6ESV, who has been very active in RACES and CARES. Thanks, Jim. VE tests for the coming year: GEARS, Chico. *First Sunday, Jan, Mar, May, Jul, Sep, Nov 1987*, Contact Walt, KE6EP. AMADOR, Jackson. Second Saturday, Mar, July, Nov. Contact Dave KE6NS. When you write the VEs be sure to include a stamped, self addressed envelope. Traffic: N6LUY 235, WA6WJZ 216, N6CVF 113, K6SRF 89, WD6BZQ 58, WA6ZUD 18, W6RFF 16, KI6GW 30, WB6SRQ 6, WD6EEZ 6, KB6COH 2.

SAN FRANCISCO: SM, Bob Smith, NA6T—SFRC made the the TV News during the El Salvador Earthquake with the Red Cross Station in operation tnx to W6JWF, WA6UVH, es WA6HVX plus two Spanish speaking intepreters. VOMARC Special Events Station was a total success, both good PR for Amateur Radio es over 500 Q's for the two weekends, good show!! ACS is looking for a Digital User Liaison))do you *usepacket,ASCII,AMTOR, or RTTY, your expertise is request*ed, contact K6LRN for further information. New FWRA meeting place is "The Pantry" in Eureka, Ca, any questions contact a FWRA MEMBER. KB6ZV and Myself will be in Eureka for the Feb. Brunch of FWRA, see you all there. DNARC has a new club station in the Old High School, new operating console, es now looking for equipment..you know..for a small club this group is sure progressive . . . keep it up. XMAS parties are in vogueforDEC . . . SFRC,SCRA, FWRAHARC, DNARC, MARC,etc. get out es enjoy the fun this year! SCRA flea Market was a huge success with the same good management the 3rd annual should be better, maybe try it TWICE a YEAR?? Nevada State Convention aka "HAM-WEST" was a huge success, 5000 in attendance, es 1000 at the banquet. Where were you? two days of forums, ALL the Manufacturers of Amateur Radio Gear were present, over 60 booths, don't miss it next year. 73, best of Holiday greetings and gud luck in the New Year. Lets make 1987 the best year for Amateur Radio. Get out and support YOUR hobby, help a young would-be amateur in obtaining his license, Help enlist a new member in the ARRL, support you local Club, SUPPORT AMATEUR RADIO !!

SAN JOAQUIN VALLEY: SM, Charles McConnell, W6DPD—SEC: WC6U. STM: N6AWH. TC: WA6EXV. ACC: W6DPD. Asst. SMs: W6TRP and K6YK. WN6A and N6ECH have resigned their appointments. Thanks for a good job. The following Section level appointments are available to qualified ARRL members: *PIO*, ATC, BM, and OO Coordinator. 1987 officers of the Lodi Amateur Radio Club are: Pres WB4AYE, VP KB6UW, S/T K6PJV. Editor K6URI. The club operates a net on Tuesdays at 1930 hours on 146.535 simplex. 1987 officers of the Central California DX Club are: Pres WA6UOR. 1st VP W6YO, 2nd VP K6PKO, S/T W6DPD. *WA6RPT is a SILENT KEY. WA6OIB is Extra. KB6GXX and* N6MZF are General. WA6OWP is WY6B. K6OZL has a TS 440. KB6GLN has a FT 757GX. WA6UOR has a Ten Tec Titan Amp. Traffic: N6AWH 67, N6MCY 47, W6DPD 32, WA6YAB 10, K6PMG 5, WD6FRS 4.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: *WA6OCV. TC: WA6PWW. STM: N6JLJ. PIO: WB6NLA. ASM:* N6JQJ & NS6S. ACC: W6MKM. BM: (vacant). OOCORD:(vacant). October '86 was a busy month in the section. Thanks to all of you who participated in the various SET exercises . . . FARS and EMARC both heard from the ubiquitous N7EQN on the local SKYWARN system . . . Project OS*CAR is planning a 25th anniversary celebration for OSCAR-I* for mid December . . . also, the local OSCAR Users Group net is now held on TUESDAY evenings on 147.15 + at 2000 (8PM) local time. This net is an excellent source of information that is current concerning OSCAR . . . the Gabilan ARC heard Carol W9HGI speak about satellite tracking . . . both SPECS and SVECS had successful *breakfasts . . . thanks to the folks in* the southern part of the section who assisted CDF on the Salinas fire in early November . . . the Public Service Honor Roll (PSHR) is becoming more active, members for October are listed below. I'm sure that many more of you qualify each

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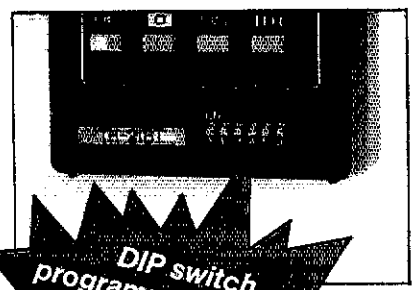
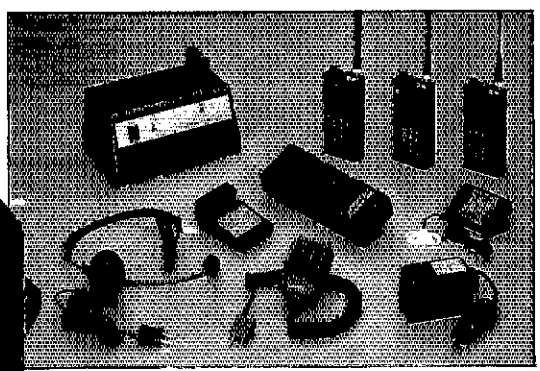
- **High or low power.** Choose 1 watt high—enough to "hit" most local repeaters; or a battery-saving 150 mW low.
- **Pocket portability!** Kenwood's TH-series HTs pack convenient, reliable performance in a package so small, it slips into your shirt pocket! It measures only 57 (2.24) W x 120 (4.72) H x 28 (1.1) D mm (inch) and weighs 260 g (.57 lb) **with PB-21.**
- **Expanded frequency coverage (TH-21BT/A).** Covers 141.000-150.995 MHz in 5 kHz steps, includes certain MARS and CAP frequencies.
  TH-31BT/A: 220.000-224.995 MHz in 5-kHz steps.
  TH-41BT/A: 440.000-449.995 MHz in 5-kHz steps.



DIP switch programmable CTCSS encoder built-in!

- **Easy-to-operate, functional design.** Three digit thumbwheel frequency selection and top-mounted controls increase operating ease.
- **Repeater offset switch.**
  TH-21BT/A: ±600 kHz, simplex.
  TH-31BT/A: −1.6 MHz, reverse simplex.
  TH-41BT/A: ±5 MHz, simplex.
- **Standard accessories:** Rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery pack, wrist strap.
- **Quick change, locking battery case.** The rechargeable battery case snaps securely into place. Optional battery cases and adapters are available.
- **Rugged, high impact molded case.** The high impact case is scuff resistant, to retain its attractive styling, even with hard use.



Optional accessories:
- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAH battery
- **PB-21H** NiCd 500 mAH battery
- **BC-2** wall charger for PB-21H
- **BC-6** 2-pack quick charger
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8/8T** soft cases with belt hook
- **BH-3** belt hook
- **AJ-3** thread-loc to BNC female adapter
- **RA-8A/9A/10A** StubbyDuk antenna
- **TU-6** sub-tone unit (TH-21AT/A only)

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TH-series transceivers shown with optional StubbyDuk antenna
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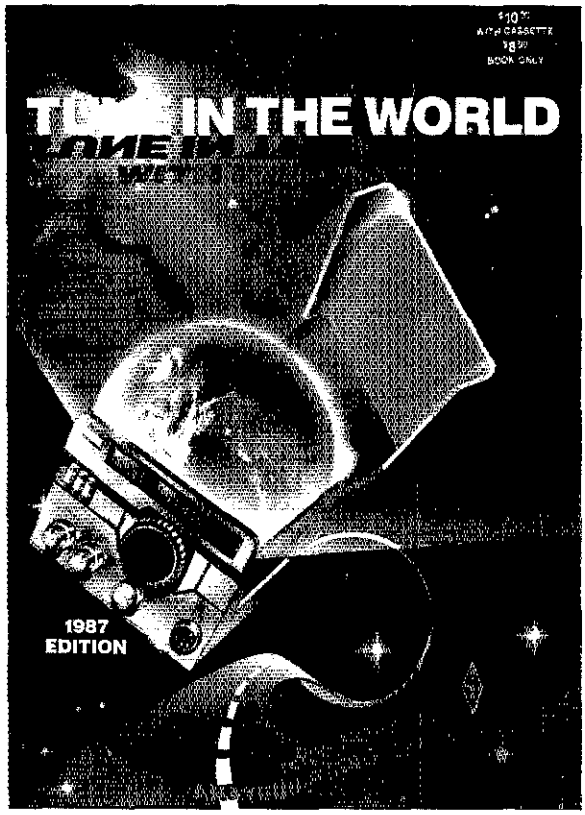

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- Learn the basics of communications electronics.

Tune In The World With Ham Radio has been used by thousands as their road to Amateur Radio adventure. The 6th Edition explains in simple bite-sized chunks what you need to know in order to pass your beginner's (Novice) exam. It also tells you how to select equipment for your first station and guides you step-by-step through your first on-the-air contact! In no time you will be communicating with new-found friends, *and* there's excitement too. During recent earthquakes and forest fires these active communicators were in the thick of the action, passing messages to loved ones and providing communications for rescue workers. Amateur communications satellites, ham-astronauts, and communication between home computers via digital ham networks are all part of the fun. A code learning cassette is included in the package. #0380 $10.00, Book only, #0399 $8.00

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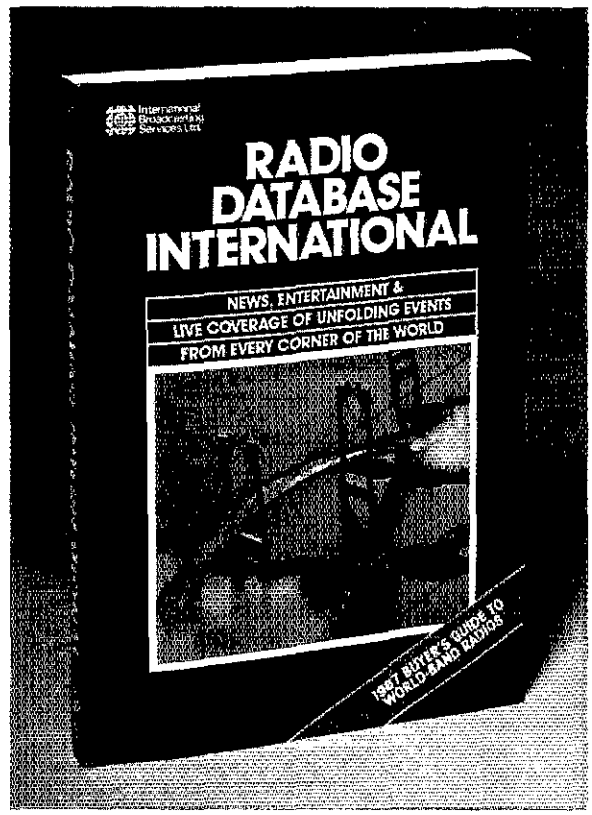
DISCOVER!

Here's your chance to discover (or rediscover) what is going on between our ham bands in the way of international broadcasting. Many modern Amateur Radio transceivers can receive these frequencies. Now it is easier than ever to hear world events as they happen — *providing* you know where and when to look for a particular station. **Radio Database International** lists shortwave broadcast stations by country and frequency. It also gives the language, power and antenna directivity at specific times. For example, when might you expect to hear an English language broadcast from Malta? The country listing shows such a transmission on 9515 kHz. For more detail you turn to the frequency listings and see that the broadcast takes place at 2030z with a power of 250 kW beaming Europe. The frequency listing makes identifying particular stations a snap! International radio is a great way of increasing your knowledge of the world. Something is happening *right now!* You can be a part of it by listening in on the medium and shortwave broadcast bands. 352 pages, 1987 edition $13.00 #RDBI.



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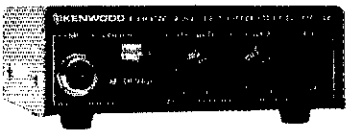
Accessories

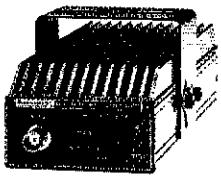
TL-922A 160-15 m 2 KW PEP/1 KW DC Input Linear Amplifier. Pair of EIMAC 3-500Z tubes and excellent IMD characteristics. Perfect safety protection with blower turn-off delay circuit.



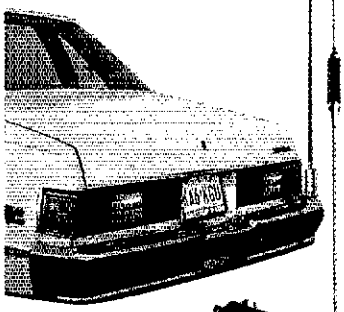
PC-1A Phone Patch (FCC Part 68 registered).

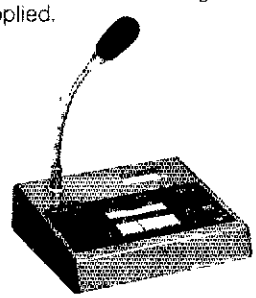
MA-5 80/40/20/15/10 meter mobile antenna. All resonators supplied. 200 W PEP max., VSWR 1.5:1 or less. Easily adjustable for center frequencies.

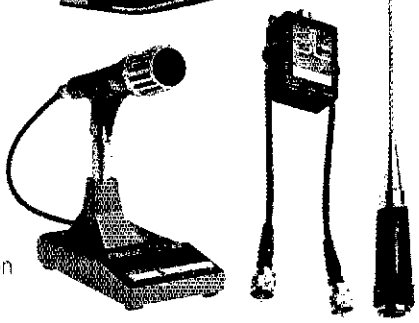
VP-1 Bumper mount for above.



VB-2530 25 W RF Power Amplifier (for TR-2600A). BNC-BNC cable, and mounting bracket supplied.

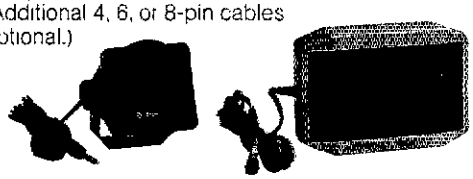






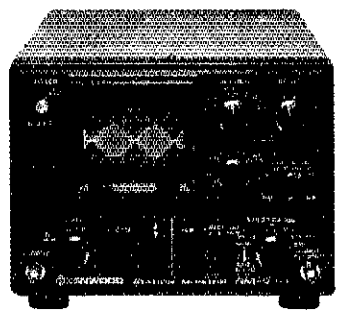
MC-85 (8-pin) Multi-function desk-top microphone (8-pin) 700 Ω unidirectional electret condenser mic. Built-in audio level compensation with output and tone control, meter, and UP/DOWN switch. Selector switch for up to three transceivers. (Additional 4, 6, or 8-pin cables optional.)

MC-60A (8-pin) Deluxe desk-top microphone. Pre-amp built-in, PTT, LOCK and UP/DOWN switches. Hi/Lo Z selector switch.

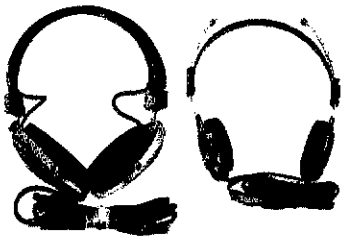


SP-40 Compact mobile speaker.

SP-50 Mobile speaker.



SM-220 Station monitor/10 MHz oscilloscope Pan display capability with optional BS-8 (for TS-940S, TS 830S). Monitor transmitted waveforms and/or received signal waveforms. Built-in 2-tone generator.



HS-5 Deluxe headphones.

HS-6 Lightweight headphones.

LF-30A Low pass filter. 1 kW, 50 Ω. Insertion loss: less than 0.5dB at 30 MHz.

MA-4000 2 m/70 cm dual band mobile gain antenna. Duplexer supplied. Ideal for use with the TW-4000A "Dual Bander" and TM-211A/TM-411A. (Mount not supplied.)

MJ-Series Microphone adapters

Not Shown:

MC-50 Desk-top microphone. Hi/Lo Z. 4-pin connector.

MC-80 Desk-top microphone. 700 Ω unidirectional electret element with flexible boom. Built-in mic. pre-amp and UP/DOWN switch, with lock. (8-pin).

MC-48B Hand microphone with 16-key DTMF pad and UP/DOWN switches. (8-pin).

MC-46 As above, but with 6-pin connector.

MC-43S Hand microphone with UP/DOWN switches. (8-pin).

MC-35S Noise cancelling hand microphone, 50 k Ω (4-pin).

MC-30S As above, but 500 Ω.

PG-4A Microphone cable for MC-60A. Converts MC-60A to 4-pin connector.

PG-4B As above, but 6-pin.

PG-4C As above, but 8-pin, as supplied with MC-60A.

PG-4D Extra 4-pin cable for MC-85.

PG-4E As above, but 6-pin.

PG-4F As above, but 8-pin.

HS-7 Micro-headphones.

KPS-7A 13.8 V DC, 7.5 A intermittent DC power supply.

RA-3 2 m, 5/8 λ telescoping antenna with BNC connector.

RA-5 2 m 1/4 λ / 70 cm 5/8 λ telescoping antenna with BNC connector.

RA-8B 2 m StubbyDuk® with BNC connector.

RA-9B As above, for 220 MHz.

RA-10B As above, for 440 MHz.

RD-20 Dummy load, 50 Ω DC-500 MHz 20 W continuous, 50 W intermittent.

PG-3A DC line filter for mobile use.

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month, but I need YOUR REPORTS to finish the job!. . .explorer post 599 is being reorganized in the Palo Alto area as a means to reach out to the younger people in our community . . . I need your inputs for this column and your totals for PSHR, send 'em in! My address is on page 8 of this very issue of QST! PSHR: KA6TGE, WB6VUL, W6NJR OO reports: K6AYB. Traffic: W6YBV 237, NR7E 103.

ROANOKE DIVISION

NORTH CAROLINA: SM, Rae Everhart, K4SWN—It's a HAPPY NEW YEAR. Did you make your amateur radio resolution? Prediction: This will be the YEAR for astronomical growth in Packet Radio. Many digipeaters popping up throughout section. Annual SET was very successful this year. KF4WY reports much activity with W4BFB and W4CQ clubs and packet radio used extensively. N4JRE conducted first SET in Ashe Co. KA4TLC made SET part of amateur radio demonstration to county fathers in Bladen Co. K4SWN used clubs new emergency generator to power repeater and activate the ARES net. Emphasis was on use of independent emergency power. State EOC used packet radio and very successful for first time use. N4MBI in Forsyth Co. combined SET/JOTA together. AB4W, SEC mailed scenario to ECs and an EXCELLENT SET using ARES/NTS was very successful. Thanks to all who participated. KJ4RF now AA4WI, KB4EFF now AA4WL. Hospitalized recently: K4KUT, N4JRE, KA4TLC, W4YVZ, and XYL of W4MHF. The W4DW group made FB photo in America's 400th Anniversary Fall issue detailing the Special Events Station WA5DJJ ATC in mountain area is available and as near as your telephone. VHF SS this month with competition for affiliated clubs. Good to see FCC granting credit for written exams. W4BFB, a Special Service Club, is now approved for validating WAS, 5-Band WAS, VUCC applications. It's no longer necessary to send QSL's to Hq. Contact WA4UNZ for details. PETN now operational on 147.015. N4LUO new NM THEN. Silent Keys: W4NZC, KD4ZE. SECTION QUARTERLY TRAFFIC REPORT. July, August, September.

NET	QNI	QTC	TFC	QND	SESSIONS	NM
NCMN	1235	509	458	1241	92	WB4HRR
NCEN	1695	589	515	2112	92	WB4WII
CN	1863	908	843	3242	184	NJ4L
CSN	928	234	211	2451	92	AA4MP
CNCTN	1011	390	323	1556	92	WA4MNR
PCTN	1336	268	220	1019	92	NE4J
RARS	974	82	82	1002	92	K4ABJ
M2MEN	2305	135	129	1498	91	KF4MZ
CFARS	1099	67	67	1175	92	W4EHF
PETN	732	198	183	1003	88	WB4HRR
THEN	967	107	66	913	62	N4LUO

Totals: 11 NETS 14,145 3,483 3,094 17,213 1,097. Efficiency on QTC/TFC is 89% VERY GOOD! Traffic for October: K4NLR 372, NJ4L 254, AA4MP 194, ABØY 163, N4JRE 140, K4JHF 128, WB4HRR 127, KA4TLC 117, KA4EYF 89, WB4WII 84, WD4HTE 70, AK1E 67, KB4IVV 64, K4IWW 62, WB4N 60, K4SWN 59, N4NTO 53, KI4YV 52, N4MMM 44, K4GI 43, WA4MNR 39, NT4K 37, WD4MRD 37, NE4J 33, KA4YMY 33, W4EHF 23, N4LUO 20, WD4EQK 19, N4CJJ 18, KB4NWX 14, KU4W 11, WB4CYN 10, N4JEO 8, N4KOZ 6, WD4RMQ 2, K4WC 2, (SEPT) N4UE 7, (AUG) N4UE 8, (Jul) N4UE 5. Total SAR's: 39.

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ— January marks the start of my third term as your SM and as I look back at what we, as a team, have accomplished for Amateur Radio, I wonder if our track record can be maintained for the next two years. With your help, WE CAN DO IT! WØIKT has called to my attention the need for a Calendar of Events for the Section. The calendar would contain dates and times for key events-SET, SC QSO Party hamfests, local ARES and RACES drills, etc. This would be a valuable planning tool for you and the Section Staff. Send me by mail or radiogram, a list of your clubs activities. I will collect, maintain and distribute the calendar, Second, if you or your club has an activity that is worthy of dissemination to others in the Section, put it in writing and I will publish it in this column. I am specifically interested in any program or activity that is drawing young people into Amateur Radio. If you have a success story, share it with others in the Section-GET INVOLVED! Traffic: K4ZN 184, KA4BZA 93, WØIKT 88, W4FMZ 59, W4ANK 57, KA4LRM 45, WB4UDK 26, KA4YEA 14.

VIRGINIA: SM, Claude Feigley, W3ATQ— STM: KB4WT. SEC: N4EXQ. ACC: NT4S. OOC: W4HU. BM: AB4U. TC: WB4MAE. For a listing of Virginia section NTS Net listings see last month's QST. As a result of a FREAK wind storm, the 275 ft tower on which the Williamsburg repeater antenna was mounted became a twisted mass of antennas, guy wires and transmission lines. This disasterous event has prompted K4JST, EC for Charles City County, to issue these warnings; (1) Do not rely upon commercial power for your emergency communications equipment, (2) Do not plan on having a repeater available, (3) Make a habit of listening on the repeater output frequency anytime there is a Weather Watch in effect, (4) Make sure you have an antenna and adequate power supply available for operation under simplex conditions. After many years of faithful service to Virginia and NTS region nets, WA4LJI has decided to take a rest. Lamar will be missed by all his tfc friends. SEC, N4EXQ, reports the Section has 786 ARES members with 25 local emergency nets reporting activity of 182 net sessions or drills. Twenty two DEC/EC reports were received. Thanks to the New River club for submitting their 1986 Annual report. KB4DJX has requested ARRL club affiliation info for the Newport News Amateur Radio Club. With the recent upswing of DX activity on 10 and 15 meters all DXers should have S.A.S.E envelopes on file at their QSL bureau, if you need info on QSL bureau operation contact the SM. OO reports were received from W4HU, K4JDJ, W8IRT and KE4EQ. The SPARK group reports their experiment with a training class designed to take you from no-license to General Class has proven highly successful. A feature of this class is a "Hands-On" session where participants will be given the chance to handle actual equipment. The next issue of the Viriginia Ham is scheduled for late January. Please submit any articles or input you may have to NN4I before Jan.10th. An effort will be made to improve the mailing time on future issues with a traffic count of 5238 for the month with 41 stations reporting. N4GHI and N4EXQ lead the pack with newcomers WB4ZTR and KI4BR reporting nice totals. I wish the best of Seasons greeting to all and may you have a Happy and Healthful New Year. Lets make 1987 a Banner Year for the Virginia Section. Traffic: N4GHI 1188, N4EXQ 625, WA4CCK 392, AA4AT 369, W3ATQ 278, K4MTX 227, KB4WT 226, K4JST 181, WB4PNY 169, KB4NGO 151, WD4OCW 136, K4DOR 106, WB4EDB 96, WD4ALY 95, WD4MIS 90, WB4KSG 83, AA4GL 81, N4KSO 79, W4JLS 76, NT4S 59, WB4ZTR 58, KI4BR 56, K4JM 53, WB4ZNB 49, NN4I 41, W4TZC 39, K4GR 35, K4VWK 34, N6ANQ 31, KJ4MF 30, K4MLC 28, WB4UHC 20, KA4IUM 12, NW4O 12, WB4KIT 9, N4FNT 6, N3RC 6, WA4TVS 5, K4AXF 4, W4YE 3, WA1VRL 1.

WEST VIRIGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: KD8G. ACC: WA8CTO. SGL: K8BS. TC: K8CG, WV CVRA/SERA Director WB8GDY. New dates for

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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.
- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **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.
- **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.
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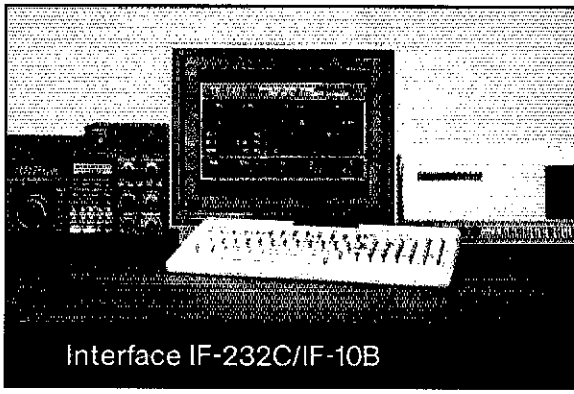
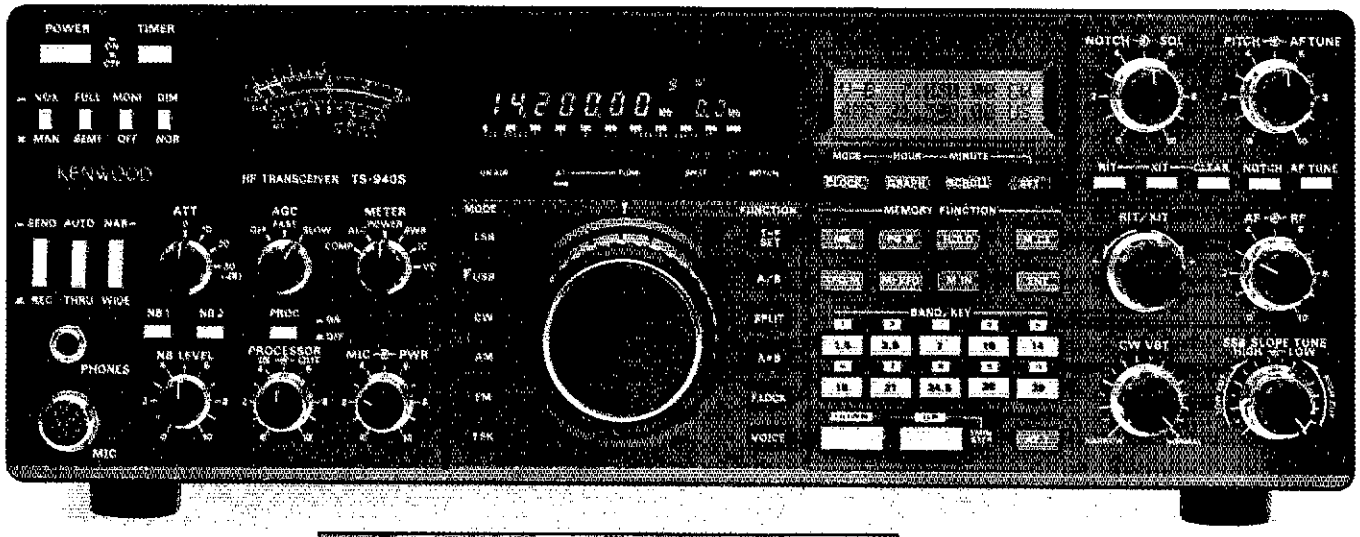


Interface IF-232C/IF-10B



Complete service manuals are available for all Trio-Kenwood transceivers and most accessories.
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More TS-940S information is available from authorized Kenwood dealers.

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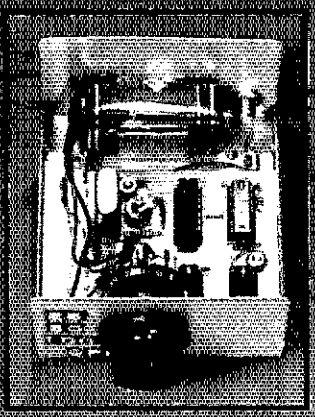
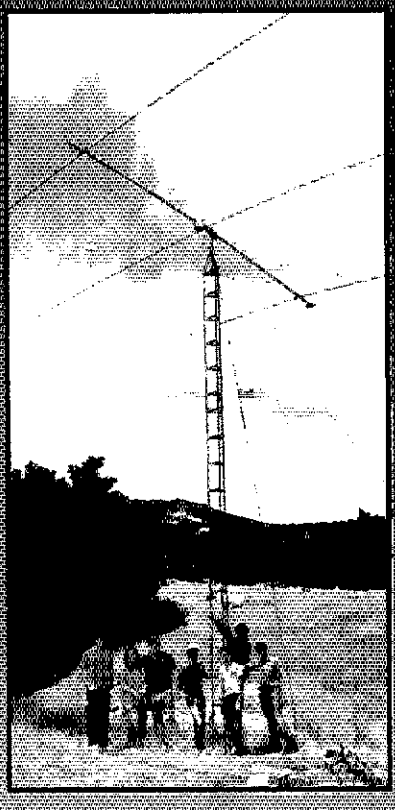
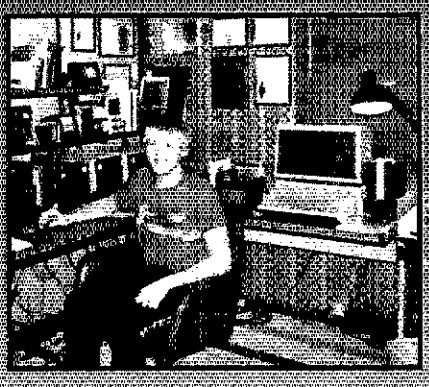
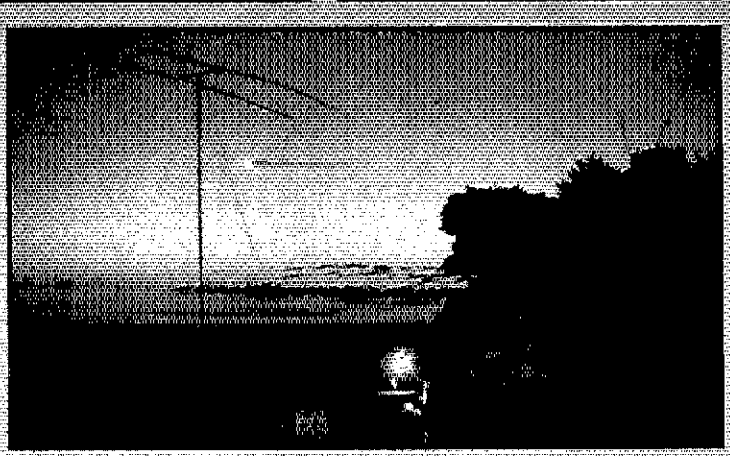
THE 1987 ARRL HANDBOOK

FOR THE RADIO AMATEUR









PUBLISHED BY: THE AMERICAN RADIO RELAY LEAGUE

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The 1987 ARRL Handbook for the Radio Amateur **is your source for the most up-to-date information on:**

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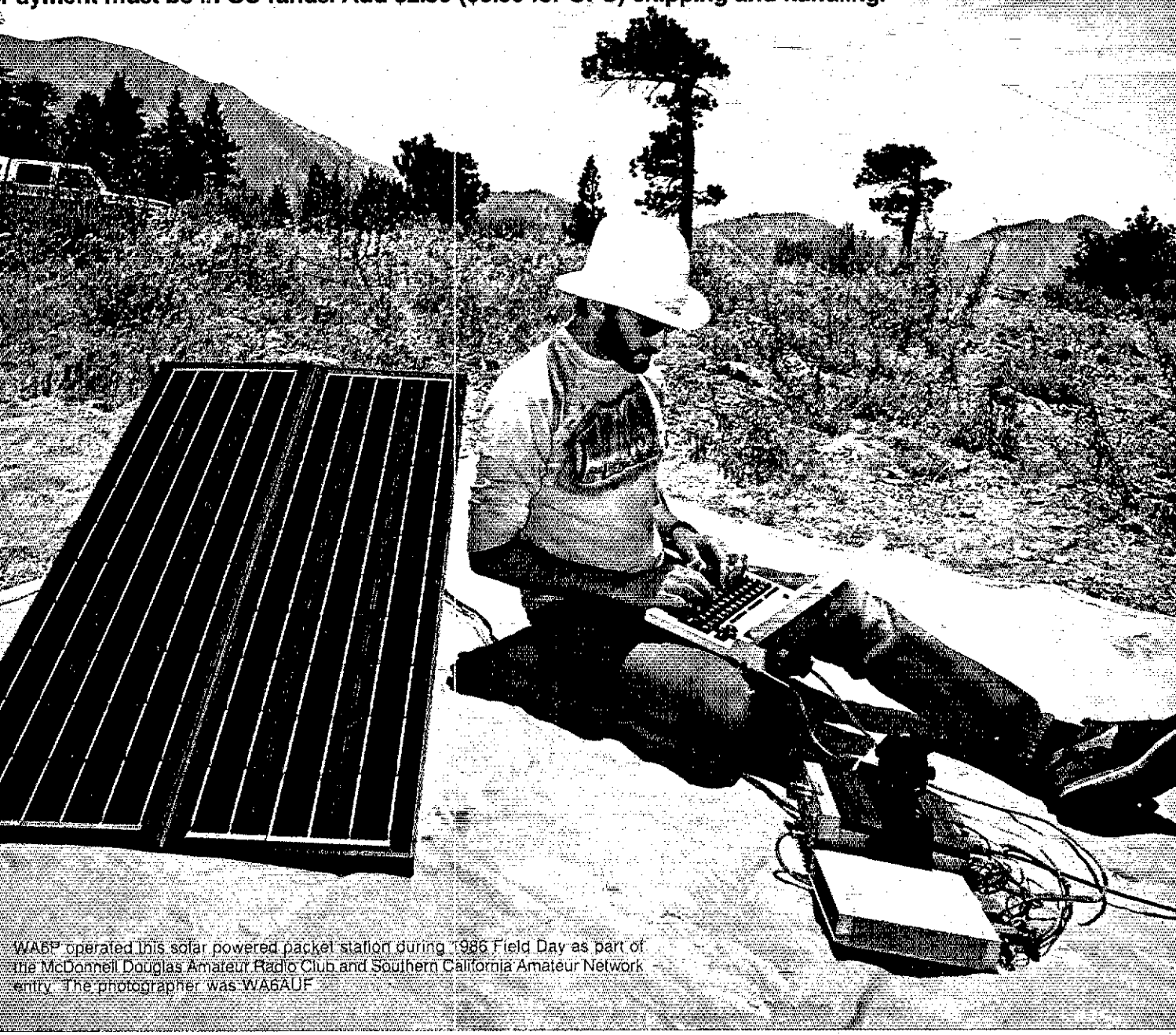
The 64th edition has 40 chapters and over 1200 pages. It's packed with practical construction projects and there are many with printed-circuit board etching patterns. Every year the *Handbook* is updated to reflect changes in the state-of-the-art. Whether you are a radio amateur, engineer or technician you'll find the latest edition a must addition to your technical library. There is no change in price from last year! Paperbound: $18 in the US, $19 elsewhere; cloth: $27 US, $29 elsewhere. Payment must be in US funds. Add $2.50 ($3.50 for UPS) shipping and handling.



WA6P operated this solar powered packet station during 1986 Field Day as part of the McDonnell Douglas Amateur Radio Club and Southern California Amateur Network entry. The photographer was WA6AUF.

JAX mill will be July 24, 25, & 26, 1987. Plans are shaping up for a bigger and better Chas. area H.F., to be held on April 5, 1987, also a new date. We now have 556 ARES members in WV. Many of which were active in SET.

NET	FREQ	TIME	QNI	QTC	SESS	NM
WVN	3587	7:00	246	90	30	KZ8Q
WVMD	7235	QQ:45	666	41	31	W8FZP
WVFN	3865	6:00	1219	162	31	W8YP
WVNN	3730	5:30	136	37	28	WD8LDY
Hillbilly	14290	Noon su	119	7	4	W8YP

Traffic: KZ8Q 351, WD8LDY 332, KE8FI 213, K8TPF 150, KD8VT 79, W8FZP 72, KA8WNO 67, K8QEW 57, K8UQY 54, KD8G 51, W8YP 50, N8FXH 38, K8KG 32, NC8G 29, KA8OGF 12, NJ8J 3.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J—ASM: KA0MQA. SEC: WB0FQB. STM: N0DZA. OO: W0ACH. ACC: WB0DUV. PIO: NOF0E. SGL: WD0GQL. TC: NC0F. BM: KA0CZW. The ASM for the Western Slope W0RSG, has moved back east to accept a new job. I would like to take this opportunity to thank him for his many hours of work on Section projects. As we begin 1987, many clubs and repeater groups will be electing new officers, and we wish them the best in their future endeavors for the year. Look for the bands to be more active with the prediction that the Sun Spot Cycle 21 is over. Packet radio has been growing by leaps and bounds in the state of Colorado, our three mountain digi's across the continental divide have been performing extremely well under very harsh winter conditions, we are able to connect into Wyoming, Nebraska and parts of Kansas and this spring should see a reliable path into Utah and into the southwest portion of Colorado. We will see more and more NTS and ARES traffic being passed by this mode in 1987, as more and more amateurs become involved with packet radio. NETS: CWN; QNI 96, QTC 86, QNF 449, Sess 26. CWXN; QNI 2979, QTC 2444, QNF 2790, Sess 31, COL; QNI 1948, QTC 43-inf 149, QNF 1023, 27 sess. HNN; QNI 1818, QTC 110-inf 387, QNF 1243, 31 sess NCTN; QNI 232, QTC 107, QNF 266, 28 sess. SCTN QNI 93 QTC 30, 12 sess. Traffic: N0BQP 2215, WA0HJZ 1382 K0RXK 614, K0JAN 585, KA0TXX 560, KB0Z 208, WD0BSZ 108, WB0FFV 96, KA0NLI 69, N0DZA 41, W0NFW 31, N0FCP 21.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: KB5XD. STM: ND5T. NMs: WA5UNO K6LL W5QNR. TC: W8GY. ACC: W5HD. Southwest Net (SWN) meets daily on 3583/7083 at 0230 UTC and handled 139 msgs with 206 stations in. New Mexico Roadrunner Net meets daily on 3939 at 0100 UTC and handled 78 msgs with 1354 stations in. New Mexico Breakfast Club meets daily on 3939 at 1330 UTC and handled 120 msgs with 1086 stations in. Yucca 2-mtr Net 01/61 handled 23 msgs with 458 checkins. Caravan Club 2-mtr Net 66/06 handled 43 msgs with 171 checkins. SCAT 2-mtr Net 66/06 handled 4 msgs with 702 checkins. Info Net, 113 checkins on 13/73. K3HOX a SK, fm Hachita, NM. K5BIS is new ASM & K6YEJ is new SEC. A warm welcome to you both. W5QNR is new NM for Breakfast Club. Congrats to W5HD on his new position as Vice Director of our Division and to AG0X as our new Director. W5DVA a SK. Traffic: W5DAD 72, KN5D Gateway BBS 801 connects w/112 hrs.

UTAH: SM, Jim Brown, NA7G—SEC: Rich Fisher, NS7K. STM: John Sampson, W7OCX. ACC: Stan Sjol, W0KP. TC: Ron Jones, K7RJ. OOC: Larry Baker, KD7FL. BM: Dallas Barrett, WA7MEL. SGL: Paul Benner, KE7QA. ASM for VE Program: Bill Moyes, N7IE. UCN NM: NS7K. BUN NM: NA7G. Questions involving any of the above areas can be directed to the persons listed. Hope the fall windstorms didn't cause damage—I lost a 2m ant but the tower remained up. GL operating; CU on 160. 73 de NA7G. Traffic: WA7KHE 108, WA7MEL 61, N7ASY 22, K7MG 20, NA7G 15, W7OCX 7, N7BQE 2.

WYOMING: SM, Dick Wunder, WA7WFC—Asst. Section Mgr: Steve Cochrane, KA7AWS. Section Emergency Coord: Jim Anderson, W7TVK. Packet radio is growing at a moderate rate in the state with a new digipeter on the air on Casper mountain, W7ZAC-1. KA3IDN, of Cheyenne, installed second digi, KA3IDN-2, near Bushnell, Nebraska which provides a link into the panhandle of Nebraska. TNX to all involved for their efforts and contributions. Maybe there is sufficient activity to support a statewide packet group. W7SDA hosted 18 Scouts and 2 Scoutmasters for the Boyscout's Jamboree-on-the-Air. KC7AR reports the Wyo. Cowboy Net held 23 sessions with 949 QNI & 11 QTC. Albany Co. 2M RACES had 21 QNI. Traffic: NN7H 282.

SOUTHEASTERN DIVISION

ALABAMA: SM, Joseph E. Smith, Jr., WA4RNP—STM: N4JAW. SGL: KA4WVU. BM: KF4VV. OO/A AUX: AA4BL. TC: N4AU. ATC: WB4BYQ. ACC: WA4RNP. "act" SEC: WA4RNP. We have two new Assistant Technical Coordinators in the Section: KF4MH, Harold McDonald of Mobile and W4DAQ, Mac Jordan of Demopolis. I have received one Silent Key Report: K4PLE, Arthur L. Smith of Ider, AL. In this new year let's rededicate ourselves anew to the task of providing service to the public. This year let's all work on our cw skills, qualify for (WAS-WAC-WAZ-DXCC-QR?). Try a new mode, join a club, or become an Elmer. During the last few years as your Section Mgr we have "Done more in 84", "Came alive in 85", "Did more tricks in 86", and now it's going to be "Heaven in 87". Traffic: CAND reports 504 messages in 3. Sessions with DRN5 REP 100% by WA4JDH, W4CKS, and NW4X. DRN5 reports 651 messages in 62 sessions with Alabama Rep 85% by WA4JDH, W4CKS, NW4X, W4WJF, and W4PIM. AENO reports 50 messages passed in 31 sessions with other nets represented by WA4JDH, WD4NYL, KJ4MG, W4DEU, and N4DCS. AENB reports 54 messages passed in 31 sessions with RN5 represented by WA4JDH, W4CKS, W4OAT, NW4X, and WA4FAT. Brass Pounders League: WA4JDH. PSHR: WA4JDH, W4CKS, and WA4RNP. TOTALS: WA4JDH 895, W4CKS 119, WA4RNP 40, K4AOZ 34, W4DGH 28, WD4NYL 25, W4WJF 12, and WB4TVY 6. Seven Three, Joe.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM & BM: K4VHC. SEC: NC4E. STM: WB4WQL. ACC: WA4ABY. OOC: NA4I. PIO: WB4DEB. SGL: W4BTZ. TC: WD4PAH. Now is the time before the Georgia State Legislature meets to get with the elected officials in your area & talk to them about getting our Georgia state license tags back on the "AMATEUR RADIO" status. Also on reducing the fee back to where it was. It will take all of us & not just a few to get the message over to them. Before you get your club or group ready to meet with them have plenty of ammunition on what the Amateur in Georgia & throughout the ountry has done for the citizens in times of emergencies etc. Sometime I think that most of them don't know that Amateur Radio exists and it's purposes. Remember it's going to take all of us to get this done before the next set of plates are issued. This is the beginning of a new year, and I want to thank all of you for the banner year we had in '86. We gained many new affiliated clubs, the ARES program is in the best shape it's ever been in, the VE program is really working. I don't think that anybody who wants to take a test can complain & this is all due to the FB hams we have in the section. There are many local nets in the section. Please let our SEC, NC4E, be informed as to the time & Freq of these nets. Jot it down on a postcard and mail it to: Jack Sanders, NC4E, at 2640 Whitehurst Dr Marietta, GA 30062. This is the beginning of a New Year & I hope that we can have the FB coopration that has been given to us in the past. HAPPY NEW YEAR to all. Traffic: W4PIM 168, WD4COL 155, WB4WQL 96, W4WXA 84, WB4DVZ 70, K4MOG 69, KF4FG 59, W9NXC 53, WD4NGI 44, KA4ATM 41, K4BAI 40, AA4JV 24, N4MWR 23, K4EV 20, KA4HHE 19, KC5VH 14, W4HON 11, K4NM 10, W4OHH 5.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—ACC: WD4RIQ. BM: KB4LB. OO/RFI: K4JJE. PIO: WA4PUO. SEC: WA4PUP. SGL: KC4N. STM: WB4GHU. TC: N4KF. Early this month your SM had the opportunity to visit ARRL HQ and meet with a number of the staff who keep ARRL running smoothly. Had the chance to meet with Rick Palm, K1CE; Mike Riley, KX1B; Steve Ewald, WA4CMS; Curt Holsopple, K9CH; Bernice Dunn, KA1KXQ; Lee Hayford, AH2W; Vicky Armentano; Jim Clary WB9IHH. Didn't have time to meet with any others, but next time in CT I will do it again. It was good to meet these people at their workplace and to see how they all pull together for the good of our Amateur Radio pursuit. WD4RIQ, our ACC, reports that several clubs are interested in affiliation and that the Silver Springs RC has been renewed as a SSC. Congratulations to this fine Ocala group. N4BLD in Orlando, is trying to pull together locations of Digipeters to prepare a guide how to get "there" from "here"! If he contacts you, please give him all the help you can so Packet Radio will continue to grow with guidance and direction. If you are a person who likes a challenge and also has a desire to aid people solve radio problems, please let your SM know about you. Charlie, N4KF, who is our TC will be leaving his post shortly after the first of 1987. We wish him well in any new venture he starts. We will need to replace him. So let me know of your interest. 73, Roy, N4ADI. Traffic: WX4H 576, N4PL 520, WA4QXT 425, KC4VK 225, KB9LT 196, WD4IIO 188, WA4EYU 176, AA4HT 153, N4GMU 149, KI4CQ 129, KB4LB 123, WD4IUI 88, KI4PB 68, N4JAQ 62, NS4C 57, N2AOX 51, NF4O 44, KB4FIY 43, KA4KAH 39, W4GUJ 34, N4EDH 32, W7YWF 30, WA4PUP 29, WA4SXW 26, WB4FJY 25, W4LDY 23, WB4TZR 22, WD4RIQ 21, WD4HUZ 21, W4DTV 19, NQ4P 19, KF4GY 17, WD4HBP 16, N2DY 16, WB4HBH 15, WB4AWG 14, N4EML 12, N4JHI 10, W8IM 9, N4UF 4.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: W4WYR. SGL: KC4N. OOC: W4TAH. ACC: WA4NBE. WD4KBW reports 90 bulletins received and 203 sent by AA4BN 14, W4DL 39, WT4F 13, KA4GUS 37, K4IEK 32, WD4KBW 41, and an amazing 117 by WA4EIC. W4TAH is continuing to attempt to make the Amateur Auxiliary a functional operation. His newsletter to OOs is excellent, and he is establishing a weekly net for the OOs to meet together to discuss coordination of their activities. Congrats to W4WYR who passed

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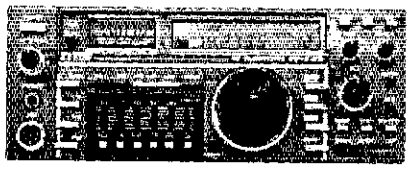
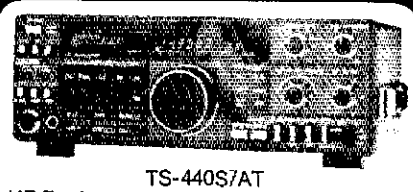


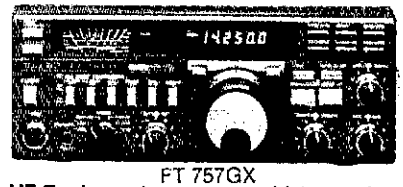
IC-735

HF Equipment	List	Juns
IC-735 Gen. Cvg Xcvr	999.00	Call $
IC-745 Gen. Cvg Xcvr	1049.00	Call $
IC-751A Gen. Cvg Xcvr	1649.00	Call $
Receivers		
IC-R7000 25-1300+MHz Rcvr	1099.00	Call $
IC-R71A 100kHz-30 MHz Rcvr	949.00	Call $
VHF		
IC-271A All Mode Base 25w	859.00	Call $
IC-271H All Mode Base 100W	1099.00	Call $
IC-27A FM Mobile 25w	429.00	Call $
IC-27H FM Mobile 45w	459.00	Call $
IC-28A FM Mobile 25w	429.00	Call $
IC-28H FM Mobile 45w	459.00	Call $
IC-2AT FM HT	299.00	Call $
IC-02AT FM HT	399.00	Call $
IC-U2AT	NEW!	Call $
UHF		
IC-471A All Mode Base 25W	979.00	Call $
IC-471H All Mode Base 75w	1339.00	Call $
IC-47A FM Mobile 25w	549.00	Call $
IC-4AT FM HT	339.00	Call $
IC-04AT FM HT	449.00	Call $
IC-3200A FM 2m/70cm 25W	599.00	Call $
220MHZ		
IC-37A FM Mobile 25w	499.00	Call $
IC-3ATFM HT	339.00	Call $
Repeaters		
IC-RP3010 440 MHz	1229.00	Call $
IC-RP1210 1.2 GHz	1479.00	Call $



TS-440S7AT

HF Equipment	List	Juns
TS-940SAT Gen. Cvg Xcvr	2249.95	Call $
TS-940S Gen. Cvg Xcvr	2049.95	Call $
TS-930S/AT Gen. Cvg Xcvr	1849.95	Call $
TS-830S Xcvr	1099.95	Call $
TS-530SP Xcvr	899.95	Call $
TS-430S Gen. Cvg Xcvr	819.95	Call $
TS-440S/AT Gen. Cvg Xcvr	1199.95	Call $
TS-440S Gen. Cvg Xcvr	1049.95	Call $
Receivers		
R-5000 NEW!	899.95	Call $
R-2000 150kHz-30 MHz	649.95	Call $
TS-670 All Mode Quad 6M	799.95	Call $
VHF		
TS-711A All Mode Base 25w	899.95	Call $
TR-751A All Mode Mobile 25w	599.95	Call $
TM-201B FM Mobile 45w	369.95	Call $
TM-211A FM Mobile 25w	399.95	Call $
TM-2530A FM Mobile 25w	429.95	Call $
TM-2550A FM Mobile 45w	469.95	Call $
TM-2570A FM Mobile 70w	559.95	Call $
TH-21AT FM, HT	249.95	Call $
TR-2600A FM, HT	359.95	Call $
UHF		
TS-811A All Mode Base 25w	1049.95	Call $
TM-401B FM Mobile 25w	399.95	Call $
TM-411A FM Mobile 25w	449.95	Call $
TH-41AT FM, HT	259.95	Call $
TR-3600 FM HT	369.95	Call $
220MHZ		
TM-3530A FM 220MHz 25w	449.95	Call $
TH-31AT FM 220 MHz HT	259.95	Call $
TL-922A HF Amp	1499.95	Call $



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430/726 430-440MHz	329.95	Call $
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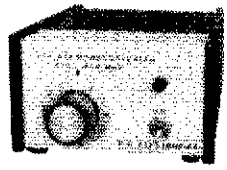

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her real estate exam and is now busy in that line of work in addition to her radio activities. I certainly enjoyed the Suncoast Conference in St Petersburg. There were excellent meetings involving emergency communications, traffic handling and an ARRL forum. At the emergency meeting it was noted that Florida has not had a statewide exercise in several years. The consensus was that we need to consider one possibly next year which involves the hf nets. I know W4SS and WA4PUP will give this careful consideration-they will certainly need the FULL cooperation of their ECs! In talking with W4SS, he said that he is in the preliminary phase of rewriting the Southern Florida Emergency Plan. Please note the difference between the emergency plan and the emergency schedule. The emergency schedule outlines the areas of responsibility for the statewide hf nets. Copies of the emergency schedule are available from K4ZK by sending a self-addressed stamped envelope. FReD is certainly impressive and will be invaluable as a source of information for the various field appointments-it will get only more accurate as there is now excellent coordination between my records and those at headquarters. KB4XE reports that hams from all over Broward County joined forces to help Coral Springs hams to serve as parade marshals for the Coral Springs Our Town Parade. Hams participating included WA4AZP KA4UDX KI4NO WB5JFM K4HGD W4OZG N4NQO W4NEE WA4MJI KB4QVY N4KBC N4LXK WA2HFA WB4QLN WS4G WA4QQR KB4XE N4ORX WD4BDE KOHJW N8CVM WB4KKG N4ORN KA4KUI. N4KB begins his winter TCC sked beginning November 27. K4ZK has assumed the responsibility for managing the Fast Net until a replacement is appointed. W4WDK reports that the Highlands County ARC provided communications assistance to the Rotary Club for their first sanctioned 5000 meter run. Hams participating were N4MTH K4ZNB KI4XM W8OKW WB4ZRH WB4PWC and WD4WDK. WD4WDK also included a copy of an article entitled, The Two-Meter Repeater — An Emergency Management Asset. It appeared in the September, 1986 issue of "Hazard Monthly". The story was conceived and written by Highlands County Emergency Management Director Bruce Savage. Too long to put here but contact WD4WDK with an SASE if interested. 73 de WA4PFK. Traffic: W3CUL 3006, W3VR 1040, WA4PFK 316, W4NFK 255, K4ZK 246, WA4EIC 201, K4SCL 180, K4IA 160, WA4RUE 156, K4EUK 148, WB4WYG 147, KA4GUS 133, AA4BN 128, KA4NXF 123, WD4KBW 111, KA4FZI 94, W3TLV 88, KF4RL 81, KF4JA 74, W4TAH 72, N4KB 67, KB4MON 66, KA4SIH 63, N4ET 61, KI4ZW 56, W4DL 56, KF4YE 55, WA4NBE 55, KA4AMC 52, N4MML 45 N4HAS 45, KA4YHS 38, WT4F 38, WA4GCK 37, W4SME 31, KJ4WJ 31, KB4KXV 28, K5IHH 28, WD4CHO 26, KB4LPL 23, W3IJR 22, KYOT 20, N4NZI 20, K4FQU 19, K4JI 19, WD4NXK 19, K4BLM 15, KB4KAW 14, N4ILN 12, W4WYR 12, W4MPV 9, KA4KDD 9, KD4GR 9, W4MFD 8, NX5Q 8, WA9VND 8, W4DWN 7, N4OIN 6, WD9AEP 6, AA4CH 6, AA4IF 3, N4ORN 3, N4LLZ 1, WB4GSV 1, WD4MCC 1. (Sept) K4SCL 195, AA4IF 1.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K6LL, KA7HEV, WB7CAG. ASM: K7OMR. SEC: KX7P. ACCs: N7ECE, W8YOY. BM: N7EH. SGL: W7YXE. TC: K7KI. OOC: NJ7E. John, NJ7E, successfully negotiated an L.I.C. agreement with FCC Field Office allowing Section Official Observers to participate in the Volunteer Monitoring program. Congratulations. Bart, K7CC, is sending computerized code practice on 147.42 MHz weekdays from 3 to 9 PM local time, and all day Sat. and Sun. He would welcome reports from users. The Arizona Cactus Keys got officially organized in Sept. with the following officers: Pres. Norma N7GLC; V.P. Phyllis, W2GLB; Secretary Carrie KA7VYF; Treas. Marilyn, N7DFH; Directors are Ruby, W7JZA and Donna, WB6UJG. Good luck, gals. Central AZ DX Assoc. reports members had great results in CQ WW Phone test due to unusual band condx particularly on ten and fifteen meters. Your SM worked numerous VK/ZLs on ten running fifty watts input. Maybe, just maybe we've turned the corner on the cycle! John, KQ7T, our EC in Cottonwood sent in a very complete and extensive report on the recent Simulated Emergency Test conducted by the Verde Valley ARES Net. Fourteen stations participated and coordinated with Chief of Police, National Guard, Red Cross, C.A.P., Highway Patrol and Hazardous Waste Control during the drill. The report is complete with documented statements of all participants. Great work and thanks to all who participated. If other ARES nets would like copies of their FB report, I can make it available. I want to wish all AZ section members the best of SEASONS GREETING for 1986, and as my term comes to an end, I've decided that if the members want me to run again, I will stand for reelection. Thanks guys, & 73, Jim. October Traffic Report:

NET	QNI	QTC	Time (MST)	Freq (MHz)
ATEN	942	79	1930	3.992
Cactus HF	535	72	1800	3.915
Cactus VHF	333	81	1830	147.26
SWN	206	139	1930	3.583

KA7MUL 522, W7GAQ 186, W7AMM 162, KN7U 159, W7EP 90, W7LVB 46, K7JKM 17, K7POF 10, KN7U PSHR 94.

LOS ANGELES: SM, Bob Poole, AJ6F— ASM:K6IYK. SEC:AK6Y. STM:W6INH. ACC:KX7Q. PIO:NJ6K. OOC:K6BMG. TC:WB6QPO. Many of the ARRL people in the section head for Las Vegas and the HamWest convention; I will be there for all the fellowship and of course the 'Vegas-style FUN! ARES, in it's recent growth and expansion, has decided to create a fifth district within the section; WA6YVL will be the DEC for the newly-created Northern district which will encompass the Antelope Valley and points on the northern side of the San Gabriel Mountains. The Hughes Club reports that WA6OPB recently retired; congratulations, Maurice! Add one more PSHR Honor roll member: WA6UVV; congratulations to you too, Bob! The Northrop ARC repeater (W6VPZ/R, 224.62) is sporting a new repeater controller that features some of the bell and whistle technology heard on many other repeaters in the area; Tom, WX6N, and yours truly, managed the integration process (Tom is a Section Assistant Technical Coordinator, repeater technology). W6FNO/R is again in the news with 223 emergency traffic items; N6AHT led the traffic scores with 55 while newly-elected PSHR member WA6UVV placed second with 40 and K6IDU reported 28. The FNO group also supported the Riverside Mountain Rescue Unit, McDonald's Bike against Diabetes and a simulated earth quake exercise with the Red Cross. The VOLMON leadership announced that the club monitor program is now underway; clubs and other groups are encouraged to form monitoring groups and to contact the SM for information on standard practices and procedures. DON'T take matters in your own hands; get this powerful new tool behind your interference problems. Hundreds of Archie Comics were distributed to Scouts at the Jamboree On The Air recently by the LAACARC. My thanks to AH2W at HQ for getting the comics here in time for the event. SGVARC's annual report pointed out that club's commitment to the following FY 1986 activities: Rose Parade, Golden Days Parade (Azusa), Billy Barty Golf Tourney, Monrovia Parade, Mexico City Emergency, San Dimas Western Daze and the San Dimas 10K run and parade. WA2KDL of the TRW ARC reminds us that the Swapmeet is every last Saturday; Chris further states that this is merely a

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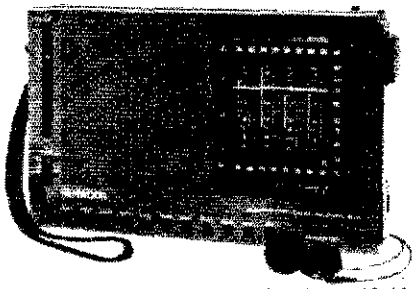

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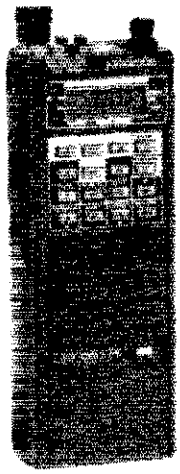

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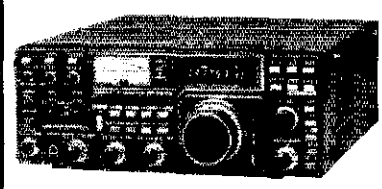

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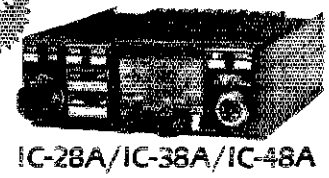

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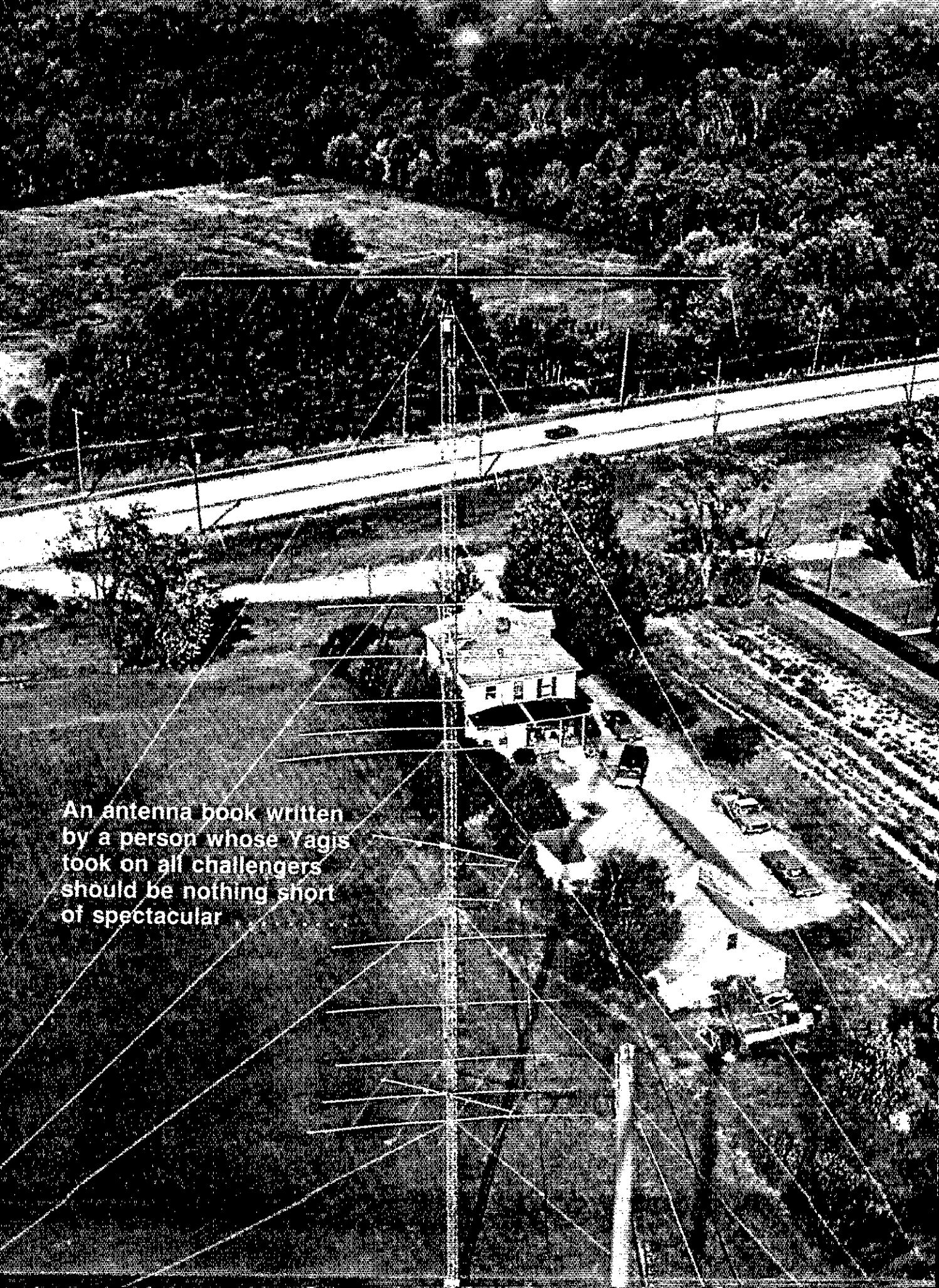

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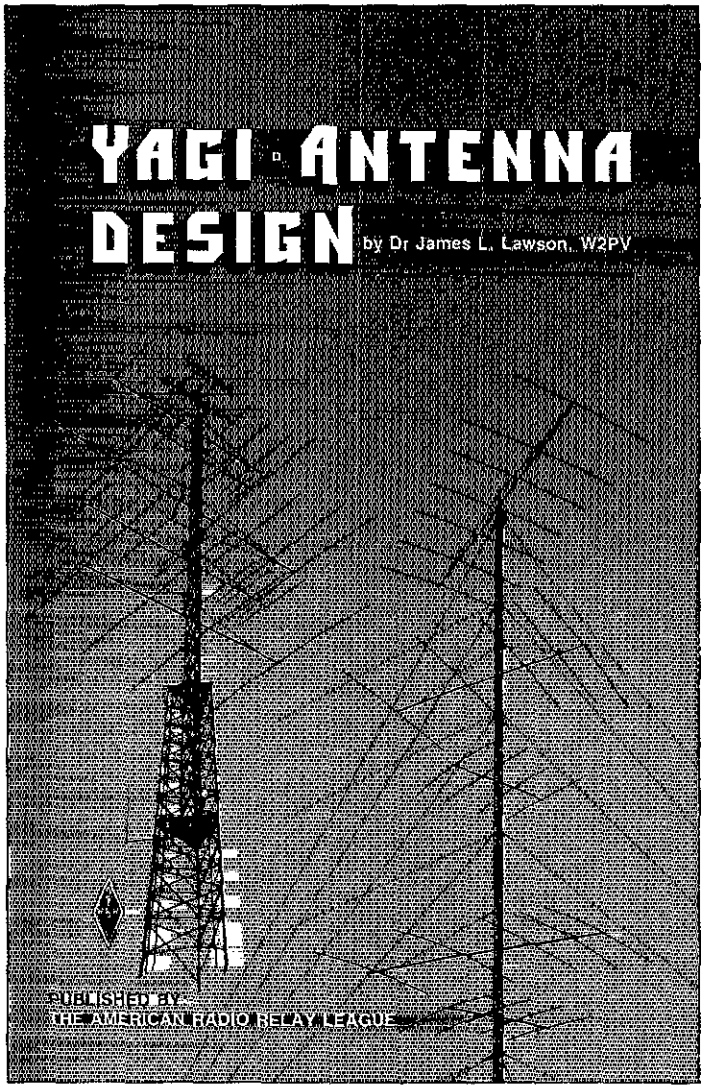

Yagi Antenna Design is based on the series in *Ham Radio Magazine* by the late Dr. James L. Lawson, W2PV. Jim was a highly competitive person and this carried through to his Amateur Radio hobby and work with antennas. Although this book is primarily the work of the author, credit should be given to its editors: Bill Myers, K1GQ; Clarke Greene, K1JX; and Mark Wilson, AA2Z. This ARRL publication stands to be a "classic" that should be added to every radio amateur's technical library. The book is available in hard cover, and contains over 210 pages of detailed information on Yagi design. For more detail, refer to the column at right. The photograph on the previous page is the 7 over 5 over 5 20-meter array on a 140 foot tower at W2PV. You can also see a 4 over 4 array for 10 meters. The photograph was taken by K1ZX. You can purchase this book at your ARRL dealer or direct from ARRL. Order #0410. Price is $15 plus $2.50 ($3.50 for UPS) shipping and handling.

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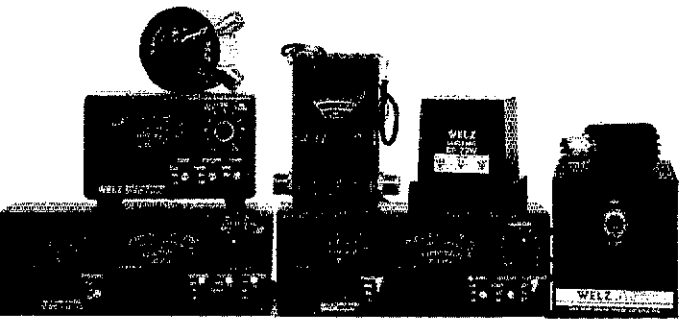

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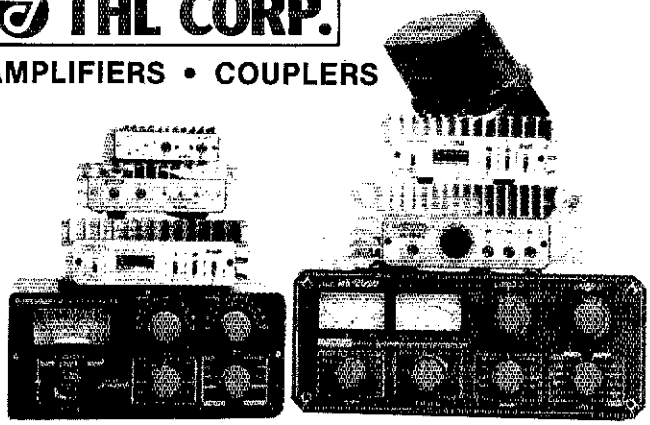

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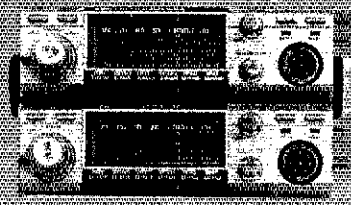

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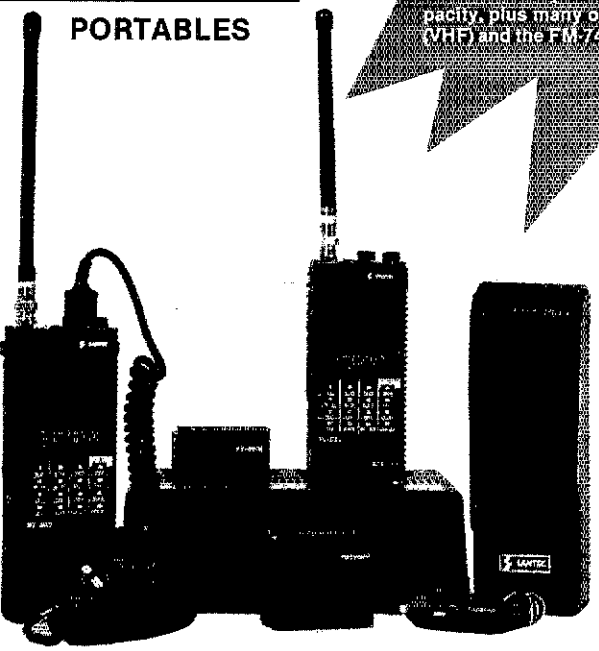

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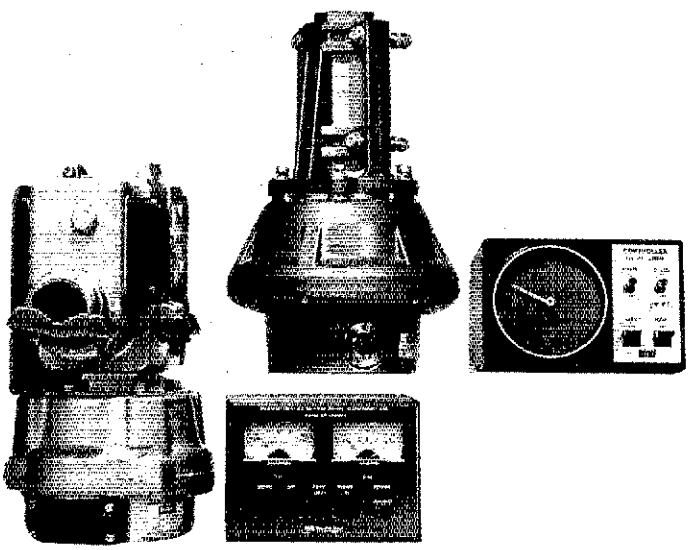

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Successfully monitoring today's many activities within the HF range of shortwave calls for a receiver with superb internal circuit designs and exceptional front panel flexibility. **ICOM's IC-R71A fills those requirements perfectly.**

This **quadruple conversion** communications quality receiver covers the full spectrum from 100kHz to 30MHz with high sensitivity and selectivity plus an impressive **100dB dynamic range.** It includes **true Passband Tuning** with steep skirted IF response and has optional filters available for narrowband (500Hz or 250Hz) CW copying. There's also a **front panel selectable RF preamp** for boosting weak signals and a 20dB attenuator for sidestepping front end overload from nearby strong signals.

Unlike several competitive units, the IC-R71A interference rejecting circuits are electrically situated **between IF stages** (before signal detection and AGC "take-off") rather than **between AF stages** (after signal detection and AGC utilization). This concept minimizes interference and prevents falsely derived AGC levels from degrading receiver performance in a "closing the barn doors after the horse escaped" manner.

Combine the previous assets with the IC-R71A **selectable AGC, continuously variable and dual width noise blanker, tunable IF notch, tone control and all-mode squelch,** and you'll surely agree it's a world class performer with "guts" rather than front panel glitter.

Also included in the IC-R71A's special operating features are **32 full function memories.** You can program these memories with your favorite listening spots for immediate recall, they can be scanned manually or automatically, sequentially, or by their programmed mode. They can also act as **32 tunable VFO's** that return to their programmed frequency and mode with a single button push. Visualize all of your listening interests within a dial's turn, a brief automatic scan, or a few direct keyboard taps, and you'll have an "opening idea" of the IC-R71A industry leading capabilities.

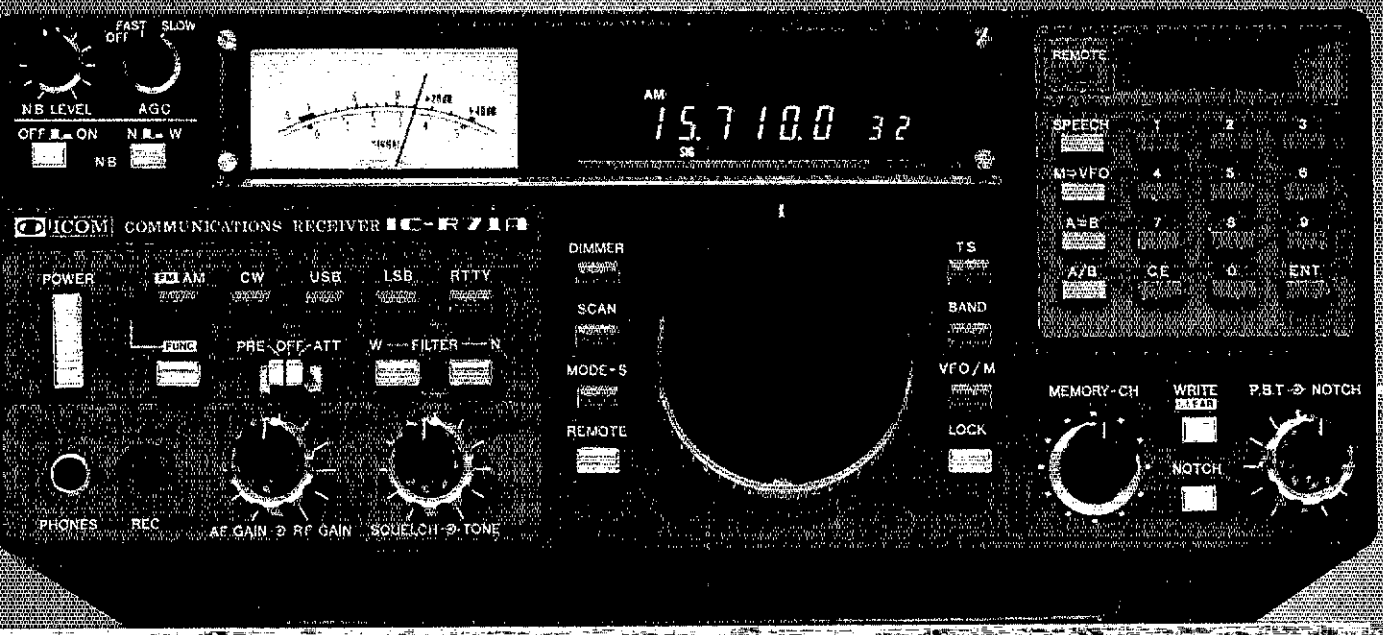
The ever-increasing use of frequencies between 30 and 2000MHz has created an endless array of exciting activities, and ICOM's all-mode IC-R7000 is meeting that wave of the future in top style. Consider, as a "starting example," a receiver that tunes the full 28, 50, 144, 220, 440, 1260 and new 900MHz amateur bands from its main dial. Next, combine the aircraft, weather, VHF and UHF police, fire, business, government, television, and weather satellite bands in those capabilities. Add **six tuning rates, commercial grade circuit designs, dial or keyboard frequency/memory selection, plus 99 programmable frequency/mode memories,** and the IC-R7000 sparkles like a new gem.

Considering the vast number of activities being conducted between 25 and 2000MHz, the IC-R7000's **99 memories and six scanning modes** are a monitor's dream come true. Storing favorite amateur FM repeaters on each band plus beacon and bulletin frequencies for OSCAR satellites mode B, J and L transponders easily requires 25 to 30 memories. Adding various aircraft, weather, police, fire and local services increases the number to near 50 memories. Including satellite frequencies, unknown and experimental signals under study along with stored frequencies of daily interest raises the memory count to near 80. The remaining 20 memories can be used with the IC-R7000 **unique "programmable scan-auto store" mode.** You program upper and lower scanning limits, the IC-R7000 finds the activity, stores their frequencies in memories 80 to 99, then you review/scan those memories at your convenience. There simply isn't an "ultra band" receiver comparable to the IC-R7000!

A convenient **infrared remote control** with on/off, the volume up/down, frequency/mode/memory selection is available for the IC-R71A or IC-R7000. Both receivers are the **most advanced yet user-friendly units available today,** both can be computer interfaced, and both are supported by a **one year warranty.** Combined use of the IC-R71A and IC-R7000 gives unequalled coverage of the full spectrum from 100kHz to 2GHz. Ready to experience today's maximum pleasures? You're ready for the ICOM experience!

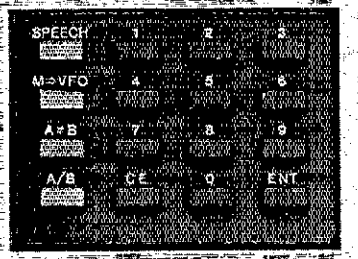
ICOM America, Inc., 2380-116th Ave NE, Bellevue, WA 98004 **Customer Service Hotline (206) 454-7619**
3150 Premier Drive, Suite 126, Irving, TX 75063
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

COM HF Receiver IC-R71A



The World Class World Receiver

ICOM introduces the IC-R71A 100KHz to 30MHz superior-grade general coverage HF receiver with innovative features including keyboard frequency entry and wireless remote control (optional). This easy-to-use and versatile receiver is ideal for anyone wanting to listen in to worldwide communications. With 32 programmable memory channels, SSB/AM/RTTY/CW/FM (opt.), dual VFO's, scanning, selectable AGC and noise blanker, the IC-R71A's versatility is unmatched by any other commercial grade unit in its price range.



Keyboard Entry. ICOM introduces a unique feature to shortwave receivers...direct keyboard entry for simplified operation. Precise frequencies can be easily selected by pushing the digit keys in sequence of frequency. The frequency will be automatically entered without changing the main tuning control.

Superior Receiver Performance. Passband tuning, wide dynamic range (100dB), a deep IF notch filter, adjustable AGC (Automatic Gain Control) and a noise blanker provide easy-to-adjust clear reception even in the presence of strong interference or high noise levels. A preamplifier allows improved reception of weak signals.

32 Tunable Memories. Thirty-two tunable memories, more than any other general coverage receiver on the market, offer instant recall of your favorite frequencies. Each memory stores frequency, VFO and operating mode, and is backed by an internal lithium memory battery.

Options. FM, RC-11 wireless remote controller, synthesized voice frequency readout, IC-CK70 DC adapter for 12 volt operation, MB-12 mobile mounting bracket, two CW filters, FL32-500Hz and FL63-250Hz, and high-grade 455KHz crystal filter, FL44A.

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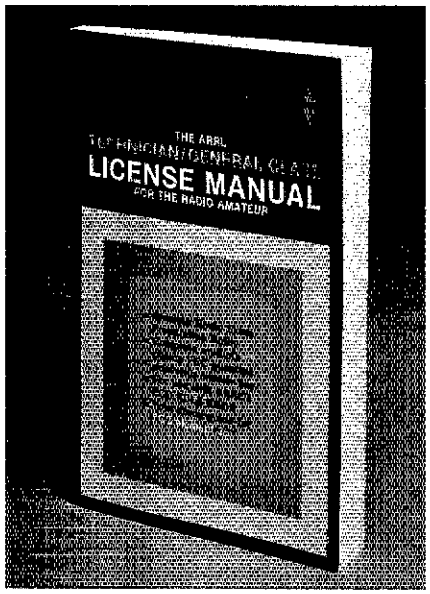
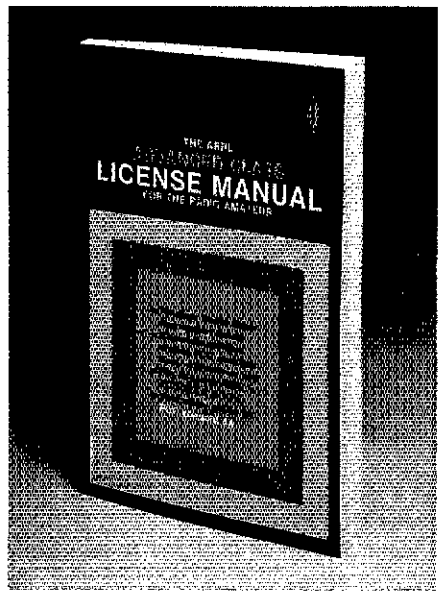
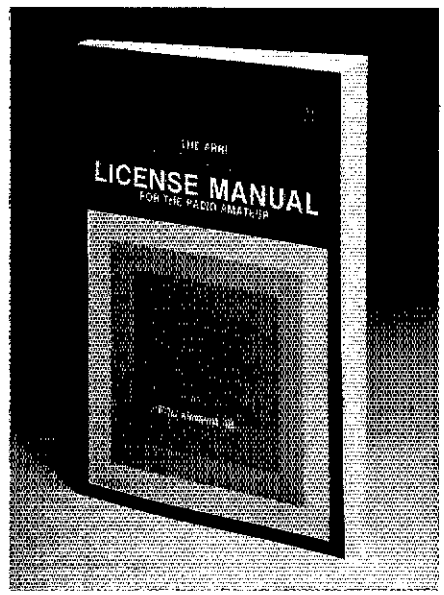


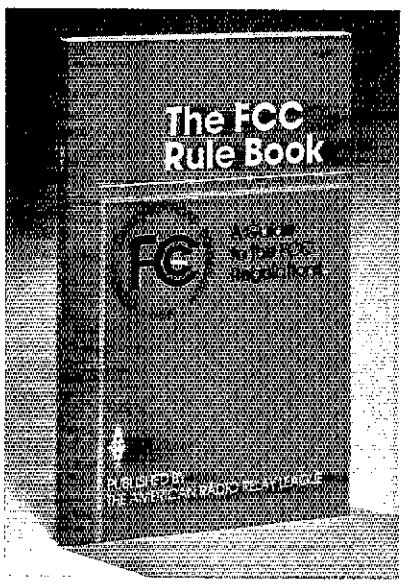




PASSING POWER!

• NEW FCC RULE BOOK!

The ARRL publications pictured on this page are just what you need in order to pass the various amateur exams. Beginning with **Tune in the World with Ham Radio** for the Novice and progressing through the new and critically acclaimed **ARRL License Manual Series** for the Technician through Extra Class; you will find passing each exam element a snap! There are accurate text explanations of the material covered along with the FCC question pools and answer keys. **The FCC Rule Book** is invaluable as a study guide for the regulatory material found on the exams and as a handy reference. *Every* amateur needs an up-to-date copy of **The FCC Rule Book!**



Tune in the World with Ham Radio
Kit with book and cassette .. #0380 $10
Book only ..... #0399 $ 8

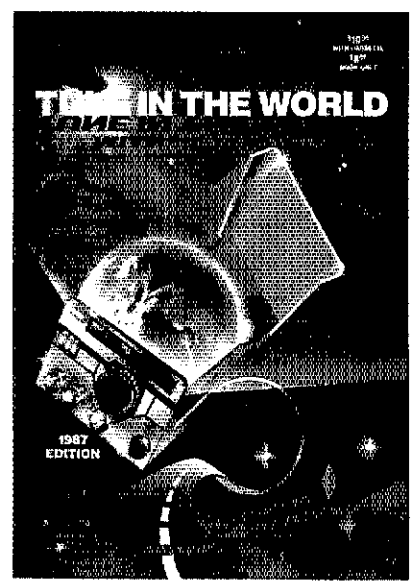
License Manual Series
Technician/General Class ..... #0143 $ 5
Advanced Class ..... #016X $ 5
Extra Class ..... #0178 $ 5
FCC Rule Book ..... #0216 $ 4

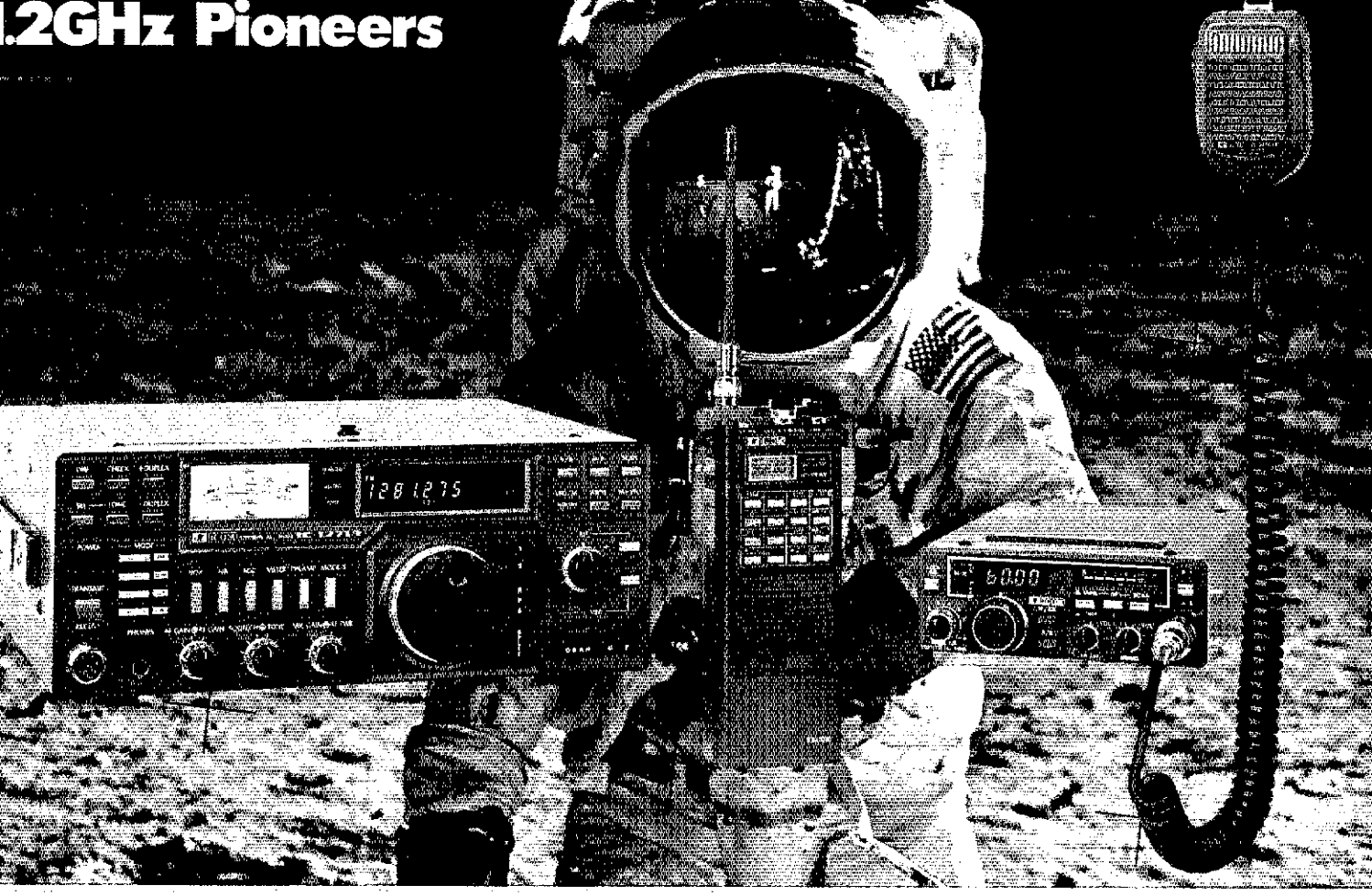
Code Proficiency
Code Kit ..... #5501 $ 8
Morse University TM Tune-in book and cartridge for C-64 computer ..... #0259 $40

C-60 Code Practice Cassettes
30 min. each at 5 and 7½ WPM* ..... #1030 $ 5
30 min. each at 10 and 13 WPM* .... #1040 $ 5
30 min. each at 15 and 20 WPM .. #2050 $ 5
*Same tapes included in *Code Kit*

Orders must include $2.50 shipping for book rate or $3.50 for UPS.

The American Radio Relay League, Inc.
225 Main Street
Newington, CT 06111





ICOM 1.2GHz

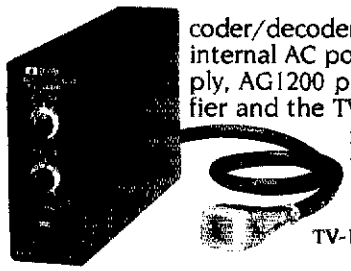
THE ONLY 1.2GHz SYSTEM... ANYWHERE

- **IC-1271A Base Station**
- **IC-12AT Handheld**
- **IC-120 Mobile**
- **IC-RP1210 Repeater**

Explore 1.2GHz with ICOM. Only COM offers the most complete line of am gear for 1.2GHz...the IC-1271A ll-featured base station transceiver, ie new IC-12AT handheld, the IC-120 obile and the IC-RP1210 repeater. So, et away from the crowd and be a ioneer on 1.2GHz.

The IC-1271A 1240–1300MHz ase station transceiver features 10 atts of RF output power, 32 memo-es, scanning and multi-mode opera-on including ATV (amateur TV).

A variety of options are available r the IC-1271A including the IC-EX310 oice synthesizer, UT15S CTCSS en-coder/decoder, IC-PS25 internal AC power supply, AG1200 preamplifier and the TV1200 TV interface unit.

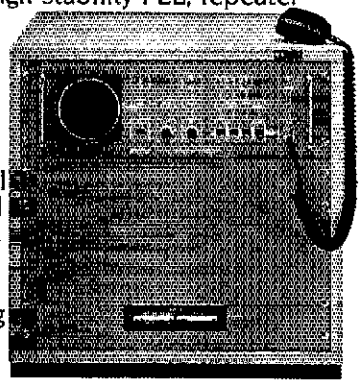


TV-1200

The new IC-12AT covers from 1260–1299.990MHz, has ten memory channels, memory scan, program scan and programmable offset. It also features an LCD readout, RIT and VXO, 32 built-in tones and a DTMF pad.

The IC-120 1.2GHz mobile transceiver has six memory channels, scanning, an HM-14 up/down scanning mic, RIT, LED readout and three tuning rates. Accessories include the ML12 10 watt amplifier and the PS45 slimline external power supply.

The IC-RP1210 completes your 1.2GHz system. It features a field programmable (198 channel, DIP switch), high stability PLL, repeater access to CTCSS, three-digit DTMF decoder for control of special functions, 10 watts, selectable hang time and ID'er.



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flea-market, intended for non-commercial sellers only. W6ORG remarked that next year's Angeles 100 mile endurance run ought to have a packet station at each of the 20 checkpoints; evidently, the packeteer to an active disaster-oriented organization? K7DCG has been appointed EC for the newly-established Northeast District of San Diego County. The Poway ARS will play a leading roll for the District. ARC of El Cajon provided an Amateur Radio display at Gillespie Field on Oct 25, 26. Solar power featured the exhibit. Participants were KB6DYM, KA2BUK, WA6BVT, N6GRB, N6GRC, KB6HEW, WA6HMZ, N6JPS, N6MRR, KE6MU, N6OBA, KG6VP. A voice net for packeteers is run by KB5MU Tuesdays at 2100. Join your local club. The Poway Amateur Radio Society (PARS) meets at 1930 on third Tuesday at the fire station cor Community Rd & Civic Center Dr. Visitors welcome. The Club is actively engaged in emergency planning with the City of Poway and sponsors two repeaters, WA6ILR 147.03 (+) on Palomar Mtn and N6AAM 147.30 (+) in Poway. The club newsletter, The Call Letter, is edited by W1LE. Traffic: N4KRA 77, N6GW 75.

SANTA BARBARA: SM, Byron Looney, K6FI—Latest appointee is John Norback, W6KFV. John is now the Section Technical Coordinator. Norwood Patterson, W6RYX, our ATC in Santa Ynez is busy with a corner reflector array for 80 meters. Watch for more about this in some future QST. The Section Meeting originally scheduled for December will be January 10 in Santa Barbara. Contact your EC for time and place. SBARC and their Big White Whale did an excellent job on Sept 27 when a fire involving hazardous materials required evacuation of residents. Support of Red Cross, Fire and Sheriff facilities required 27 ARES and SBARC members. Your SM and XYL attended the Rally of the RV Net (7263 daily) in King City. Great time was had by all but you have to see that Nipomo group perform to really appreciate their talent.

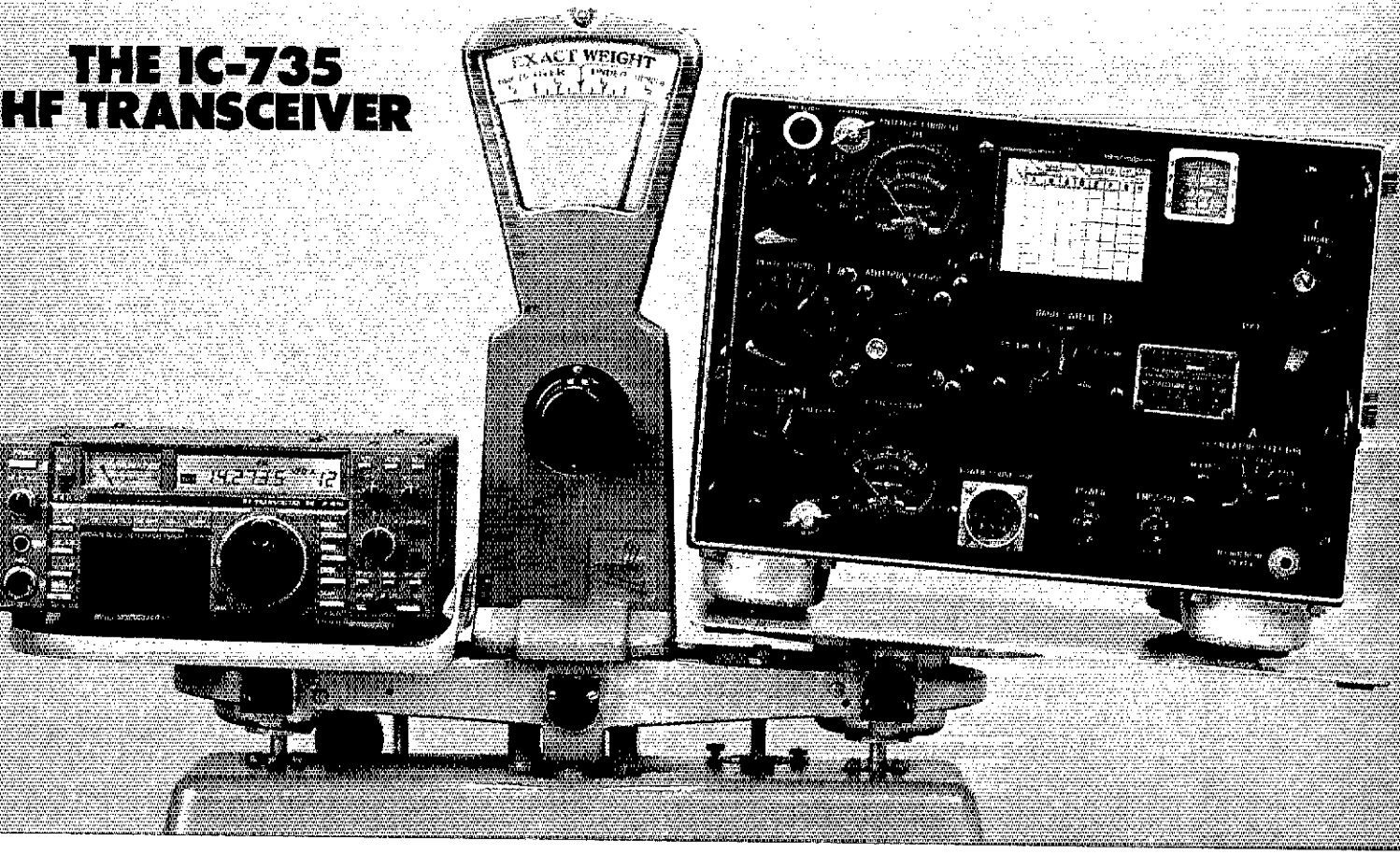
WEST GULF DIVISION

NORTHERN TEXAS: SM, Phil Clements, K5PC—Asst. SM: K5MXQ. STM: AE5I. SEC: W5GPO. SGL: W5UXP. PIO: K5HGL. TC: W5LNL. ACC: NI5V. OOC: WB5JBP. BM: W5QXK. ATC/KA5QYV reports that we have a Fast Scan ATV Repeater on the air south of Waco on the KXXV-TV tower. If you can see channel 25 from your QTH, you can probably hit the machine. It features monitoring capability on the NOAA weather radar at Waco, and soon will be tied into a doppler radar during wx emergencies. The repeater group is called the Centex Amateur Television Society (CATS). Contact KA5QYV for details and freqs. New officers for the 7290 Tfc. Net are: Net Mgr: KA5AZX Asst. Mgr: KD5RC Tres: W5CTZ Sec: WD5CVX. The Lake Country ARC received a cert. of merit from ARRL HQ. STM/AE5I reports he has joined the ranks of the Packeteers, and having a blast with it. New EC's: K7CMH/Wichita Co. KA5IVZ/Montague Co. KA5PTG/Potter & Randall Co's. W5BEY/Motley Co. W5NPF/Hardeman Co. N5IJD/Mitchell Co. K5EPE/Anderson Co. Congrats to K5NW on his appointment to the ARRL DX Advisory Committee. The Texas State RACES Net for districts 11,12,and 13 is now active on Monday night on 3997.5 kHz. All State County and Local RACES members can check in. PSHR for OCT: WG5S KA5SPT KB5ADE W5VMP N5JHI K5MXQ KA5AZK KB5UL AE5I and KA5QYV. Traffic: W5TNT 393, N5BT 318, KA5SPT 230, W9OYL 220, KB5UL 209, AE5I 208, K5MXQ 203, KD5RC 154, W5VMP 145, N5IUI 136, K5UPN 120, KA5AZK 112, WG5S 101, KB5ADE 90, WB4HML 88, N5JHI 44, KA5QYV 17, WD5EEH 4.

OKLAHOMA: SM, Bill Goswick, K5WG—ASM: NB5N. SEC: W5ZTN. STM: KV5X. ACC: NJ5Y. BM: W5AS. PIO: WB5SYT. SGL: W5NZS. TC: W5QMJ. Congrats to the Texoma Hamarama Assn. for a FB hamfest at Lake Texoma Oct 24-26. The ARRL Forum was conducted by Ray Wangler, W5EDZ, West Gulf Dir. & was well-attended. Tom Comstock, N5TC, West Gulf Vice Dir. conducted a very interesting forum on emergency communications. Activities included a banquet and dance Saturday evening and a QCWA breakfast Sunday morning. Over $6,000 in prizes were distributed Sunday. A large outdoor flea market rounded out an excellent hamfest. Be sure to reserve the last weekend in Oct. for next year's event which should be even better. Congrats to Dave Cox NB5N, on receiving appointment as the ASM. Dave will be heading up some special projects that will be of great benefit to the Section. It's good to have him back as a member of the official team. Happy holidays to all. Traffic: W5AS 391, WB5SRX 241, NX5E 223, KV5X 206, W5RB 123, NQ5W 116, N5IKN 111, WA5OUV 73, K5GBN 33, WA5OGC 32, W5VOR 30, W5VLW 30, WA5ZOO 20, KA5WGS 17, W5SUG 14, K5CAY 8, ND5S 8, KD5IS 5, N5DWN 5, NQ5Y 3, KF5LG 2. (Sept) KV5X 190, N5IXV 32, WA5OGC 28, ND5S 6, N5DWN 4.

SOUTHERN TEXAS: SM, Art Ross, W5KR—ASM: N5TC. STM: K5QEW. OOC: WA2VJL. PIO: WA5UZB. NZ5U. BM: W5OVH. Northwest ARS (Houston) will provide communications for a three-day, 150-mile bike ride between Houston and Huntsville State Park; a group of Boy Scouts viewed Amateur Radio at two of the NARS members' chacks as part of the BSA Jamboree-on-the-air. OBS W5KLV reports 16 ARRL bulletins, 31 satellite bulletins, 4 propagation forecasts, 5 DX bulletins and 5 CRRL bulletins given 183 readings on 9 nets. Sun City ARC (El Paso) provide communications for the Juarez International Classic; also reports N5IA made tests which proved that the Jack's Peak Rptr, WD5HTQ, and his TRASH group will be able to enter all of Arizona thru the Green's Peak Rptr, and that will put Nevada and California in range! Hill Country ARC (Kerrville) put on an antenna party for handicapped WD5AEP. University of Texas ARC (Austin) provided communications for Dripping Springs Century Classic bicycle ride; over 200 bikers rode in the more than 100 miles of the route. CAND Mgr W5KLV October report: 504 messages in 31 sessions with DRN5 represented 100%; STX stations helping - KD5KQ, W5KLV, WB5FQU, WB5EPA, N5DFO, NX5V, WB5YDD, K5WOB, NZ5U, K5OEW, KE5ZV. The Govt of Mexico has awarded certificates to NI5I and N5FOL for their work in earthquake communications. DRN5 Mgr WB5YDD October report: 651 messages in 62 sessions; STX represented 100% by W5CTZ, NX5V, KD5KQ, N5DFO, AJ5K, W5KLV, WB5EPA, WB5FQU, WA5ZJY, N5BHQ,

THE IC-735 HF TRANSCEIVER



BUY YOUR HF FOR PERFORMANCE, NOT BY THE POUND

- **All HF Band Transceiver/ General Coverage Receiver**
- **HM-12 Scanning Mic Included**
- **12 Memories/Frequency and Mode**
- **105dB Dynamic Range**
- **All Modes Built-In USB, LSB, AM, FM, CW**

The IC-735 is a heavyweight when you compare features and performance. Other transceivers may weigh more than the advanced IC-735 compact HF transceiver, but inch-for-inch and pound-for-pound, the IC-735 outweighs them all.

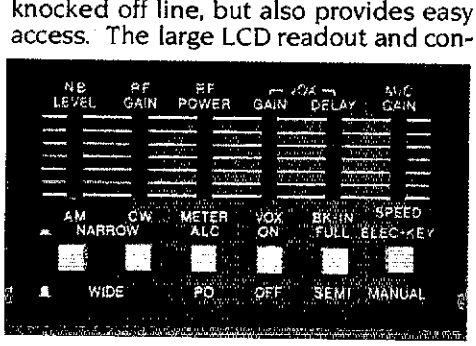
Ultra Compact. Measures only 3.7 inches high by 9.5 inches wide by 9 inches deep and weighs only 11.1 pounds. Without question, the IC-735 is the best HF transceiver for mobile, marine or base station amateur operation.

All Amateur Band Coverage. It's a high performer on all the ham bands, plus it includes general coverage reception from 100kHz to 30MHz. May be easily modified for MARS operation.

12 Memories. Frequency and MODE may be easily stored and retrieved in the 12 tunable memories.

Exceptional Receiver. To enhance receiver performance, the IC-735 has a built-in receiver attenuator, preamp, and noise blanker. PLUS it has a 105dB dynamic range and a technologically advanced low-noise phase locked loop for extremely quiet rock-solid reception.

Simplified Front Panel. Controls which require infrequent adjustment are placed behind a unique hatch cover on the front panel of the radio. The hatch cover is designed to protect seldom used controls from being accidentally knocked off line, but also provides easy access. The large LCD readout and conveniently located controls enable easy operation, especially important for the mobile environment.



More Features. FM built-in, HM-12 scanning mic, program scan, mode scan and memory scan. Switchable AGC, automatic SSB selection by band and RF speech processor. Continuously adjustable output power up to 100 watts, 12V operation, 100% duty cycle and deep tunable notch filter.

Options. A new line of accessories are available, including the AH-2 mobile antenna system, AT-150 whisper quiet automatic bandswitching antenna tuner for base station operation and the PS-55 power supply. The IC-735 is also compatible with most of ICOM's existing line of HF accessories.

See the IC-735 performance heavyweight at your local authorized ICOM dealer.

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TUNE IN THE WORLD WITH HAM RADIO

YOUR ROAD TO HAM RADIO EXCITEMENT

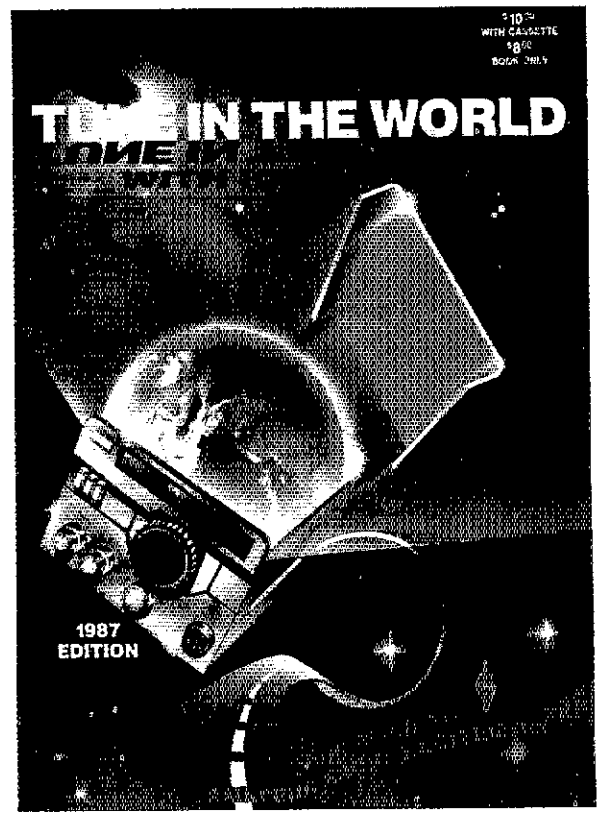
Imagine being able to personally communicate with an astronaut as the Space Shuttle circles the globe. Perhaps you would like to become a friend over the airways with a descendant of the mutinous crew of the HMS Bounty who lives on Pitcairn Island in the remote South Pacific.

There are Amateur Radio stations everywhere! They are located in homes, boats, airplanes and even bicycles. Hams take their gear on vacations, camping trips and even on walks around the block. Just think how thrilling it would be to talk to a ham in Australia as you drive along in your car.

Hams communicate with each other using voice, Morse code, computers and radioteletype. Hams even build their own satelites to provide reliable communications around the earth.

To start out on the road to fun and excitement, you need the Novice Amateur Radio License. The best way to pass your Novice exam is by using *Tune in the World With Ham Radio.*

Over 300,000 people have used *Tune in the World With Ham Radio* as their steppingstone into Amateur Radio. The book tells you everything you need to know about the FCC rules and regulations and Amateur Radio operating procedures. An easy-to-read chapter gives you the basic knowledge about radio you need for the exam. The cassette makes learning the code easy. The 4th edition contains the entire FCC question pool for the Novice license so you can practice the *actual* questions.



The *Tune in the World With Ham Radio* book consists of 137 pages of easy-to-understand text. The cassette included in the kit teaches the Morse code character by character — a proven method. The entire package is available for $10 (in U.S. funds) or the book only for $8. Available at your favorite dealer or from **The American Radio Relay League, 225 Main Street, Newington, CT 06111.**

MFJ TUNERS

This may be the world's most popular 3 KW roller inductor tuner because it's small, compact, reliable, matches virtually everything and gives you SWR/Wattmeter, antenna switch, dummy load and balun — all at a great price!

Meet "Versa Tuner V". It has all the features you asked for, including the new smaller size to match new smaller rigs-only 10¾"Wx4½"Hx14 7/8"D.

Matches coax, balanced lines, random wires—1.8 to 30 MHz. 3 KW PEP—the power rating you won't outgrow (250pf-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.

MFJ989B **$329.95**

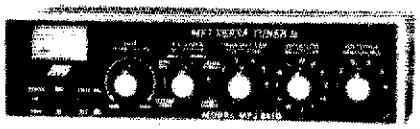
Lighted Cross-needle Meter reads SWR, forward and reflected power all in one glance. Has 300 and 3,000 watt ranges. Meter light requires 12 VDC.

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's Fastest Selling TUNER

MFJ-941D **$99.95**



MFJ's fastest selling tuner packs in plenty of new features. New styling! Brushed aluminum front. All metal cabinet. **New SWR/Wattmeter!** More accurate. Switch selectable 300/30 watt ranges. Read forward/reflected power.

New antenna switch! Front panel mounted. Select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load.

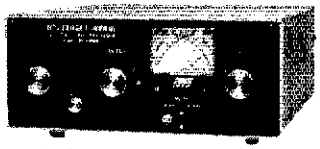
New airwound inductor! Larger more efficient 12 position airwound inductor gives lower losses and more watts out. Run up to 300 RF power output.

Matches everything from 1.8 to 30 MHz! dipoles, inverted vee, random wires, verticals, mobile whips, beams, balanced and coax lines.

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.

MFJ's 1.5 KW VERSA TUNER III

MFJ-962B **$229.95**



Run up to 1.5 kw PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 300 and 3,000 watt ranges. 6 position antenna switch handles 2 coax lines, wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic inductor switch. New smaller size matches new rigs: 10¾ × 4½ × 14⅞ inches. Flip stand for easy viewing. Requires 12V for light.

MFJ's Best VERSA TUNER

MFJ-949C **$149.95**

MFJ's best 300 watt tuner is now even better! The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome new black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

You can run full transceiver power output—up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

A large efficient airwound inductor—3 inches in diameter—gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches gives you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

2 KW COAX SWITCHES

MFJ-1702 **$19.95**

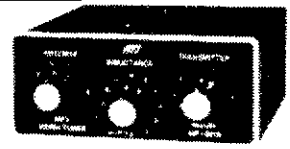
MFJ-1702. $19.95. 2 positions. 60 dB isolation at 450 MHz. Less than .2 dB loss. SWR below 1:1.2.

$29.95 MFJ-1701

MFJ-1701, $29.95. 6 positions. White markable surface for antenna positions.

MFJ's Smallest VERSA TUNER

MFJ-901B **$59.95**



MFJ's smallest 200 watt Versa Tuner matches coax, random wires and balanced lines continuously from 1.8 thru 30 MHz. Works with all solid state and tube rigs. Very popular for use between transceiver and final amplifier for proper matching. Efficient airwound inductor gives more watts out. 4:1 balun for balanced lines. 5 x 2 x 6 inches. Rugged black all aluminum cabinet.

MFJ's Random Wire TUNER

MFJ-16010 **$39.95**

MFJ's ultra compact 200 watt random wire tuner lets you operate all bands anywhere with any transceiver using a random wire. Great for apartment, motel, camping operation. Tunes 1.8-30 MHz. 2 x 3 x 4 inches.

MFJ's Mobile TUNER

MFJ-945C **$79.95**

Designed for mobile operation! Small, compact. Takes just a tiny bit of room in your car. SWR/dual range wattmeter makes tuning fast and easy. Careful placement of controls and meter makes antenna tuning safer while in motion.

Extends your antenna bandwidth so you can operate anywhere in a band with low SWR. **No need to go outside and readjust your mobile whip.** Low SWR also gives you maximum power out of your solid state rig—runs cooler for longer life.

Handles up to 300 watts PEP RF output. Has efficient airwound inductor, 1000 volt capacitor spacing and rugged aluminum cabinet. 8x2x6 inches. Mobile mounting bracket available for $5.00.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT SATISFIED, RETURN WITHIN 30 DAYS FOR PROMPT REFUND (less shipping).
• One year **unconditional** guarantee • Made in USA • Add $5.00 each shipping/handling • Call or write for free catalog, over 100 products.

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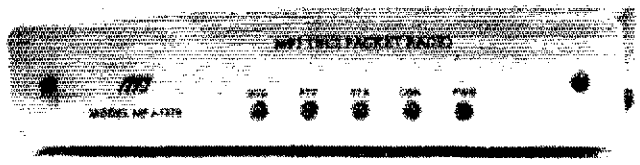
Call 601-323-5869 in Miss. and outside continental USA Telex 53-4590 MFJ STKV

VISA MasterCard

AFFORDABLE PACKET RADIO FROM MFJ

MFJ's TAPR TNC 2 clone in a new cabinet with added features...for an incredible $139.95!



MFJ-1270
$139.95

Join the exciting packet radio revolution and enjoy error-free communication...for an incredible $139.95! MFJ brings together efficient manufacturing and TAPR's (Tucson Amateur Packet Radio) leading edge technology to bring you top quality and affordable packet radio.

You get MFJ's highly acclaimed clone of the industry standard TAPR TNC 2. Its in a new cabinet and includes a TTL serial port and an easily replaceable lithium battery for memory back-up.

All you need is your rig, home computer with a RS-232 serial port and a terminal program. If you have a Commodore 64, 128, or VIC-20 you can use MFJ's optional Starter Pack to get on the air immediately.

You get interfacing cable, terminal software on tape or disk and complete instructions...everything you need to get on packet radio. Order MFJ-1282 (disk) or MFJ-1283 (tape), $19.95 each.

Unlike machine specific TNC's you never have to worry about your MFJ-1270 becoming obsolete because you change computers or because packet radio standards change. You can use **any** computer with an RS-232 serial port and an appropriate terminal program. If packet radio standards change, software updates will be made available as TAPR releases them.

Also speeds in excess of 56K bauds are possible with a suitable external modem! Try that with a machine specific TNC or one without hardware HDLC as higher speeds come into widespred use.

You can also use the MFJ-1270 as an excellent but inexpensive digipeater. You can use 12 VDC for portable operation or 110 VAC for fixed station operation.

It features AX.25 Level 2 Version 2 software, hardware HDLC for full duplex, true Data Carrier Detect for HF, 16K RAM, simple operation plus more.

Help make history! Join the packet radio revolution now and help spread this exciting network throughout the world. Order the top quality and affordable MFJ-1270 today.

Here are MFJ's latest and hottest products for improving your station's performance.

MEMORY KEYER

MFJ-484B
$139.95

The MFJ-484B "GRANDMASTER" Memory Keyer is **THE** choice of CW contesters. Why? Because it's so easy to use it's second nature...you don't have to remember how to use complex commands...**and** it has all the features you'll ever need for easy CW.

Features like these... you can store up to twelve 25 character messages that you can combine and send at whatever speed you want, you can repeat any message continuously or pause between repeats, you can change or insert into a playing message by simply sending and much more.

The MFJ-484B is RF proof, sends 8-50 WPM and measures just 8x2x6 inches. It uses 12 to 15 VDC or 110 VAC with MFJ-1312, $9.95.

HF SWR/WATTMETER

MFJ-816
$29.95

Want minimum SWR to maximize your antenna performance?

The MFJ-816 is our smallest -4½x2¼x3 inches-(and most affordable) SWR/Wattmeter that lets you read SWR, forward and reflected power (30/300 watt scales) from 1.8 to 30 MHz. Uses toroidal current pickup for uniform sensitivity.

CROSS-NEEDLE SWR/WATT METER

MFJ-815 $59.95

MFJ's cross-needle SWR/Wattmeter gives you SWR, forward and reflected power —all at a single glance! SWR is automatically computed —no controls to adjust. Easy-to-use push buttons select three power ranges that give you QRP to full legal limit power readings. Reads 20/200/2000 W forward, 5/50/500 W reflected and 1:1 to 1:5 SWR on easy-to-read two color scale. Lighted meter. Needs 12 V. ±10% full scale accuracy. 6½ x 3¼ x 4½ inches.

2 KW COAX SWITCHES

MFJ-1702
$19.95

$29.95 MFJ-1701

Instantly select any antenna or rig by turning a knob. Organizes coax cables and eliminates plugging and unplugging. Unused terminals are grounded to protect your equipment for stray RF, static and lightning. 2 KW PEP, 1 KW CW. For 50 to 75 ohm. Negligible loss, SWR, and crosstalk gives high performance. SO-239s. Convenient desk or wall mounting.

MFJ-1702, $19.95, 2 positions. Cast aluminum cavity construction gives excellent performance up to 500 MHz with better than 60 dB isolation at 450 MHz. Heavy duty, low loss switch has less than 20 milliohm contact resistance, less than 0.2 dB loss and SWR below 1:1.2. 2 x 2½ x 1 inches.

MFJ-1701, $29.95. 6 positions. White markable surface for recording ant. positions. 8½ x 1½ x 3 in.

ANTENNA CURRENT PROBE

MFJ-206 $79.95

This new breakthru MFJ Antenna Current Probe lets you monitor RF antenna currents—no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

- **Indicate transmission line radiation** due to high SWR, poor shielding or antenna unbalance.
- **Detect re-radiation** from rain gutters and guy wires that can distort antenna field patterns.
- **Detect RF radiation** from ground leads, power cords or building wiring that can cause RFI.
- **Determine if ground** system is effective.
- **Pinpoint RF leakage** in shielded enclosures.
- **Locate the best place** for your mobile antenna.
- **Use** as tuned field strenght meter.

Monitors RF current by sensing magnetic field. Uses an electrostatically shielded ferrite core, FET RF amplifier, op-amp meter circuit for excellent sensitivity, selectivity. 1.8-30 MHz. Has sensitivity, bandswitch, tune controls, telescoping antenna for field strenght meter. 4 x 2 x 2 inches.

MFJ's Best VERSA TUNER

MFJ-949C
$149.95

MFJ's best 300 watt tuner is now even better!

The MFJ-949C all-in-one Deluxe Versa Tuner II gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a new compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A new cross-needle SWR/Wattmeter gives you SWR, forward and reflected power—all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale.

Run up to 300 watts RF output—and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Tune out SWR on dipoles, vees, long wires, verticals, whips, beams/quads. 10x3x7 in.

RF PRESELECTOR

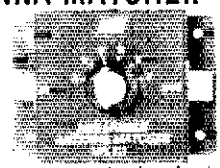
MFJ-1040
$99.95

Is your transceiver or receiver "hearing" all it could? Adding a MFJ-1040 RF preselector can make "lost" signals readable while reducing troublesome images and out-of-band signals. It adds 20 dB of low noise gain with a strong, sharp tuning front end and covers all HF amateur and shortwave bands through lower VHF from 1.8 to 54 MHz.

A built-in 20 dB attenuator prevents receiver overload. It has automatic bypass for transmitting, works with 2 antennas and 2 receivers, is 8x2x6 inches and uses 9-18 VDC or 110 VAC with optional MFJ-1312, $9.95

MOBILE ANTENNA MATCHER

MFJ-910 $19.95



Lower your SWR and Get more power into your mobile whip for solid signals and more QSOs. Your solid state rig puts out more power and generates less heat. For 10-80 meter whips. Easy plug-in installation. Complete instructions. Fits anywhere. 2½x2½in.

ORDER ANY PRODUCT FROM MFJ AND TRY IT-NO OBLIGATION. IF NOT SATISFIED RETURN WITHIN 30 DAYS FOR PROMPT REFUND (less shipping).
• One year **unconditional** guarantee • Add $5.00 each shipping/handling • Call or write for free catalog, over 100 products.

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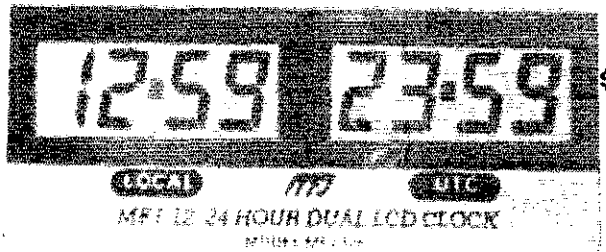
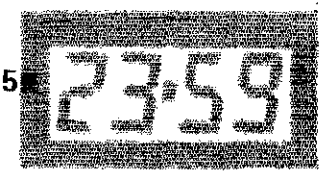
MFJ ACCESSORIES

MFJ 24 HOUR LCD CLOCKS



MFJ-108 $19.95



MFJ-107 $9.95

These MFJ 24 hour clocks make your DXing, contesting, logging and SKEDing easier, more precise.

Read both UTC and local time at a glance with the MFJ-108, $19.95, dual clock that displays 24 and 12 hour time simultaneously. Or choose the **MFJ-107, $9.95** single clock for 24 hour UTC time.

Both are mounted in a brushed aluminum frame, feature **huge easy-to-see 5/8 inch LCD numerals** and a sloped face that makes reading across-the-shack easy and pleasant.

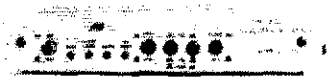
You can read hour, minute, second, month and day and operate them in an alternating time-date display mode. You can also **synchronize them to WWV** for split-second timing. Both are **quartz controlled** for excellent accuracy

They are **battery operated** so you don't have to reset them after a power failure, and battery operation makes them suitable for mobile and portable use. Long life battery included.

MFJ-108 is 4½x1x2 in. MFJ-107 is 2¼x1x2 in.

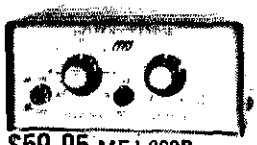
RTTY/ASCII/CW COMPUTER INTERFACE

MFJ-1224 **$99.95**



Free MFJ RTTY/ASCII/CW software on tape and cable for VIC-20 or C-64. Send and receive computerized RTTY/ASCII/CW with nearly any personal computer (VIC-20, Apple, TRS-80C, Atari, TI-99, Commodore 64, etc.). Use Kantronics or most other RTTY/CW software. Copies both mark and space, any shift (including 170, 425, 850 Hz) and any speed (5-100 WPM RTTY/CW, 300 baud ASCII). Sharp 8 pole active filter for CW and 170 Hz shift. Sends 170, 850 Hz shift. Normal/reverse switch eliminates retuning. Automatic noise limiter. Kantronics compatible socket plus exclusive general purpose socket. 8x1¼x6 in. 12-15 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

RX NOISE BRIDGE



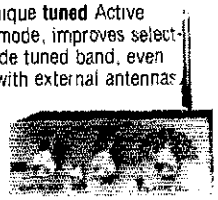
Maximize your antenna performance! **$59.95** MFJ-202B

Tells whether to shorten or lengthen antenna for minimum SWR. Measure resonant frequency, radiation resistance and reactance.

New Features: individually calibrated resistance scale, expander capacitance range (±150 pf). Built-in range extender for measurements beyond scale readings. 1-100 MHz Comprehensive manual. Use 9 V battery. 2x4x4 in.

INDOOR TUNED ACTIVE ANTENNA

NEW! IMPROVED! **with higher gain "World Grabber" rivals or exceeds reception of outside long wires!** Unique **tuned** Active Antenna minimizes intermode, improves selectivity, reduces noise outside tuned band, even functions as preselector with external antennas. Covers 0.3-30 MHz. Telescoping antenna. Tune, Band, Gain, On-off bypass controls. 6x2x6 in. Uses 9V battery, 9-18 VDC or 110 VAC with adapter, MFJ-1312, $9.95. **MFJ-1020A $79.95**



POLICE/FIRE/WEATHER 2 M HANDHELD CONVERTER

Turn your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner! **$39.95** MFJ-313

144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA maritime coastal plus more on 160-164 MHz. Converter mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. Crystal controlled. Bypass/Off switch allows transmitting (up to 5 watts). Use AAA battery. 2¼x1½x1½ in. BNC connectors.

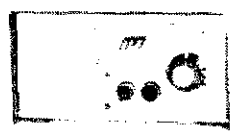
MFJ/BENCHER KEYER COMBO

MFJ-422 **$119.95**

The best of all CW worlds- a deluxe MFJ Keyer in a compact configuration that fits right on the Bencher iambic paddle! MFJ Keyer - small in size, big in features. Curtis 8044-B IC, adjustable weight and tone, front panel volume and speed controls (8-50 WPM). Built-in dot-dash memories. Speaker, sidetone, and push button selection of semi-automatic/tune or automatic modes. Solid state keying. Bencher paddle is fully adjustable; heavy steel base with non-skid feet. Uses 9 V battery or 110 VAC with optional adapter, MFJ-1305. $9.95

VHF SWR/WATTMETER

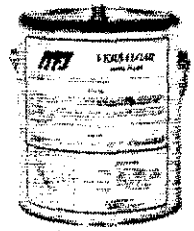
MFJ-812 **$29.95**



Low cost VHF SWR/Wattmeter! Read SWR (14 to 170 MHz) and forward/reflected power at 2 meters. Has 30 and 300 watts scales. Also read relative field strength. 4x2x3 in.

1 KW DUMMY LOAD

MFJ-250 **$39.95**



Tune up fast, extend life of finals, reduce QRM! Rated 1KW CW or 2KW PEP for 10 minutes. Half rating for 20 minutes, continuous at 200 W CW, 400 W PEP. VSWR under 1.2 to 30 MHz, 1.5 to 300 MHz. Oil contains no PCB. 50 ohm non-inductive resistor. Safety vent. Carrying handle. 7½x6¾ in.

MFJ "DRY" DUMMY LOADS

MFJ-262 **$64.95**

MFJ-260 **$26.95**

MFJ's "Dry" dummy loads are air cooled—no messy oil. Just right for tests and fast tune up. Non-inductive 50 ohm resistor in aluminum housing with SO-239. Full load to 30 seconds, de-rating curve to 5 minutes. **MFJ-260 (300 watt)**, SWR 1.1:1 to 30 MHz, 1.5:1, 30-160 MHz, 2½x2½x7 in. **MFJ-262 (1 KW)**, SWR 1.5:1 to 30 MHz, 3x3x13 inches.

MFJ ANTENNA BRIDGE

MFJ-204B **$79.95**

Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge that you can take to your antenna site—no other equipment is needed.

You can determine if your antenna is too long or too short, measure its resonant frequency and antenna resistance to 500 ohms. It's the easiest and most convenient way to determine antenna performance available today to anyone. There's nothing else like it and only MFJ has it. Built-in resistance bridge, null meter and tunable oscillator-driver (1.8-30 MHz). Uses 9 V battery. 4 x 2 x 2 inches.

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• One year **unconditional** guarantee • Add $5.00 each shipping/handling • Call or write for free catalog over 100 products.

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VISA MasterCard

K5QEW, WB5YDD. KA5FYS reports Brady's ARRL ARES quite busy putting Amateur Radio in the public eye; newspaper articles and radio spots show what an actual campaign can produce; one result is 10-year old 5th grader KB5AUM and her new novice ticket. PIO WA5UZB looking for more PIAs; lotsa clubs not heard from; reports W5EDZ appointed K5CVD as Assistant Director in Houston area. Traffic: WB5YDD 501, W5KLV 288, W5CTZ 268, AJ5K 258, W5TFB 219, WB5J 119, WB5FQU 96, WB5EPA 81, AC5Z 48, WD5GKH 48, W5KR 29, WA2VJL 24, K5HZR 19, NZ5J 10, WA5UZB 4.

Ham-Ads

(1) Advertising must pertain to products and services which are related to Amateur Radio.

(2) The Ham-Ad rate is 85 cents per word. This includes firms or individuals offering products or services for sale. A special rate of 25 cents per word applies to individuals seeking to dispose of or acquire personal station equipment, and to hamfest and convention announcements.

3) Remittance in full must accompany copy since Ham-Ads are not carried on our books. Each word, abbreviation, model number, and group of numbers counts as one word. Entire telephone numbers count as one word. No charge for postal Zip code. No cash or contract discounts or agency commission will be allowed. Tear sheets or proofs of Ham Ads cannot be supplied. Submitted ads should be typed or clearly printed on an 8-1/2" × 11" sheet of paper.

(4) Closing date for Ham-Ads is the 13th of the second month preceding publication date. No cancellations or changes will be accepted after this closing date. Example: Ads received August 14 through September 13 will appear in November *QST*. If the 13th falls on a weekend or holiday, the Ham-Ad deadline is the previous working day.

(5) No Ham-Ad may use more than 100 words. No advertiser may use more than two ads in one issue. A last name or call must appear in each ad. Mention of lotteries, prize drawings, games of chance, etc. is not permitted in *QST* advertising.

(6) New firms or individuals offering products or services for sale must submit a production sample (which will be returned) for our examination. Dealers are exempted, unless the product 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 support all claims and specifications mentioned in their advertising before their ad can appear.

The publisher of *QST* will vouch for the integrity of advertisers who are obviously commercial in character, and for the grade or characters of their products and services. Individual advertisers are not subject to scrutiny.

The League reserves the right to decline or discontinue advertising for any reason.

CLUBS/HAMFESTS

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed the entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA, Inc., 1409 Cooper Drive, Irving, TX 75061.

PROFESSIONAL CW operators, retired or active, commercial, military, gov't., police etc. invited to join Society of Wireless Pioneers—W7GAQ/6 Box 530, Santa Rosa, CA 95402.

IMRA-International Mission Radio Association Helps missionaries by supplying equipment and running a net for them daily except Sunday, 14.280 MHz, 1900-2000 GMT. Br. Bernard Frey, 1 Pryer Manor Rd., Larchmont, NY 10538.

THE Veteran Wireless Operators Association, a non-profit organization of communications people founded in 1925, invites your inquiries and application for membership. Write VWOA, Ed F. Pleuler, Jr., Secretary, 46 Murdock Street, Fords, NJ 08863.

HAVE A-M capability? Join S.P.A.M. (Society for Promotion A-M) Membership is free. Write: F.A. Dunlap (S.P.A.M.), 14113 Stoneshire, Houston, TX 77060 (S.A.S.E. please).

FCC EXAMS. Novice-Extra. Sunnyvale VEC ARC. 408-255-9000, 24/hr. Gordon, W6NLG, Pres. Flea Market, Los Altos, CA March-September.

FIND OUT what else you can hear on your General Coverage Transceiver or Receiver. Join a shortwave radio listening club. Complete information on major North American clubs and sample newsletter $1. Association of North American Radio Clubs, P.O. Box 462, Northfield, MN 55057.

INDIANA: SOUTH BEND Swap & Shop, Jan. 4 at the Century Center downtown, on U.S. 33, ONEWAY north between St. Joseph Bank Building and the river. Four lane highways to door from all directions. Tables: $5/5 ft. Round; $10/8x2.5 Rectangular; $2/ft. Wall locations. Talk-in 52-52 & area Repeaters. Sponsored by Repeater Valley Hamfest Committee. Contact: Wayne Werts K9IXU, 1889 Riverside Dr., South Bend, IN 46616, Telephone 219-233-5307.

LIMARC LONG ISLAND Hamfair, Sunday February 15, Electricians Hall, 41 Pinelawn Road, Melville, NY. Advance table sale only, reservations with check to LIMARC, Hank Wener, WB2ALW, 53 Sherrard Street, East Hills, NY 11577. 4' x 6' tables $12 or yours. $1.50 a foot with $8 minimum. Table admits one person, additional $3.25 each. Buyers 9 am, $4 at door, $3.25 in advance with SASE. Send check to LIMARC Tickets, Mark Nadel, NK2T, 22 Springtime Lane East, Levittown, NY 11756 by 2/5/87. Everyone must pay admission. Exit 49N of 495, go North a block to Pinelawn Road, turn right to site. Additional info call Hank at night 516-484-4322. Talkin 146.85.

QSL CARDS/RUBBER STAMPS/ENGRAVING

CANADIANS QSL samples $1 (refundable) M.Smith, VE7FI, Box 1376, Delta, BC V4M 3T3.

POST CARD QSL Kit - Converts Post Cards, Photos, to QSLs! Stamp brings circular. Labelcraft, P.O.Box 31, East Schodack, NY 12063.

DON'T buy QSL cards until you see my free samples-or draw your own design. I specialize in custom cards. Send black and white sketch: will give quote. Little Print Shop, Box 9848, Austin, TX 78766.

FREE samples—stamp appreciated. Conner, 522 Notre Dame Ave., Chattanooga, TN 37412.

QSLs & RUBBER STAMPS. Top quality. QSL samples and stamp information 50 cents. Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

EMBROIDERED EMBLEMS, custom designed club pins, medallions, trophies, ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info: NDI, Box 6665 M, Marietta, GA 30065.

QSLs-1)FAMOUS KØAAB custom collection. 2)Railroad employees and raifan's specials. 3)Front report styles. 4)Multiple callsigns. 5)Ham business cards. State your sample wants. 39 cents self addressed business size envelope required. Marv Mahre, WØMGI, 2095 Prosperity Ave., St. Paul, MN 55109-3621.

QSLs SAMPLES 40 cents (stamps OK) Fred Leyden, W1NZJ, 454 Proctor Ave., Revere, MA 02151.

BE SURPRISED-get a variety of cards-100 for $8 or 200 for $13. Samples $1 refundable. All three colors, fast service, satisfaction guaranteed. Constantine, 1219 Ellington, Myrtle Beach, SC 29577.

QSLs-SINCE 1956, free samples, Rusprint, Box 7575, Kansas City, MO 64116.

FREE, 100 QSLs with first order. Samples 50c. Gazebo Press, Rt. 4 Box 4148, LaPlata, MD 20646.

ENGRAVING: CALLSIGN/name badges by WØLQV. SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs—Completely different! Samples $1. (refundable). Mac's Shack, P.O. Box 43175, Seven Points, TX 75143.

PICTURE QSL CARDS of your shack, etc. from you photo or black ink artwork. 500 $24; 1000 $36.50. Also non-picture cards. Customized cards, send specifications for estimate. Send two stamps for illustrated literature. Generous sample kit $2; half pound of samples $3. Raum's, RD 2, Orchard Road, Coopersburg, PA 18036. Phone: 1-215-679-7238.

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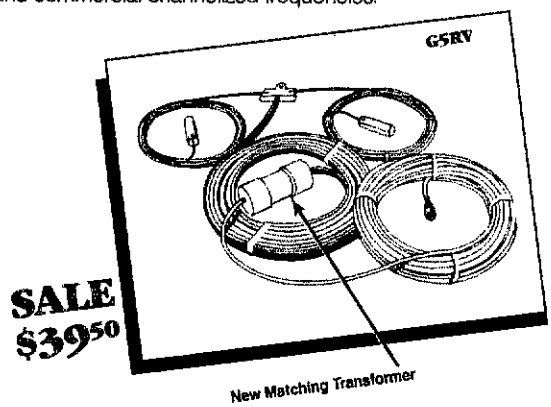

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Drive Power: 100W Nominal for 1500 Watt SSB PEP output, 125W Nominal for 1500 Watt CW output.
RF Output SSB 1.5 KW PEP continuous, CW 1.2 KW Average continuous, RTTY, SSTV 1 KW Average 1.5 KW PEP.
Plate Voltage: RTTY/AM/SSTV/CW/SSB 3.2 KV DC
Harmonic Suppression: -50 dB minimum.
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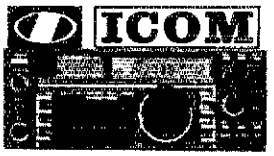

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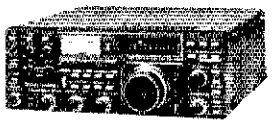

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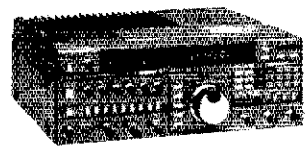

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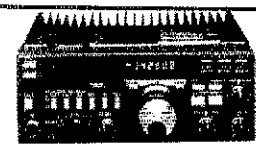

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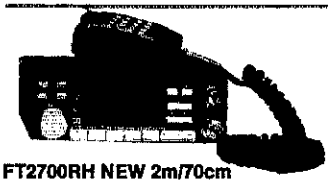

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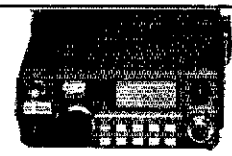

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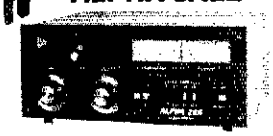

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B1016	2M	Yes	10W	160W	$259
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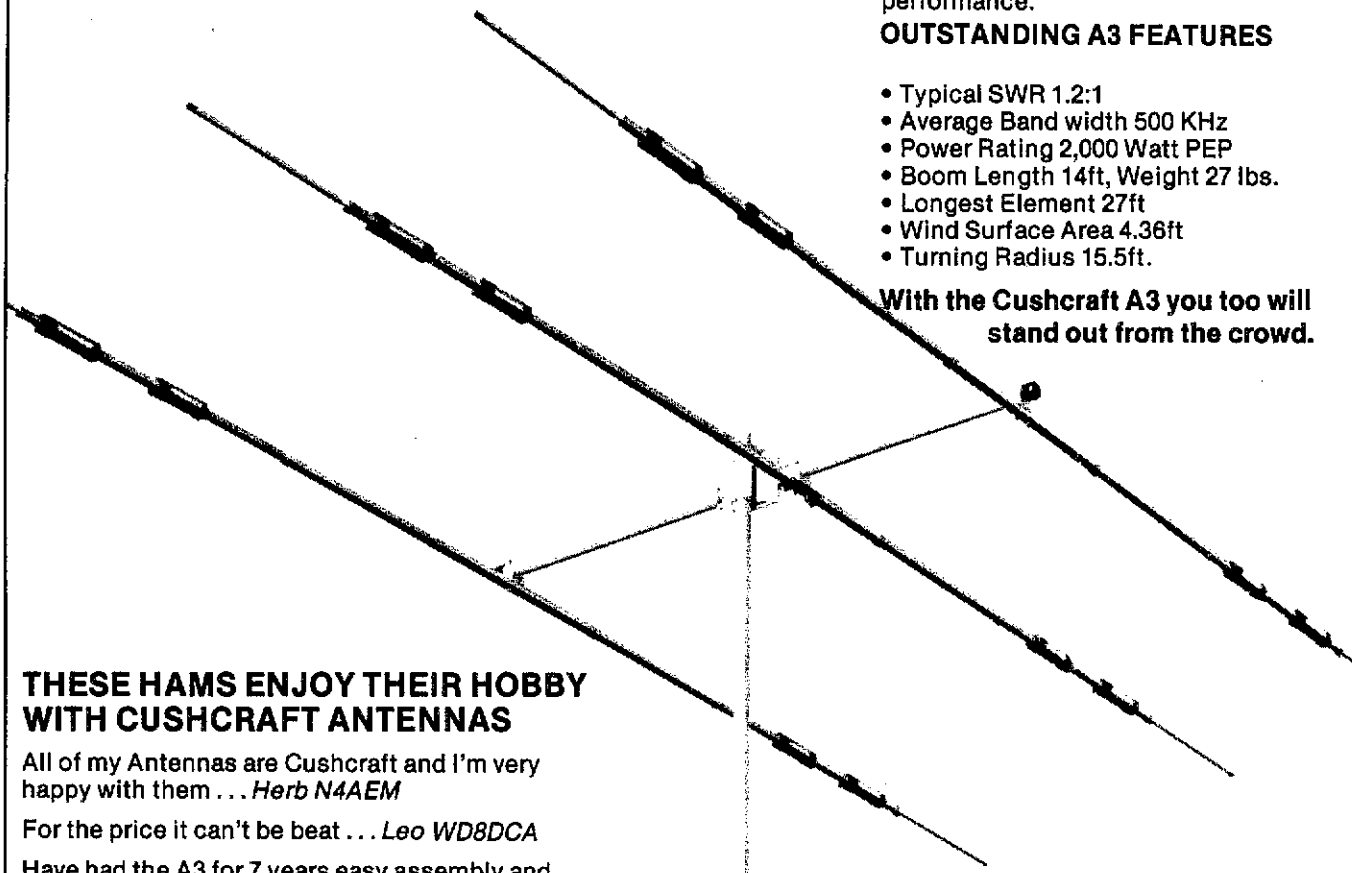

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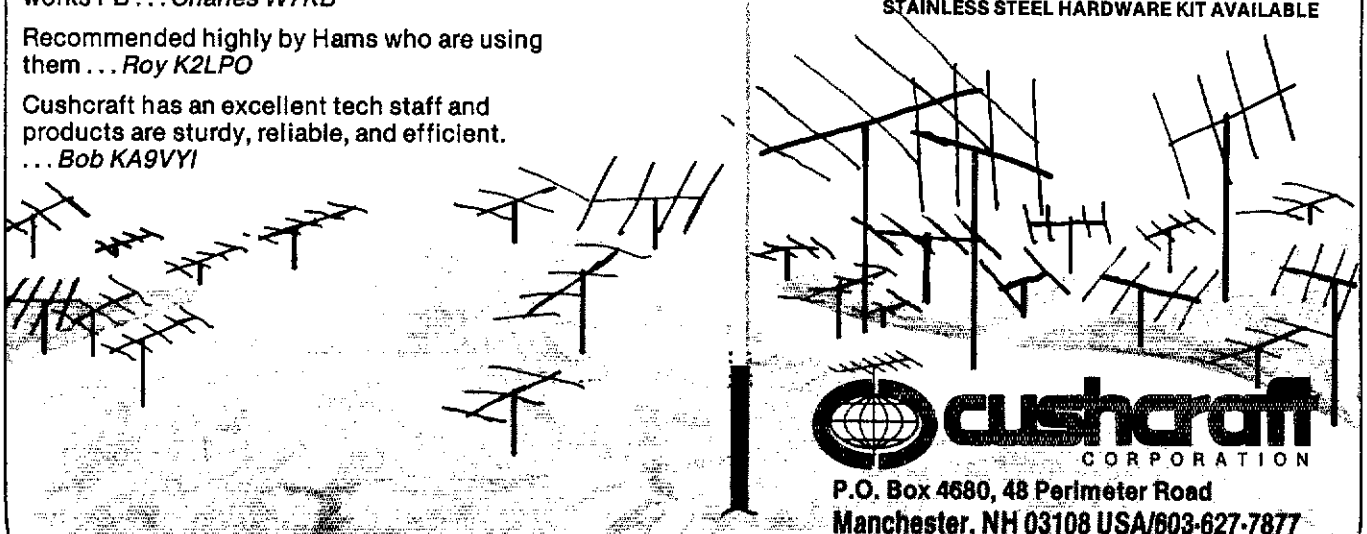

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DRAKE TR-7 Power Supply, SB Filter, NB, Desk Mic., mint; complete with manuals. $850 plus UPS. K5MEC, 4 Sombrero Lane, St. Rose, LA 70087

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HEATHKIT HW-101. CW Filter SB-600 Speaker, HB23A Power Supply,Mic, Manual. Clean. $225 includes shipping. John W6MQK, 1049 N. Holliston Ave. Pasadena, CA 91104 818-798-9345

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SELL: DRAKE TR-7 3 filters speaker fan RV-75 synthesized VFO Drake L7 Drake power supply & fan Like new. Call Marv AG1L 401-397-5442

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WANTED: SHIP RADIO OFFICERS, 1st or 2nd Radio-Telegraph Operators License with 6 month service endorsement (FCC). Send resume to: MARITIME RECRUITERS, Box 260 Mercer Island, WA 98040

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Index of Advertisers

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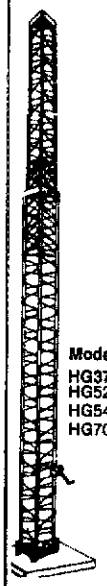

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All Models Shipped Factory Direct—Freight Paid*!

Check these features:
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- Hot dip galvanized after fabrication
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- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
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HG52SS	52 ft	9 sq ft	$CALL
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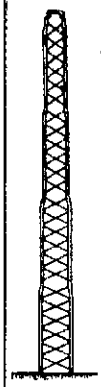
Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



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Self Supporting Towers On SALE!
FREIGHT PREPAID

- All Steel Construction—Rugged
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- America's Best Tower Buy—Compare Save $
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- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
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*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN
Guyed Tower Packages

- World Famous Rohn Quality and Dependability
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Packages shown below are rated for wind zone "B" (86 mph wind). Zone "C" (100 mph wind) design prices slightly higher. All tower packages shipped freight collect from our Plano, TX warehouse, in stock for prompt delivery.

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50'	$ 579	1079	1439
60'	639	1209	1609
70'	689	1329	1759
80'	849	1479	1929
90'	919	1749	2089
100'	989	1899	2259
110'	1189	2019	2639
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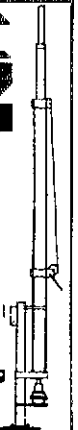
US TOWER CORPORATION



These rugged crankup towers and masts now available from Texas Towers!

Check these features:
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- Totally self-supporting-
- No guys needed

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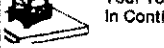
TX456	22'	56'	18 sq ft	1249
TX472	23'	72'	18 sq ft	2058
HDX556	22'	56'	30 sq ft	1879
HDX572	23'	72'	30 sq ft	3229

Note - US Towers Shipped Freight Collect From Visalia, CA Factory

**Note-towers rated at 50 mph to EIA specifications*

RG-213U



$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

$.19/ft $179/1000 ft

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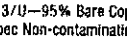
- Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

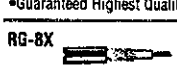
9086



$.39/ft $379/1000 ft

- Same specs as Belden 9913
- Lower loss than RG8U
- 100% shielded-braid & foil

HARDLINE/HELIAX™



Lowest Loss for VHF/UHF!

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½" LDF4-50 Andrew Heliax™ $1.79/ft
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select connectors below

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Impad.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.6
9086	50	.4	.64	1.7	3.1
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE & HELIAX™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax™	$25	$25	$25	$25
⅞" Heliax™	$49	$49	$49	$49

COAX CONNECTORS

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UG21B N Male $2.95
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Short Dipole Kits SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line $29.95
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ALPHA DELTA

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A4 4-el Tribander Beam $299
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R3 20, 15, 10mtr Vertical $275
AV5 80-10mtr Vertical $109
D40 40mtr Dipole $159
40-2CD 2-el 40 mtr Beam $299
A50-5 5-el 6 mtr Beam $85
215 WB NEW 15-el 2 mtr Beam $85
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4218 XL 18-el 2 mtr Beam $105
3219 19-el 2 mtr Beam $99
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424B 24-el 432MHz Beam $85
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Limited Quantities purchased at old prices. Call for current prices

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TH5MK2S Broad Band 5-el Triband Beam.
TH7DXS 7-el Triband Beam .....
TH3JRS 3-el Triband Beam .....
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155BAS 5-el 15-mtr Beam .....
105BAS 5-el 10-mtr Beam .....
204BAS 4-el 20-mtr Beam .....
64BS 4-el 6-mtr Beam .....
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TBR160 160m Coil Kit $49
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2m-16LBX NEW 16-el 2-mtr Beam $169.95
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432-30LBX NEW 30-el 432 MHz Antenna $139.95
435-18C 435 MHz Satellite Antenna W/CS-2 ..... $179.95
435-40CX 435 MHz Satellite Antenna W/CS-2 ..... $209.95

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Alliance HD73 (10.7 sq ft rating) $119.95
Alliance U110 (3 sq ft rating) $49
Telex CD 45II (8.5 sq ft rating) ..... $Call
Telex HAM 4 (15 sq ft rating) ..... $Call
Telex Tailtwister (20 sq ft rating) ..... $Call
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Kenpro KR5400 AZ/EL Rotor Package $319

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Heavy Duty 8 Cond cable $.36/ft
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10 FT. STACKED SECTIONS

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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 Double Guy Kit ..... $249.
45G Double Guy Kit $269

*Above antenna loads for 70 mph winds w/guys at hinge and apex. All foldover towers shipped freight prepaid in 48 states. Prices 10% higher west of Rockies.

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5/16 EHS Guywire (11,200 lb rating) ..... $.29/ft
5/32 7 × 7 Aircraft Cable (2700 lb rating) ..... $.15/ft
3/16 CCM Cable Clamp (3/16" or 5/32") ..... $.45
1/4 CCM Cable Clamp (1/4" Cable) ..... $.55
1/4 TH Thimble (fits all sizes) ..... $.45
3/8EE (3/8" Eye & Eye Turnbuckle) $6.95
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1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle) $13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle) $16.95
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HPTG4000 Guy Cable (4000 lb rating) ..... $.49/ft
HPTG6700 Guy Cable (6700 lb rating) ..... $.69/ft
9901LD Cable End (for 2100/4000 cable) $8.95
9902LD Cable End (for 6700 cable) $9.95
Socketfast Potting Compound (does 6-8 ends) $14.95

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Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	$29	$49	$69	$89
.18 in Wall	$39	$69	$99	$129
.25 in Wall	$69	$129	$189	$249

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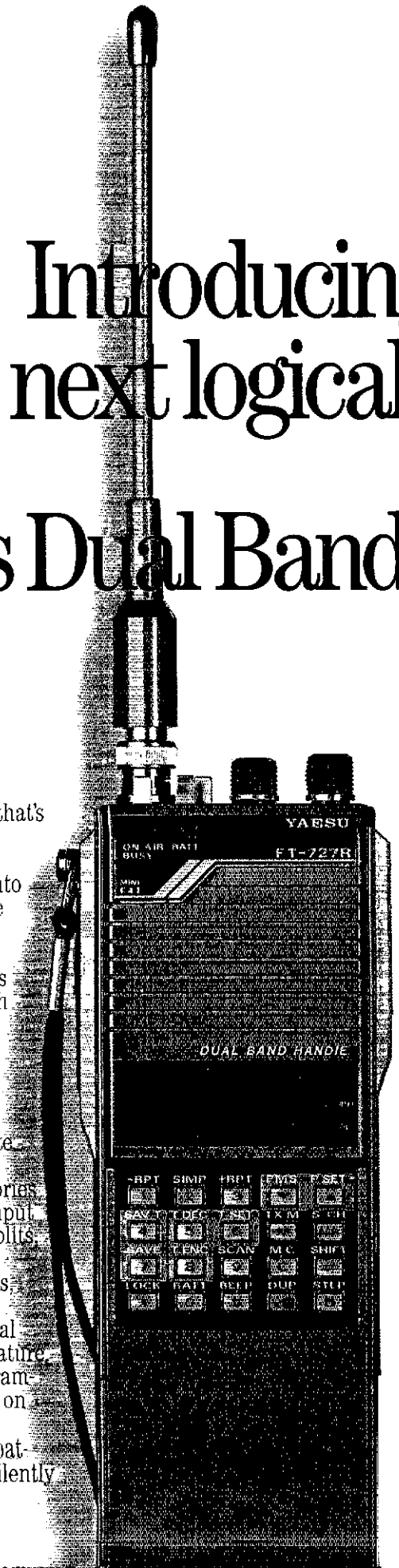

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- **All modes built-in**
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- **Built-in automatic antenna tuner (optional)**
  Covers 80-10 meters.
- **VS-1 voice synthesizer (optional)**
- **Superior receiver dynamic range**
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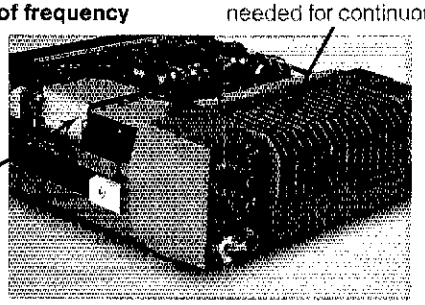
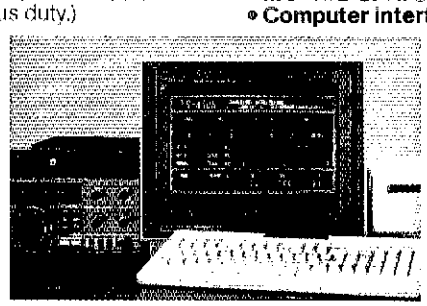
- **Adjustable dial torque**
- **100 memory channels**
  Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**
  Subtone is memorized when TU-8 is installed.
- **Superb interference reduction**
  IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.
- **MC-43S UP/DOWN mic. included**
- **Computer interface port**





- **5 IF filter functions**
- **Dual SSB IF filtering**
  A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
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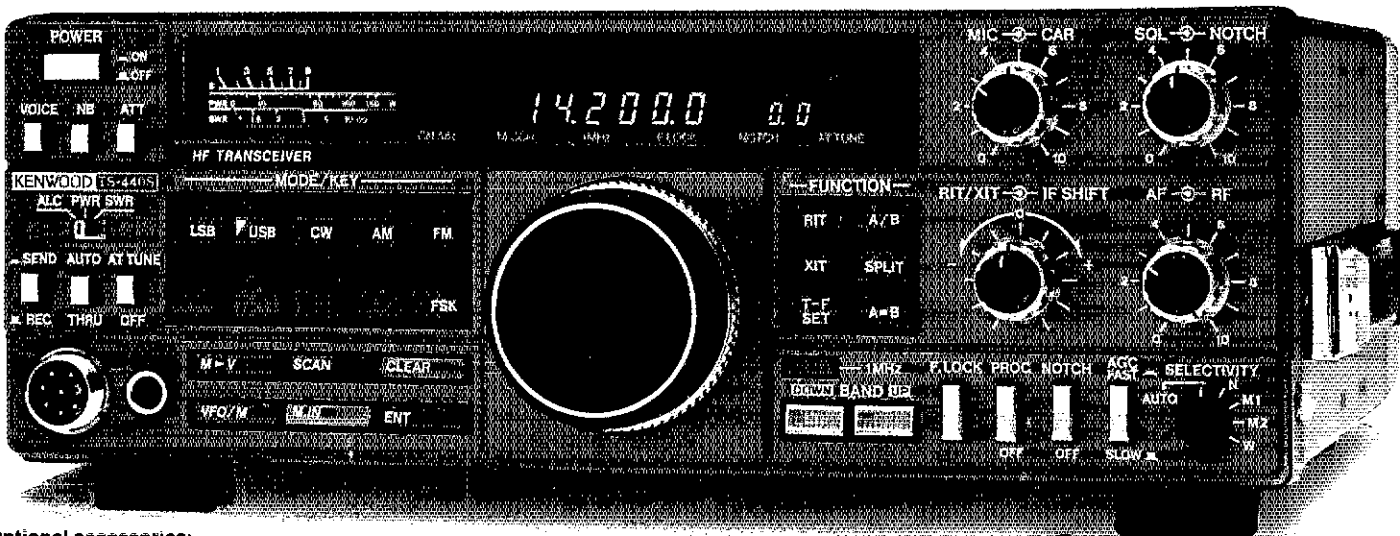

Optional accessories:
- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S/88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-5/6/7 headphones
- SP-40/50B mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
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- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
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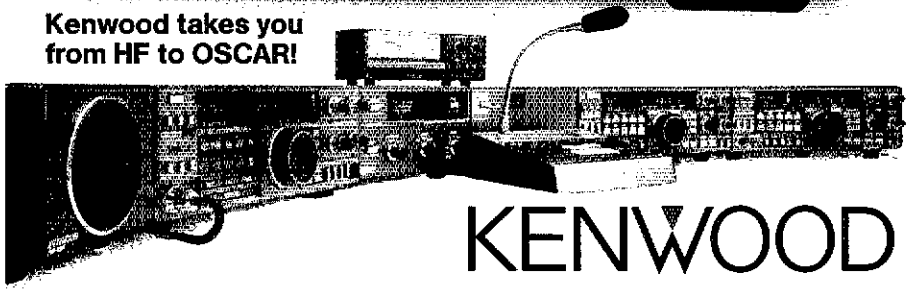

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