QST

September 1988 $3.00

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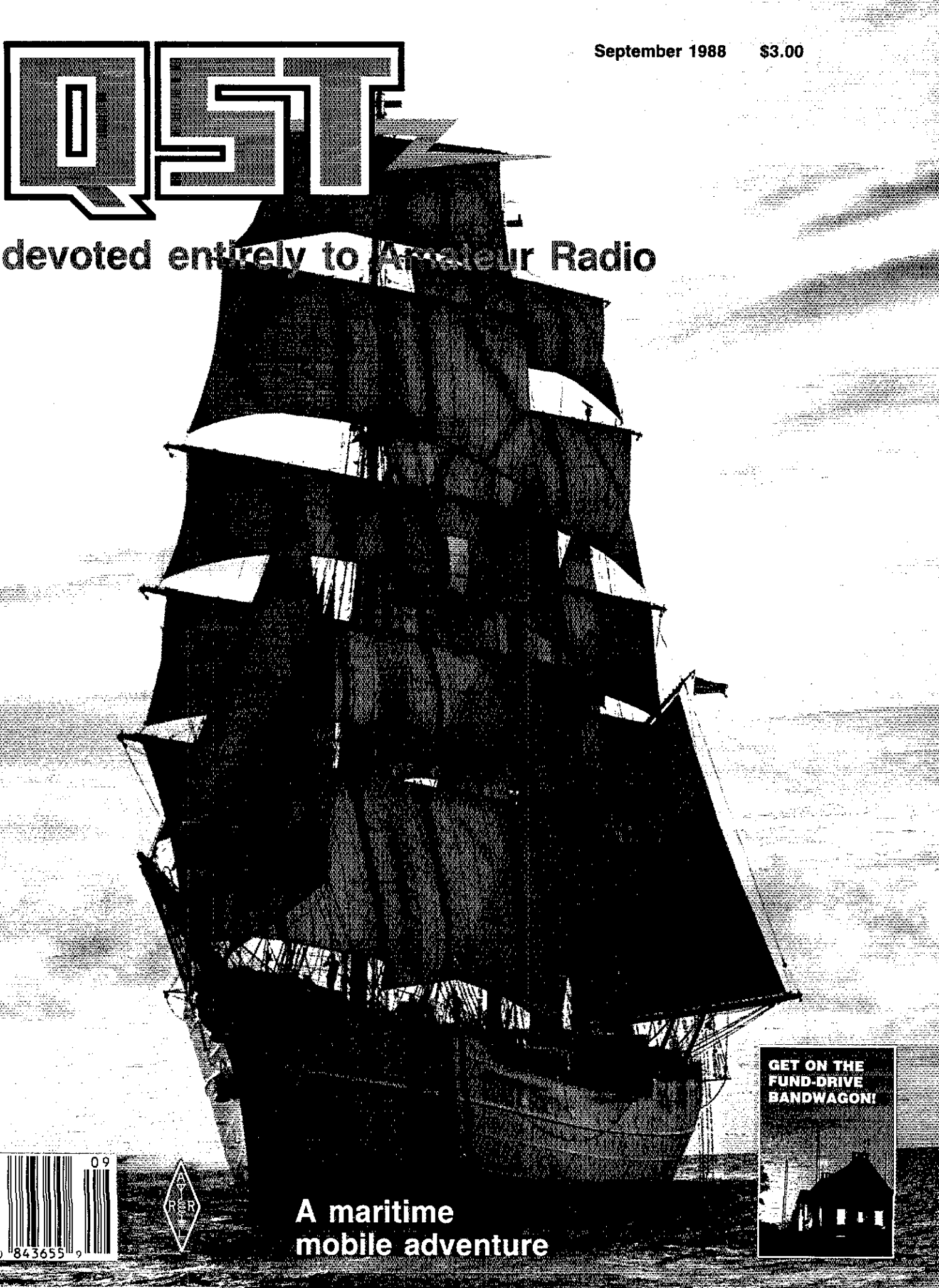

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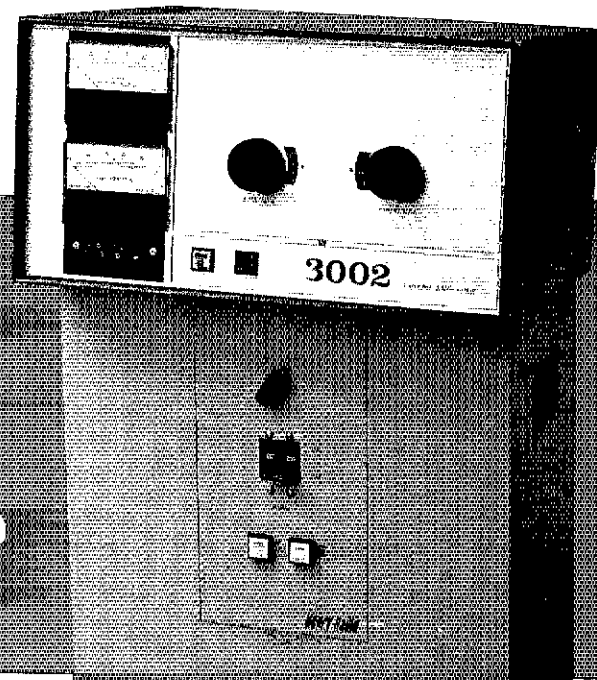
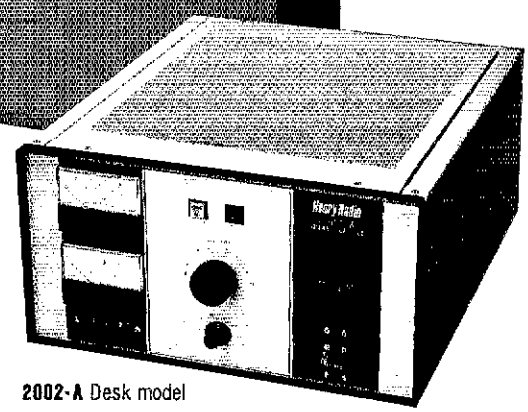


3002-A Console

The 2002A and 3002A 2 meter VHF power amplifiers from Henry Radio



2002-A Desk model

Both the 2002A and the 3002A operate in the 2 meter band (144-148 MHz), but are also available for frequencies between 100 and 300 MHz. They are biased for linear operation so that they operate for CW, FM, SSB, AM or pulse applications.

The 2002A uses a single Eimac 3CX800A7 ceramic triode offering up to 2000 watts for pulse operation, up to 1200 watts for SSB operation and up to 400 watts for continuous applications.

The 3002A uses a single Eimac 8877 ceramic triode mated to a heavy duty power supply offering full legal power at 2 meters as well as rugged reliable operation in a variety of commercial, industrial and scientific operations.

All of the amplifiers above 100 MHz employ simple reliable and elegant strip-line tank circuits which give unexcelled performance with a minimum number of components. Both models include adjustable input circuits for good input matching to your exciter. Both are also available as rack mounted units.

25 years of producing power amplifiers has made Henry Radio THE amplifier specialists. With 13 models to choose from we offer more amateur bands, more power ranges and a broader price range than anyone else.

HENRY AMPLIFIERS AVAILABLE:

2KD Classic Desk model	3.5-30 MHz	**5K Classic** (Not available to U.S. amateurs)	3.5-30 MHz
2K Classic Console	3.5-30 MHz	**2006-A** Desk model	50-54 MHz
2K Classic X Heavy duty console 3.5-30 MHz		**2002-A** Desk model	144-148 MHz
3K Classic Mk II	3.5-30 MHz	**2002-A** Desk model	220 MHz
3KD Premier Desk model	1.8-30 MHz	**3006-A** Console	50-54 MHz
3K Premier Console	1.8-30 MHz	**3002-A** Console	144-148 MHz

Please call or write us for literature or information on our broad range of UHF, VHF and HF power amplifiers. If you have a requirement for a special purpose amplifier please call Ted Shannon, Meredith Henry or Ted Henry at our Los Angeles office.

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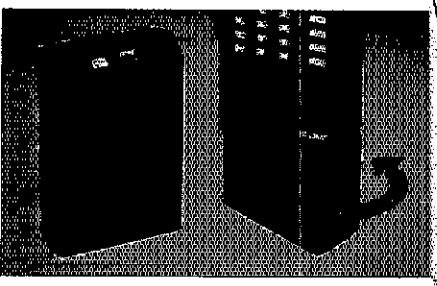
TH-205AT

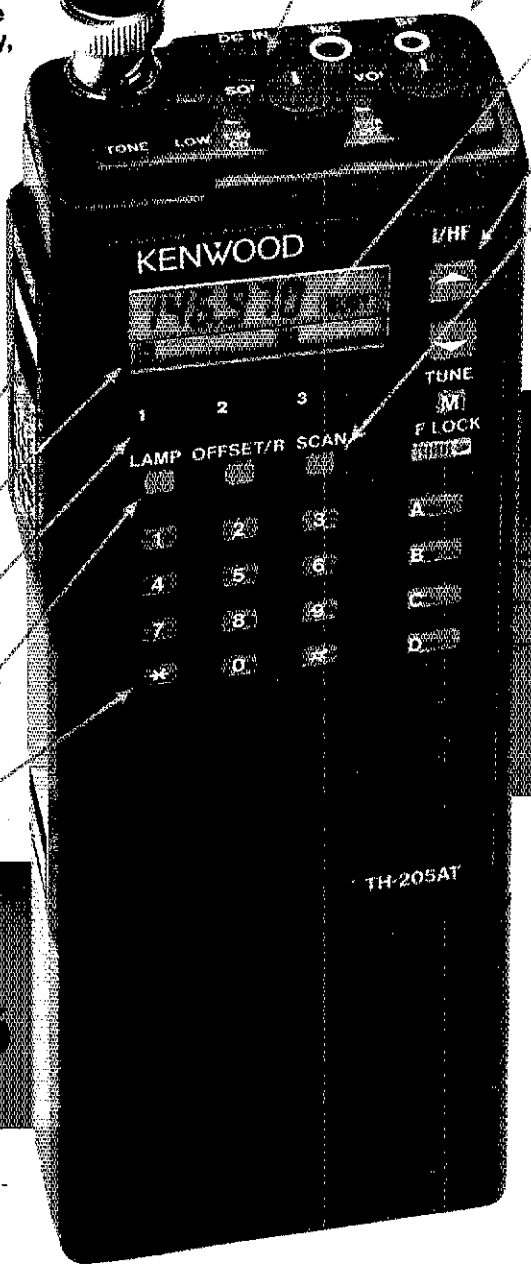
Affordable 5-watt hand-held transceiver. Ultimate Affordability!

It's here now! The affordable, "Kenwood Quality" hand-held transceiver. Standard features include a large, easy-to-read LCD display, wide-range power requirements (operates on 7.2 VDC—16 VDC), 3-channel memory, built-in battery saver circuit, and, when operated on 12 VDC, a robust five watts of power! The die-cast metal rear panel/heat sink assures cool, reliable operation. Receiver frequency coverage from 141—163 MHz is also standard—you can even listen to the "weather channels" at 162.40 or 162.55 MHz!

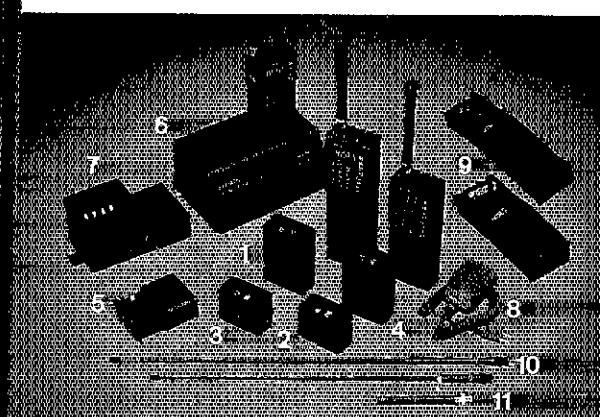
- Monitor switch—to check frequency when PL encode/decode switch is on.
- Extended frequency coverage for certain MARS and CAP operations.
- 3 memory channels store frequency and offset. And so easy to use! Simply press the memory channel number to recall your favorite channels!
- Night light, offset/reverse.
- 16-key DTMF pad for repeater autopatch is standard.



- NEW! Twist-Lok Positive-Connect™ battery case. A wide range of quick-change commercial duty battery packs are available.



- 12 VDC input terminal—allows direct mobile or external power supply operation. When 12 VDC is applied, power output increases to **5 watts!**
- Heavy-duty final amplifier and heat sink. The die-cast rear panel assures reliable operation. With the optional 12-volt PB-1 battery pack, the TH-205AT provides 5 W output. The standard 8.4 volt PB-2 provides 2.5 W output. (500 mW low power).
- Large, easy-to-read LCD display. Frequency, offset, memory channel, TX, RX, and battery indicator.
- Frequency UP/DOWN keys. Used to select frequency or scanning direction.
- Scan function
- Automatic battery saver circuit extends battery life. No buttons to push!
- Supplied accessories include: Rubber flex antenna, belt hook, 8.4 V, 500 mAH NiCd battery pack, wall charger.



Optional Accessories:

1) PB-1 12 V 800 mAH NiCd batt. pack (5 W output). **2)** PB-2 8.4 V 500 mAH NiCd batt. pack (2.5 W output). **3)** PB-3 7.2 V 800 mAH NiCd batt. pack (1.5 W output). **4)** PB-4 7.2 V 1600 mAH NiCd batt. pack (1.5 W output). **5)** BT-5 AA manganese/alkaline battery case. **6)** BC-7 Rapid charger for PB-1, 2, 3, or 4. **7)** BC-8 Compact battery charger **8)** SMC-30 Speaker microphone. **9)** SC-12, SC-13 Soft cases. **10)** RA-3, RA-5 Telescoping antennas. **11)** RA-8B StubbyDuk antenna • TSU-3 CTCSS encode/decode unit • VB-2530 2 m, 25 W RF power booster • LH-4, LH-5 Leather cases • MB-4 Mobile bracket • BH-5 Swivel mount • PG-2V DC cable • PG-3C Filtered cigar lighter cord.

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Dual Band Mobile & Handheld

DOUBLE YOUR PLEASURE
DOUBLE YOUR BANDS

Dual Band Radios from ICOM!
Double your operating pleasure with Icom's new dual band IC-3210 mobile and IC-32AT handheld FM transceivers. Each unit incorporates a wealth of special features and options designed to move you into the forefront of today's expanded 2-meter and 440MHz activity. Icom dual banders: the FM enthusiasts dream rigs!

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Full Duplex Operation. Simultaneously transmit on one band while receiving on the other for incomparable dual band autopatching!

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Powerful! The IC-3210 delivers 25 watts output on both bands. The IC-32AT is five watts output on both bands. Selectable low power for local use on both units.

Programmable Band and Memory Scanning. Includes easy lockout and recall of various memories. Exceptional flexibility!

Repeater Input Monitor Button. Opens the squelch and checks Tx offset simultaneously.

Priority Watch. Monitor any channel for calls while continuing operation on another frequency.

Optional Beeper. Monitors for calls with your subaudible tone, then gives alerting beeps.

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

Offices
225 Main St, Newington, CT 06111 USA
Telephone: 203-666-1541
Telex: 650215-5052 MCI
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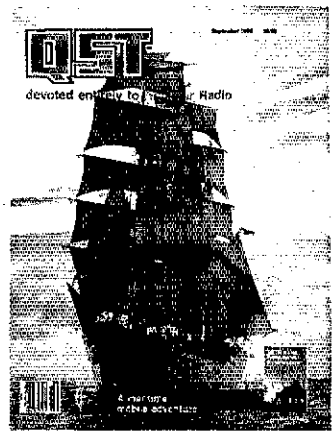

OUR COVER

Become a passenger aboard the US Coast Guard tall ship *Eagle* for an exciting maritime mobile operation. The adventure begins on page 54. (*Photo by Tom Hopkins; W1AW photo by W2ABE*)

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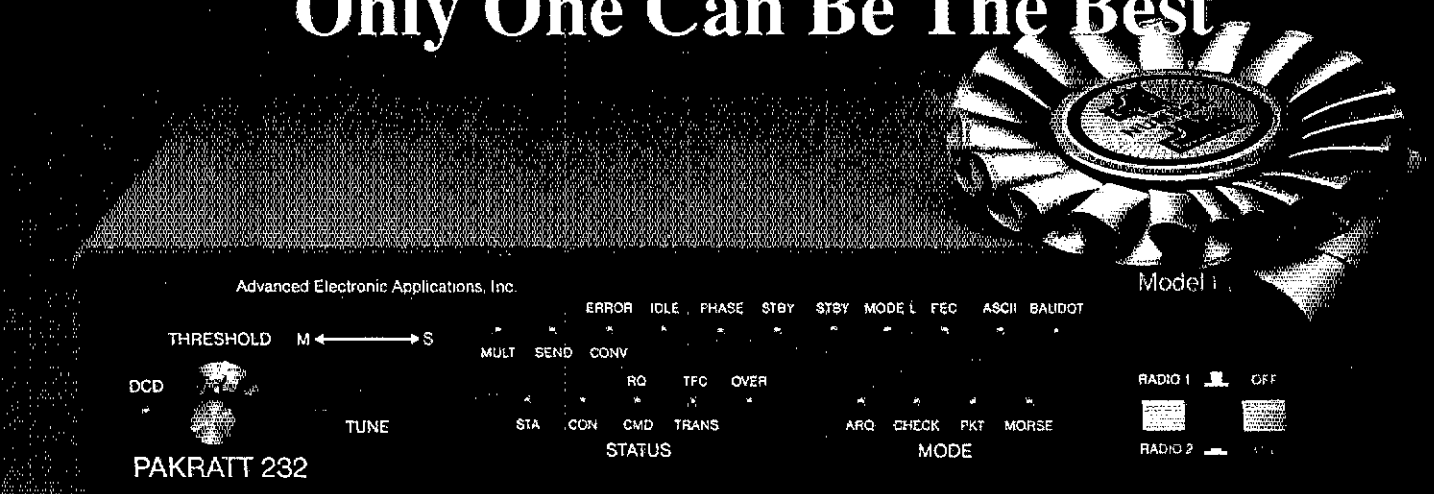
Others May Try to Imitate, But...

Only One Can Be The Best



Morse Code - Baudot - ASCII - AMTOR - Packet - Facsimile - Navtex

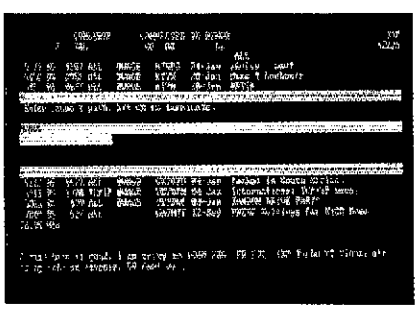
Amateur Net Price $319.95

It's a lesson you learn very early in life. Many can be good, some may be better, but only one can be the best. The PK-232 is the best multi-mode data controller you can buy.

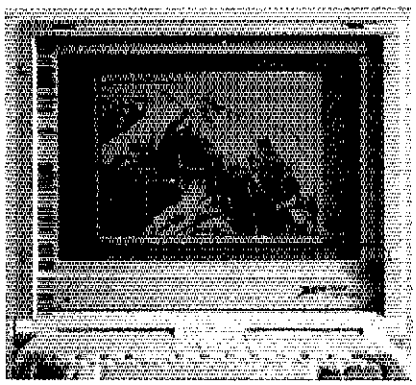
1 Versatility

The PK-232 should be listed in the amateur radio dictionary under the word Versatile. One data controller that can transmit and receive in six digital modes, and can be used with almost every computer or data terminal. You can even monitor Navtex, the new marine weather and navigational system. Don't forget two radio ports for both VHF and HF, and a no compromise VHF/HF/CW internal modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold control.

The internal decoding program (SIAM[tm]) feature can even identify different types of signals for you, including some simple types of RTTY encryption. The only software your computer needs is a terminal program.



PC Pakratt Packet TX/RX Display



Facsimile Screen Display

2 Software Support

While you can use most modem or communications programs with the PK-232, AEA has two very special packages available exclusively for the PK-232....PC Pakratt with Fax for IBM PC and compatible computers, and Com Pakratt with Fax for the Commodore 64 and 128.

Each package includes a terminal program with split screen display, QSO buffer, disk storage of received data, and printer operation, and a second program for transmission/reception and screen display of facsimile signals. The IBM programs are on 5-1/4" disk and the Commodore programs are plug-in ROM cartridges.

3 Proven Winner

No matter what computer or terminal you plan to use, the PK-232 is the best choice for a multi-mode data controller. Over 20,000 amateurs around the world have on-air tested the PK-232 for you. They, along with most major U.S. amateur magazines, have reviewed the PK-232 and found it to be a good value and excellent addition to the ham station.

No other multi-mode controller offers the features and performance of the PK-232. Don't be fooled by imitations. Ask your friends, or call the local amateur radio store. We're confident the PK-232 reputation will convince you that it's time to order your very own PK-232.

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R4

NO GROUND RADIAL VERTICAL

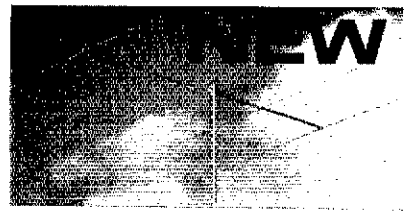
10, 12, 15, 20 METERS

The R4 is a second generation electrical half wavelength vertical antenna. Developed from the very successful R3 it has many new design features for easier assembly and operation plus improved performance.

The half wave design gives optimum current distribution for best low angle radiation and excellent DX communications. R4 brings high performance antenna features to those living in apartments, condominiums or on small city lots. Even if you have plenty of space, R4's combination of neat appearance and DX capability make it ideal for your ham station.

The new R4 design has a broadband solid state impedance matching network for full coverage of all four bands. Frequency selection is completely automatic. There are no moving parts or remote tuner. The only connection required to the antenna is your 50 ohm coax. The unique counterpoise ground uses four 48" long by .100" diameter stainless steel rods. This system gives excellent RF decoupling for mounting in any location from ground level to roof top. Make R4 your compact choice for a full-performance no-compromise HF vertical antenna.

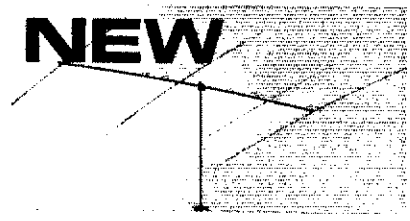
Frequency: 10, 12, 15, 20 meters
Gain excellent
Low angle radiation
360° radiation pattern
Broadband impedance matching
Hi Q frequency selecting traps
SWR: 1.2-1 typical
2:1 SWR bandwidth: 10M-1.7 MHz 12M-100 KHz
15M-450 KHz 20M-350 KHz
Power handling watts: 1800 PEP
Connector: UHF Female SO-239
Self-supporting
Height: 18 ft. 5.5 M
Weight: 8 lbs. 3.7 Kg
Mast mount, in (cm): Min.-Max. 1.5 (3.8)—1.75 (4.44)



12 METER 4 ELEMENT SKYWALKER

Enjoy the most popular WARC band. Whether your interest is friendly rag chewing or operating awards and DX-ing, the Cushcraft 12-4CD is designed to punch your signal through on this active new band.

Forward Gain	excellent
Front to Back Ratio	excellent
SWR	1.2:1
Boom Length	18 ft (5.5 m)
Longest Element	19 ft 10.5 in (6.1 m)
Turning Radius	15 ft (4.6 m)
Wind Surface Area	4 ft² (.46m²)
Weight	21 lb (9.5 kg)



A4S THE PREMIUM 10-15-20 METER BEAM

The A4S is the true high performance tribander. Precisely tuned high power traps, carefully selected element lengths and proper spacing combine to make A4S the preferred antenna. It has pinned boom sections and formed aluminum brackets to keep elements straight under all conditions. All hardware and clamps are stainless steel.

Forward Gain	excellent
Front to Back Ratio	excellent
SWR	1.2:1
Boom Length	18 ft (5.5 m)
Longest Element	31 ft 4.5 in (9.6 m)
Turning Radius	18 ft (5.5 m)
Wind Surface Area	5.5 ft² (.51 m²)
Weight	37 lb (16.8 kg)

cushcraft CORPORATION

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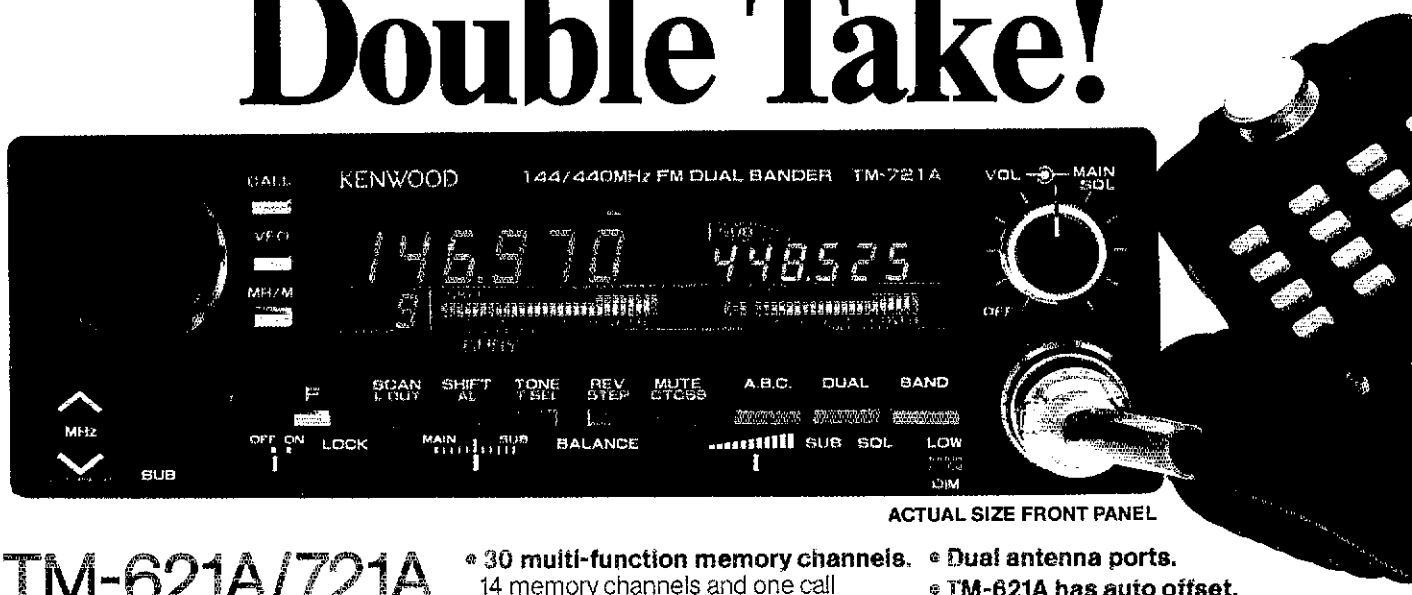
Double Take!



ACTUAL SIZE FRONT PANEL

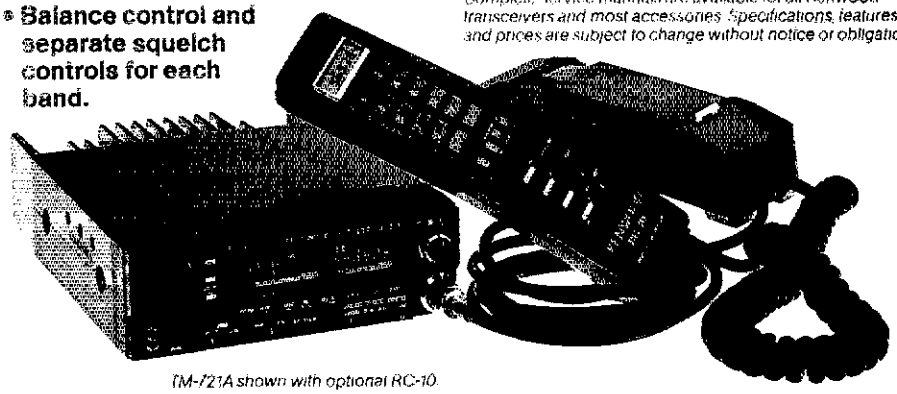
TM-621A/721A

144/220 and 144/450 MHz FM Dual Banders

Once again, Kenwood brings you another Dual Bander First! The TM-621A is the first 144/220 MHz FM Dual Bander. The Kenwood TM-621A and TM-721A (144/450 MHz) re-defines the original Kenwood "Dual Bander" concept. The wide range of innovative features includes a dual channel watch function, selectable full duplex operation, 30 memory channels, extended frequency coverage, large multi-color dual digital LCD displays, programmable scanning, and more!

- **Extended receiver range** (138.000-173.995 MHz) on 2 m; 70 cm coverage is 438.000-449.995 MHz; 1-1/4 m coverage is 215-229.995 MHz. (Specifications guaranteed on Amateur bands only. Two meter transmit range is 144-148 MHz. Modifiable for MARS/CAP. Permits required.)
- **Separate frequency display for "main" and "sub-band."**
- **Call channel function.** A special memory channel for each band stores frequency, offset, and sub-tone of your favorite channel. Simply press the CALL key, and your favorite channel is selected!
- **30 multi-function memory channels.** 14 memory channels and one call channel for each band store frequency, repeater offset, CTCSS, and reverse. Channels "A" and "b" establish upper and lower limits for programmable band scan. Channels "C" and "d" store transmit and receive frequencies independently for "odd splits."
- **45 Watts on 2 m, 35 watts on 70 cm. 25 watts on 1-1/4 m.** Approx. 5 watts low power.
- **Automatic Band Change (A.B.C.)** Automatically changes between main and sub-band when a signal is present.
- **Dual watch function allows VHF and UHF receive simultaneously.**
- **Programmable memory and band scanning, with memory channel lock-out and priority watch function.**
- **Balance control and separate squelch controls for each band.**
- **Dual antenna ports.**
- **TM-621A has auto offset.**
- **Full duplex operation.**
- **CTCSS encode/decode selectable from front panel** or UP/DWN keys on microphone. (Encode built-in, optional TSU-6 needed for decode.)
- **Each function key has a unique tone for positive feedback.**
- **Illuminated front panel controls and keys.**
- **16 key DTMF mic. included.**
- **Handset/remote control option (RC-10).**
- **Frequency (dial) lock.**
- **Supplied accessories:** 16-key DTMF hand mic., mounting bracket, DC cable.

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



TM-721A shown with optional RC-10.

Optional Accessories:
• **RC-10** Multi-function handset/remote controller • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SW-100B** Compact SWR/power/volt meter • **SW-200B** Deluxe SWR/power meter • **SWT-1** 2 m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-40** Compact mobile speaker • **SP-50B** Deluxe mobile speaker • **PG-2N** DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MA-4000** Dual band 2 m/70 cm mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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

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Vice Director: Wayne Overbeck, N6NB 14021 Howland, Tustin, CA 92680 (714-731-6178)

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

*Executive Committee Member

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Reports Invited: The ARRL Board of Directors (see list at left) determines the policies of ARRL. The 15 divisions of the League are further arranged into 68 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.

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Santa Clara Valley — Glenn Thomas, WB6W, 554 Simas Dr, Milpitas, CA 95035 (408-263-9450)

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Southern Florida — Richard D. Hill, WA4PFK, 3800 SW 11th St, Fort Lauderdale 33312 (305-583-6932)
Puerto Rico — Jose A. "Tony" Purcell, KP4IG, Urb Tomas Carrion, Calle 2, #95, Juana Diaz, PR 006 (809-837-2975)
Virgin Islands — Ronald Hall, Sr, KP2N, PO Box 3987, St Thomas 00801

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South Texas — Arthur R. Ross, W5KR, 132 Sally La, Brownsville 78521 (512-831-4458)
West Texas — Amelia "Milly" Wise, W5OVH, 8516 Mt Scott, El Paso 79904 (915-751-4160)

"It Seems to Us . . ."

Repeater Coordination Redux

Three years ago, FCC proposals in PR Docket 85-22 (and the ARRL response formulated by the Board at its July 1985 Meeting) moved us to devote this page to the subject of repeater coordination. At the risk of being accused of saying "We told you so," here is an excerpt from that September 1985 editorial:

> . . .The ARRL further recommends that consideration of the procedural framework within which frequency coordinators are recognized and conduct their operations be the subject of a future FCC proceeding.
>
> [This] guideline represents the longest "loose thread" in the finely woven fabric of repeater coordination policy. A coordinator's authority is derived from the consent of the governed, but how is that authority conferred? Generally it has been by default: repeater coordination is a thankless task, and if someone has been willing to take it on they've been more than welcome to do so—and most have done an excellent job. But increasingly, we're hearing of groups wanting to coordinate an impossibly small area, or to set up in competition with an existing coordinator—and there has to be a mechanism for mediating such situations before chaos erupts. Once the commission has established the basic principles underlying repeater coordination, addressing this issue is the logical next step.

Unfortunately, the "logical next step" was never taken. Instead, in its Report and Order in Docket 85-22 the FCC said simply this:

> Several coordinators urged us to establish some mechanism to officially recognize local or regional coordinators. Others were concerned about abuses of power at the local level. Another concern was exclusive right to coordinate within a geographical area. It is essential that repeater coordinators respond to the broadest base of local amateurs and consider the concerns not only of repeater owners but also of those users of spectrum affected by repeater operation. Their authority is derived from the voluntary participation of the entire amateur community; their recognition must be derived from the same source. We believe the new rules will assure that a coordinator is representative of all local amateur operators.

The rules adopted in Docket 85-22 shed no light on the question of how a coordinator's authority is conferred; a "frequency coordinator" is simply defined as being "recognized in a local or regional area by amateur operators whose stations are eligible to engage in repeater or auxiliary operation." The Commission line is, "The amateurs must decide"—but no decisional process is mandated or even suggested. In other words, the FCC wants a group of volunteers to accept responsibility for certain functions without providing the authority needed to do the job.

In the Docket 85-22 Report and Order, the Commission said coordinators were able to, among other things, "deny requests for coordination in congested bands or require the use of less congested bands." When a coordinator finds it necessary to do that, it's bound to make the would-be repeater operator unhappy. On the other hand, if a new repeater is coordinated into a crowded band it may well make existing repeater operators and users unhappy. It's a no-win situation for the coordinator, made worse by the lack of clear-cut authority. Under the circumstances, it's remarkable that the system of voluntary coordination has worked—and in most of the country, continues to work—as well as it has. This is not to say that coordinators are perfect; some have fallen short of meeting the standard that justice must not only be done, but must appear to be done. But remember that amateur frequency coordination has evolved from nothing over a period of two decades, and continues to evolve. Evidence of the latter is the considerable work that has gone into the drafting of a "Coordinators' Code" through the mechanism of the *Repeater Coordinators' Newsletter*.

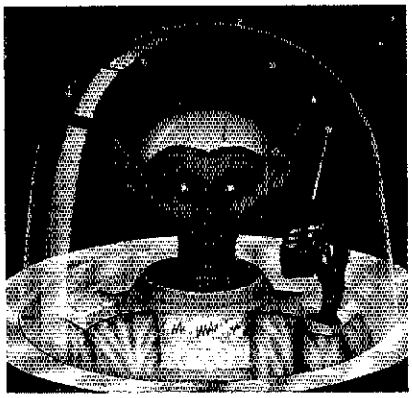
Longstanding ARRL policy has been that the League is not a coordinator, nor does it certify coordinators, and publication in the *Repeater Directory* does not constitute or imply endorsement or recognition of the authority of such coordinators. But it is also longstanding policy to support local coordination, not just in principle but by such tangible means as the National Repeater Data Base. At its most recent meeting, the Board took two more actions in support of coordination.

The Board established as League policy that the League ". . .shall offer repeater owners, trustees, and repeater coordinators/spectrum managers its good services in arranging binding arbitration through the American Arbitration Association or similar forum." This will only work if both parties to a dispute agree in advance to its being resolved in this fashion, but it should at least serve as a reminder that there are ways, short of legal action, to fill the void left by the Commission in Docket 85-22.

In its other action, the Board restated the

(continued on page 13)

Yaesu's FT-736R. Because you never know who's listening.



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With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

You see, the FT-736R is the most complete, feature-packed rig ever designed for the serious VHF/UHF operator. But you'd expect this of the successor to our legendary FT-726R.

For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm (430-450 MHz!), with two additional slots for optional 50-MHz, 220-MHz, or 1.2-GHz modules.

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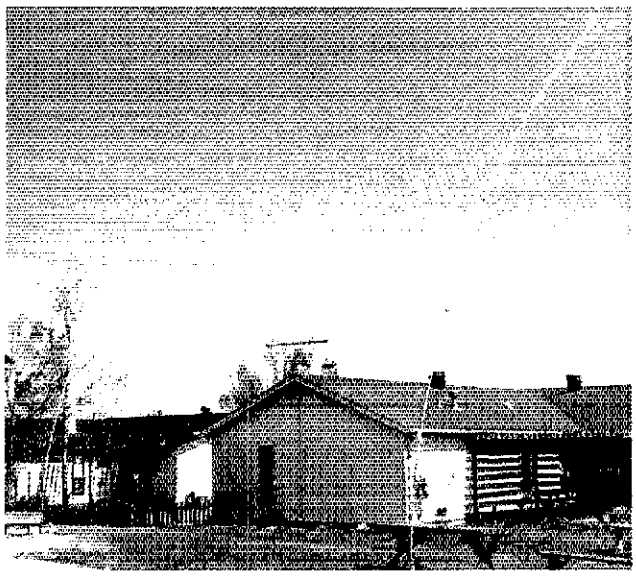
UP FRONT in QST

Please Don't Let it Rain: Twenty people, all boaters cruising in the Caribbean, took Amateur Radio exams at the US Coast Guard facility in St Thomas, US Virgin Islands, on May 14. The exam session, sponsored by the St Thomas ARC, was held outside due to construction work in progress at the Coast Guard building. Looks like the weather cooperated. (*photo courtesy NP2AZ*)

81 Years Young: Sylvester Stolzenberger, W7IVM, of Clarkston, Utah, must be young at heart. Jed Owen, W7GDH, reports that Sy, as he's known, is still active and runs a well-organized station. In addition to his Amateur Radio activities, Sy has also put many miles on his motorcycle in recent years. Just goes to show you're as young as you feel. (*photo courtesy W7GDH*)



Swaying in the Breeze: John Risch, WØFEV, of Florissant, Missouri, sent along this picture of his 40-meter phased verticals in a 50-mi/h wind. John reports that they are still perfectly vertical after weathering many storms. (*photo courtesy WØFEV*)

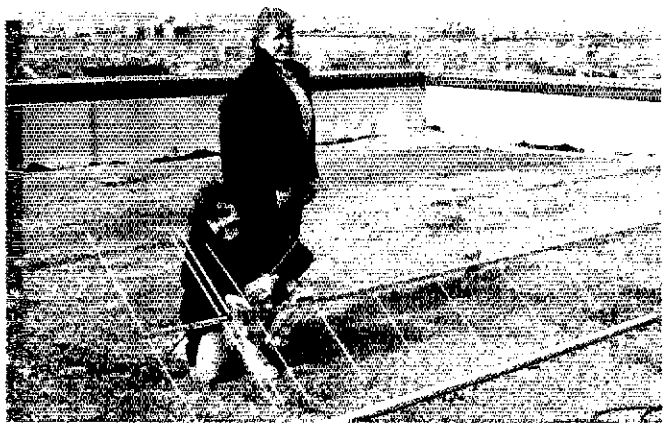
Home Brewing Isn't Dead: Who said that today's Novices are only appliance operators? Joshua Mason, KB7HFE, of Port Orchard, Washington, is shown here with his home-brew 6C4 Pierce crystal oscillator with a 2E26 final that puts out 15 watts, and his Heathkit SB-300 receiver. His grandfather, Murray Ehrlich, K7AU, supervised as Josh drilled, bent and soldered; Murray reports they both had a ball. Josh operates Murray's station occasionally, but Murray's personal incentive plan is in effect—Josh cannot operate 10-meter or 220-MHz voice until he has his General! He operates on 7102 and 7126 kHz—give him a call! (*photo courtesy K7AU*)

Among the Titans: The Green Valley (Arizona) ARC operated a special-event station from the Titan Missile Museum in April, making over 700 contacts. The station operated under the call of Phil Doersam, KX7J, who reports that many of the contacts were made on the Novice segment of the 10-meter band. (*photos courtesy KX7J*)

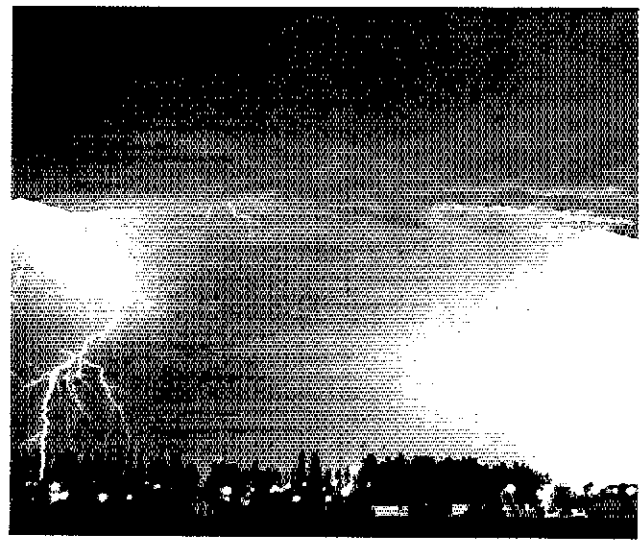
Wrong QTH

Several amateurs have written to report that the QTH given for the Ham's Station (July 1988 *QST*, p 12) was incorrect. The correct QTH is on Highway 88 about 70 miles east of Stockton, California. Tom Jones, N7KTQ, of Gardnerville, Nevada, reports that the owner clipped the Ham's Station item out of the UpFront section of his *QST* and have placed it in a prominent position behind the bar. Tom reports that the owner thought "it was kind of nifty." Thanks to all who wrote in with this correction; you can't slip anything past a ham!

Ham Hospitality: Ray Johnson, W7QDM (right), of Idaho Falls, Idaho, recently visited Hannover, West Germany on business, but was unable to get lodging reservations. However, Ray had previously contacted Franz Nieberding, DK1II, who found him bed and breakfast, met him at the airport and generally made things pleasant during his visit. Ray wishes he could hand deliver all his QSLs this way. (*photo courtesy W7QDM*)

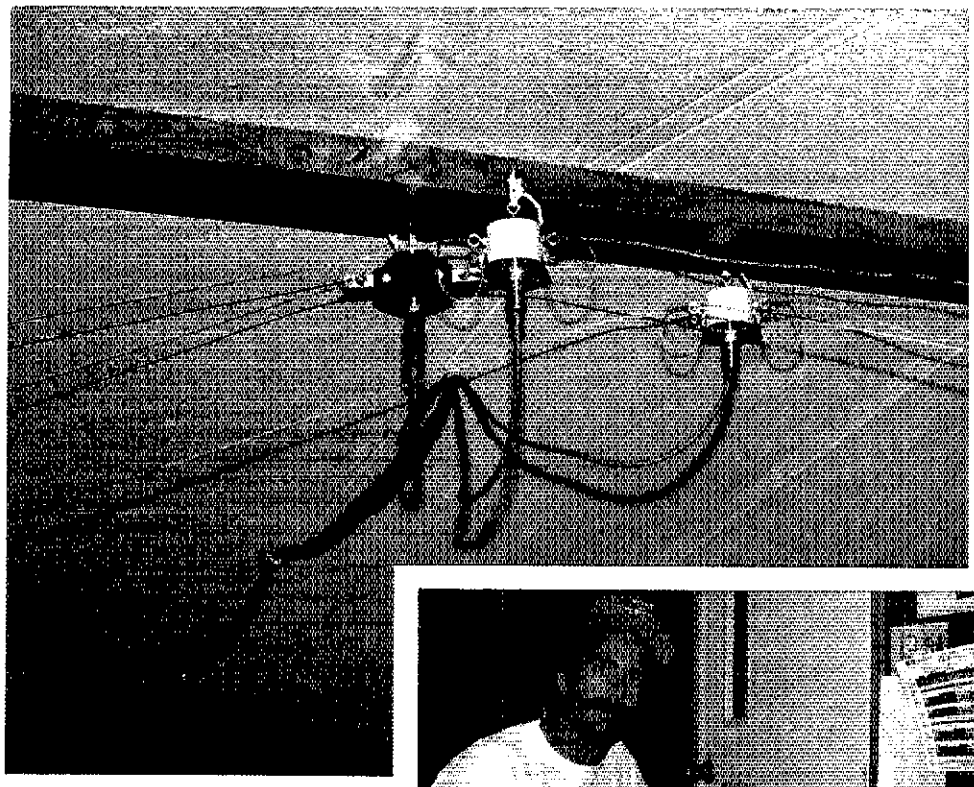


On Track: The 1987-88 IEEE Vincent Bendix Award was given to students in the Temple University Electrical Engineering Department for their Senior Design Project, "Synchronous Amateur Radio Satellite (AMSAT) Tracking System." The award is a monetary grant for funding imaginative projects likely to contribute to the professional development of students. This is the second year in a row students in Temple's EE Department have won the award in Region II. The project members, Elaine Friel (left), Susan Wilkinson (right), Nicola DiToro and Eugene Heuschel, are sponsored and advised by Dr Dennis Silage, an EE professor at Temple. (*photo courtesy WB2LGI*)



Light Show: Lightning—Mother Nature's way of balancing the electrical forces that exist between the earth and the upper atmosphere. For more on this striking natural phenomenon, check out the Public Service column on page 81 of this issue. (*photo courtesy WB7OMY*)

Don't Give Up: Ronald Mudersbach, N4RRM, of Winter Garden, Florida, lives in a subdivision where outside antennas are prohibited, so he strung up three dipoles (10/15/20 meters) through his living room and kitchen. Ron has worked 34 countries, 11 islands and 40 states since becoming a ham in December 1987. He would like to thank all the nonham spouses who allow wire antennas and cables throughout the house. (*photo courtesy N4RRM*)



A Cure for What Ails You

Is multitransmitter operation giving you or your club problems? Check out K4VX's article on band-pass filters on page 17 of this issue and start enjoying multi-transmitter operating again.

Take the 610

Is your 610 on the track to Gettysburg, Pennsylvania? For your map to the FCC Licensing Division, turn to page 50 of this issue.

Repeater Coordination Redux

(continued from page 9)

generally accepted principles that there can be only one recognized frequency coordinator per band per geographic area, and that the authority of such coordinators is derived from recognition accorded them by the entire amateur community in the area. The sole departures from past policy are (1) that the motion adopted by the Board includes a list of those coordinators who appear to have such recognition; and (2) that no coordinator shall be listed in the *Repeater Directory* when there has been a Commission finding that no coordinator exists or the existing coordination mechanism is in significant dispute until the dispute has been resolved by mediation, arbitration or other means. We are aware of only two such Commission findings at present. What the Board has said, in effect, is that the ambiguity perceived by the FCC in those two locales should not cause the work being performed by voluntary coordinators in all the rest of the country to be called into question. We'll continue to urge the Chief, Private Radio Bureau, to try to bring those disputants together (see Minute 91 of the January Board Meeting, March *QST*, page 53), recognizing that it's not likely to be an easy job.

We'll close this month with another brief quotation from the FCC Report and Order in Docket 85-22:

> We are not prepared to impose so drastic a remedy as a requirement that all amateur repeaters be coordinated without first determining whether the rules we adopt today will suffice. If repeater-related interference problems continue to increase in the Amateur service without adequate voluntary resolution, then perhaps we may need to examine whether to pursue such a course in the future.

—*David Sumner, K1ZZ*

League Lines

By the time you read this, ***the FCC may have reached a decision on General Docket 87-14, the FCC proposal to take away the bottom 2 MHz of the 220 band from amateurs.*** A Commission meeting on the proposal is scheduled for *August 4*—two days after this issue of *QST* goes to press. Check W1AW for the latest bulletins.

The 1988 ARRL National Convention is *September 9-11* in Portland, Oregon! For more details, see page 55 of July *QST*.

The League will hold a four-hour ***PRB-1 seminar*** entitled, "Land Use Regulation of Federally licensed Communications Facilities and the Doctrine of Federal Preemption" at the National Convention on September 10 at 9 AM. The seminar is primarily intended for ARRL Volunteer Counsel, attorneys and municipal officials, and has been approved for Continuing Legal Education (CLE) for attorneys. Registration will be handled at the door. The charge to participants and anyone else who wants a copy of the course materials is $50, which covers reproduction of course materials. There is no charge for those not wanting course materials.

Because of the annual office outing, ARRL HQ will close at 11 AM EDT on September 1.

ARRL was represented at the ***75th Anniversary luncheon of the Radio Society of Great Britain*** by President Larry E. Price, W4RA, and Executive Vice President David Sumner, K1ZZ. The luncheon was held July 15 in Birmingham, England, in conjunction with the RSGB National Convention. The highlight of the affair was the opening of the Convention by His Royal Highness, The Duke of Edinburgh, Patron of the RSGB.

The following day, Amateur Radio representatives from 18 countries gathered in informal session to compare notes on allocations conference preparations, stimulating Amateur Radio growth, attracting young people to our ranks, and other topics of international interest.

Six regions of the National Forest Service have again proposed new rental fee schedules for the various radio and television services, including amateur, that rent US Forest Service land for communications sites. Last year these Regions had separately proposed fees ranging from $100 to $1200 for amateur repeaters and the ARRL had filed strong comments urging that the fees be reduced drastically or eliminated. In the new proposals, printed in the *Federal Register* July 28, all six Regions propose a $75 yearly fee for Amateur Radio repeaters. Comments are due September 26 at each Region headquarters. For background, see Happenings, July, September, October and December 1987.

NTS historical info needed! ARRL Honorary Vice Presidents "Doc" Gmelin, W6ZRJ, and George Hart, W1NJM, recently spent some time at Headquarters researching historical documentation on the founding of the National Traffic System. They are interested in drafting a series of articles for *QST* on this subject.

If you remember anything historically significant about NTS operations in late 1949-50, or have any related correspondence or documents, you could contribute significantly to the project by sending them to: A. Gmelin, W6ZRJ, 10835 Willowbrook Way, Cupertino, CA 95014 or George Hart, W1NJM, 66 Highland St, Newington, CT 06111.

W1AW open house: The ARRL HQ building and W1AW, the Hiram Percy Maxim Memorial Station, will be open Saturday, ***October 1,*** from 10 AM to 4 PM. Normally, the station and HQ building are closed on weekends. The open house is the same weekend as the ARRL New England Convention in Boxboro, MA, about a two-hour drive from HQ. If your club would like to schedule a visit on this date, please notify HQ. If you're visiting New England to experience the brilliant fall foliage, don't hesitate to drop in. Remember to bring a copy of your amateur license if you'd like to operate W1AW.

The Constitution Bicentennial celebration continues with special "2Ø0" prefixes from preregistered club stations in the following states:

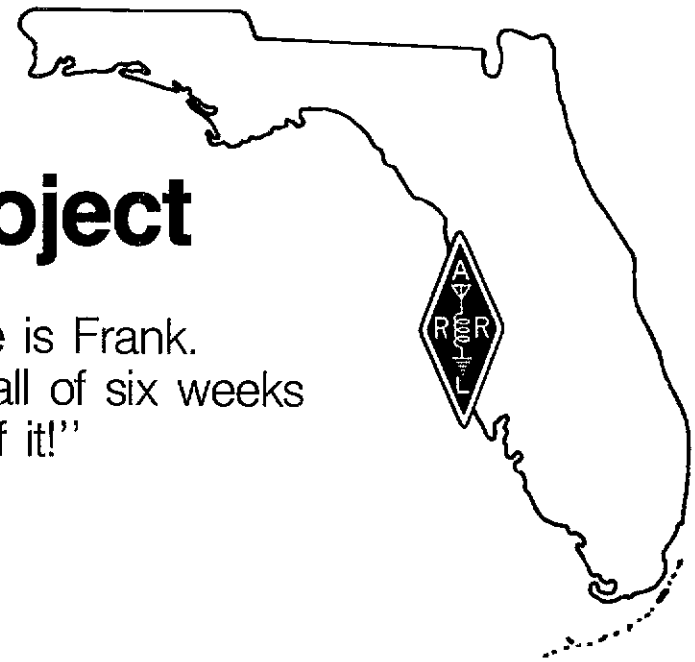
August 20-26—Hawaii
September 3-9—California

A special enrollment period is currently in progress until November 1 for the ARRL "All Risk" Ham Radio Equipment Insurance Program. All members may enroll with guaranteed acceptance. For further information on this program, see this month's Happenings column and page 158.

The results for the June VHF QSO Party, which have been published in the September issue of *QST* in the past, will appear in December *QST*. This new schedule is necessitated by earlier *QST* press deadlines and because the DX Contest and Field Day results are already earmarked for the October and November issues, respectively. High claimed scores will appear in the next issue of the *National Contest Journal*. The winners of the new plaques will also be announced in the results.

The 7th ARRL Amateur Radio Computer Networking Conference will be held Saturday, ***October 1,*** at the Johns Hopkins Applied Physics Laboratory in the Columbia-Laurel, MD area. *Gateway* has details, or call Maty Weinberg at ARRL HQ.

Project Suncoast Seniors: The ARRL New-Ham Pilot Recruitment Project



"Roger, old man, the name here is Frank. Age is 65. I've been a ham for all of six weeks and I'm enjoying every minute of it!"

By Michael R. Riley, KX1B
Assistant to the Executive Vice President, ARRL

Rarely do we hear such an exchange on the air. We've grown accustomed to the fact that most hams who have reached retirement age have been licensed for decades, not weeks. The small flame of a new-ham recruitment project in south Florida is glowing brighter and is well on its way toward changing that perception!

Local amateurs from Hillsborough and Pinellas Counties, Florida are initiating a new-ham recruitment pilot project which targets nonamateurs aged 50 and over. This project will coordinate the many strengths of the ARRL Field Organization, affiliated clubs, registered instructors, Volunteer Examiners and others toward one cohesive goal: Bringing the fun and excitement of Amateur Radio to more people. In fact, more than 130 hams have become advisors, providing assistance and suggestions. ARRL, in conjunction with ongoing recruitment of youth and other age groups, is supporting efforts in every manner possible, to help these volunteers succeed.

Welcome Aboard!

If you're an amateur residing in either Hillsborough or Pinellas Counties, Florida and would like to participate in this unique new-ham pilot recruitment project, there is still time to jump aboard! Send your QSL card to ARRL HQ, Attention: MS. Within a few days you'll be notified of your local project coordinator. Thanks!

A Combination of Old and New Recruitment Techniques

This bold new-ham recruitment effort is unlike any program attempted previously by the ARRL. Although many of the techniques are time-honored, coordinating these and other approaches is a radical change from past recruitment practices. Local cable television channels are airing videotapes about our hobby on a frequent basis, and commercials and public-service announcements will air on local radio stations. There will also be advertisements in senior-oriented newspapers on a regular basis.

"Brainstorming" sessions are being used to develop unique recruitment posters and

After recently taking classes sponsored by the Metropolitan Repeater Association of Pinellas Park, Florida, these proud upgrades smile for the camera. (*photo submitted by WA1DHM*)

W4ILE, N4LYT, WD4FNX, WD4FOB and VE3HVQ manning the operating positions at Clover Leaf ARC station WD4IIO. (*photo submitted by W4ILE*)

Special Service Club Sets the Standard

The Clover Leaf Amateur Radio Club in Brooksville, Florida (just northeast of Hillsborough and Pinellas Counties) is a superb example of successful new-ham recruitment of people aged 50 and over. Regis, W4ILE, and Angie, WB4JJH, Kramer moved into this retirement community several years ago and discovered that they were the only ham residents.

They introduced their friends to ham radio by operating from a card table during an Arts, Crafts and Hobby Show in 1977, and later gained the support and encouragement of the retirement community's management. Today, the club has 31 active members and has earned ARRL 100% Club status and been accepted as an ARRL Special Service Club!

Today, these enthusiastic club members delight in increasing their ranks. Their club meetings are well attended because they invite speakers to talk on topics of diverse interest. They advertise regularly on the local cable television channel and in the local community newsletter. After attempting to increase their club's treasury by having cake sales and even building and selling birdhouses, club members began attending local flea markets, selling items donated by residents. Their strategy has paid off—their treasury is in excellent condition. Club members travel throughout the South (from Atlanta to Miami) attending one hamfest after another—proudly wearing their distinctive green Clover Leaf ARC vests.

Does the club provide a public service? You bet it does! As a more unusual example, hams riding adult tricycles around the grounds have become a familiar sight at Cloverleaf Farms. The hams ride trikes to pick up and deliver radiograms to the residents—while also getting a little exercise! There are also three radiogram drop-off points in the community recreation halls and laundry facilities. The Brass Pounders' League listings in the Public Service column of any recent *QST* attests to the public service offered by Clover Leaf ARC station WD4IIO.

The success of the Clover Leaf ARC is testimony to the recruitment goals that any active club can reach. As one club member said during a new-ham recruitment discussion on a local cable television program, "If you have the time (to take the Novice class), we have the desire and enthusiasm to do the rest."

WB4JJH at the workbench of WD4IIO. (*W4RH photo*)

brochures for regular distribution at senior centers, mobile home parks, grocery stores and ham radio demonstrations. Volunteers will maintain regular contact with senior-oriented agencies and organizations in the area. Every recruitment avenue is being pursued in this all-volunteer effort.

Project Depends On People

Now that you know how the project will publicize Amateur Radio, you're probably wondering how prospective hams will become interested in our hobby, attend classes and eventually become Novices. In a nutshell, the heart and soul of this pilot project depends on people. One-on-one contacts, building friendships and offering personal assistance are the simple tools necessary to get interested nonhams into Novice classes. Continued personal support will also get them on the air.

Although quite a bit of work has already been done toward the success of this project, the most important work will be done by the volunteers in the test market. Novice classes will be scheduled so prospective hams can "hit the books" while their interest levels are still high. Volunteer examiners are already giving tests twice monthly. Recruitment volunteers will attend large civic events whenever possible. Local politicians and personalities will be asked to jump on the bandwagon. These new-ham recruitment pioneers in the Sunshine State are actively participating in the development of a pilot project which, if successful, will be offered as a thoroughly developed, tested and documented approach for use by ARRL-affiliated clubs, Field Organization Leadership Officials, ARRL Registered Instructors and individual hams nationwide.

But why recruit nonhams aged 50 and over? For one thing, they have more free time on their hands than those who are making a living and/or raising children, and the number of people in this age group is rapidly increasing. People over 50 usually enjoy attending social activities such as club meetings. Many of them still remember the grand days of radio when the ability to send Morse code placed one in high esteem among hams and nonhams alike. Many potential hams who have reached the age of 50 remember the excitement of talking to loved ones via the Military Affiliate Radio System. Hillsborough and Pinellas Counties in Florida were chosen for the pilot project because they have an unusually high percentage of residents aged 50 and over, as well as an active ham community.

K4EUK, WA4LLU, W4RH and WD4HHA (along with others) represented Amateur Radio at a recent National Association of Retired Federal Employees convention in Tampa. (*W4RH photo*)

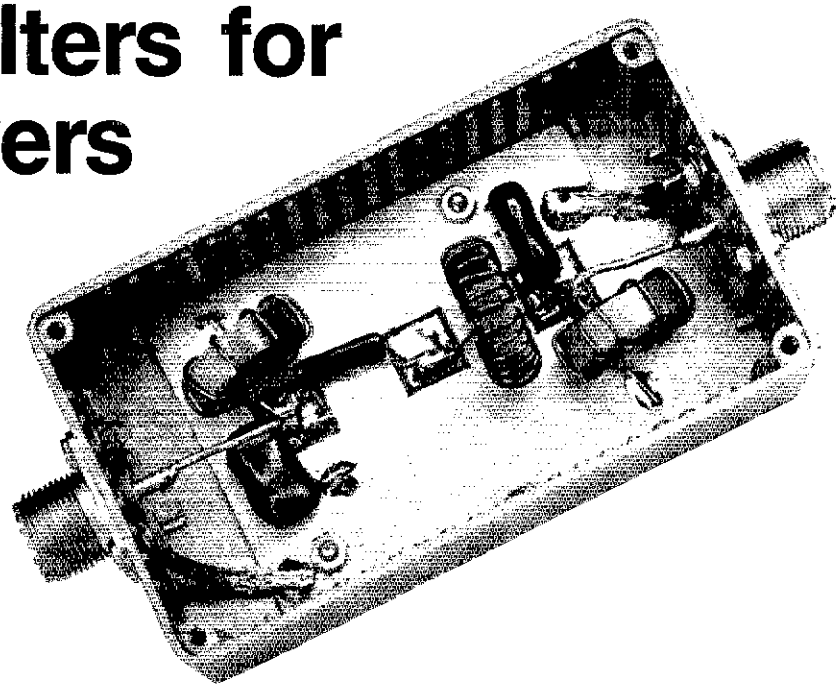
In-Home Novice Class Tutor Program

Along with those mentioned previously, there are several other unique aspects of this pilot project. One is the development of a volunteer in-home Novice class tutor program. Hams will be available to visit the homes of potential hams and teach them the basics of our hobby in a relaxed setting. Another key aspect is that coordination, information flow and cooperation among local amateurs will be emphasized. Every ham in the two-county area will be kept informed regularly about the recruitment program, who to contact if they know of a potential ham, and how to volunteer their assistance. Also, the program is designed so that the results will be measurable. Prior planning, documentation of efforts and results, and objective evaluations are the keys toward reaching this goal.

Project Suncoast Seniors Affects You

This pilot project may affect you more than you realize. The knowledge of field-proven new-ham recruitment techniques will be available to you in the future. By using those techniques and adapting many to your particular circumstances, you'll be more successful in recruiting hams in your area. The result will be more hams, a stronger voice in Washington, more members in your local club and an increased awareness of our hobby by the public.

Band-Pass Filters for HF Transceivers



Do your multiple-transmitter Field Day or contest efforts suffer from intrastation interference? These handy and inexpensive filters can help!

By Lew Gordon, K4VX
PO Box 105
Hannibal, MO 63401

One of the more aggravating aspects of competitive Amateur Radio operation comes when you're all set up for Field Day or a DX contest in a multiple-transmitter category and you discover an intrastation interference problem. All that planning and anticipation appears to be headed down the drain! Frustrations and tempers immediately mount: Someone yells "Eighty meters is wiping me out!" or someone else screams "Every time you transmit, all I hear is noise!" Anyone who has participated in a Field Day operation with more than one transmitter can probably relate to this situation.

Although interference caused by receiver front-end overload from adjacent transmitters has existed since the earliest days of multiple-transmitter operations, the mutual interference problem has been exacerbated in the last few years by widespread use of all-solid-state synthesized exciters. These rigs have not only greatly expanded operating ease and capabilities, but recent designs are providing receivers with greater stability, sensitivity and selectivity, and, as new devices and techniques are introduced, greater dynamic ranges than have previously been possible.

There is a shortcoming in the new generation of transceivers, however: Phase noise.[1] Reducing phase noise is a problem that radio design engineers have been attacking for years with varying degrees of success. Not only is phase noise transmitted (and propagated by the ionosphere) along with your signal on the band on which you are operating, but some noise energy is also transmitted on adjacent bands. Adjacent-band phase-noise interference is not usually a major problem unless stations are operating in close physical proximity, as is the case in Field Day or multitransmitter contest operations.

In seeking a solution to the intrastation interference problem that I could apply in my multitransmitter DX-contest station, I first entertained the idea of constructing large, high-power-handling band-pass filters for each transmitter. These filters would not only reduce the transmitted noise spectrum from each exciter, but would reduce receiver front-end overload problems as well, because each operating position would transmit *and* receive through a band-pass filter. I quickly retreated from this idea, however, as the expense of the components required to handle 1500 W of RF while providing an acceptable SWR to the transmitter would be excessive.

After considering the problem for a while, it occurred to me that the phase-noise spectrum is not generated in the amplifiers, so filters between the exciters and amplifiers, constructed with components that could handle 100 W of exciter output, would do the job nicely. In addition, this scheme would provide filtering during receiving, helping to reduce front-end overload problems. The best part is that even if you use all new components, the cost of these filters should not exceed $10 each. All that's necessary for tune up is a dip meter and a general coverage receiver. These filters were first described in an article I wrote for the *National Contest Journal*.[2]

Filter Design and Construction

The filter design I chose is a three-section Butterworth band-pass filter (See Fig 1). I chose this design to minimize insertion loss, produce a flat response across each band and maintain a 50-Ω impedance. The impedance match is very important with solid-state transceivers, if maximum power output is to be obtained from the exciters. I derived the component values in Table 1 by iterating the design formulas until standard-value capacitors could be used without compromising insertion loss, bandwidth, or performance.

A single-sided 2- × 4-inch PC board is used to mount the components for each filter. Three square pads, each approximately 0.4 inch per side, are required

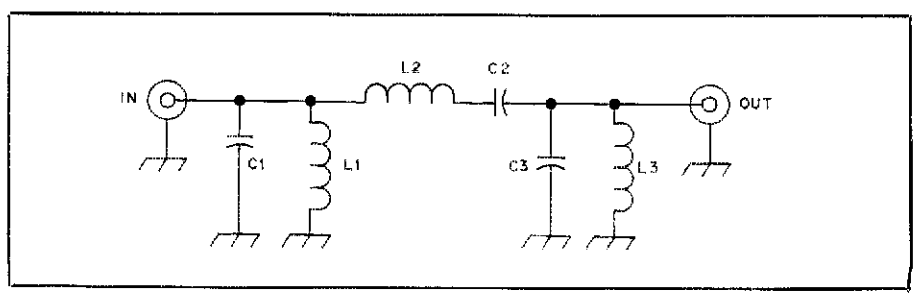


Fig 1—Schematic diagram of the three-pole Butterworth band-pass filters.

[1]Notes appear on p 23.

Table 1
HF Band-Pass Filter Specifications

					T-68-6 core		T-80-6 core		
Band (MHz)	C1/C3 (pF)	C2 (pF)	L1/L3 (μH)	L2 (μH)	L1/L3 (no. turns)	L2	L1/L3 (no. turns)	L2	F_r (MHz)
1.8	4000	400	2.2	22	22	69	23	70	1.75
3.5	2000	200	1.1	11	16	48	16	50	3.38
7	1000	100	0.55	5.5	11	35	11	35	6.78
14	500	50	0.28	2.8	8	25	8	25	13.56
21	330	33	0.18	1.8	7	20	7	20	20.65
28	250	25	0.14	1.4	6	17	6	18	27.39

Toroidal Inductors

The inductors used in Lew's filters can be wound on a number of different toroidal cores, or they can be made from air-wound inductor stock. Toroidal inductors are preferred to air-core coils because the magnetic field of a toroidal inductor is contained almost entirely in the core, so toroidal inductors usually need not be shielded from other circuit components. This property allows filters with toroidal inductors to be built more easily, and into smaller enclosures, than those with air-wound coils.

The choice of toroidal cores for the inductors in Lew's filters depends mostly on exciter power level. For 100-W transmitters, cores as small as ½-inch OD (T-50-XX cores) can be used for the coils if there is little perceptible heating of the inductors when power is applied to the filters. If the core material saturates—which occurs when the flux density in the core rises beyond the safe region as a result of excessive applied power—the core can be destroyed. This is less likely to occur in the 0.68- and 0.80-inch OD cores (T-68-XX and T-80-XX, respectively).

Mix-6 powdered-iron material is used for the inductors in this article because its frequency response and Q characteristics are suitable, and because, for the inductances needed in these filters, relatively few turns are required on mix-6 cores. Which core to use is related to a compromise between the number of turns on the toroids and the ease of tuning the filters. Inductors made using T-80-6 or T-68-6 cores require about the same number of turns for a given inductance, but the turns will be spread over a larger area on the larger core, leaving more room for turn-spacing adjustments. If smaller (T-68) cores are used, the turns come closer to filling the core, making tuning easier.

Similarly, if you wind the inductors on T-50-6 cores (½-inch OD), the inductor turns will cover the cores more completely. Also, an inductor wound on a T-50-6 core requires more turns for a given inductance than one wound on a T-68-6 or T-80-6 core. Tuning these smaller inductors is easier, because removing one turn from a coil with 20 turns of wire is easier than removing ½ turn from a coil with 10 turns! Also, the placement of the remaining turns is less critical to inductor value on a coil with more turns. Using smaller cores is fine as long as the core material doesn't saturate when power is applied to the filter.

Choosing toroidal cores is easy to do. Using a scientific calculator, the inductance values given in Table 1 and published values for the number of turns necessary for a given inductance on a certain core, you can determine the coil-winding information for that core. Each toroidal core has an A_L value, which simply represents the number of microhenrys that 100 turns of wire will produce on that core. The A_L values for common cores are given in manufacturer's literature, *The ARRL Handbook* and other sources.† To calculate the number of turns necessary for a given inductance on a toroidal core, use

$$N = 100 \times \sqrt{L/A_L} \quad \text{(Eq 1)}$$

where

N = number of turns
L = required inductance in μH
A_L = no. of μH per 100 turns

For a 5.5-μH inductor (the value of L2 in the 40-meter filter) on a T-68-6 core (A_L = 47),

$$N = 100 \times \sqrt{5.5/47} = 34 \text{ turns.} \quad \text{(Eq 2)}$$

Wound on a T-50-6 core (A_L = 40), the same inductor would require

$$N = 100 \times \sqrt{5.5/40} = 37 \text{ turns.} \quad \text{(Eq 3)}$$

The smaller size of the T-50 core and the few extra windings makes tuning a bit easier, and reduces the chance of changing the inductor value by accidentally rearranging the winding during handling. After building filters using smaller inductors, make sure the cores don't heat perceptibly during operation, or they may be damaged.—*Rus Healy, NJ2L*

†A_L values and other winding information for powdered-iron toroids is given in M. Wilson, ed., *The 1988 ARRL Handbook* (Newington: ARRL, 1987), p 2-34.

(see Fig 2). This layout is simple enough that the boards can be prepared using an X-acto® knife, although if construction of many boards is anticipated (or if "ugly" construction offends you), etched PC boards might be desirable. Each filter is mounted in an aluminum enclosure. Install SO-239, BNC, or phono connectors at each end of the enclosures for input and output connections. The filter pictured in the title photograph is built in a Hammond 1590N enclosure.

A parts-placement diagram for the filter components is shown in Fig 3. All inductors can be wound on Amidon or Palomar T-68-6 toroids, although larger T-80-6 toroids may be used, if desired.[3] In an early design using T-50-2 toroids, the windings became warm with 100 W output, so I decided to use larger T-68-6 cores. (See the sidebar, "Toroidal Inductors.") All inductors are wound with no. 20 enameled wire, with the exception of L2 on the 3.5- and 7-MHz filters, which must be wound with no. 24 or smaller wire if T-68-6 cores are used. If you use T-80-6 cores, you can use larger wire for these inductors. In winding the inductors, start with the number of turns specified in Table 1, and space the turns evenly over about 75% of the core. Leave three or four inches of extra wire on each inductor for adjustments.

I used silver-mica capacitors in all the filters, but polystyrene capacitors can be substituted, and they're cheaper. The capacitors you use should be rated at 500 V or more. If you have access to an impedance bridge or capacitance meter, you could use 20%-tolerance disc-ceramic capacitors with adequate voltage ratings, after finding those close enough in value to do the job.

Tuning the Filters

Final adjustment of the inductors requires a dip meter. (If you have access to a network analyzer or impedance bridge, so much the better, but a dip meter will work fine for this job.) Solder each capacitor across its corresponding inductor to make a parallel LC circuit. Leave sufficient space between the leads to couple the dip meter into the circuit. The values for F_r in Table 1 are the resonant frequencies for C1/L1, C2/L2 and C3/L3 for each filter. Adjust the dip-meter frequency and watch for a dip. Be sure to couple the dip meter very lightly to the circuit being measured, and look for the frequency that produces a barely observable dip. Because my dip meter is 25 years old, I use a general coverage receiver to verify the meter's frequency readings. Of course, this is a good practice any time you use a dip meter.

Fine adjustment of the resonant frequencies specified in Table 1 can usually be done by spreading or compressing the coil turns on the cores. If necessary, add or remove one turn at a time from each coil until resonance occurs near the specified F_r. When the resonances correspond to the F_r

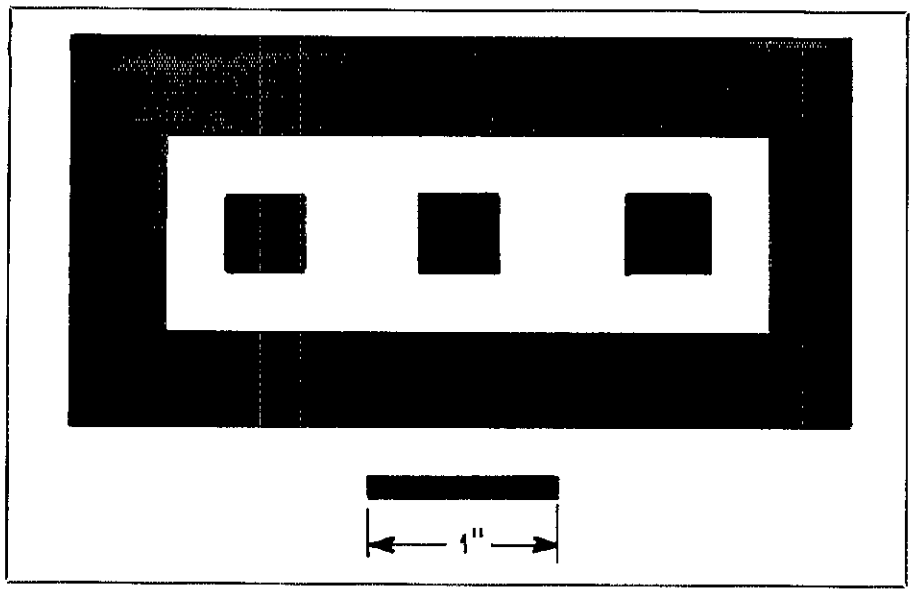


Fig 2—Full-size, foil-side PC board pattern for the three-pole band-pass filters. Shaded areas represent unetched copper foil. Components are soldered on the foil side.

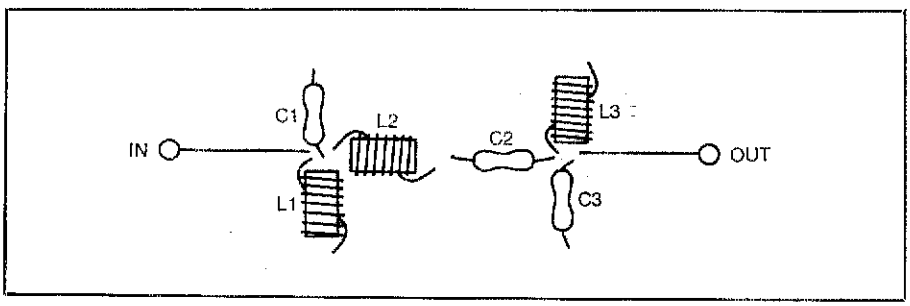


Fig 3—Parts-placement diagram for the three-pole band-pass filters. Input and output connections can be made with small coaxial cable or short lengths of hookup wire. Be sure to make a good connection from the ground foil of the PC board to the enclosure and connector grounds. See the title photograph.

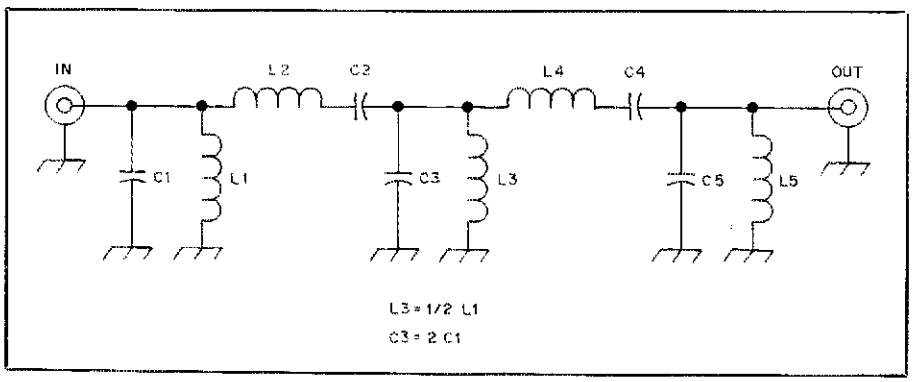


Fig 4—Schematic of a five-pole Butterworth band-pass filter. The same construction techniques as used for the three-pole filters should be used when building five-pole versions.

values in Table 1, unsolder the capacitors. Then, without disturbing the placement of the turns on the core, coat the inductors with Q Dope® or spray paint, and trim the leads to about ¾ inch. When the inductors have dried, solder them to the designated spots on the PC board. Solder in the capacitors and mount the filters in the enclosures.

If you have access to a network analyzer, you can use it to help optimize the overall filter performance. Using a borrowed HP-8656B signal generator and a 50-Ω terminated RF voltmeter, I measured the filter characteristics shown in Table 2.[4]

The insertion loss of these filters is less than 0.5 dB across the bands for which they are built, so obtaining adequate amplifier drive when transmitting through the filters should not be a problem. The major advantage of these filters is the near-total

Table 2

Filter Loss v Frequency*

Band (MHz)	Loss (dB) at freq (MHz)				
	3.5	7	14	21	28
3.5	<0.5	29	50	>65	>65
7	30	<0.5	32	41	49
14	56	32	<0.5	16	40
21	63	44	8	<0.5	15

*Not measured at 1.8 or 28 MHz.

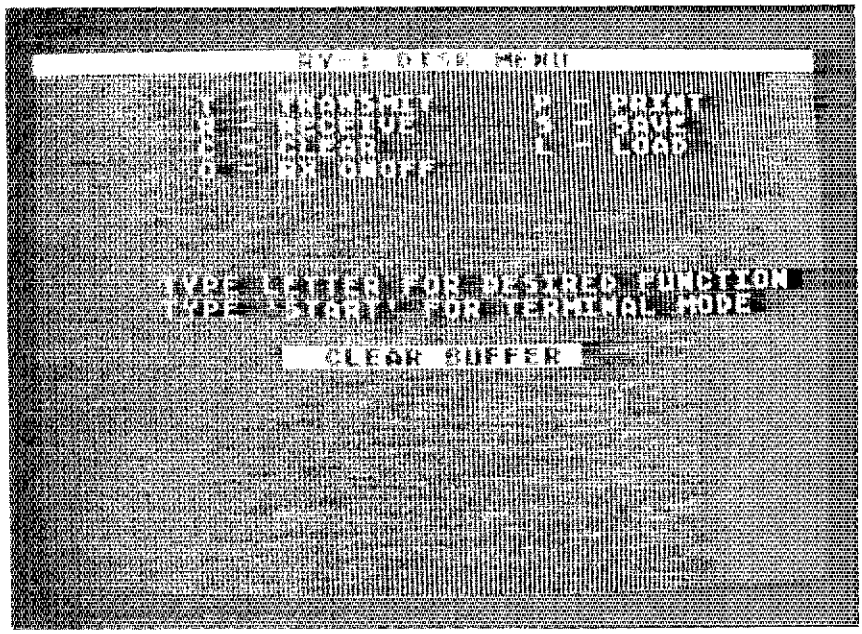
elimination of the phase-noise interference they provide when transmitters and receivers are operated on adjacent bands in close proximity to each other. Although the isolation they provide between the 14- and 21-MHz bands, and between the 21- and 28-MHz bands, is less than the isolation possible between bands that differ in frequency by a 2:1 or greater ratio, the filters are good enough to practically eliminate phase noise and effectively reduce intermodulation problems at my station. On 28 MHz, I can barely detect the noise from the 21-MHz transmitter, where the filter attenuation is only 15 dB (I don't use a filter on the 28-MHz rig). The relatively low attenuation of the 21-MHz filter at 28 MHz may be a result of the fact that the 21-MHz filter I use was constructed using air-wound no. 14 wire in self-supporting coils (instead of toroidal inductors) for L1 and L3 in that filter. The close proximity of these air-wound coils allows mutual coupling, which deteriorates filter performance. If you build these filters using air-wound inductors, use shields between the inductors to reduce coupling. Toroidal forms should be used, if possible.

If problems with phase-noise interference persist after installation of these filters, five-pole Butterworth filters may solve the problem. (A five-pole filter is essentially two cascaded three-pole filters.) The center section of the filter combines the output section of one three-pole filter with the input section of the other, and should have twice the capacitance and half the inductance of the end sections of the corresponding three-pole filters to maintain 50-Ω impedance (see Fig 4). Rejection should be considerably more than the values shown in Table 2. F_r is the same for the center section as for the others. Insertion loss for the five-pole filters will be slightly greater than the three-pole versions, but this is a small price to pay for interference-free operation. If a five-pole filter doesn't do the job, you may want to seriously consider replacing the troublesome transceiver!

In the past, vast improvements in selectivity, sensitivity and dynamic range that we enjoy today in Amateur Radio equipment have come about as direct results of amateurs making their feelings about equipment performance known to manufacturers. Manufacturers should seriously consider incorporating additional bidirectional filtering in their transceiver designs—users

(continued on page 23)

Baudot and ASCII RTTY Programs for Atari Computers



You can put Baudot and ASCII RTTY at your fingertips conveniently—and at low cost! Why wait to join in on the fun?

By Steven Stuntz, NØBF
1656 South California St
Loveland, CO 80537

Here are two more plug-and-play programs to add to the existing library of CW, RTTY and packet-radio software published in *QST* for Atari computers.[1-6] Now there are five programs—covering four modes—that you can easily run on these low-cost computers. If you haven't already bought one of the inexpensive 8-bit Ataris (or dug one out of your closet or attic), do it! Some Atari 400 and 800 computers can be found at yard sales for nearly nothing, and the Atari 65XE and 800XL computers can be purchased from mail-order houses for $100 or less. For such a small cash outlay, using one of these compact computers as a dedicated communications terminal is not only a temptation that's hard to resist, but a good idea, too! If you already have another computer, you can free it up for other, perhaps less enjoyable, uses—such as work...

General Description

I'll describe two programs: one for Baudot RTTY, the other for ASCII RTTY. There are some fundamental differences between the two programs. The Baudot code uses five bits per character; the ASCII code uses seven bits per character. Baudot RTTY allows the use of a maximum of 63 characters, and all alphabetic characters are uppercase only. On the other hand, ASCII RTTY permits the use of 128 characters, including upper- and lowercase alphabetic characters. Another difference is speed. The Baudot RTTY program runs at a maximum of 100 WPM; the ASCII RTTY program hits 300 bit/s.

Both the programs I've written run on the Atari 400, 600XL, 800, 800XL, 1200XL, 65XE and 130XE computers. Each program offers the following features:

- A split-screen, scrolling display.
- A 255-character type-ahead buffer.
- Three 255-character volatile (temporary) message buffers.
- Disk storage and retrieval of messages.
- Printer output.
- Word-wrapping for received and

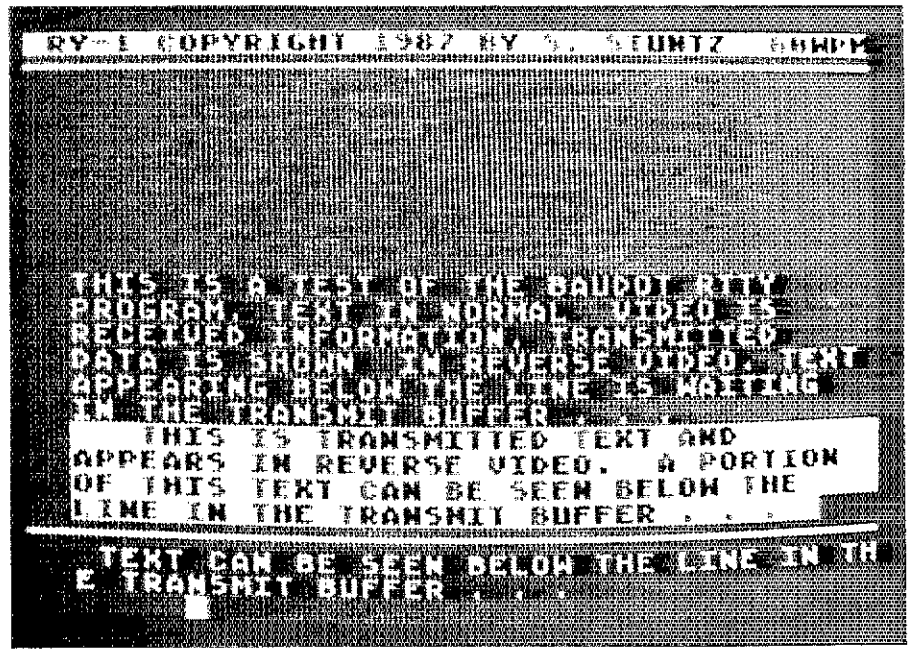


Fig 1—A sample of how the terminal-mode display screen appears during Baudot RTTY operation. A portion of the transmitted text previously stored in the transmit buffer can be seen below the lower screen-dividing line. Note the RY-1 (Baudot RTTY program) identifier in the upper-left corner of the screen. The current speed of operation is displayed in the upper-right corner of the screen.

[1]Notes appear on page 23.

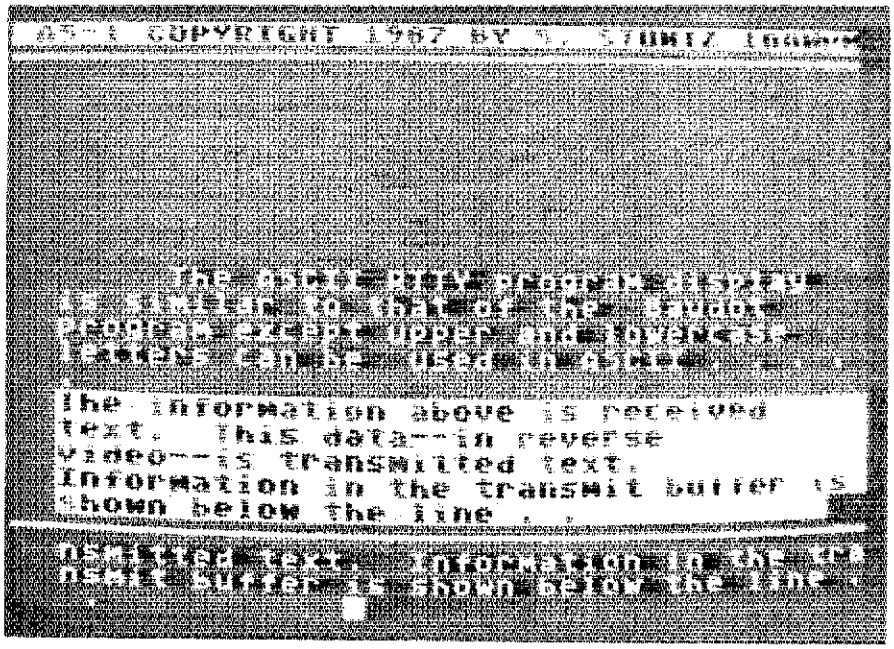


Fig 2—Here's what the ASCII RTTY terminal-mode screen looks like. At the upper-left, AS-1 identifies the program; data-transfer speed is shown in the upper-right screen corner. Here you can see the use of lowercase letters (not available in Baudot RTTY).

transmitted messages.

- Baudot RTTY speeds of 60, 67, 75 and 100 WPM.
- ASCII RTTY speeds of 75, 100, 150 and 300 bit/s.

With the two-window, split-screen format I devised, the upper window displays received messages in normal video. Transmitted information is shown in reverse video. The lower window displays the type-ahead buffer contents. (See Figs 1 and 2.)

Word-wrapping is used in the upper window. This feature prevents words from being split between two lines. Any word of 14 characters or less that extends beyond the 38th screen column is moved to the next line. Carriage returns are converted to spaces to make maximum use of the 40-character-wide display.

The word-wrapping technique used for outgoing information prevents data from being lost by mechanical teleprinters (because of type-over) when long sentences are sent. Both programs automatically generate a carriage return when a space appears after 57 characters have been sent without the operator having issued a carriage return. Also, a carriage return is automatically generated after 72 characters have been sent without an intervening space.

Of course, you need a modem or communications processor. (See "A Cheap n' Easy Modem" and "A Simple Tuning Indicator," described in the June and July issues of *QST*.[7,8]) The modem or communications processor (CP) converts the received tones to TTL levels for the computer, and turns the TTL-level output of the computer into tones for the transmitter. If your CP requires RS-232-C levels, there's a simple and inexpensive way to provide them.[9]

Program Design

I wrote the Baudot and ASCII RTTY programs in assembly language. Because I wanted the programs to run on any 8-bit Atari computer with a minimum of 16 kbytes of RAM, the programs couldn't be combined. Therefore, each program is contained in a separate 2732 EPROM.

A keyboard-and-screen loop and an interrupt loop similar to those described in my November *QST* article (see note 6) are at the heart of each program. The keyboard-and-screen loop polls the keyboard for a keypress and stores a bit representation of the character in the transmit buffer. For the Baudot program, this character representation requires 8 bits: one start bit, five bits for the Baudot character and two stop bits. In the ASCII program, 10 or 11 bits are used: one start bit, seven bits for the character, one parity bit (not used) and two stop bits—one stop bit for speeds other than 100 WPM. A more detailed description of these formats can be found in Chapter 19 in recent editions of *The ARRL Handbook*.

The keyboard-and-screen loop also checks the receive buffer for data. In both programs, this loop converts the incoming character to an Atari screen code before writing it to the screen.

Received and transmitted data is transferred between the computer and CP by the interrupt loop. For each bit sent or

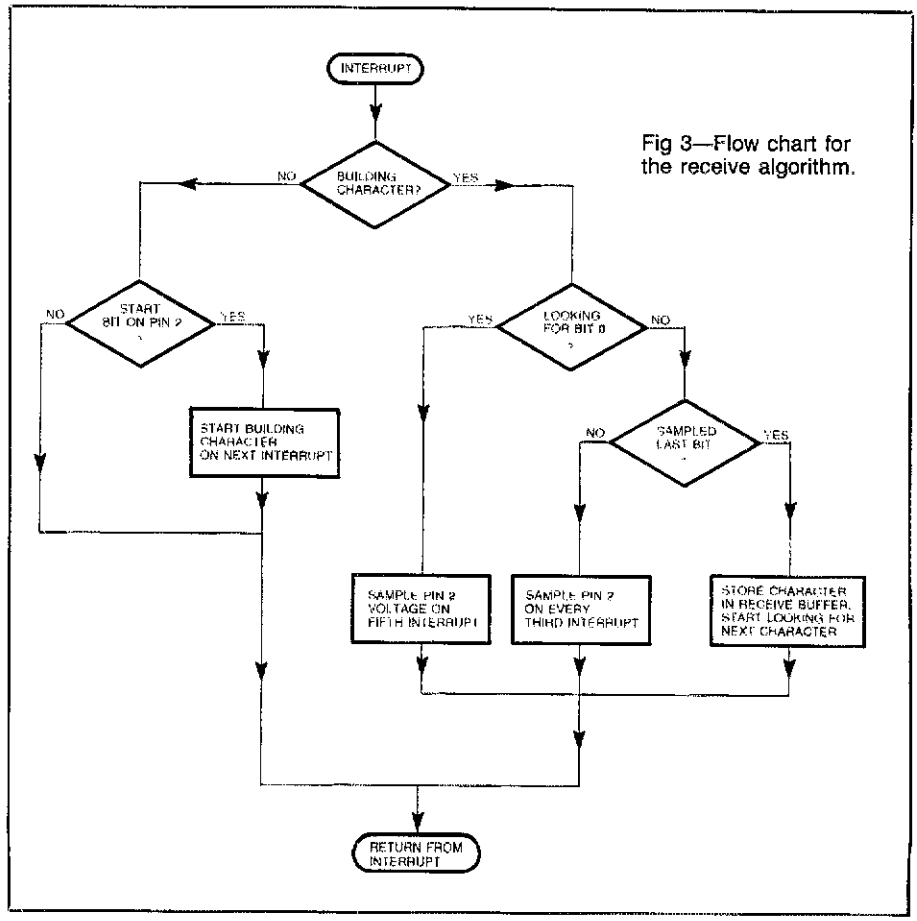


Fig 3—Flow chart for the receive algorithm.

received, this loop is executed three times. The interrupt timer is a divide-by-N counter running at 1.79 MHz. The length of time between interrupts is determined by the number (N) stored in the audio-frequency registers AUDF1 (low byte) and AUDF2 (high byte) where:

$$N = \frac{1{,}790{,}000 \times 0.996}{3 \times \text{data rate}} \qquad \text{(Eq 1)}$$

A multiplier of 0.996 is used to reduce N by 0.4% to compensate for the time required to process each interrupt. For example, N equals 13,075 when the Baudot program is set to 60 WPM (45.45 bauds), and N equals 5403 when the ASCII program is set to 100 WPM (110 bauds).

Receiving Algorithm

A flow chart of the receiving algorithm is shown in Fig 3; it's the same one used in my packet program (see note 6). Fig 4 shows the waveforms that are present on pin 2 of CONTROLLER jack 1 when receiving the letter Y. The routine begins by sampling the voltage on pin 2, looking for a start bit (a transition from +5 V to 0 V) to tell it to build a character. Once a start bit is detected, the routine waits for four interrupt intervals, then samples the voltage on pin 2 during the fifth interrupt. The value of this voltage sample is stored as bit 0 of the character. Bit 0 is a 1 if the voltage on pin 2 is 0 V, and a 0 if +5 V is present.

Next, the routine determines bit 1 by waiting for three interrupt intervals and sampling the voltage on pin 2 during the eighth interrupt. The remaining bits that make up the character are determined by sampling the voltage present on pin 2 during every third interrupt until the entire character has been read. The routine finally stores the character in the receive buffer and repeats the entire process for the next character. As shown in Fig 4, the bit pattern for the letter Y stored in the receive buffer is 10101 for the Baudot program and 1011001 for the ASCII program.

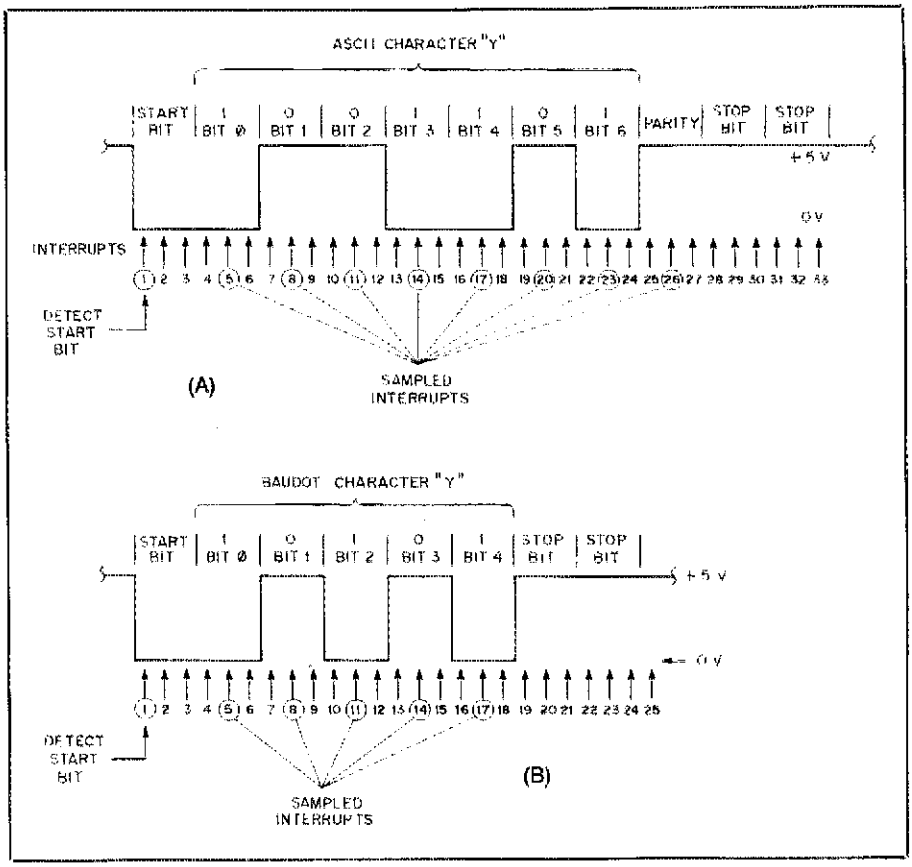


Fig 4—ASCII (A) and Baudot (B) waveforms present on pin 2 of the Atari CONTROLLER jack 1 when receiving the character Y.

Program Operation

Fig 5 shows the connections required between the computer's CONTROLLER jack 1 and the CP. No pin numbers are shown on the CP connector as they vary from one unit to another. Two display screens—a disk menu and a terminal mode—are used in the Baudot and ASCII programs.

Terminal Mode

When the computer is turned on, both programs come up displaying the terminal screen, ready to receive. On the terminal screen, received and transmitted messages are displayed (see Figs 1 and 2) above the screen dividing line. The transmit buffer is shown below the line. Table 1 lists the commands used to switch back and forth between receive and transmit status, edit user buffers and change the data rate.

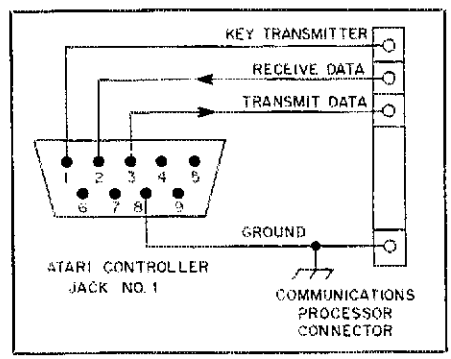


Fig 5—Pin connections for CONTROLLER jack 1 of the Atari computer. This is an outside view of the jack.

To transmit, press CONTROL T and begin typing. Outgoing messages up to 255 characters long may be entered into the type-ahead buffer while receiving data. This buffer will hold the outgoing message until CONTROL T is pressed.

Messages can also be stored in three user buffers. The information is first entered into the type-ahead buffer, then moved to the chosen user buffer by pressing the TAB key followed by the chosen user buffer number: 1, 2 or 3. A message in a user buffer may be moved to the type-ahead buffer by pressing the ESC key, followed by the user buffer number. As mentioned earlier, all buffers are volatile so, when you turn off the computer, the information is lost.

Disk Menu

Press the SELECT key to bring up the disk menu shown in the title photo. From this menu, you can store and retrieve messages to and from disk, and send information to the printer. The commands to perform these functions are shown in Table 1. Pressing the START key returns both programs to the terminal screen.

Using a Printer

The following steps describe how to send information to a printer.

1) Press the SELECT key to bring up the disk screen menu.
2) Press the R key.
3) Press the START key.
4) Perform the terminal work to be printed.
5) Press the SELECT key.
6) Press the P key to print the message.
7) Press the START key.

Storing a Message on Disk

Information can be stored in a disk file

Table 1
Command Functions

Terminal Menu Commands	*Function*
CONTROL T	Toggle transmit mode on
CONTROL R	Toggle receive mode on
CONTROL S	Change data rate
CONTROL CLEAR	Clear type-ahead buffer
BACK S	Backspace in type-ahead buffer
TAB (1, 2 or 3)	Move type-ahead buffer data into user buffer 1, 2 or 3
ESC (1, 2 or 3)	Move user buffer into type-ahead
Disk Menu Commands	*Function*
T	Transmit message from disk buffer to the CP
R	Store received data in disk buffer
C	Clear the disk buffer
O	Toggle receive mode on or off
S	Save the message in the disk buffer to a file on disk
L	Load a message from a disk file into the disk buffer
P	Print a message from the disk buffer

by replacing step 6 with the following procedure:

6a) Press the S key.

6b) Enter the file name (D:RY1.LIS, for example).

6c) Press the RETURN key.

Transmitting a Disk File

1) Press the SELECT key.

2) Press the L key.

3) Enter the file name (D:RY1.LIS, for example).

4) Press the RETURN key.

5) Press the T key.

The information stored in the file named D:RY1.LIS will be transmitted after the T key is pressed. Both programs are returned to the terminal screen before the disk message is sent.

Obtaining The Programs

Plug-in cartridge versions of both programs are available from me for $35 each. Disk, cassette and EPROM-only versions are $15 each. (The ARRL and *QST* in no way warrant this offer.) The assembler source-code listings for each program are available from the ARRL for $5 each to cover photocopying and handling costs.

You can purchase the EPROM only and build your own cartridge[10] by following the instructions given in the August 1986 article (see note 3). The cartridges are by far the easiest to use. This is particularly true if you change operating modes often.

Summary

I've enjoyed operating Baudot and ASCII RTTY with these programs. They're similar in structure and, with a little practice, are easy to use. The disk-storage and user-buffer features greatly enhance performance. Disk files can be used to store all sorts of information about your QTH, equipment, other hobbies and pictures or calendars!

Most any modem or CP will work with the Baudot RTTY program, but some modems, designed to accommodate Baudot RTTY only, may require modification to operate properly on ASCII. That's because the ASCII RTTY data rate is higher than that used with Baudot RTTY. Check your modem specifications; the maximum data rate should be at least 110 bauds in order to run ASCII RTTY at 100 WPM. If necessary, contact the modem manufacturer and see if they can supply you with any required modification information.

You can test both programs by copying ARRL bulletins transmitted by W1AW. The bulletins are first transmitted in Baudot at 60 WPM, then in ASCII at 100 WPM. Check *QST* for the current W1AW operating schedule.

Notes

[1]S. Stuntz, "A CW Keyboard Program for Atari Computers," *QST*, Feb 1985, pp 32-33.
[2]S. Stuntz, "A CW Receive Program for Atari Computers," *QST*, Nov 1985, pp 51-53; Feedback, *QST*, Feb 1986, p 53.
[3]S. Stuntz, "A CW Program Cartridge for the Atari Computer," *QST*, Aug 1986, pp 34-36; Feedback, *QST*, Apr 1987, p 59.
[4]R. Frohne, "Replacement Detector," Technical Correspondence, *QST*, Jul 1987, p 41.
[5]R. Lewis, "Split-Screen RTTY for Atari Computers," *QST*, May 1987, pp 16-20.
[6]S. Stuntz, "A Packet Terminal for Atari Computers," *QST*, Nov 1987, pp 15-17; Feedback, *QST*, Jan 1988, p 49.
[7]T. Miller, "A Cheap n' Easy Modem," *QST*, Jun 1988, pp 15-21.
[8]T. Miller and E. Hare, "A Simple Tuning Indicator," *QST*, Jul 1988, pp 28-31. See Feedback, this issue, p 48.
[9]S. Stuntz, "Easy RS-232-C," Technical Correspondence, *QST*, Apr 1988, p 46.
[10]Cartridge cases and PC boards are available from Best Electronics, 2021 The Alameda, Suite 290, San Jose, CA 95126, tel 408-243-6950. Cartridge cases, $1.50 each; PC boards, $1 each (minimum order, $5). The ARRL and *QST* in no way warrant this offer.

Steve Stuntz has a BSEE degree and is a licensed professional engineer in the state of Colorado. He is the Director of the System Planning and Analysis Division of the Western Area Power Administration. Steve's responsible for planning improvements to the high-voltage transmission system in Colorado and Wyoming to accommodate future energy requirements. Steve has been a ham for 28 years; he received his Novice ticket when he was 13 years old. As an amateur, Steve enjoys QRP CW work and designing computer applications for Amateur Radio. Steve's other interests include biking, skiing and hiking.

Band-Pass Filters for HF Transceivers

(continued from page 19)

not be forced to add these devices. We cannot control the received spectrum before it reaches our gear, but we *can* control the transmitted spectrum. I think that a few less memories, fewer confusing front-panel buttons, and a little more attention by some manufacturers to a clean output spectrum would be appreciated by everyone.

If your local radio club plans a serious multiple-transmitter effort for Field Day, you may want to consider making it a club project to construct these filters. Many of the components are probably available among your membership from junk boxes or "retired" projects. These filters could keep your club's Field Day effort, or your next multitransmitter contest effort, from turning into a disaster!

Notes

[1]For more information on phase noise, see J. Grebenkemper, "Phase Noise and its Effects on Amateur Communications," *QST*, Mar 1988, pp 14-20, and Apr 1988, pp 22-25. Also see Feedback, *QST*, May 1988, p 44.
[2]L. Gordon, "Bandpass Filters for Transmitters," *National Contest Journal*, Mar/Apr 1987, pp 19-20.
[3]Amidon toroidal cores are available from Amidon Associates, 12033 Otsego St, N Hollywood, CA 91607. Palomar toroids can be obtained from Palomar Engineers, PO Box 455, 1924-F W Mission Rd, Escondido, CA 92025, tel 619-747-3343.
[4]Rejection values for 1.8, 24.9 and 28-MHz filters were not measured. Because of its close proximity to the 21- and 28-MHz bands, no filter component values for the 24.9-MHz band are given in Table 1.

Lew Gordon has been a licensed ham since he was 17 years old in 1947, and earned his Extra Class ticket in 1952. He has held K4VX since 1973. Lew earned a BS degree in physics from Purdue University and did graduate-level work at Georgetown University. Presently, Lew is a semiretired systems engineering consultant for government and private agencies. Lew's wife holds NSØZ, and his daughter is licensed as NØHVY.

An active member of the Society of Midwest Contesters, Lew's main love in Amateur Radio is antenna-system design and construction. His antenna farm is currently composed of eight towers ranging in height from 50 to 170 feet, and includes rotatable antennas for 40 through 10 meters. All his antennas are homemade, except for one 2-element 40-meter beam. His other radio interests include using computers to optimize antenna designs and to perform contest-log duping.

A Dipper Amplifier for Impedance Bridges

Planning to work with antennas? This dip-oscillator amplifier is inexpensive, compact and can be constructed with readily available parts in one afternoon.

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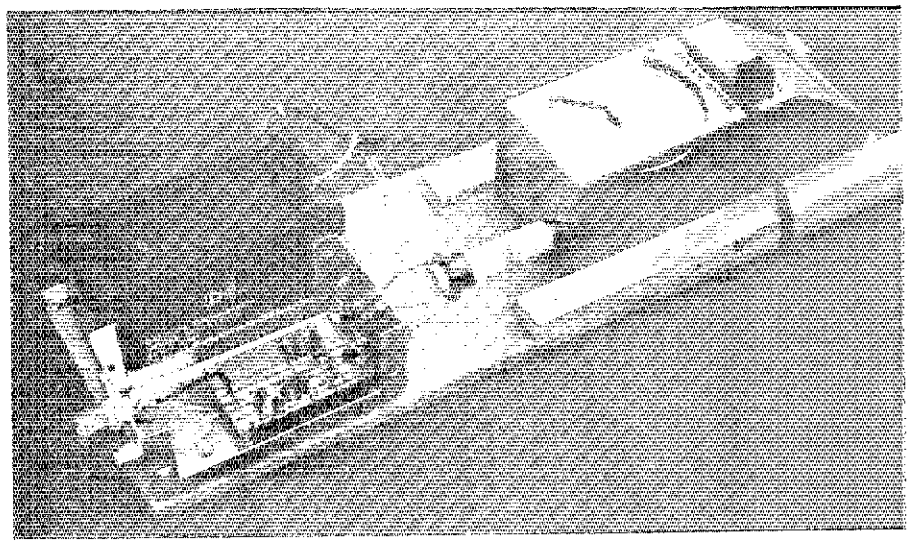

If you experiment with antennas, an impedance bridge is a useful tool. Many bridges are designed to be driven by a dip oscillator. Solid-state battery-powered dip oscillators, however, sometimes do not have enough output to drive an impedance bridge. This simple amplifier solves that problem.

My impedance bridge is patterned after one in The *1988 ARRL Handbook*.[1] The battery-powered amplifier shown in Fig 1 operates class A and draws about 32 mA from a 12 V dc source. The amplifier drives the bridge to at least half-scale meter readings from 3 to 60 MHz when used with my Heath® solid-state dip meter. The combination provides useful readings up to 100 MHz.

Building the Amplifier

Construction of the dip-oscillator amplifier is simple and parts are readily available. The circuit board is made from a 1-3/8- × 2-1/4-inch piece of double-sided, glass-epoxy board; no etching is required. Following the pattern in Fig 2, cuts in the foil on the top, or component side of the board, are made with a hacksaw.[2] One way to do this is to first drill the mounting holes, then screw the board to a small block of wood to keep it flat. Place the block of wood (with the board attached) into a vise such that the block is below the top of the vise jaws and the sides of the jaws are aligned with the cut to be made. The sides of the vise jaws act as a guide for the hacksaw blade. Keep the saw blade parallel to the vertical edge of the circuit board and cut through the copper foil only. Components are mounted to the side of the board (see Fig 3) where the saw cuts are made. Ground leads are passed through countersunk holes and soldered to the bottom foil. Other leads are soldered directly to the pads formed by the saw cuts.

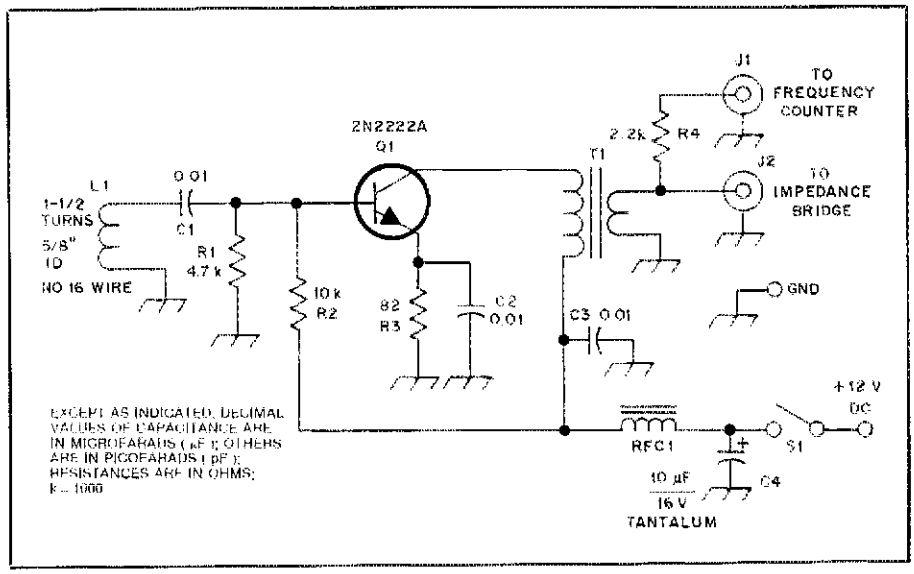

Fig 1—Schematic of the battery-powered dipper amplifier. All resistors are ¼-W units. Capacitors are disc ceramic unless otherwise noted.

J1—Phono jack.
J2—SO-239.
L1—1½ turns no. 16 enam wire, 5/8-inch ID.
Q1—2N2222A or Radio Shack® 276-2009 NPN transistor.
RFC1—3 turns no. 26 enam wire through an Amidon FB-43-101 bead (about 4.6 µH).
T1—Primary: 17 turns no. 26 enam wire covering entire circumference of an Amidon FT-23-43 core; secondary: 6 turns no. 26 enam wire over primary. (For use on 1.8 MHz, use 25 turns on the primary and 9 turns on the secondary; see text).

[1]Notes appear on page 76.

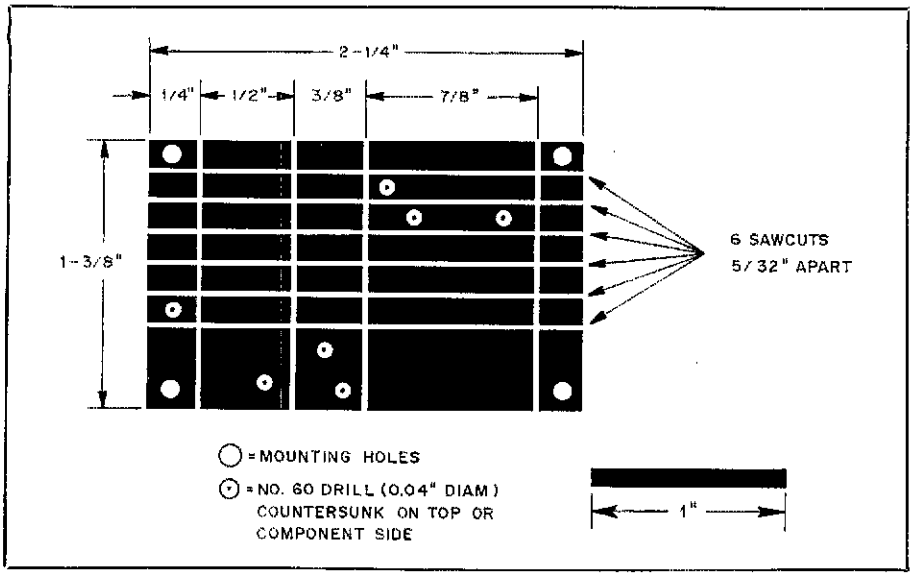

Fig 2—Circuit-board cutting pattern for the dipper amplifier (see text).

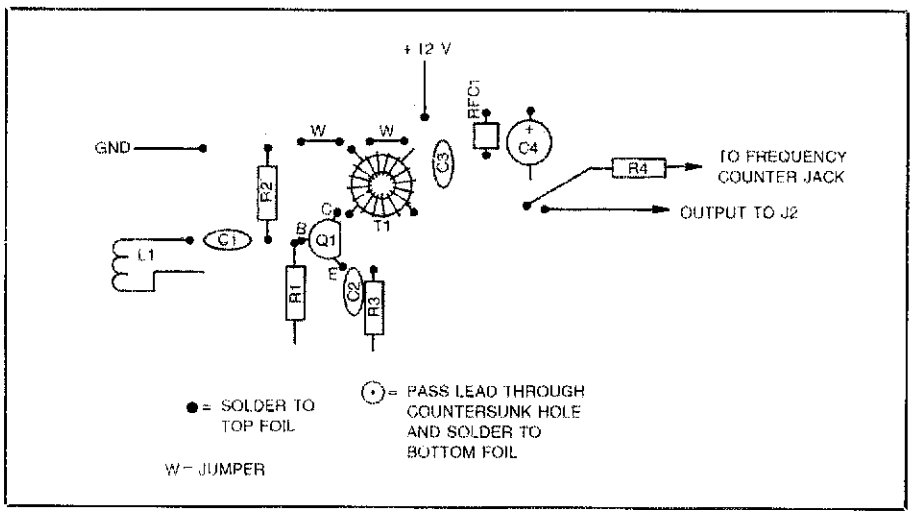

Fig 3—Parts-placement guide for the dipper amplifier. Parts are placed on the saw-cut side of the board.

The pick-up coil, L1, is made of no. 16 wire and is self-supporting. It has a 5/8-inch inside diameter to allow the coils of the Heath dipper to fit inside the loop. I mounted my amplifier in a 4 × 2 × 1-5/8-inch aluminum box. L1 projects beyond the end of the box by 1¼ inches. The coaxial output connector is mounted in the opposite end of the box.

The assembly shown in Fig 4 is mounted on a 14 × 4¼-inch piece of ¼-inch-thick plywood. The amplifier box is screwed to the plywood platform, and the dipper sits on the platform between two wooden rails. These rails keep the dipper coil aligned with L1 and permit the dipper to be moved back and forth to make coupling adjustments between the dipper and the amplifier. Two heavy rubber bands hold the dipper in place on the platform.

Using the Dipper Amplifier

Connect the amplifier to a 12 V dc battery. I use a 1.2-Ah gelled-electrolyte battery. When the amplifier is turned on, check that the current drawn is about 32 mA. If the current drain differs significantly from this figure, recheck your wiring. Since the amplifier draws only 32 mA, a battery made of eight AA cells should last quite a while.

To use the amplifier, connect the impedance bridge to the amplifier. Adjust the position of the dipper so that one-third of the dipper coil is inside L1. Turn on the amplifier and the dipper, and advance the dipper level control until the bridge meter deflects. If no reading is observed, change the position of the impedance dial on the bridge. Slide the dipper back and forth, near and into L1, until a maximum reading is obtained on the bridge meter. Adjust the

(continued on page 76)

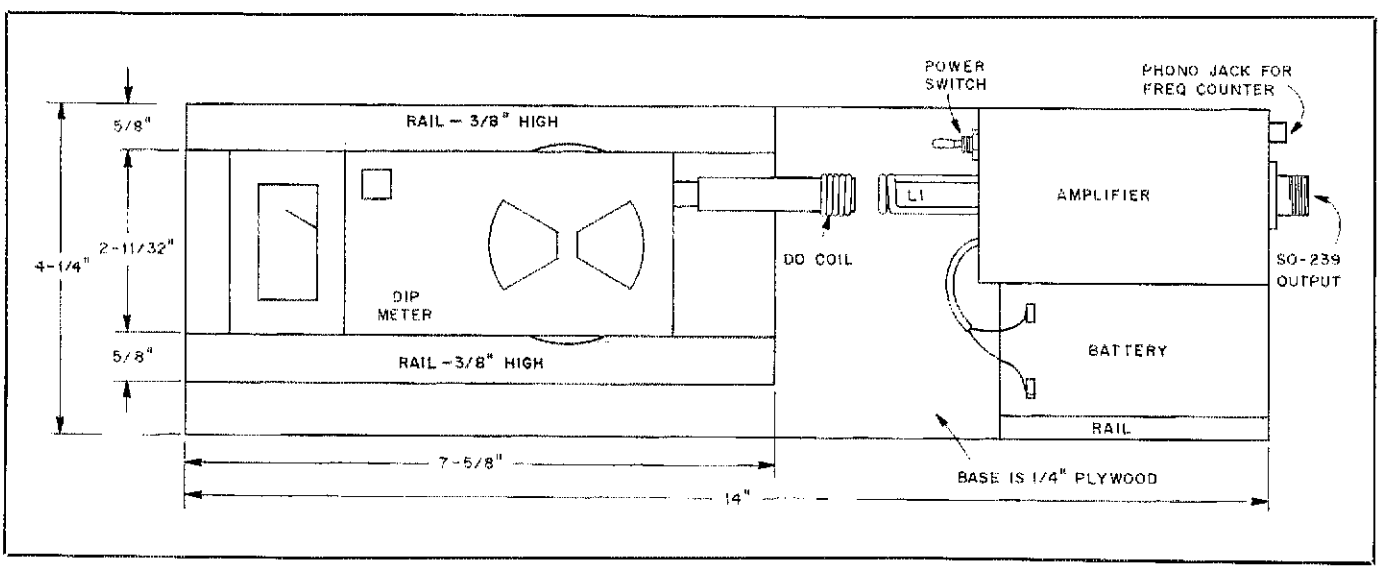

Fig 4—Top view of the amplifier box/dip-meter assembly. See text for an explanation of how the unit works.

A Simple Resonant ATU

Eliminate roller inductors and tapped coils with this simple HF-band Transmatch. This circuit is suitable for QRP or QRO.

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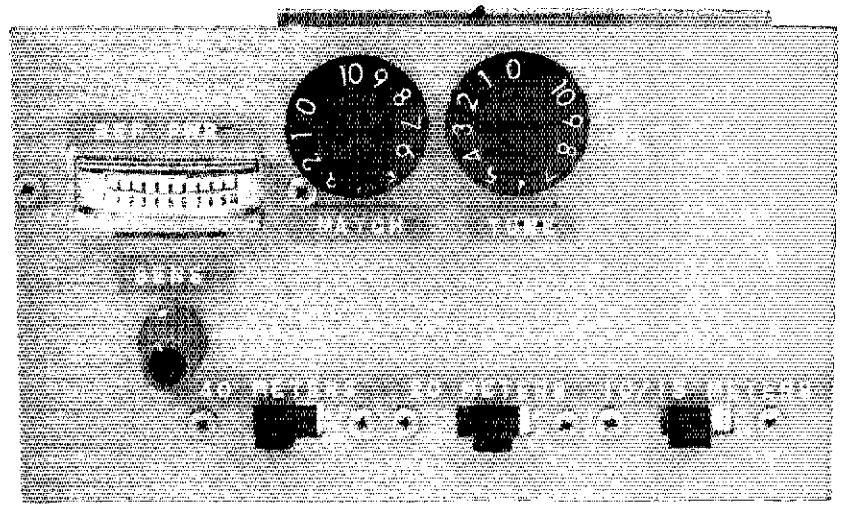

Are you weary of looking for expensive roller coils? Do tapped coils in ATUs (antenna tuning units) fail to provide the inductance resolution you need for matching a broad range of impedances? We are kindred souls if your answers to these questions are "yes." The roller-coil problem is even more acute for a QRPer: Tiny roller inductors that fit the small format of QRP gear are not available. The remaining option is a tapped coil and switch.

The circuit I shall discuss in this article is by no means new or original. The manner in which I am using it is, however, a bit uncommon. Fig 1 illustrates the circuit. Unlike other Transmatch circuits, this one is resonant at the operating frequency. Most tuners contain elements of L and C, which are used to cancel inductive or capacitive reactance in an antenna circuit. Circuit resonance is not a criterion. The popular T match that is used in most commercial Transmatches is an example of a nonresonant ATU. A resonant Transmatch offers the advantage of simplicity and harmonic reduction.

A Closer Look at the Circuit

Please refer to Fig 1. The main part of the circuit is L1 and L2, along with C1. Here we have a standard tuned circuit or resonator. L1 is the coupling link into the tuned circuit. As shown, C1 and L2 form a resonant 80-meter circuit. C2 has been added to permit matching the signal source (transmitter) to the load. A matched condition will prevail at some setting of C2. This is a very old trick that has been with us for decades.

There is considerable interaction between C1 and C2, since the greater the capacitance at C2, the less capacitance we need at C1 to maintain tuned-circuit

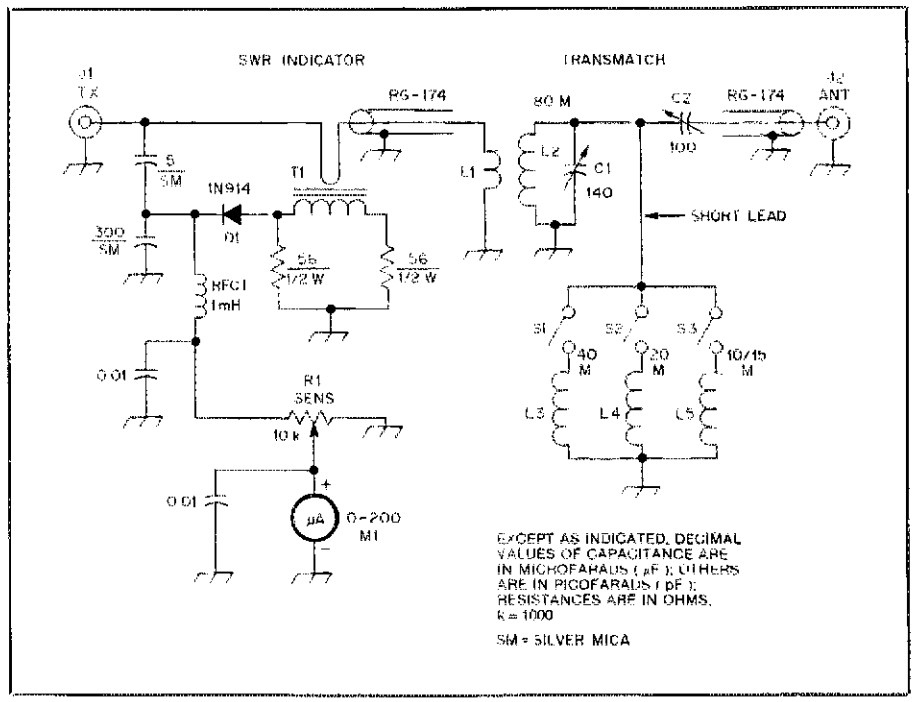

Fig 1—Schematic diagram of the SWR bridge and Transmatch. Fixed-value capacitors are disc ceramic unless noted otherwise. Fixed-value resistors are carbon composition.

C1—Miniature 100- or 140-pF air variable.
C2—10-100 pF trimmer with shaft (see note 1) or 100-pF air variable.
D1—Silicon high-speed switching diode, type 1N914 or equiv.
J1, J2—Single-hole mount phono jack or SO-239.
L1—6 turns of no. 22 insulated wire over ground end of L2.
L2—28-μH inductor. Use 70 close-wound turns of no. 22 enamel wire on a 7/8 × 2-inch length piece of PVC pipe.
L3—10-μH inductor. Use 30 turns of no. 26 enam wire, closely wound, on a 5/8 × 1-inch piece of PVC pipe.
L4—2.6-μH inductor. 16 turns of no. 20 enam wire, closely wound, on a 5/8 × 1-inch piece of PVC pipe.
L5—0.85-μH inductor. Use 9 turns of no. 20 enam wire on a 5/8 × 1-inch piece of PVC pipe. Space turns to occupy 5/8 inch.
M1—Small edgewise tuning meter, 200 μA. Surplus S meter used here with scale from page 35, July 1986 *QST* glued to meter face.
R1—Linear-taper, 10-kΩ potentiometer, carbon composition.
RFC1—Miniature 750-μH or 1-mH RF choke.
S1, S2, S3—SPST slide switch (see text).
T1—Toroidal transformer. Use 35 turns of no. 26 enam wire on an Amidon FT-50-61 ferrite toroid (μ = 125). Primary has 1 turn of no. 26 enam wire.

resonance. In other words, the C2 capacitance adds to that of C1. For this reason we must adjust C1 and C2 alternately as we tune for minimum SWR, just as with conventional ATUs.

How do we solve the problem of multiband operation? A simple solution is provided by adding L3, L4 and L5. These coils are switched in parallel with L2 by means of S1, S2 and S3. A single-pole, three-position wafer switch can be used in place of the individual switches, although it would limit the flexibility of the circuit. I will discuss this later. As is the situation when we place resistors in parallel, coils that are placed in parallel have a net value that is less than that of the smallest coil in the combination. Therefore, we simply add L3 to the circuit for 40-meter operation, L4 for 20 meters and L5 for 10- and 15-meter operation. The 30-meter band can be covered in the 40-meter range, and 12 meters falls into the 10-15 meter range.

The advantage in placing the smaller coils in parallel with the large one is that the L1/L2 turns ratio remains the same as when only the main coil is being used. L1 can be eliminated by tapping the coil six turns above the grounded end. I chose the link method because it is easier to deal with than a coil tap. I wanted to avoid the potential of shorted turns with small wire.

The main coil has an inductance of 28 μH. The effective circuit inductance is 7.5 μH when L2 and L3 are in parallel. L2 + L4 = 2.4 μH and L2 + L3 = 0.82 μH. If all four coils are placed in parallel the net inductance becomes 0.6 μH. The singular coil inductances are given in the Fig 1 caption.

SWR Indicator

You may eliminate the SWR-sensing circuit in Fig 1 if you have a separate SWR meter to use with this tuner. I included this circuit for my convenience when operating afield with QRP equipment. I did not include the circuitry for reading the forward power. My concern is for obtaining a matched condition between the transmitter and the antenna. Therefore, I need only the reflected-power information. T1 samples the RF current (reflected). D1 rectifies the current and produces a dc voltage that is indicated at M1. The ATU is adjusted for minimum needle deflection at M1. R1 is a sensitivity control that prevents the meter from reading off scale during tuner adjustments. The SWR bridge is designed for QRP operation, as shown. A transmitter power output of 1 watt or greater will provide full-scale deflection at M1.

Construction Data

Fig 2 shows the first-run constructional detail of the coil subassembly. You will note the presence of two shaft-driven compression trimmers. I later changed C1 of Fig 1 to a small APC style air variable. This was done to eliminate mechanical problems that resulted in very "touchy" adjustment of C1. The trimmers are 10-100 pF units with 1/8-inch OD shafts.[1] I drilled holes in the ends of two ¼-inch wooden dowel rods, then glued the trimmer shafts into the dowel rods with epoxy cement. This allowed the use of standard knobs with ¼-inch holes.

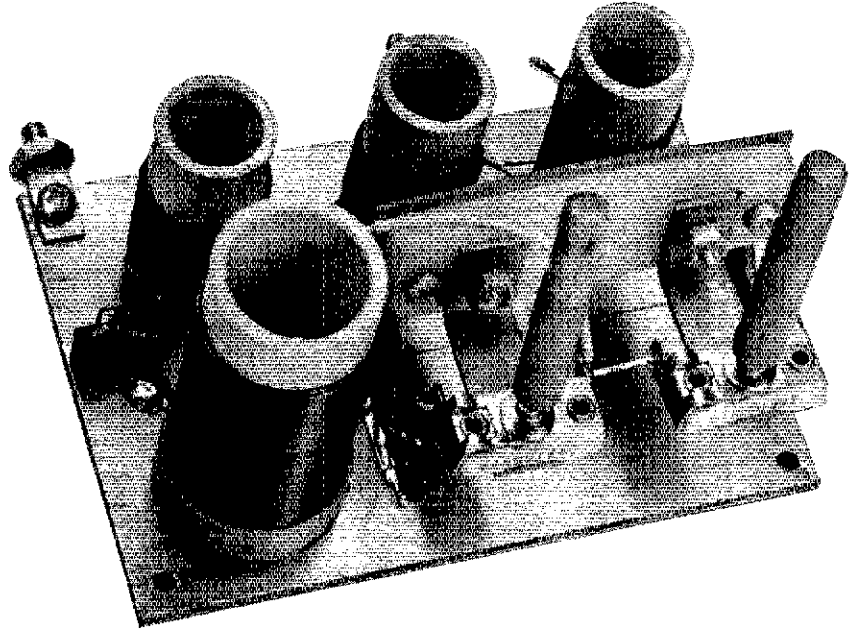

Fig 2—The ATU subassembly before C1 was replaced with a small air-variable capacitor. Holes are punched in the base plate (PC board material) to accommodate the OD of the coil forms. The coils are cemented into the holes with epoxy glue. A small shelf is soldered to the base plate to allow mounting C1 and C2. A plastic block insulates C2 from ground. Wooden dowel rod is glued to the capacitor shafts to allow the use of knobs with ¼-inch holes. The ends of the dowels are ground down to a true ¼-inch diameter.

Schedule-40 PVC tubing is used for the coil forms. PVC is not suitable for high-power use, since it will heat and melt in the presence of high RF voltage. PVC is entirely acceptable for power levels under 50 watts. L2 is wound on 3/4-inch PVC pipe, which has an OD of 7/8 inch. The remaining coils are wound on 1/2-inch PVC pipe (5/8 inch OD). All of the coils are mounted on the subassembly base plate by gluing them into holes (5/8 and 7/8 inch diameter) that are cut in the PC-board base plate. Epoxy cement is good for this purpose. The coils are spaced apart 1 inch, center to center. The base plate is made from double-sided PC board (2½ × 3¾ inches). The grounded ends of the coils are soldered to the base plate.

Fig 2 shows a 1½ × 2-inch shelf upon which the trimmer capacitors are mounted by means of metal L brackets. A plastic insulator is bolted to the shelf to allow C2 of Fig 1 to be isolated from ground. The PC-board shelf is soldered to the base plate, and a small triangular PC-board bracket is soldered between the bracket and base plate (at each end of the shelf) to strengthen the shelf. Two no. 6 spade bolts are used to affix the subassembly to the main chassis of the ATU. You may use brass or aluminum for the base plate and shelf if you prefer.

I made my chassis and panel from PC-board material. The sections are soldered at the joints to form the main frame. The assembled unit is shown in Fig 3. The dimensions are (HWD) 3¼ × 5¾ × 3 inches. A 1 × 5-3/8 strip of PC-board is soldered across the back of the chassis to contain J1 and J2 of Fig 1. Two strips (½ × 3 inches) are used at the sides of the main frame to serve as panel braces. I polished the copper on the PC-board material, then coated it with clear lacquer to prevent tarnishing. The panel is sprayed with gray automotive primer paint. I first sanded the panel to provide a rough surface. This helps the paint to adhere better than it would on the smooth surface. Gray Dymo™ tape labels identify the control functions. Four adhesive-backed rubber feet are affixed to the bottom of the chassis.

I used a technique that some call "ugly construction" when I built the SWR circuit. A neater job will result if you assemble the parts on a PC board, although the performance will be the same. I used a multilug terminal strip to contain most of the SWR-bridge parts. Other components have mid-air joints.

I used inexpensive slide switches for S1, S2 and S3 of Fig 1. Miniature toggle switches may be substituted, or you may prefer to use a single rotary switch, as dis-

[1]Notes appear on p 28.

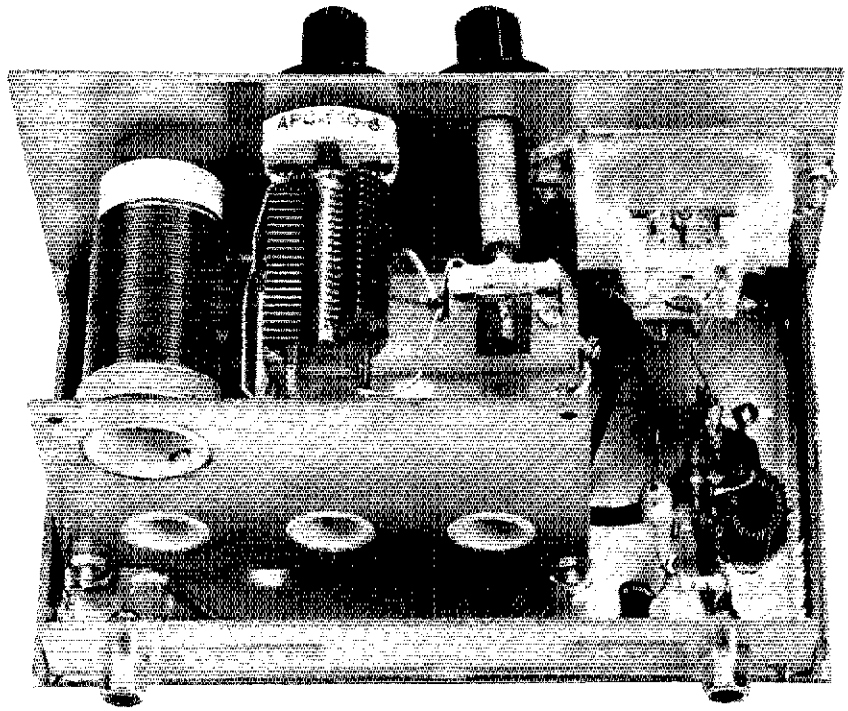

Fig 3—Interior view of the assembled ATU. "Ugly construction" (see text) is used for the SWR-bridge circuit, lower right. The subassembly, chassis and panel are made from pieces of single- and double-sided PC board. The seams are soldered to hold the sections together.

cussed earlier. Trimmer C2 may be replaced with a 100- or 140-pF air variable. If this is done, you will need to isolate the stator and rotor from ground. The circuit will function satisfactorily if you use two 100-pF capacitors (C1 and C2).

Circuit Performance

I tested this ATU at power levels from 1 to 15 watts. I used resistive loads from 15 to 1000 ohms, and obtained an SWR of 1:1 in all cases. No arcing occurred at trimmer C2. I later connected the ATU to my 80-meter dipole (coaxial cable feed) and ran it through its paces from 80 through 10 meters. Despite the complex impedance the feed line presented above 3.5 MHz, I was able to obtain an SWR of 1:1 on all bands.

Adjustment is done by setting the coil switches for the proper amateur band. With RF power applied to the circuit, adjust C1 for the lowest SWR attainable. Next, adjust C2 slightly and readjust C1 for minimum indicated SWR. Repeat this process until the SWR is 1:1. *Caution*: Use the greatest amount of capacitance possible at C2, consistent with a 1:1 SWR. Although smaller values of capacitance at C2 will result in an SWR of 1:1, the loss through the ATU increases at such settings. All Transmatches introduce some loss, but it is insignificant (less than 1 dB normally) for the most part.

Some Final Thoughts

Keep all RF leads as short as you can. This will prevent unwanted stray inductance, which can lower the tuned-circuit Q. Long RF leads, such as those marked "RG-174" in Fig 1, should be made from coaxial cable. RG-174 is miniature coaxial line that is suitable for short runs and for power levels up to 40 or 50 watts at the lower amateur frequencies.

There is no reason why the circuit of Fig 1 can't be adapted for high-power use. The coils would need to be made with large-diameter wire, and the coil forms should have good high-voltage, low-loss properties. Lexan™ or fiberglass tubing[2] is good material for the coil forms. Surplus ceramic coil forms are also suitable. C1 and C2 of Fig 1 must have wide plate spacing for high power, since substantial RF voltage is present at the top of L2. S1, S2 and S3 need to be high-quality RF ceramic switches if QRO use is contemplated. Fair Radio Sales in Lima, Ohio sells surplus RF power switches.[3]

You may use toroidal coils for your QRP ATU. This will enable you to make the tuner smaller. For example, L2 would have 35 turns of no. 24 enamel wire on an Amidon FT-82-63 core. L1 would consist of 3 turns of no. 24 wire over L2. For L3 use 24 turns of no. 24 wire on an FT-50-63 toroid. L4 would have 23 turns of no. 24 wire on an Amidon T-50-2 toroid, and L5 would consist of 15 turns of no. 24 wire on a T-50-6 core. There is no reason why you can't design a PC board that can contain the four toroidal coils, plus the SWR bridge. This would result in a low-profile, compact ATU.

I wrote this article in order to share some old ideas that may have been forgotten by some of you. I hope you have found the circuit and construction hints interesting and useful.

Notes

[1]Trimmers with shafts are available from Hosfelt Electronics, 2700 Sunset Blvd, Steubenville, OH 43952. Sales line: 800-524-6464 (catalog available).

[2]Plastic rod, tubing and sheeting (many types of plastic) are available by UPS or truck line from U.S. Plastic Corp, 1390 Neubrecht Rd, Lima, OH 45801. Sales line: 800-537-9724 (catalog available).

[3]Fair Radio Sales, Inc, Box 1105, 1016 E Eureka St, Lima, OH 45802, tel 419-227-6573.

QEX

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Strays

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☐ anyone with instructions on adding an RIT control to a Heathkit HW-101 transceiver. David Smith, N4PRI, 5424 Kinsale Ln, Charlotte, NC 28215.

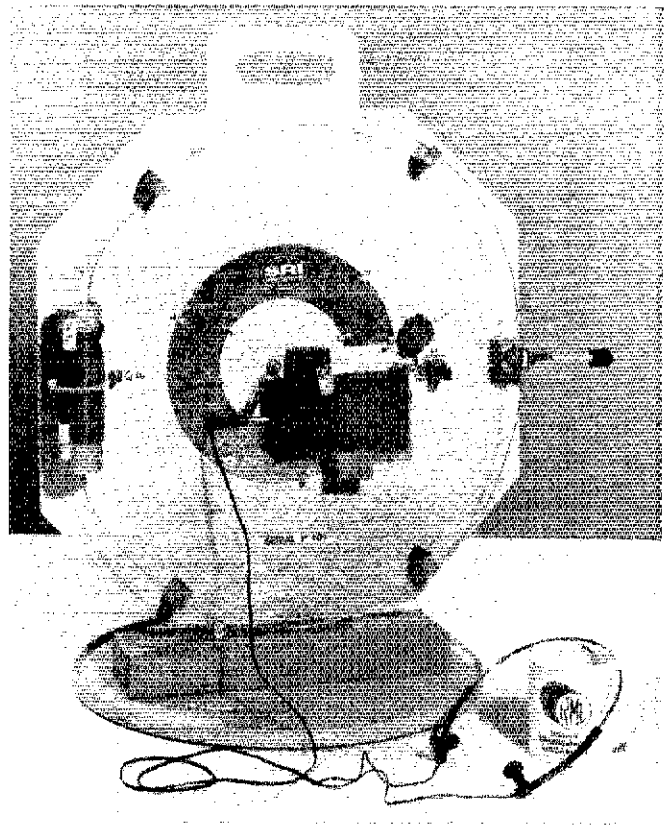
☐ anyone who has copies of *Radio News* or *Radio Amateur News* from the early '20s, especially the article "Radio on the Farm." Russell Erickson, NØERR, 4699 W 69th Ave, Westminster, CO 80030, tel 303-430-1821.

☐ hams who enjoy building model tanks and other replicas of military vehicles. Bill Copeland, WB6RVE, 21786 Markham St, Perris, CA 92370.

The Coplanar-Twin-Loop Antenna

Build this compact, unidirectional HF receiving antenna for ground- and sky-wave interference rejection and direction finding!

By O. G. Villard, Jr, W6QYT
SRI International
333 Ravenswood Ave
Menlo Park, CA 94025



Conventional, compact loop receiving antennas exhibit little directivity on certain sky-wave signals because some signal components arrive at different vertical angles. As a result, directional bearings obtained with conventional loop antennas can be blurred, and can fluctuate with time.

This article describes the design and construction of a compact, portable receiving antenna with a unidirectional null. Null depth is 20 dB or so. I call this antenna the *coplanar-twin loop* (CTL) because of its physical configuration. It consists of two concentric loops instead of one (see the title photo). When station bearings are reasonably well separated, a CTL is capable of greatly reducing sky-wave interference, even if an interfering signal is on exactly the same frequency as the desired signal. This is something a notch filter or Q multiplier cannot do. Accordingly, the designation "spatial notch filter" seems appropriate for the CTL's function. The CTL also adds a new dimension to "fox hunts": *sky-wave* direction finding (see the sidebar entitled "How the CTL Responds to Propagation Modes").

CTL Description

The CTL works, no matter how many vertical-plane modes are present, as long as all the modes travel along the shorter great-circle path from the transmitter to the receiving site, and their arrival angles are below 45 to 50°. (This is usually the case when the received signals originate more than 400 km from the receiving site.)

For receiving ground-wave and low-angle sky-wave signals, the azimuth-plane pattern of the CTL is basically cardioidal (a heart-shaped, unidirectional pattern). The pattern is somewhat sharper than a classical cardioid, though, and has nulls (or near-nulls) at 90°, 180° and 270°. These low-angle nulls can be seen in Fig 2 (slightly filled in, as this pattern shows CTL response at a somewhat higher wave angle). This added directivity is especially helpful in locations such as cities, where there are multiple local inter-

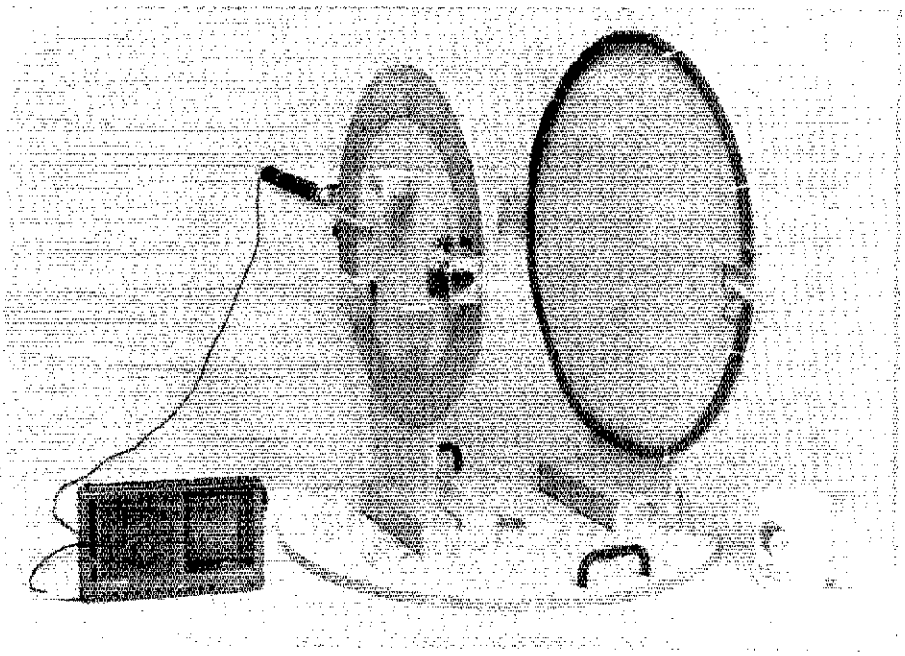


Fig 1—Photograph of an offset-twin-loop antenna for 15 MHz. This model uses offset loops and a coaxial-choke balun to isolate the feed line from the antenna.

Sky-Wave Signal Characteristics

Ionospheric propagation complicates direction-finding and signal rejection by nulling because of polarization rotation and the presence of signal components at multiple vertical angles. These circumstances are more troublesome when, for practical reasons, an antenna's size must be small compared with the wavelength (which must be the case if the antenna is to be portable).

Near most types of ground, the vertically polarized component of an incoming sky-wave signal is considerably stronger than the horizontal component. Nevertheless, the horizontal component cannot be ignored, especially when operating in the upper floors of wooden buildings or other tall structures with relatively low signal attenuation. Many antennas, such as conventional loops, will respond to both vertically and horizontally polarized signals, but their directive patterns are usually quite different for the two. A null in the pattern in one plane is not generally a null for the other. With the CTL, however, in the null direction the component loops are oriented end-on. The planar design makes CTL sensitivity to horizontally polarized signals in this direction so low that it can be ignored.

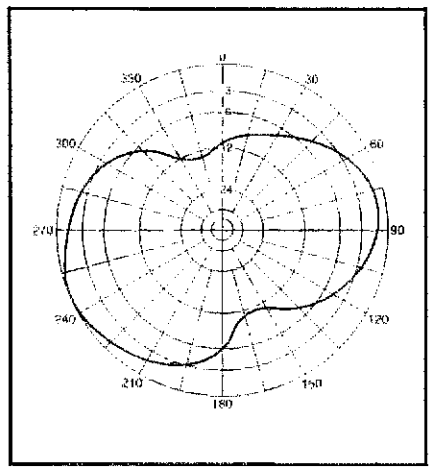


Fig A—Measured azimuth-plane radiation pattern of a conventional loop antenna receiving a multimode signal. This pattern was measured during the same period and on the same signal as the CTL pattern shown in Fig 2.

CTLs do respond to horizontally polarized sky-wave signals from other directions. This response does no harm beyond filling in the pattern nulls which would otherwise appear at 90° and 270° (these are observable in the reception of ground-wave signals).

When the I loop is detuned, the R loop functions as a simple vertical-loop antenna.†, †† Fig A shows the polar pattern of a simple vertical loop when receiving a sky-wave signal. Nulls are filled in when signals are horizontally polarized.

†O. G. Villard, Jr, K. J. Harker and G. H. Hagn, "Interference-Reducing Receiving Antennas for Shortwave Broadcasts," Final Report, Jan 1987, Contract IA 22082-23, US Information Agency, Voice of America, 601 D St NW, Patrick Henry Building, Washington, DC 20547.

††O. G. Villard, Jr, "Portable Unidirectional HF Aerial for Reducing Co-Channel Multihop Sky-Wave Interference," *Proceedings of the Fourth International Conference on HF Radio Systems and Techniques*, April 1988, pp 141-144, Institution of Electrical Engineers, London, England.

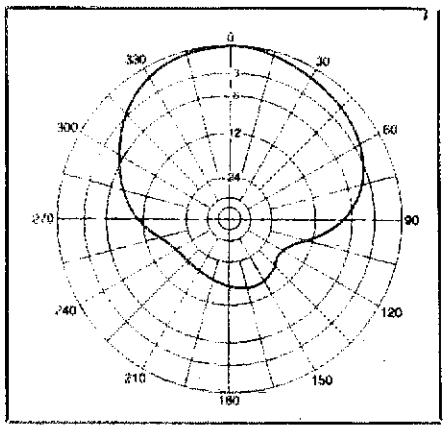


Fig 2—Measured azimuth-plane radiation pattern for a coplanar-twin-loop antenna while receiving a ground-wave signal from an elevated local source. The antenna was located 3 feet above ground for this measurement.

ference sources in different directions. In addition, the ability of the CTL's 180° null to reject signals over a wide range of vertical angles often makes possible near-complete rejection of ground-wave signals that consist of several vertical components.

A hybrid schematic diagram of the CTL shown in the title photo appears in Fig 3. For convenience and portability, a small receiver is included with the loop. This combination is particularly convenient for exploration of local signal fields, both indoors and out. It is especially useful for finding the best location for reception indoors, where both direction of arrival and directional discrimination are strongly affected by reradiation from conductors. Since reradiation fields depend on the details of building construction and furnishing, the best location for receiving must be found by trial and error. This is particularly easy to do when the receiver and loop are a single package.

Advantages of a self-contained device—apart from portability—include the avoidance of feed-line pickup or RF energy conduction along power lines. Larger receivers than that shown can be used with a CTL, if the loops are scaled up appropriately in size. It is desirable—though not essential—that the radio be only an inch or so thick, because this keeps most of the electrical components in the plane of the loops.

The CTL design does have drawbacks. The penalties of good performance in an antenna structure of small size include the reduced sensitivity that results from increased losses, and diminished aperture (energy-collecting area). Relatively narrow bandwidth is also a characteristic of reduced-size antennas, and the CTL exhibits this trait. The effects of losses and small aperture are compensated in the CTL design by making the loops resonant. Reduced bandwidth is overcome by using tunable loops.

How the CTL Works

The CTL consists of two resonant loops, one inside the other, having a common center and lying in a common plane. (It is also possible to use two loops of nearly the same size, concentric and side-by-side, as shown in Fig 1.) The smaller loop is connected to the receiver (as explained later) and is therefore called the *R* (receiver) *loop*. The outer loop is not connected to anything else, thus it's dubbed the *I* (independent) *loop*. It is roughly analogous to a parasitic element in a two-element broadside array or Yagi antenna, but its action is quite different.

The R loop of a CTL is a single-turn, low-impedance loop made of a wide strip of metal. It is tuned by means of a standard medium-wave-band tuning capacitor (350 to 600 pF—C2 in Fig 3). R2 is included in the R-loop assembly to allow variation of the amount of signal supplied to a receiver, as I'll explain later.

The R loop responds primarily to magnetic fields. The I loop, on the other hand, has a relatively high impedance. The I loop responds well to both electric and magnetic fields. Its tuning capacitor has a maximum capacitance of about 20 pF. Both loops are tuned to resonance at the operating frequency. The low-impedance (R) loop is set first and needs no further adjustment for a given band. The I loop, however, must be retuned whenever the operating frequency is altered by more than 10 kHz or so, depending on the desired null depth. The I loop is loaded by L1 and tuned by C1. The Q of the I-loop assembly is controlled by R1.

Directional Properties of the CTL

The null direction of a properly adjusted CTL is in the plane of the loops (instead of

How the CTL Responds to Propagation Modes

There are two fundamentally different situations encountered in practice with sky-wave signals: single and multimode propagation. (Polarization effects and upper-ray propagation are less important and can be ignored here for simplicity.) In the first situation, an ordinary loop—or the R loop of a CTL by itself—will give deep bidirectional nulls suitable for discriminating between two signals when their directions differ. The only difficulty is that this propagation mode is not encountered most of the time. When two or more modes are present, an antenna such as the CTL is needed to give good unidirectional rejection.

The way in which single and multimode propagation varies with time is illustrated in Fig B. This shows a typical daily variation of the major modes for a fixed distance on two bands (14 and 28 MHz). Path length is assumed to be about 4000 km. In the early morning, 28 MHz is usually not open and 14 MHz generally supports only one-hop propagation. (The elevation angle of this hop is small, because of the path length). Under such conditions, a simple loop—especially one with its tuning capacitor in a horizontal segment of the loop—gives a figure-eight pattern†, and is therefore useful for DFing. This is because a single-mode, low-angle, sky-wave signal is—as far as a simple loop is concerned—equivalent to a ground-wave signal.

As the sun rises farther, 14 MHz supports multimode propagation. Under such conditions, a simple loop antenna will give bearings that "wander." This is a situation in which the CTL works very well.

†H. Whiteside, and R. W. P. King, "The Loop Antenna as a Probe," *IEEE Transactions on Antennas and Propagation*, Vol AP-12 (May 1964), No. 3, pp 291-297.

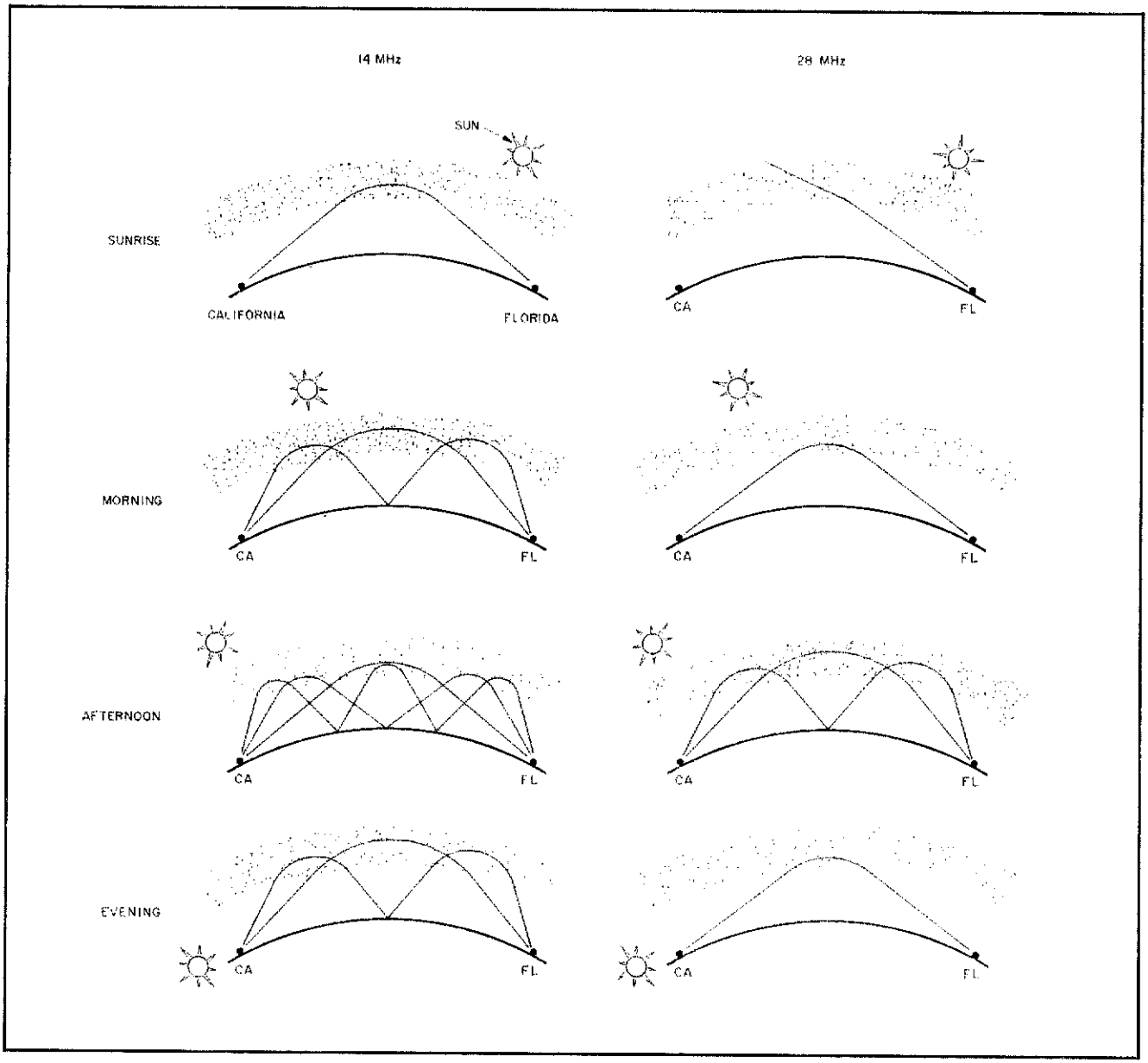


Fig B—Typical vertical-angle propagation modes on 14 and 28 MHz over the course of a day. A CTL antenna performs considerably better than a conventional loop antenna for receiving signals with more than one vertical mode.

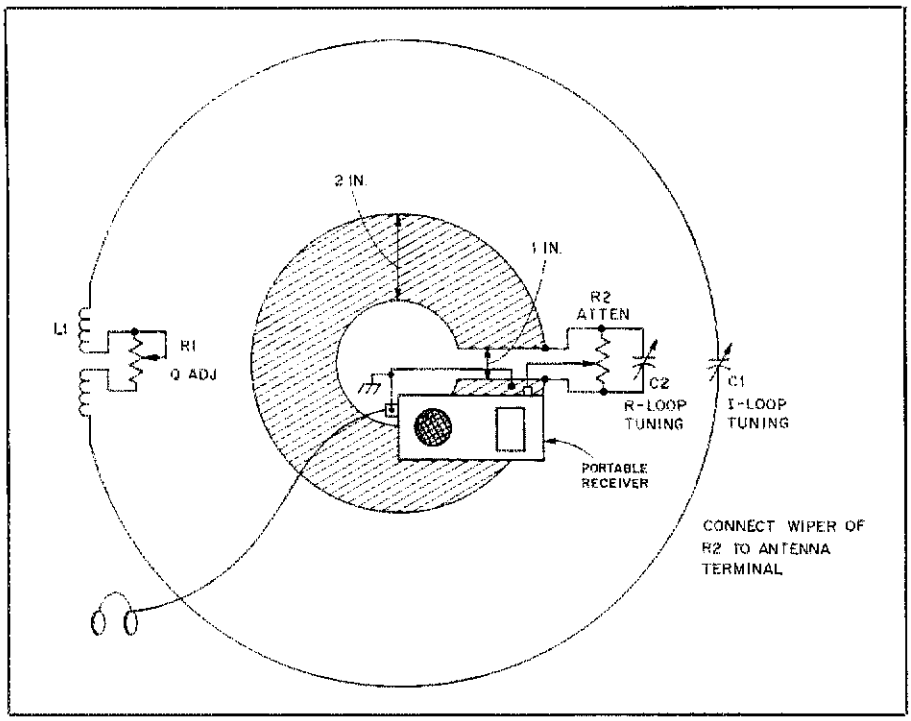


Fig 3—Hybrid schematic of a CTL antenna. The loops can be supported by a single sheet of plywood (or any lightweight nonconductor), or they may be built as shown in Fig 1. A small portable receiver can be connected directly to the R loop (as shown in the title photo) or operated separately from the CTL. If the antenna and the radio are mounted independently, the radio ground must be connected to the end of the R loop as shown. In either case, all other antennas (such as built-in whips) should be disconnected from the radio when the CTL is in use.

Parts list for a 7- to 21-MHz CTL antenna

C1—5- to 20-pF receiving variable.
C2—300- to 600-pF receiving variable (RS 272-1337).
L1—23 turns of no. 18 insulated wire wound on a 1-inch diam wood core approx 6 inches long (approx 8 μH for 15-MHz reception). Open at center for connection of R1.
R1—50-Ω carbon-composition potentiometer.
R2—5-kΩ carbon-composition potentiometer.
I loop—Approx 50 inches of no. 18 insulated wire.
R loop—9-inch OD, 2-inch wide piece of thin sheet metal.

Relative Loop Positions in a CTL Antenna

It is easiest to obtain a good front-to-back ratio when the two loops of a CTL are concentric, of roughly the same size, and spaced apart a distance of one third or one half their diameter, with their planes parallel (see Fig 1). However, with the coplanar arrangement shown in the title photo, the loops are less disturbed by field gradients associated with standing waves created by nearby reflecting objects. (This is because when coplanar loops are in a field having an intensity gradient along a line roughly perpendicular to the plane of the loops, both component loops respond to this gradient in more nearly the same manner than if they were parallel and spaced some distance apart, as in Fig 1.)

As an example of insensitivity to local effects, the portable antennas shown in the title photo and Fig 1 can be used to estimate signal arrival direction when operated inside a small car!

being at right angles to that plane, like conventional loop antennas). Let's assume that a signal arriving from the null direction has vertical components whose elevation angles are no higher than 50°. The function of the I loop is to generate a local magnetic field that cancels the incident field and produces a "shadow" in the total magnetic field at the position of the R loop. When I-loop tuning and station direction are correct, this shadow completely surrounds the R loop (as shown in Fig 4) so that the R-loop output goes to zero.

The position and depth of the shadow (the region of field cancellation) at the R loop depend on the azimuth direction of the incoming signal. Once a magnetic-field shadow has been generated around the R loop, that loop is effectively isolated from the outside world insofar as the nulled signal is concerned. When changes occur either in signal direction or in loop direction with respect to the signal, the I-loop current changes, the region of incident-signal cancellation around the R loop becomes incomplete, and energy can be picked up by the R loop.

For relatively small changes in vertical angle of arrival in the null direction, the I loop's output, and the shadow "darkness" (the degree of incident-signal cancellation), change very little. As a result, once adjustments are made to produce a null in a given direction, the null is independent of elevation angle over a considerable range of angles (Fig 5). At sufficiently high elevation angles, however, the null depth decreases (as it must if there is to be a useful reception in the direction opposite to the null).

Incident signals cause current to flow in the I loop. This current generates a magnetic field. When the I loop is tuned near resonance, the local magnetic field it generates has the correct phase to cancel the incident magnetic field at the position of the R loop. For this cancellation to occur, the locally-generated field must also be of the correct magnitude. This is controlled by either adjusting the axial spacing between the loops, or the Q of the I loop (by adjusting R1).

The I loop generates a local electric field in addition to the desired magnetic field. The electric field of the I loop (which could disrupt the R-loop response) is kept from affecting antenna performance by keeping the R-loop impedance low.

Building the CTL

The parts that make up each loop of the CTL should be as nearly in the same plane as possible (see the title photo and Fig 1, and the sidebar entitled "Relative Loop Positions in a CTL Antenna"). Physically small components are preferable to large ones. C1 should have a relatively small capacitance, although the exact value is not critical—10 pF at 15 MHz is about right for the middle of the HF range (from about 7 to 21 MHz). C1's value can be altered proportionally as the frequency is changed. Once C1 is set, L1 is adjusted by adding or removing turns so that resonance can be found in the middle of the range covered by C1. Band changing with the CTL is discussed in detail later.

The I loop should have only one turn. Improved front-to-back ratio can be obtained if the I-loop conductor is made of two wires spaced roughly an inch apart, and connected at the ends. This increases the electrical width of the conductor and improves the I loop's sensitivity to electric fields. The I loop should be larger than the R loop; the size difference is not critical. Loop spacing can be much closer than that shown in the title photo; 1½ to 2 inches is a good distance.

Since high Q is needed, plug-in loading coils are probably best for L1 if the antenna is to be used over a wide frequency range (more than a 3:1 ratio). Switch-selected separate coils are preferable to one coil of which turns are short- or open-circuited when frequency is changed.

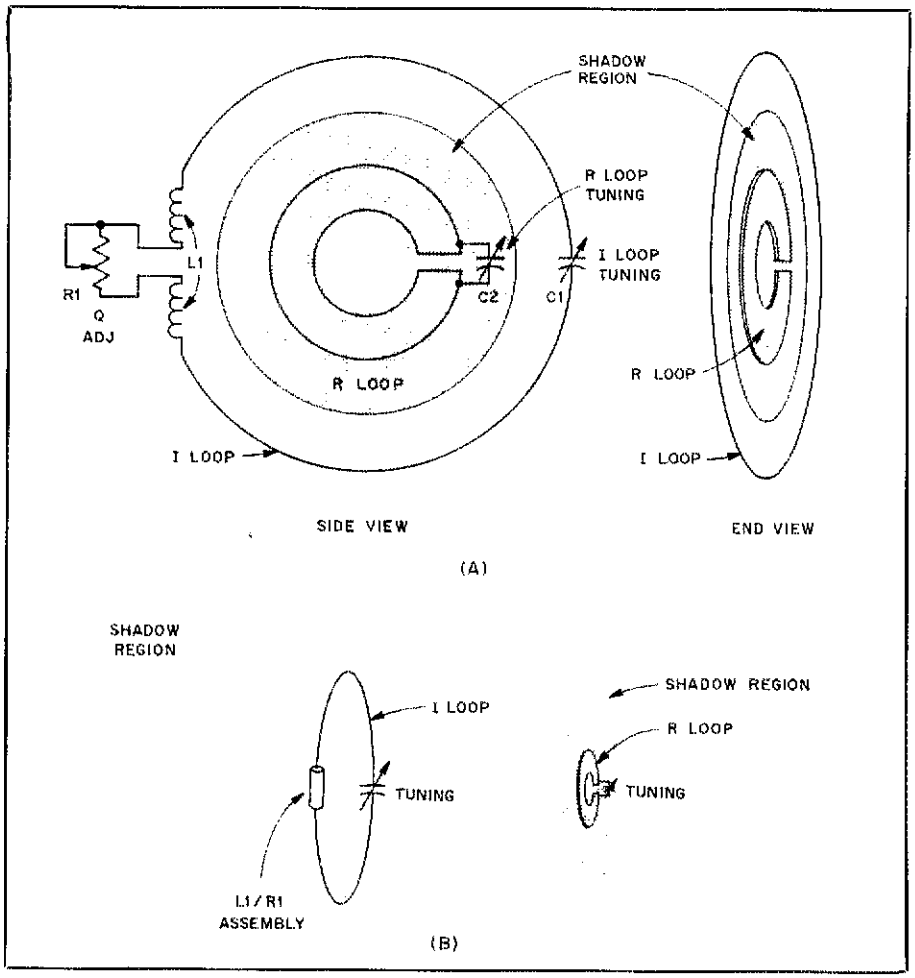


Fig 4—Current flowing in the I loop as a result of an incoming signal creates a shadow in the magnetic field around the inner (R) loop. If the I and R loops are in the same plane (as shown at A), the magnetic-field shadow only occurs around the R loop itself, inside the I loop. If the loops are offset, however, shadow regions exist around the R loop and in a position the same distance away from the I loop as the R loop, but in the opposite direction, as shown at B.

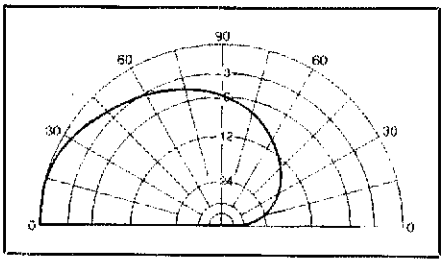


Fig 5—Measured elevation-plane radiation pattern of a CTL antenna located near ground level.

It is important that the tuning capacitors be located in the center of one of the vertical sides of each loop, and that these sides be adjacent to each other. The R loop can have multiple turns if desired, although one should be wide, as shown in the title photo.

Building a CTL is straightforward. Plywood and dowels are about the easiest materials to use for constructing the framework. A hand saw and a drill make the frame building easy. Small blocks of plywood can be used to set the I loop away from the board (giving clearance for the loop and L1, and keeping losses to a minimum). A dab of silicone sealant where the I loop crosses each block will hold the loop in place. Use the title photo and Fig 1 for reference in building the CTL.

Adjusting and Using a Coplanar-Twin-Loop Antenna

The use of lightweight, good-quality headphones—such as those shown in the title photo—is strongly recommended. Changes in signal level resulting from loop and receiver rotation can more readily be distinguished when headphones are used. (Headphones provide an acoustic path of constant length and attenuation.) Because the R loop has a low impedance, there is little hand-capacitance effect, and presence or absence of the headphone wires has little or no effect on receiver and antenna operation. Even touching the R loop with a finger has little effect. The general proximity of the body to the assembly can, for all practical purposes, be ignored, as long as nothing comes within a few inches of the I loop.

The antennas shown the title photo and in Fig 1 are designed for the 15-MHz broadcast band, and will cover the 14-MHz amateur band without modification. The loops are usually operated in the vertical position. To prepare the CTL for operation at a given frequency, first detune the I loop by means of C1 by setting it to maximum or minimum capacitance (see Fig 3). Initially, set R1 to minimum resistance. Then, tune the R loop (with C2) to peak the desired signal. Usually, no further adjustment of C2 is needed unless the operating frequency is changed by a few hundred kilohertz.

Next, tune the I loop to resonance at the signal frequency as follows: Assume that the direction of the received station is known. Orient the loops with their common plane in that direction, and with the loading coil of the I loop on the side closest to the desired station. A pronounced dip in receiver output will occur when C1 is correctly tuned. With the CTL pointing in the opposite direction, the decrease in signal strength is all but unnoticeable. Because the dip will be deepest when the loop plane is precisely aligned with the station direction, readjust loop direction as you approach a signal-strength null while tuning C1. Signal-strength null depth can be in excess of 20 dB, so C1 must be tuned with care to get the best rejection.

Increase the value of R1 from minimum

CTL Performance with High-Angle Signals

The CTL rejects incoming vertical-plane signal components very well from 0 to about 45° in elevation (see Fig 5). This range usually includes the most important angles from the standpoint of long-distance propagation. From 45 to 90°, the amount of rejection falls off. Signals from transmitters at short ranges, delivering only high-angle components, are not rejected as well. In those cases, it is possible to obtain signal rejection by placing the CTL on its side. The antenna is then sensitive to horizontally polarized signals. In that position, the antenna can be rocked or tipped so that its null provides the best rejection. The pattern null is wide in azimuth in this configuration.

Because vertical-plane modes fade independently, the strongest one at any given time will usually yield a good drop in signal strength when the antenna is positioned and tuned correctly. By successive observations, frequently you can estimate which propagation modes are active at a given time, even when there are several present simultaneously. Low-angle signals from distant stations are easily identified in this way. The amount of attenuation on low-angle signals resulting from nearby obstacles, such as trees and buildings, can also be estimated this way.

(while readjusting loop direction and I-loop tuning slightly, if necessary) until the null depth on a particular station is as deep as you can make it. An R1 value of a few ohms is about right. Outdoors, with favorable propagation, the null can be made extremely deep. As propagation conditions change over the course of a minute or so, the null depth typically decreases somewhat. Once the proper setting for R1 is found, there is usually no need for readjustment unless the operating band is changed.

As C1 is tuned through its range, sometimes there is a setting at which the receiver audio output increases. This is most noticeable if R1 has been initially set to zero. When this happens, increase the value of R1. When R1 is close to the optimum value, only a dip in signal strength will be found as C1 is tuned through its range.

As mentioned previously, the purpose of R2 (Fig 3), is to vary the amount of signal supplied to the receiver. (Unfortunately, few broadcast receivers have provisions for disabling the AGC and controlling gain manually. AGC smooths out amplitude changes and makes direction judgement difficult, especially in the case of sky-wave signals with fluctuating amplitudes.) When the CTL is initially adjusted, R2 should be set to reduce signal input to the receiver to somewhere below the point at which AGC action is pronounced. Once the antenna has been adjusted, R2 can be set to minimum resistance, and need not be adjusted further. If your receiver has defeatable AGC, there is no need to adjust R2; just disable the AGC during antenna tuning.

Proximity of the radio to the metal comprising one side of the R loop capacitively couples the radio ground to that side of the loop. Improved results can sometimes be obtained if the radio's ground is physically connected (with a piece of wire) to the same side of the loop. The best point of connection is close to the tuning capacitor, C2. The radio's chassis ground can usually be accessed at either the earphone jack or the external power-supply jack. Some small portable radios become unstable when operated in close proximity to metal. If this is a problem, move the radio to the space between the loops and install a separate ground connection to the radio as previously described.

Once tuning is complete, turn the antenna so that the desired signal lies in the direction of maximum response. Alternatively, the antenna can be rotated so that the null direction coincides with that of an undesired signal. Useful sky-wave signal discrimination can usually be obtained when the angular separation between stations is as small as 45°.

As a result of the resonant-loop, wide-metal-strip design, the sensitivity of the setups shown in the title photo and Fig 1 is surprisingly high—in fact, it is comparable to that of the receivers' built-in whip antennas. To prevent overloading in areas where very high field strengths are encountered, it may even be necessary to couple the radio's antenna connection to the loop via a small (10-pF) capacitor in series with the wiper of R2.

Indoor and Outdoor CTL Operation

Best results are obtained when the antenna is operated outdoors, in a location that is reasonably clear of reflecting objects. Familiarize yourself with the CTL tuning procedure outdoors; it is not necessary to go more than a few feet outside a building. A "reasonably clear" area can be a parking lot—proximity to automobiles has surprisingly little effect at HF, because cars are usually small compared with the wavelength, and are insulated from the ground by their tires.

CTL height above ground is not important. Best interference rejection is often obtained when the antenna is physically close to the ground. (Indoors, this means close to the floor of a room, especially when the building is made of reinforced concrete.) Indoors, the best place to operate a CTL is close to outside walls and, above all, to windows. If there are several windows side by side, the best place for reception is in the middle of the window area.

Although CTL performance—as measured by directional discrimination—suffers when the antenna is used indoors, the degradation is not as serious as you might expect. In general, some degree of directional discrimination is possible wherever a signal of usable strength can be found indoors using a receiver with a built-in antenna.

When a CTL is operated indoors, the following performance changes usually occur, in addition to a reduction in average signal level:

- The indicated direction of arrival may be more related to the direction to the nearest window than the direction to the station.
- Once a null has been obtained on a particular signal, it will tend to drift more rapidly than when outdoors—that is, the amount of rejection decreases appreciably over a minute or two. This is caused by reflections from local conductors. The original rejection level can be restored, but a slight change in azimuth and/or tuning setting is usually required.
- More than one null (often two) in the otherwise unidirectional pattern may be observed.

Move the CTL around and find the spot where these effects are least noticeable. Many reflections encountered indoors have a surprisingly short range. A location change over a distance of a few feet often makes a significant difference.

Band Changing

The R loop can be tuned over about a

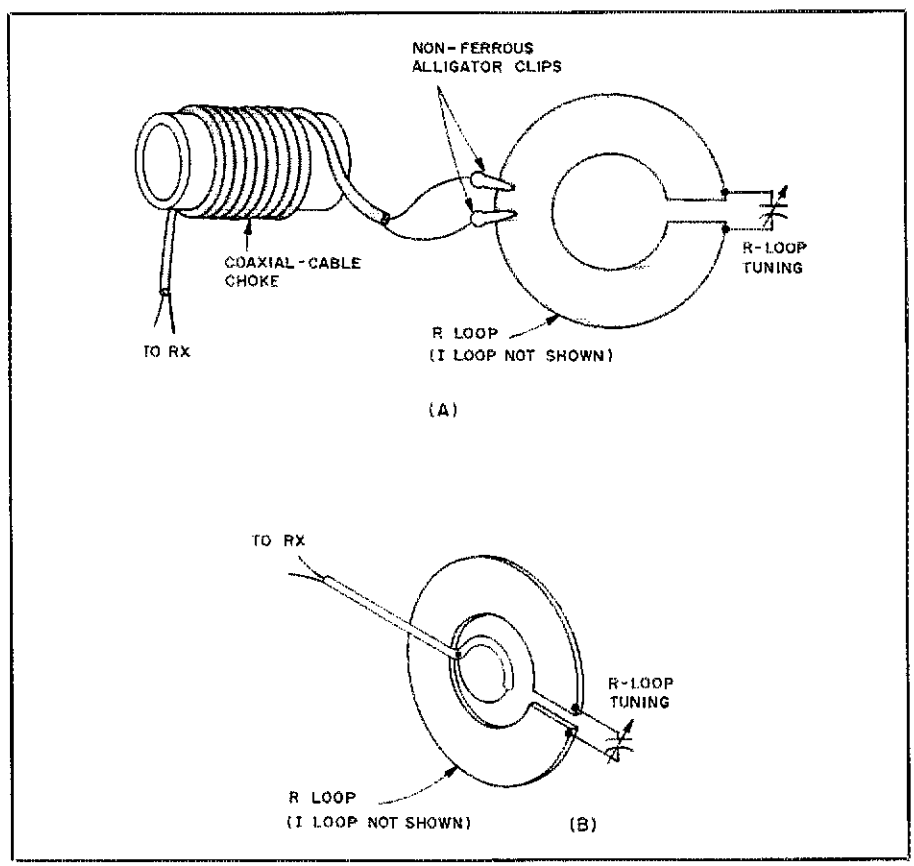


Fig 6—Two methods of connecting a coaxial feed line to a CTL antenna. At A, the feed line is wound over a wooden dowel in solenoidal form. At B, a shielded link is used to couple energy from the loops into the feed line. No direct connection to the CTL is required for this feed method.

three-to-one frequency range (such as 7 to 21 MHz), without band switching, because its tuning capacitor is quite large. For operation at lower frequencies, switch-selected additional turns made of insulated hookup wire can be added to the R loop. These can be wound right over the metal strip, if desired.

Using the CTL with a Separate Receiver

If you want to use the CTL with a separate receiver (instead of a small portable receiver like that shown in the title photo), there are a few approaches to use in attaching a coaxial feed line. One approach is to connect a coaxial cable across the high-current part of the R loop, as shown in Fig 6A. A convenient means for reducing RF current flow on the outer conductor of the coax is to use a small-diameter coax and to wind a portion of it in the form of a solenoidal RF choke, also shown in Fig 6. A coupling loop like the one shown in Fig 6B is another good way to attach a coaxial feed line.[1]

Summary

Although the amount of energy received by a coplanar-twin-loop antenna is considerably less than that of a good Yagi antenna on a tall support, the CTL performs adequately for most amateur HF interference rejection and DF work. If desired, a CTL can be operated by remote control on a rooftop or tower much more easily than a Yagi can be brought indoors!

Acknowledgment

I am grateful to Dr Robert R. Everett for drawing to my attention the instability of some small receivers when operated in contact with sheet metal.

Reference

[1]D. E. Barrick, "Miniloop Antenna Operation and Equivalent Circuit," *IEEE Transactions on Antennas and Propagation*, Vol AP-34 (Jan 1986), pp 111-114.

O. G. Villard, Jr., "Interference-Reducing Antennas for Short-Wave Broadcast Listeners," *IEEE Transactions on Broadcasting*, Vol 34 (Jan 1988), pp 159-166.

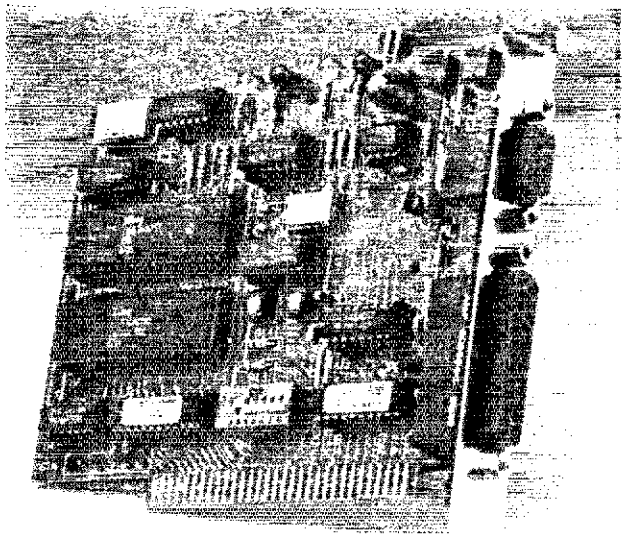
O. G. "Mike" Villard is a Senior Scientific Advisor at SRI International, a Professor Emeritus of Electrical Engineering at Stanford University and a former trustee of the Stanford Amateur Radio Club, W6YX. Mike has authored more than 22 QST technical articles over the last 38 years. Mike earned the ARRL Merit Award in 1955 for "...technical contributions in the fields of wave propagation, single sideband telephony, and selective circuits." Mike has been associated with developments in meteor-scatter propagation, backscatter sounding, long-delayed echoes, magnetospheric HF propagation and ionospheric radar. He was instrumental in the widespread growth of SSB after World War 2, and designed a tunable AF circuit commonly known as the Select-o-Ject. QST

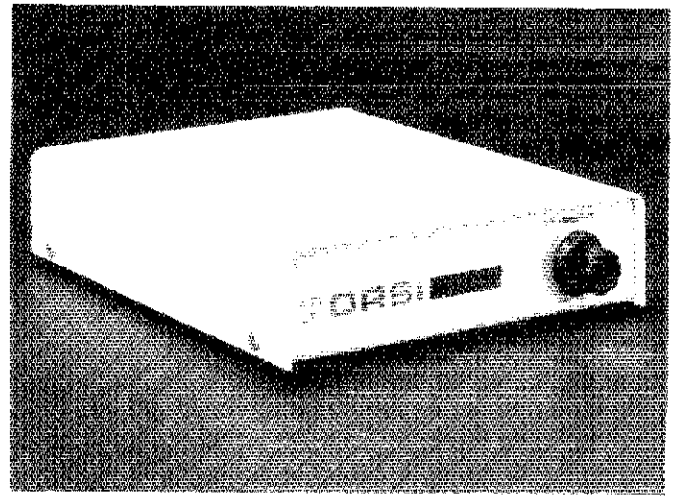
New Products

PACKET RADIO PLUG-IN TNC AND HF MODEM FOR IBM PCs

☐ Digital Radio Systems, Inc (DRSI) has introduced the PC*Packet system for the IBM® PC/XT/AT and compatible computers. PC*Packet consists of a half-length, plug-in PC board that provides the capabilities of two conventional TNCs. The PC*Packet board has two ports. One port has a 1200-bps CMOS crystal-controlled AFSK modem that connects directly to a VHF FM transceiver; the second port is configured for use with an external modem that uses RS-232-C or TTL signal levels. When used with the DRSI HF*Modem, the PC*Packet system provides two-port (HF/VHF) operation, featuring the ability to connect to stations on both ports—simultaneously. A version of PC*Packet with two built-in VHF 1200-bps modems is also available.

The software included with the PC*Packet system features a split-screen, menu-driven terminal program, TSR background AX.25 device driver, a stand-alone TNC emulator and a calibration utility program. The terminal program offers pop-up windows, on-line help information, a scrollable buffer to review received text, ASCII and YAPP binary file transfer, printer support and more. For the more technically inclined, the PC*Packet system includes the developer's software documentation for the low-level TSR driver, and information on how to write an original software application for the system. Prices for the components of the PC*Packet system are: PC*Packet system (including PC board, terminal program, AX.25 protocol support software, RS-232-C serial port and 1200-bps modem), $139.95; HF*Modem with LED bar-graph tuning indicator and selectable 200, 600 or 1000-Hz shift, $79.95; TNC-232 (RS-232-C adapter for TNC-2 and clones), $24.95. Cable sets for the PC*Packet system are also available. A package of two cables (a 5-foot shielded RS-232-C cable and a cable for connecting the PC*Packet board to the HF*Modem) is $12.95, and a cable for connecting the PC*Packet board to a VHF FM transceiver is $12.95. The PC*Packet system is available from DRSI, 2065 Range Rd, Clearwater, FL 34625, tel 813-461-0204 or 800-999-0204.—*Rus Healy, NJ2L*





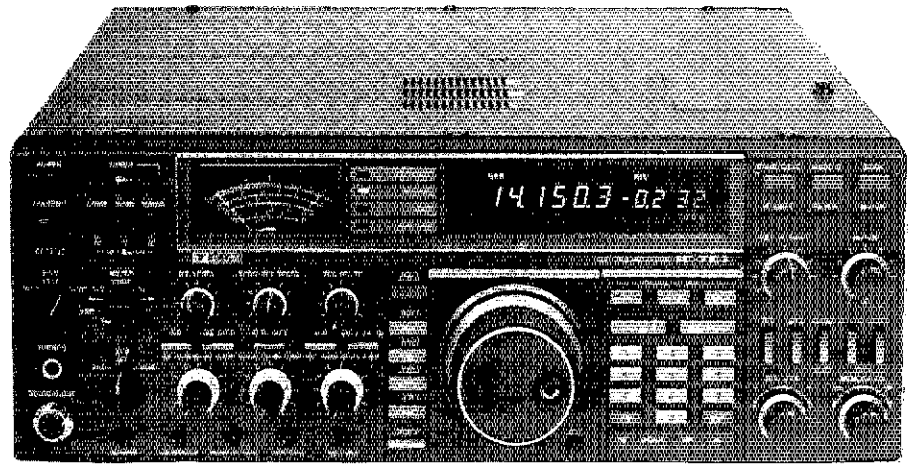
Conducted By Mark Wilson, AA2Z
Senior Assistant Technical Editor

ICOM IC-761 160- to 10-Meter Transceiver

Reviewed by Tom Miller, NK1P

With the introduction of the IC-761, ICOM has once again proven their ability to complement operator convenience with superior performance. The IC-761's standard features include a newly designed internal antenna tuner, memories and scanning, general coverage receiver, internal power supply, internal iambic keyer, 500-Hz CW filters and much more.

The first thing that most people notice about the IC-761 is that it's in a *big* box. Unlike most of the previous ICOM models, the '761 has large controls and switches that are easy to find and grab ahold of. With the internal power supply and antenna, the radio weighs in at a hefty 38.6 pounds. Don't worry about trying to find a place for this transceiver in your car, though—there is no provision for connecting it to an external 13.8-V dc supply.



Frequency Control

A large, white, fluorescent frequency display dominates the top center of the front panel. There should be no complaints about the legibility of this display—it's large and easy to read. Some users commented that they think the display is too bright even in a bright room. There is no dimmer switch—the '761's operating and service manuals contain no evidence of one—and operating the '761 in a darkened room is actually hard on the eyes. Here's a plus for display-accuracy fanatics, though: The IC-761 has a *front-panel* display-calibration control!

The IC-761's frequency display resolves frequencies only to the nearest 100 Hz (0.1 kHz) even though the '761's synthesizer tunes in 10-Hz steps at the '761's slowest tuning speed. (There are enough digits on the fluorescent tube's frequency field to *display* frequencies to 0.01-kHz digits, and you can light *all* the digits in the field from the rig's keypad [more on this later], but the receiver's central processing unit ignores the extra information.) How about including 10-Hz display resolution, ICOM?

An optional voice synthesizer provides audible confirmation of operating frequency. The frequency display indicates the carrier frequency in AM, FM, SSB and CW modes (CW signals must be tuned to the proper pitch for display accuracy); the mark frequency is indicated in the RTTY mode. However, the '761's control program doesn't keep the rig tuned to the same carrier frequency when jumping between modes. Fig 1, from the IC-761 service manual, describes this characteristic better than words. Yes, jumping to CW or RTTY from LSB, AM or FM changes the IC-761's frequency display by −600 Hz; jumping to USB from LSB, AM or FM changes the display by −3 kHz.

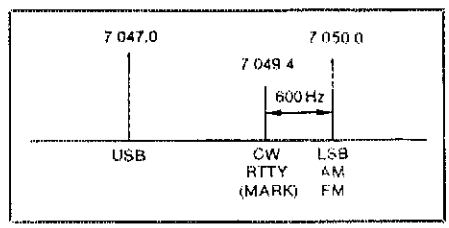


Fig 1—Carrier frequency versus mode selection for the ICOM IC-761 (from the IC-761 service manual).

Receiver or transmitter offset tuning (up to ±9.9 kHz) is displayed to the right of the operating frequency. Operating mode (USB, LSB, CW, RTTY, AM or FM) is displayed above the frequency readout. Indicators for SPLIT operation and VFO A or VFO B selection are located below the frequency readout. Other indicators: SCAN lights when a scan function is selected; MEMO lights when a memory mode is selected; NARROW lights when the narrow CW or RTTY filter is selected; GENE lights when the general-coverage mode is selected.

The IC-761 has two "VFOs"[1] and is capable of split operation. The radio tunes in 10-Hz steps at its slowest speed. Tuning speed is a comfortable 5 kHz per revolution when the knob is turned slowly and 25 kHz per revolution when it is turned rapidly. A third speed, 500 kHz per revolution, is available when TS (tuning speed) is pressed. A LOCK switch inhibits the main tuning dial (only) to prevent an accidental QSY. The large main tuning knob is weighted and has a silky smooth feel. The manual shows how to adjust the brake pressure on the tuning knob shaft to suit individual preferences.

You aren't limited to using the main tuning knob to change frequencies. A numeric keypad located just to the right of the main tuning knob may be used for direct frequency entry. For example, if you want to QSY to 28.885 MHz, press 2 8 8 8 5 0 ENTer. The keypad has the same resolution as the frequency display: It allows direct entry of frequencies only to the nearest 100 Hz even though the tuning knob can tune in 10-Hz steps—another candidate for a fix. Leading zeroes must be included during entry of frequencies below 1 MHz; there is no decimal-point key. A nice feature is that you don't have to enter trailing zeroes if you want to move to an even multiple of 1 MHz. For example, press 1 4 ENT to move to 14.0 MHz.

To change bands, you can enter the new frequency on the keypad, or you can use the UP and DOWN switches located below the keypad. When the '761 is in the general coverage mode, these switches move the frequency up and down in 1-MHz steps. In the ham band mode, they move the operating frequency to the next higher or lower amateur band (including 10, 18 and 24 MHz).

Use of the UP/DOWN switches proved frustrating. In the general-coverage mode, pressing these switches moves you up or down exactly 1 MHz (for example, 7.885 to 6.885 to 5.885 and so on). In the ham

[1] D. Newkirk, "View: DigiVFO," Technical Correspondence, *QST*, Sep 1987, p 43.

Table 1

ICOM IC-761 160-10 Meter Transceiver, Serial no. 01440

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: Receiver, 100 kHz to 30.0 MHz; transmitter, 1.8 to 2.0, 3.45 to 4.1, 6.95 to 7.5, 9.95 to 10.5, 13.95 to 14.5, 17.95 to 18.5, 20.95 to 21.5, 24.45 to 25.1, 27.95 to 30.0 MHz.	As specified.
Modes of operation: USB, LSB, CW, FM, AM, RTTY.	As specified.
Frequency display: 7-digit white fluorescent.	
Frequency resolution: Not specified.	100 Hz.
Power requirement: 100 to 120 V ac, 650 VA max on transmit, 80 VA max on receive.	
Transmitter	*Transmitter Dynamic Testing*
Transmitter output power: Max 100 W PEP on SSB, 100 W on RTTY, CW and FM, 40 W on AM.	Typically 125 W PEP on SSB, 115 W on CW, RTTY and FM, and 63 W carrier on AM. Power output varied slightly from band to band. Minimum SSB/CW/RTTY output power: 7.6 W.
Spurious signal and harmonic suppression: Greater than 60 dB below peak power output.	See Fig 2.
Third-order intermodulation distortion products: Not specified.	See Fig 3.
CW keying waveform: Not specified.	See Fig 4.
Transmit-receive turnaround time (PTT release to 90% audio output with an S9 signal): Not specified.	20 ms.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity (preamp on): SSB, CW and RTTY: (bandwidth not specified) $<0.5\ \mu V$ for 10 dB S/N from 0.1-0.5 MHz; $<$ 10 dB S/N from 0.5-1.6 MHz; $<0.15\ \mu V$ for 10 dB S/N from 1.6-30 MHz.	Minimum discernible signal (noise floor) with 500-Hz filter: *Preamp on*: 1.0 MHz: -125 dBm; 3.5 MHz: -140 dBm; 14 MHz: -139 dBm *Preamp off*: 1.0 MHz: -125 dBm; 3.5 MHz: -135 dBm; 14 MHz: -132 dBm
AM: (6.0 kHz bandwidth) $<3\ \mu V$ for 10 dB S/N from 0.1-0.5 MHz; $<6\ \mu V$ for 10 dB S/N from 0.5-1.6 MHz; $<1\ \mu V$ for 10 dB S/N from 1.6-30 MHz.	6.0 kHz bandwidth, test signal signal 30% modulated with a 1 kHz tone, preamp on: 1.0 MHz: 0.9 μV 3.5 MHz: 0.48 μV 14 MHz: 0.55 μV
FM: $<0.3\ \mu V$ for 12 dB SINAD from 28-30 MHz.	Preamp on: 0.25 μV for 12 dB from SINAD at 29 MHz.
Receiver dynamic range: 100 dB (preamp on), 105 dB (preamp off).	Blocking dynamic range†: *Preamp off*: 3.5 MHz: 126 dB; 14 MHz: 131 dB *Preamp on*: 3.5 MHz: 120 dB; 14 MHz: 122 dB Two-tone, third-order intermodulation distortion dynamic range†: *Preamp off*: 3.5 MHz: 100 dB; 14 MHz: 102 dB *Preamp on*: 3.5 MHz: 95 dB; 14 MHz: 96 dB Third-order input intercept: *Preamp off*: 3.5 MHz: 15 dBm; 14 MHz: 21 dBm *Preamp on*: 3.5 MHz: 2.5 dBm; 14 MHz: 5 dBm
S-meter sensitivity (μV for S9 reading): Not specified.	*Preamp on*: 58 at 1 MHz; 10 at 1.9 MHz; 10.5 at 14 MHz; 8.5 at 28 MHz *Preamp off*: 58 at 1 MHz; 26 at 1.9 MHz; 27 at 14 MHz; 29.5 at 28 MHz
Squelch sensitivity: $<0.3\ \mu V$.	Min, 0.7 μV; max, 0.5 μV.
Receiver audio output: >2.6 W at 10% distortion with 8 ohm load.	2.76 W at 10% total harmonic distortion (THD) with an 8 ohm load.
Color: Black.	
Size (height, width, depth): 5.9 × 16.7 × 15.4 inches.	
Weight: 38.6 lbs.	

†Blocking dynamic range and third-order IMD dynamic range measurements were made at the ARRL Lab standard signal spacing of 20 kHz.

band mode, however, you end up on each band's "initialization frequency." The initialization frequency is about 50 kHz up from the bottom band edge. For example, if you're operating SSB on 21.255 MHz and press the DOWN switch, you'll move to about 14.050 MHz. This characteristic is annoying, especially if you do a lot of band changing (in a contest, for example).

Fortunately, there's another way to change bands. The IC-761's 32 memories store operating mode and filter selection, as well as frequency, and all 32 memories are *tunable*. Once you get used to the memory system, it's like having 32 other "VFOs" in addition to VFO A and VFO B. During a CW contest, I found it convenient to program the first six

memories for the low end of each band, 160 to 10 meters, and use the memory selection rotary switch at the lower right corner of the front panel as my band switch.

The '761 can scan all 32 of its memory channels. If you like, you can scan only those channels with the same operating mode as the main VFO, or you can scan between the frequencies stored in channels one and two. A switch accessible through the bottom panel determines whether opening the squelch gate will suspend or terminate scanning.

The '761 is capable of remote control by means of a serial port located on the back panel. ICOM uses a LAN-type system called Communication Interface-V (CI-V). According to ICOM literature, remotely controllable functions include frequency, mode, VFO selection and memory operation. There isn't any specific information on remotely controlling the '761 in the instruction manual or the service manual.

Good news: The operating program for the IC-761's microprocessor is contained in ROM, not in RAM. This means that when the transceiver's memory-backup lithium cell is exhausted, the transceiver *still works.* In ICOM's words, "The transceiver transmits and receives normally if the backup battery is exhausted but the transceiver cannot memorize frequencies."

Receiver

Signals can enter the receiver chain either from the SO-239 ANTenna connector or through the RECEIVE ANT IN phono jack, allowing use of separate receiving and transmitting antennas. Signals then pass to a 20-dB attenuator, a preamp or directly to the first mixer (a doubly balanced pair of 2SK125 JFETs operating at 13.8 V). The corresponding front-panel switch positions are labeled PRE, ATT OFF and 20dB. The preamplifier works—the ARRL lab measured a change in the minimum discernible signal (MDS) of 5 to 7 dB with the preamp on. It would be nice to have a choice of attenuation, though. There are times, especially on 160, 80 and 40 meters, when 10 dB or 30 dB are more appropriate choices.

The IC-761 employs a quadruple conversion scheme for SSB, CW, RTTY and AM, and triple conversion for FM. Intermediate frequencies are 70.4 MHz, 9.0 MHz, and 455 kHz for FM, with a fourth IF of 9.0 MHz employed in all other modes. (The return to 9 MHz allows the inclusion of passband [variable bandwidth] tuning, IF shift and other features.)

The '761 certainly doesn't lack when it comes to filters. Different combinations of filters can be selected by pressing the FILTER switch, located just above the IF shift and notch filter controls. As the radio comes from the factory, this switch provides bandwidths of 6.0 or 2.6 kHz for AM; 2.6 or 2.4 kHz for SSB; and 2.4 kHz or 500 Hz for CW and RTTY operation. FM operation is limited to a single bandwidth of 15 kHz. This range of selectivity is accomplished by choosing one of four filters in the second IF (9 MHz), and one of six in the third IF (455 kHz). The stock IC-761 is equipped with 2.4-kHz and 500-Hz crystal filters in the second IF and third IF. Optional filters for the second IF and third IF provide 250 Hz bandwidth for CW and RTTY. These filters were not installed in the review unit. There is also an optional 6-kHz second-IF filter for AM operation.

Some other receiver features worth mentioning include the QRM fighting team of passband tuning (PBT), IF SHIFT and the (audio) NOTCH filter. PBT and IF SHIFT work in the CW, SSB and RTTY modes. A single control is used for both PBT and IF SHIFT, and both functions cannot be used at the same time. PBT and IF SHIFT function differently, and both are useful. PBT narrows the passband from either the high side or the low side, while IF SHIFT moves the center frequency of the passband without changing the passband width. I found combining the use of the notch filter and PBT to be just about fail-safe when it came to adjacent channel interference.

Three controls are used for the noise blanker. The NB switch activates a noise blanker that is fairly effective against ignition noise and power-line noise. Although this blanker didn't work on all noise I encountered, it did work most of the time. NB LEVEL varies the threshold of the blanker. The third control, NB WIDE, is used for noise with long-duration pulses, such as the Soviet "Woodpecker" over-the-horizon radar. Again, this blanker was effective much of the time, but not all of the time. Receiver dynamic range is noticeably degraded when the noise blankers are in operation—an effect common to most receivers.

The AGC in the '761 is a joy to use. For casual SSB work with strong signals, the SLOW time constant position (fast attack, slow release) is the right choice. AGC action is smooth, and signals are easy to listen to. For CW and for SSB contesting and DXing, though, FAST AGC is the better choice. FAST AGC doesn't thump at all. Also, the AGC has depth—strong signals sound louder than weaker ones, making it easier to dig out weak signals sharing the passband with stronger ones.

The '761's clean receiver audio is compromised just a bit by a hissy audio power chip. Adjusting the rig's TONE control doesn't touch this hiss—a pity because the '761's quiet IF strip can't be fully enjoyed in the presence of such noise.

Transmitter

With harmonic suppression approaching 60 dB on all bands, the IC-761 is definitely one of the cleanest new rigs available (see Fig 2). This can be attributed to proper filtering and five relatively low-gain stages in the transmit amplifier chain. Of course, there is no need to tune up the '761—just set drive level and audio gain (if applicable) and you're ready to go. Fig 3 shows the transmit audio during two-tone testing.

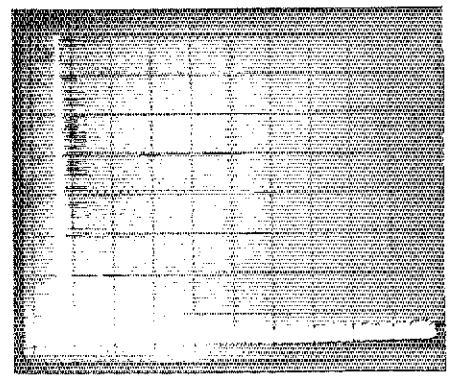


Fig 2—Worst-case spectral display of the ICOM IC-761. Horizontal divisions are each 2 MHz; vertical divisions are each 10 dB. Output power is approximately 110 W at 1.85 MHz. All harmonics and spurious emissions are at least 56 dB below peak fundamental output. The IC-761 complies with current FCC specifications for spectral purity.

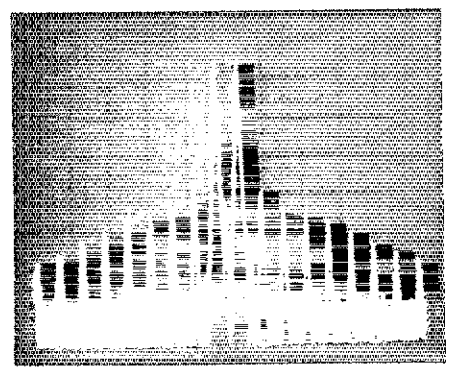
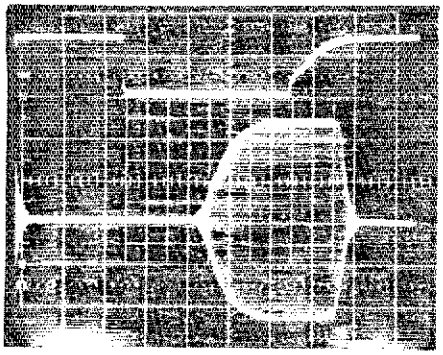


Fig 3—Spectral display of the ICOM IC-761 during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 37 dB below PEP output, and fifth-order products are approximately 45 dB down. Vertical divisions are each 10 dB; horizontal divisions are each 2 kHz. The transceiver was being operated at 100 W PEP output on 14 MHz.

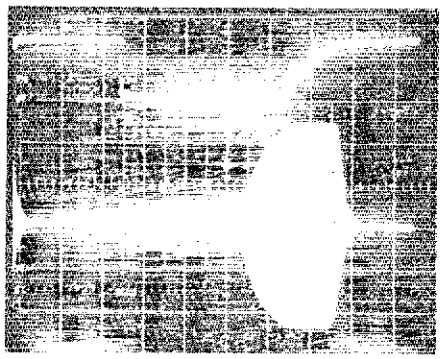
Antenna Tuner

If you're like me, with narrow bandwidth antennas, you'll appreciate the 160 through 10 meter built-in antenna tuner. ICOM claims a matching range of 16.7 to 150 ohms, and a maximum tuning time of three seconds. The internal tuner uses a tapped coil and two motor-driven variable capacitors, forming a T match.

To achieve the fast tuning specification,



(A)



(B)

Fig 4—CW keying waveform for the ICOM IC-761. The photo at A is with the IC-761 in the semi-break-in mode. The photo at B is with the IC-761 in the full-break-in (QSK) mode. In each photograph, the lower trace is the RF envelope; the upper trace is the actual key closure. Each horizontal division is 5 ms.

ICOM uses a clever scheme to preset the capacitors for each band. When initializing these presets, you transmit at low power and let the IC-761 find the right match on its own. Once a match is found, you open a cover on the top panel of the transceiver, flip the PRESET/AUTO switch to PRESET and adjust a pair of potentiometers (there is one pair per band) until four LEDs go out. Repeat the process for each band. From then on, when a band change is made, the tuning capacitors move to the preset positions and fine tune from there. The result is an automatic antenna tuner that works quickly and is almost transparent to the operator.

As with any automatic antenna tuner, there are times when it is not capable of finding a match. This is not a dead end in the case of the '761, as the preset potentiometers can be used to manually tune the T match capacitors. This procedure worked for me when I tried to match a 40-meter dipole on 160 meters! (No, I don't *normally* use my 40-meter dipole on 160.)

CW Operation

Another nice feature of this rig is the built-in iambic keyer. (Of course, you can still use the external key or keyer of your choice.) The keyer is enabled by pressing ELEC KEY located to the right of the noise blanker controls. A speed control is provided just above the enable switch, and a weight control is located inside the rig. Whether or not the internal keyer is used, key(er) connection is made via a ¼-inch stereo jack on the rear panel.

CW offset is set at 700 Hz. Some operators prefer a lower offset, and internal adjustment—to about 550 Hz—is possible.

Both full-break-in (QSK) and semi-break-in operation are available. The QSK mode sounds a bit thumpy because of sidetone transients, but receiver blanking is perfect. Unfortunately, the transmitted CW sounds choppy in QSK, especially at speeds of about 20 WPM and higher (see Fig 4). This occurs because of a delay between the time that the key line is closed and the transmitter RF output is generated. It is possible to compensate for this problem by adjusting keyer weighting.

Phone and RTTY Operation

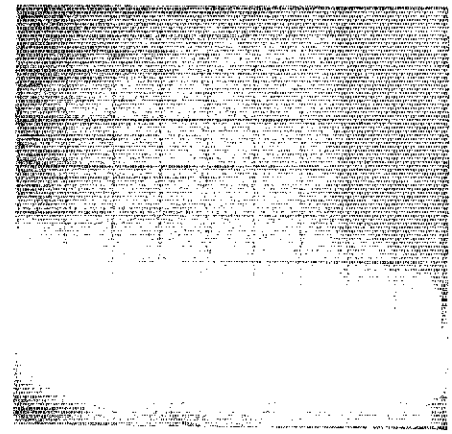
For phone ops, the IC-761 has a good sounding speech compressor (according to numerous reports) and a transmit audio monitor, which I think *all* rigs should have. At the beginning of the review, I used ICOM's SM-10 desk microphone. Many reports indicated that although the audio "wasn't objectionable," it sounded kind of "blah." (Several people who used the '761/SM-10 combination reported similar on-air comments, so the problem probably wasn't my voice.) Adjustment of the microphone's equalizer and compressor controls didn't improve the audio—in fact, many settings made the transmit audio sound awful. Note that the SM-10's built-in compressor has only LOW, MED and HIGH positions—but no OFF position! Later in the review period, I switched to a Heil HM-5 microphone. The Heil worked very well with the IC-761, and I received a number of excellent audio reports.

RTTY operation is also a snap, with capabilities for AFSK and true FSK included. For AFSK, all connections can be made through the microphone plug on the front panel or through the 8-pin ACC(1) jack on the rear panel. For FSK operation, a key line is provided (called RTYK) in the ACC(1) jack. Switches inside the rig select 850 or 170 Hz shift and reverse mark/space relationship.

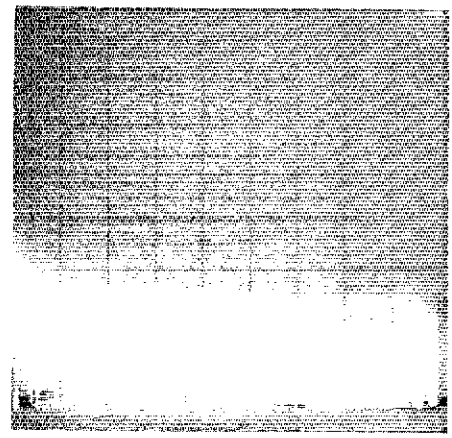
Synthesizer

ICOM has a relatively quiet synthesizer, as shown in the ARRL Lab phase-noise photos in Fig 5. In use, this translates to an absence of pops, clicks and birdies in the receiver. During contest periods, even on bands filled with strong signals, I did not notice any phase-noise problems.

The IC-761 is not without synthesizer-related problems, though. Synthesizer phase noise is relatively low partly because the acquisition time is relatively long. That is, when you change frequency, it takes a relatively long time for the synthesizer to lock. We're only talking milliseconds here, and the longer acquisition time is not apparent to the operator and causes no problems *except during QSK CW operation when the transmitter and receiver frequencies are offset more than 300 to 500 Hz*. During split-frequency QSK operation, the synthesizer lockup time is longer than the transceiver TR switching time. The transmitter puts out RF *before* the synthesizer locks. The result: The trans-

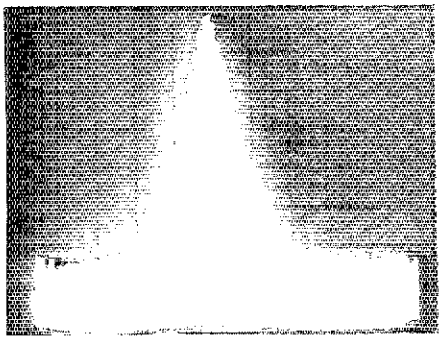


(A)

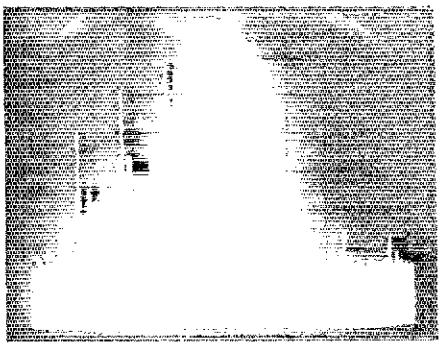


(B)

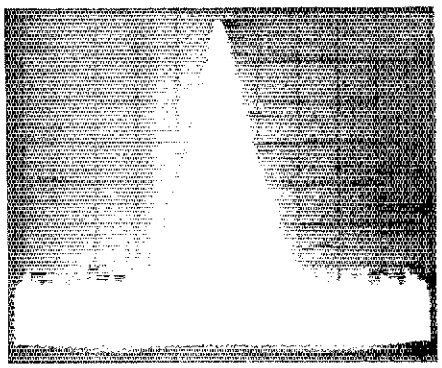
Fig 5—Spectral display of the ICOM IC-761 transmitter output during phase-noise testing. Power output is 100 W at 3.5 MHz (A) and 14 MHz (B). Each vertical division is 10 dB; each horizontal division is 2 kHz. The scale on the spectrum analyzer on which these photos were taken is calibrated so that the log reference level (the top horizontal line on the scale in the photos) represents −60 dBc/Hz and the baseline is −140 dBc/Hz. Phase-noise levels between −60 and −140 dBc/Hz may be read directly from the photographs. The carrier, which would be at the left edge of the photographs, is not shown. These photographs show phase noise at frequencies 2 to 20 kHz offset from the carrier.



(A)



(B)



(C)

Fig 6—These spectral photographs taken in the ARRL Lab show CW keying sidebands when the IC-761 is used for full-break-in (QSK) CW operation. See text for further discussion. Vertical divisions are each 10 dB; horizontal divisions are 1 kHz. Bandwidth is 300 Hz. In all cases, the transceiver is in the CW position and is being keyed with a series of pulses 30 ms on, 30 ms off. The photo at A shows the transmitter output of the unmodified IC-761 operating full-break-in (QSK). The receiver is using VFO A and the transmitter is using VFO B; both VFOs are set to 14.0495 MHz. Everything looks normal. The photo at B shows what happens to the unmodified IC-761 during QSK operation when the transmit and receive frequencies are offset by as little as 500 Hz. In this photo, the transmitter is using VFO B, set for 14.0495 MHz; the receiver is using VFO B, set for 14.0490 MHz. Note that the signal is broader and that there are a number of discrete spurious signals near the carrier. The on-air signal sounds broad and has a noticeable chirp. The photo at C shows the results of ICOM's suggested modifications. Here, the IC-761 is operating full-break-in with the transmit and receive frequencies offset by 20 kHz. The signal appears normal, and the on-air sound is fine.

mitted signal sounds chirpy, and the transmitter puts out spurious signals. See Fig 6 for ARRL Lab spectral photos of this effect.

Let me emphasize that there is no problem with the unmodified IC-761 during CW semi-break-in operation or voice operation at any frequency split, or during QSK operation when the transmitter and receiver are on the same frequency. This problem only occurs during CW *QSK* operation at frequency splits greater than about 300 to 500 Hz.

Tom Moore, KF7GH, and Russell Dudley, KW5O, of ICOM acknowledged the problem and provided us with four modifications for the IC-761. These modifications are described in ICOM service bulletins 24287-002, 24287-005, 24387-001 and 7088-001. Two of the modifications (24287-005 and 24387-001) had already been incorporated in our IC-761 during production; the other two were performed by ARRL Lab Engineer Ed Hare, KA1CV. The remaining two modifications involve changing resistors on the main board and the PLL board, and readjusting a potentiometer.

Did the modifications work? Yes—to a degree. The modifications improve the situation dramatically at frequency splits up to 30 kHz or so. Up to about 30 kHz, the chirp and spurious signals are gone, and the radio is perfectly usable. At wider frequency splits, the synthesizer still has problems locking before transmitter RF output, and a very rapid chirp is noticeable on the signal, as are clicks several kilohertz either side of the main signal. Although the modifications don't solve the problem perfectly, they are a tremendous improvement and make the '761 usable for most split-frequency QSK operation.

If you have an IC-761 and want to attempt the modifications yourself, you'll need a copy of the IC-761 service manual, a dual-trace oscilloscope and some experience working on electronics equipment. According to ICOM's customer service people, they will modify—free of charge (except to-ICOM shipping costs)—any IC-761 with split-frequency QSK CW problems. This applies to all units—even those outside the normal warranty period. If you have questions about modifying your '761, contact ICOM's customer service department.

ICOM deserves recognition for being very responsive to fixing a major flaw in an otherwise fine radio. It's also reassuring that they stand behind their gear after the sale and update older transceivers at no charge.

Operation

Hooking up the IC-761 was easy. It's worth reading the manual first, however. The CW key jack is a two-circuit unit to allow the dot, dash and common connections required for the IC-761's internal keyer, and probably isn't compatible with whatever you're using with other radios. The wiring instructions for this jack are clear, however, and ICOM even includes a suitable plug. Assuming you've plugged your paddle into the rear panel KEY jack, the '761's electronic keyer circuitry makes a straight key unnecessary for key-down tests: When the keyer is not selected (ELEC-KEY button out), the paddle dot lever functions as a straight key.

If you plan to use a linear amplifier with the '761, you'll appreciate the fact that the amplifier key line terminates in a phono jack instead of being buried in a multi-pin connector. What you may not appreciate, however, is this warning in the instruction manual: "**DO NOT** attempt to switch greater than 50V DC, 0.5A." If you use an amplifier with a higher relay keying voltage (a Heath SB-220/221 or Alpha 77, for example), plan to add a relay or transistor switch between the IC-761 and your amplifier.

I must say I was intimidated at first by the apparent complexity of the '761's front panel. After spending some time reading the instruction manual with the rig in front of me, though, operating techniques quickly fell into place. Control feel and placement complement the rig's superior design, resulting in a quality piece of equipment. Since I find myself operating at a number of locations, having the built-in keyer and antenna tuner saved trunk space and reduced setup complexity.

The IC-761 received a thorough workout in several phone and CW contests. It performed very well under extreme conditions, and its superior receiver performance was noticeable. Even on 40-meter CW, it was usually possible to find a spot to call CQ—sandwiched in between a couple of strong stations!

The IC-761 includes an excellent general-coverage LF/MF/HF receiver. Its AGC works as well for reception of full-carrier AM stations as it does for CW, SSB and RTTY. Short-wave listening enthusiasts may find that the IC-761 exhibits a few rough edges, however. The transceiver's trait of not staying tuned to one carrier frequency during all possible mode changes is particularly annoying during reception of full-carrier AM signals as SSB—a technique in which sideband switching is routine for listeners intent on dodging interference. The transceiver's stock "AM wide" selectivity—6 kHz at −6 dB and 18 kHz at −50 dB—is a bit too wide for comfortable reception in crowded short-wave broadcast bands. (Addition of the optional 9-MHz AM filter [6 kHz at −6 dB and 18 kHz at −60 dB] may tighten up somewhat, although 4 kHz at −6 dB would be a better choice for both filters.) This isn't much of a problem, though, because the '761 does a superlative job

receiving full-carrier AM signals as SSB signals, carrier tuned as close to zero beat as possible with the rig's 10-Hz tuning steps. (Note: In some spots throughout the world, IC-761 users may experience *tweet* interference in the medium-wave broadcasting band. You've heard of birdies, of course; *tweet* is the decades-old term for interference caused by harmonics of a receiver IF beating with incoming signals. Sound impossible? It's not: Tweet interference occurs in the IC-761 when the rig is tuned to Connecticut local broadcast station WRCQ, 910 kHz—twice the '761's second IF (455 kHz). Luckily, the tweet is close enough to zero beat to be inaudible with 'RCQ tuned on the nose—but its presence prohibits IC-761 owners wanting to listen to their 910-kHz locals from offsetting the '761's tuning for better recovery of high modulating frequencies.)

I really enjoyed using the IC-761 and found it an excellent transceiver, except for the problems with split-frequency QSK operation. It is easy to use, it looks great, and the controls feel good. ICOM has done an outstanding job with both the operating and service manuals. Both are easy to read and informative.

I would like to thank Bill Myers, K1GQ, Dave Newkirk, AK7M, and Mark Wilson, AA2Z, for using the IC-761 and providing comments that were incorporated in this review.

Price class: IC-761, $2700; SM-10 desk microphone, $140. Manufacturer: ICOM America, Inc, 2380-116th Av NE, Bellevue, WA 98004, tel 206-454-7619.

SOLICITATION FOR PRODUCT REVIEW EQUIPMENT BIDS

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

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

Sealed bids must be submitted by mail and be postmarked on or before September 27, 1988. Bids postmarked after the closing date will not be considered. Bids will be opened seven days after the closing postmark date. In the case of equal high bids, the high bid bearing the earliest postmark will be declared the successful bidder.

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

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

Kenwood TS-140S 160-10 meter transceiver, s/n 8101427, with 500-Hz CW filter and PS-430 power supply (sold as a package only; see Product Review, Jun 1988 *QST*). Minimum bid $784.

Kenwood TM-221A 2-meter FM transceiver, s/n 9020515 (see Product Review, Jul 1988 *QST*). Minimum bid $238.

Kenwood TM-321A 220-MHz FM transceiver, s/n 8090113 (see Product Review, Jul 1988 *QST*). Minimum bid $248.

Kenwood TM-421A 440-MHz FM transceiver, s/n 8090067 (see Product Review, Jul 1988 *QST*). Minimum bid $244.

New Products

MN ANTENNA ANALYSIS SOFTWARE FOR THE IBM PC

☐ Brian Beezley, K6STI, has dramatically enhanced the MiniNEC antenna analysis program developed by NOSC. MN (for IBM® PC and compatible computers) allows modeling of almost any antenna made of wire or tubing, at any frequency. Antennas can be modeled over real or perfect ground, or in free space. MN gives forward gain, front-to-back ratio, maximum sidelobe levels, beamwidth, vertical radiation angle, input impedance, SWR, element currents, far-field radiation patterns and near-field intensity. MN also allows performance comparisons between antenna designs.

MN is menu driven, and has extensive, easy-to-read documentation. Basic system requirements include an IBM PC or compatible with a single floppy disk drive, at least 300 kbytes of free memory (450 kbytes if the plotting routine is to be used during MN operation), a CGA, EGA or HGC card, and a text editor or word processor (for creating and modifying antenna files). A math coprocessor will speed up MN calculations by 15 to 20 times, but is not a system requirement. A hard disk is not necessary. The basic MN package includes MN.EXE (executable program file), sample antenna files, a demonstration plotting program, and documentation. The complete MN package consists of all the files in the basic package as well as MNPLOT.EXE (executable plotting routine for graphics cards), the complete antenna library (over 50 antennas), the plot library (antenna-file plots), a guide to plot comparisons, and additional documentation.

Antenna patterns can be plotted using the MNPLOT program. Azimuth- and elevation-plane far-field polar patterns can be plotted on the standard ARRL log-decibel grid (so that patterns generated using MNPLOT can be compared to those in ARRL publications), or patterns can be plotted on a linear-decibel grid. MNPLOT also allows plotting patterns in rectangular form. MN is provided on a single 360-kbyte floppy disk via first class mail. Price: Basic MN Package, $25; Complete MN Package, $75. If you purchase the Basic MN Package and order the Complete MN Package within 30 days, you'll receive full credit for the purchase of the Basic MN Package. More information and the MN software packages are available from Brian Beezley, K6STI, 507½ Taylor St, Vista, CA 92804.—*Rus Healy, NJ2L*

ARD HEAVY DUTY ANTENNA ROTATOR

☐ Looking for a *substantial* antenna rotator? Advanced Radio Devices has introduced the R9100—an RS-232-C controllable monster rotator capable of 10,000 inch-pounds of torque and 23,000 inch-pounds of braking capability. The R9100 has a 2000-pound vertical-load capability, weighs 230 pounds, and fits inside a Rohn 45 tower. Software to use the computer-control capability is included with the R9100. It allows you to enter a call-sign prefix on your computer keyboard, and turns the rotator to the correct beam heading automatically. The control unit for the R9100 has both analog and digital displays. The ARD R9100 is sold exclusively by EEB of Vienna, Virgina. Suggested price: $3975. For availability information, contact EEB at 800-368-3270 or 703-938-3350. ARD can be contacted at 103 Carpenter Dr, Sterling, VA 22170, tel 703-478-3100.—*Rus Healy, NJ2L*

Hints and Kinks

Conducted By David Newkirk, AK7M
Assistant Technical Editor

IMPROVING RIT AND SPLIT-FREQUENCY OPERATION IN THE HEATH HW-5400 TRANSCEIVER

☐ I found CW operation in the HW-5400's "split-frequency" mode cumbersome because of a delay between key closure and RF output. A call to Heath® confirmed that this delay is inherent in the HW-5400 because time is required to reset the frequencies of various oscillators—in particular, the microprocessor clock—when changing from receive to transmit. Wanting to reduce the delay, I wondered if the oscillator-reset time could be shortened. (I also wanted to be able to operate at splits wider than those possible with the '5400's ±350-Hz RIT [receiver incremental tuning] range; increasing the RIT range by adding diode D701B per a later revision of the '5400's assembly manual did not increase the range enough for my purposes.)

Finally, I hit upon a solution: Use *two* microprocessor clock oscillators—one for receive and the other for transmit—and *switch between them* instead of tuning the '5400's crystal-controlled clock between transmit and receive frequencies. The oscillator circuit I use (Fig 1) was designed by Lyle Audiss, K6PJE, and has given good results. This LC oscillator operates at the same nominal frequency as the HW-5400's crystal-controlled clock (8.04 MHz) and can be switched in to serve as the clock on receive. Because the LC oscillator can be tuned over a wider range than the crystal oscillator, the LC oscillator allows a much wider RIT swing than that possible with the clock. (The clock

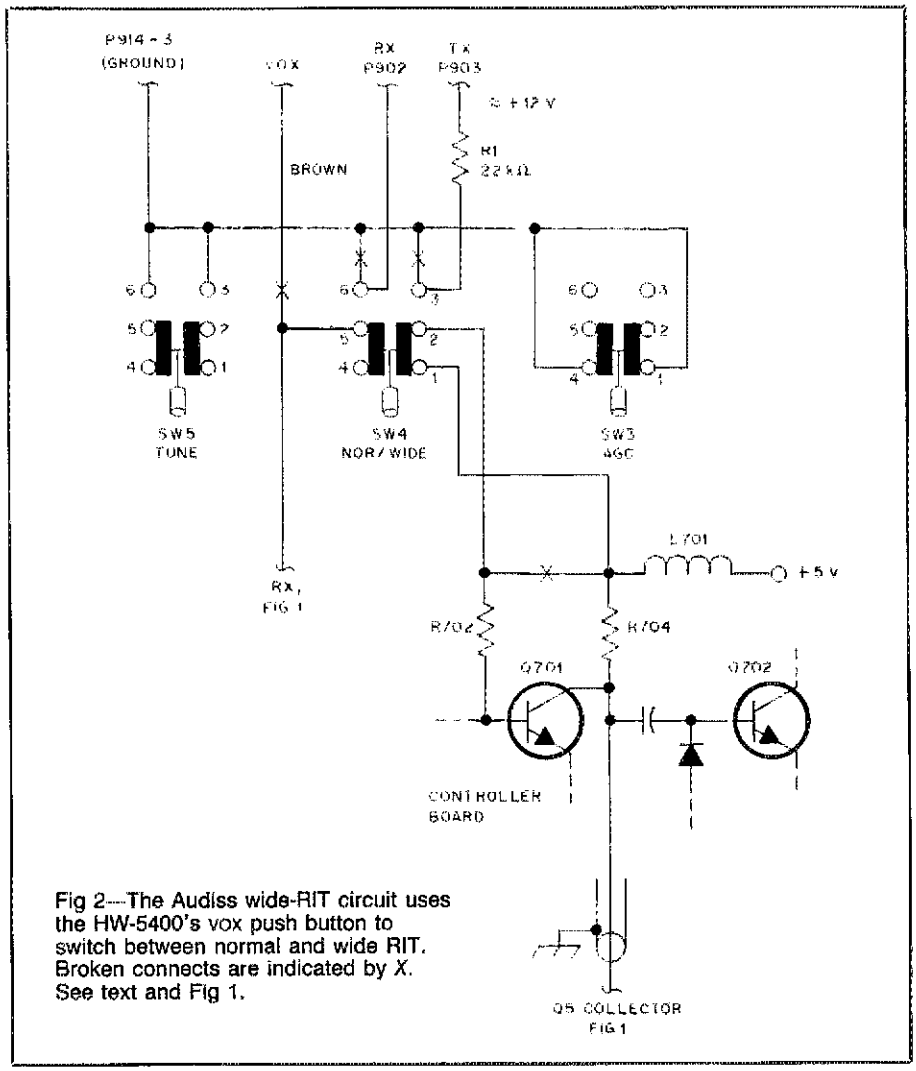


Fig 2—The Audiss wide-RIT circuit uses the HW-5400's vox push button to switch between normal and wide RIT. Broken connects are indicated by X. See text and Fig 1.

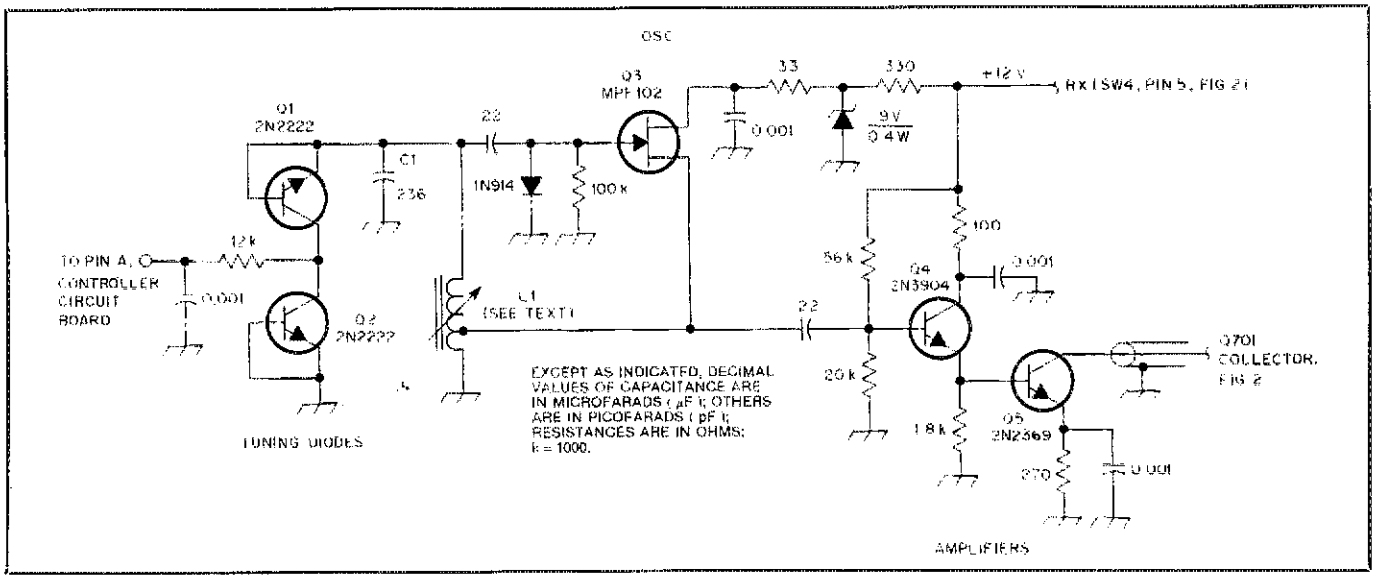


Fig 1—This oscillator allows Gary Audiss to use his Heathkit® HW-5400 transceiver at splits much greater than possible with the rig's RIT circuitry. Decimal-value capacitors are disc ceramic (16 V or greater); the 22- and 236-pF capacitors are NP0 or C0G discs. (Although Gary specifies a 236-pF capacitor at C1, you can use several standard-value capacitors in parallel to approximate that value.) Resistors are ¼-W, carbon-composition or -film units. See text and Fig 2.

[Q701 and its associated 8.04-MHz crystal] is retained as the microprocessor clock on transmit.) I use the HW-5400's VOX/PTT switch, SW4, to switch between normal and wide RIT (see Fig 2); I don't operate VOX, and using SW4 avoids the necessity of adding another switch to the rig's front panel. PTT operation of the HW-5400 is unaffected by this modification.

The wide-RIT oscillator circuit is built on a double-sided PC board about 1 × 1½ inches in size. L1 is wound on a junkbox slug-tuned form approximately 1/4 inch long and 1/8 inch in diameter. The winding consists of 17 turns of no. 28 enameled wire; place the tap at 5 turns from the ground end of the coil.

Disconnect the VOX lead (a brown wire) from terminal 5 of SW4, tape the end of the wire, and fold the wire out of the way. Disconnect terminals 3 and 6 of SW4 from ground (the wire that goes to pin 3 of P913). Install a 22-kΩ, ¼-W resistor in series with the TX line to SW4, pin 3. (This resistor drops the TX voltage [approximately 12] to the 5 V necessary for biasing Q701.)

Mount the wide-RIT oscillator board on a standoff at the corner of the Controller board (directly above the 8.04-MHz crystal). Connect the collector of Q5 (the wide-RIT oscillator's output transistor) to the collector of Q701 (on the '5400's Controller board) by means of a short piece of RG-174 coax. Connect point A of Fig 1 to pin A on the Controller board.

Assuming that you've successfully built and installed the wide-RIT oscillator board, and you've completed the necessary wiring modifications around SW4, the only step left is the adjustment of L1. With the HW-5400 on and receiving, switch SW4 to WIDE RIT and adjust L1 so that the RIT control swings the receiver tuning equally above and below the nominal transmit frequency. That's it! The problem I haven't solved is that of labeling SW4 to match the lettering on the HW-5400's front panel. Any ideas?—*Gary Audiss, N6SI, 6540 Birch Dr, Santa Rosa, CA 95404*

HW-5400 SPEEDY TUNE

☐ After working a major SSB/CW contest with my Heath HW-5400 transceiver, I realized that I need a faster and easier method of changing frequency than that allowed by the stock '5400. The circuit shown in Fig 3 is my solution to this problem. Dubbed the Speedy Tune, it provides rapid up/down frequency slewing and is controllable by a momentary, DPDT, center-off toggle switch. The Speedy Tune is easy to build and does not affect the '5400's manual tuning.

The Speedy Tune circuit is based on a 555 timer, U1. The 555 is connected as an astable multivibrator that free runs at eight times the tuning rate (in steps per second) desired. The multivibrator frequency is adjustable by means of RATE control R1. U2 delivers two pulse trains 180° out of phase which, when divided by binary counters U3 and U4, produce two pulse trains *90°* out of phase (in quadrature)—just as does the optical shaft-rotation encoder associated with the HW-5400's tuning knob. These signals are routed to the $\phi 1$ and $\phi 2$ inputs of the HW-5400's controller board by means of UP/DOWN switch S1.

My version of the Speedy Tune is built on a small piece of perfboard and mounted near the HW-5400's Controller board. (Power for the Speedy Tune is obtained from P703 on the '5400's Controller board: Pin 1 supplies 5 V dc and pin 3 is common.) S1 can be mounted on the '5400's front panel—to the lower right or left of the tuning knob—with room to spare. The Speedy Tune circuit may also be usable with any other optically-encoded tuning system that accepts TTL-level inputs from its shaft encoder.—*Dexter King, AB4DP, 6438 Pettus Rd, Antioch, TN 37013*

THE WHIPPY WHIP

☐ The 2-meter band bustles with repeater activity in the Denver area: Even with 15-kHz channel spacing, almost all the possible repeater frequencies are filled. Having many repeaters to choose from is great, but two aspects of repeater use give constant trouble: Inadequate antennas and battery packs on hand-held rigs. I've found a way to attack both of these problems at once: the Whippy Whip.

A hand-held rig works surprisingly well if used with a decent antenna; the "rubber duck" commonly used with hand-held rigs might better be called a "rubber dummy load"! The Whippy Whip is a move toward a decent antenna. It consists of a BNC connector and a length of 0.025-inch music wire (available at hardware stores; my wire cost 15 cents). Disassemble the BNC connector so that no insulation is left in contact with the center pin. Sandpaper the end of the wire and tin it lightly. Then, solder the end of the wire to the connector's hollow center pin. Assemble the BNC and cut the overall length of the antenna to ¼ wavelength at the center of the 2-meter repeater band (19 to 19½ inches). (Make the wire a half inch or so longer than necessary to allow the wire end to be bent into a small loop with needle-nose pliers. Don't use the Whippy Whip without adding this loop because the end of the wire is dangerously sharp.)

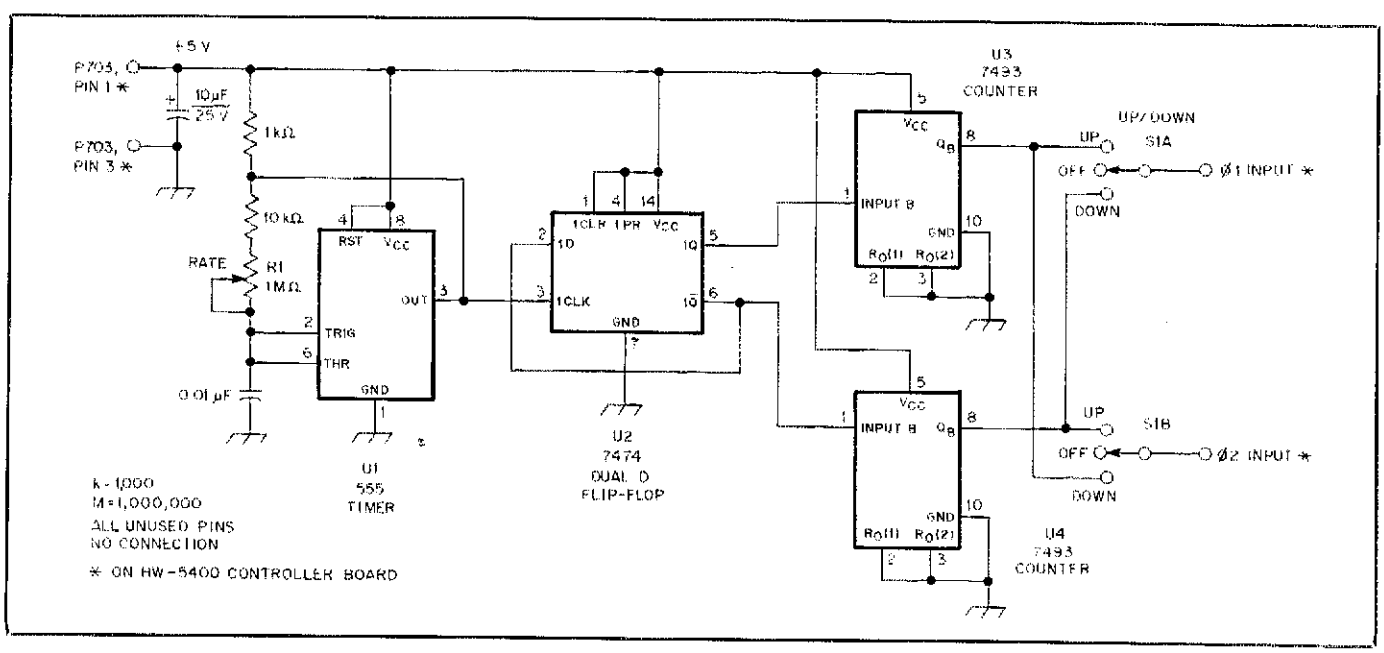


Fig 3—Dexter King's Speedy Tune circuit adds up/down frequency slewing to the Heath HW-5400 transceiver. R1 allows adjustment of the slewing rate.

With the Whippy Whip in place, you can make many contacts impossible with a rubber duck. Because the Whip is a significantly better antenna than the duck, you may often find that you can use your handheld at its low-power setting and get more QSOs per charge out of the rig's battery pack. Not bad for a buck's worth of parts! By the way, I find the Whippy Whip to be every bit as convenient as a rubber duck because it can be looped into a circle or put into a pocket. It literally springs into action when released!—*Nate Bushnell, KDØUE, 7175 S Grant, Littleton, CO 80122*

STRAY CAPACITANCE AFFECTS INDUCTANCE MEASUREMENTS

☐ As I calibrated my version of the L-Meter,[1] measurement errors confused me until I realized what was happening. Although a coil of wire exhibits inductance, there is also *distributed capacitance* between the turns of the coil. Because the L-Meter (an oscillator) depends on tuned-circuit resonance to measure inductance, the inductance *and distributed capacitance* of the inductor under test are factors in its inductance measurements.

When an inductor is measured on a reactance bridge or Doyle Strandlund's gadget,[2] the inductor's capacitive reactance cancels part of its inductive reactance. This results in an inductance reading less than the actual inductance of the inductance under test. Distributed capacitance has the opposite effect in measurements made with the oscillating L-meter: The measured inductance of the component under test appears to be greater than the actual inductance of the part.—*Herbert T. Bates, KAØCAG, 1622 Fairview Ave, Manhattan, KS 66502*

BLENDING CIRCUIT-BOARD FABRICATION TECHNIQUES FOR SUCCESS

☐ In his August 1987 article on homemade circuit boards,[3] Doug DeMaw mentioned the unsuitability of mechanically etched boards for use with ICs or other components with close pin spacings. (Generally, mechanical etching isn't precise enough to make traces suitable for the 0.1-inch pin spacing standard with ICs.) I've been getting around this limitation by making a gridded sub-board for the IC and mounting to the main (mechanically etched) circuit board with the piggyback method described in Doug's article (see Fig 4). Jumper wires connect the IC sub-board pads to the main circuit board; glue holds the IC sub-assembly in place.—*John Evans, K3SQO, Box 84, RD #1, Kingsley, PA 18826*

[1]Alf Reinertsen, "The L-Meter," *QST*, Jan 1981, pp 28-29.
[2]Doyle Strandlund, "Amateur Measurement of R+jX," *QST*, Jun 1965, pp 24-27.
[3]Doug DeMaw, "Homemade Circuit Boards—Don't Fear Them!," *QST*, Aug 1987, pp 14-16.

ETCH-RESIST PENS FOR HOME-MADE CIRCUIT BOARDS

☐ Because I've been fabricating circuit boards at home for some time, Doug DeMaw's circuit-board article[4] was of more-than-usual interest to me. In particular, I've been involved in "longhand" PC-board production (a general term for boards produced with resist applied by hand with a brush or marking pen) for quite some time.[5] Most problems with boards made by the longhand method are caused by uneven ink flow from the pen. Marcus referred to this problem in a *CQ* article.[6] This uneven-flow problem can be corrected by opening the pen and adding a solvent that is compatible with the ink. (Usually, the ink vehicle is an alcohol-based solvent.)

The ink in most felt- or fiber-tip pens is stored in a fiber cylinder enclosed in a thin plastic sheath. Add 10 to 15 drops of alcohol or a similar solvent (rubbing alcohol [70% isopropyl], lacquer solvent [denatured ethyl alcohol] and butyl acetate [thinner for model paints] are satisfactory) to the cylinder end that contacts the pen tip. (Stop adding alcohol if it appears that the next drop will cause leakage from the bottom of the cylinder.) Replace the ink cylinder in the pen and allow a few minutes for the rejuvenated ink to migrate into the pen tip. Now, the pen should produce opaque black lines without smearing. If the lines appear to be almost *too* fluid, that's ideal. (By the way, overapplication of alcohol to the ink cylinder can cause leakage through the pen's tip vent hole. Watch out for this so you don't generate profanity when a vent drop hits the board and spoils your work!) Using this method, I've successfully rejuvenated *10-year-old* pens!

[4]See note 3.
[5]Robert J. Grabowski, "longhand printed-circuit layout," comments, *ham radio*, Jun 1979, p 6.
[6]Alan Marcus, "A Printed Circuit Board Primer," *CQ*, Oct 1982, pp 44 and 47.

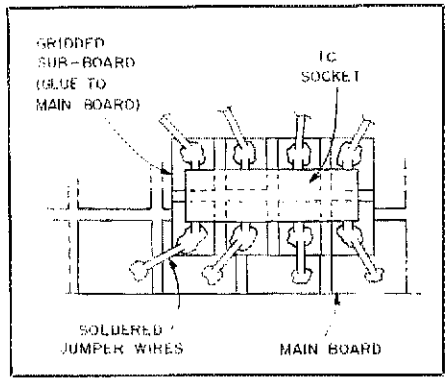


Fig 4—John Evans gets around the incompatibility of mechanically etched boards and ICs by mounting his ICs on gridded, single-sided sub-boards. (Here, the main board is also gridded for clarity.) The sub-boards are mounted to the main board using the piggyback technique described by Doug DeMaw. See text.

The best resist pens I've found for circuit-board work are produced in Germany and sold in art stores under the name Staedtler Lumocolor. Medium (no. 317) and fine (no. 318) points are available. (I recommend the no. 318 pen for most circuit-board work.) These pens contain a high-quality waterproof ink and can be opened by removing the top cap (pliers may be necessary in some cases). Most of these pens can be used for circuit-board fabrication *without* the solvent-addition treatment just described.

For builders who do not have easy access to an art supply store, I recommend the 0.4-mm, extra-fine-point version of Sanford's® Sharpie® marker. This model has a removable top that allows easy access to the ink cylinder. Many supermarkets stock this pen with stationery supplies or laundry products.

Two types of *medium*-point Sharpie pens are available. That labeled PERMANENT MARKER is definitely better for circuit-board work than the no. 3000 "highly water-resistant" model; the permanent marker has the further advantage of easy "openability." (The tip end of the permanent pen is pressed into the barrel assembly portion and held snug with several small rings. If the two parts are simultaneously bent slightly and pulled, the two pieces separate, allowing easy removal of the fiber ink cylinder. Once you've disassembled one of these pens, shave the rings with a file or knife to make subsequent assembly/disassembly cycles easier.) The second-choice (no. 3000) pen is cemented shut; if you must use one of these, I suggest sawing off the top end of the pen to add solvent to the ink cylinder. Reassemble the pen with tape if you do this.

My *ham radio* letter suggests use of a commercial metal-marking lacquer (DYKEM®) as etch resist for the portion of the circuit-board copper intended to remain as a ground plane. If you have trouble locating this product, I recommend thin lacquer, model paint or fingernail polish as a substitute. Be sure the resist you use flows easily so that it can be worked quickly. Also, the resist should be easily removable after etching. (I suggest using acetone as resist-removal solvent.)

Be sure to take proper safety precautions when working with any of the chemicals I've discussed here: Don't breathe their fumes and keep them out of contact with your skin. Further on the subject of chemicals, I add this: As a retired chemist, I cheerfully object to the characterization of home etched-PC-board fabrication as requiring "messy chemicals." *Chemicals* aren't messy, but *the people who use them* may be!—*Robert J. Grabowski, W5TKP, Rte 1, Box 388, Ozark, AR 72949*

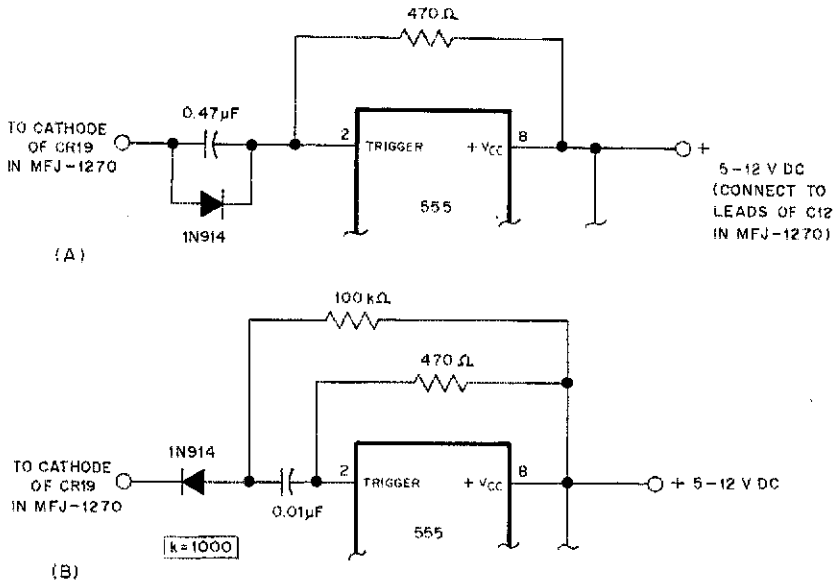


Fig 5—Frederick Losch's TNC connect alarm didn't always sound the alarm when his TNC connected, so he modified part of the original circuit (A) as shown at B. Frederick further reports that the 555's ability to drive more than one piezoelectric buzzer can be put to good use when multiple alarm buzzers are desired (one at the TNC and another at a remote location, for instance). He cautions, however, that electromagnetic transients picked up by long buzzer wires can cause false triggering of the alarm.

IMPROVING THE TNC CONNECT ALARM

☐ February 1988 *QST* carried a very timely TNC-connect-alarm circuit.[7] My version of the connect alarm did not trigger reliably, so I modified the circuit as shown in Fig 5. Now, it works every time. *—Frederick D. Losch, KA9CCZ, RR#4, Box 207, Winchester, IN 47394*

"NO HOLES" STANDBY SWITCH MODIFICATION FOR THE HEATH SB-220/221 AMPLIFIER

☐ Most of the standby-switch modifications I've seen for the SB-220/221 amplifier require drilling holes in or modifying the amplifier itself. I prefer to keep my ham equipment in its original condition, though, because this helps in reselling the equipment later.

My solution to this problem requires that no holes be drilled—in the amplifier, that is! *My* standby switch is mounted external to the amplifier in a Radio Shack® aluminum box (no. 270-235). The switch opens the SB-220's antenna-relay line to place the amplifier in standby. The pictorial/schematic at Fig 6 shows how I installed such a switch with my Kenwood TS-530S transceiver and SB-220 amplifier. Bought at my local Radio Shack store, the components necessary to add the switch cost under $7.—*Christopher B. Hays, NTØW, 3675 Estates Dr, Florissant, MO 63033*

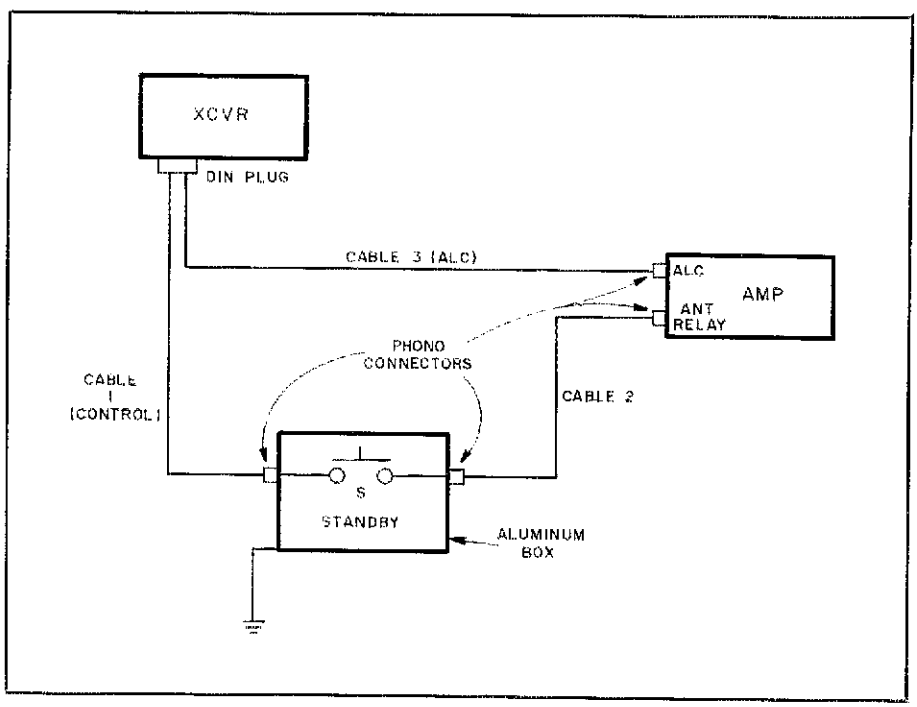


Fig 6—Christopher Hays added this standby switch to his SB-220 amplifier by breaking the '220's antenna-relay control line outside of the amplifier box. Cables 1, 2 and 3 consist of shielded wire (Radio Shack patch cords are suitable; RG-174 coax and phono connectors would provide better shielding). Standby switch S is a SPST push-button type (Radio Shack no. 275-1565), but a toggle is suitable. Hints and Kinks recommends that you keep your transceiver and amplifier turned off when unplugging or plugging in the connecting cables in your standby-switch installation. Otherwise, the open-circuit voltage on the SB-220's relay control line (about 125 V dc) can appear on the exposed center pins of the phono plugs on the transceiver ends of cables 1 and 2.

CORRECTION TO THE IC-735 POWER CONTROL HINT

☐ Missouri Section Traffic Manager John Turner, NDØN, points out two errors in "Smoother Power Control with the ICOM IC-735 Transceiver" (*QST*, June 1988, pages 48 and 49). In step 2 of the modification, "pin 6 of jack 3" should read "pin 4 of jack 3." In step 3, "pin 1 of jack 6" should read " pin 6 of jack 6." John also reports that the colors of the POC and SQLL wires can aid in their identification: The POC wire (pin 4 of jack 3) is brown and the SQLL wire (pin 6 of jack 6) is white.—*AK7M*

[7]George Kammerer and Pat MacLeod, "A TNC Connect Alarm," Hints and Kinks, *QST*, Feb 1988, p 39.

Technical Correspondence

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

MATCHING RECEIVERS TO TRANSMISSION LINES

☐ Properly matching receivers to transmission lines is much more complicated than matching transmitters to the line. The latter is relatively simple—just obtain the largest power transfer. With receivers, the goal is a low system noise figure. The relative cost of measurement techniques is a good indicator of the difficulty involved. Lab-quality devices for measuring power transfer cost hundreds of dollars, and noise-figure measurement equipment costs run into the thousands.

Fortunately, good receivers are optimized for 50-ohm source impedances. (If they weren't, they wouldn't look good in *QST* product reviews!) Notice I said *source impedance*, and not *input impedance*. Just because a receiver is designed to work well with 50-ohm sources doesn't mean it has a 50-ohm input impedance. In fact, the receiver input impedance may be far from 50 ohms, particularly if the noise figure is pretty good and obtained with an FET amplifier. As a result, feeding a receiver with an antenna matched to 50-ohm coaxial cable usually works pretty well, at least on HF.

The mismatch is also important if you have a big station with stacked beams. The mismatch could upset carefully designed combining and phasing schemes. There are two common solutions to the input-mismatch problem. One is to minimize the feed-line loss by mounting the preamplifier at the antenna. The second approach is to use a better preamplifier design with a good input return loss or SWR. An example of the second approach is the 432-MHz preamp designed by Chip Angle, N6CA, and described in the recent editions of the *ARRL Handbook*. These designs generally use some form of low-loss feedback.

The difference between noise-figure matching and power-transfer matching explains why using a receiver to tune a Transmatch doesn't always work. When you tune the Transmatch for maximum signal, you are often tuning for a maximum power transfer into a load, which often isn't 50 ohms. The receiver noise figure is probably degraded, but that usually is difficult to tell on the MF/HF bands because of atmospheric noise. In fact, amateur receivers often have 20 or 30 dB more sensitivity than is required on the lower-frequency bands.

The RF selectivity of the input filters of the receiver is another consideration. Hopefully, the filters were designed to operate with a 50-ohm input termination. Like amplifiers, the filters don't necessarily present a 50-ohm input impedance, even when adjusted for lowest loss and terminated in a 50-ohm load! Even so, receiver input filters need to see the design input impedance to operate properly. (Input filters are often omitted from low-noise VHF preamplifiers in order to obtain the lowest possible noise figure.)

Receivers operating in the MF/HF spectrum often do just fine when the antenna system is properly adjusted for transmitting purposes, assuming that the antenna contains a single driven element. Antenna systems using phased arrays may provide better receiver performance with a front end designed for low input SWR or high input return loss. Because of inevitable construction errors and connector impedance mismatches, it may not be worthwhile to obtain return losses greater than 30 dB (SWR below 1.07 to 1). —*Zachary Lau, KH6CP, ARRL Lab Engineer*

DIRECT-CONVERSION RECEIVER NOTES

☐ Gary Breed has achieved close to the optimum expected performance from a direct-conversion (D-C) receiver.[1] His article brought back memories of my D-C SSB projects of several years ago.[2,3] Gary obviously went through laborious considerations of op-amp performance, because the op amps (NE5534s) largely determine the receiver noise figure. Three years ago, Bruce Trump of Burr-Brown wrote a paper which, among other things, quantified op amp noise figures v source impedances for various op amps.[4]

The NE5534 is an outstanding op amp for the price. It's used in expensive professional audio-recording equipment because of its low noise and excellent linearity. Many people don't know that it is available in a quad version, the NE5514, which is preferable to the TL084s that Gary uses in the all-pass networks. Also, there is a low-noise version of the NE5534, the NE5534A, available from Signetics. Gary's receiver can be improved by replacing the NE5534s with NE5534As, the TL081 with an NE5534, and the TL084s with NE5514s. The '5534 and '5514s have lower noise levels, better linearity and higher saturation levels than the TL op amps. All of these qualities contribute to a higher dynamic range.

After reading Gary's article, I began rethinking D-C SSB receivers. These receivers offer freedom from spurious responses, simplified design and can be configured easily to detect USB and LSB simultaneously. There is no reason why D-C receivers cannot be built with performance levels approaching—or even exceeding—that of superhets. A major problem of D-C SSB receivers has been insufficient rejection of the unwanted sideband. Here's a technique for improving the unwanted sideband rejection of D-C receivers. I call it the "Doubly-Nulled D-C SSB Receiver."

A block diagram/schematic is shown in Fig 1. By adding another quad op amp to Gary's existing circuit, unwanted sideband rejection of over 50 dB is possible. LSB and USB are detected simultaneously using the traditional phasing method. For additional sideband rejection, the undesired sideband signal is attenuated (about 30 dB), phase inverted and used as a second cancellation signal in a second summing amplifier. (As shown in Fig 1, the second summing amplifiers are actually difference amplifiers.)

After I discussed this technique with Gary, he tried it and got an additional 6 dB of unwanted sideband rejection. This limited improvement is caused by the band-pass ripple of the all-pass sections in the receiver. The ripple is attributable largely to gain variations, which in turn result primarily from the feedback resistors in the all-pass filter sections. Much better filter gain linearity is possible if 0.1% integrated resistors are used instead of the 1% 10-kilohm resistors specified. The fact that all eight feedback resistors have a value of 10 kilohms indicates that a single 0.1% integrated multiresistor IC could reduce the filter parts count. Alternatively, trimmer potentiometers could be installed to replace some—or all—of the feedback resistors. Furthermore, the additional nulling stages shown in Fig 1 could be added for outstanding unwanted sideband rejection.

The narrower bandwidths needed for CW allow optimization of sideband rejection across the CW passband only. Consequently, for CW receivers, greater unwanted sideband rejection can be expected.

Simultaneous LSB and USB detection allows for an interesting twist to receiver

[1] G. Breed, "A New Breed of Receiver," *QST*, Feb 1988, pp 16-23. See also Feedback, *QST*, Apr 1988, p 47.
[2] Signetics Applications Note AN1981.
[3] R. Zavrel, "ICs Simplify Design of Single-Sideband Receivers," *EDN*, Apr 3, 1986.
[4] B. Trump, "Maintaining Accuracy in Signal Processing," Proceedings of WESCON, 1985.

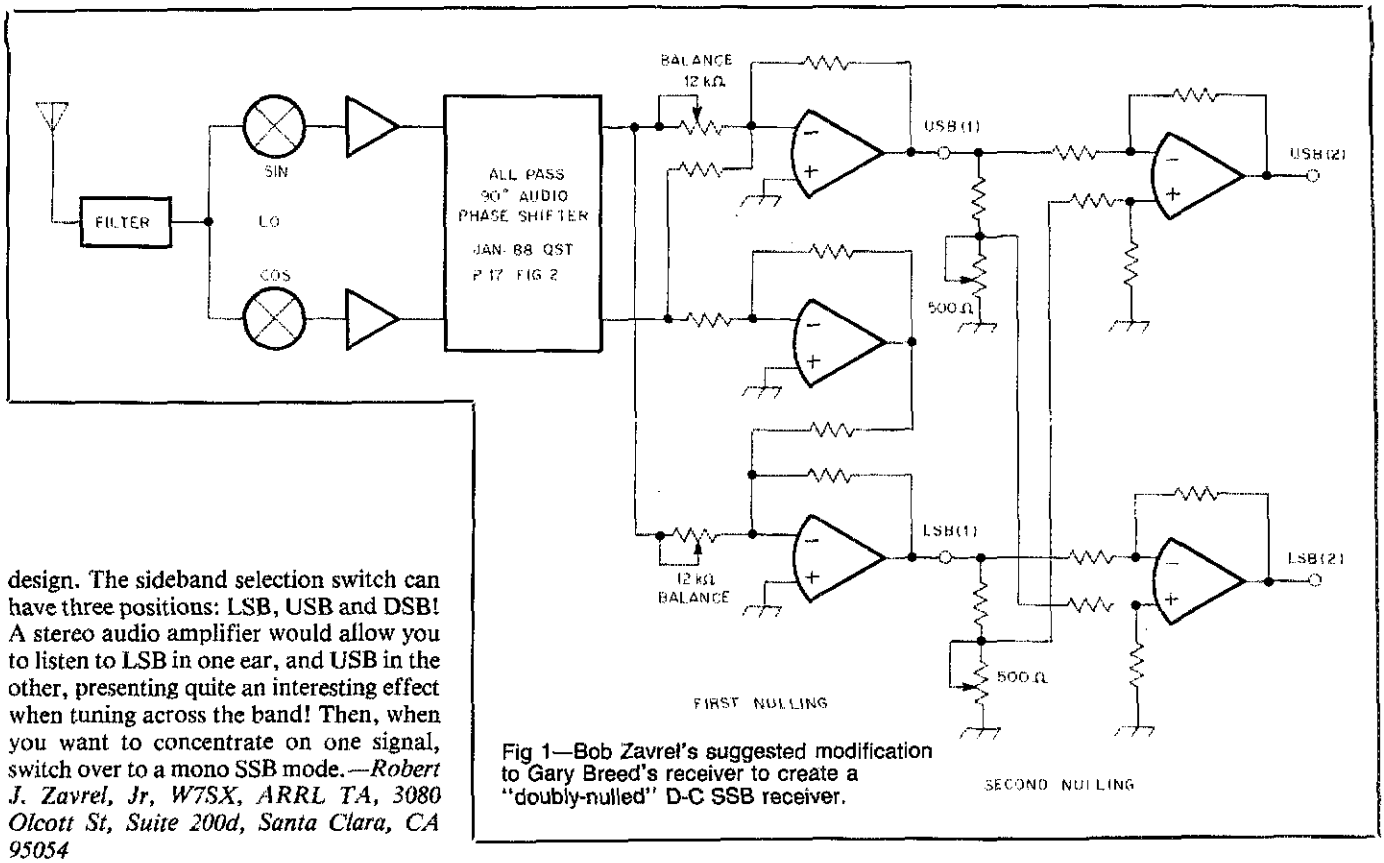


Fig 1—Bob Zavrel's suggested modification to Gary Breed's receiver to create a "doubly-nulled" D-C SSB receiver.

design. The sideband selection switch can have three positions: LSB, USB and DSB! A stereo audio amplifier would allow you to listen to LSB in one ear, and USB in the other, presenting quite an interesting effect when tuning across the band! Then, when you want to concentrate on one signal, switch over to a mono SSB mode.—*Robert J. Zavrel, Jr, W7SX, ARRL TA, 3080 Olcott St, Suite 200d, Santa Clara, CA 95054*

A POSSIBLE 2N3553 SUBSTITUTE

☐ The 2N3553 transistor is quite popular as an RF amplifier for HF QRP rigs. I first recall it being recommended by Doug DeMaw (W1FB) and Wes Hayward (W7ZOI) in *Solid State Design for the Radio Amateur.*[5] I have since seen it specified in several circuits in *QST* and elsewhere. This transistor is relatively inexpensive (under $3 in single-unit quantities), but it is available to most builders only by mail order.[6]

I've built several 1½-W QRP transmitters based on the Universal QRP Transmitter design using the 2N3053, which is available at Radio Shack (RS 276-2030) for less than a dollar. I've not used the transistor on any band above 30 meters, but it performs flawlessly there. The 2N3053 appears to be a good, cheap, readily available alternative to the 2N3553 in HF QRP rigs.—*Gary E. Myers, K9CZB, 28W135 Hillview Dr, Naperville, IL 60565*

[The specifications for the 2N3553 and 2N3053 are compared in Table 1.—Ed]

Table 1

Comparison of the 2N3553 and 2N3053 Specifications

	2N3553	*2N3053*	*Units*
V_{CEO}	40	40	V dc
V_{CB}	65	60	V dc
V_{EB}	4.0	5.0	V dc
I_C	1.0	0.7	A dc
P_O	7	5	W
F_T	500	100	MHz

[5]W. Hayward and D. DeMaw, eds, *Solid State Design for the Radio Amateur*, 2nd edition (Newington: ARRL, 1986).

[6]RF Parts, 1320 Grand Ave, San Marcos, CA 92069, tel 800-854-1927. (Shipping and handling, $5; see their ads in *QST*.)

DTMF DECODER NOISE SENSITIVITY

☐ If you're having strange and unexplainable difficulties with the proper operation of certain DTMF (dual-tone, multifrequency) decoders, what follows may be of interest to you.

Many of the popular DTMF decoders use digital high/low frequency filters. These decoders include the Teltone® M947, M957, et al, and the SSI 202, 203 and 204 units. The specification sheets for these devices indicate that the *wideband noise* on the 5-V power supply line should not exceed 10 mV P-P. They're not kidding! If you don't have the power-rail noise below the 10-mV level, the decoder will often fail to decode an input signal for no readily explainable reason.

Achieving a wideband (from audio to over 100 kHz) noise level of less than 10 mV requires more than casual attention. Proper operation can normally be achieved by using a 10-mH RF choke in series with the 5-V power source (see Fig 2), and by placing a 4-μF (or greater value) tantalum capacitor directly across the V_{DD} and V_{AG} pins. It also helps to locate the DTMF receiver away from computer address and data buses on a PC board.

For those of you not interested in fussing with a part that has this kind of wideband noise sensitivity, the Mitel MT8870 offers about 30 dB more noise tolerance for just a few dollars more. However, the Mitel device is still sensitive to power-supply noise in the audio range, so good bypassing of the power supply bus is essential.—*Joe Mehaffey, K4IHP, 6950 Hunter's Knoll, Atlanta, GA 30328*

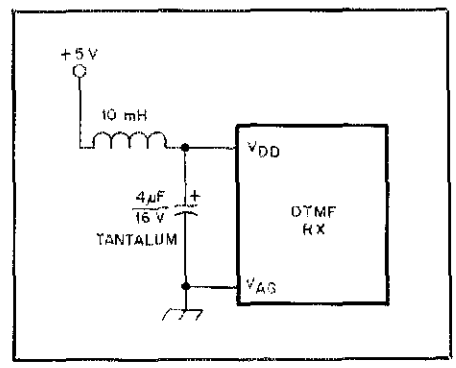


Fig 2—Noise on the dc supply line can cause mysterious malfunctions of some popular DTMF decoder ICs. The added RF choke and bypass capacitor help keep power-rail noise to an acceptable level.

COMMODORE USER'S GROUP ADDRESS

☐ In "Pictures By Packet,"[7] I noted that the address of the Commodore User's Group of Kansas City (CUGKC) was listed as unknown. I'm the Disk Librarian for the CUGKC. Interested readers can contact the CUGKC at PO Box 36492, Kansas City, MO 64111. The Koala Pictures disk referenced in the article may be obtained by mail for $10, including shipping and handling; specify disk "K.P." A disk containing the club library catalog is also available for $5.—*Neil Preston, WBØDQW, 1019 Noel Ct, Lee's Summit, MO 64081*

[7]C. Pratt and V. Yarbrough, "Pictures By Packet," *QST*, May 1988, pp 15-17.

DX-60 SWITCH UPDATE

☐ In the September 1987 issue of *QST*, Gus White provided some information on replacing the Heath® DX-60 transmitter FUNCTION switch.[8] I was unable to purchase the recommended Centralab® switch (PA 077-0018) locally. Gus suggested I contact Centralab.

Kim Motl, Customer Service Representative of MEPCO/Centralab, Inc, indicated that she's had many requests for the switch and provided me with the following cost breakdown: For 1 to 9 pieces, $62.67 each; 10 to 25 pieces, $34.86 each; 25 or more pieces, $18.13 each. Also, they've a minimum charge order of $250.—*Howard Hartzell, Jr, WA3YKD, RD 2, Mifflinburg, PA 17844*

[Here's an opportunity for a parts distributor to provide a service to DX-60 owners.—Ed.]

[8]G. White, "DX-60B Switch Replacement," Technical Correspondence, *QST*, Sep 1987, p 43.

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include a daytime telephone number at which you may be reached if necessary.

New Products

HEATH DUAL-BAND HAND-HELD TRANSCEIVER

☐ Heath® has introduced the HWS-24-HT dual-band 144- and 440-MHz hand-held transceiver. The '24-HT features two VFOs, 20 memory channels, frequency entry via front-panel keypad or rotary switches, a vacant-channel-search feature, automatic power turn-off circuitry and tone-operated squelch. Semi-duplex capability is provided on either band between the two VFO frequencies, or between one VFO and a memory channel. Full-duplex capability is available during cross-band operation.

Other features of the HWS-24-HT include optional 100-kHz tuning steps, VFO and memory-channel scanning modes, switch-selectable tone-squelch frequencies, frequency lock, PTT inhibit and a DTMF pad for repeater and autopatch use. Included with the HWS-24-HT are a NiCd battery pack, wall charger and an extra battery shell. Price class: $450. For more information, contact Heath Company, PO Box 8589, Benton Harbor, MI 49022, tel 800-253-0570.—*Rus Healy, NJ2L*

VEHICULAR CALL-SIGN DISPLAYS

☐ Sign On, of Merrick, New York, makes vehicular call-sign displays in two varieties: A magnetic sign for metal vehicle panels, and a suction-cup mounted version for inside-window mounting. The flexible, vinyl 2 × 8-inch in-window signs are available in white lettering on black, blue and red backgrounds. Magnetic signs, also 2 × 8 inches, are available in black, blue or red lettering on a white background. Price: $8.50 per sign, postage paid; volume discounts are available. For more information, contact Sign On, Dept PT, 1923 Edward Ln, Merrick, NY 11566.—*Rus Healy, NJ2L*

Feedback

☐ Please refer to "A Simple Tuning Indicator," *QST*, Jul 1988, pp 28-31. On p 29, Fig 1, +12 V should be shown connected to the common point of pin 8 of U2, the wiper of R12, the cathode of D5 and the emitter of Q9. In Fig 2, p 30 (in the upper-right corner of the PC-board pattern), the trace connecting the commoned wipers and one end each of R8 and R12 to pin 11 of U1 is not needed (see Fig 1). (That pin of the IC is not internally connected, however, and the presence of the trace in the prototype units presents no problems.) On p 31, Table 1, the third entry in the fourth column should be 850, not 250. Also, the fifth entry in the third column should be 1360, not 1350. In Fig 3, p 30, U5 and U6 should be labeled DS1 and DS2, respectively. (*Tnx Norman Monro, K4FRY*)

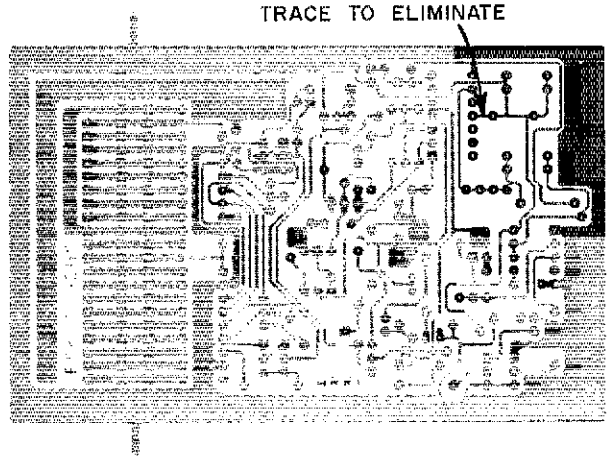


Fig 1—Correction to the PC-board layout Fig 2, p 30, of "A Simple Tuning Indicator." The trace indicated may be physically removed from an existing PC board, or the trace on the original PC-board pattern can be eradicated before copying.

Strays

***QST* congratulates...**

☐ the following radio amateur on 60 years as an ARRL member:

• Glen F. Peterson, WØELY, of Minneapolis, Minnesota

☐ the following radio amateurs on 50 years as ARRL members:

• Wilfred T. Siddle, W4ELB, of Birmingham, Alabama

• Harry R. Hyder, W7IV, of Tempe, Arizona

• Theodore P. Cocores, W6CSP, of South Lake Tahoe, California

• Otto M. Arnquist, W5NT, of Dallas, Texas

• Camille S. Marie, W3EPR, of Pikesville, Maryland

• Earl W. Smith, W1BML, of Groton, Connecticut

A W1AW Vignette:

The W1AW Dedication—50 Years Ago This Month

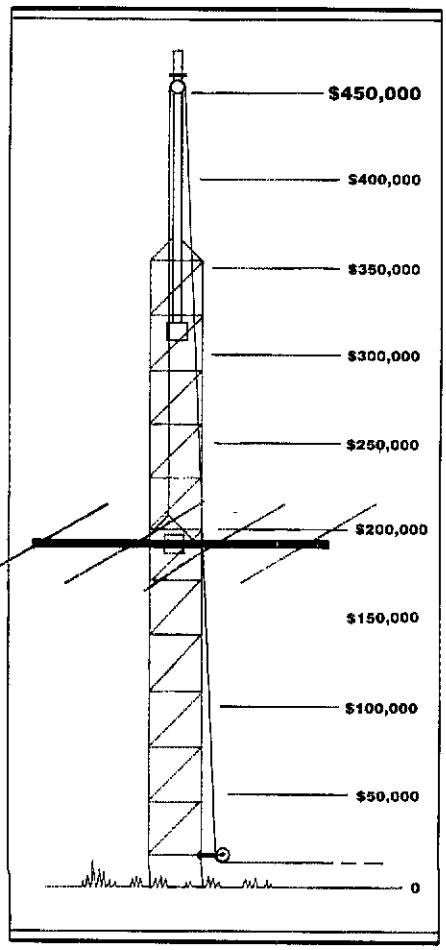
How did W1AW begin and where is it going? Read on for a fascinating bit of history that still lives.

By Charles R. Bender, W1WPR
Chief Operator, W1AW

The brick and stone colonial-style memorial building had been finished, the state-of-the-art equipment had been designed and built by the ARRL Technical Department, and the antenna farm was complete. There were transmitters and amplifiers for each band from 160 through 10 meters, with a common modulator, and there was an automatic tape machine for sending perfect CW. The station had actually been on the air for almost two months, most of the bugs had been identified and cleared, and it was all ready to go on regular code practice and bulletin schedules.

On what would have been his 69th birthday, September 2, 1938, the new W1AW was formally dedicated to the memory of Hiram Percy Maxim, HPM, the original

(continued on page 57)



How to Contribute to the W1AW Renovation Drive

"The W1AW Dedication" is part of the rich and colorful history of the Maxim Memorial Station, a station that has served the Amateur Radio public nonstop through daily code practice transmissions, amateur news bulletin service and general on-the-air operating for the past 50 years. Today, the W1AW installation needs to be completely refurbished, inside and out, so that these services can continue to be provided into the year 2000 and beyond. As indicated in April *QST* and succeeding issues, we need your support to make it happen for a new dedication scheduled for 1989. Here's how to contribute to the W1AW Fund Drive:

- **By Mail:** Address all contributions to W1AW Fund Drive, 225 Main St, Newington CT 06111. Please make your check or money order payable to W1AW Renovation Fund.
- **By Phone:** For your convenience, credit-card contributions can be made by calling Jennifer at ARRL HQ, tel 203-666-1541, between 8 AM and 4 PM Eastern Time, weekdays.

All contributions are tax deductible to the extent allowed by law, as ARRL is a 501(c)(3) tax-exempt organization. Please be as generous as you can to help W1AW maintain its leadership on the frontlines of Amateur Radio technology. Thank you.

Recognition

Contributors to the W1AW Fund Drive will be recognized as follows:

- *W1AW Kilowatt Club:* Those contributing $1000 or more.
- *Hiram Percy Maxim Club:* Contributions of $500-$999
- *W1AW Century Club:* Contributions of $100-$499
- *W1AW Booster Club:* Contributions of up to $100

All contributors will receive a handsome certificate, suitable for framing. Members of the *Hiram Percy Maxim* and *Kilowatt Clubs* will, in addition, have their name and call sign inscribed on a special plaque that will be on permanent display in the renovated W1AW Building. Members of the *Kilowatt Club* will receive a specially inscribed personalized plaque, which you'll be proud to display in your ham shack. In addition, special recognition will be given to those who donate substantially more than $1000.

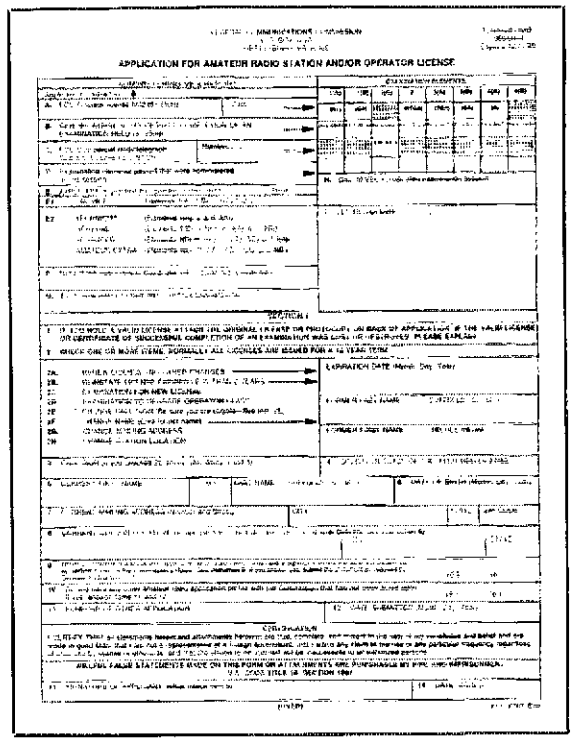
All Aboard the "610 to Gettysburg"...

...Your upgrade application's journey to the FCC.[1]

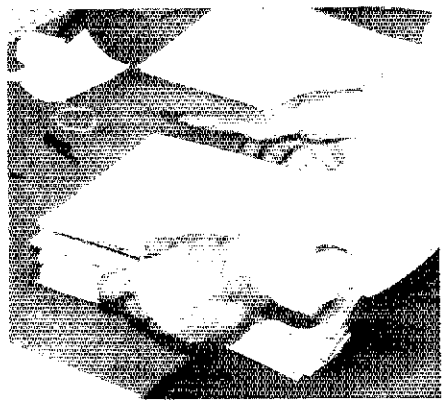
By Steve Place, WB1EYI
Manager, Volunteer Resources

You put a lot of effort into your studies to upgrade. And last night, under the watchful eyes of a local team of Volunteer Examiners, you sat for the exam. The hours you spent hitting the books proved to be a wise investment. You passed! Now you're faced with what will seem the hardest step of all, that familiar "rite of passage" for everyone who upgrades: THE WAIT.

What happens to an FCC Form 610 as it wends its way from printing press to VE Team to candidate to VEC, and finally reaches the end of the line in Gettysburg, Pennsylvania? To all who have upgraded under the VEC program...to all who now await their upgraded tickets...and to all who will upgrade in the months to come, welcome to "The Saga of the Sent 610."


APPLICATION FOR AMATEUR RADIO STATION AND/OR OPERATOR LICENSE

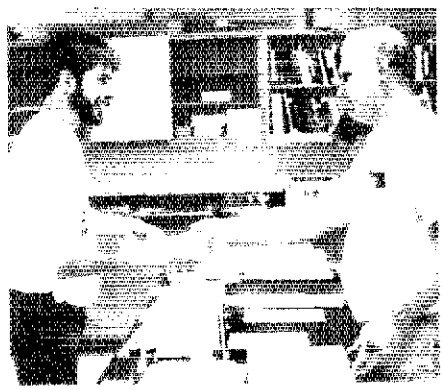
4 Each candidate must take great care in filling out his 610, making sure he or she doesn't accidentally request a new call sign, mistakenly enter the current date in the "Date of Birth" block or carelessly omit the signature.



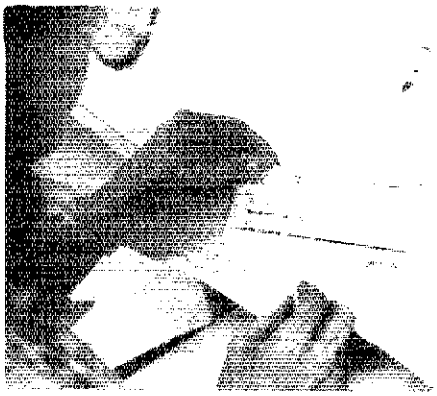
2 610s are routinely packaged with ARRL/VEC exam materials and shipped to VE Teams...

5 At the completion of an exam session, all three members of the administering VE Team must sign the appropriate boxes on the back of successful candidates' 610s. The Team Liaison must then send them, with the other session materials, back to the ARRL/VEC within 10 days of the exam.[2]

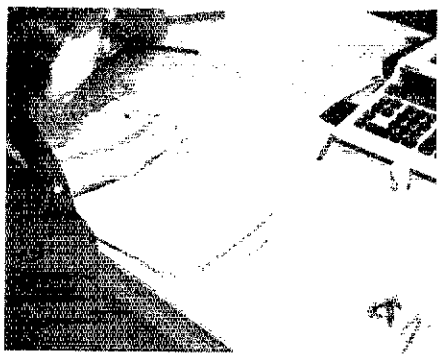
1 Your 610 begins its journey. The FCC isn't the only source—the ARRL prints tens of thousands of 610s to FCC "spec" each year.



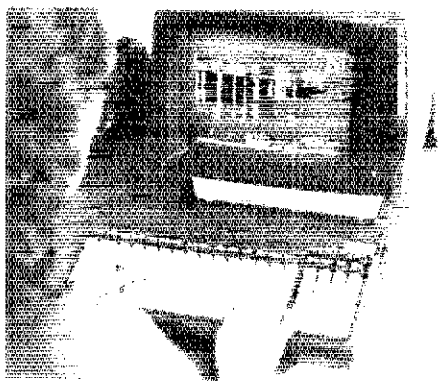
3 ...who distribute them to upgrade candidates before each test session.



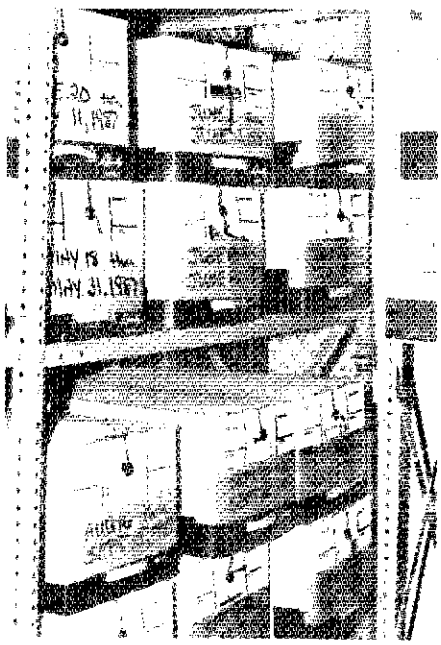
6 All post-session exam packages sent to the ARRL/VEC are first opened in the Controller's Office where exam fees are immediately reconciled and logged, and the contents dated.



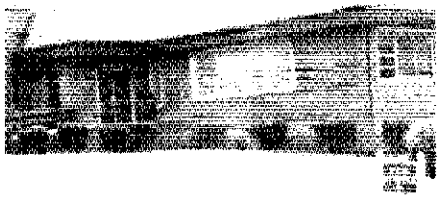
7 Then, back in the ARRL/VEC office, experienced VEC Assistants carefully screen all 610s for completeness and accuracy, checking them against the VE Team's report to catch discrepancies *before* the 610s are permitted to leave the office. Most of the completed Form 610s are sent to the FCC, though some are returned to VEs for correction and some are held for further action. Typically, a Form 610 is held because an eager candidate upgrades before the FCC has a chance to issue an earlier license. In such cases, the VEC must hold the 610 until the candidate forwards a copy of that license when he finally gets it; VEC staff then attach the copy to the withheld 610 and forward them to the FCC for final processing.



8 At the ARRL/VEC, a staff member then enters session results data into VE Team computer records.



9 All VECs are required to retain test materials for 15 months.

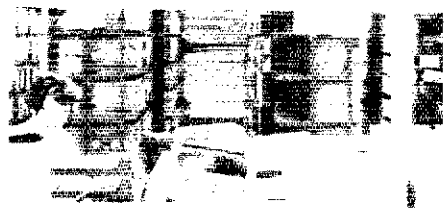


10 The end of the line for your 610 is the FCC Licensing Division in Gettysburg, Pennsylvania.[3]

11 Your Form 610 arrives at the FCC as part of the carefully checked session package shipped off by the ARRL/VEC. It is immediately date-stamped and forwarded to the Amateur Processors. Here, *every* Form 610 that is submitted to the FCC is checked for validity by a professional staff equivalent to only 2½ people!

12 Once your Form 610 passes muster, it's forwarded to the Support Services Branch where your record is updated on the FCC computer. Then, usually one day per week, licenses are printed and mailed to those radio amateurs whose transactions have been entered since the previous processing date. The time between your exam and the day you receive your license in the mail typically runs six to eight weeks.

13 Problems or questions concerning a license? The Consumer Assistance Branch is the public's contact point with the FCC Licensing Division. People seated at terminals along the wall are not FCC staff but visitors who are researching questions.



14 Your Form 610 has done its job. Its final resting place is FCC storage. It's kept on file in case the need arises to review the original document on which the decision to issue your license was based.

The journey has been long from printing press to "610 Boot Hill." But the end result—your FCC ticket to a lifetime of radio enjoyment and adventure—has made the trip one worth taking.

Notes

[1]Though the requirements are the same for all VECs, this article deals with the procedures of the ARRL/VEC.

[2]Thanks also to the Pioneer Valley Radio Association VE Team (W1VMY, N1EAH and AD1A) for their assistance.

[3]Photographs of FCC Gettysburg were taken by Lori A. Weikert. Thanks also to Larry Weikert, *Communications Specialist within the FCC* Special Services Branch, for his gracious cooperation. Other photos by Steve Place, WB1EYI.

• *At the Foundation*

Happy 15th Anniversary, ARRL Foundation!

We take a look back at the founding and progress of ARRL's philanthropic offspring. As a contributor, you have a right to be proud . . . so, put on your party hat and join with us in a salute to *your* Foundation's accomplishments!

By Mary Schetgen, N7IAL
Assistant Secretary
The ARRL Foundation

In 1969, the year that man first walked on the moon, Robert York Chapman, W1QV, then New England Division Director, had an idea for an ARRL first: An educational, scientific and philanthropic entity, separate from ARRL, that would be empowered to raise funds and administer programs "for the advancement of Amateur Radio." The idea grew into an Action Plan with the following motion at the January 18, 1973 meeting of the ARRL Board of Directors: "that the Management and Finance Committee is directed to proceed with further preparations leading to the establishment of an ARRL Foundation..."

Sharing the same vision and enthusiasm as Director Chapman in this creative endeavor were fellow Management and Finance Committee members Larry E. Price, W4DQD, then Southeastern Division Director, and Larry J. Shima, WØPAN, then Dakota Division Director. Soon, a framework was drafted for the proposed new entity. The Foundation's structure and purpose were developed to be *distinct* from, but entirely supportive of, the programs of ARRL and its members. At the July 19, 1973 Board of Directors meeting, the Board approved the creation of *THE ARRL FOUNDATION, INC* with these words: "NOW THEREFORE BE IT RESOLVED, that the Management and Finance Committee of ARRL is empowered to do all acts necessary to establish an organization to be known as The ARRL Foundation, Inc..." On September 21, 1973, a corporate charter and By-Laws were formally signed and certified with the State of Connecticut, bringing into legal existence The ARRL Foundation, Inc.

Kicking off the ARRL Foundation programs in the early seventies were a series of OSCAR projects in association with AMSAT. Large seed contributions from ARRL members and prominent industry donors insured the successful funding of these pioneer satellite projects. To understand the impact your support made to these early, important exercises in Amateur Radio experimentation is to consider the OSCAR Program as it exists today—high technology and state-of-the-art hardware.

What better namesake could we have chosen to honor with our most prestigious scholarship than our most famous Amateur Radio advocate, Barry M. Goldwater, K7UGA?

Widening the emphasis to encompass the *preservation* of Amateur Radio, fundraising energies were directed toward establishing a fund for the 1979 World Administrative Radio Conference and future WARCs. It's a never-ending fight to preserve our Amateur Radio frequencies, and Foundation supporters are just as committed as they were in '79 to lend a hand through their contributions to the ongoing WARC Fund.

Recognizing early-on the need for up-to-date and informative Amateur Radio public educational materials, the ARRL Foundation funded in part the production of the *SAREX* and *Amateur Radio's Newest Frontier* video series. These popular videos, as well as the most recent, *The New World of Amateur Radio* video cassette, are in continuing demand from ARRL. Cable TV showings of these videos have introduced literally *thousands* to the educational aspects (and thrill) of Amateur Radio!

The ARRL Foundation Scholarship Program has been enthusiastically supported by contributors since the establishment of the first ARRLF-administered scholarships in 1979-80. Over the years the sponsorship of scholarships by several ARRL Directors and prominent private industry members has enabled more young hams to receive financial assistance with their academic expenses. With the addition of the ARRL Scholarship Honoring Senator Barry M. Goldwater, K7UGA, in 1984, a renewed emphasis on outstanding scholastic and public service achievement inspired more applicants to apply for all available ARRL Foundation scholarships! Making contributions to our Scholarship Program continues to be popular among ARRL members. Memorial bequests have made possible the creation of two recent scholarships. At present, individuals and clubs have established memorial scholarship funds to honor the memories of Donald R. Riebhoff, K7ZZ, and Bill Bennett, W7PHO—two men well known on the international DX scene.

With the happy tasks of administering the Victor C. Clark Youth Incentive Program and the Jesse A. Bieberman

Meritorious Membership Program, our busy Foundation looks forward to more projects and programs to serve you, the ARRL Member, and everyone interested in the preservation and advancement of Amateur Radio. Your help, through your contributions, is greatly appreciated. With your support, we'll keep up the good work!

A NEW SHUTTLE AMATEUR RADIO EXPERIMENT (SAREX) AND OTHER HIGHLIGHTS OF THE ARRLF SPECIAL MEETING

The ARRL Foundation Board of Directors convened for a Special Meeting on Saturday, July 23, in Hartford, CT. Recognizing an opportunity to discuss new ARRL Foundation projects in the works, President Paul Grauer, WØFIR, called the meeting to follow the close of the ARRL Board of Directors Second Meeting, bringing together those Directors that serve on both Boards and other ARRLF officers and numerous observers. In an upbeat and expeditious manner, several items were discussed and voted on by the ARRL Foundation Board. Highlights include:

- Providing funding in part for the proposed upcoming Space Shuttle Amateur Radio Experiment (SAREX) tentatively scheduled for the fall of 1989, to be conducted by shuttle astronaut Ron Parise, WA4SIR. This SAREX project, in conjunction with NASA and AMSAT, may include new packet-radio experiments, a first attempt at fast-scan amateur communications and longer operating times for shuttle in-flight QSOs. Look for more information about this mission in upcoming *QST*s. You can contribute to exciting space projects by sending your donation to *The Satellite Fund, ARRL Foundation, 225 Main St, Newington, CT 06111.*
- Providing funding for displays at ARRL Headquarters of artifacts, gifts and pictures of significance to Amateur Radio history donated to the ARRL and ARRLF. In addition, this supplement to the ARRL's lobby museum will tell the story of the progression of Amateur Radio through wall displays and photographs adjacent to the recently installed display cases. Your Foundation's commitment to the preservation, as well as the advancement of Amateur Radio is realized in our support of this project. We welcome you to view the results of your contributions the next time you visit HQ.
- The creation of a simple will kit to be made available to all our Foundation friends seeking bequest information. We continue to receive requests for this information and we hope to provide a plain-language, easy-to-understand kit for use by all inquirers by the end of the year.

In Gratitude to Our Contributors:

The Directors and Officers of the ARRL Foundation would like to take the opportunity on this, our 15th anniversary, to thank all of our generous contributors. Over the years, it is YOU who have made Foundation programs possible. Thank you for your continued support!

CONTRIBUTOR'S CORNER

We wish to thank the following for their generous contributions to:

The Jesse A. Bieberman Meritorious Membership Fund
Frankford Radio Club (Ft. Washington, Pennsylvania)

The Satellite Fund
Tom Frenaye, K1KI

The Dr James L. Lawson Memorial Fund
Amalia Lawson

The Victor C. Clark Youth Incentive Program Fund
Tom Frenaye, K1KI

The General Fund
John B. Rotondi, WA2OOB
Henry M. Haupt, KA5QHE
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John S. Bolly, Sr, WB3JZS
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Klaus Ludwig Goebel, DF2ZH
Donald L. Flynn, K3IMC
Donald W. Howe, W1CJR
Jaun Jose Laguna, EA8AKQ
Edward Dervishian, W9VSU
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Bobby L. Smith, KA9RGX
Milfred L. Heldreth, WA2IAE
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Joseph H. Calligan III, W5RVJ
Sovanna Nhuong, AA6HX
Robert G. Truscott, W9LO
Harold E. Gillmann, WB6DOT
Michael W. Thomas, KL7GBK
Adrian M. Zeffert, KA2MIF
Arthur J. Hay, W2JTH
Frederick Gilchrist, W1PDV & Family in memory of Andrew T. Henderson, W2GXU.
Al Vincent, KA8QJK
Howard Daubman, WA4LFZ
Richard G. Burggraf, W8PGP
Wyndham G. Mortimer, KG5EK
Henry E. Wells, Jr, K1CII
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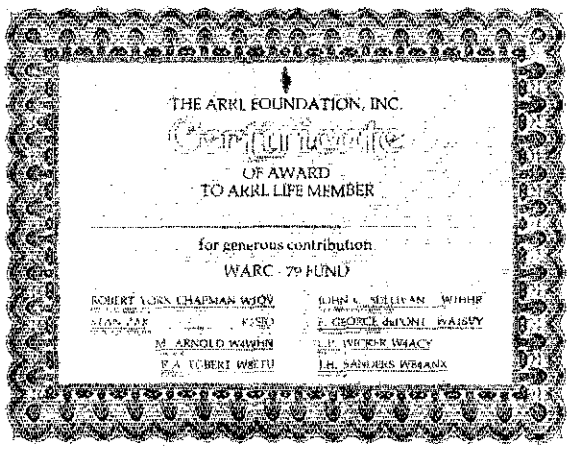
Louis Hubert, K8IXU
Leonard Meadows, K2HPW
Pedro N. Ortiz, KP4AQC
Harry L. Paulson, WAØSSX
Ralph W. Arbuckle, W6FUZ
Samuel J. Cirino, KB4MPU

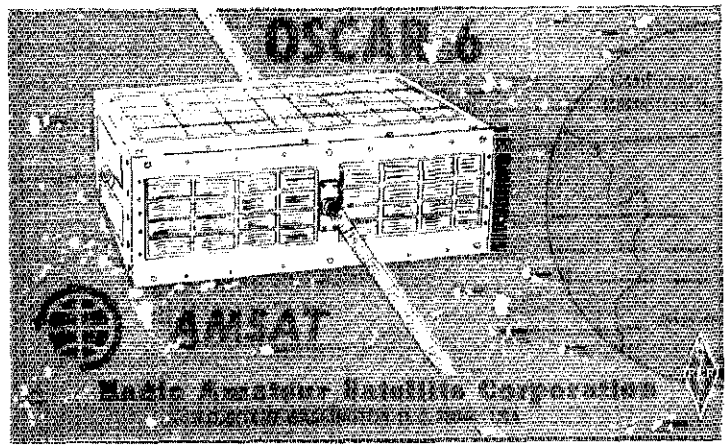
As received and acknowledged during the month of **June**

DID YOU RECOGNIZE "THE MYSTERY GUEST?"

On this page last month we featured the youthful picture of Delbert Neil Rapp, WB9VPG, acclaimed in 1976 (at age *five*) to be the world's youngest ham. Now an Advanced class licensee, Neil is busy with premedical studies at Vincennes University in Indiana. Neil says, "By receiving my license at age five, I try to inspire hopeful hams to put their doubts aside—if a five year old can do it, they can do it!" It's no mystery that hard working students like Neil are grateful for your support of the ARRL Foundation Scholarship Program. We wish all Foundation friends well in their studies!

THE ARRL FOUNDATION, INC.
"for the advancement of amateur radio"





The 1979 World Administrative Radio Conference, OSCAR Program and SAREX are among the programs your support has made possible.

The *Eagle* is QRV

By Rick Booth, KM1G
Offshore Publications
PO Box 817
Needham Heights, MA 02194

Capt Ernst M. Cummings, Commanding Officer of the *Eagle*, who gave me permission to use the ship's radio equipment.

Ever wonder what it would be like to switch places with a rare one, to *be* the DX instead of trying to *catch* the DX? I always had, and I found a chance when I was granted permission to sail from Long Beach, California to Acapulco, Mexico aboard the US Coast Guard windjammer *Eagle*.

Eagle, I reasoned, would be a sufficiently rare catch to interest enough hams so I wouldn't be lonely. I expected to work a couple of hundred stations, wave the Coast Guard banner on the amateur bands, and perhaps generate some interest among the crew and cadets from the Coast Guard Academy in New London, Connecticut, where *Eagle* makes her home. I got all that and more, and found myself the center of a firestorm, pressing my operating skills and stamina to what aircraft pilots call "the outside of the envelope."

The Captain Contacts Me

It started with deceptive ease. "Rick," my XYL Jeannie called down the basement steps early one March evening, "telephone for you. It's Ernie Cummings."

That got my attention. Capt Ernst M. Cummings is commanding officer of the *Eagle*, which is one of the world's premier tall ships, America's only active military one, and a pearl beyond price. I was scheduled to join her on March 31 in California, as she plied her way home from being America's ambassador to the Australian Bicentennial. The trip, my second on *Eagle*, was arranged through the magazine I work for. During a previous trip, I'd hatched a plan to put her on the amateur bands.

"Hi, Ernie," I said. I'd made his acquaintance while his wife pursued her Novice ticket. She's now KA1PJG.

"Hi, Rick," said Cummings' familiar voice. "Mary said you wanted me to call you. We're in Port Angeles, Washington. Just came across the Pacific. What's up?"

It was now or never. I took a breath and plunged in, outlining my plan to run a special-event amateur station from *Eagle* during my trip. Would he go for it? And if he did, could I pull it off alone? One thing at a time, I remember thinking.

"We'll play it by ear when you get here," was all he said. "Glad you can make it." He rang off.

Well, he hadn't said yes, but he hadn't said no. I was already playing it by ear. I had no idea whether *Eagle*'s radio gear would be available to me, though I secretly doubted it would. Being a tall ship, Eagle's tactical importance is limited at best, so the ship's radio shack is not hush-hush, but red tape is still red tape. Better I should treat it like Field Day; whatever I didn't bring, I couldn't count on having.

WCARC Offers Support

I glanced at the Ten-Tec Omni D on the table before me. I'd have to carry 50 pounds of camera gear for the magazine assignments I'd do before joining *Eagle*. Could I lug the Ten-Tec too? Not likely. How to get a rig? Hmmm. Pondering that hurdle, I returned to 15 meters which, true to the legend of amateur miracles, held the answer. I heard N6BNN with a strong signal, and on a hunch called him, briefly explaining my plight.

"I don't know if I can help you," he said, "but I think I know somebody who might." He put the wheels in motion that would lead me to the West Coast Amateur Radio Club (WCARC), without whose help and guidance the Amateur Radio aspects of my trip might not have flowered.

When I boarded my plane at Boston's Logan Airport, I carried an antenna tuner, CW keyer and paddle. I also carried the names and telephone numbers of three key WCARC members, Dick and Marcie Bruno, N6ISY and N6ISW, and Ken Newkirk, N6JWX. Ken and Marcie are former WCARC presidents and Dick is activities chairman. The next day, I called Dick from a pay telephone across the street from my borrowed, phoneless apartment in Southern California's Huntington Beach. After eyeball introductions all around, they began arranging for me to borrow the WCARC's club transceiver, an ICOM IC-735, a rig, incidentally, the club won from the ARRL for having the most club members join the League.

I kept in touch with them through five days of working magazine assignments, with time out for a thrilling visit to W6RO aboard the *RMS Queen Mary*. On the day before I was to report to *Eagle*, Dick drove me to the Naval Base in Long Beach, where the ship had arrived from San Francisco that morning. A call to the Officer of the Deck got us through the gate, and I was reunited with friends from my last *Eagle* voyage. I spied Capt Cummings in the waist, the middle portion of the ship's deck, and introduced him to Dick, explaining that Dick wanted to confirm arrangements for having the WCARC rig shipped back from Acapulco or points south. Cummings smiled. "That won't be necessary," he said. "You can use our equipment."

Though I felt foolish for having put Dick, Marcie and Ken through so much trouble, I was relieved at not having their club rig in my care, relief I'm sure they shared. Still, their willingness to support the adventure says much about the spirit of Amateur Radio. So I bid them farewell and waited for the *Eagle* to sail.

Early next morning, I again spied Cummings, this time with a young Coast Guard enlisted man. He introduced me to Radioman Third Class Brett Johnson, admonishing him to help me in every way he could.

Brett and I hit it off instantly. He showed

Radioman Third Class Brett Johnson, who was assigned to help in every way he could.

great interest in my project, and allowed as how he'd won a keyer for copying CW at 28 WPM in radioman school. "Of course, I've forgotten most of it," he said. "We mostly use RATT," which is Coast Guard vernacular for RTTY. Every so often over the next few days, I'd catch him in his off moments working with a code oscillator, trying to get his speed back up. It was the first feedback that my presence was kindling interest in Amateur Radio aboard *Eagle*. It would not be the last.

The *Eagle* Shack

It took me awhile to get acclimated to Eagle's tiny radio shack, starboard side aft in the deck house.

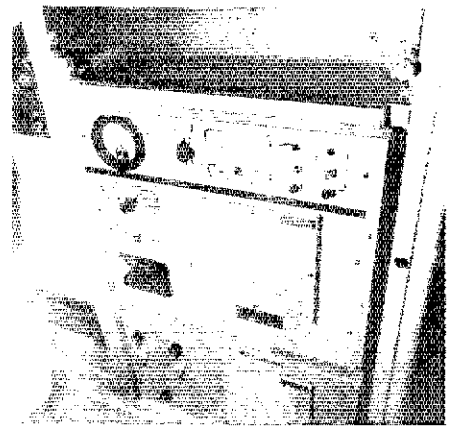
Eagle carries two Sunair Electronics GSB 900 RU HF transceivers, one connected to a Sunair GSL 1900A amplifier, using a single 4CX1500B tube. Two RATT (RTTY) terminals are racked under the transceivers, which are above eye level in front of the operating position. The amp is down and to the operator's right, and a Collins R-651 receiver down and to the left of the transceivers, just over the tiny operating table at the operator's nine o'clock. Receiving is on a series of long wires patched through N-connectors to the Collins, unless the GSB 900 is used in transceive, which both transmits and receives through a 14-foot whip on the front of the ship's mizzen mast. The mizzen is the shortest and farthest aft, or back, on the ship.

Passing time during the voyage, Brett Johnson told me how the amplifier, installed specifically for the Australia trip, had caused arcing between the whip and portions of the ship's rig. Whichever shroud was resonant close to the operating frequency at the time attracted the RF, and apparently created real fireworks. By the time I was aboard, however, the steel stays had been replaced by synthetic ones, so we experienced no trouble. But no one could work aloft on the mizzen while we were QRV, and signs were posted on the shrouds to warn crew and cadets not to climb. Boatswain's Mate First Class Len Romanick, charged with maintaining the mizzen rigging, patiently scheduled his crew's work around my operating periods. It wasn't easy.

Operating the *Eagle's* Equipment

Setting up the rigs was very simple, though for reasons I'll explain, not very easy. The transceivers didn't have conventional VFOs, but keypads into which send and receive frequency were programmed separately.

In military use, the ship is told by the controlling communications station, or COMSTA, to use a certain duplex frequency pair, or "window." The COMSTA acts like an air traffic controller, ensuring the frequency is clear of other stations. In ham use, I had to use the Collins to spot a clear frequency, and punch in the transceiver to go there. A quick twist of the transceiver mode to "tune" let the automatic kilowatt tuner on the amp find resonance. The needle dropped at SWR unity. On 7, 14 and 21 MHz, that occurred in a single try. On either 75 or 80 meters, I needed several tries; loading a 14-foot whip for 80 meters is no picnic. The tuner didn't like it, but it worked. As it turned out, 90 percent of my operating was on 20 meters, though 75 provided the ship with



The *Eagle*'s Sunair Amplifier.

a vital piece of information for morale: the final score of the NCAA basketball championship, played while we were at sea.

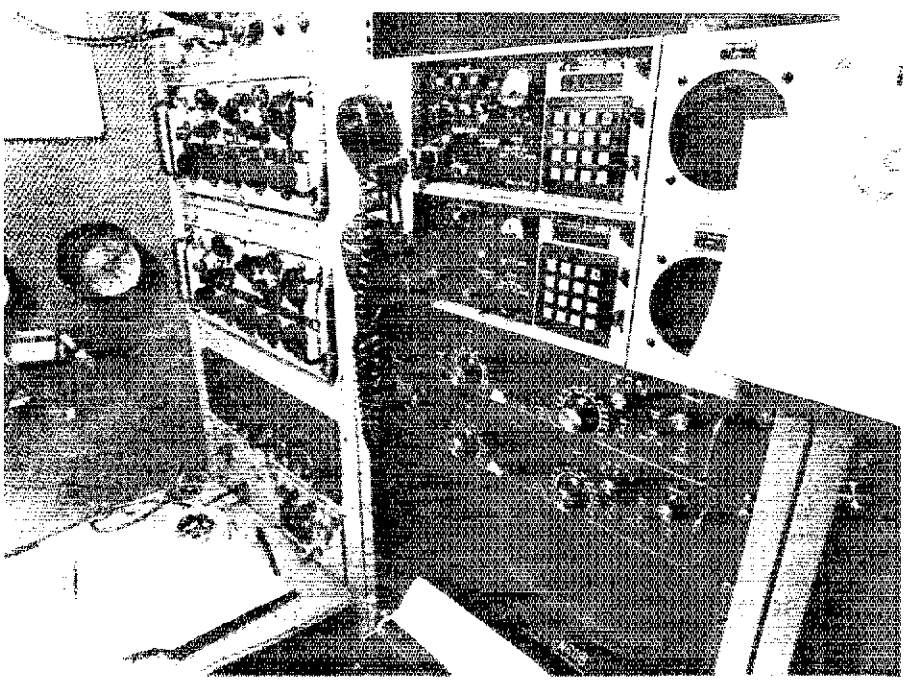
Describing how to operate is much simpler than doing it was. In practice, the time between finding a clear spot and tuning the rig to it often meant the frequency was occupied, and the whole process had to be repeated. Getting shoved around by QRM on the 20-meter phone band is bad enough with a conventional VFO; with the keypads it was murder, mitigated only as I got used to quick QSYs. Another annoyance was that the microphones on Coast Guard radios are hard-wired to the rig, and in my case required unusually heavy pressure to keep the PTT down. Through experience, I eventually devised two or three different grips on the hand mic, but not until I had made my right hand (I'm lefty) very sore. Switching hands wasn't practical, since I had to log.

Early on, I tried to use the Collins for receiving during the QSOs, rather than just hunting for a clear spot. But that required switching the MHZ switch on the receiver, to save it from the kW. Until I got the hang of transceiving, I was the proverbial one-armed paper hanger.

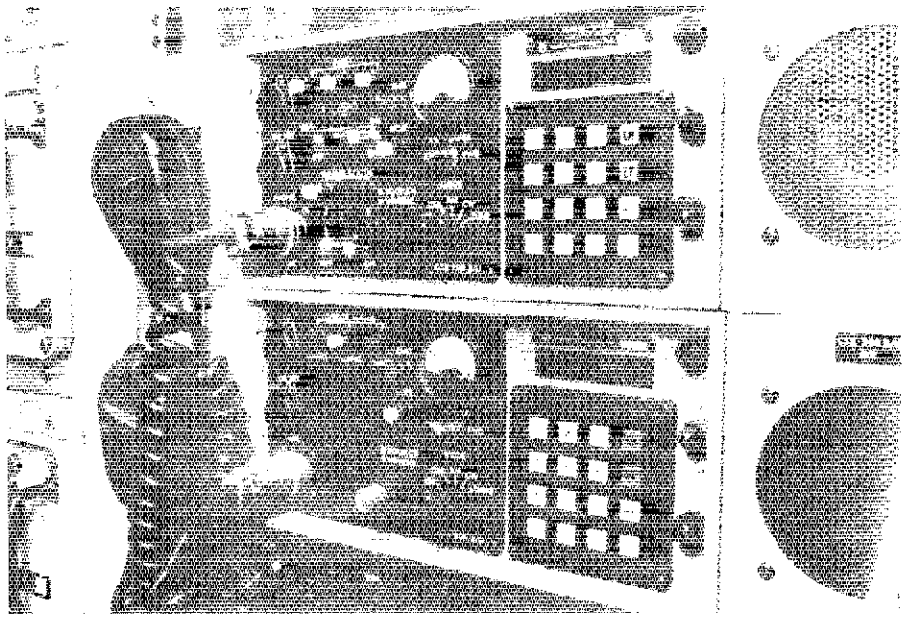
I've Had Some Contest Experience, but...

So we were all dressed up and ready for the ball, tuned for the 14.313 Maritime Mobile net. I checked in, and learned two things—my signal was covering a continent, and my original Elmer, Chris Bowne, AJ1G, was true to his word: He picked me up right away.

Chris and I found a spot and chatted awhile, putting him first in my log. He was followed quickly by Carl Walther, W1OPZ, a retired Coast Guard man, and K1SSN, the club station at the Naval Submarine Base in Groton, Connecticut. Like AJ1G, both knew where I'd planned to be. Unknown to me, as we talked leisurely, a storm was brewing. A hundred transceivers were tuning on my signal, with scores of directive antennas whirring around. As I broke with K1SSN and



Main operating panel of the *Eagle*, with the GSB 900 transceivers, RTTY equipment and receivers. Note the ship's call sign at bottom, NRCB.



Close-up of the Sunair Electronics GSB-900s. The top one is connected to the amplifier. The bottom one runs 100 W barefoot.

announced my intention to work anyone who wanted it, a completely new sensation met my ears: a pileup, waiting for *me*.

It's an odd sensation to be at the bottom of a pile for the first time. While undeniably exciting, it was tiring. Like a surfer, I had to expend energy to ride the wave. Four or five hours of running three and four stations a minute, with the occasional break either for giving my call or QSL manager (John Carr, N1BPV), took a lot out of me. I'd intended to run some phone patches that first day, but couldn't. Only the failure of propagation gave me rest—that, and a Coast Guard schedule with COMSTA San Francisco. Brett Johnson found me shell-shocked, ready to surrender my seat in the tiny shack. I've had some contest experience, but never anything like that. If I was shocked then, I hadn't seen anything yet.

Author Rick Booth, KM1G/MM, seated in the main operating position aboard the US Coast Guard tall ship *Eagle*.

Day Two QRV was a bust; propagation was terrible, and even the *Eagle*'s comskeds were postponed. I asked Johnson if dead periods were common. "They sure are," he said, "I've seen it stay dead for days in the middle of the Pacific." I shuddered, appalled that the rest of my trip could be ruined by an electromagnetic disturbance. I needn't have fretted.

Piled-up traffic kept Johnson QRV on RATT for a lot of Day Three, and I didn't get on until late afternoon, when he cleared. I realized at once that 20 meters was back, and the W call signs found me in quick order. I hammered them until midnight, when I realized US propagation was dying, even to the West Coast. At last, I thought, I'll get some rest.

Not on your life. Closure of the North America path signaled a super opening to Australia, and if there's a country well-acquainted with *Eagle*, it's the folks down under. *Eagle* had just finished a multi-port tour there, and she was the darling of the Aussie media throughout. The feeling was mutual: All the *Eagle* talk was of Australia, and if the crew had its way, the first order of business would be phone patches to VK. They had acquaintances to keep up!

Alas, the time difference was against me. Virtually all of *Eagle*'s crew were asleep, the rest on watch. So, I ran VKs and ZLs, together with a smattering of such tidbits as Tahiti, Norfolk Island (politically a VK, if not for hams), Guadalcanal, New Guinea and New Caledonia (a mobile, no less). For a ham licensed only since the decline of the last sunspot cycle, it was Utopia, whether it killed me or not. I'd run DX until the band quit.

Only it never quit! Brett Johnson opened the door next morning for his 0800 comsked, spilling morning light into the red-lit darkness of the radio shack. I hadn't finished with the VKs, and the Ws were beginning to wake up. I excused myself and went below for a four- or five-hour nap, intent on running some CW later to rest my weary voice.

When I returned in the darkness of Day Three, I learned that CW is not the strong point of the GSB 900. Maybe an older hand would have had less trouble, but my experience with only new transceivers left me stumbling—I couldn't figure out where to listen. I knew people were coming back to my CQ on the bottom of 20, but only occasionally could I snag someone. Later, I went below to seek ET1 Ray Wiedower, an electronics technician and custodian of the radio manuals. The book said listen up 1 kHz; for reasons that still escape me, in practice I learned I should have been listening *down* 500 Hz. No matter, because the three dozen or so stations I ran on CW told me I had a chirp. I abandoned CW for SSB. On sideband, as station after station told me, my signal was very good.

Quality Phone Patches

After Day Three I began to run phone patches, the first for Capt Cummings, then for officers, cadets and crew. I enjoyed terrific help from stateside stations, and while the quantity of patches wasn't what I'd hoped, their quality was excellent.

I had underestimated one aspect of patching, the organization required to administer it aboard ship. All the various random aspects of patching—time differences, propagation, "long-haul" charges—not only had to be explained, but integrated into the ship's duty and training schedule. By the time we got the hang of it, the trip was over.

I was particularly proud of one patch, between an *Eagle* enlisted man and his dad. The Guardsman had just returned from emergency leave, during which time his father underwent surgery which he was not expected to survive. The father was still recovering when the son's leave expired and he returned to the ship. We were able to connect the two, and affirm for the son that the father's health was considerably (and audibly) improved.

Other highlights of the trip included hearing from W3HJY, who hammered through a pileup to inform me that his granddaughter, Laura Dickie, was a Third Class cadet (sophomore) on the ship, and connecting some *Eagle* officers with a colleague in Connecticut recuperating from a motorcycle accident. Laura was able to enjoy several conversations with Mike, including a current rundown on her beloved Baltimore Orioles.

Several members of the ship's company confided that the presence of a ham operator on the entire trip would have made the eight-month separation from home easier to bear. Several approached

ET1 Ray Wiedower, an Electronics Technician and custodian of the radio manuals.

me about obtaining an amateur license, and needless to say, were pointed in the right direction, with a gentle reminder that a ham is always a happy addition to life at sea. If I couldn't use my paddle and keyer on the bands, I could, and did, see to it that many people tried it on for size.

Although I didn't know it at the time, another ham was preparing to join *Eagle* for its Miami-New London, Connecticut run. Jim Jacobs, K1GHT, subsequently ran many phone patches, and at this writing arrangements were being made to get both Brett Johnson and *Eagle*'s leading radioman, RM1 Mary Johnson, licensed before the ship's early summer departure for a European training cruise. Mary Johnson was on leave during my trip, which avoided the confusion of having two radiomen with the same last name.

1200 QSOs Later

Early on the morning of Day Eight, as I was running Ws again, the door opened and in from the darkness stepped Lieutenant Bob Palumbo. "Can you secure?" he asked me. "We'd like to rig the awnings for port, and we'll have to climb the mizzen."

It dawned on me that my adventure was over, at least the Amateur Radio part. By the time they rigged the awnings, we'd be in Mexican waters, and I didn't have a reciprocal license (I'd kept close contact with the navigating team to ensure we were in international waters while I worked).

I looked down at the legal pad, now jammed with over 1200 QSOs, and for a few seconds vignettes of the past week filled my brain. I keyed the rig, and for the last time gave my call, name and QSL information. I shook my head.

"What's wrong?" Palumbo asked.

"Say, Mister Palumbo," I replied, "How'd you like to help fill out a thousand postcards?"

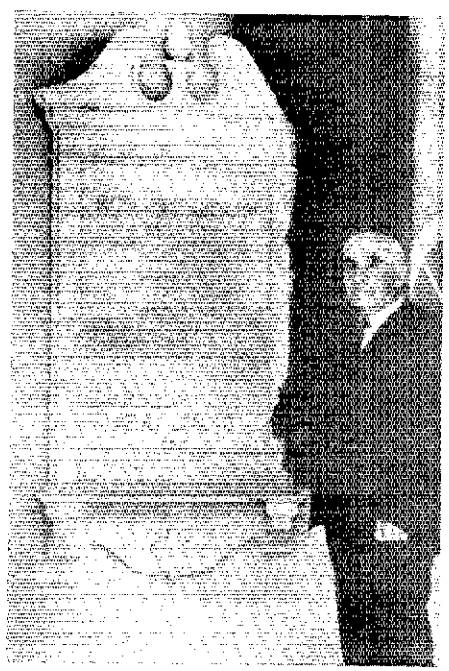
The W1AW Dedication—50 Years Ago This Month

(continued from page 49)

1AW and founding president of the League. By the start of the ceremony at 2 PM, the guests included a "who's who" of leaders of the Amateur Radio fraternity. Mr Maxim's daughter, Percy Maxim Lee, later to become famous in her own right as national president of the League of Women Voters, and his son and daughter-in-law, Mr and Mrs Hiram H. Maxim, were also present. Connecticut Governor Cross sent General Ladd (Connecticut's Adjutant General) as his representative, and dignitaries from the Town of Newington attended, as did ARRL officers and Headquarters staff. The ceremonies were broadcast locally over the Hartford radio stations WTIC and WDRC and were carried live nationally over the CBS Radio Network.

The climax of the program was the dedication by ARRL President Dr Eugene C. Woodruff, W8CMP, of a Memorial Tablet in the lobby of the new station. In gold lettering, the plaque read "Dedicated to the Memory of Hiram Percy Maxim, Father of Organized Amateur Radio, Beloved First President of the American Radio Relay League."

The evolution of the HQ station—from a modest corner-of-a-room 20-watt outfit into a multiband, maximum legal power station ready to go on any mode at the throw of a switch—is something that parallels the growth of Amateur Radio and the League itself. The first 1AW was operated by HPM himself. When ARRL grew to sizable proportions, a small station, 1MK, was established at the HQ offices on Main Street in Hartford in 1924. More equipment was added when the League moved to larger offices on Park Street in Hartford. In 1927, the ARRL Board of Directors authorized the creation of what October 1928 *QST* called "a real man-size station." By February 1928, this was completed. After eight years of fruitful service and thousands of contacts, this HQ station was brought to an untimely end in the devastating floods of March 1936. Temporary work continued through W1INF, a small station at the West Hartford office on LaSalle Road, where the HQ had moved in 1932. In May 1936, at the ARRL Board Meeting following HPM's death in February and the flood in March, the Board determined to build a new and better station to replace W1MK and to make this station a living memorial to HPM. Thus, the W1AW station at its present Newington site—a location about 4½ miles south of the HQ offices in West Hartford. (The entire HQ facility is now consolidated at the Newington site).



ARRL President Dr Eugene C. Woodruff, W8CMP, unveils the Maxim Memorial Tablet on September 2, 1938.

The operating phase of the festivities began at 6 PM with the Maxim Memorial W1AW Dedication Relay. Amateur stations all over the country had been invited to originate messages of greetings and good wishes. W1AW operators Hal Bubb, W1JTD, and George Hart, W3AMR (now W1NJM), kept the new W1AW on the air all night receiving the messages, and other Connecticut stations (such as Joe Moskey, W1JMY, who handled 102 from his home station) handled the overflow. Hal and George copied 61 messages before finally closing down at 6 AM. All in all, a total of 479 congratulatory messages were received.

The general theme of the messages was aptly expressed by H. L. Caveness, W4DW, then Roanoke Division Director, whose message read, "The dedication of the Maxim Memorial is another important event in the history of the ARRL. We are happy that our founder's memory will be perpetuated among amateurs in this fitting way and we hope the memorial will ever be used for the advancement of the amateur cause."

Nice thought! We still feel the same way.

The 1988 Second Meeting of the ARRL Board of Directors

A brief summary of actions taken.

By Michael R. Riley, KX1B
Assistant to the Executive
Vice President

July 21-22, 1988 was a pivotal time for thousands of Americans. The Democratic National Convention was in full swing in Atlanta, professional golfers from around the world were driving, chipping and putting at the Canon® Sammy Davis, Jr Greater Hartford Open, and the ARRL Board of Directors, meeting in Hartford, hit one straight shot after another down the fairway when confronted with several critical issues before our fraternity.

Items on the agenda included the League's defense of 220-222 MHz, acknowledgement of sole VHF and UHF frequency coordinators, the possible use of binding arbitration by those embroiled in repeater disputes, approval of VHF and UHF packet radio spectrum-management guidelines, the substitution of VHF and UHF sub-bands for automatic beacon operation, recommendations to amateurs involved with the media, endorsement of an ARRL-affinity credit card, an Amateur Radio Public Awareness Day program and much more. Each action taken by the Board of Directors affects you to some extent—some more than others. (Refer to Table 1 for a summary of actions taken.)

Director Harrison, WB5IGF, listens intently to a motion being made.

Vice President Wilson, W4OYI, smiles for the camera during a break in the action.

The 87-14 Front

As this article is being written, the time is nearing for a decision by the FCC as to whether 220-222 MHZ remains in the Amateur Radio spectrum or is given to the land mobile interests. It's possible that a decision will be on the books by the time you read this. If it's favorable to the amateur community, we have every reason to rejoice. If not, ARRL President Larry Price, W4RA, made it extremely clear during the Board Meeting that the League will not cease its efforts toward the retention of this band until "Nothing else is available [as an option]." (Minute 6)

Frequency Coordinators

The ARRL acknowledged the recognition by the entire amateur community of sole frequency coordinators for most areas of the US. In areas where the FCC has determined that coordination responsibilities are in dispute, no listing will be made in the *ARRL Repeater Directory* until the dispute is settled by mediation, arbitration or other means. (Minute 61)

Repeater Coordination Disputes

In an effort to assist in settling repeater coordination disputes, the ARRL will offer its good services to arrange for binding arbitration through the American Arbitration Association or similar forum. This offer is extended to repeater owners, trustees and repeater coordinators/spectrum managers. (Minute 53)

Amateur Awareness Day

ARRL Headquarters has been tasked with determining the most opportune time for an Amateur Radio Public Awareness Day, developing guidelines for setting up and operating an Amateur Radio display and distributing handouts and materials to groups wishing to participate. (Minute 68)

VHF/UHF Packet Radio Coordination Guidelines

The Board of Directors approved packet-radio guidelines for VHF and UHF spectrum managers. (Minute 23)

Substitution of Sub-bands for Automatic Beacon Operation

ARRL Counsel has been directed to petition the FCC requesting the substitution of sub-bands for automatic beacon operation in the VHF and UHF spectrum. The ARRL band plans were amended with regard to automatic beacon operation above 450 MHz. (Minute 13)

Amateur Radio and the Media Guidelines

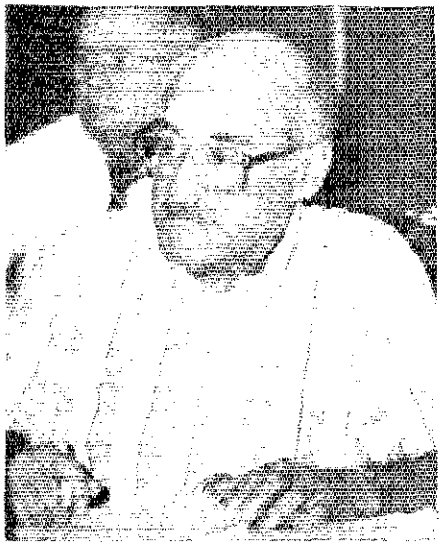
The Board approved the recommended guidelines of the ARRL Ad Hoc Committee on Amateur Radio and the Media chaired by CRRL President Tom Atkins, VE3CDM. The guidelines are:

- Amateur Radio operators may assist news media representatives in their efforts to gather information for relay to the public from areas in which normal communications have been disrupted.
- Amateurs may ask questions of, or relay media questions to, amateurs in the emergency area. The responses may be electronically recorded by media representatives.
- Amateur Radio should not be used to assist the news media in gathering informa-

Table 1

Summary of Board Actions

Minute	Purpose	Disposition
Awards and Acknowledgments		
36	Board applauds DXCC staff work	Adopted
38	1987 ARRL Humanitarian Award to WB2GQW	Adopted
46	1987 ARRL Technical Excellence Award to W7XC	Adopted
48	1987 ARRL Professional Teacher of the Year Award to WB2JKJ and WB2MGP	Adopted
65	1987 Hiram Percy Maxim Award to KA9WDE	Adopted
66	1987 ARRL Instructor of the Year Award to K7NUL	Adopted
86	Resolution to staff	Adopted
ARRL Organizational		
15	Change Category 4 Club criteria	Lost
34	Approval of Kansas City, MO as site of 1990 ARRL National Convention	Adopted
35	Motion to hold 1991 ARRL National Convention in the Chicago, IL area	Postponed
39	Removal of restriction on names of youth clubs	Lost
41	Study of making ARRL Board meetings more open	Postponed
44	Staff investigate costs of an 800-number at HQ	Adopted
45	Approval of 1989 Central Division Convention in Indianapolis, IN	Adopted
49	Approval of 1988 ARRL Kansas State Convention in Wichita	Adopted
51	Approval of 1988 ARRL Pacific Division Convention in San Jose, CA	Adopted
55	Approval of 1989 ARRL Georgia State Convention in Albany	Adopted
58	Study of support for local clubs in developing a class for television use	To Committee
59	Study of entry-level guide for ECs with voluntary self-test	To Committee
63	Ad hoc planning committee for the 1989 Region 2 IARU conference in Orlando, FL	Adopted
70	Study of MOU's evaluating liability insurance coverage	To Committee
71	Staff to negotiate with companies offering "Affinity credit cards"	Adopted
73	Dates of 1989 Annual ARRL Board of Directors Meeting	Adopted
74	SOP for the formation of new ARRL Sections	Postponed
76	Establish goal of doubling the number of school clubs by 1991	Adopted
79	Study the usefulness of the ARRL Simulated Emergency Test	To Committee
82	National Traffic System Service Award	Postponed
Amateur Radio Operations		
13	Petition the FCC re VHF/UHF beacon subbands	Adopted
14	Support possible FCC rulemaking on 6-meter repeater subbands	Postponed
23	Guidelines for local packet-radio spectrum management bodies	Adopted
40	Study of Field Day rules change	To Committee
53	Arbitration arrangements in repeater disagreements	Adopted
61	Acknowledged frequency coordinators	Adopted
62	Recommended procedural and organizational guidelines for frequency coordinators	Lost
77	Petition the FCC to allow SSB between 7075-7100	Lost
80	Study merits of 911 access on repeaters	To Committee
83	Study new ARRL Life Membership card	Lost
85	Study ways of encouraging Novices and Technicians to operate in CW	To Committee
Publications/Media		
16	Approval of guidelines between Amateur Radio and the Media	Adopted
47	Editor, *QST* to determine interest in propagation charts in *QST*	Adopted
56	Study ways to encourage clubs to promote membership supplies and League publications	To Committee
78	Study placing ARRL publications in national booksellers' stores	To Committee
81	Study desirability of an "Op-Ed" column in *QST*	Adopted
84	Adoption of ARRL Education Task Force recommendations	To Committee
Miscellaneous		
67	Endorsement of Amateur Radio event in 1990 Goodwill Games in Seattle	Adopted
68	Establishment of "Amateur Radio Awareness Day"	Adopted
72	Board urges ARRL Foundation to reimburse SAREX expenses	Adopted



Director Mark, W0OZC, takes notes while hearing a report.

tion when telephones or other commercial means of communications are available.

- Amateur Radio should not be used to facilitate the operation of any business.
- Amateur Radio operators should depend upon their own judgement in dealing with the news media and in operating their station in the public interest, convenience and necessity. (Minute 16)

ARRL Affinity Credit Card

The Board authorized an affinity credit card program to be made available to interested League members. Half of the derived royalties from the program will be allocated to the Fund for the Defense of Amateur Radio Frequencies. (Minute 71)

Special Recognition Awards

Among those receiving special recognition for their efforts were: W7XC, Technical Excellence Award; K7NUL, Instructor of the Year Award; KA9WDE, Hiram Percy Maxim Award; WB2JKJ and WB2MGP, Professional Teacher of the Year Award and WB2GQW, International Humanitarian Award. (Minutes 46, 66, 65, 48 and 38, respectively)

ARRL National Convention

The Board of Directors voted to hold the 1990 ARRL National Convention in Kansas City, Missouri on June 8-10. (Minute 34)

Summary

The information mentioned previously consists of excerpts or brief summaries of the actual minutes. Rather than quickly read this article to "get the facts," you owe it to yourself to refer to the actual minutes of the Board Meeting for a more in-depth explanation.

Moved and Seconded ...

MINUTES OF THE 1988 SECOND MEETING OF THE BOARD OF DIRECTORS
The American Radio Relay League, Inc.
July 21-22, 1988

Summary Agenda

1. Roll Call
2. Moment of Silence
3. Consideration of the Agenda for the Meeting
4. Election of a Parliamentarian
5. Approval of the Minutes of the 1988 Annual Meeting
6. Reports by the Officers
7. Receive Reports and Consider Recommendations of the Committees
8. Report of the Host Director, 1989 National Convention
9. Consideration of the Site for the 1990 National Convention
10. Directors' Motions

1) Pursuant to due notice, the Board of Directors of the American Radio Relay League, Inc., met in second session at the Parkview Hilton Hotel, in Hartford, CT, on Thursday, July 21, 1988. The meeting was called to order at 8:32 AM EDT with President Larry E. Price, W4RA, in the Chair and the following Directors present:

Frank M. Butler, Jr., W4RH, Southeastern Division
Rush S. Drake, W7RM, Northwestern Division
Thomas W. Frenaye, K1KI, New England Division
Paul Grauer, WØFIR, Midwest Division
Joel M. Harrison, Sr., WB5IGF, Delta Division
Jim Haynie, WB5JBP, West Gulf Division
Fried Heyn, WA6WZO, Southwestern Division
Howard Mark, WØOZC, Dakota Division
Stephen A. Mendelsohn, WA2DHF, Hudson Division
Edmond A. Metzger, W9PRN, Central Division
Gay E. Milius, Jr., W4UG, Roanoke Division
Leonard M. Nathanson, W8RC, Great Lakes Division
Marshall Quiat, AGØX, Rocky Mountain Division
Rodney J. Stafford, KB6ZV, Pacific Division
Hugh A. Turnbull, W3ABC, Atlantic Division

Also present as members of the Board without vote were: Jay A. Holladay, W6EJJ, First Vice President; George S. Wilson, III, W4OYI, Vice President; Clyde O. Hurlbert, W5CH, Vice President; Tod Olson, KØTO, International Affairs Vice President; and David Sumner, K1ZZ, Executive Vice President. Also in attendance at the invitation of the Board as observers were the following Vice Directors: Joseph A. Butler, K5OS, Delta Division; Thomas W. Comstock, N5TC, West Gulf Division; Evelyn D. Gauzens, W4WYR, Southeastern Division; John C. Kanode, N4MM, Roanoke Division; James Knochenhauer, K6ITL, Pacific Division; Bruce Meyer, WØHZR, Dakota Division; L.C. "Chuck" Miller, WAØKUH, Midwest Division; James M. Mozley, W2BCH, Atlantic Division; Wayne Overbeck, N6NB, Southwestern Division; Allan Severson, AB8P, Great Lakes Division; William R. Shrader, W7QMU, Northwestern Division; Paul Vydareny, WB2VUK, Hudson Division; Robert Weinstock, KN1K, New England Division; and Hugh Winter, W5HD, Rocky Mountain Division.

There were also present: Thomas B.J. Atkins, VE3CDM, President, The Canadian Radio Relay League, Inc.; Harry J. Dannals, W2HD, ARRL President Emeritus; Honorary Vice President Jean A. Gmelin, W6ZRJ; Secretary Perry Williams, W1UED; Counsel Christopher D. Imlay, N3AKD; Larry Shima, WØPAN, Controller; Paul Rinaldo, W4RI, Publications Manager; Stephen C. Place, WB1EYI, Volunteer Resources Manager; and Michael Riley, KX1B and Robert Schetgen, KU7G, Assistants to the Executive Vice President.

Vice President Holladay, W6EJJ, President Price, W4RA and Executive Vice President Sumner, K1ZZ, during the discussions. *(Meyers Studio photos)*

2) The assembly observed a moment of silence in recollection of Radio Amateurs who have passed away since the previous meeting of the Board.

3) On motion of Mr. Milius, seconded by Mr. Mendelsohn, the agenda as amended was adopted.

4) The Chair declared nominations open for Parliamentarian. Mr. Nathanson nominated Mr. Heyn, but Mr. Heyn declined. Mr. Heyn nominated Mr. Wilson. Mr. Harrison nominated Mr. Hurlbert, but Mr. Hurlbert declined. On motion of Mr. Hurlbert, seconded by Mr. Mendelsohn, it was VOTED that nominations are closed and Mr. Wilson is elected as Parliamentarian.

5) On motion of Mr. Milius, seconded by Mr. Mendelsohn, the Minutes of the 1988 Annual Meeting are APPROVED as previously amended.

6) Mr. Price presented his report as President, dealing first with the intense and many faceted campaign to retain the entire 220-225 MHz band. "We shouldn't rest on this one," he said, "until nothing else is available." The President attended the annual meeting of the Canadian Radio Relay League, and the 75th Anniversary celebration of the Radio Society of Great Britain. The latter event provided opportunity for officers of several societies present from every region of the world to discuss the likelihood of a World Administrative Radio Conference having allocations powers in the early 1990s, and preparations to date for any such meeting.

7) First Vice President Holladay presented a written report highlighting the improved performance of ARRL's Advisory Committees in the past several months, and peak levels of League membership. Solutions must be found to the growing number of frequency coordination problems and disputes. The battle in General Docket 87-14, concerning 220 MHz, has been very well carried out; another matter is now before us calling for close study and careful response: PR Docket 88-139, the rewrite of Part 97, the Amateur Regulations.

8) Next came an extensive written report by Executive Vice President Sumner. Hard work by staff and volunteers in the recruiting area has led to the peak ARRL membership figures. A new tool in that effort will be the "Novice Survival Guide" to be sent to each new licensee. Financial performance for the first five months of 1988 is nearly $100,000 ahead of the budget plan, led by strong publications sales and in spite of higher operating costs than expected. Improvements in staff retention, the functioning of the Volunteer Examiner Coordinator activity and a shift in emphasis of the Club Services program were reported. There were appendices to the report covering the W1AW renovation project, IARU-related expenses, a possible Amateur Radio archive, and a status report on previous Board actions.

9) Counsel Imlay covered the rewrite of Part 15, in Docket 87-389; the proposed rewrite of Part 97, the Amateur Rules, Docket 88-139; the status of the amateur band at 18 MHz, and of course, FCC General Docket 87-14 regarding 220 MHz. Sections of the extensive report were dedicated to local legal matters where there have been increasing numbers of local decisions implementing PRB-1. Problems arising from current FCC policies in radio frequency interference cases were also covered extensively.

10) Mr. Grauer, as President, presented the report of the ARRL Foundation, Inc. The Foundation's funds totaled some $265,000 as of June 30, with more than $30,000 of new

donations during the past 12 months and an average return on investments of 6.7%. New activities are being undertaken to heighten awareness of the ARRL Foundation.

11) CRRL President Atkins brought greetings from our Sister Society. The Minutes of its annual meeting July 2-3, 1988 were made available to the ARRL Directors. In June, publication began for *QST Canada*, a monthly magazine currently running 24 pages. ARRL's *QST* continues to be supplied to CRRL members, though in the future it will be on an optional basis. Mr. Atkins predicted that the widely publicized changes in the Canadian license structure would take place about January, 1990. The CRRL has emulated ARRL by setting up a fund for the defense of Amateur frequencies. At the close of Mr. Atkins' remarks, the Board was in recess from 9:58 to 10:25 AM, at the close of which Mr. Joe Butler was presented with a 25-year Award.

12) The Board then turned its attention to reports and recommendations of the various committees. Mr. Metzger, as Chairman, presented the report of the Administration and Finance Committee which discussed legislation pending in Congress regarding the unrelated business income tax; a need for long-range financial planning; increases in the costs of paper and postage; investment matters; W1AW fund raising; and the new IBM System 38 computer which is gradually being brought on-line at Headquarters.

13) Mr. Quiat, as Chairman, presented the report of the Membership Services Committee. Its work centered on beacons, band-plans, repeater coordination; field checking of QSLs for DXCC was rejected. On motion of Mr. Harrison, seconded by Mr. Heyn, it was unanimously VOTED that Counsel is directed to petition the FCC for amendment of Section 97.87(e) to substitute the following sub-bands for automatic beacon operation, in place of those presently listed for the respective bands: 144.275-144.300 MHz, 220.275-220.300 MHz, 432.300-432.400 MHz. Further, the ARRL band plans are amended to provide the following sub-bands for automatic beacon operation above 450 MHz: 902.300-902.400 MHz, 1296.300-1296.400 MHz, 2304.300-2304.400 MHz, 3456.300-3456.400 MHz, 5760.300-5760.400 MHz, 10368.300-10368.400 MHz. The League shall seek appropriate modification to the Region 2 band plans at the 1989 IARU Region 2 Conference.

14) It was moved by Mr. Heyn, seconded by Mr. Harrison, that the following resolution be adopted:

WHEREAS, petitions for rule making have been received by the Federal Communications Commission looking toward expansion of the repeater segment of the 50-54 MHz band, and

WHEREAS, the Commission may well adopt a notice of proposed rulemaking in the matter in the next several months, and

WHEREAS, the Board of Directors of the American Radio Relay League agrees in principle that expansion is warranted, and

WHEREAS, Committees of the ARRL have been studying the issue since the Executive Committee request [Minute 3.3.1, December 4-5, 1987 meeting], now, therefore

BE IT RESOLVED that the Counsel is authorized to file comments, subject to review by the President and Executive Vice President, in general accordance with recommendations of the MSC on advice of VRAC and VUAC. After discussion, on motion of Mr. Nathanson, seconded by Mr. Grauer, it was voted to POSTPONE discussion of this motion indefinitely. Mr. Heyn requested to be recorded as voting against postponement.

15) Mr. Mendelsohn, as Chairman, presented the report of the Volunteer Resources Committee. It was moved by Mr. Mendelsohn, seconded by Mr. Quiat, that in the Rules and Regulations Concerning Affiliated Societies, Item 4, percentage of League membership, third sentence be changed for a trial period of two years by reducing the required percentage from 75% to 51% for Category 4 clubs. After extended discussion, it was moved by Mr. Nathanson, seconded by Mr. Harrison, that action on the motion be postponed indefinitely. A roll-call vote being ordered on request, the motion to postpone was decided in the negative, seven votes in favor to eight opposed. Those voting in favor were Messrs. Butler, Grauer, Harrison, Metzger, Milius, Nathanson, and Turnbull. Those voting opposed were Messrs. Drake, Frenaye, Haynie, Heyn, Mark, Mendelsohn, Quiat, and Stafford. Proceeding then to a vote on the motion itself, and a roll-call vote again being ordered on request, the question was decided in the negative, six votes in favor to nine votes opposed. Voting in the affirmative were Messrs. Drake, Harrison, Haynie, Heyn, Mark and Mendelsohn. Those opposed were Messrs. Butler, Frenaye, Grauer, Metzger, Milius, Nathanson, Quiat, Stafford, and Turnbull. So the motion was LOST.

16) The report of the Ad Hoc Committee on Amateur Radio and the Media was presented by Mr. Atkins, as Chairman. On motion of Mr. Mendelsohn, seconded by Mr. Haynie, it was VOTED that the guidelines set forth by the Ad Hoc Committee for use during Amateur Radio/Media contact are adopted, and the Committee is dissolved with the thanks of the Board for a job well done (applause).

17) Mr. Holladay, as Chairman, reported that the Special Study Committee on Advisory Committees had only one task remaining, that of refining the mission statement for the VHF Repeater Advisory Committee, and this would be presented at the 1989 Annual Meeting.

18) Mr. Wilson, as Chairman, reported briefly for the Part 97 Rewrite Committee. On motion of Mr. Quiat, seconded by Mr. Mendelsohn, it was VOTED that Counsel is directed to request a 90-day extension of the deadline for filing comments in the Notice of Proposed Rule Making, PR Docket 88-139, which proposes a rewrite of Part 97 of the FCC Rules.

19) The written report of the RFI Task Group was presented by its Chairman, Mr. Turnbull. Issues receiving the Committee's attention included the rewrite of Part 15 of FCC Rules, governing various unlicensed devices; preparation of a standard for appliance immunity; alleged interference by an amateur to the pacemaker of a neighbor; and FCC policies toward neighborhood radio frequency interference problems.

20) Mr. Mozley, as Chairman, reported for the Committee on the Biological Effects of Radio Frequency Energy. The Committee is preparing material on radio frequency safety for the *Microwave Book*, *The ARRL Handbook*, and the *Operating Manual*. Similar material was placed in the new *Antenna Book*, now at the printers. Material on RF safety has been added to the Novice and Technician syllabus and will be prepared for the question pool due on October 1. Research papers on radio frequency energy are being gathered by the Committee, and an article on RF safety is being prepared for *QST*.

21) The Board was in recess for luncheon at 12:05 PM, reconvening at 1:10 PM, with all persons hereinbefore mentioned present. Honorary Vice President L. Phil Wicker, W4ACY, joined the meeting at this point (applause).

22) A special technical report, *RF Energy Hazards in Amateur Radio*, was presented by Mr. Overbeck. It concluded with a number of recommendations, which will be taken into consideration by the Bio-Effects Committee.

23) Mr. Comstock, as liaison, presented the report of the ARRL Committee on Amateur Radio Digital Communications. On motion of Mr. Haynie, seconded by Mr. Butler, the following resolution was adopted:

WHEREAS, packet-radio digipeaters, network switches, computer based message systems and other network servers often share a limited set of designated frequencies, and

WHEREAS, the efficient use of such shared resources requires cooperation among servers and users within local areas and between adjacent areas, and

WHEREAS, each area of the United States has a local frequency coordinator having experience with the coordination of voice repeaters and some other VHF/UHF operations, and

WHEREAS, some frequency coordinators function not only as voice repeater coordinators but also as spectrum managers representing the user community in general, now therefore,

BE IT RESOLVED that the following guidelines are recommended:

1. It is the responsibility of the VHF/UHF spectrum management body to designate specific VHF/UHF frequencies for packet use, in coordination with other users and in consideration of the ARRL band-plans.

2. It is the responsibility of the packet-radio community in each frequency coordination area to determine the need for, and extent of, coordination of packet frequency use appropriate to the area, and to determine what body is competent to represent the needs of the amateur packet community. For example, this packet coordinating body may or may not be part of or subsidiary to the spectrum management body. Further, the packet coordinating body may determine that it is necessary only to establish guidelines for the general type of usage according to frequency or may find it desirable to coordinate certain specific network servers. Packet coordinating bodies are encouraged to cooperate with neighboring counterparts.

3. The spectrum management body and the packet coordinating body are encouraged to establish a permanent relationship such that the needs of the packet community and those of other communities continue to be fairly addressed by the spectrum management body.

4. The packet coordinating body should serve as packet-radio advisors to the spectrum management body, and serve as liaison between the frequency coordinator and the packet-radio community.

5. The packet coordinating body is encouraged to work with area packet groups in order to achieve an agreement on the orderly usage of the designated frequencies within that area and with counterparts in adjacent areas.

6. Packet radio groups within an area are urged to consult with one another and with the packet coordinating body on guidelines for uses of each frequency and the need, if any, to coordinate specific network servers.

24) The report of the Legal Strategy Committee was presented by its outgoing Chairman, Mr. Nathanson. Topics covered at a recent Committee meeting included repeater coordination, a system of arbitrating repeater disputes, a comprehensive discussion of covenant problems, market values of properties near amateur antennas, FAA restrictions on amateurs, and pending local antenna litigation.

25) Mr. Haynie, as Chairman, presented the report of the Publications Committee. Among its tasks were reviewing publication lead times for *QST* material; selection, review and approval of articles for publication; a revived *Operating an Amateur Radio Station* booklet; publication of *QST* editorial policy and a cumulative index;

and telemarketing, among other topics.

26) Mr. Frenaye, as Chairman, presented the report of the Education Task Force. There were extensive recommendations from each of the three Task Groups for elementary, secondary, and adult levels of education. There were also two extensive addenda to the report, one on a review of existing training materials and one on innovative ways to stimulate Amateur Radio Clubs in Elementary, Junior and Senior High Schools. There were also extensive recommendations from each of the three Task Groups for elementary, secondary and adult levels of education. The Board of Directors was in recess from 2:50 PM to 3:20 PM.

27) Mr. Wilson, as Chairman, reported briefly for the Election Committee, which has proceeded midway through its tasks. A further meeting will be held in August; some recommendations should be available for the next meeting of the Board.

28) Mr. Stafford, as Liaison, reported briefly for ANERCOM. That group, too, will have an in person meeting in August, supplementing the work which has been accomplished by correspondence.

29) Mr. Shrader, as Liaison, presented the report of the VHF Repeater Advisory Committee. Topics covered included 2.3 GHz band-plan, local coordination of digipeaters, possible procedural guidelines for frequency coordinators, a 33 cm band-plan, and clarification of rules for autopatches. At the conclusion of the report, Mr. Shrader expressed the thanks of all concerned to Karl Pagel, the outgoing Chairman, for his work with the Committee (applause).

30) Mr. Kanode, as Liaison, presented the report of the Contest Advisory Committee. The Committee recommended action on several items, including: a Novice/Technician entry category in the 10-Meter Contest; Novice Roundup and Field Day Rules to embrace newly licensed Canadian amateurs; changing the format of the Novice Roundup; and Maritime Mobile competition in the VHF/UHF Contests. A proposal to establish the "First ARRL RTTY Roundup" in January 1989 is presently under study.

31) Mr. Drake, as Liaison, presented the report of the DX Advisory Committee. Matters of interest to the Committee were: computerization of DXCC records; QSL card check points; country status of Western Sahara and Okino Tori-Shima; RTTY DXCC; and the case of an individual suspended from DXCC.

32) Mr. Vydareny, as Liaison, presented the report of the Public Service Advisory Committee whose topics were certification of Emergency Coordinators, ARRL training materials for Emergency Coordinators, and access to the 911 system. It was moved by Mr. Mendelsohn, seconded by Mr. Mark, that staff develop an entry level guide for Emergency Coordinators with a voluntary self-test included. On motion of Mr. Heyn, seconded by Mr. Olson, it was voted to POSTPONE consideration of the matter until the morrow.

33) Reaching Agenda Item 8, there was a preliminary report on the 1989 ARRL National Convention celebrating the 75th Anniversary of the League, by host Director Mr. Haynie.

34) The President invited proposals for the site of the 1990 ARRL National Convention. Mr. Grauer offered a presentation for Kansas City. Mr. Heyn presented the application of San Diego. A secret ballot was taken, and it was announced that a majority of the Directors had voted for the convention to be held at the Kansas City, Missouri Convention Center, June 8-10, 1990 under the auspices of the PHD Amateur Radio Association, Inc. (applause.)

35) It was moved by Mr. Metzger, seconded by Mr. Mark, that the 1991 National Convention be held in the Chicago area under the sponsorship of the Amateur Cross Link Repeater Club in July 1991. On motion by Mr. Frenaye, econded by Mr. Nathanson, it was voted to POSTPONE consideration of the matter indefinitely.

Director Stafford, KB6ZV, makes a point with Director Gay Milius, W4UG. After serving as Director and Vice-Director (and alternate Director) for 14 years, Gay has announced he will not run for reelection this year.

36) On motion of Mr. Harrison, seconded by Mr. Frenaye, the following resolution was unanimously adopted:

WHEREAS, new DXCC rules and awards were authorized at the 1988 Annual Board eeting, and

WHEREAS, these additions presented an increased work load to the Membership Communications Services Group and the DXCC staff, and

WHEREAS, the DX community has voiced approval of the implementation procedures set forth by staff, now, therefore

BE IT RESOLVED that the Board applaud the hard and diligent work of MCS Manager John Lindholm, DXCC Manager Don Search, and their dedicated staff.

37) The Board was in recess for dinner from 4:50 to 8:12 PM, reconvening with all persons hereinbefore mentioned present.

38) On motion of Mr. Mendelsohn, seconded by Mr. Hurlbert, it was unanimously VOTED that the 1987 ARRL International Humanitarian Award is conferred on the Reverend Michael F. Mullen, C.M., WB2GQW. (Applause)

39) It was moved by Mr. Frenaye, seconded by Mr. Stafford, that Rule 4, Rules and Regulations Concerning Affiliated Societies, be amended to remove the restriction on the name of a youth group club; specifically, in the second sentence, "In a Category 3 Society, affiliation status may be granted if the sponsor, faculty advisor, President or Trustee of the society is a licensed amateur and a League member, and where the society's name clearly shows that it falls within this grouping," to delete the last phrase. A roll-call vote being required, the question was decided in the negative, 4 votes in favor to 11 votes opposed. Those voting for the motion were Messrs. Frenaye, Nathanson, Quiat and Stafford. Those voting against the motion were Messrs. Butler, Drake, Grauer, Harrison, Haynie, Heyn, Mark, Mendelsohn, Metzger, Milius, and Turnbull. So the motion to amend the Rule was LOST.

40) At this point, 8:27 PM, Mr. Knochenhauer took the seat for Mr. Stafford. On his motion, seconded by Mr. Mendelsohn, it was VOTED that the Contest Advisory Committee study a change in the Field Day rules to provide 1) a bonus of 250 points to stations which are physically located in public areas such as city parks, school yards, shopping centers, etc., that have easy access by the general public, and; 2) a bonus of up to 250 points to be earned at the rate of one point for each non-ham related visitor at the Field Day site. Score will be based upon a signed "visitor log book." During the course of the above, Treasurer James E. McCobb, Jr., K1LLU, joined the meeting. Mr. Stafford resumed his seat at 8:36 PM.

41) It was moved by Mr. Milius, seconded by Mr. Heyn, that the Membership Services Committee study the feasibility of making ARRL Board meetings more open to the members. On motion of Mr. Metzger, seconded by Mr. Mendelsohn, it was voted to POSTPONE the matter indefinitely. Mr. Heyn, Mr. Frenaye and Mr. Nathanson requested to be recorded as voting against postponement.

42) Returning to Agenda Item 6(g), Treasurer McCobb presented his report. The League's portfolio, in the range of $5 million, is invested largely in fixed income securities of fairly short duration, three months to three years. Equity investments are a small part of the portfolio and are in blocks which generally do not exceed $35,000 for any particular company.

43) The Board was in recess from 8:56 PM to 8:37 AM on the morrow, reconvening in the same place with all persons herein before mentioned present. John F. Lindholm, W1XX, Manager of Membership Communications Services, joined the meeting at this point.

44) On motion of Mr. Haynie, seconded by Mr. Frenaye, it was unanimously VOTED that staff investigate the costs and method of implementation for the establishment of an "800" number for membership use to purchase products and/or purchase or renew membership,

and, if after review by the Publications Committee it appears feasible, to implement it.

45) On motion of Mr. Metzger, seconded by Mr. Mendelsohn, it was VOTED that the Board authorize the holding of a Central Division Convention, July 8-9, 1989, at Indianapolis, Indiana, to be sponsored by the Indianapolis Hamfest Association, an association of Amateur Radio clubs in the Central Indiana area.

46) On motion of Mr. Mark, seconded by Mr. Mendelsohn, it was VOTED that the 1987 Technical Excellence Award is given to Mr. C.J. Michaels, W7XC, and that he is awarded the Pewter Cup for his article, "Some Reflections on Vertical Antennas," which appeared in the July 1987 issue of *QST*. The Board of Directors thanks all Technical Advisors for their help to the amateur community throughout the year.

47) It was moved by Mr. Harrison, seconded by Mr. Mark, that the Editor of *QST* is requested to determine reader interest in the propagation forecast charts in *QST*, and if in his judgment, the space could be better utilized for some other purpose, to cease their publication. On motion of Mr. Nathanson, seconded by Mr. Mendelsohn, it was voted to amend the motion by deleting all after "charts in *QST*." The question then being on the motion as amended, the same was ADOPTED.

48) On motion of Mr. Mendelsohn, seconded by Mr. Nathanson, it was VOTED that the 1987 ARRL Professional Teacher of the Year Award be conferred jointly on Mr. Joseph Fairclough, WB2JKJ, and Mrs. Carole Perry, WB2MGP.

49) On motion of Mr. Grauer, seconded by Mr. Mendelsohn, it was VOTED that the Board authorize the holding of a Kansas State Convention, in Wichita, on October 1-2, 1988.

50) On motion of Mr. Frenaye, seconded by Mr. Stafford, it was VOTED, at 9:15 AM, that the Board sit as a Committee of the Whole to discuss advertising and product review policy; members of the staff other than Messrs. Sumner and Rinaldo were excused. The Committee arose and reported to the Board at 9:55 AM and the staff returned. At this point, Mr. Holladay took the Chair for Mr. Price.

51) On motion of Mr. Stafford, seconded by Mr. Heyn, it was VOTED that the ARRL Board of Directors approves the holding of an ARRL Pacific Division Convention in San Jose, California, on October 14-16, 1988 to be sponsored by the Santa Clara County Amateur Radio Association, an ARRL affiliated club.

52) It was moved by Mr. Milius, seconded by Mr. Nathanson, that the Public Relations Committee investigate the feasibility of providing support to local clubs in the area of developing classes for use on TV channels. On motion of Mr. Quiat, seconded by Mr. Heyn, it was voted to POSTPONE consideration of the matter for one hour.

53) It was moved by Mr. Nathanson, seconded by Mr. Mendelsohn, that the League shall offer repeater owners, trustees and repeater coordinators/spectrum managers its good services in arranging binding arbitration through the American Arbitration Association or similar forum. It was moved by Mr. Hurlbert, seconded by Mr. McCobb, that the motion be amended by adding at the end, "But shall take no part whatsoever in the actual arbitration process; it shall be the policy of the ARRL that no Officer or Director of the ARRL shall serve as an arbitrator/mediator." Mr. Nathanson rose to a point of order: the amendment was at contrary purposes to the motion being amended. The Chair ruled that the motion was in order. Mr. Nathanson appealed the ruling of the Chair, but on vote of the Board, the ruling was sustained. The question on the amendment then being called, the same was LOST. Whereupon, the original question being put to the Board, the motion was ADOPTED.

54) The Chair recognized Honorary Vice President George Hart, W1NJM, who entered the meeting at 10:23 AM (applause).

55) On motion of Mr. Butler, seconded by Mr. Quiat, it was VOTED that approval is granted for an ARRL State Convention to be held in Albany, Georgia, on June 16-17, 1989.

56) On motion of Mr. Heyn, seconded by Mr. Haynie, it was unanimously VOTED that the Volunteer Resources Committee and the Publications Committee jointly study ways to encourage affiliated clubs to more actively promote and sell membership supplies and League publications, particularly at hamfests and other events that such clubs sponsor. The Board was in recess from 10:25 to 10:50 AM, at which point Mr. Price resumed the Chair.

57) On motion of Mr. Olson, seconded by Mr. Mendelsohn, it was VOTED at 10:51 AM, that the Board of Directors sit as a Committee of the Whole to discuss international matters. During the course of these discussions, the Board was in recess for luncheon from 11:32 AM to 1:06 PM, reconvening with all persons hereinbefore mentioned present except Messrs. Gmelin and Hart. Deliberations as a Committee of the Whole continued until 1:34 PM, at which point the Committee arose and reported to the Board. On motion of Mr. Milius, seconded by Mr. Turnbull, it was VOTED to adopt the report of the Committee. Mr. Nathanson requested to be recorded as voting against adoption.

58) The Board then considered Mr. Milius' motion at Minute 52, action on which had been postponed at that time, and the same was ADOPTED. Accordingly, the Public Relations Committee will investigate the feasibility of providing support to local clubs in the area of developing classes for use on TV channels.

59) The Board then considered Mr. Mendelsohn's motion at Minute 32, action on which had been postponed on Thursday. On motion of Mr. Heyn, seconded by Mr. Mark, it was VOTED that the matter of an entry level guide for Emergency Coordinators with a voluntary self-test included is referred to the Publications Committee.

60) The Board was in recess from 1:53 until 2:37 PM, during which time members had the opportunity, at the invitation of the Administration and Finance and Membership Services Committees, to hear a presentation on affinity credit cards. At this point, Mr. Kanode took the seat for Mr. Milius.

61) It was moved by Mr. Mendelsohn, seconded by Mr. Quiat, that the following be adopted:

1. After due consideration by the ARRL, it has been determined that the authority of the following listed frequency coordinators is derived from the voluntary participation of the entire amateur community in the areas they serve.

2. The ARRL, in recognition of the specific terms of the FCC's Report and Order in PR Docket 85-22, agrees that there can be only one recognized frequency coordinator per band per geographic area.

THEREFORE, the following are acknowledged, by virtue of the recognition accorded them by the entire amateur community, as the sole frequency coordinators in their respective jurisdictions:

ALABAMA—Alabama Repeater Council, Inc.

ALASKA—Mel Bowns, KL7GG (western interior and northern)—Jerry Curry, KL7EDK (southeast area)—Edward Schilling, W6SJJ

ARIZONA—Ralph Turk, W7HSG

ARKANSAS—Rick Mobley, WB5FDP

CALIFORNIA—(northern) Northern Amateur Relay Council (southern - 29, 52, 450 MHz, ATV and Microwave)—Southern California Repeater and Remote Base Association (southern-144 MHz)—Two Meter Area Spectrum Management Association

COLORADO—Colorado Council of Amateur Radio Clubs—Repeater Coordination Committee

CONNECTICUT—See New York City-Long Island

DELAWARE—See Maryland

DISTRICT OF COLUMBIA—See Maryland

FLORIDA—Florida Repeater Council, Inc.

GEORGIA—SouthEastern Repeater Association

HAWAII—Hawaii State Repeater Advisory Council

IDAHO—(south and east) Ronnie E. Moss, K7ENE (north and west) Larry E. Smith, W7ZRQ (panhandle and eastern Washington) Doug Rider, KC7JC

ILLINOIS—Illinois Repeater Association; Member, Mid-America Coordination Council

INDIANA—(50 MHz) David A. Epley, N9CZV (144 MHz) Walt Breining, N9WB (220 MHz) Paul L. Schmidt, K9PS (440 MHz) Richard E. Shelton, N6RS

IOWA—Iowa Repeater Council; Member, Mid-America Coordination Council

KANSAS—(Except Kansas City metro area) Kansas Amateur Repeater Council; Member, Mid-America Coordination Council

KENTUCKY—(eastern) SouthEastern Repeater Association (remaining areas) Larry Malone, KC4TX

LOUISIANA—Louisiana Council of Amateur Radio Clubs

MAINE—See Massachusetts

MARYLAND—The Middle Atlantic FM and Repeater Council

MASSACHUSETTS—New England Spectrum Management Council

MICHIGAN—(lower) Michigan Area Repeater Council (upper Peninsula) Upper Peninsula Amateur Radio Repeater Association

MINNESOTA—Minnesota Repeater Council

MISSISSIPPI—J.S. Grantham, N5DWU

MISSOURI—(Except Kansas City Metro Area) Missouri Repeater Council; Member, Mid-America Coordination Council

MONTANA—Repeater Advisory Committee of Montana

NEBRASKA—Member, Mid-America Coordination Council

NEVADA—(northern) CARCON (southern) R. Scott Fowler, WA7GIV

NEW HAMPSHIRE—See Massachusetts

NEW JERSEY—(northern) See New York (NYC-LI) (southern) See Pennsylvania (eastern)

NEW MEXICO—New Mexico Frequency Coordinating Committee

NEW YORK—(New York City-Long Island, northern New Jersey and Connecticut) Tri-State Amateur Repeater Council (TSARC) (upstate-except: [Clinton and N. Essex Counties—see Vermont] [Franklin and St. Lawrence Counties—St. Lawrence Valley Repeater Association]) Upper New York Repeater Council (western New York [west of Rochester]) Western New York-Southern Ontario Repeater Council

NORTH CAROLINA—SouthEastern Repeater Association

NORTH DAKOTA—William Ockert, WBØVHW

OHIO—Ohio Area Repeater Council, Inc.

OKLAHOMA—Oklahoma Repeater Society, Inc.; Member, Mid-America Coordination Council

OREGON—(also Vancouver, WA) Oregon Region Relay Council, Inc.

PENNSYLVANIA—(eastern Pennsylvania and Southern New Jersey) The Philadelphia Area Repeater Council (TPARC) (western) Western Pennsylvania Repeater Council

PUERTO RICO—Puerto Rico ARC
RHODE ISLAND—See Massachusetts
SOUTH CAROLINA—SouthEastern Repeater Association
SOUTH DAKOTA—Member, Mid-America Coordination Council
TENNESSEE—SouthEastern Repeater Association
TEXAS—Texas VHF-FM Society, Inc.
UTAH—Utah VHF Society
VERMONT—(also Clinton and N. Essex Counties of New York) Vermont Independent Repeater Coordinating Committee
VIRGINIA—(northern) See Maryland (southern) SouthEastern Repeater Association
WASHINGTON—(eastern, also Idaho panhandle) Doug Rider, KC7JC (western) Western Washington Amateur Relay Association (Vancouver area) Oregon Region Relay Council, Inc.
WEST VIRGINIA—SouthEastern Repeater Association (eastern panhandle) See Maryland
WISCONSIN—Wisconsin Association of Repeaters; Member, Mid-America Coordination Council
WYOMING—Wyoming Council of Amateur Radio Clubs

3. In those few geographic or political areas in which no clear determination of the desired repeater coordinator/spectrum manager exists or the existing coordination mechanism is in significant dispute, based on a Commission determination, then no coordinator is, or shall be, listed in the *ARRL Repeater Directory* until, by a settlement of differences within the area, a recognition of a single coordinator can be made by mediation, arbitration or other means.

4. The President, Executive Vice President and Counsel, together with such other persons as they deem necessary, shall solicit from the FCC a reaffirmation of the principles set forth in PR Docket 85-22 in support of frequency coordination efforts. It was moved by Mr. Heyn, seconded by Mr. Nathanson, that the motion be amended by striking all of the text except paragraph 4, but the motion to amend was LOST. Whereupon, a roll-call vote being ordered on request, the motion was adopted, ten votes in favor to one vote opposed, with four abstentions. Those voting in favor were Messrs. Butler, Drake, Frenaye, Harrison, Haynie, Mark, Mendelsohn, Milius, Quiat and Stafford. Mr. Heyn voted nay and Messrs. Grauer, Metzger, Nathanson and Turnbull abstained. So the motion was ADOPTED.

62) It was moved by Mr. Heyn, seconded by Mr. Stafford, that the Membership Services Committee, with advice from the VHF Repeater Advisory Committee and the Legal Strategy Committee, be tasked to develop a set of recommended procedural and organizational guidelines for frequency coordinators. These guidelines shall be prepared in time for review at the 1989 Annual Meeting. A roll-call vote being ordered on request, the question was decided in the negative. Those voting in favor were Messrs. Frenaye, Heyn, Quiat and Stafford. Those voting nay were Messrs. Butler, Drake, Grauer, Harrison, Haynie, Mark, Mendelsohn, Metzger, Milius, Nathanson and Turnbull. So the motion was LOST.

63) On motion of Mr. Butler, seconded by Mr. Turnbull, it was VOTED that the President is directed to appoint an Ad Hoc Committee charged with the responsibility of completing the planning for the role of ARRL as host of the 1989 Region 2 IARU Conference in Orlando, Florida.

64) At this point, 3:20 PM, Mr. Price resumed the Chair, and Mr. Knochenhauer took the seat for Mr. Stafford.

65) On motion of Mr. Mark, seconded by Mr. Mendelsohn, it was VOTED that the 1987 Hiram Percy Maxim Award is conferred on Stacey L. Garner, KA9WDE. During the course of the above, Mr. Stafford resumed his seat.

66) On motion of Mr. Mendelsohn, seconded by Mr. Drake, it was VOTED that the 1987 ARRL Instructor of the Year Award be conferred on Larry Odoms, K7NUL.

67) On motion of Mr. Drake, seconded by Mr. Haynie, it was VOTED that the ARRL endorses and supports in principle the effort to include a competitive Amateur Radio activity in the program of the 1990 Goodwill Games in Seattle.

68) On motion of Mr. Stafford, seconded by Mr. Mendelsohn, the following resolution was ADOPTED:

WHEREAS, there appears to be a need to make the general public more aware of the existence, purposes and benefits of Amateur Radio, now therefore,

BE IT RESOLVED, that the Board of Directors hereby establishes an "Amateur Radio Public Awareness Day." Further, that staff is tasked with the following:

1. Determine the most opportune time for such an Amateur Radio Public Awareness Day, taking into consideration other operating events;

2. Develop a set of guidelines or recommendations for setting up and operating a public display related to Amateur Radio. The guidelines should include previously published articles or papers on how to operate a public display on Amateur Radio and suggestions by groups or individuals who have operated such an Amateur Radio display. Such guidelines shall include a listing of the written materials and handouts available to such groups for the promotion of Amateur Radio;

3. Upon request, make available to any Amateur group desiring to operate a public Amateur Radio display, the guidelines and handouts referred to above;

4. Take additional steps necessary and appropriate to promote Amateur groups' participation in said Amateur Radio Public Awareness Day programs.

69) The Board was in recess from 3:43 to 4:02 PM during which time Messrs. Hurlbert and Atkins departed from the meeting, and Mr. Gmelin returned to it.

70) On motion of Mr. Kanode, seconded by Mr. Stafford, it was VOTED that the appropriate committee evaluate all existing national Memoranda of Understanding, especially addressing the issue of liability insurance coverage for amateurs who operate with them (the served agencies) and under what conditions the insurance is activated.

71) It was moved by Mr. Metzger, seconded by Mr. Haynie, that the Executive Vice President negotiate with appropriate companies for affinity cards, that is, credit cards bearing the emblem and name of ARRL, which can be offered to ARRL members. Half of all royalties to be realized from these cards are reserved for the Fund for the Defense of Amateur Radio Frequencies. After extensive discussion, on motion of Mr. Heyn, seconded by Mr. Grauer, it was VOTED to terminate debate. A roll-call vote being ordered on request, the question was decided in the affirmative, ten votes in favor to five opposed. Those voting aye were Messrs. Butler, Drake, Frenaye, Haynie, Heyn, Mendelsohn, Metzger, Quiat, Stafford and Turnbull. Those voting nay were Messrs. Grauer, Harrison, Mark, Kanode, and Nathanson. So the motion was ADOPTED.

72) On motion of Mr. Haynie, seconded by Mr. Holladay, it was unanimously VOTED that, consistent with Board policy adopted at Minute 34 of the 1988 Annual Meeting, the ARRL Board urges the ARRL Foundation to reimburse expenses for Shuttle Amateur Radio Experiment (SAREX) hardware incurred by the Johnson Space Center Amateur Radio Club to a limit of $8,000, in support of the shuttle mission on which Dr. Ron Parise, WA4SIR, is scheduled to fly.

73) On motion of Mr. Mark, seconded by Mr. Harrison, it was VOTED that the 1989 Annual Board Meeting begin on the third Friday in January, that is, January 20.

74) It was moved by Mr. Mendelsohn, seconded by Mr. Drake, that a standard operating procedure for formation of new Sections be adopted as follows: Should members of a Section desire to form a new Section, or Sections, from an existing Section, or Sections, the following procedures shall apply.

1. The case is made to the Division Director by members and/or Section Managers for dividing present Sections. The case will include suggested county or natural geographic boundary lines.

2. If the Director decides the case is meritorious, then the Director presents the case to the Volunteer Resources Committee for review. The Volunteer Resources Committee forwards it with a recommendation to the Executive Committee. The Executive Committee reports to the full Board, with recommendation for action. Maximum publicity, using all available media, will be given (during this process) to the affected section.

3. At any stage, upon petition of 10% of the members voting in the previous Section election, a referendum shall be held on the question.

4. If the referendum favors the creation of a new Section or Sections, and the Board concurs, then an interim Section Manager shall be appointed by the Field Services Manager in consultation with the Division Director, and the new Section is worked into the next available Section Manager election cycle, following established routine. On motion of Mr. Kanode, seconded by Mr. Heyn, it was voted to POSTPONE consideration of this matter indefinitely.

75) It was moved by Mr. Mendelsohn, seconded by Mr. Mark, that the Rules and Regulations of the Field Organization be amended as follows:

"7(d) The Field Services Manager, at the request of, or in consultation with, the affected Section Manager, and with the agreement of the Executive Vice President, may cancel the appointment of any non-elected member of the Field Organization." Paragraphs 7(d) (e) and (f) would be renumbered to (e) (f) and (g), respectively. After discussion, however, Mr. Mendelsohn withdrew the motion with the permission of his second.

76) On motion of Mr. Frenaye, seconded by Mr. Kanode, it was VOTED that the ARRL Board establish the goal to double the number of ARRL-affiliated Amateur Radio Clubs already existing in schools during the next three years and that staff members develop a plan to reach this goal by the end of 1991. At this point, 5:04 PM, Mr. Milius resumed his seat.

77) It was moved by Mr. Nathanson, seconded by Mr. Milius, that the following resolution be adopted:

WHEREAS, the entire world and some American possessions are active on 40-meter single sideband on the 7075-7100 kHz portion of the 40-meter band, and

WHEREAS, the American Amateurs are disadvantaged in international contacts as a result of this condition, and

WHEREAS, the use of this portion by American Amateurs is reasonable and just, now therefore,

BE IT RESOLVED that Communications Counsel is directed to forthwith petition the FCC to allow Advanced and Extra-Class Amateurs SSB privileges in the 7075-7100 kHz portion of the 40-meter band. A roll-call vote being ordered on request, the question was decided in the negative, three votes in favor to twelve votes opposed. Those voting in favor were Messrs. Harrison, Milius and Nathanson. Those voting nay were Messrs. Butler, Drake, Frenaye, Grauer, Haynie,

Heyn, Mark, Mendelsohn, Metzger, Quiat, Stafford and Turnbull. So the motion was LOST.

78) On motion of Mr. Nathanson, seconded by Mr. Metzger, it was VOTED that the Publications Committee study the possibility of placing ARRL publications in national booksellers stores.

79) On motion of Mr. Mendelsohn, seconded by Mr. Harrison, it was VOTED that the Volunteer Resources Committee review the Simulated Emergency Test to determine its timeliness and utility.

80) On motion of Mr. Mendelsohn, seconded by Mr. Frenaye, it was VOTED that the VHF Repeater Advisory Committee examine the merits of encouraging trustees of all repeaters that have an autopatch to also provide a readily accessible method for connecting to police emergency telephone (911) services.

81) On motion of Mr. Mendelsohn, seconded by Mr. Nathanson, it was VOTED that the Executive Vice President and the Editor of *QST* study the desirability of an opinion/editorial (op-ed) column in *QST*. If the idea is found to be desirable, the editor of *QST* shall implement an "op-ed" feature. A report on their findings shall be given to the 1989 Annual Meeting of the Board of Directors.

82) It was moved by Mr. Mendelsohn, seconded by Mr. Nathanson, that the Board of Directors establishes a National Traffic System Service Award to be presented to those who furnish assistance in the way of FM repeaters, digipeaters or similar systems through which NTS traffic is allowed to flow. This award shall be presented by ARRL Headquarters, upon the recommendation of a Section Manager, to the trustee and support staff of the system being recognized.

Criteria: The system must exhibit sustained support of National Traffic System operation for at least one year.

Award application: Section Traffic Manager sends a letter of recommendation to the Section Manager, who further recommends the trustee/support group to the Field Services Department Manager. The Field Services Department then sends the certificate to the Section Manager/Section Traffic Manager for presentation. On Motion of Mr. Stafford, seconded by Mr. Heyn, it was voted to POSTPONE consideration of this matter until completion of a study of a similar proposal by the Volunteer Resources Committee.

83) It was moved by Mr. Mendelsohn, seconded by Mr. Nathanson, that the appropriate committee study furnishing both current and new Life Members with a plastic membership card similar in size to a credit card to foster pride in belonging to ARRL. The card should have an appropriate League symbol and the name, call and membership number of the Life Member; but the motion was LOST. The Board was in recess from 5:31 to 5:44 PM.

84) It was moved by Mr. Frenaye, seconded by Mr. Stafford, that the Board adopt the recommendations of the ARRL Education Task Force to revise the order of presentation of material in all ARRL license manuals and Training Guides, and that the Volunteer Examiner Coordinators Question Pool Committee be urged to make contemporaneous changes in its materials. On motion of Mr. Haynie, seconded by Mr. Heyn, the matter was referred to the Publications Committee.

85) On motion of Mr. Stafford, seconded by Mr. Milius, it was VOTED that the Membership Services Committee study ways of encouraging Novice and Technician licensees to operate in the CW mode.

86) On motion of Mr. Mendelsohn, seconded by Mr. Nathanson, it was unanimously VOTED that the Board of Directors thanks the staff, especially Robert Schetgen and Maty Weinberg, for their support of the Board Meeting. (Applause)

87) There followed an opportunity for all present to make final comments. Mr. Milius observed that this would be his last meeting, since he is not running for re-election after having served eight years on the Board, and expressed thanks for the courtesies extended to him during that time (applause). Mr. Weinstock announced that he, too, was not seeking reelection, since he is contemplating entering a doctorate program, which might well occur outside the New England Division. He also expressed his appreciation for the courtesies extended by Board members (applause). There being no further business, on motion of Mr. Milius, the Board adjourned sine die at 6:30 PM. (Total time in session as a Board: 11 hours, 49 minutes; as a Committee of the Whole: 1 hour, 49 minutes.)

Respectfully submitted,
Perry Williams, W1UED
Secretary

Strays

EXOTIC DX CALLING

☐ I was fishing for DX on 20 meters CW one evening when I heard a weak and raspy station calling CQ.

Chunker ching chunker ching, chunk chunker ching kerchunk, he went. On and on, then more of the same.

Sometimes his CQ sounded like several stuttering Ns (chunker chings) run together, but he kept up a certain rhythm and had an interesting swing in his fist.

I smelled exotic DX from the beginning, and visualized some indigenous genius on a remote island who had salvaged a few radio parts from a crashed WW II bomber. Now, he had at last gotten everything hooked up to a random wire, which by mere happenstance was throwing a lobe in my direction.

Occasionally he went key-down, as if he was at last ready to send the DE, identify himself and end his call-up. I'd slide to the edge of my chair and grab my main tuning knob in readiness, because with his rig steady keyed for even a moment his final tank circuit began picking up oscillations and he consequently zoomed out of my bandpass. Then I had to chase his slippery signal up the band.

But, instead of sending DE and his call sign, he would send what I imagined to a be sloppy DX, and go right to calling CQ. You know the kind of guy I'm talking about.

I left my volume up high and rushed to the kitchen for a cold soda pop. As I slammed the refrigerator door, the DX guy went crazy; I ran for my knurled knobs!

After a lengthy steady carrier, he finally sent DE followed by probably the most exotic call sign ever uttered. He sent it twice, garbled, with all his gruff dits and dahs run together, then fell silent.

As he sent, I twiddled my dial and followed him up-band 20 kHz! With my other hand, I scribbled down what I heard and also committed it to memory.

When I was sure he had stopped sending, I quickly switched my Deluxe Electronic Keyer to "Semi-Auto," and with a very risky 275 mils on my final plate began pounding out a call on the dah side of my paddle at about 10 WPM.

I sent everything I could imagine that sounded like what I had just heard. I imitated his sloppy swing and tried to develop his unique rhythm as I went along. With a few variations, my calls to him went something like this:

ZM91CZ/JX9JVQ? BN9FQY/MM7? DE N7IGP N7IGP K

I waited through an anxious period of silence before chancing each call, grateful that no one else was butting in. Evidently I was the only op who had the DX station, or else the others had gotten bored and moved on.

I kept calling for ten minutes in the general area of the band where the rare DX station had transmitted.

Suddenly he went key-down, producing a wavering crescendo of noise. I figured he was tweeking up his rig, getting ready to answer me!

Just as his signal climbed in intensity to a solid S9 on my meter, I heard a loud sizzling and snapping sound in my weak left ear.

At first, I optimistically imagined the distant station had asked me QRZ? or sent IMI.

But then, in my peripheral vision I perceived several bright flashes of light emanating from behind the narrow vent at the bottom front of my refrigerator. This was accompanied by some more sizzling sounds, several little blasts of smoke and a heady whisp of ozone.

At that moment, an ancient fuse on my main line blew out, so everything went dead, even my HF rig.

So there I sat in darkness and wonderment.

Well, I never got a QSL card from the guy. But framed on the wall of shack alongside the other cards you'll see a service call/repair bill from a local appliance repair shop for $47.75.

It constantly reminds me of the day I worked my refrigerator.—*Jack M. Fosmark, N7IGP*

MOVING, UPGRADING YOUR CALL?

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

Happenings

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

ARRL Files Comments on Restrictive Antenna Covenants

It is usually not the practice of the ARRL to become involved in FCC dockets and rule makings outside of the scope of direct interest to amateurs. However, FCC Docket 88-138 is an exception.

Docket 88-138 is an FCC Inquiry into possible adverse effects to viewers when cable television companies do not carry all of the local broadcast stations. In the past, the FCC has tried to require cable companies to provide an "A-B switch," with which the viewer could switch between the cable system and his outside antenna to receive local stations not on his cable system.

How does this affect amateurs? In order to receive the broadcast station not carried by his cable system, the television viewer usually must use an outside antenna. The point of the ARRL comments is that restrictive outside antenna covenants limit the off-the-air reception of broadcast television signals in the same way they prohibit or seriously limit amateur communications. League studies show that antenna covenants began to proliferate in the early to mid-1970s, during the heyday of the Citizen's Radio Service (CB), when rooftop antennas for CB became numerous.

Dr Wayne Overbeck, N6NB, ARRL Vice Director of the Southwestern Division, has conducted research on restrictive antenna covenants in new housing developments near Los Angeles, Dallas/Ft Worth and San Francisco. His research paper on this subject, presented at the 1986 Western Communications Educators Conference and published in the Winter 1987-88 issue of *Mass Comm Review*, is "Communications Policy-Making by Real Estate Developers: The 'Must Carry' Rule, A/B Switches and Deed Restrictions."

The ARRL's comments cite Overbeck's findings and include a copy of his report. According to the study, in the Los Angeles area "Every single new housing development in Orange or Ventura County was found to have a deed restriction prohibiting all outdoor antennas. Only in the more rural and inexpensive areas of Riverside County was there a variation in the pattern."

Furthermore, many of the deed restrictions that Overbeck examined contained virtually identical language forbidding antennas. This suggests that real estate developers have reached a consensus that outdoor antennas should be prohibited, and that such language has become standardized among the law firms who draft declarations of covenants for builders.

Not only are new housing developments forbidding outside antennas, but more ominously, planned communities consisting of multiple developments governed by one master declaration of covenants can effectively prohibit outside antennas in entire towns!

The study points out that "...real-estate developers could eventually limit the [non-cable] television viewing alternatives for a large percentage of the population. In the end, homebuilders, not the FCC or even the free marketplace, might determine the fate of the competing electronic communication technologies by denying some an adequate customer base..."

The study in the Dallas/Ft Worth area showed nearly one-half of the developments either prohibited outdoor antennas altogether or imposed severe height restrictions. An additional one-third allowed one radio or TV receiving antenna per lot. Only rural, large-acreage subdivisions some distance from Dallas had no antenna prohibitions. His studies in the San Francisco area (Contra Costa County) showed antenna restrictions in 15 of 18 new developments, with 9 prohibiting antennas altogether and 5 requiring architectural control board or homeowner association approval. One development allowed outdoor antennas until cable television was installed.

Our comments conclude that "the proliferation of restrictive covenants makes it impossible to cast the issue aside by calling them 'private contractual agreements'; there is no alternative. The covenants become contracts of adhesion, with no reasonable means of accommodation for television viewing short of cable subscription...the ad hoc regulation of interstate communication by covenant is so extensive as to require the Commission's immediate attention." ARRL comments were filed July 8.

ARRL FILES COMMENTS AGAINST SSB ON 30 METERS

The ARRL has filed comments opposing a petition (RM-6363) filed by Anthony Sivo, W2FJ, to permit SSB operation in the 30-meter (10.1-10.15 MHz) band. In his petition, Sivo contended that the band is underutilized because phone emissions are not permitted there.

The ARRL's comments took issue with Sivo's statements that this band is underutilized and said that a "great deal of amateur communication is conducted 24 hours per day" in this band. We noted that the 30-meter band is allocated to the fixed service outside of the US on a primary basis and amateurs are not allowed to cause "harmful interference" to this service. Thus "the primary obligation of the Amateur Radio Service on this band... is not to load it 'to the full extent possible' as the petition would have it. Rather the obligation is to use it in such a manner as to protect against interference to ongoing fixed station use."

In his petition, Sivo noted that some countries permit SSB operation on the 30-meter band. The League responded by saying that this was true only because these countries do not provide subbands for different emissions and "such operation is not in accordance with the band plan for the thirty-meter band adopted worldwide by the International Amateur Radio Union (IARU). The IARU band plan is adhered to *almost* universally."

The ARRL also cited a 1980 survey in which the amateur community was asked what the uses and subdivisions of the 30-meter band should be. "Of 610 written comments received at League Headquarters, 71% of the respondents suggested that either A1A and F1B emissions only in the 50-kHz wide band should be allowed."

The comments concluded by noting that the FCC had expanded HF phone bands in 1983 and that the 24-MHz band offered a 60-kHz phone segment. "There is no showing, in the instant petition or otherwise, that the creation of a telephony subband at thirty meters is in any sense necessary or desirable. In summary, the League believes that the instant petition does not warrant further Commission consideration, and requests it be denied."

HAVE YOU WRITTEN YOUR CONGRESSMEN YET?

Your assistance is urgently needed! As reported in "Congressional Resolutions Support Amateur Radio" (August 1988 *QST*, page 60), two Concurrent Resolutions are presently "in processing" concerning Amateur Radio: one in the House of Representatives (H Con Res 317) and the other in the Senate (S Con Res 127). These resolutions express a "sense of the Congress" in general support of Amateur Radio. In order for these Resolutions to be

accepted, 218 cosponsors are required in the House and 51 in the Senate, a majority in each body.

Please take a few moments to write a short note to your Congressional representatives (perhaps on a QSL card!) asking them to cosponsor these resolutions. If they are already cosponsors, thank them for supporting these resolutions and Amateur Radio.

This is a current list of the cosponsors of H Con Res 317, introduced by Rep Robert Dornan (R-CA): Nancy Johnson R-CT; John Rowland R-CT; Amory Houghton R-NY; Edolphus Towns D-NY; Delbert Latta R-OH; George Hochbrueckner D-NY; Dennis Hastert R-IL; Bill Schuette R-MI; Robert Roe D-NJ; Frank Horton R-NY; Robert C. Smith R-NH; Clay Shaw R-FL; Peter DeFazio D-OR; Earl Hutto D-FL; Bob Traxler D-MI; Helen Bentley R-MD; Jerry Lewis R-CA; Tom Robinson D-AR; Pat Roberts R-KS; Jack Davis R-IL; Manuel Lujan R-NM; Ben Campbell D-CO; Dan Coats R-IN; Lynn Martin R-IL; Bill Clinger R-PA; James Florio D-NJ; Bill Emerson R-MO; Charlie Rose D-NC; and Bob Lagomarsino R-CA. The Senate Resolution introduced by Sen. Pete Wilson (R-CA) has two cosponsors: Bob Dole R-KS and Dale Bumpers D-AR.

The complete texts of both House and Senate Resolutions are available by sending a business size SASE with your request to the Regulatory Information Branch, ARRL HQ.

FCC FINES THREE FOR ILLEGAL OPERATION

According to an FCC news release, three New York City residents have been fined a total of $3750 for illegal shortwave radio operation between New York City and the Dominican Republic. The Commission inspected the three stations in April and May and found them operating just outside the amateur 20-meter band without valid FCC radio station licenses. The three stations were apparently being used to help transfer money between the United States and the Dominican Republic.

The illegal transmissions were detected by the FCC's national monitoring network; such unlicensed operation is a violation of Section 301 of the Communications Act, and operators are subject to fines of up to $100,000 and/or one year in prison.

FCC "LUNCHEON" MEETING HELD

The FCC's Consumer Assistance and Small Business Division of the Office of Public Affairs recently sponsored a "brown bag" luncheon. The get-together was hosted by FCC Private Radio Bureau Chief Ralph Haller.

A number of topics of interest to the Amateur Radio community were discussed during the luncheon, and a brief overview of the most important items is included here.

FCC-Issued Call Signs Update

The following is the FCC listing of "just-issued" amateur call signs as of July 1.

District	*"A" Extra*	*"B" Advanced*	*"C" Tech/Gen*	*"D" Novice*
Ø	WKØB	KEØWN	NØJMN	KBØCYK
1	NS1G	KC1KC	N1FVG	KA1SIH
2	WI2D	KE2HU	N2IJP	KB2GAX
3	NQ3T	KD3IJ	N3GIW	KA3TJA
4	AB4IW	KM4DY	N4TFY	KC4GAT
5	AA5GR	KG5LG	N5MUL	KB5GTF
6	AA6JH	KJ6IV	N6SOW	KB6ZBI
7	WQ7F	KF7LM	N7LIA	KB7FIZ
8	WI8F	KE8ST	N8JRE	KB8FEJ
9	NZ9R	KE9LN	N9HPL	KB9BDW
Guam	KH2K	AH2BY	KH2DH	WH2ALQ
Hawaii	**	AH6JC	NH6PS	WH6BZC
Alaska	**	AL7KB	NL7OF	WL7BRV
US Virgin Is	KP2Y	KP2BN	NP2CR	WP2AGA
Puerto Rico	**	KP4PK	WP4PX	WP4IBR

**All 2 × 1 calls have been issued in the district.

Haller spoke on the status of Volunteer Examining in Amateur Radio and stated, "there is tremendous interest in being a VE... We're most appreciative of the tremendous untiring efforts of the VECs and VEs. What a tremendous improvement over the old system where you had to go to an FCC office."

The PRB-3 call-sign inquiry "is under active consideration," and a decision should be made in the near future, according to Haller.

Haller also spoke briefly on Novice Enhancement and its effects on decreasing dropouts and improving license upgrading among Amateur Radio operators.

The physical quality of Amateur Radio licenses was also discussed. There will be a study to ascertain alternatives in the printing of Amateur Radio licenses hopefully to develop a new form which is more appropriate for the personal effort gone into earning the license.

Regarding the Part 97 rewrite, the audience asked Haller about the regulation of RFI susceptibility in consumer products and the lack of procedures in the proposed rules to ensure amateurs' rights of due process in RFI disputes. Haller responded, "I urge you to comment in the [Part 97 rewrite 88-139] docket on this. The Commission sometimes has to look at what is the effect of the amateur operation on the community. If an amateur is on the air and wiping out 500 homes because the ham is getting into a cable TV system, one of the immediate ways to rectify that problem and pacify the town council is to ask the amateur to shut down. Generally, the first approach is the voluntary approach. This would be a secondary approach, and one that we would hope would not be long term... [but would] give immediate relief to a tough situation."

Haller concluded by saying, "It is very important that you keep up with what the Commission is doing, not only in the Amateur Service, but also in services that may have some kind of relationship with the Amateur Radio Service."

IS YOUR HAM LICENSE HARD TO READ?

Here's a reminder to those who receive their Amateur Radio license in the mail, expectantly tearing open the official-looking envelope, only to find that they are unable to read the call sign!

The licenses are typed on carbon copies already in the mailer—a money-saving measure for the FCC—at times making for "difficult copy" by the amateur on the receiving end!

If you are thinking of going over the call with a pencil to darken it up, *don't*! *Any* alteration to the license automatically voids it. The "enhanced" license, if presented to a VE team for license upgrade testing, will probably be rejected.

If your license arrives in "unreadable" condition, simply request a duplicate license from the FCC, Box 1020, Gettysburg, PA 17326, explaining the circumstances.

FCC LICENSING FIGURES

FCC licensing figures as of the end of May show that more new amateur licenses were issued during the first five months of this year than in any recent year except 1987 (which had an unusually large number during May, the result of people slipping under the wire before the Novice Enhancement rules took effect). We've welcomed 10,743 newcomers to our ranks in the first five months of this year.

Even more impressive, there were 11,941 upgrades during the same five-month period. This is more than twice the number of upgrades four years ago and is an 18% increase over the same period last year.

ARRL ADMINISTRATIVE HQ ANNIVERSARY

It was 25 years ago that the address for

the ARRL Administrative Headquarters changed forever from 38 LaSalle Road, West Hartford. Beginning July 1, 1963, members were asked to use the Newington address—a change to a larger, more modern facility that they themselves had made possible through their contributions to the Building Fund.

As the 25th anniversary of the dedication of what many members still think of as the "new" building approached, and with another fundraising project underway for the renovation of W1AW, it occurred to ARRL EVP Dave Sumner, K1ZZ, that there was no visible acknowledgment at Headquarters of the support members had given to the Building Fund. Accordingly, a large brass plaque has now been installed outside the main entrance with this inscription:

ARRL ADMINISTRATIVE HEADQUARTERS

Construction was made possible by the voluntary contributions of thousands of members in 1962-63.

This Plaque was placed in grateful appreciation to them on the 25th anniversary of the building's dedication. July 1, 1988.

MICHIGAN MAN SENTENCED FOR ILLEGAL CB OPERATION

According to an FCC Public Notice, Bradford Mitchell, of Niles, Michigan, was sentenced to one-year imprisonment for using a high-power CB transmitter. The one-year sentence was suspended except for an incarceration period of 90 days. In addition, Mitchell was placed on three years' probation with the special condition that he refrain from possessing or operating a radio tranmitter. He was fined $1025 and ordered to forfeit to the US Government all CB radio equipment that had been seized from him by the Government in 1986 and 1987. Mitchell must also perform community service as determined by his probation officer.

LICENSE RENEWAL

HQ has been receiving a number of calls recently regarding license renewal and the "grace period" involved. For all FCC licenses issued with a 10-year term, there is a *2-year* grace period for renewal. Since 10-year term licenses have been issued since 1984, it will be 1994 before anyone recently licensed needs to worry about renewing.

The question comes in regard to the older (pre-1984) licenses issued with 5-year terms. Some holders of 5-year licenses think that their licenses have been automatically extended for an additional five years. This is not true! The FCC will allow you a *5-year* renewal grace period, but this is not the same as a time extension. If you do not renew your license it will expire, and if you renew more than 2 years after the expiration (but before 5 years) you will be issued a different call sign by the FCC. To sum it up, renew your license **before** it expires!

To renew your license, simply fill out the FCC Form 610 with your current information, and mail it to the FCC, PO Box 1020, Gettysburg, PA 17326. ARRL HQ has the Form 610 available for a SASE.

ARTISTS TAKE NOTE!

The ARRL Board of Directors Membership Services Committee announces a QSL card contest. Object? Design a unique and distinctive ARRL member QSL card to be available through interested QSL card printers. "Amateur" as well as professional submissions are encouraged.

Please send your design to ARRL Member QSL Card Contest, c/o ARRL HQ, before October 1. A plaque, *QST* recognition, ARRL publication of your choice, and a stock of QSL cards (of course!) await the winner.

While all you graphic artists have your pencils sharpened, the ARRL is also looking for a logo for the National Traffic System. NTS has been serving Amateur Radio since 1949, and has no logo (unlike ARES, Special Service Clubs or the ARRL).

The logo design must depict the true spirit of NTS: pride, service, tradition and innovation. Entries will be judged on how well they symbolize NTS spirit and aesthetics, and *must* contain the following: The ARRL diamond, featured prominently, the words "National Traffic System." In addition, the design must be legible when reduced and embroidered in a size roughly 4 × 6 inches.

Original designs must be submitted on 8½- × 11-inch white paper to Rick Palm, K1CE, at ARRL HQ before October 1. The winner will receive an engraved plaque, an *ARRL Operating Manual* and recognition in *QST*, *Field Forum* and *Section Leader*.

ARRL POTPOURRI

President Larry Price has appointed James Brooker, NI8E, as Chairman of the VHF Repeater Advisory Committee for the remainder of the 1988 term. Also appointed for the remainder of the 1988 term was James Dockery, WB2HBZ, as Chairman of the Public Service Advisory Committee following the resignation of Dale Temple, W5RXU.

JOIN ARRL "ALL-RISK" INSURANCE PROGRAM DURING SPECIAL ENROLLMENT PERIOD

A Special Enrollment Period is currently in progress until November 1 for the ARRL "All-Risk" Ham Radio Equipment Insurance Program. All members may enroll with guaranteed acceptance.

Insured equipment and accessories are covered for loss due to theft, damage caused by fire, lightning, collision, short circuiting due to fire, flood, tornado or other natural calamity.

Coverage includes equipment at home, in your car and at a Field Day or hamfest site. Furthermore, if new equipment is purchased during the policy year valued up to $1000, that equipment is fully covered at no additional cost until the next renewal of the policy.

The most outstanding feature of the program remains its cost. This fully comprehensive insurance program can be purchased for entire year for only $1.25 per $100 of replacement cost value, plus a $5 yearly administration fee. A $20 minimum premium is required. Other policies on the market can cost up to $8 per $100 of replacement cost value.

Complete details about the coverage provided by the ARRL "All Risk" Ham Radio Equipment Insurance Program will be sent to League members. An application is also provided on page 158 of this issue of *QST*. Simply complete the short application and mail it with your first annual premium check to the ARRL Insurance Administrator: Albert H. Wohlers & Co, ARRL Group Insurance Plans, 1440 N Northwest Hwy, Park Ridge, IL 60068-1400, tel (toll-free) 800-323-2106; in Illinois 312-803-3100.

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 1988, p 55
Club Contest Rules	Jan 1988, p 86
Considerate Operator's Frequency Guide	Jan 1988, p 13
Constitution Bicentennial WAS	Sep 1987, p 14
Element 2 Question Pool, New and Revised Questions, Answers	Apr 1987, p 23
Frequency/Mode Allocations	Jan 1988, p 77
Hamfest Calendar Rules	Apr 1988, p 73
License-Renewal Information	Jan 1988, p 77
Major ARRL Operating Events and Conventions—1988	Jan 1988, p 78
Packet-Radio Frequency Recommendations:	
Below 225 MHz	Sep 1987, p 54
Above 225 MHz	Mar 1988, p 51
QSL Bureaus	
Incoming	Jun 1988, p 72
Outgoing	This issue, p 71
Reciprocal-Operating Agreements	Mar 1988, p 55
Rules, September VHF QSO Party	Aug 1988, p 101
Rules, 1988 CRRL CAN-AM Contest	Aug 1988, p 103
Tech and General Written Exams	Apr 1987, p 29
Third-Party-Traffic Agreements	Apr 1988, p 66
VUCC Annual Listing	Dec 1987, p 68
What is Amateur Radio?	This issue, p 90
220-MHz Band NPRM	Apr 1987, p 16

How's DX?

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

Contest Operating

Larry Brockman, N6AR, presented a well-received program called "Operating the CQ Contest" at the March Orlando Hamcation DX meeting, highlighting a number of important points that make for good basic DX contest operating procedures, something to keep in mind at the start of the intensive contest operating season. Got your paper and pencil handy?

1) Have the right forms available for the contest (summary sheet, log forms, rules, dupe sheets).

2) Have a band operating plan (Start out on the highest frequency that is open; catch grey-line openings at dusk/sunrise on 40/80; go to lower frequencies sooner on CW than SSB; when multiple bands are open spot-check them all; if you operated on one of two open bands on the first day at a given time, reverse the pattern on the second day; 160 is often best on the hour and the half hour).

3) Know the propagation.

4) Special operating tips: • Don't call anything for more than five minutes • Watch for open windows in CW pileups (±0.5 kHz of the DX station) • Know where the DX windows are (1830-1840 on 160—CW DX window, USSR above 1830, 1907-1912 on 160—Asia/Pacific window, 3630-3680 on 80 SSB—USSR and others, 3720-3750 on 80 SSB—popular DX window, 3792-3802 on 80 SSB—JA/VK and others, 7040-7100 on 40 SSB—most DX operates here) • Know where to operate in the US band: try transmitting 3810-3850—with DX in lower windows; find the sparse holes on 40 SSB (sometimes 7163 7177 7185 7205 7210 7235 7263 7275); on 20 CQs are often more successful above 14250; on 15, CQs are often more successful above 21300 • Tune consistently from the bottom to top or vice versa, tune slowly and listen for the weaker ones • Use short and frequent rather than long CQs, establish a rhythm; don't give up prematurely • Don't just call CQ, listen for the weaker ones, keep track of key multiplier frequencies, work the propagation charts, keep track of easy countries and zones.

5) Nonoperating tips (especially if you're serious): • Prepare for the test with a nap ahead of time • Sleep during dead times (11 AM to 2 PM, 2 AM to 5 AM) • Have meals prepared for ease of consumption (soup, etc) • Stay away from beer and other alcohol.

6) After the contest: • Dupe your log, even if you did it during the test • Submit it before the deadline • Submit an SASE or postcard for confirmation of receipt.

7) Good luck!

SUPER GOLDEN JUBILEE

Twenty members of the National Capitol DX Association worked 200 or more countries during the 1987 ARRL DXCC Jubilee year, receiving Super Golden Jubilee plaques. Winners (and the number of countries worked) include: K6IR 268, N3II 254, WC4B 250, N4MM 250, N3EHD 233, W3UJ 230, WA3DVO 227, KC3EK 223, WØYVA 223, K3SKE 222, N3US 221, KK4HD 219, N4RA 218, N3FBN 217, W3NF 216, W2GHK (forever) 207, KZ3H 207, W3YY 206, N3TO 205, G4MZF 203.

MINI DXPEDITION

VE2LC notes the 48-hour October 1-2 expedition to northeastern Quebec in the vicinity of Sept-Iles (Zone 2 north of Latitude 50), sponsored by the Union Metropolitaine des Sans Filistes de Montreal, 7000, rue Marie-Victorin, Montreal, PQ H1G 2J6. Phone frequencies: 3785 7085 14185 21185 28525; CW spots: 3685 7025 14025 21025 28025. Cards via the bureau.

QUITE EFFECTIVE RADIATED POWER (QERP)

by Jeffrey Horlick, KZ3F

In his article *DXing for Little Guns* (this column, April '88), WB3EEK wrote about big guns and little guns, dividing the world of little guns into three classes. There are actually many more ways to look at little guns (QRP, mobile, stations with antenna restrictions, etc). It follows that the concept of QRP and QRO is no longer useful and should be replaced with a single, all-encompassing term. I would like to propose a new quantitative measure of station power, called QERP, that takes several factors into account.

The unit of measure for QERP is the BIGGUN (pronounced either as two words—big gun—or as a one-word contraction of "big one," as in that's a big'n). Numbers greater than 1 are reported in BIGGUNS (BS), and numbers less than 1 are reported in decimal fractions. Very small values may be reported as millibigguns (μBS) and microbigguns (uBS). Calculate QERP by:

$A \times B \times C$

where

A = power output of the transmitter in watts

B = height of the antenna in feet, measured from ground level straight up to the highest part of the antenna

C = antenna gain in dB.

The standard unit of measure is: 1,000,000 watt Foot dB = 1 BIGGUN or 1 BS. The measure of QERP has been scaled to conform with the common usage of the notion of power. Examples:

1) 1000 watts × 100 feet × 10 dB = 1,000,000 watt foot dB = 1 BIGGUN

2) 1500 watts × 190 feet × 12 dB = 3,420,000 watt foot dB = 3.42 BS

3) 5 watts × 22 feet × 9 dB = 1000 watt foot dB = 1 millibiggun

4) 5 watts × 100 feet × 12 dB = 6000 watt foot dB = 6 millibiggun

5) 100 watts × 5 feet × 2 dB = 1000 watt foot dB = 1 millibiggun

Examples 1 and 2 show that 1 BIGGUN represents a station that, to most of us, would be called a big gun. It can also be seen from examples 3 and 4 that a QRP station may be in the range of 1 millibigun to 6 mBs. Finally, example 5 shows that a station running a barefoot transmitter under very poor antenna conditions can easily be equivalent to, or less than, a traditionally defined QRP station. Example 5 describes my station: 100 watts or so from a Kenwood 430 to dipoles at 5 feet, hidden on two wooden fences. (A 40-meter dipole at 5 feet up is 0.04 wavelength.) Using QERP as a measure, my little gun station falls into the QRP class, even though I am running 100 watts. In order to give little guns a chance, a new set of rules could be written around the QERP measure that would allow classes of stations to be described for contesting, awards, DX and personal goals.

THE CIRCUIT

☐ **FOC:** Oct 1 will be the occasion for the 50th anniversary dinner of the First Class CW Operator's Club, to be held at Lord's Cricket Ground. Additional info from G3VTT. (See you in London!)

☐ **BTØLS/BTØZML:** This Tibet operation was accompanied by China, Japan and Nepal in a Friendship expedition to Mt Everest from March-May. The stations were set up at 3800 m on Everest, and 5154 m in Xizang (Tibet). Cards via PO Box 6106, Beijing, China. (*Thanks, KC3EK, KØCVF, N6AW and others!*)

☐ **2ND OP:** The familiar "wheel" op aid made famous by W2IOP, and carried on by N6RJ, has now come "full circle" electronically. Distributed by the Radio Amateur Callbook, Inc, this electronic 2nd op, authored by N6RJ and written for the IBM® PC and compatibles, offers a host of features essential

(l-r) Jamal, 9K2JF, Adnan, 9K2KA, and Hameed, 9K2AH. (*photo courtesy DK7PE*)

for the serious operator. Check out details via the Callbook, 925 Sherwood Dr, Lake Bluff, IL 60044.

☐ **DX EDGE:** IBM users are really in luck, what with the above item and now the IBM version of the popular Super DX Edge, with advanced graphics highlighting long-path and gray-line possibilities. Full information from N2UN, Xantek, Inc, Box 834, Madison Square Station, New York, NY 10159.

☐ **BY4RSA:** In a letter to KC3EK, BY4AA reports that this new station in Nanjing will be operational next month. QSL via PO Box 6106, Beijing, China.

☐ **Amsterdam:** Reminder, FT5ZB will be QRV to November, 160-10 meters, maybe some 6-meter tests—you name it; sideband, CW, RTTY, AMTOR, packet (maybe satellite!). QSL direct before the end of August. Martin de Vivies, St Paul and Amsterdam Islands, French Antarctic.

☐ **YBØEMJ:** Rudi needs South Dakota for WAS. Check 21040 daily 1700-1800Z.

☐ **VK9LU:** Cards (with SASE) via Dave Miller, K9POX, 7462 W Lawler Ave, Niles, IL 60648.

☐ **HG5A:** Need a card from this world-famous contest station? SAE with IRCs to Magyar Balázs, 1581 Budapest, PO Box 80, Hungary. (HA5KDQ and HA5KDX via this address, too.)

☐ **Got 'Cher Naany?:** Think about this one till a future issue (for working 250 DX stations on any continent except your own). Thanks, at least I think thanks, to K7ZR!

WALK SIX BLOCKS DUE NORTH

[The following material is courtesy of W6BDN.]

Playing with the phonetics in your call can be great fun. The ultimate challenge is to use all the letters and numbers to form a clever phrase. I tried, "Walk Six Blocks Due North." After a very prolonged silence, the reply was usually, "and then what?" I've given up on that one!

These games, however, tend to make us overlook the real power of standardized phonetics. Under adverse conditions, a word (beginning with the selected letter) is almost always easier to recognize than that letter alone. (Echo compared to eee, for instance.) That is why we use word phonetics. A *standard phonetic* is one of a specific group of selected words and, because there are only 36 of them (26 letters and 10 numbers), is much more than "just" another word. (The ITU list is generally recommended for our amateur use.) Since you know the words on this list, you only need to catch part of a standard phonetic to identify which of the 36 it is! This usually isn't the case with random words.

Suppose the noisy woodpecker or lightning strikes were booming in, and you only heard, "...iskey, ...ix, ...avo, ...elta, ...ember." In this sample, the actual letter sounds have been obliterated. Yet, you can easily identify this call because each of the word fragments is coincidental with only one of the ITU standard phonetics.

Cute words and phrases can only be useful when they are readily identifiable and understandable to the recipient. For the DXer, communicating your call correctly and accurately is a *must*, and standard phonetics can help you do it!

[Note: Your column editor couldn't agree more after hearing a family member recently signing Kilowatt One Zulu Xerox!]

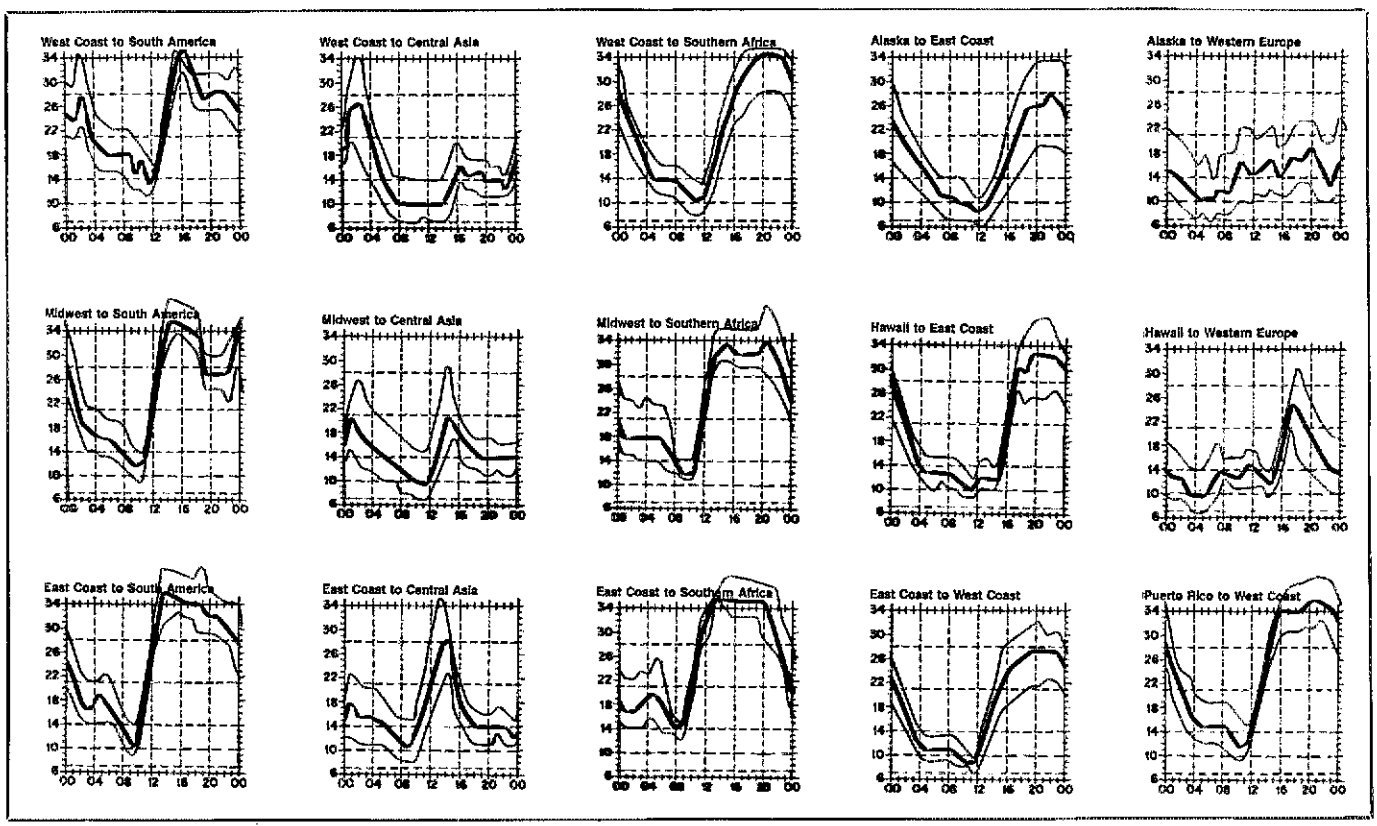
HOW DO YOU DO THAT?

At a recent convention (Rochester, NY) your editor had a lively discussion with a DX-interested audience, one enthusiastically committed to "enhancing the radio amateur's unique ability to foster international goodwill." On a practical day-to-day basis it was felt that learning a few expressions in the language of the DX participant, particularly on CW would be a good way to start. In these days of glasnost, a lot of enthusiasm was demonstrated for the CW equivalents of a few common Russian phrases.

English/Russian

Good morning/Dobroe utro
Thanks for the QSO/Sbo za QSO
Goodbye/DSW
Peace/Mir

(CW Into Foreign Languages, converse with the world in Morse Code in Spanish, German, Swedish, Dutch, Russian, Norwegian, French, Polish, Hungarian and Serbo-Croatian; by VE3EIM and VE3MGY. Available from C. W. Publications, Box 2571, Station A, London, ON, N6A 4G9, Canada.)



When are the bands open? These charts predict this month's average propagation predictions for high-frequency circuits between the US and various overseas points. One chart showing 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). The horizontal axis shows Coordinated

QSL Corner

Administered By Joanna Hushin, KA1IFO

ARRL-MEMBERSHIP OVERSEAS QSL SERVICE

Send outgoing cards: American Radio Relay League, QSL Bureau, 225 Main St, Newington, CT 06111, USA.

This is an "outgoing" service that allows ARRL members to send DX QSL cards to foreign countries at minimum cost and effort. While QSLing direct to foreign amateurs is faster, it is also more tedious. Time spent searching for addresses in the foreign *Callbook*, addressing and stuffing envelopes, and mailing could be better spent operating DX. And, the cost of IRCs, airmail postage and envelopes can be prohibitive.

An unlimited number of QSLs may be sent for distribution 12 times per year. The fee is just $1 per pound or portion thereof (155 QSL cards average a pound). Recommended size of QSL cards is 3½ × 5½ in (90 mm × 140 mm).

The ARRL-Membership Overseas QSL Service operates *only* in an outgoing capacity. To receive QSLs from DX stations, see "The ARRL DX QSL Bureau System" (Incoming), Dec 1987 *QST*, page 56, or send an SASE to ARRL QSL Bureau, 225 Main St, Newington, CT 06111.

US amateurs may send SWL reports to foreign shortwave listeners. Unlicensed (associate) members may send SWL cards to foreign amateurs. QSL managers: write for details.

Note: The ARRL QSL Service should not be used to exchange QSL cards within the 48 contiguous states.

Requirements

1) Presort your DX QSLs alphabetically by call-sign prefix (AP, C6, CE, DL, F, G, JA, LU, PY, 5N, 9Y, and so on).

2) Enclose the address label from your current copy of *QST*. The label shows that you are a current ARRL member.

3) Enclose payment of $1 per each pound (or less) or cards—approximately 155 cards weigh one pound. In other words, $1 is the *minimum charge* whether you send 1 card or 155 cards. Please pay by check (or money order) and write your call sign on the check. Do not send cash.

4) Include only the cards, address label and check in the package. Wrap the package securely and address it to the ARRL Outgoing QSL Service, 225 Main St, Newington, CT 06111.

5) Family members may also use the service by enclosing their QSLs with those of the primary member. Include the appropriate fee with each individual's cards and indicate "family membership."

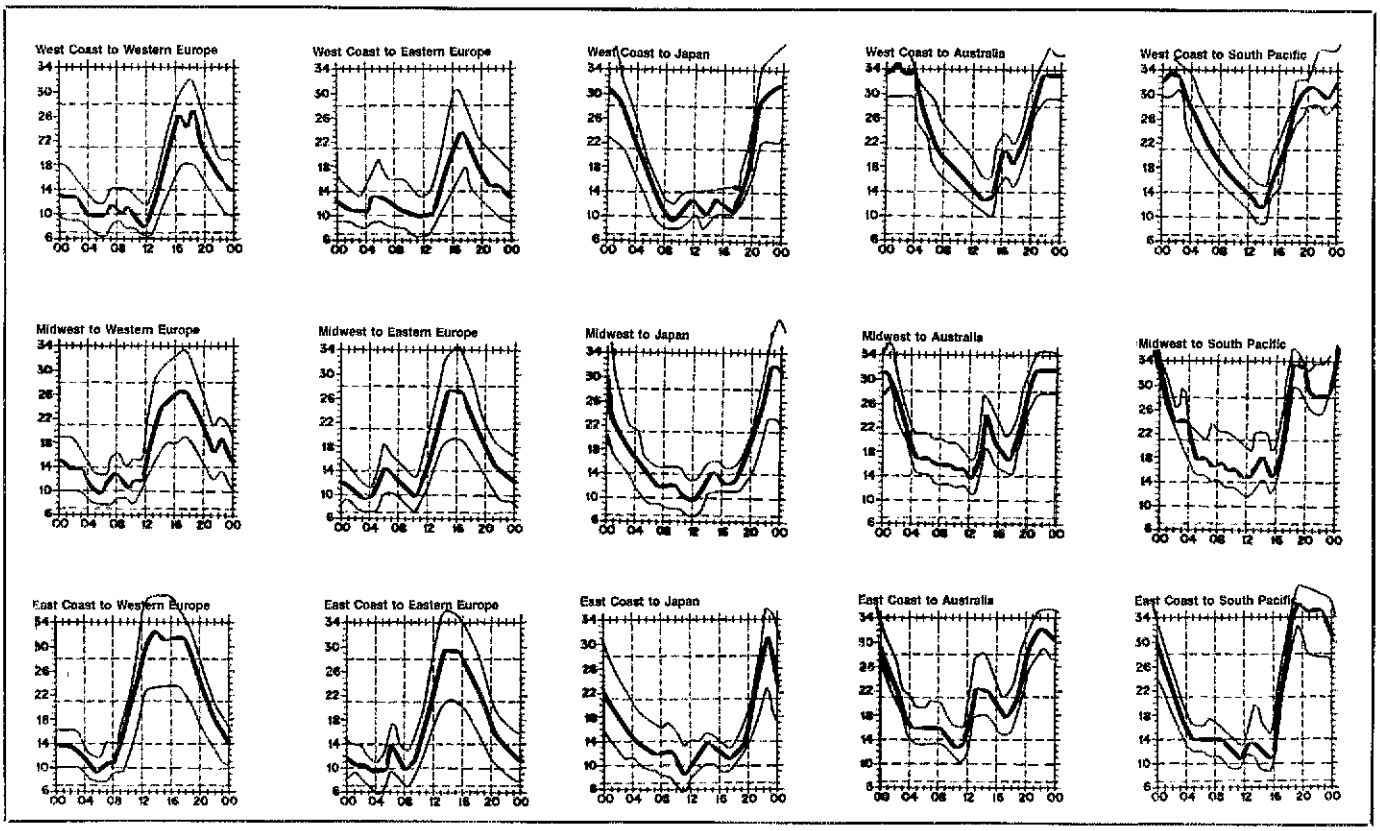
6) Blind members who do not receive *QST* need only include the appropriate fee along with a note indicating that the cards are from a blind member.

7) ARRL affiliated-club stations may use the service when submitting club QSLs by indicating the club name. Club secretaries should check affiliation papers to ensure that affiliation is current. In addition to sending club station QSLs through this service, affiliated clubs may also "pool" their members' individual QSL cards to effect an even greater savings. Each club member using this service must also be a League member. Cards should be sorted "en masse" by prefix, and a *QST* label enclosed for each ARRL member sending cards.

Countries not Served

A5	Bhutan	TZ	Mali
A6	United Arab Emirates	V4	St. Christopher and Nevis
A7	Qatar	VP2E	Anguilla
BV	Taiwan	VR6	Pitcairn Is
C9	Mozambique	XT	Burkina Faso
D6	Comoros	XU	Kampuchea
ET	Ethiopia	XW	Laos
HZ	Saudi Arabia	XX9	Macao
J5	Guinea-Bissau	XZ	Burma
KC4	US bases in Antarctica	YA	Afghanistan
		ZA	Albania
KC6	Belau	ZD7	St Helena
KC6	Micronesia	ZD9	Tristan da Cunha
KH1	Baker and Howland Is	ZK2	Niue
		ZK3	Tokelau
KH3	Johnston Is	3C	Equatorial Guinea
KH5	Palmyra and Jarvis Is	3V	Tunisia
KH7	Kure Is	3W	Vietnam
KH9	Wake Is	3X	Guinea
KP1	Navassa Is	4W	North Yemen
KP5	Desecheo Is	5A	Libya
P5	North Korea	5H	Tanzania
SU	Egypt	5R	Madagascar
T2	Tuvalu	5U	Niger
T3	Kiribati	5X	Uganda
T5	Somalia	7O	South Yemen
TJ	Cameroon	7Q	Malawi
TL	Central African Rep	8Q	Maldives
		9G	Ghana
TN	Congo	9N	Nepal
TT	Chad	9U	Burundi
TY	Benin		

(QST)



Universal Time (UTC); the vertical axis, frequency in MHz. See April 1983 *QST*, pp 63-64, for a more-detailed explanation. The 3rd edition of *The ARRL Operating Manual* contains similar charts for a range of sunspot numbers and times of the year. Data provided by the Institute for Telecommunication Sciences, Boulder, Colorado. These predictions, for September 16, to October 15, 1988, assume a sunspot number of 120, which corresponds to a 2800-MHz solar flux of 164.

DX Century Club Awards

Administered By Don Search, W3AZD

The ARRL DXCC is awarded to amateurs who submit written confirmation 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 May 16 through June 6, 1988. An SASE will bring you the rules and application forms for participation in the DXCC program.

New Members

Mixed

D68QL/118 HA6VB/115 JF4PAG/112 S79KG/108 NC1E/107 AA4ZW/103 W6KG/FH/114 K9DFK/106 WA9WJE/135
DF6MS/100 HA7XL/112 JH5GPE/110 VE2ADL/102 K2EVY/102 WA4IHO/107 W6QL/FR/115 KR9Z/250 KE0KB/140
DL1BFZ/114 HA8CN/118 JA9FO/105 5Z4KG/108 W2IZY/117 KA5GIS/100 K7WK/121 KY9Q/102 N0RM/207
FM5CL/277 HA0LC/103 JH0LME/110 8Q7QL/104 WB2PTH/110 NU5O/165 WC7F/103 N9GDG/100 NT0V/150
G4FVK/100 HB9DCQ/117 KL7N/108 8R1AMO/110 WB2SON/182 K6JYO/239 KB8BHE/103 WA9LOZ/127 WB0B/105
HA1KSQ/101 JF1KBL/113 NL7HT/106 K1FJ/103 WB3HLH/105 KG6JW/104

Radiotelephone

CP6XH/110 I7VEZ/247 NL7HT/104 K2EVY/102 WA3DMF/105 KJ4VG/123 NU5O/135 WC7F/103 WA9LOZ/113
HA6VB/113 JF4PAG/112 VK3YH/109 N2ZZ/105 WA3NGT/108 N4MZL/127 W5VHN/110 NK8F/108 WA9WJE/132
I3GJZ/202 JH5GPE/110 XE1FER/112 WB2SON/166 KA4OMI/101 N4RFN/127 KE6FV/101 NU8Z/115 N0RM/133
IV3GQL/18 JE7JZT/117 YC2BAB/111 K3AYK/113 KD4ZU/174 WA4ACL/114 W6BDD/102 KR9Z/224 NZ0R/118
IK5HHA/11 JA9FO/105 9R1AMO/110 N3BBS/139

CW

DL4MCF/105 FE1JNA/107 JA9PBZ/106 W1WA/112 W2RSL/153 K7WK/106 NF9Q/104 N0RM/119 NZ0R/106
DL8NBW/107 IT9AXZ/226 PA0AWJ/114 NW2I/107 KC3W/100

RTTY

EA1AVN/110 I5ICY/150 I5IGQ/159 IS0MVE/104 UZ4FWD/100 ZL2AKI/104 KE0KB/113 NT0V/109

160 Meters

HB9G/101 ON4UN/160 AI7B/100

5BDXCC

WB6OKK KS0X JH7BDS N1NTR W7AM K6SIK JF7XKY KQ4O 5B4MF
W0ULU

New Honor Roll Members

Mixed

312
W8OBI/327

311
W0TRF/321

309
K2TV/315

Radiotelephone

312
W8PR/332

311
N0AT/317

310
I0SSW/322
KA4D/316
W0YMH/325

309
PY5EG/315
W3FDP/323

CW

307
N4VZ/311

Endorsements

Mixed

DJ4SO/270 IK8EPC/283 VE3WT/344 K2FL/360 W3CWG/360 W4PTH/327 W5LVD/335 WX6M/312 WA8CZS/289
DJ5JH/337 JA1CJF/330 VE3WW/340 K2LWR/358 W3EVW/364 W4UG/346 W5RJA/229 K7EG/319 WA8VDC/306
DK2XX/315 JH2UVL/273 VE6EJ/174 K2NV/278 AA4DO/261 W4UXI/259 W5VCS/125 K7LAY/319 WB8BMX/150
DK5PR/329 JH4UVU/293 ZS6ASW/252 K2TQC/351 K4FJ/345 W4WXZ/310 WA5ZIJ/304 K7LJQ/293 WB8SFF/182
DL4MCF/206 JA7AD/350 4Z4BS/258 KA2OOG/231 K4JAG/270 W4YKH/327 K6EXO/339 K7UT/324 AJ9C/175
DL7JY/303 JA7MFL/226 4Z4DX/325 KB2HZ/310 K4RA/331 W4YV/336 K6FM/310 K7ZBV/313 K9KK/296
DL7NB/329 KH6CD/363 9H4G/323 KQ2O/310 K4RD/324 WA4BEC/311 K6LGF/356 KD7RX/125 KA9CFD/264
FM5WD/271 KH6CF/322 K1JO/334 N2MF/317 KB4O/202 WB4CSK/300 K6RK/325 N7JB/173 KR9P/311
G2DMR/335 KL7KJ/280 K1KI/328 N2RR/304 KB4YT/183 WD4FZO/255 K6SIK/250 NZ7D/254 NC9T/174
G3KLL/301 KP4BJD/314 K1YR/310 NR2W/204 KC4MJ/200 WN4G/204 K6YRA/344 W7CB/338 W9AA/204
G4BUE/308 NL7J/273 KA1QY/355 W2FG/340 KD4YT/178 AD5N/342 NJ6P/126 W7JFO/337 W9CA/307
G4KZZ/125 OE1KJW/175 KB1I/308 W2GW/362 KE4UC/249 K5HYB/302 W6JRY/331 WB7EEI/309 W9HJ/350
G4OBK/256 OH2BN/313 KG1V/225 W2MPI/312 KF4QD/201 K5KNA/304 W6KH/356 K8UE/311 W9MP/280
GM3BQA/338 OH2QQ/356 N1WR/162 W2SUA/337 KJ4MD/254 K5KX/330 W6OAT/329 KA8ANQ/225 K0II/274
HA1SQ/154 OZ1TD/150 W1AFF/350 W2VYX/338 N4OM/320 K5NV/274 W6OMM/324 KX8W/312 K0JW/320
HA4XX/282 OZ3Y/358 W1BL/320 W2ZZ/335 N4TG/255 K5RC/339 W6OUL/292 KZ8Y/312 KC0Q/307
HA5NK/228 PY1DFF/281 W1GDQ/330 WB2TPS/145 N4VZ/322 K5TA/305 W6PHF/346 N8MC/314 N0AT/319
HB9MQ/360 PY5EG/315 W1HJF/276 AJ3K/283 N4XO/348 K5UC/364 W6RFX/324 N8ZA/329 W0ELA/367
HK3HFQ/213 SM2EKM/332 W1KDD/227 K3BEQ/311 NE4R/323 KC5M/309 W6TC/330 W8QBY/203 W0IJR/291
HK6HFY/163 SV1JA/233 W1RED/325 K3FN/320 W4HY/317 N5JR/316 WA6HAN/138 W8QWI/337 W0ZV/352
HL4CCM/150 T77C/319 W1WEF/309 K3GL/362 W4JVU/342 N5UR/325 WA6OGW/322 W8RT/362 WA0EWU/125
HL9EP/125 UA3FT/315 W1XS/306 K3NW/270 W4LRE/173 W5EIJ/262 WA6WZO/321
I2ZGC/321 VE1AST/320 K2AX/272 NI3B/202 W4OO/353

Radiotelephone

DJ5JH/306 JH2UVL/199 YV3BAP/158 K2TV/296 W3EVW/349 W4JVU/341 K6LGF/352 K7UT/323 K9LKA/337
DK2XX/313 JH8GWW/292 YV5EF/197 KB2HZ/308 W3IF/323 W4UG/345 K6RK/310 K7ZBV/312 KA9VRA/124
DL4MCF/186 JH8MXH/281 ZL1AMN/323 KQ2O/272 W3SUE/222 W4UW/307 K6SIK/249 N7JB/161 KB9PO/208
DL4YAH/317 KL7KJ/278 4Z4DX/318 KS2I/342 AA4DO/210 WA4BEC/310 K6YRA/343 W7AEP/301 KC9SF/201
DL7NB/320 KP4CZ/179 5Z4BP/150 N2RR/280 K4FJ/337 K5UC/358 W6FAH/260 W7JFO/337 KU9I/320
EA8LD/317 OE1KJW/125 9H4G/323 NA2G/253 KB4CWO/280 KC5M/307 W6QON/175 W7UPF/338 W9CA/292
F9JS/279 OE2GKL/325 K1JO/323 NR2W/180 KB4YT/178 KD5BM/270 W6RFX/315 WA7UVO/317 W9HJ/320
G3KLL/300 OZ3WK/312 KA1PM/250 W2FG/336 KC4BX/300 KF5MP/152 WA6AHF/334 K8MDU/204 W9PVD/201
G4BUE/285 OZ3Y/351 KB1I/304 W2HXF/312 KC4MJ/199 N5JR/293 WA6HAN/135 K8YVI/196 WB9SYF/311
GM3BQA/338 SM2EKM/326 W1AFF/350 W2IOO/321 KE4FW/256 NI5D/222 WA6LOD/276 KA8ANQ/201 K0JZM/253
HK3HFQ/213 VE3WT/344 W1HJF/271 W2MPI/312 KF4M/303 NT5C/203 WA6OGW/320 KZ8Y/311 KN0L/282
HK6HFY/162 VE3WW/340 W1QJI/201 W2SUA/335 KJ4MD/249 W5RJA/224 WA6WZO/321 W8GMF/347 W0DFT/250
HL4CCM/149 VK2AGA/199 W1XS/211 AJ3K/266 N4CRU/309 WA5ZIJ/303 WX6M/312 W8KST/338 W0IJR/276
I2KVI/180 VK6RU/365 WA1PEL/290 K3BEQ/311 N4ONI/251 WQ5Y/230 K7EG/284 W8QWI/300 W0PSH/251
I2ZGC/321 VO1CU/326 WA1ZCC/310 K3JGJ/232 NE4R/313 AH6HY/175 K7LAY/294 WA8CZS/285 W0UGV/175
IK8EPC/283 XE1JRV/162 K2FL/351 W3CWG/358 W4FPS/322 K6EXO/333 K7LJQ/294 K9KK/291 W0WFB/254
JH1ROJ/177 XE1KH/131 K2TQC/328

CW

DJ5JH/300 JH2UVL/184 OZ3Y/313 K1JO/306 K2TQC/318 K3FN/318 K5OGX/229 K7ZBV/272 W8QWI/306
DL2HBX/203 JH4UVU/267 SM2EKM/171 KA1KPH/172 K2TV/247 W3EVW/306 N5JR/313 KZ8Y/282 AJ9C/131
DL7NB/274 LA9XG/260 SM4OTI/151 NC1B/167 KQ2O/251 AA4DO/199 K6RK/285 N8MC/297 K9VAL/279
G3VQO/157 OE1KJW/150 VE6EJ/139 W1HJF/135 N2MF/294 K4FJ/298 W6OUL/248 W8PR/271 KC0Q/297
HB9ALO/299 OE1TKW/176 YB2BNJ/176 W1XS/137 NA2G/200 K4HDV/125 W6TC/310 W8QBY/200 W0IJR/269
JH1NMO/296 OH2BN/304 4Z4DX/297 K2FL/318 AJ3K/174 WD4HJY/130 K7EG/255

RTTY

W2FG/177 W6MI/177

160 Meters

OK1ATP/151 4Z4DX/151 N1ACH/175 KG4W/152 W0ZV/200

Correspondence

Conducted By John C. Hennessee, KJ4KB
Regulatory Information Assistant, ARRL

WHERE ART THOU, GOOD FIST?

☐ Last week, I tuned across the CW spectrum and found that I could hardly copy a 15 WPM QSO! Then I heard an 18 WPM W1AW bulletin and, to my amazement, my copy was nearly perfect! I realized that the problem was not with the speed, but rather in the quality of the transmission. During the QSO at 15 WPM, I observed the following:

- Irregularly spaced characters like this—T HI S H ASN O RH YTHM.
- Insufficiently spaced characters—THISISHOWITLOOKSIFYOUSENDTHISWAY.
- Too many errors and repeats—I DOM DONT SOI SPELL TOO O WELL.

I think emphasis on receive-only code exams has detracted from the art of sending. Poor sending burdens the operator receiving poorly sent code. Take a few minutes and record yourself. If your code doesn't sound near computer grade, consider the following:

- Slow down to a speed in which you can send each character proficiently. A run of mistakes is a good sign to slow down. Don't let your quest for speed turn your sending into "chicken scratch."
- Try sending off the air to better concentrate on your technique.
- Develop a rhythm. There should be an underlying beat to your sending.
- Don't rush short characters like E and T so that BETTER sounds like 6 GR or BPR.
- Use a keyboard or electronic keyer, if necessary, and set the weight on mechanical bugs correctly.

Maybe it's time we gave our "fist" a checkup. CW is music to many hams' ears—does your sending fall into the category of symphony or heavy metal? —*Chuck King, KX9S, Wichita, Kansas*

[The Old Man (HPM) would give this letter a nod.—Ed.]

THE EXPOSITION OF COVENANTS

☐ Your recent discussions on local restrictions and real estate covenants brings to mind a recent event.

Last summer, I made an offer for a home in a "newish" area that was quite devoid of any other antennas. My suspicions were aroused, so I included in my offer a paragraph called "further conditions" on the realtor's standard offer form which stated, "Completion of this transaction is subject to there being no ordinances or covenants on the property or the dwelling which would prevent or seek to prevent the installation of antennas for Amateur Radio use per FCC Part 97."

The seller removed the clause in the counter-offer, so I re-included it. At that point I was furnished with a copy of the covenants which did indeed state that until the year 2010, the "Architectural Commission" of the subdivision had the authority to rule on any structure or addition. I provided the Commission's president with a sketch of the home with the addition of a "low profile" tribander and they were good enough to furnish a prompt disapproval.

I had no cause to argue, and certainly respected the supposed wishes of the other area residents. That clause, however, served to pre-expose the problem rather than let it surface after far more work had been done. I offer that clause to others. Me? I'm still happy in my old neighborhood, pursuing DXCC with my old antenna farm intact.—*Phil Brown, WE7A, Indianapolis, Indiana*

[You may want to check with your attorney before relying on Phil Brown's, or similar, language.—Ed.]

A TOWER AT LAST!

☐ For many months, I had been trying to secure a permit from the City of Brookfield, Wisconsin to erect a 66-foot tower in my yard. I've faced many obstacles, including a 35-foot height limit and a TVI clause.

The City has finally recognized the need for a height limit in excess of 35 feet, but they retained the TVI clause which would have required the removal of the tower if TVI occurred without any type of investigation or proof. Naturally, I would not accept the TVI clause. With the help of the ARRL, the FCC (through PRB-1) and the recommended Volunteer Counsel [an attorney who is also a ham and has registered with the ARRL—Ed.] we have finally convinced the City that control of TVI was outside of their jurisdiction. After many months of battle, the TVI clause has finally been removed from the city ordinance.

I now have a building permit and the tower is under construction. This new tower will carry a triband beam!—*Jim Zabel, W9KNZ, Brookfield, Wisconsin*

W1AW BULLETIN FREQUENCIES

☐ Lately, while trying to copy W1AW code practice, there have been many other stations on or near the same frequency making it just about impossible to copy.

Amateurs should remember that W1AW transmits code practice and bulletins on certain frequencies and amateurs should avoid operating on or near them during the time W1AW is transmitting. I realize there is a W1AW schedule in *QST*, but evidently, many amateurs don't look at it.

I am a Technician going for my General, and I need all of the help I can get. I'm sure that there are others trying to upgrade who would appreciate the cooperation of other amateurs.—*Earl W. Larsson, KB4JNC, Brooksville, Florida*

IN PRAISE OF CW: AN INFORMAL STUDY

☐ Having retired last year, I found myself with enough time to do some of the things I've always wanted to do. One of those was to do more hamming!

I've been a lover of CW ever since I received my first ticket back in 1957. At my station, I operate CW 95% of the time for several reasons: (1) In poor conditions, CW will get through the QRM when SSB won't. (2) The CW bands aren't nearly as crowded as are the voice bands. (3) There are no problems copying amateurs who speak with regional accents. (4) CW is a very challenging mode for poor spellers!

For some time, I have been hearing and reading about how difficult it was to recruit new people into Amateur Radio. In the fall of last year, I decided to make an effort to find out something about the age of the CW operators I contacted. Between the latter part of November 1987 and February of this year, I contacted nearly 120 amateurs on CW. Most of the contacts were on the bottom 50 kHz of the 20 through 160 meter bands. I asked each contact for their age and for the length of time they had been licensed.

While yielding some very interesting data, this informal survey is by no means a representative study of CW operators. Due to limited space for towers and large antenna arrays, I've made relatively few long distance contacts. Therefore, most of my contacts are from the Pacific area of North America. Also, the time of day (1100Z-1700Z) is a factor since many of the younger operators may have been unable to be on the air at that time.

According to the results of my informal study, very few "hard-core" CW operators started in the hobby after age 40 (11%). The great bulk of CW ops seem to be age 40 and older. 65% started in the hobby between the ages of 12 and 22 inclusive. It was interesting to find during our chats that most of these operators enjoy CW for the same reasons that I do.—*Bob Strack, K6CNB, Covina, California*

IARU News

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

German Hamfest at Friedrichshafen

For aircraft buffs, Friedrichshafen, located on the shores of Lake Konstanz in the southern part of West Germany, is known as the home of the Zeppelin, and there is a fine lighter-than-air museum in the town. But over the weekend of June 16-19, it became the temporary home for more than 15,000 radio amateurs from all over the world who were gathered there for a gigantic hamfest. Of course, most of the countries of Europe were represented, but there were also visitors from North and South America, Oceania, the Far East and the Middle East.

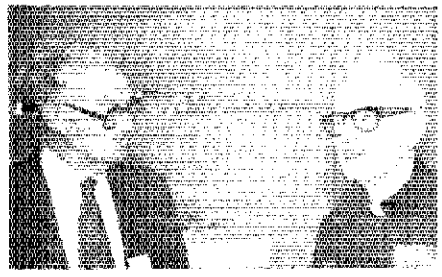
Because of its size and popularity, Friedrichshafen has sometimes been called the Dayton of Europe. Equipment displays by manufacturers and dealers and a large flea market attract much of the attention of those who either come for a day or make a weekend of it. Although there are no technical presentations as such, the Deutscher Amateur Radio Club does sponsor an international meeting, where the presidents and other IARU society officials get together to discuss mutual problems. This year, for example, two prime topics of discussion were preparations for a future World Administrative Radio Conference, and the effects on Amateur Radio in Europe of a system of type approval for amateur equipment which is now being proposed in some of the Common Market countries. With respect to this latter item, a principal concern was that the adoption of type approval would in no way limit the traditional experimental nature of Amateur Radio.

The accompanying photographs will give you a bit of the flavor of Friedrichshafen, emphasizing some of the personalities, but they're only a poor substitute for being there and enjoying the fraternity of 15,000 fellow amateurs.

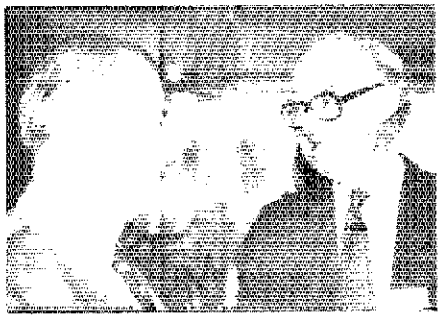
The main entrance to the exhibit hall of new equipment and components.

Judy Wardlaw and David Wardlaw, VK3ADW, past president of the Wireless Institute of Australia.

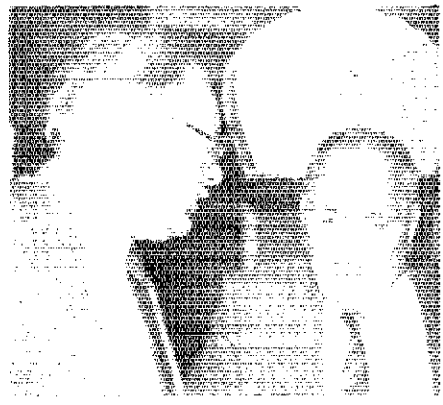
In the flea market, wall-to-wall with people and bargains. Some of those bargains are quite exotic; others would make excellent boat anchors. There's something for everyone's taste and pocket book.



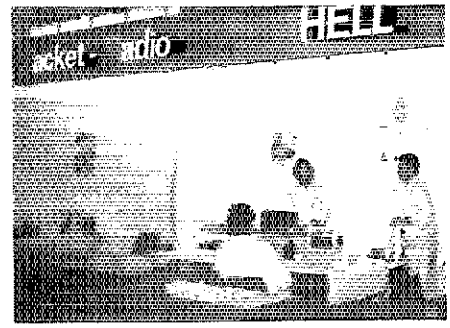
Sir Richard Davies, G2XM, and Father Moran, 9N1MM, from Nepal.



Two prominent European amateurs. On the left, Wojciech Nietyksza, SP5FM, vice chairman of IARU Region 1. On the right, Sir Richard Davies, G2XM, president of the Radio Society of Great Britain.



Left, Kees Van Dyck, PA0QC, president of VERON (the Netherlands) and chairman of the Region 1 VHF Committee, and on the right Max Cescatti, HB9IN, president of USKA (Switzerland).



Besides the usual equipment displays of specific manufacturers, there were a number of booths set up to display such specific facets of Amateur Radio as satellites, emergency communications, fox hunting, DX, old timers—and this one on packet radio. (*photos courtesy of W1RU*)

The New Frontier

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

Optical Communication

In The New Frontier, I report on activities in the "world above 1 GHz." Usually, this is taken to mean the region of the electromagnetic spectrum between 1 GHz and 300 GHz, but there is another region of interest: the visible and near-infrared part of the spectrum. Those who know ARRL VHF contest rules well are no doubt aware of the rule which reads: "Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (eg, laser) and at least one stage of electronic detection on receive." There hasn't been much optical communications work reported recently. The farthest amateur laser DX contact that I know of is a 15-mile contact between the Ventura County ARC, K6MEP, and Steve Noll, WA6EJO, way back in 1979. To encourage activity in the above-300-GHz region, ARRL has introduced a VUCC award for laser contacts. See League Lines in August *QST* for details.

In this month's column, I'll outline some basic principles of optical communications that may be of use to those who are interested in trying it. I'll limit this discussion to free-space communications, rather than optical-waveguide (fiber optics) systems, and I won't discuss high-data-rate systems or heterodyne-detection schemes.

Transmitters

In ARRL contests, *coherent radiation* must be used. For practical amateur purposes, this dictates the use of lasers. Two kinds of lasers are fairly commonly available on the surplus market: One is the Helium-Neon (HeNe) gas laser, which operates on a wavelength of 0.6328 microns (0.6328×10^{-6} meter—red light—corresponding to a frequency of 474 THz or 474,000 GHz). The second type is the semiconductor-diode laser, usually operating in the near-infrared region (wavelengths between 1 and 2 microns). HeNe lasers are used in commercial equipment such as supermarket checkout scanners and some photocopiers. Semiconductor lasers in the near IR region are used as transmitters in fiber-optic systems, usually at 1.3 and 1.5 microns. HeNe lasers are easier to work with than semiconductor-diode types because they have visible beams. They also usually have less-divergent beams than semiconductor lasers, which is an advantage.

HeNe lasers in the 1-mW output class sell for between $50 and $200 at flea markets and through surplus catalogs. Beam divergence is an important parameter (it corresponds to antenna gain in a lower-frequency system) and is usually expressed in radians (1 radian = 57.3°). Beam divergence is a result of diffraction, and is given by the relationship:

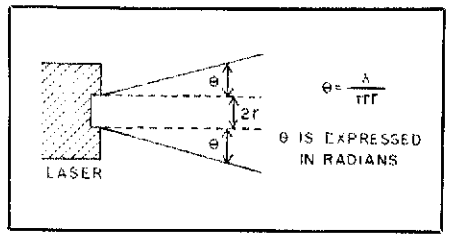


Fig 1—Illustration of diffraction-limited beam divergence of a laser beam, as discussed in the text.

$$\theta = \frac{\lambda}{\pi \times r} \qquad \text{(Eq 1)}$$

where

θ = the half angle of beam divergence, as shown in Fig 1, and

r = beam radius.

The larger the beam diameter, the lower the beam divergence. An analogy, in microwave antenna terms, is that large parabolic dish antennas have narrower beamwidths than smaller antennas. The relationship in Eq 1 applies to all antennas, and predicts, for example, that the beamwidth of a 1-meter dish at 10 GHz is 2.2°. For a HeNe laser with a beam diameter of 0.8 mm, the "beamwidth" (divergence) turns out to be 1.008×10^{-3} radians, or 0.058°. For a 10-GHz antenna to have the same beamwidth, it would have to be 125 feet in diameter!

One aspect of optical communication now becomes clear: very high transmitter "antenna gain" (low beam divergence) is inherent in HeNe laser sources. The same applies, to a lesser extent, to diode laser sources, which usually show somewhat higher beam divergence (larger beamwidth) and hence lower gain. The beam can be sharpened even more by expanding it, thereby reducing diffraction-limited beam spreading. The optical layout of a beam expander is shown in Fig 2. If a beam is expanded 10 times, then the beam divergence is reduced by a factor of 10, and the area illuminated by the beam at any distance is reduced by a factor of 100. This results in 100 times the power density at any given distance, or an effective system gain of 20 dB.

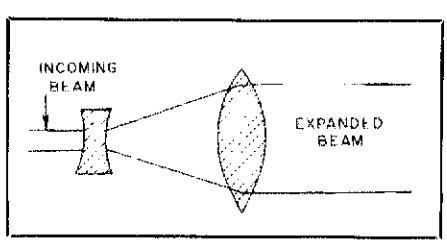


Fig 2—Optical expansion of a laser beam.

Lasers can be modulated by several methods. Some lasers can be modulated via their power supplies. For other lasers, the use of external modulators is required. An electro-optic modulator (a device in which optical transmittance can be altered by the application of an electric field) is ideal for this function. Such devices are used commercially, but are not often found on the surplus market, and are expensive to buy new. The simplest modulation method, ideal for normal amateur CW speeds, is simply to block off the beam mechanically with a solenoid arrangement. This works fine and gives 100% modulation, but has limited high-speed potential.

Receivers

The simplest optical-communications receiver is the human eye! *Warning: lasers are dangerous at close range.* Permanent eye damage can result from looking into the output beam of even a low-power laser! *Don't try it.* As mentioned earlier, ARRL contest rules require "...at least one stage of electronic detection on receive." Direct detection (analagous to a sort of "crystal set") is probably the only practical scheme that amateurs can use. Fortunately, this is not difficult to do. Silicon photodiodes have good response to the red part of the visible spectrum. Their sensitivity is often quoted in terms of amperes per watt (current output for a given level of incident optical power). A value of 300 mA/W is typical for a good silicon photodiode. Photodiode sensitivity is limited by internally generated noise and dark current (which varies from 10^{-7} to 10^{-10} A, depending on diode characteristics).

Photomultiplier tubes may also be used as detectors. They have much higher gains than photodiodes, but require high-voltage supplies for operation. As at lower radio frequencies, a narrow-bandwidth receiver will give better sensitivity than a wideband receiver. Because lasers are generally monochromatic (single-frequency) sources, a narrowband optical filter can be used ahead of the receiver. Such a filter with a passband of 0.6328 ± 0.005 microns and a 3-dB insertion loss can be bought for $20 to $30.

The receiving "antenna" is usually a telescope. The larger the lens or mirror, the higher the gain. Because the purpose of the

telescope is to concentrate incoming light onto the photodiode (which typically has an area of several square millimeters), diffraction-limited optics are not necessary. Almost any telescope will perform this function quite well, regardless of minor optical imperfections. Converting detector output into a readable signal is left to you, but basically consists of a few stages of amplification, noise filtering, a comparator and a tone oscillator.

A Sample Path

To estimate signal levels over a given optical link, let's consider the following example: A 1-mW HeNe laser with a 0.6-mm beam diameter and a 1.3- $\times$ 10^{-3}-radian beam divergence is being used to communicate over a 1-mile path. The receiving optics used are 8 inches in diameter.

Using simple geometry, it can be calculated that the laser beam will expand from its initial diameter of 0.6 mm to about 6.8 feet over the 1-mile path. The beam will thus be spread over an area of 37 square feet. The 8-inch-diameter mirror has an area of 0.35 square feet, and it will therefore intercept 0.95% of the laser radiation, or about 9.5 μW. A properly aligned 10 $\times$ beam expander at the transmitter would increase this amount to 0.95 mW. The sensitivity, noise and dark current of the detector, in combination with the amount of unwanted (background) light received, determines whether or not this is a detectable signal (in most cases, it should be). Of course, it is very advantageous to use the narrowband optical filter to reduce background light, and/or preferably work at night! The most difficult part of setting up an optical link such as this is in lining up the laser and receiving telescope optics.

Summary

I hope that this gives you some idea of what is involved in free-space optical communications. Optical systems of this type are under serious consideration as the communications links between Earth and the next generation of deep-space probes. It should be possible to communicate with spacecraft at distances of up to 9.3 $\times$ 10^{10} miles (1000 astronomical units) at 20 kbit/s using a 10-W laser. I am interested in hearing from any readers who are experimenting with optical communications systems.

One source for new lasers, filters and other optical components is Edmund Scientific, 101 E Gloucester Pike, Barrington, NJ 08007. At the time of writing (July), Timeline was selling a 10-mW HeNe laser with a 140-MHz acousto-optic modulator for about $500. Timeline can be reached at 1490 W Artesia Blvd, Gardena, CA 90247, tel 213-217-8912. *Sky and Telescope* magazine is a good source of telescopes and telescope optics suppliers.

A Dipper Amplifier for Impedance Bridges

(continued from page 25)

impedance dial and the dipper level control for maximum or full scale on the bridge meter. Proceed with normal bridge operation.

If you want the amplifier to cover the 1.8-MHz band, more turns are needed on broadband transformer T1. I suggest using 25 turns on the primary and 9 turns on the secondary. The high-frequency limit may be reduced, but should not go below 30 MHz.

Notes

[1]M. Wilson, ed., *The 1988 ARRL Handbook* (Newington: ARRL, 1987), p 25-33.
[2]D. DeMaw, "Homemade Circuit Boards—Don't Fear Them," *QST*, Aug 1987, p 14.

Radio and electronics have been Andrew Griffith's hobby since he was 15. He was first licensed in 1951, received his Advanced class license in 1952 and graduated to Extra Class in 1983. In 1943, Andrew earned a BS degree in Chemical Engineering from Virginia Polytechnic Institute. After a tour of duty with the Army in Europe, he received his MS degree in 1947. His industrial career was spent with the Dupont Company.

Now retired, Andrew devotes his free time to ham radio, golf and staying out of his wife's hair! His primary radio interests are its technical and building aspects. Andrew's homemade equipment includes a linear amplifier and a digital readout for his Kenwood TS-520 transceiver. He occasionally chases DX and is active in the Volunteer Examiner program.

Exam Info

CHANGING CALL SIGNS

Most licensees who upgrade are eligible to request call sign changes; many other licensees who do not seek an upgrade are also eligible. (Technician class amateurs who already hold a call sign beginning with "N," followed by a numeral and three suffix letters and who upgrade to General are not eligible for a change as the call signs for both classes are issued from the same call sign block.)

If you're eligible (and interested), all that is needed to request a call sign change is to file a Form 610 with the FCC. Check off Item 2E ("Change Call Sign"), fill out the remainder of Section I (don't forget to sign it!), and mail it with a photocopy of your current *signed* license to the FCC's address at the top of the 610. Your new license should show up in just a few weeks.

One warning, though: Once you have been issued a new call sign, your former call will not be reissued to you. Be sure that you really want to change it before your 610 goes in the mail!

Note: The FCC is currently considering adopting a proposal, PRB-3, that may allow amateurs to select call signs from certain as-yet-undetermined call sign blocks. Watch *QST* for details.—*Jim Clary, WB9IHH, Manager, ARRL/VEC*

Strays

CODE SPEED RECORD TO BE CHALLENGED AT PORTLAND CONVENTION

☐ One of the features of this year's ARRL National Convention is an effort to establish a new speed record in the international Morse code.

The eliminations will begin on Friday afternoon, Sep 9 with an official speed run at 50 WPM. Participants are encouraged to bring their favorite typewriters. Transcribing devices must be capable of same-time output. Editable data storage features may not be used.

Transmissions will be approximately five minutes of plain text, of which one minute must be copied accurately (including word spaces in their proper locations) for credit to be granted. For those traveling a great distance, a typewriter could possibly be supplied. For more information or pre-registration please contact: H. Lea T. Ball, AL7W, 4536 SE Gladstone St, Portland OR 97206, tel 503-777-1032.

QST congratulates...

☐ Bill Lowell, K7JBQ, of Grosse Pointe, Michigan who won first place in the 1988 American Auto Racing Writers and Broadcasters Assn writing contest in the magazine writing category.

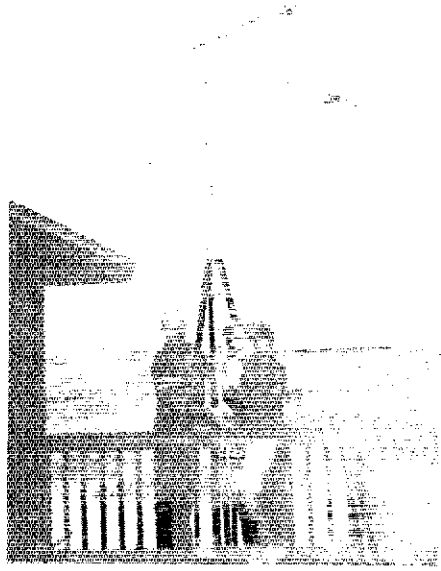
The World Above 50 MHz

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

Gridexpeditioning—It Can Be Easy and Fun

Elsewhere in this column are accounts of several DXpeditions to faraway islands. Most of us do not have the opportunity to ham from such exotic spots. But the popularity of the Maidenhead grid system and the League sponsored VUCC awards makes it possible for all of us to become sought-after DX, even if we travel only a few miles from home and set up in a cow pasture. Once more, since operation will be in our favorite part of the spectrum, kWs and huge antennas are not required. This kind of DXpedition has been dubbed the "Gridexpedition," and it is becoming increasingly popular among VHFers. This column lead is intended to salute all of those who have mounted gridexpeditions over the past few years and to encourage others to try it too.

Gridexpeditions have been conducted in virtually every part of this country as well as in Canada and Mexico. They have been from boats off both the East and West Coasts as well as in the Gulf of Mexico. They have been from mountaintops in the East. (The Westerners call them hills.) They have been on the Midwestern plains and from the mountains and deserts of the West. On land, gridexpeditions have used transportation of nearly every kind of vehicle—from bicycles and motorcycles to plush motorhomes.



One, who has been particularly active in providing rare grids has been WA4VCC. Shown is his 2 and 220 installation on a 2nd floor balcony during a recent visit to EL79. Pictured are Bob, WW4T and Ted, WA4VCC with Donna, N4ORP hiding behind the tower.

There are all kinds of opportunities to go gridexpeditioning. It doesn't have to be during a contest, but that's one time to be sure of lots of activity.

You don't need a lot of equipment. Most of us have small multi-mode rigs capable of operation from 12 volts. A solid state brick would help too, but may not be necessary. Small beams can be bought or built that can easily be disassembled and carried on the top of a car.

If you want your gridexpedition announced in advance in The World Above 50 MHz, I must receive your notice by the 1st of the month 2 months ahead of the *QST* cover date; eg, for a November operation, I must be informed by Sept 1. My deadline is now the 10th of each month. And after you return home, drop me a line and let me know how you made out.

You'll enjoy gridexpeditioning and those you work will appreciate your efforts in helping them up their grid totals.

ON THE BANDS

Not surprisingly, sporadic E provides the lion's share of both the 6- and 2-meter news again this month, but tropo is in there contending also. What kind of E season has it been? Viewing it from a single location, one might reach the conclusion that conditions have been quite spotty—with some days roaring with excellent single and multi-hop openings, while others are absolutely dead. However, if one is able to observe a broader geographical perspective, a different picture is evident. It has been a truly wonderful E_s season up through the first few days in July. A sampling of a broader geographical area is furnished by the following example. On two successive evenings, July 4 and 5, I had occasion to talk to VE2DFO, near Montreal, on the telephone. At my location, near Washington, 6 meters was dead, or nearly so, both times. Don revealed, however, in each instance that it was open to Europe from his QTH. He was even able to tantalize me by playing the SSB signals of CT4KQ over the telephone. Such is the proclivity of E_s. There is a good reason it's called "sporadic."

WA5IYX cites another difficulty in assessing the magnitude of E_s seasons using only what one works or hears on the 6- and 2-meter amateur bands. Obviously, the problem is lack of continuous activity. Pat does extensive listening to the FM broadcast band and finds it a better measure, at least at his San Antonio QTH. Just to give an inkling of how 1988 has stacked up, he says that the total number of minutes of FM E_s for June alone exceeds that of the entire year 1985.

Last month, the huge European 6-meter multi-hop E_s opening of June 6 dominated the news. And it's no wonder, as it will certainly be talked about for years to come. As if to give those who may have missed the June 6 event a second chance, another European opening occurred Saturday June 25. If it were not for the June 6 affair, the one on the 25th would be considered quite monumental. But, it pales by comparison in terms of area covered, the strength of the signals and its duration. Nevertheless, it came at a particularly fortuitous time, beginning only a few hours after the start of Field Day. Many groups had 6 meters and they literally had a "field day" working the Europeans. Many FD participants, who may have had only a vague understanding of the capabilities of the band, were completely dumbfounded to hear British accents coming from the speaker in the 6-meter tent! For avid 50-MHz DXers who had the foresight to stay home that weekend, the catch of the day was Finnish station OH1ZAA. Most that worked him described his signal as very easily copied with a number of reports of 559. I am sure that I do not have a complete list of all who added this new country to their rosters, but information at hand lists VE1YX, K2MUB, W3IWU, W3GUF, W2BXA, W2BN, W4OO, N4EJW, WA4OWC, K4KUZ and N4TL among the successful ones. It is particularly interesting that so many Florida stations were able to work OH1ZAA. It demonstrates anew that it's not only the Northeast that gets a crack at European DX.

The West got its chance again June 27. N7DB and W6YKM both called the answering machine to report a very good JA opening around 0500Z. W6YKM notes working about 40 Japanese stations over the course of an hour. He said that the JAs were working as far east as Nebraska, but I have had no reports from that area as of this writing. K7KV was another Northwest station in on that one. Dave completed some 70 JA contacts, despite having to divide his time with other pursuits. K6QXY said that it started with KL7NO, who was in for about an hour. Then, at 0452Z, Bob worked his first JA. Altogether, 13 were worked in the 1, 2, 4 and 7 call areas. A few days earlier, K6QXY observed an interesting effect when, at 1845 June 18, he heard KH6HI while his beam was aimed at 100 degrees. Turning it to the normal direction produced nothing. KC9RG reports a similar occurrence. It took place while Bob was operating W9YB during the June VHF Contest. On two occasions during Saturday evening, he was able to hear stations to the west while pointed east, but unable to hear them on the direct path. One possibility for such a phenomenon is that reflection takes place off the edge of an E cloud. Does anyone have any other ideas?

On his end, JA1VOK reports results during the June 27 multi-hop session E_s to the

70-cm Standings

For WAS holders, listings are WAS number, call, state, call areas worked and grids worked. For others, call, state, US states worked, call areas worked and grids worked. Call areas are the 10 US 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 those Maidenhead designators worked since the VUCC award was instituted January 1, 1983. Those not showing some indication of activity or interest within the past two years are subject to being dropped. They will be reinstated upon presentation, in writing, that they are still active on the band and wish to be listed. It is not necessary to have worked any new states or grids in order to remain listed or be reinstated. Compiled July 9, 1988. Updates for next listing must be received by January 5, 1989.

1	WØYZS*†	MO	—	—
2	K2UYH*†	NJ	55	—
3	K5JL*†	OK	48	—
4	WB5LUA*	TX	41	—
5	W5FF*†	NM	28	—
6	W1JR*†	MA	52	170
7	WØRAP*†	IA	42	190
8	WBØTEM*	IA	—	—
9	KAØY*	IA	—	—
10	WA4MVI*†	SC	26	—
11	K5FF*†	NM	29	—
12	DL9KR*†		55	202
K1FO *†	CT	46	44	206
W2SZ/1*	MA	29	12	79
K1PXE	CT	25	11	—
K1LPS*	VT	22	12	28
WA1HYN	RI	17	8	45
W1RIL	MA	15	9	36
AF1T	NH	14	8	—
W1EJ	NH	13	8	—
N1AIS	MA	11	5	—
W1FAJ	CT	10	3	12
KA1DHO	MA	9	4	11
W2VC	NJ	27	11	67
W2PGC	NY	24	10	45
WB2NPE	MJ	24	9	79
K2GK	NY	24	9	73
WA2FGK	NJ	22	9	—
WA2FUZ	NY	18	8	—
K2YCO	NY	17	8	—
N2WK	NY	16	9	53
N2BJ	NY	16	8	46
K2OVS	NY	16	6	20
W3RUE	PA	31	11	66
W3IP	MD	28	10	57
WA3FYJ	PA	25	10	44
WB3LJK	MD	24	10	65
AE3T	PA	23	8	—
KB3QM	DE	23	—	54
K3HZO	MD	22	10	51
W3ZZ	MD	22	9	58
KB3PD*	DE	22	9	52
W3WFM	MD	21	9	60
WB2DNE/3	MD	17	8	51
AC3T	DE	13	5	18
W3XO	MD	13	5	12
WA3DMF	MD	10	5	13
K4QIF*	VA	48	38	—
W5HUQ/4*†	FL	36	39	—
WB4NXY	KY	29	8	90
KC4EG	KY	28	8	65
WA4PCS	KY	27	9	—
W4FJ*	VA	25	8	—
W4ISS	GA	25	8	—
WA4CQG*	AL	25	8	—
WS4F	GA	23	8	61
WA4SBC	VA	21	7	46
N4VC	TN	21	6	54
K4QF	AL	21	—	—
K4CKS	GA	17	6	61
KI4CI	FL	16	6	72
WD4DGF	TN	15	6	29
WB4RUA	GA	15	4	31
K4KAE	SC	14	6	—
WA4OFS*	FL	13	11	53
WA4OWC	FL	11	—	—
WD4AHZ	FL	9	2	43
KB4CRT	FL	9	2	31
WB4SLM	GA	9	2	31
WD4FAB	FL	9	—	25
KA4CRT	MS	8	2	16
NA4I	GA	5	2	14
WØRRY/5*	OK	48	35	165
WB5AFY*	TX	42	33	158
W5RCI*	MS	36	14	118
K5UR	AR	28	9	140
K5SW	OK	28	9	112
W5HN	TX	26	8	62
WA5VJB	TX	22	7	—
KB5MR	OK	21	5	71
W5DFU	OK	20	8	62
WA5HNK*	TX	19	6	44
KE5EP	TX	19	—	75
W5ASH	TX	18	8	69
W5SXD	TX	17	5	36
K5JRH	TX	17	4	—
WA5DBY	TX	14	4	—
N5BBO	TX	12	3	58
W5UWB	TX	11	3	17
W5NZS	OK	6	—	50
W6ABN*†		43	34	—
N6AMG*		9	16	—
K6JYO		9	6	—
K6QXY		4	3	—
WA6HXM		4	2	—
W4WD/7*	UT	38	33	—
W7HAH*	MT	36	25	65
W7JF*†	MT	34	25	—
K7ICW	NV	4	2	20
W8IDU*	MI	41	11	—
W8YIO*	MI	40	31	105
NI8O	OH	31	10	119
WB8BKC	MI	30	9	73
WA8MIL	MI	20	9	56
WB9SNR	IL	34	11	77
W9ZIH	IL	33	11	—
WB9MSV	IL	25	8	92
NC9F	IL	20	9	51
W9YCV	WI	13	6	25
W0UC/9	WI	13	4	6
W9YCU	WI	12	6	31
KB9NM	WI	9	3	—
KØTLM*†	MO	47	24	91
KØALL*	ND	35	17	—
WØPW*	CO	28	10	—
WØRT	KS	28	7	79
KØDAS	IA	26	7	—
WØFY	MO	24	8	46
WBØDRL	KS	21	6	74
WØOHU	MN	20	6	46
KCØQR	NE	18	8	80
WØJRP	MO	18	8	55
KCØOG	NE	18	6	56
KØIFL	MO	18	6	54
KFØM	KS	16	5	60
WAØTKJ	KS	15	5	50
KØRZ*	CO	11	6	49
WBØDGF	NE	10	3	25
NØBTN	NE	6	3	19
KH6HME		2	2	6
VE1UT	NS	14	6	—
VE3LNX		21	10	65
VE4MA*†		45	43	—
G3SEK*		29	46	190

*Some states or grids worked via EME.
†WAC
—Information not provided.

western US. Hat lists stations worked as: N7ML, K6QXY, W6YKM, WA6BYA, N6AMG, WA8LLY/6, N7DB, K7RWT and WB7PEK. JA1VOK also notes working KH6JJI, KH6IJ, KH6VP and KH6IAA June 10-11 and some of the same plus AH6IO on the 18th.

A new country for everyone who was fortunate enough to work it was provided by the operation from Aruba of W6JKV and N4HSM. It was a new one for everybody because that island was just recently declared a separate country for DXCC purposes following its separation from the other islands of the Netherlands Antilles. Operating as P40JT, W6JKV managed to work 216 different stations during a 10-day stay. A breakdown shows 15 W1s, a like number W2s and 3s, 64 W4s, 43 W5s, a lone W6 (K6QXY), 4 W7s including K7KV who journeyed to eastern Washington for a quieter shot at the elusive contact, 27 W8s, 4 W9s, 16 WØs, 3 VEs, CT1DTQ and CT4KQ, 2 8P6s (guess who?), a VP2, YS1ECB and VP5D. Also worked was a local, P43AS, who Jim says will be active from now on, using 100 W and a 7-element beam. N4HSM concentrated on 2-meter EME, where they had an array of two M^2 Yagis. Working as P40H, Dick exchanged reports with W4ZD, K6MYC, KB8RQ and W5UN. Operation on both bands was hampered by the fact they were forced by circumstances to run 150 W, rather than the kW they had planned. Nevertheless it was another successful operation of the kind for which W6JKV and his various cohorts, often N4HSM, have become well known. Our thanks are extended again for helping make life on the VHF bands more interesting for everyone. Many who were not successful in contacting P40JT at least had a lot of fun trying. K6QXY, in commenting on being the sole Californian to make the grade, noted the help that the 50.100 to 50.125 DX window afforded him in making it possible to copy the extremely weak signal which P40JT put into California. And some Westerners continue to insist that the DX window is of no benefit to them.

Another DXpedition which did a lot to add some excitement to 6 meters was that of FP/KA3B to St Pierre. Harry turns in an impressive total indeed, QSOing 418 US stations and 193 Europeans, including Gibraltar DXpedition ZB2/G4VXE plus VP5D, OX3LX and 4U1UN. He was disappointed in not being able to work any 9s, only a single Ø (WØJRP), only 6 VEs and no 6s or 7s. He was hampered by the airline failing to deliver all of his gear, including the memory keyer and preamp. In addition, due to mounting problems at the hotel, he was forced to use his 2-element mini-Quad rather than the larger Yagi he had intended to employ. KA3B expresses his apologies to those who called that he was unable to hear, especially the QRPers. Both a high spot and a frustration was hearing the ZD8VHF beacon on Ascension Island but not being able to arouse ZD8MB. Incidentally, Harry says that St Pierre resident Henri LaFitte, FP5HL, has a Swan 250 and a 6-element beam, promises to be on from his summer QTH next season but has been unable to operate in town.

E skip, as the 2-meter gang prefers to call it, was not limited to 6 meters. There were quite a few 2-meter openings, too numerous to recount them all. One such session is reported by KI3L/5 Gallup, NM. Don says that on June 9, between 0250 and 0315Z, he worked the following Pacific Northwest stations: K7EIV, NF7X, W7IDZ, W7YOZ, W7EMP, N7NW, WA7RHE, WA7DHW, W7ZSL, KD7TS, N7BNJ, W7FN, W7FIV and WA7DCW. Word of another good 2-meter E_s opening, this one June 19, is passed along by NØLL. Larry says that he missed it, but notes that WAØTKJ managed 33 contacts in AZ, NV and CA. Apparently the same opening was caught by KØFPC Salina, KS. Bob said that the unusual aspect of this session was that he was home and knew it was happening! Stations he contacted were N6CW and WA5BNH/6 both in DM12, N6ND and K6STI in DM13 and K6PVS in DM14, all worked in a 20-minute span beginning about 1825Z. He comments that the usual failure to move off 144.200 probably prevented more QSOs. Still another 2-meter E_s opening is reported by W6EMD Redwood City, CA. Dave says that on June 30 between 0124 and 0206, he contacted WS5C and W8CM/5 DM91, KB5ELQ DM82, NG4C/5 DM62, W5OZI EMØØ and WD5FTO EMØ1. It was a special thrill for Dave as he says that this is the first time that he has ever heard anything outside of CA other than Reno, NV on 2 meters. I hope that this has broken the ice for you Dave.

A reminder for 6-meter DXers: Reports are due Sept 1 for the next updating of the 6-meter DX box. See The World Above 50 MHz in November 1987 *QST* for needed information. Please provide a list of countries, calls and dates worked. This is necessary as credit cannot be given for countries not permitting 50-MHz operation at the time of the contact.

Another reminder: This year's Mid-Atlantic VHF Conference and big Hamarama hamfest, sponsored by The Mt Airy VHF Radio Club, are scheduled for Oct 1 and 2. Both will be at their usual haunts, the conference at the Warrington Motor Lodge Warrington, PA and the Hamarama just down the street at the Rte 611 drive-in. For further information, drop an SASE to Rick Connor, WC2K, RD 3, Box 107 Carranzo Rd, Tabernacle, NJ 08088.

THE CREW AT 22 GETS REAL ANSWERS VIA HAM RADIO

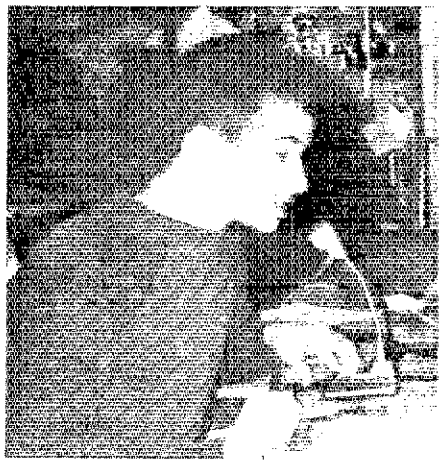
☐ Jim[1], a 4-land ham, is not an AIDS sufferer—he is an AIDS fighter. Jim is also a charter member of the Classroom Net, which uses the theme of a better life and education for young people via ham radio. A mild hemophiliac, Jim contracted the disease several years ago after receiving AIDS-contaminated Factor 8, a blood-clotting agent. At that time, donated blood was not routinely checked for the AIDS virus. What is important to Jim now, is making sure that people know about disease, and that some of the many myths about the disease are dispelled. Enter WB2JKJ, the Crew at the Radio Club of Junior High School 22 and the Classroom Net.

The lower east side of Manhattan is a conglomeration of tiny streets, larger boulevards, teeming multi-story housing projects and tenements left over from the turn of the century. Loisada or Alphabet City, as it is called by its residents, is said to have the second highest concentration of AIDS in the nation. The education via ham radio program is designed to promote learning among young people who have not been academically successful; however, one must survive to learn. For years, students going through the program have known Jim on the air and heard stories about his trips, as a sea captain, to faraway places. Many have even spoken to him while he was at sea. They know he supports the program, both with friendship and finances, and now their friend has this disease everyone is talking about. Right answers to the inevitable questions about AIDS are hard to come by, however.

What to do? Get 30-35 kids in at a time and have a real question and answer period on the air. The Crew knows and trusts Jim. They will open up and get the right answers to real questions, and at the same time educate those listening on their ham or shortwave radios. The idea is to let the kids ask anything and everything in their own language, and to open the session up to friends and community members not in the program but brought in by the Crew for this special event.

Sounds like a great, life-saving idea and wonderful use of ham radio—but will it work? After the first 67 eighth and ninth graders had their first session with Jim in early March, we knew we had something. Every type of question you could imagine from how to, why and where, all in the language of the street, was skillfully handled by Capt Jim. The unanimous comment from the students was, "At last we got somebody who knows the real answers!" And those answers will keep coming.—*Joe Fairclough, WB2JKJ*

[1]Jim is not his real name.



Gilberto, sixteen and in the ninth grade, asks his friend Jim a question about AIDS while the rest of the Crew at 22 listen in. *(photo courtesy of Joseph Fairclough, WB2JKJ)*

Joseph Fairclough, the originator of "Education through Communication" and Jim are planning the Fall 88 term. They would like to reach all the 200 plus that learn via ham radio at JHS 22 and bring in other schools around the country as well. They also plan to go into Loisada and meet with other young people introducing them to Amateur Radio, Jim and the message he has to deliver. Those wishing further information may write Joseph J. Fairclough, WB2JKJ, President, Radio Club of JHS 22 NYC, Inc, 111 Columbia St, New York, NY 10002. [At its July meeting, the ARRL Board of Directors conferred on Joe (and WB2MGP) the 1987 Professional Teacher of the Year Award.—Ed.]

MICROSATELLITES IN 1989

☐ Three AMSAT organizations, AMSAT-NA, AMSAT-LU and BRAMSAT (Brazil) have teamed with the Center for Aerospace Technology (CAST) at Weber State College, Ogden, Utah, to produce four ultracompact *microsatellites*. TAPR is providing initial financial support, and the ARRL is assisting with design and construction. The AMSAT-NA and AMSAT-LU payloads are packet-radio transponders (PACSATs). The BRAMSAT payload is a voice synthesizer and the CAST payload is an earth-looking CCD (charge coupled device) camera. AMSAT-NA has contracted for a 1989 launch for these microsats by Arianespace.

KANSAS HAM AIDS IN RESCUE ON HIGH SEAS

☐ Gary Gerber, KBØHH, of Anthony, Kansas aided in the rescue of three people from a sailboat in distress on June 28. Gary happened to hear MAYDAY from Raymond Tripplet, WB6ZQA, the owner of *September Song*, a 50-foot sailing vessel 400 nautical miles west of San Diego. Ray, his wife and a relative were sailing from Hawaii to California and encountered rough seas causing the ship's hull to buckle. Gary contacted the Coast Guard in California by telephone and relayed information to them as the Coast Guard was unable to to make radio contact with the boat. According to Coast Guard Petty Officer Arn at Long Beach, two Coast Guard search planes and one Navy aircraft located the *September Song* and remained with the vessel for eight hours. A commercial ship was rerouted to the distressed sailboat, where the three were rescued and taken to Midway Island. The fate of the abandoned *September Song* is unknown. —*Larry England, WCØX*

Gary Gerber, KBØHH who picked up the MAYDAY call from the *September Song* and relayed vital information to the Coast Guard. *(photo by Larry England, WCØX)*

CLUBS: SHARE YOUR BEST PUBLICITY/RECRUITING IDEAS

☐ Many affiliated clubs have developed sure-fire techniques for getting good publicity for Amateur Radio in their communities and for attracting newcomers into our ranks. If this describes your club, we want to hear from you! Don't hide your light under a bushel basket! Garner all the fame and notoriety you're entitled to—by sending us your ideas so we can share them with others!

The best ideas are the simple ones, so please try to keep your description down to two pages. If you want to attach some exhibits (photos, drawings, clippings, brochures, whatever), that's fine. Send to: Rick Palm, KICE, ARRL HQ. Please don't send anything that you need returned. Deadline for receipt at HQ is Dec 1, 1988.

Submissions wil be judged based on how readily and effectively the idea can be adapted by others to generate new hams. We're interested in knowing what propective hams, especially the younger ones, tell you they find most attractive and enjoyable about Amateur Radio. We'll print the best ideas, and maybe some runners-up in *Field Forum* or some other League publication.

And now to sweeten the pot. To say "thanks" to amateurs for their support though the years, and in the interest of promoting the growth of Amateur Radio, the Radio Shack division of Tandy Corporation will donate the latest Tandy 1000 computer with monitor to the affiliated club making the best submission!

Need any more incentive? We didn't think so!

FM/RPT

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

They Shoot Radios, Don't They?

One night, I was awakened by a thunderstorm. The next day, I discovered that my low-band set was blown up. It did not take much troubleshooting to figure out what had caused the explosion.

Other times, my radios go haywire for no obvious reason. I will be motoring along listening to the gossip on my favorite repeater, then, all of a sudden, my radio either whimpers or goes bang! Time to do some troubleshooting, which, next to visiting my dentist for a root canal, is my favorite way to kill time. Having troubleshot more than my fair share of broken radios, I thought I would pass along some things I have learned that might help you when the inevitable occurs; that is, when your radio dies.

The Day the Radio Died

If your radio is a victim of lightning, and it contains stuff like microprocessors, ROM and RAM, the radio's brains may be so scrambled that you might have to boat-anchor it. When I sent my lightning-struck low-band set back to the manufacturer for repair, the technician telephoned me to explain that once a radio like mine (with microprocessors, ROM and RAM galore) gets hit by lightning, it is usually never the same. He could do his magic and send the radio back to me in working condition, but the next day or the next year the radio could go south again. The technician explained that the force of the lightning could weaken other components that may be working today, but not tomorrow, and that any repairs he made were not guaranteed for any length of time. (For insurance purposes, the tech wrote a note stating that the radio was totaled. My insurer accepted the claim and I was able to replace the radio minus $100 deductible.)

Now, Let's Deal With Some Lesser Disasters

When you push or toggle the power switch and power does not come on, there are a number of possible causes. Check the power cord assembly. Make sure that it is snug in the radio's power connector. At the other end, check that it is properly connected to the power source. In between, check that there are no breaks in the power cord.

If the power cord assembly checks out, then a fuse may be blown (or may have failed for mechanical reasons). Likely, there is a shorted component, possibly in the power supply circuit. If your radio comes with decent documentation, it should have a readable schematic that will allow you to find the power supply circuit and check for the short. If you have no schematic or, after popping the hood, you find that your radio's innards look like multicolored linguine, it might be time to find a suitable box for shipping the radio for repair by an authorized dealer or by the manufacturer. Yes, you will be out of radio for a few weeks, but that is better than making matters worse by poking around in all of that pasta.

The Silence is Deafening

Your radio lights up, but there is no sound from its speaker. I know this may sound too obvious, but check that the volume control is turned up. More than once, I have found that my receiver seems dead and I could swear on a stack of Gideons that the last time I used the radio I had the volume set so, but, lo and behold, some gremlin (or three-year-old daughter) had turned the volume control down. Of course, I normally discover the gremlin's handiwork only after removing all 18 screws from the radio's cover in order to poke around in the linguine. Similarly, your squelch control may be cranked up so high as to squelch everything, so check it out, too.

Another cause may be that your radio is in the transmit mode; the PTT switch may be in the transmit position. You know and I know that we never shut off our radios with the transmitter transmitting, but, trust me, the same gremlins who fool around with volume and squelch controls also like to fool around with PTT switches for the spice of variety. So, before you go popping those 18 screws, check PTT.

If all of the controls or switches are set properly, and you still hear nothing, your next step depends on whether your speaker is internal or external. If it is internal, pop the cover and check the speaker cable assembly. Perhaps, the last time you were poking around inside, you loosened it so that it has now become disconnected from its receptacle or it got pinched by the cover when you reinstalled said cover. If your speaker is external, check the speaker cable for breaks and the speaker connector for a snug fit.

All of the lights are on and the transmitter is transmitting and the receiver is receiving, but something is amiss: that repeater that used to pin your S meter is only half-scale. If only that one repeater seems weaker, perhaps the repeater's transmitter is to blame. On the other hand, if all stations seem weaker, then your receiver's sensitivity is at fault. Is your antenna feed line connected to your radio? (After my brush with lightning, I disconnect everything whenever I am away from the shack and often forget to reconnect the feed line before powering up.) If the coax cable is properly connected to the radio, check out the rest of the feed line for shorts or breaks, which can occur easily in mobile installations especially if the feed line snakes through doors and trunk covers. That cable snaking through a door may have been pinched just one too many times.

I Can't Hear You!

Your receiver is working, but your transmitter is not being heard. If your radio has an adjustable power output control, perhaps that gremlin has struck again and cranked your transmitter down to a milliwatt output. Maybe, your antenna system is not functioning properly, so check its SWR. A high SWR may be the cause of your transmitter's low output.

If your transmitter cannot be keyed by your PTT, check the microphone cable and connector. The cable may have a short or a break, or the connector may be loose. Such a problem is not uncommon because the microphone cable is probably the most abused link in your radio system, especially in mobile installations. Just think how many times that microphone cord has been twisted and pulled.

You can key the transmitter and the output is normal, but you still cannot be heard. Then, the gremlin has probably struck one last time and has changed the setting of the simplex/duplex switch causing you to transmit on the repeater's output.

Check this obvious stuff out before you go digging into the circuitry (and possibly make things worse) or stick the radio in a box and send it for repair. Beyond these troubleshooting suggestions, your expertise at deciphering schematics and jumping into linguine will determine whether you try and fix it yourself or let someone more expert fix it for you.

REPEATER LOG

According to May 1988 reports received, repeaters were involved in the following public-service events: 376 vehicular emergencies, 25 medical emergencies, 17 alerts/drills, 16 fire emergencies, 12 public safety activities, 11 weather emergencies and 8 criminal activities.

The following repeaters were involved (followed by the number of events): K1UN/K1ISR/WA1UCO 8, WA3BXW 10, W3LIF 4, WA4AOS 11, W4BFB 9, W5FB 55, WA6BJY 11, WD6DIH 127, KA6EEK 89, N6ME 117, WA7RPS 2, K8DDG 20, KE8DR 2.

Public Service

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

Severe Storms: The Art of Being Weather-Wise

By Otis Henry, N4KQX

"Some ten thousand homes in Nashville and Davidson County were without power last night as the result of the electrical storm." Is this a familiar story in your area during the summer season?

If you are a member of an ARES, RACES or SKYWARN net or team, you have the unique opportunity to perform extremely important public service communications during these disruptions, and in so doing, help justify our very existence as members of the Amateur Radio Service.

While just about all activity is affected by severe weather conditions, Amateur Radio is particularly susceptible.

It's regrettable, but we do have some unfortunate accidents. We certainly want our outdoor activities, whether they be the Simulated Emergency Test, Field Day or contests, to be fun but at the same time safe and technically rewarding. We can eliminate many of the weather related incidents with proper planning, but we can do even more by becoming more understanding of the weather itself.

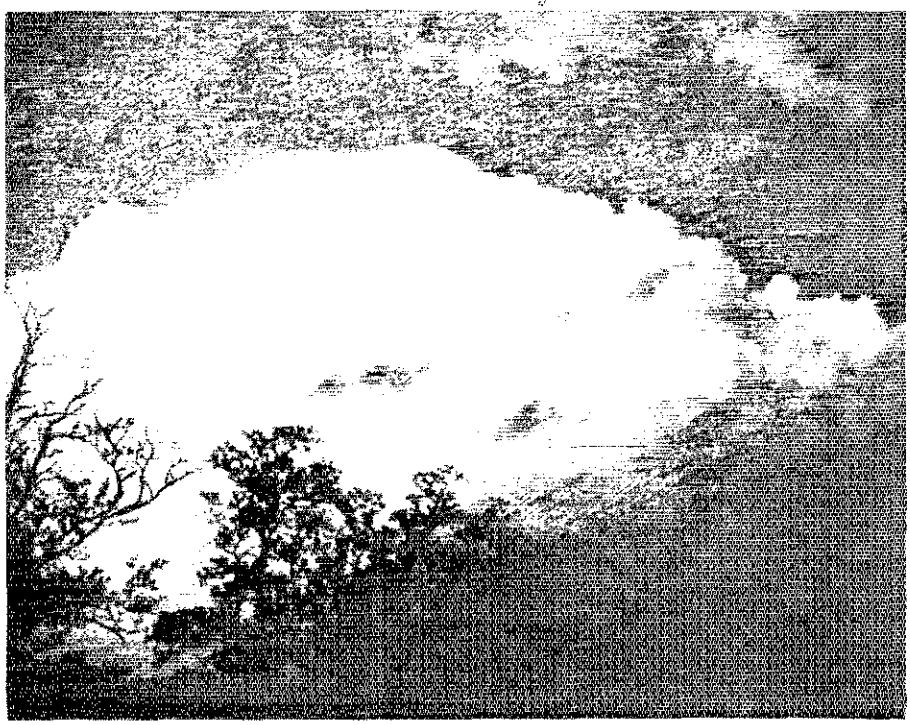
Being weather-wise means more than never getting rained on. It means being sensitive to nature. The weather-wise individual is aware of the color and texture of the skies, the dew on the grass, and even the very taste of the wind. The subtle changes that take place in our environment all have meaning.

Now, for a few observations on the thunderstorm, its development and characteristics. Every thunderstorm begins as a cumulus cloud, but only a few reach thunderstorm proportions. The ordinary thunderstorm that is most common in our summer months normally gets its start in an updraft of warm air. Warm temperatures and high humidities play very prominent roles in the formation of convective thunderstorms. Those of you who participate as members of SKYWARN and spotter teams may have been briefed on some of this information. The meteorological meaning of convection is the up or down movement, thermally or mechanically produced, of a limited portion of the atmosphere. It is essential to the formation of many clouds, especially the cumulus and cumulonimbus (thunderhead) type (see photo).

In the early stage of the thunderstorm development, an updraft carries warm moist air to a level where the air becomes saturated with moisture and visible droplets begin to form as a cloud. These continued upward movements of air soon produce large clouds resembling rising mounds, domes, or towering cumulus, known as developing thunderheads. When fully developed, the cumulonimbus cloud, now a thunderstorm, is 6 to 8 miles across its base, and often towers to altitudes of 30,000 to 40,000 feet or more. The storm is 30 to 45 minutes into maturity. After the initial raindrops begin falling, the dissipating stage lasts 20 to 30 minutes. Some may even last for hours. As the thunderstorm develops, interactions of charged particles produce an intense electrical field within the cloud. A large positive charge is usually concentrated in the frozen upper layers of the cloud, and a large negative charge, along with a smaller positive area, is found in the lower portions. This region, the transition zone, near the freezing level within the cloud, is also known as the "lightning hearth region" since most of the lightning begins in this part of the cloud.

For the information of our SKYWARN and spotter groups, we will mention that thunderstorms that develop east or south of you will normally go past, but those forming in the western or northern quadrants may give you trouble. For the information of the emergency nets, the severe thunderstorm is so classified because of winds in excess of 57 mi/h, hail ¾ inch in diameter or larger, incessant lighting and generally heavy rain. The National Weather Service issues severe weather watches if conditions are favorable for severe thunderstorms and will issue a warning if storms have been observed or reported in the area.

The National Weather Service tells us that at any given moment, more than 2000 thunderstorms are occurring around the world. It's apparent, then, that no ARES, RACES and SKYWARN teams can afford to ignore the possibility of utility outages and other events that accompany severe weather situations. Indeed, with the widespread use and coverage of voice and



An example of a maturing thunderhead—18 minutes later and 10 miles northeast, 1/2 inch hail, heavy rains, gusty winds and lightning were experienced. (*photo courtesy N4KQX*)

packet repeaters, especially if there are emergency power sources to back them up, the time is now perfect for more and more groups to organize, even in smaller communities, for just these types of emergency-preparedness activities.

Since lightning is one of our foremost adversaries in the thunderstorm, let's examine it a bit more closely. Although lightning research has gone on since the kite-flying days of Benjamin Franklin, scientists have lacked a system that is both broad enough and fast enough to watch electrical storms unfold on the spot.

A violent thunderstorm with its bright flashes of lightning and loud claps of thunder is an awesome thing for most of us to observe, even if life and property are not at stake. In addition to casualties and injuries, each year lightning causes some $50 million in property damage and ignites about 10,000 forest fires in the United States. Have you ever been near a tree that has been peeled from top to bottom by lightning, and wondered why? As the lightning strikes the tree, it produces heat energy perhaps five times as intense as that at the surface of the sun. The temperature of the sap rises instantly to many thousands of degrees. When this happens, the tree explodes and cracks open from top to bottom to relieve the steam pressure which has built up. The mighty oak seems to be a favorite target for lightning strikes. Some have theorized that their height, plus the fact that they are very deep rooted, with roots often going to the water table, makes them a better conductor than many other trees.

What are your chances of being struck by lightning? If you are standing under a tree during a bad thunderstorm in the month of July, your chances are very good. In fact, these conditions make you a prime target for lightning, as most reported cases of lightning death involve people standing under trees. People operating farm, heavy construction or other such machinery are a close second in this dubious race.

The myth about lightning not striking in the same place twice is just that—a fallacy. Lightning strikes are not totally random; they hit a given point for a reason. It may be the high point on the terrain, or it may be that there is an attractor (like a metal fence or—hmm, a tower) at that point. If there was a reason for its striking there once, it could do the very same thing again.

Lightning is the visible transfer of atmospheric electricity between a cloud and the earth or between two clouds. It is most common during thunderstorms but may also be associated with snowstorms. The electrical energy needed to create lightning is generated in large storm clouds which may extend 10 miles or more above the earth. There are a number of theories which attempt to explain how lightning occurs. Basically, lightning occurs when the difference between positive and negative charges becomes great enough to overcome the resistance of the insulating air between them. This may occur within a single cloud, between two clouds or between the earth and a cloud.

It is hard to conceive of the vast amount of energy needed to bridge this gap, which may be miles wide. The average lightning discharge may deliver from 40,000 to 60,000 amps to the moist earth below, but can emit a hundred million volts or more. Remember, thunderstorms and lightning are Mother Nature's way of balancing the electrical forces that exist between the earth and the upper atmosphere; in fact, she does an admirable job!

Contrary to what you have heard about lightning coming out of the heavens and striking the earth, it actually strikes the other way around. It moves from the positively charged ground to the negatively charged sky. Think about that for a second. Lightning is a two-step process. The first stroke is a very faint electrical impulse, which is about as big around as your index finger but can be five miles long. It moves downward from the negatively charged cloud to establish a route for the return stroke, which rises to meet it from the positively charged ground. This entire process may take less than a microsecond. It is this return stroke, and the flow of super-heated air for several feet around it, that you see as the familiar lightning bolt. The return stroke surges upward at the incredible speed of 75,000 miles per second. The sound it makes, the thunder, is caused by the rapid heating and expansion of the air through which the lightning passes. These shock waves of thunder will then bounce off nearby hills, buildings and other objects, making the familiar echoes of rolling sounds of thunder.

There are numerous opportunities for Amateur Radio operators to become involved in weather-related emergency communications situations. Most communications outages in the weather situations we have discussed above are likely to involve antennas, power and other utilities. Fortunately, many of us that are seriously involved in emergency communications planning efforts have spare antennas and even equipment that can operate independently of normal power mains.

And while we're thinking about pre-emergency planning, let's take a moment to remind ourselves that as the result of so many severe weather storms throughout the country, there is little doubt that most emergency nets could use a large influx of additional help. No, not *during* an emergency; it's probably too late then to gain the training necessary to provide effective communications for your community! If you've not already done so, contact your Local, District or Section Emergency Coordinator *now* to determine what emergency communications efforts have already been made in your area. Don't know who your ARES leadership officials are? Ask your Section Manager. His address is on page 8 of *QST*.

Remember, for many decades now, the terms "Amateur Radio Service" and "emergency communications" have been used synonymously by the many communities and agencies we serve. Check into your local ARES, RACES and SKYWARN nets *this week* and see what the conditions are like. Get to know the capabilities, both in terms of human and equipment resources that presently exist in your area and plan now to add your own to their volunteer efforts.

Strays

FATHER MORAN, 9N1MM, TO SPEAK IN CENTRAL FLORIDA

☐ The Silver Springs Radio Club, Inc, of Ocala, Florida is pleased to announce that Father Marshall Moran, S.J., 9N1MM, of Nepal, will speak on September 30, 1988, at 7:30 PM.

As the recipient of this year's ARRL Humanitarian Award, Father Moran has spent the past 26 years living and teaching in India and Nepal. As the only Amateur Radio operator in Nepal, Father Moran has seen and met many dignitaries and Heads of State who have visited his school and radio shack. He will share his experiences with all interested amateurs and the general public.

This special event will be held in the Commissioners' Auditorium of the Marion County Governmental Complex on SE Fort King St, Ocala, Florida. For amateurs driving to Ocala for this event, talk-in will be on 146.01/61.

QST congratulates...

☐ William Gery, KA2FNK, on being a recipient of the Francis W. Reichelderfer Award for the development of the Weather Access for Hearing Impaired Printer (WEATHIP) system, providing access to weather warnings and forecasts for persons whose hearing is impaired. Bill is the lead forecaster at the National Weather Service Forecast office in Indianapolis, Indiana.

☐ Patrick Shirley, KD5MN, of Mumford, New York on being ordained a Catholic priest on June 6, 1988.

Future Shock in the NTS—An Opinion

By Brad Wells, KR7L, Washington Section Manager

While few readers will agree with *all* portions of SM Wells' following opinion, I believe that it will certainly stimulate discussion! Your comments (pro and con) are welcomed both by ARRL HQ and by the author himself.

A primal law governing human events is that "the only constant thing in our life is change." This continued accelerating change, however, can lead to "future shock" syndrome, in which we become increasingly resistant to progress and begin to fondly remember the simpler times of the past. In Amateur Radio, we have seen such changes come with the shifts in electronics technology. Solid-state devices, integrated circuits and computers can bemuse and bewilder those of us who began our Amateur Radio careers with tubes (hollow-state?), a J-38 hand key and discrete, hard-wired components. The diverse capabilities contained in a shoebox sized radio of today would have required an entire garage full of electronic equipment some 25 years ago.

In the late '50s and early '60s, one revolution in Amateur Radio was the advent of SSB technology which, for the most part, replaced the older AM equipment. The revolution of the '70s was the explosive growth and development of VHF/UHF FM and repeaters. Both of these technologies lead to different styles of operating by most amateurs. Single sideband greatly increased the popularity in HF phone operation, since it effectively doubled the available spectrum for this mode and was more efficient under adverse conditions than AM. FM and repeater technology gave us hassle-free communications from our cars and hand-held rigs that was far in excess of line-of-sight capabilities.

Of all the diverse groups within our hobby, the National Traffic System has been one of the slowest to accept and utilize the advantages of these new technologies. For example, the "Phone Cycle" of NTS nets came years after the original inception of NTS. Likewise, the capability of FM and repeaters for local traffic handling lagged far behind its initial acceptance by most of the amateur community. Yet today, the majority of messages handled by NTS operators utilize these technologies at some point between their origination and destination. One reason for this slow acceptance of new ideas and technologies is a natural process of human nature which turns the young, aggressive leaders of yesterday into the entrenched, reactionary leadership of today.

We are now in the middle of yet another communications revolution. Whether or not we are ready for it, whether or not we are in favor of it, and whether or not we can afford it, packet radio and networking technology are changing the face of Amateur Radio. It is very important to understand the vital and significant difference between packet radio and SSB or FM. While the other two technologies eventually enhanced the operation of the National Traffic System, packet radio networking is going to affect the very structure of the NTS. For those of you who have been involved with traffic handling for any length of time, "future shock" is just around the corner. Within the next few years, and well before the turn of the century, most messages will *not* be manually handled above the Section level. Region and Area nets, along with the TCC may well become relics of the past.

The technology to do this is already here; it's being utilized today. A number of store-and-forward bulletin board systems are already operating on HF packet with a significant percentage of NTS traffic being handled by this method. In spite of an unspoken feeling among traffic handlers that "computers can't replace real live operators", the intense efforts of those on the cutting edge of packet technology are going to prove just the opposite. Within several years, virtually all messages listed on a Section net for out of state destinations will be picked up by operators who will punch them into local BBSs for automatic transmission into their delivery Section. Here, they will be picked up by other operators and listed on Section nets for delivery. Eventually, little traffic will even be listed on Section nets due to the expansion and rapid growth of packet networking. This process will be aided by the increasing numbers of operators that are packet capable. Additionally, BBSs will grow in numbers (remember repeaters?) and being linked together, every nook and cranny of any Section will be covered by one or more bulletin board systems.

Slightly over three years ago, I wrote an article entitled, "Traffic Handlers: A Vanishing Breed?" which appeared in the Public Service column of *QST*. That article discussed some current, pressing problems facing the National Traffic System. Foremost among these was the lack of qualified operators to make the system work effectively and efficiently. It was interesting to note that reaction to this article fell into three categories: those who saw no problems and were interested in maintaining the status quo; those who recognized that the problems existed but wrung their hands and talked the problems to death in hopes that they would disappear; and finally, those few who not only recognized the existing problems, but had set out to do something about them.

Unfortunately, the efforts of these few have not outweighed the indifference of the many. Many traffic handlers have not been very aggressive in the active promotion of the NTS. A result of this inactivity has been little growth and no significant revitalization of the National Traffic System during the past few years. To be fair, a scattered handful of Section Traffic Managers, Region Packet Managers and even individual SYSOPS have worked to marry traditional message handling with this new technology. It is through their individual efforts that there now exist some standardized procedures for passing NTS message traffic through linked BBSs. Unfortunately, they comprise the small number of operators who have the foresight to realize that the National Traffic System is changing. They understand and accept the fact that the existence of TCC, Area and Region nets may wither and die with the demise of manually handled traffic. The continued rapid improvement of, and convenience associated with automatic message forwarding could very well guarantee this.

All of which brings us to the bottom line. No matter how much you like and enjoy what you are currently doing in the NTS, you probably will be unable to perform many of these same functions within the near future. The most pleasurable part of my years within the National Traffic System has been operating on the Area nets and serving as a TCC liaison operator. But no matter how much I like and enjoy doing this, it's coming to an end. The volume of traffic is down perhaps because it's simply more convenient and just as reliable for other operators to dump their messages into an automatic transmission network.

A larger question is whether or not the entire National Traffic System will perish with the demise of manually handled traffic. I think not, provided its leadership is willing to embrace the future. The time has come to recognize that we need to start some new traditions and break with the operating patterns of the past. There will always be a need to recruit and train operators in the proper procedures for handling messages, no matter what their mode of transmission, but the formalized structure of the NTS must change in response to developing packet technology. No matter how much we revere CW as the mode used by "real traffic handlers," no matter how much we enjoy SSB TCC schedules, they are rapidly becoming a footnote in the history of Amateur Radio. Likewise, if we all are unwilling to assume an aggressive, visionary position with respect to emerging packet technology, the National Traffic System may well become an aging dinosaur traveling down the road to ultimate extinction.

Field Organization Reports June 1988

ARRL Section Emergency Coordinator Reports

Thirty one SEC reports were received, denoting a total ARES membership of 19,598. Sections reporting were: AK, AR, EPA, IA, IN, LAX, MI, MN, MO, MS, NE, NFL, NH, NLI, NNJ, NTX, NV, OH, ORG, PAC, SD, SDG, SFL, SJV, VA, WA, WMA, WNY, WPA, WTX, WV.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	106	88.00	455	928
TCC Central				
TCC Pacific	98	75.38	311	523
Summary	204	81.69	766	1451
Cycle Three				
TCC Eastern	52	86.67	22	44
Cycle Four				
TCC Eastern	103	85.83	438	882
TCC Central	59	76.60	388	822
TCC Pacific	109	87.90	559	1111
Summary	271	83.44	1385	2815

TCC Roster

Eastern Area, Cycle 2: KW1U, Director. W1CE K1EIC WA1FCD KT1Q W1QYY WA2FJJ W2FR NN2H KA2UBD N2XJ N3AZW N3EMD KQ3T NJ3V AA4AT WD4FTK W4FRR N4GHI WB4PNY N4SS KA8CPS W8PMJ KA8WNO WB8YDZ VE3FAS.

Eastern Area, Cycle 3 and 4: KN1K, Director. KB1AF W1CE W1EFW WA1FCD W1NJM W2FR W2GKZ NN2H NO2H KB2HM W2LWB WB2QIX W2RQ WA2SPL K2VX N2XJ N3AZW N3EMD N3FM W3GL WB3GZU W3OKN W3PO KO3T NJ3V AA4AT N4GHI KB4N N4SS W4UQ K4ZK W8BO W8PMJ K8TPF KA8WNO N8XX VE3FAS VE3GSQ

Central Area, Cycle 4: K5GM, Director. WB5J AJ5K K5MXQ WZ5N N5TC K5TL W5TNT KB5W W9CBE WB9UYU KA0EPY AI0O KS0U

Pacific Area, Cycle 2: ND5T, Director. W5JOV KU6D N6LHE K6UYK WF6O WA7CBN KF7R W7TGU W7IGC N0HFZ N0IA

Pacific Area, Cycle 4: K0DJ, Director. N2IC ND5T W5QVK K6LL W6EOT W6INH W6VZT KN7B KA7CPT NR7E W7GHT W7EP W7LG W7VSE K7GXZ K0DJ K0EZ K0TER KC0D KJ0G

National Traffic System

Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN	30	758	25.26	.699	85.0	
CAN	30	708	23.60	.631	99.6	
PAN*	60	312	5.20	.438	87.2	
Region Nets						
1RN	60	330	5.50	.324	83.0	100.0
2RN	56	63	1.12	.249	84.8	96.7
3RN						93.3
4RN	60	356	5.93	.300	76.7	93.3
RN5						100.0
RN6	38	126	3.31	.300	—	86.6
RN7	60	232	3.86	.316	82.6	90.0
8RN	60	315	5.25	.303	95.0	86.7
9RN	60	231	3.85	.308	90.0	97.0
TEN	68	505	7.42	.320	79.0	100.0
TWN	57	—	—	—	80.7	85.0
ECN						0.0
Cycle Three						
Area Net						
EAN	30	130	4.33	.306	74.7	
Region Net						
1RN	30	89	2.97	.320	84.3	66.6
2RN	30	113	3.76	.384	90.0	66.6
3RN	28	15	.53	.079	83.3	86.6
4RN						73.3
8RN						86.6
ECN						80.0
Cycle Four						
Area Nets						
EAN	30	917	30.56	.960	97.6	
CAN	30	846	28.20	.941	100.0	
PAN	30	658	21.93	.795	99.4	
Region Nets						
1RN						100.0
2RN	43	85	1.97	.286	60.3	90.0
3RN	60	183	3.05	.276	93.9	100.0
4RN	60	366	6.10	.282	92.0	100.0
RN5	60	502	8.37	.560	100.0	100.0
RN6	60	357	5.90	.302	100.0	100.0
RN7	60	313	5.21	.508	95.7	100.0
8RN	59	285	4.83	.347	87.0	100.0
9RN	60	333	5.55	.508	95.8	100.0
TEN	60	582	9.70	.779	69.8	100.0
TWN	54	227	4.20	.349	89.3	100.0
ECN						100.0
ARN	30	58	1.93	.058	100.0	93.3

*PAN operates both cycles one and two.

ARRL Section Traffic Managers reporting: AL, AR, AZ, BC, CT, DE, EMA, ENY, EPA, GA, ID, IL, IN, KS, MDC, ME, MI, NC, NFL, NH, NTX, OH, OK, OR, PAC, RI, SB, SD, SFL, STX, TN, UT, VA, VT, WA, WMA, WNY, WPA, WTX, 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, upon sending notification of qualifying months to ARRL Public Service Branch, will be awarded a special PSHR certificate from HQ. This certificate is a one-time award, ie, it is not issued more than once.

361
KC9CJ

142
K4MTX

140
W2MTA

139
WD8V

138
WB2OWO

136
N4EXQ

134
WA4QXT

132
WA2SPL

124
N2EIA
WB2ZJF
WX4H

123
W7LRB

122
KA9FFO

119
AA4TE
ND2S

118
KD7ME
N4GHI

115
KA3DLY

114
W2QNL
KA9VII

113
WA4PFK
N9BDL
K9CNP

112
NG1A

111
W4JLS

110
KF5BL

108
WB7WOW

107
WD8KQC
W9KLN
NM1K
KW1U

106
WA2JBO

105
K4NLK
W9YCV

104
WA9VND
AG9G
W7VSE
N1CPX
K8UQY

103
K4ZK
KA2F
WA4JDH
WB1GXZ

102
WB4WII
WB4DVZ
N0DPF
W9CBE
WB4KSG

101
K8TVG
WA2ERT
WG7H
KZ8Q

100
N8HHH
KT1Q
N2XJ
WF60

99
AA4ZV
W4ANK

98
WB4WQL
KA1FVY

97
N5AMK
W6VOM

96
ND0N
WB2VUK
W4CKS
N4MEJ

95
WA0HTN
AC5Z
W3FA

94
KD8HB
WD5GKH
N7ELF
N3EMD
KQ3T

93
WA1FCD
K5UPN

92
W9JUJ
WB6DOB
N3AZW
WB2RBA
KJ4VT
K5MXQ

91
W6INH
W7LNE
WA2FJJ

90
KA2QOO

89
W0OYH
N6NLW
WA1JVV
WB6QBX
KA7EEE
KA1GWE
AA4HT
KB4WT

88
VE7BNI
NN2H

87
K2ZVI
WR5O
KA7AID

86
KA2INE
KA0KPY
NC9T
KB1AF

85
KD8WX

84
WB8JGW
W5CTZ
WA1TBY

83
WB0ZNY
WA4EIC
W7GHT
K0ERM
W7GHT

82
KA9RNY
KI4YV
WB8SYA
NJ3V

81
N2DXP
VE7EJU
K4VWK

79
N4JRE
WA9VLC
KA8WNO

78
N8FWA
W4RWB
WD4KBW
WA2VJL
W1KX
N7BGW
K3JL

77
KA1IFC
NV5L

76
NJ9S
N2HIF
N4SMB
W5YQZ

75
KJ9J

WA4RUE
KA4FZI
KA7SYG
NO3M
N3EGF
WA3WIY
KN1K

74
WB1BTJ
WD6BZQ

73
N8EFB
W7LBK

72
KC3Y
KB4LB

71
KF8J
AJ5F
KI6ZH
N6EQZ
WB7EMO

70
K9ZBM
WB5FQU
WB5J
WM7C
KA9RII
N5KCL

69
KA8TNT
WB8R
KF4FG
N3DRM
WA6QCA
KJ3E
KB4OPR
KI4BR

68
N8CEI
KD8KU
W4PIM
W3YVQ
W4TZC
KI4W
K4BGZ

67
K2YAI

66
NB1A
WB5YDD
VE7EJW
WA3UNX
W2FR

65
N8GPU/T
K4IWW
W0OUD
KA4HHE
VE7FB
KA5ZWY

64
K8JDI
AI0O
WB2FTX
N4RT
N7GGJ
KK4FV
KB4NGO

63
WB8KWC
WB8BKW
KD0YL
N2ABA/T
K3GHH

62
W9UMH
NS9Q
KC2JW
NC3V
NQ1P
WB3AVZ

61
WA8DHB
KB4JPN
NZ5J
KA2ZNZ
KB4BZA

60
KA8CPS
W4HON

N1DHT
W2RRX
K2VX
WB2QMP
W1RWG
KA1JXH
KA1KP

57
KA9CTW/T

56
WA2GYY/T

54
KB2EPU/T

52
N2EVG/T

50
KA6TND/T

49
KA1NOI/T
KA1QFC/T

48
KA1HPO/T

47
KA1QFV/T

41
N8HRW/T

40
KB4UED/T
KB2BNW/T

The following stations qualified for PSHR during the month of May, but did not appear in last month's column: KA8TNT, K8UQY, WD8V, KD8WX, KA8WNO.

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.

The Brass Pounders League Medallion is available to individual operators who achieve BPL and are listed in the BPL column for the third time. This medallion is a one-time-only award, that is, it is not issued more than once. It is not necessary that the three months involved be consecutive. Any three months will qualify an operator. Stations that qualify for the BPL medallion, upon written notification of the qualifying months to the ARRL Public Service Branch, will be awarded the call sign-engraved BPL medallion.

Call	Orig	Rcvd	Sent	Dlvd	Total
W3CUL	817	769	1264	93	2943
KD9QB	100	79	1724	0	1903
WB9YPY	0	1080	108	698	1886
W1PEX	—	301	1153	1	1455
WA1FHB	1	430	430	1	862
WA4JDH	0	498	447	2	847
WA2SPL	3	362	448	33	846
W3VR	309	208	245	42	804
W9ZRX	0	342	344	0	686
N0DPF	221	109	306	48	784
KA1IFC	3	389	333	21	746
KC9CJ	7	443	14	282	746
N3AZW	23	264	269	38	594
WF6O	1	269	278	4	552
W9JUJ	4	277	251	3	535
KT1Q	0	269	263	2	534
WX4H	3	277	240	10	530
KA9VII	56	257	235	23	522
KW1U	0	288	216	6	510
WA4QXT	71	198	208	33	510
K4DOR	24	225	249	4	502

BPL for 100 or more originations plus deliveries: WD4IIO 176
N3AZW qualified for BPL during March and June 1988, but was inadvertently left out of the BPL column.

March:	28	233	260	17	538
June:	28	289	296	42	655

Independent Nets

Net Name	Sess	Tfc	Check-Ins
Amateur Radio Transmitting Society	26	208	289
Central Gulf Coast Hurricane Net	30	119	3182
Clearing House Net	30	265	298
Early Bird Net	30	592	289
Empire Slow Speed Net	30	52	297
Great Lakes Emergency & Traffic Net	30	73	1015
Hit and Bounce Net	29	174	506
IMRA	26	712	1490
Mission Trail Net	30	69	833
NYSPTEN	30	59	493
Southwest Traffic Net	30	217	1502
West Coast Slow Speed Net	30	97	495
20 Meter ISSBN	28	646	342
75 Meter ISSBN	30	398	1104
7290 Traffic Net	30	395	3017

Conducted By
Vern "Rip" Riportella, WA2LQQ
PO Box 177, Warwick, NY 10990

Getting On the New OSCAR

Part 1: "Where Shall I Put Those New Antennas?"

Now that AMSAT OSCAR 13 (AO-13) is in orbit and operations have begun, more amateurs than ever are wondering what equipment is required to operate the newest OSCAR. Let's take a brief look at the process of planning a station, and then look at some concrete examples of outfitting your station for OSCAR operations. We'll start outside—at the antenna "farm."

As I've pointed out in recent *QST* columns, and in my June *QST* article,[1] choosing the right equipment is only *part* of the process of "getting on OSCAR." As with many new activities, sometimes it's best to sit down and do a little advance planning and learning before investing in equipment. That way, at least in theory, you'll have a better chance of getting what you expect. Conversely, there will be less of a chance of either getting in over your head, or winding up with an assembly of expensive boxes that does little or nothing of what you wanted to do in the first place.

Significantly, many amateurs seem to view any new activity in their hobby in terms of what equipment it will require (or allow)[2] them to acquire. Thus, many would-be OSCAR newcomers make a quick survey of their station to determine:

1) If the estimated effort and cost is worth the perceived benefits (fun).

2) If a clandestine entry to the shack might be designed so as to facilitate surreptitious integration of new equipment into the shack whilst pondering the first question. (You know...sneak it in the back door!)

Having gone through *that* charade, they get on with the serious business of planning the new OSCAR station—cost/benefit analysis notwithstanding!

One of the most important aspects of new-station planning is determining where to put your satellite antennas. Remember the old ham-radio saw: "The higher the better!"? Well, operating OSCARs provides some very real exceptions to this "given" of Amateur Radio operation. Let's see why this is so.

When operating at HF, there are lots of good reasons to put the antenna as high as possible. The effect of conductors (both metallic and earth ground) in the near field around the antenna is significant. The effect of the wave reflected from the ground can be profound in terms of shaping and aiming the resultant beam. For best DX, you want the major lobe of your beam to have a low take-off angle. That is, it should be low to the horizon. To get this from a Yagi or quad requires that it be at a significant height above ground in terms of their wavelength; one to two wavelengths above ground is typical at top DX stations.

The other reason you might want to have the antenna on a high tower is to clear obstructions. But it's at this point that the picture becomes slightly more clouded. Although signals at 40 or 20 meters can easily penetrate dense foliage and many buildings, the higher the operating frequency, the more likely the signal will be attenuated by these obstacles. Beginning at 10 meters, the signal-attenuation effects of very dense foliage dripping with rain—or laden with snow—can be detected. At longer wavelengths, the effects are mostly negligible.

As the frequency of operation increases, the signal attenuation in foliage increases dramatically, such that at 70 cm and above, trees can appear largely *opaque*; they block and/or absorb much of the RF you're attempting to pass through them. Thus, it is essential to get that VHF/UHF antenna into a position where it can see its target without having to take a path through a tree. See Fig 1.

To review, it is highly desirable to have lofty antennas for HF and VHF/UHF, albeit for distinctly different reasons. On HF, you want to be aloof from earth reflections, and the signal can easily penetrate trees and the like. On VHF/UHF, you can easily place the antenna several wavelengths up[3] to avoid the beam-distorting effects of ground reflections, but you need to have a path to the target that is clear of obstructions like trees and buildings.

Now, when we begin to consider VHF/UHF antennas for satellite work, the "higher the better" rule starts to unravel. On VHF/UHF, placing your antenna on a high tower to clear trees is done at the cost of increased transmission-line losses. Losses at 23 cm and above can be staggering—presenting you, the station planner, with a substantial dilemma: (1) Do you put the antenna on the tower to avoid the trees; or (2) do you keep the antenna close to the ground to reduce transmission-line losses?

Look at the satellite-communications case. Since uplinks are at the 2-meter and higher-frequency bands,[4] avoidance of ground reflections by raising the antenna many wavelengths is easily accomplished. Moreover, because the satellites often rise far above the horizon—indeed, can be directly overhead—there are many times that a patch of clear in an otherwise dense forest is all that's required to access a satellite on UHF. The task of the station designer is, therefore, to get an idea of the directions from which the satellites will present themselves, and determine if attenuation caused by foliage will be a problem in that direction. Then, a good compromise between antenna height, transmission-line losses and attenuation in foliage can be achieved (or at least approached). Just remember: As antenna height increases, transmission-line losses increase, but foliage attenuation goes down.

What level of attenuation can be expected on VHF/UHF signals through trees? The question is an important one, but good, reliable data on the subject is scarce. The reason seems to be that experiments are difficult to carry out, and even more difficult to replicate. Thus, it is practically impossible to equate 150 feet of Norway maple at 23 degrees Celsius in June in New Hampshire with a

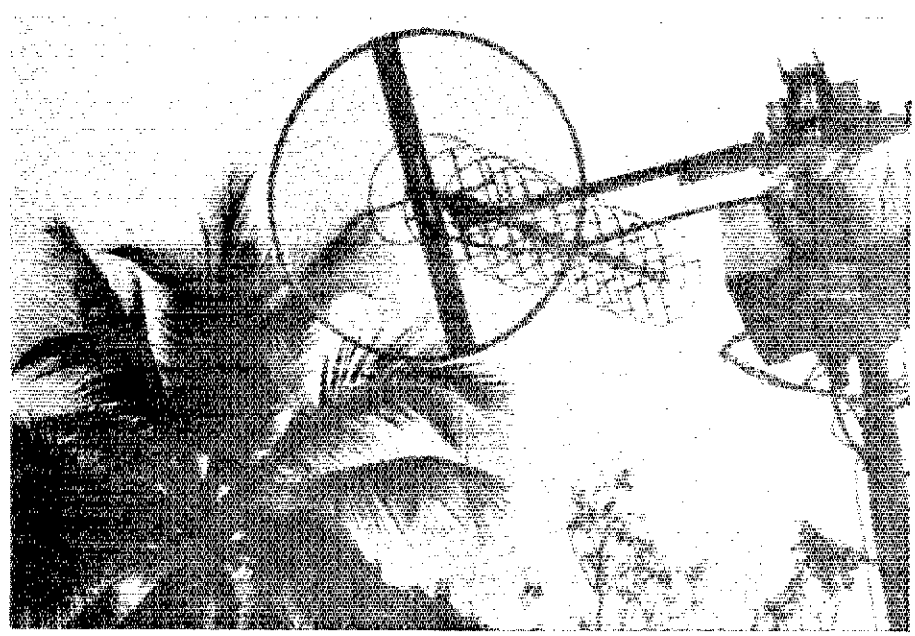


Fig 1—A healthy tree—like this palm in Malaysia—can cost you several decibels on a 70-cm link if it's in your signal path. (*photo courtesy Colin Richards, 9M2CR*)

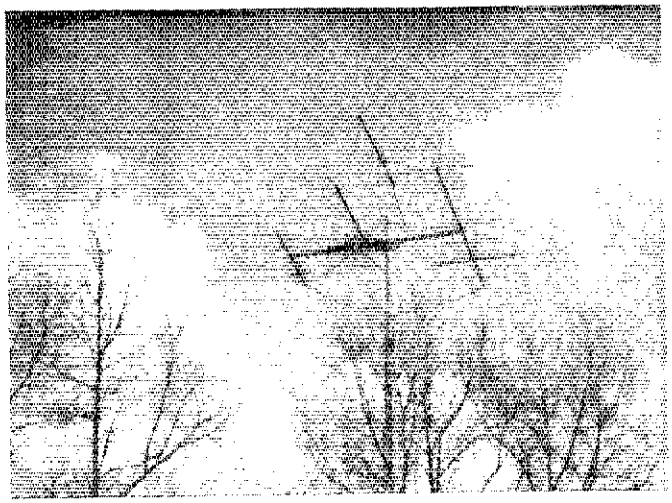


Fig 2—Leafless, deciduous trees such as these offer little attenuation of 2-m signals. Attenuation effects on 70 cm, though greater than at 2 m, are barely detectable.

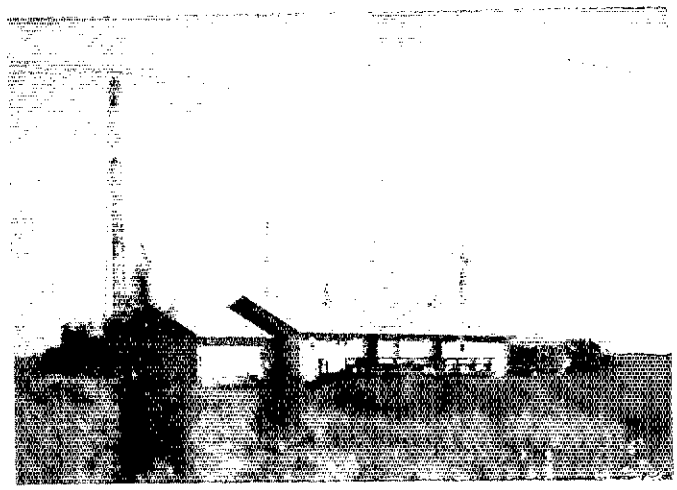


Fig 3—A location with no trees to impede RF is ideal for Amateur Radio. Winter winds and household heat loss are the costs incurred for having a clear path to the sky. (*photo courtesy Vern Riportella, WA2LQQ*)

10-dB loss at 435 MHz! Yet these are the types of parameters that enter into consideration in deciding where to put your antenna.

For example, here's a typical dilemma: Should you go up another 20 feet to "look" through 50 feet less of dense foliage when transmission-line losses will increase 1.2 dB, and the extra tower sections will cost $100? In other words, is the cost of a 50-foot path of leaves more or less than 1.2 dB? And, because the leaves are absent in winter, can the added loss contributed by the summer foliage be tolerated for the time the trees are bearing leaves? See Fig 2. What if the trees are conifers (evergreens) that maintain their RF opacity year round? What then? In the absence of extensive data based on repeatable experiments, we must rely on less-precise judgments.

The amount of moisture in the trees (in leaves and branches, and snow on the trees, if any) determines how much RF passes through, how much is reflected, and how much is absorbed and dissipated as heat. The ability of a radio wave to penetrate a conductor depends on its wavelength. Typically, a radio wave penetrates to only a fraction of its wavelength into a conductor. This is why the Navy uses VLF and ELF[5] with wavelengths in the tens to hundreds of thousands of meters to communicate by radio with submerged submarines.[6]

So, if you were looking through a dense forest of trees covered with snow, you shouldn't be surprised if your 23-cm signal goes in one end of the forest, but never comes out the other! On the other hand, you should have no difficulty hearing WWVB at 60 kHz at the bottom of a lake.[7]

Perhaps a few examples will demonstrate what I'm talking about. Take a look at Table 1.

The table is intended to give you a general appreciation of signal attenuation and its relationship to foliage. These are gross estimates based on empirical and conjectural data. Exceptions can easily be cited. With this in mind, use the information in Table 1 for general planning. Then, refer to the transmission-line-attenuation table in the *ARRL Handbook* to determine transmission-line power losses. At that point, you'll have most of the basis for a rough idea on where you should place your satellite antennas.

An ideal satellite-tracking QTH would be on a windy knoll with an unobstructed view to the horizon in all compass directions. See Fig 3. But trees do make a lovely windbreak in the face of winter winds, are nice perches for feathered friends (who otherwise would light on your fragile 23-cm loop Yagi) and certainly add to the aesthetics of your domicile. So, before you warm up that chain saw to clear a path to the sky for your OSCAR antennas, give these other spouse/house-related factors a thought as well.

Next month, I'll continue the discussion on getting on AO-13.[8]

Table 1

Frequency Versus Attenuation (Rough Guide Only)

Band	*50' Light Foliage*	*50' Medium Foliage*	*50' Dense Foliage (Dry)*	*50' Dense Foliage (Wet)*
10 m	N	N	S	S-M
2 m	N-S	S	S-M	M-H
70 cm	S	M	M-H	H-VH
23 cm	M-H	H-VH	VH	VH-P
13 cm	H	VH	VH-P	P
10 cm	VH	VH-P	P	(Forget it!)

Legend: Effects in terms of attenuation are

N = Negligible; less than 1 dB of signal loss; hardly noticeable.
S = Slight; in the range of 1 to 2 dB; up to 37% of the signal is lost.
M = Moderate; in the range of 3 to 6 dB; up to 75% of the signal is lost.
H = High; 10 to 15 dB; up to 97% of the signal is lost.
VH = Very high; 15 to 20 dB; up to 99% of the signal is lost.
P = Profound; greater than 20 dB; signal losses exceed 99%.

Notes

[1]V. Riportella, "Introducing Phase 3C: A New, More Versatile OSCAR," *QST*, Jun 1988, pp 22-30.

[2]The difference is perhaps a bit subtle. Identifying an activity in which one wishes to be involved often drives or helps define the equipment-performance requirements. That is: "Want to work Mode B? Then you must have a 70-cm transmitter and a 2-m receiver." But on the other hand, it's surprising how often the converse is true: "Ah! What a nice piece of equipment! I must have it! But . . . what can I do with it?" In this situation, you have performance driving activities. And *that* drives two communities of people hams deal with berserk: engineers and spouses! Psychologists call it "rationalizing."

[3]At 1296 MHz, 6 feet is nearly 8 wavelengths.

[4]Except for the RS series, which use 15- and 2-meter uplinks.

[5]Very low frequencies and extremely low frequencies.

[6]Sea water is an excellent conductor.

[7]Try it. But be sure you use a battery-powered radio. No five-tube, ac-operated superhets, please!

[8]For more information on getting started on OSCAR, and information on AMSAT membership and membership benefits, call AMSAT, 301-589-6062 or write AMSAT, PO Box 27, Washington, DC 20044. Please send a business-size SASE.

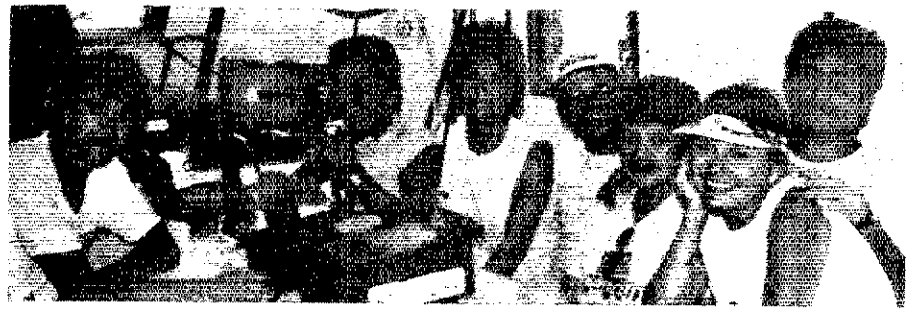
Conducted By Joan Gibson, KG1F
RR 1, Box 1465, Waterbury, VT 05676

HK5AZA Leads Expedition to Save the Magdalena River

A funny thing happened to Ana Elisa Pardo, HK5AZA, while she was attending a routine meeting of the Cali section of the Liga Colombiana de Radio Aficianados. She found herself involved with a project to save the Magdalena River! Within 24 hours of the meeting, she boarded a flight from Cali to Cartagena, taking an HF transceiver, a portable dipole for 40 and 15 meters and a rig for 2 meters, and embarked on a unique experience.

That unusual adventure was called "La Caracola," an expedition organized by the Caracol Radio and Television network and *El Espectador*, a local newspaper. The purpose of the expedition was to bring to the attention of Colombia, as well as the rest of the world, the dire consequences of the pollution and deterioration of the country's rivers and ports. The expedition's 16-day itinerary included a river journey aboard the *Caracola Fluvial 87* during its sail from Cartagena, through the Canal del Dique to the Magdalena River at Puerto Calamar, then upriver to the city of Neiva.

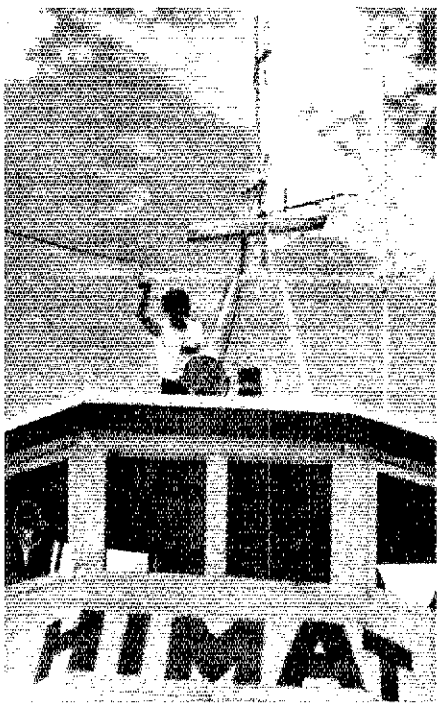
In recent years, so much of the country's woods and jungles had been ravaged by indiscreet cutting and demolition that it began to affect not only the rivers but their cities located on the banks. Erosion has increased the sedimentation, which in turn has changed the navigation. Until recently, nearly 80% of the Magdalena could be navigated by a variety of river craft. Now in many parts of the river, only small boats with outboard motors can maneuver safely. A tugboat was used from the Caribbean seaport of Cartagena to carry the crew to Barrancabermeja. There, they changed to a flat-bottomed boat which carried them to an agricultural port near Bogota. From there, until the end of the trip at Neiva, only a small boat could be used. Not too long ago, the river boat would sail between Neiva and the Caribbean.



Ana (third from left) with crew members from *El Espectador*, the Public Works Ministry and official representatives of the La Caracola expedition.

The boat's crew consisted of newspaper personnel, ecologists and government officials. At every port along its river journey, the boat stopped so the travelers could meet with the local townspeople and the municipal council. All shared their mutual concerns about what was happening to the beautiful rivers and their ecology. Most of the concerns centered on the pollution caused by petroleum and chemical companies. The waste dumping continues to destroy life in the river and its lagoons. As the cycle of pollution continues, it closes in on the inhabitants of the river communities causing disease and infection. "It is the spinning wheel of death," grimly comments HK5AZA.

Ana was the only operator of the boat's official radio station, 5J-RIO. Approximately 1000 QSOs were made with stations in South America, Europe and the US. Ana's job was to keep the station on the air and in contact with other stations listening for the 5J prefix as well as to ensure the safety of all involved with the trip. "That immense responsibility gave me the strength to withstand the heat of 40° C, the swarms of mosquitoes which seemed to enjoy the taste of my mosquito repellent and the deafening noise of the boats' engines," remembers Ana. "It was well worth it, because the rivers of the world are an asset to humanity. We radio-aficionados should unite to defend them, as we defend our radio frequencies. The rivers are not only a source of life but a means of communication."



Ana, HK5AZA, waves from the HIMAT vessel (Hydrology and Meteorology Agency of the Colombian government).

HOWDY DAYS

(Sponsored by YLRL)

Starts: Wednesday, September 7, 1988 at 1400 UTC
Ends: Friday, September 9, 1988 at 0200 UTC
Eligibility: All licensed women operators throughout the world are invited to participate.
Procedure: Call CQ YL.
Operation: All bands and modes of emission may be used. No cross-band operation. A station may be worked and counted once on each band and mode for QSO points. Participants may operate only 24 hours of the 36 hours of the contest. Operating breaks must be indicated in the log. The maximum power output that may be used at any time during the contest is 750 W on CW and 1500 W PEP on SSB.
Exchange: YLRL member or non-YLRL member. Entries in log must also show date, time, band, call of station worked and operating breaks.
Scoring: Score two (2) points for each YLRL member worked and one (1) point for each non-YLRL member worked. No Multipliers.
Logs: All logs must show if operator is YLRL member or non-YLRL member to be eligible for awards. Do *not* send carbon copies of logs. Please print or type. Logs must be signed by the operator. No logs will be returned. Logs must show score and be received by October 10, 1988. Send Log To: Carol Shrader, WI4K, 4744 Thoroughgood Dr, Virginia Beach, VA 23455, USA. Please mark your return address clearly.
Duplicates: For each duplicate contact that is removed from the log by the Vice President, a penalty of three (3) additional and equal contacts will be exacted.
Awards: Top-scoring YLRL member will receive her choice of a YLRL pin, charm or stationery. Top scoring non-YLRL member will receive a one (1) year membership in YLRL.
Suggested Frequencies: CW: 80 meters—3.540-3.570; 40 meters—7.040-7.070; 20 meters—14.040-14.070; 15 meters—21.120-21.150; SSB: 80 meters—3.940-3.970; 40 meters—7.240-7.270; 20 meters—14.250-14.280; 15 meters—21.380-21.410; 10 meters—28.380—28.410.

Note: Since band allocations in other countries are often different than the US, North American YLs should look for DX YLs in other parts of the bands, especially on 40 and 80 meters.

Coming Conventions

ROANOKE DIVISION CONVENTION

September 17-18, 1988, Virginia Beach

The 1988 ARRL Roanoke Division Convention and 13th Annual Hamfest/Computer Fair will be held at the Virginia Pavilion, Virginia Beach on Saturday and Sunday, September 17 and 18, 1988. Admission for both days will be $5 in advance or $6 at door, children under 12 free. There will be the latest equipment by Alinco, ICOM, Kenwood and Yaesu. Also featured will be license exams on Saturday from 10 AM-3 PM (bring your present license and a check for $4.55 payable to ARRL/VEC), a large flea market, two days of forums on DXing, computers, SWLing, and plenty of programs to entertain the nonhams and children. Flea market tables are $8 per day, electricity for booths available at an additional cost upon request. For information and tickets, call or write Manny Steiner, K4DOR, 3512 Olympia Ln, Virginia Beach, VA 23452, tel 804-340-6105.

ILLINOIS STATE CONVENTION

October 2, 1988, Rockford

The ARRL Illinois State Convention and Rockford Hamfest 88 will be sponsored by the Rockford Amateur Radio Association and Experimental Amateur Radio Society. It will be held at the National Guard Armory, which is located at 605 North Main St in downtown, from 9 AM-4 PM. Admission in advance $3, at the door $4. Features include ARRL speakers/forum, Amateur Radio/computer forums, VE exams, exhibits, DX forums, large flea market, commercial booths, refreshments, free parking. Talk-in will be on 146.01/61, 222.68/224.28, and 146.52 simplex. For tables, booths, tickets send SASE to Rockford Hamfest, PO Box 10003, Rockford, IL 61131. Phone info: tables, booths—Roger Sawvell, KD9MQ, 815-282-1283; tickets—Dale Landis, KB9WD, 815-633-0520; general info—Jim Miller, W4JR, 815-397-4602 or Bob Szuch, W9AOR, 815-633-8206.

NEW ENGLAND DIVISION CONVENTION

October 1-2, 1988, Boxboro, Massachusetts

The New England Division Convention, sponsored by the Federation of Eastern Massachusetts Amateur Radio Assn. It will be held at the Sheraton Boxboro Hotel, Rte 495 at Rte 111. Admission in advance will be $6, at the door $7. The flea market and 80 commercial exhibits will be open Saturday 8 AM-5 PM and Sunday 8 AM-3 PM. The features will include a tour of W1AW and ARRL HQ on Saturday (a chartered bus will leave in the morning from Boxboro and will return in the late afternoon). People driving to Boxboro Saturday are also welcome to visit W1AW and ARRL HQ. At midnight there will be a Wouff Hong Ceremony. Nonham programs will be offered both days. Exams will be given for Novice to Extra Class both days. Many seminars. There will be a full course roast beef banquet, dance and show for $18.50 and a bus tour to Newington (including lunch) for $13.50. For further information send SASE to Arthur Tomkinson, W1THT, 9 Oliver Terr, Revere, MA 02151 (make checks payable to FEMARA).

September 2-4
Southwestern Division, Anaheim, CA

September 17-18
Roanoke Division, Virginia Beach, VA

October 1-2
New England Division, Boxboro, MA

October 1-2
Mississippi State, Biloxi, MS

October 2
Illinois State, Rockford, IL

October 8-9
Delta Division, Memphis, TN

October 8-9
National Capital DXPO 88
Falls Church, VA

ARRL NATIONAL CONVENTIONS

Sept 9-11, 1988—Portland, Oregon
June 2-4, 1989—Dallas/Forth Worth, Texas
June 8-10, 1990—Kansas City, Missouri

DELTA DIVISION CONVENTION

October 8-9, 1988, Memphis, Tennessee

The Delta Division Convention will be sponsored by the MidSouth Amateur Radio Assn. It will be held at the Cook Convention Center overlooking the Mississippi River. From the west, take the first exit after crossing the new bridge, the Convention Center is at the foot of the exit ramp. From the east and south follow I-240 west to the 2nd St exit, go south one block to Exchange St, the Convention Center will be behind the Crown Plaza Hotel. Open Saturday 9 AM-4 PM and Sunday 9 AM-3 PM. Admission is $5 for hams, good for both days, general public is free. Features will include forums, ARRL VE exams for all classes (Saturday morning at 9 AM, no walk-ins, preregister with Maxine Balentine, WD4FLD, 4155 Sevella, Memphis, TN 38128), hospitality room and Delta Convention banquet. There are 300 tables available at $20 each for the weekend. Talk-in will be on 146.28/88. For rental and further information contact Wayne K. Gregory, KB4GFK, 3243 Tena Ruth Cove, Memphis, TN 38118, tel 901-365-7823, or Jim Alexander, AA4OU, 901-458-8604, after 6 PM.

NATIONAL CAPITAL DXPO 88 CONVENTION

October 8-9, 1988, Falls Church, Virginia

The National Capital DXPO 88 Convention will be sponsored by the National Capital DX Assn. It will be held at the Best Western Inn at the corner of Arlington Blvd (US Rte 50) and Annandale Rd (use service road to access motel parking). Open Saturday 9 AM-9 PM, and Sunday 9 AM-1 PM. Admission in advance is $15 (with banquet $35), at the door $17.50 (with banquet $37.50). Features will include all programs related to DX such as DX Contesting, and programs on how to work DX for Novices. Talk-in will be on 147.42. For more information contact Stuart Meyer, W2GHK, 2417 Newton St, Vienna, VA 22180, tel 703-281-3806.

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 ext. 283.

Note: Sponsors of large gatherings should check with League HQ for an advisory on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance.

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 (Mobile)—September 10-11.** *Sponsor:* Mobile ARC. *Time:* 9 AM-3 PM Saturday, 9 AM-2 PM Sunday. *Place:* Texas Street Recreation Center, I-10 eastbound exit #25 Virginia St, take a right onto Washington St then take another right onto Texas St, look for large brown building. *Features:* exams, refreshments, free parking. *Talk-in:* 146.22/82. *Admission:* $2. *Tables:* $5/day, $8 both days. *Contact:* Rick Wiles, 124 McKeough St, Saraland, AL, 36571, tel 205-679-0731.

†ARRL Hamfest

Alberta (Calgary)—September 17. *Sponsor:* Novatel ARC. *Time:* 9 AM-1 PM. *Place:* Parkhill Community Centre, 4013 Stanley Road SW. *Features:* refreshments. *Talk-in:* 146.52 or 146.25/85. *Admission:* $2. *Tables:* $2. *Contact:* for tables send name, call and $2 to Novatel ARC, PO Box 7578, Station E, Calgary, AB, T2E 3M3, Canada.

British Columbia (Sidney)—September 10-11. *Sponsor:* Victoria Short Wave Club. *Place:* Saancha Hall, Sidney. *Contact:* Larry Michaels, 975 Tattersall Dr, Victoria, BC V8X 2X1, Canada.

California (Santa Rosa)—September 17. *Sponsor:* Sonoma County Radio Amateurs Inc. *Time:* vendors setup at 7 AM, public 8 AM-2 PM. *Place:* National Guard Armory, 1500 Armory Dr, from Hwy 101, exit E onto Steele Ln, then turn right twice. *Features:* flea market, VE exams, exhibits, refreshments, auction around noon. *Talk-in:* 146.13/73. *Admission:* free. *Tables:* $5 advance, $7 door. *Contact:* Sonoma County Radio Amateurs, Inc, Box 116, Santa Rosa, CA 95402, tel (D) 707-577-3981, (N) 707-538-7115.

Colorado (Boulder)—September 25. *Sponsor:*

Boulder ARC. *Time:* 8 AM-4 PM. *Features:* refreshments, forums (beginning at 9 AM), VE exams (will be given at 1 PM, preregistration is appreciated but walk-ins are welcome). *Admission:* $3. *Tables:* $7 per table with a chair for non-commercial exhibitors, dealers please make arrangements in advance. *Contact:* campsite reservations call 303-449-1812 directly, registration for exams contact Barbara McClune, NØBWS, 5338 Spotted Horse Trail, Boulder, CO 80301, tel 303-530-1872.

†**Connecticut (Willimantic)—September 25.** *Sponsor:* Natchaug ARA. *Time:* dealers 8 AM, public 9 AM. *Place:* French Club, Cemetary Rd, off Rte 66 (old Rte 6). *Features:* flea market, VE exams, refreshments. *Talk-in:* 147.90/30. *Admission:* $2 at door, under 16 free. *Tables:* $6 in advance, $8 at door, tailgating $5 and up. *Contact:* Ed Sadeski, KA1HR, 49 Circle Dr, Mansfield Center, CT 06250, tel 203-456-7029.

†**Florida (Melbourne)—September 10-11.** *Sponsor:* Platinum Coast ARS. *Time:* 9 AM-5 PM Saturday, 9 AM-4 PM Sunday. *Place:* Melbourne Auditorium on Hibiscus Blvd. *Features:* ARRL forum, QLF contest, commercial exhibits, swap tables, tailgating. *Talk-in:* 146.25/85. *Admission:* advance $3, door $4. *Contact:* send SASE to PCARS Hamfest, PO Box 1004, Melbourne, FL 32902-1004.

†**Georgia (Gainesville)—September 25.** *Sponsor:* Lanierland ARC. *Time:* 8 AM-5 PM. *Place:* Georgia Mountains Center, downtown Gainesville. *Features:* VE exams (walk-ins welcome), overnight camper parking (no hookups), flea market, dealer displays. *Talk-in:* 146.07/67. *Admission:* free. *Tables:* free for dealers. *Contact:* Eddie Keith, KK4IG, 3137 Lake Ranch Cir, Gainesville, GA 30506, tel 404-532-1479.

†**Georgia (Warner Robins)—October 7-8.** *Sponsor:* Central Georgia ARC. *Time:* 4 PM-9 PM Friday, 8 AM-5 PM Saturday. *Features:* VE exams, flea market, packet forum. *Talk-in:* 146.25/85. *Admission:* free. *Contact:* Jesse, WB4KQA, tel 912-953-3922.

Illinois (Grayslake)—September 24-25. *Sponsor:* Chicago FM Club. *Time:* set up will be from 2 PM-8 PM on Friday, flea market open 6 AM-6 PM, exhibits open 9 AM-4 PM. *Place:* Lake County Fairgrounds at Rte 45 and 120. *Feature:* refreshments, free camping (electricity is $4 per day), parking available. *Talk-in:* 146.16/76. *Admission:* advance $4, door $5, children under 12 free (admission good for both days). *Tables:* $7.50 each (8 ft). *Contact:* CFMC, PO Box 1532, Evanston, IL 60204.

†**Illinois (Harrisburg)—September 11.** *Sponsor:* Shawnee ARA. *Time:* 7 AM-3 PM. *Place:* In Southern IL, get off I-57 at Marion, and go about 25 miles east just past Harrisburg, to Southeastern IL College campus. *Features:* new equipment, computers, women's activities, flea market, VE exams, refreshments. *Talk-in:* 146.28/88, 147.63/03 and 146.52. *Admission:* $3. *Contact:* Bill Johnson, W9ERI, 502 Kenicott, Carbondale, IL 62901, tel 618-457-7586.

†**Illinois (Joliet)—September 11.** *Sponsor:* Bolingbrook ARS. *Time:* 6 AM-5 PM. *Place:* 1 mile east of I-55 on IL Rte 52 (Jefferson St), convenient to both I-55 and I-80 exits at Joliet, IL. *Features:* VE testing, seminars. *Talk-in:* 147.93/33 and 222.94/4.54. *Admission:* advance $3, door $4. *Contact:* Ed Weinstein, WD9AYR, 7511 Walnut Ave, Woodridge, IL 60517, tel 312-985-0527.

†**Illinois (Peoria)—September 17-18.** *Sponsor:* Peoria Area ARC. *Time:* vendors 6 AM both days, public Saturday 9 AM-4 PM, Sunday 9 AM-3 PM. *Place:* Exposition Gardens on West Northmoor Rd, off the 6300 Block N, University. *Features:* VE exams on Sunday, flea market, full camping facilities available, banquet Saturday night, reservations mandatory, $11 per person, guest speaker is Wayne Green, publisher of *73 Amateur Radio*, and much more. *Talk-in:* 146.16/76. *Admission:* advance $4, door $5, children under 16 free. *Contact:* Superfest 88, PO Box 3461, Peoria, IL 61614 (SASE please), tel 309-674-5656.

Illinois (Shelbyville)—October 1-2. *Sponsor:* The Breakfast Club. *Place:* Forest Park at the north edge of Shelbyville. *Features:* flea market, refreshments, free parking. *Talk-in:* 3.973 and 146.52. *Admission:* free. *Contact:* Bob Backlund, KV9A, 633 Glen Ave, Morton, IL 61550, tel 309-266-6147.

Indiana (Hammond)—October 2. *Sponsor:* Lake County ARC. *Time:* setup at 6 AM, public 8 AM-2 PM. *Place:* Hammond National Guard Armory, 2530 - 173rd St. *Features:* VE testing (walk-ins welcome), Novices free, refreshments, free parking, ARRL, ARES, and Navy MARS information available. *Talk-in:* 147.00 and 146.52. *Admission:* $3.50. *Tables:* $5 each. *Contact:* Lucy Schendera, N9DTG, 812 E 40th Pl, Griffith, IN 46319, tel 219-923-4873.

Indiana (LaPorte)—September 11. *Sponsor:* LaPorte and Michigan City ARCs. *Place:* LaPorte Co Fairgrounds, located on State Rte 2 on the west side of LaPorte. *Features:* tailgating area available. *Talk-in:* 146.52. *Tables:* inside tables available. *Contact:* LaPorte ARC, PO Box 30, Laporte, IN 46350, for table reservations contact Tom, KA9ZUM at the same address.

†**Iowa (West Liberty)—October 2.** *Sponsor:* Muscatine Iowa City ARC. *Time:* 7 AM. *Place:* West Liberty Fairgrounds, south on exit 259 off of I-80. *Features:* camping, flea market, refreshments, VEC exams (start at 10 AM, advance registration due by September 2, send a current and completed FCC 610, a photocopy of current license, $4.55 check or money order payable to ARRL/VEC, to Tom Kramer, KEØY, 905 Leroy St, Muscatine, IA 52761, tel 319-264-3259). *Talk-in:* 146.25/85 or 146.31/91. *Admission:* advance $3, door $4. *Tables:* $5. *Contact:* for table reservations contact Ken Kucera, KAØY, RR 2, Box 52A, Riverside, IA 52327, tel 319-648-5037, for general information contact Bud Pitt, WBØMEW, 105 Clinton St, Muscatine, IA 52761, tel 319-264-1788.

†**Kentucky (Louisville)—September 10-11.** *Sponsor:* Greater Louisville Hamfest Association. *Time:* 8 AM-5 PM Saturday, 8 AM-3 PM Sunday. *Place:* accessible from I-264 East or West and I-65 North or South. *Features:* forums, VE exams. *Talk-in:* 146.10/70, 146.25/85, or 444.700/449.700. *Admission:* advance $5, door $6. *Contact:* Greater Louisville Hamfest, PO Box 34444, Louisville, KY 40232, tel 502-368-6657.

†**Maryland (Columbia)—October 2.** *Sponsor:* Columbia ARA. *Time:* 8 AM-3:30 PM. *Place:* Howard Co Fairgrounds, take I-70 to MD 32 East, proceed to 1st light, take a right ½ mile to fairgrounds. *Features:* electronics exhibits, tailgating, free parking, refreshments. *Talk-in:* 147.735/135 and 146.52. *Admission:* no advanced, at door $4. *Contact:* Mike Vore, W3CCV, 5492 Mystic Ct, Columbia, MD 21044, tel (D) 301-770-9190, (N) 301-992-4953.

†**Maryland (Gaithersburg)—September 11.** *Sponsor:* Foundation for Amateur Radio. *Time:* 8 AM-3:30 PM. *Place:* Montgomery Co Fairgrounds. *Talk-in:* 146.04/64. *Admission:* no advance, at door $5. *Contact:* Nancy Draheim, NK4U, 3513 Old Post Rd, Fairfax, VA 22030, tel (703) 246-4526. For reservations contact Robert Moore, 9449 Mayflower Ct, Laurel, MD 20707, tel 301-776-3571.

Massachusetts (Cambridge)—September 25. *Sponsor:* MIT Radio Society, Tailgate Electronic Computer Fleamarket. *Time:* setup at 7 AM. *Place:* Albany and Main St. *Talk-in:* 146.52, 449.725/444.725, PL2A, W1XM/R. *Admission:* $1.50 for buyers with free off street parking, sellers $6 per space includes one admission. *Contact:* tel 617-253-3776.

†**Michigan (Adrian)—September 25.** *Sponsor:* Adrian ARC. *Time:* 8 AM-2 PM. *Place:* Lenwaee Co Fairgrounds. *Features:* table sales, trunk sales. *Talk-in:* 144.77/145.37 and 444.675/449.675. *Admission:* advanced $3, door $4. *Contact:* K. Mark Hinkleman, NU8Z, 108 E Kilbuck, Tecumseh, MI 49286, tel (N) 517-423-5906, (D) 517-423-8573.

Michigan (Benton Harbor)—October 2. *Sponsor:* Blossomland ARA. *Time:* 8 AM-4 PM. *Place:* Lake Michigan College, take I-94 exit 30, east to Yore Rd, north to entrance. *Contact:* "Blast," PO Box 175, St Joseph, MI 49085

Michigan (Grand Rapids)—September 17. *Sponsor:* Grand Rapids ARA. *Time:* 8 AM. *Place:* West Catholic High School, 1801 Bristol NW, from US 131 just north of I-196, exit at Leonard St, go west to Bristol, turn north, West Catholic High School is located near the corner of Bristol and Richmond. *Features:* VE exams. *Talk-in:* 223.26/224.86 and 224.64. *Admission:* $3, sellers $2 additional. *Contact:* Don Hazelswart, KA8BCI, tel 616-363-0649 or write PO Box 1248, Grand Rapids, MI 49501.

Michigan (Lansing)—October 9. *Sponsor:* Central Michigan ARC and the Lansing Civil Defense Repeater Assn. *Time:* 8 AM-3 PM. *Place:* Lansing Civic Center's Exhibition Hall, 1 block south and 1 block west of the State Capitol. *Features:* flea market, refreshments, new and used equipment. *Talk-in:* 144.79/145.39 and 146.34/94. *Admission:* $3.50. *Tables:* $1.50 per foot. *Contact:* Rowena Elrod, KA8OBS, 111 Lancelot Pl, Lansing, MI 48906, tel 517-482-9650.

†**Michigan (Mt Clemens)—September 18.** *Sponsor:* L'Anse Creuse ARC. *Time:* vendors 6 AM, public 8 AM-3 PM. *Place:* L'Anse Creuse High School on Reimold St, NE of the I-94 and Metro Parkway intersection. *Features:* trunk sales. *Talk-in:* 147.68/08 and 146.52. *Admission:* advance $1, door $3. *Contact:* Ralph Wilcox, KA8YOJ, 39610 Chart, Mt Clemens, MI 48045, tel 313-469-3308.

Missouri (Marshall)—September 11. *Sponsor:* Indian Foothills ARC. *Time:* 8 AM. *Place:* Marshall Senior Citizens Building, one block south of the Marshall Sq. *Features:* refreshments, free parking, exams 9 AM. *Talk-in:* 147.765/165. *Admission:* $2 each, 3 for $5 at door, 4 for $5 in advance. *Tables:* free, first come first serve. *Contact:* send SASE to Randy Ebers, WAØI, 125 Lakeview, Marshall, MO 65340.

†**Missouri (Monett)—September 11.** *Sponsor:* Ozarks ARS. *Time:* 9 AM. *Place:* City Park, corner of Hwys 60 and 37. *Features:* flea market, tailgating, refreshments. *Talk-in:* 146.37/97. *Admission:* free. *Contact:* Charles Young, WBØYIU, Rte 1, Box 29 D, Republic, MO 65738, tel 417-732-2500.

Missouri (St Charles)—October 2. *Sponsor:* St Peters ARC. *Time:* 6 AM-2 PM. *Place:* Zumbehl Rd, south to Droste, east on Droste approximately 1 mile on left. *Features:* swapfest. *Talk-in:* 144.81/145.41 and 146.52. *Admission:* at door $1. *Contact:* Allen Underdown, NØGOM, 58 Judy Dr, St Charles, MO 63301, tel (D) 314-851-7464, (N) 314-723-4200.

†**New Jersey (Pennsauken)—September 18.** *Sponsor:* South Jersey Radio Assn. *Time:* 8 AM-2 PM. *Place:* Pennsauken High School, Rte 73 and Remington Ave. *Features:* VE testing, flea market. *Talk-in:* 144.69/145.29. *Admission:* $3. *Contact:* Alan P. Sherman, WB2OEZ, tel 609-768-8380 or SJRA, PO Box 1026, Haddonfield, NJ 08033.

New Jersey (Stirling)—September 11. *Sponsor:* Tri-County RA. *Time:* 8 AM-3 PM. *Place:* Passaic Township Community Center; *Features:* refreshments. *Talk-in:* 147.855/255, 146.52 and 444.975/449.975. *Admission:* $3. *Tables:* $8, with power $10. *Contact:* Dick Franklin, W2EUF, 201-232-5955, or PO Box 182, Westfield, NJ 07090.

New Mexico (Santa Fe)—September 24. *Sponsor:* Northern New Mexico ARC. *Time:* 9 AM-6 PM. *Place:* US Army Reserve Center, 2501 Cerrillos Rd. *Features:* tailgating, flea market, new equipment vendors. *Talk-in:* 146.22/82. *Admission:* adults $5, children under 12 $3. *Contact:* Clem Burke, W5IXR, Box 73, Ojo Sarco, NM 87550 (SASE please).

†**New York (Ballston Spa)—September 10.** *Sponsor:* Saratoga County RACES. *Place:* Ballston Spa Fairgrounds, take I-87 to exit 12 and follow the red and white hamfest signs. *Features:* refreshments, seminars by Director Stephen Mendelsohn, WA2DHF, walk-in exams, 2-meter fox hunt. *Talk-in:* 147.60/00 and 147.84/24. *Admission:* $3 includes tailgating. *Tables:* inside space is $3 per 8-foot table supplied. *Contact:* Dave Atwell, N2FEP, RD #5, Box D15, Ballston Spa, NY 12020.

New York (Elmira)—September 24. *Sponsor:* Elmira Amateur RA. *Time:* 6 AM-5 PM. *Place:* Chemung Co Fairgrounds. *Features:* outdoor flea market, dealer displays, refreshments. *Contact:* Don Estus, 42 Maplehurst Park, Horseheads, NY 14845.

†**New York (Goshen)—September 24.** *Sponsor:* Orange County ARC. *Time:* 9 AM-3 PM. *Features:* VE testing. *Talk-in:* 146.16/76. *Admission:* advance $2. *Contact:* Barbara Christopher, N2AWI, Box 447, RD 2, Wallkill, NY 12589, tel 914-564-0688.

New York (Niagara Falls)—September 10. *Sponsor:* Five Amateur Clubs in Erie and Niagara Cos. *Time:* vendors 7 AM, public 9 AM-5 PM. *Place:* Niagara Falls Convention and Civic Center on 4th St, between Rainbow Blvd and Niagara St. *Features:* inside flea market, refreshments, VE exams at 9 AM (please bring copy of license), parking. *Talk-in:* 146.31/91 and 146.52. *Admission:* advance $6. *Tables:* $4. *Contact:* Nelson Oldfield, Box 352,

Cheektowaga, NY 14226, tel 716-634-6394.

†**New York (Old Westbury)—September 18.** *Sponsor*: Long Island Mobile ARC. *Time*: 9 AM-4 PM. *Place*: Long Island Expy, exit 39 north to Glenclove Rd, north to Rte 25A Northern Blvd, turn right, go east 1 mile, hamfest will be on the right. *Features*: refreshments. *Talk-in*: 146.25/85. *Admission*: door $3. *Contact*: Mark Nadel, NK2T, 22 Springtime Ln, Levittown, NY 11756, tel (H) 516-796-2366, (B) 516-273-1830.

New York (Yonkers)—October 2. *Sponsor*: Yonkers ARC. *Time*: gates open to sellers at 8 AM, public 9 AM-3 PM (rain or shine). *Place*: Yonkers Municipal Parking Garage, corner of Nepperhan Ave and New Main St. *Features*: auction at 1 PM, refreshments. *Talk-in*: 146.265/865, 445.150/440.150 and 146.52. *Admission*: no advance, door $3, children under 12 free. *Tables*: bring your own. *Contact*: John A. Costa, WB2AUL, 195 Woodlands Ave, Yonkers, NY 10703, tel 914-963-1021.

North Carolina (Spruce Pine)—September 24. *Sponsor*: Mayland ARC. *Time*: dealers 7 AM, public 9 AM-5 PM. *Place*: ¼ mile west on Greenwood Rd, off of Hwy 19E. *Features*: dealers, exhibits, tailgaters, flea market, seminars, nonham activities, refreshments, walk-in exams (need copy of license and original). *Talk-in*: 147.975/375 and 144.59/145.19. *Admission*: $4. *Contact*: David McCarty, KK4PW, Rte 2, Box 73A, Greenmountain, NC 28740, tel (D) 704-682-9270, (N) 704-675-5996.

†**Ohio (Berea)—September 25.** *Sponsor*: Cleveland Hamfest Assn. *Time*: 8 AM-4 PM. *Place*: One mile west of I-71 and Bagley Rd interchange, ½ mile south on Eastland Rd. *Features*: technical forums, VE exams for all classes (walk-in), refreshments. *Talk-in*: 146.52. 6 AM til noon. *Admission*: advance $3.50, door $4. *Contact*: Marion Hill, tel 216-238-1152.

†**Ohio (Cincinnati)—September 18.** *Sponsor*: Greater Cincinnati ARA. *Time*: 7 AM-5 PM. *Place*: Stricker's Grove, Rte 128. *Features*: flea market, entertainment, refreshments. *Admission*: advance $5, door $6. *Tables*: advance $5 per car space. *Contact*: GCARA, John Haungs, WA8STX, 10615 Thornview Dr, Cincinnati, OH 45241, tel 513-563-7373 or Walter Harris, KA8KLP, 6788 Parkview Dr, Cincinnati, OH 45224, tel 513-242-1691.

Ohio (Lima)—October 9. *Sponsor*: Northwest Ohio ARC. *Time*: setup after 3 PM Saturday, all night security provided, Sunday 6 AM-3 PM. *Place*: Allen Co Fairgrounds, Rte 309E approximately 1½ miles east of I-75. *Features*: camping (electricity for camping $7), exams for all classes, doors open 8:30 AM, handicap accessible. *Talk-in*: 146.07/67, 147.63/03 and 444.925/449.925. *Admission*: advance $3.50, door $4. *Tables*: $8, half tables $4. *Contact*: for exams, send 610 form with a copy of present license by September 9 with an SASE to W8TY, 1370 Stevick Rd, Lima, OH 45807. For table and ticket reservations, send SASE to WD8BND, PO Box 211, Lima, OH 45802, tel 419-647-6513.

Ohio (Springfield)—October 2. *Sponsor*: Springfield Independent Radio Assn. *Time*: 8 AM-4 PM. *Place*: Clark Co Fairgrounds, just west of I-70 on State Rte 41. *Features*: indoor flea market, vendors, refreshments. *Talk-in*: 144.85/145.45 or 222.66/224.26. *Admission*: advance $2, door $3. *Tables*: $6 advance, door $7. *Contact*: Gary, WB8YUC, at 513-339-4732, or SIRA, PO Box 523, Springfield, OH 45501.

Pennsylvania (York)—September 24-25. *Sponsor*: York Hamfest. *Time*: gates will open 8 AM both days. *Place*: York Fairgrounds. *Contact*: write to York Hamfest, PO Box W, Dover, PA 17315, tel 717-528-8412.

†**Pennsylvania (Butler)—September 11.** *Sponsor*: Butler Co ARA. *Time*: 9 AM-4 PM. *Place*: Butler Farm Show Grounds at Roe Airport. *Features*: overnight campers welcome, handicap parking, free indoor and outdoor flea market, refreshments, free parking. *Talk-in*: 147.96/36, 147.84/24. *Admission*: $1, children under 12 free. *Tables*: indoor table space $5 per 8-ft table, to reserve table space contact Joseph Stahlman, WA3BVQ, Box 354-B RD4, Slippery Rock, PA 16057, tel 412-794-8383; for advance tickets contact Ed Napoletan, WB3LKO, 445 Morton Ave, Butler, PA 16001, tel 412-282-7090.

Pennsylvania (New Kensington)—September 18. *Sponsor:* Skyview Radio Society. *Time:* 9 AM-3 PM. *Place:* Skyview Club Grounds, Turkey Ridge Rd. *Features:* flea market, refreshments. *Talk-in:* 146.04/64. *Admission:* $2. *Contact:* John Thompson, WB3FYP, 1014 Cable Ave, Pittsburgh, PA 15238, tel 412-828-5966.

Pennsylvania (Warrington)—October 1-2. *Sponsor:* Mount Airy VHF ARC. *Time:* gates open 6 AM rain or shine. Place: Warrington Motor Lodge, Rte 611 on Saturday and the Bucks Co Drive-in Theater on Sunday, also on Rte 611. *Features:* Mid-Atlantic VHF Conference on Saturday, the Hamarama will be on Sunday, flea market. *Admission:* advance registration for the Conference is only $5, or $6 at door includes admission to the flea market, admission to just the flea market is $4 per person, $7 per carload *Tables:* bring your own, selling spaces are $6. *Contact:* Pat Cawthorne, WB3DNI, 215-672-5289.

Texas (Tyler)—September 17. *Sponsor:* Texas Traffic Net. *Place:* Tyler State Park. *Features:* programs, speakers, refreshments, catered barbeque at noon ($5.25 per person and $2.65 for age 12 and under with advance reservations). *Admission:* $2. *Contact:* send barbeque reservations to Josiah Brown, K5UPN, PO Box 2936, Longview, TX 75606. For further information monitor Texas Traffic Net on 3873 from 6:30 to 7:30 PM CDT. Also will be on other nets (7290, DRN5, TEX CW, 75-meter ISSB, Gulf Coast Hurricane Net and Southwest Traffic Net).

†**Texas (Wichita Falls)—September 17.** *Sponsor:* Wichita ARS. *Time:* setup Friday 3 PM-8 PM, Saturday public 7 AM-6 PM. *Place:* Wichita Falls Activity Center, 1001 Indiana. Features: ARRL forums, VE testing (bring original license, a copy, two forms of ID and $4.55), refreshments, free parking and handicap facilities, QCWA, AMSAT, MARS, QLF contest, net meetings. *Talk-in:* 146.34/94, 147.74/14, 449.3/4.3. *Admission:* advance $6, door $7. *Tables:* reserved 8-ft tables $5 each. *Contact:* Wichita Falls ARS, PO Box 4363, Wichita Falls, TX 76308, tel (D) 817-767-2722, (N) 817-767-6504.

Virginia (McLean)—September 23-25. *Sponsor:* QCWA National Convention. *Place:* McLean Hilton Hotel (reservations by Sep 8 after which first come first served). *Features:* Technical programs, FCC forum, banquet Sep 24. *Contact:* John Kelleher, W4ZC, 301-924-1605.

†**Washington (Walla Walla)—September 24-25.** *Sponsor:* Walla Walla Valley ARC. *Time:* 8 AM-5 PM. *Place:* Community Building, Milton-Freewater, OR. *Features:* commercial displays, license exams, swap tables, refreshments, nonham activities. *Talk-in:* 147.88/28 or 146.52 simplex. *Admission:* free. *Tables:* free. *Contact:* Paul Hamon, KA7VHL, tel 509-525-0512.

†**West Virginia (Huntington)—October 1.** *Sponsor:* Tri-State ARA. *Time:* 9 AM-4 PM. *Place:* Huntington Civic Center, 8th St and 3rd Ave. Features: flea market, forums, walk-in VE testing, dealers, handicap accessible. *Talk-in:* 146.16/76. *Contact:* Charley Shumaker, N8IKP, PO Box 4120, Huntington, WV 25729, tel (D) 304-696-5958, (N) 304-523-5264.

Wisconsin (Milton)—September 11. *Sponsor:* Tri-County ARC. *Time:* 7 AM-2 PM. *Place:* Parking lot of Black Hawk Technical College, Hwy 51 between Janesville and Beloit. *Talk-in:* 144.85/145.45. *Admission:* $2. *Tables:* bring your own. *Contact:* Tri-County ARC, PO Box 321, Milton, WI 53563.

Silent Keys

Administered by Nancy A. Slipski

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

K1AET, Bernard E. Thibodeau, Presque Isle, ME
KA1CVM, Martin Polstein, North Bridgton, ME
KA1EIT, Ernest E. Lamb, Groton, CT
W1ENC, Francis J. Maher, East Dorset, VT
W1MCL, Edward J. Rice, Uxbridge, MA
WA1QQS, Philip T. O'Rilley, New Britain, CT
W1VK, Norman R. Simmons, Burlington, CT
W1VWN, Arthur N. Parent, Pawtucket, RI
ND1Y, Stanley W. Pozerski, Tewksbury, MA
K2CBG, Raymond H. Bunnell, Branchville, NJ
K2EW, Emil Weber, Ormond Beach, FL
WB2GAH, George E. Stewart, Breesport, NY
W2IGV, Harold W. Ford, Montclair, NJ
W2KQW, Robert Kling, Palm Bay, FL
WA2LOJ, Thomas Van Schuyler, Franklin Square, NY
WB2LTV, Fred Layton, Clayton, NJ
W2MGM, Robert E. Lee, Franklin Square, NY
WB2OPZ, Raymond W. Graper, Binghamton, NY
K2PVF, Herman Dinman, Pennsauken, NJ
WB2TTP, H. Kenneth Rosecrans, King Ferry, NY
WB2TYN, Edward D. Olsen, Lake Ronkonkoma, NY
WB2YMH, Michael J. Foley, Englewood, NJ
WA2ZAB, Ray L. Klar, Long Branch, NJ
*K3GM, Leon T. Lapkiewicz, Philadelphia, PA
KA3JJH, John A. Dutko, Shillington, PA
KA3JTW, Charles E. Shearer, Shermans Dale, PA
K3KDF, George Smyth, Philadelphia, PA
W3LIV, William T. Tobin, Altoona, PA
*W3MC, C. H. Foell, Norristown, PA
WA3MJH, R. R. Webster, Bethel Park, PA
W3NHH, Louis A. J. Bobula, Pittsburgh, PA
W3NR, Frank Grace, Erie, PA
K3OQA, George W. Ferguson, Middletown, PA
KA3ROZ, Robert H. Hafer, Reading, PA
W3SLS, Betty J. Aylor, Rockville, MD
KI3T, Robert G. Hoffecker, New Castle, DE
K4AUA, Julian F. Oberg, Largo, FL
KP4AZN, Richard J. Gonzalez, Coral Gables, FL
K4BC, Hunter R. Frischkorn, Jr, Richmond, VA
W4BMG, James H. Rea, Asheville, NC
WD4DGR, James L. Wyatt, Chattanooga, TN
W4EGN, R. H. Irwin, Louisville, KY
W4EOD, C. Ivan Peterson, Lake Park, FL
N4FC, Arnold L. Hendrick, Sarasota, FL
K4FQM, Harry G. Andrews, Jr, Bradenton, FL
WD4IGH, Frank S. Fleischman, St Petersburg, FL
W4ILZ, Wesley M. Jackson, Chattanooga, TN
*W4OKN, Morris B. Tillotson, Lynchburg, VA
W4OPW, John C. Williams, Roanoke, VA
*K4PGM, Ray Cobb, Raleigh, NC
W4PJT, Monchie M. Gunter, Jr, Pensacola, FL
K4PP, Bandel T. Linn, Pensacola, FL
K4YXZ, Robert R. Spaulding, Nokomis, FL
W5AXS, Shirley S. Arrighi, Baton Rouge, LA
N5BDX, Dennis P. O'Brien, Arlington, TX
WD5CYQ, Orville L. Dickinson, Jacksonville, AR
W5ETL, Jesse A. Williams, Odessa, TX
W5FQX, William G. Davaul, Albuquerque, NM
W5GML, Charles L. Cain, Sherman, TX
W5HGG, Warren L. Anderson, New Braunfels, TX
W5ID, James B. Keller, Houston, TX
W5OFT, Irving E. Escagne, Port Arthur, TX
W5PQJ, Louis J. Frenkel, Jr, Albuquerque, NM
KE5QD, Guy Z. Moore, Jr, El Paso, TX
KH6AOG, Robert K. Nakatsuka, Aiea, HI
N6AX, Robert H. Cromwell, Grass Valley, CA
WD6CUG, Allen J. Wheelock, Visalia, CA
W6CVV, Tommy L. Mathews, Redondo Beach, CA
W6CWK, Vendit Johnson, Sweet Home, OR
WB6DMB, R. H. McGihon, Fremont, CA
W6DVT, Richard F. Stratfull, West Sacramento, CA
WB6EBI, John H. Dry, Mountain View, CA
K6GYF, Milford D. Kite, Wofford Heights, CA
KF6HB, Ronald K. Olson, Vienna, VA
W6KZL, Glen C. Tillack, Sepulveda, CA
KA6OQS, Christopher Brown, Carson, CA
W6RAV, Francis A. Everett, Burbank, CA
*K6ROR, Philip F. Schutze, Vista, CA
KA6SDD, Fearn E. Munster, Thousand Palms, CA
W6SVM, Henry Gassmann, Pinedale, CA
W6TZA, Howard R. Sweezey, Carmichael, CA
W7APB, Richard H. Zirk, Auburn, WA
N7BYA, G. Arnold Thomsen, Scottsdale, AZ
K7CQS, Robert D. Sainsbury, Pleasant View, UT
WB7DEE, James R. Shunn, Klamath Falls, OR
W7IEB, Fred W. Fiedler, Red Bluff, CA
*W7IKY, Richard V. Thomas, Seattle, WA
W7LQW, Carl A. Long, Tempe, AZ
W7MF, Ward M. Brown, Centralia, WA
WA7UFQ, Phillip A. Lincks, Auburn, WA
KA7VDP, William M. Kletzer, Yachats, OR
K7ZHD, Charles Z. McDonald, North Las Vegas, NV
W8CIV, Chad R. Thrasher, Chardon, OH
WA8CJO, Robert F. Strawser, Ashley, OH
W8CUS, Maynard B. Chenoweth, Midland, MI
W8DHC, Onne L. Santti, Detroit, MI
W8DVY, Edward Gleason, Cincinnati, OH
W8TQF, Leslie M. Bennett, Lincoln Park, MI
W9BYP, Floyd B. Simpson, Bethalto, IL
W9EQ, Stanley D. Fisher, Racine, WI
W9ID, George C. Udry, Pekin, IL
W9SQJ, Charles D. Newell, Minorque, WI
WØAL, Laurence E. Hastings, Wheat Ridge, CO
NØAMJ, Leonard F. Nielsen, Yankton, SD
WØAYD, Donald M. Robbins, Hopkins, MN
WØCYY, Francis Weatherford, Cresco, IA
WØECX, J. Milton Myhre, Bradenton, FL
WAØGBD, Walter Pfeffer, Strawberry Point, IA
WØIYU, Myron R. Hanson, Manhattan, KS
KBØNE, Bill R. Talley, Denver, CO
WØPGX, Albert M. Gorton, La Junta, CO
WAØREX, Duane E. Lewis, Jr, Empire, CO
WØRLM, Kenneth J. Dado, Papillion, NE
KDØTH, Nathan Morland, Waterloo, IA
KØUYJ, Stanley G. Brinker, White Bear Lake, MN
EI2W, H. L. Wilson, Dublin, Ireland
GØAVA/W2IVW, Irving P. Richter, Merseyside, Great Britain
*I1AOH, Costantino Rallo, Portici, Italy

*Life Member, ARRL

Notes: 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*.

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. Canadian reports should be sent to the CRRL HQ address on page 9.

Many hams have remembered a Silent Key with a memorial contribution to the ARRL Foundation. Should you wish to make a contribution in a friend or relative's memory, you might designate it for an existing youth scholarship, the Jesse A. Bieberman Meritorious Membership Fund, the Victor C. Clark Youth Incentive Program Fund or for the General Fund. Contributions to the Foundation are tax-deductible to the extent permitted under current tax law. Our address is: The ARRL Foundation, Inc, 225 Main St, Newington, CT 06111.

50 Years Ago

September, 1938

☐ Recent amateur activity in disaster communications points up the strong desirability of detailed advanced planning, as well as organized groups in preference to individual/isolated preparation. W3EMM's description of the plans and gear-building by Norfolk, Va. club members is a good pattern to follow.

☐ A number of commercially manufactured receivers lack the advantages of an r.f. stage. W1LJI shows us an effective one-tube unit with switching for five bands.

☐ 56 Mc. is whooping it up again this summer and provided the first "transcon" contact on that band—W1EYM and W6DNS. The Editor recalls that not long ago, the band was considered totally useless, and suggests there is still much more to be learned about this order of frequency.

☐ W1JFO of Harvard is engaged in a study of layer height measurement and offers a preliminary interpretation of five meters' phenomena this past year. But more reports from amateurs are needed to round out the project.

☐ W1CBD summarizes recent developments in radio control of models, in particular reporting on this year's competition at Detroit. Ross Hull's rubber-band powered escapement arrangement, presented in *QST* last year, was still the most popular system in use by modelers.

☐ The banquet speaker at the Atlantic Division convention in Washington this past June was the Chairman of F.C.C., Frank R. McNinch. Typical of his praise of amateurs is this excerpt: "I know of no other field... where the public at large receives such great benefits as a direct consequence of the work of amateurs."

☐ The new W1AW will be dedicated on September 2nd, Hiram Percy Maxim's birthday. During the evening, amateurs everywhere are invited to send a message of good wishes; many Connecticut stations will join W1AW on the bands to accept the expected flow of traffic.

☐ The world radio conference scheduled for Rome in 1942 will be a tough one for amateur radio, true, but not as bad as the inaccurate "scare" article in another radio journal that the League expects to lose the 40- and 20-meter bands at that meeting! *QST*'s more rational item adds that it is inappropriate to bombard Senators with protests, as the other article suggests, since international agreements are negotiated by the executive branch, not the legislative.

25 Years Ago

September, 1963

☐ W1OLP updates us on progress in radio control of model airplanes. Though a CB license will suffice today, amateurs continue to form the nucleus of the sport and its advancement. Proportional control has now replaced the older pulse control of escapements.

☐ Using a 1200-foot antenna at Stanford, W6UGL achieved moonbounce on 28 Mc. He encourages participation by others and outlines the basic facts for determining minimum equipment and antenna needed for lunar communication.

☐ Did "73" originate as a message of good wishes to Andrew Carnegie on his 73rd birthday, as one tale has it? No way, says telegraphy expert historian WB6BBO (now W3WRE), who debunks some other myths and sketches the true history.

☐ Amateur radio continues to grow; there are 247,603 operator licenses now compared with 230,459 a year ago.

☐ This issue carries a tear-out placard to be posted at the member's operating position; it recommends a number of good operating principles aimed primarily at achieving effectively wider bands through efficient occupancy.

☐ A "little U.N." of amateur radio convened at Malmo, Sweden this past June with nearly 60 delegates present from 16 amateur societies. This was the triennial conference of Region 1 of I.A.R.U., attended as observers by President W6ZH, Secretary W1LVQ, and Canadian Director VE3CJ.

☐ If you'd like to work sideband on two meters, try W7LHL's transverter circuit which takes "standard" s.s.b. output at, say, 15 Mc. and heterodynes it to 144 Mc. Since the procedure works at a low level, incoming signals can be processed on the reverse route.

☐ The Dakota Division leads the pack in the Building Fund Drive with 87% of its quota already filled.—*W1RW*

1987 CRRL CAN-AM Contest Results

By Yuri Blanarovich, VE3BMV/W2
Box 282, Pine Brook, NJ 07058

The phone and CW portions of the 1987 CAN-AM contest ran on two separate weekends. This allowed contestants more time to enjoy the weekend with their families. Considering that last year we were hitting the bottom of the sunspot cycle, we saw an increase in participation and an improvement of scores this year. More logs turned in, more participants, and more fun for everyone was this year's cliche. CAN-AM was a good place to chase states for "We the People WAS" and work the rare Canadian—VY1CW.

We congratulate and welcome back familiar past champions David Hachadorian, K6LL and Lee Sawkins, VE7CC, who are the winners of the American and Canadian Champion trophies, respectively. Dave and Lee won both Phone and CW categories in their countries, which earned them undisputed first places in the combined category.

Also in the combined category, second place goes to Jeff Bolda, WC4E, who more than tripled his last year's score, while third place went to John Hawkins, K5NW. Second place in Canada goes to Doug Freestone, VE5UF, and third place to Pete Pel, VE7DLM.

The multioperator category was represented only on CW, so there was no combined-mode winner. The CW winner is N8LM, who operated with the assistance of WB4SPB, KØHLB and WØMHS, to beat second place WD4IIO, operated by W4ILE.

The West Coast stations seem to have an advantage in this contest. There are more participants on the East Coast and when the high bands open, the pipeline between the East and West seems to give the sparse westerners an advantage. The phone winner is David, K6LL, beating Bob Turner, AG7M, and Jeff, WC4E. From Canada, the top dogs were Lee, VE7CC, Doug, VE5UF and Pete, VE7DLM.

On CW in the single-operator, all-band category, we had the same three American operators, in a slightly different order: (1) Dave, K6LL; (2) John, K5NW; and (3) Jeff, WC4E. In Canada, the top CW places were taken by VE7CC, VE5UF and Ken Dixon, VE3KP.

The single-operator, single-band category lumps all the bands against each other. The 14-MHz band yielded the winners. In the US on phone, they were Larry McKay, K5MK making a respectable 806 QSOs on phone, followed by N6PLG and WA6FGV. The highest phone score was produced by Brian Kelly, VO1QU, with a whopping 1053 QSOs, ahead of VE3FGU and VE4MG.

On CW the top honors go to the same winners: K5MK and VO1QU, with runners-up NA9J, WA6FGV and VE3OEQ, VE1BXI.

In the Flea Power Category (QRP), phone was won by WAØVBW, ahead of KC3RT and W5TTE in the US, while in Canada there was a lonely VE3OOL. More stations enjoyed QRP operation on CW. The winners were W6JTI and VE6CSE ahead of KØSCM, W2JEK and VE1CBP.

If you participate in a contest, it is a courtesy to send in your log. It may even bring you a certificate if you are a winner in your area. Those who received our certificates know how beautiful they are. The last three years' certificates were done on a laser printer and personalized with a rustic map of North America in the background—well worth fighting for. By the time you will read the results in *QST*, all certificate winners should have received their awards, including those for 1985 and 1986. Sorry about the delay, but our problems associated with the move from Ontario to New Jersey and configuring the laser printer caused this delay. Thank you for your patience.

Many Americans were commenting about the low participation from Canada. Looking at the ratio of licensed hams and the ratio of logs received from the US and Canada, it is not too bad. I tried for 16 years to increase the popularity of contesting in Canada by writing the contest column for the *Long Skip* bulletin of the Canadian DX Association and by promoting contesting at the club meetings and conventions. There is perhaps a warmer climate for contesting in Canada now. Still the major organizations do not support the sport side of Amateur Radio to the extent it deserves. We are pleased to see the support of the Canadian Radio Relay League and we hope that with *QST Canada* publication, we will see more publicity for radiosport events. There is no better training for an amateur operator than a contest! So considering the Canadian showing is not all that bad. We hope to see an increase in participation over the next few years, especially with sunspots bringing longer-lasting openings on higher bands.

Please read the 1988 CAN-AM rules carefully. We have some minor changes. We are introducing the Low Power Category (less than 200 W). We have eliminated the off periods and please note the difference in QSO points on phone and CW. With increased activity, it will be possible to have separate monoband categories rather than just one, where one station could submit logs for more than one band. We are also considering the unification of the QSO point system by having 2 points for phone contacts and 3 points for CW contacts, regardless of working your own or the other country. This would allow a closer comparison of American and Canadian scores, while eliminating a possible "bonus" of working the other country. What do you think?

We are redesigning our contest forms. They are better looking and include everything you need for logging, duping, tracking multipliers and calculating your score. Please send an SASE for your latest CAN-AM Contest kit to VE3BMV/W2 (Canadians can request the forms from CRRL Headquarters).

Congratulation to our winners and a big thank you to all participants and those who sent their logs in. Please mark your calendar with the 1988 CAN-AM dates, and we wish you good propagation and lots of fun for the 1988 CAN-AM Contest!

CAN-AM Contest Comments

Canada

VE5AAD: Had great fun, too bad 15 m didn't open up; my score would have been better. VE3FVW: I had much fun, but the *NCJ* sprint contest caused much confusion. VE6CSE: It was a good CW contest and my first QRP. I worked the whole contest on 12 volts and 9 watts input. The 599 exchange seems rather futile as that is all I got for reports, and I am sure when I was asked to repeat several times I was not 599. I would like to thank the Albuquerque DX Assn for sponsoring the trophy that I and VE6CSF won in 1985 CAN-AM CW, and to the other persons involved in making this contest the success it is. VE6DZ: Conditions just fair. Some confusion in overlap with Sprint contest during busy period. VE5UF: Congrats to VE7CC; just couldn't keep up to him. All QSO data processed on my MAC with Microsoft EXCEL. VE7DLM: Great contest as usual. VE3AXV: I enjoyed the contest this year, although the Sprint contest that ran in the middle was more than a little wild and confusing for the uninitiated, like myself.

US

NWØF: Missed the last 2 years, but I am back with new call. More activity than I remembered. Very enjoyable contest; CU next year! W5NR: Enjoyed it much, but would like many more VE stations. KE7KF: I enjoyed the CAN-AM very much, but I didn't like the *NCJ* Sprint in the middle of it. KI8W: Had a good time, but a little TVI during the Tiger-Blue Jay series caused me to shut down and watch baseball. Maybe next year. WØIZV: Rig failed after one hour of operating (TR7). KDØEE: Wish I could have worked on Sunday! Contests are not for pastors that serve two churches-hi! W9HE: Strong activity

made this a great test. I had to work on Saturday, hope to go the whole test next year. W4RVU: We created a LOTUS 1-2-3 logging and duping program for the contest and were able to debug it during the test. For the first time we were able to operate without a pencil taped to our finger. NL7DU: Sure wish condx had been better! CU next year. KT2D: Dog Shows precluded submission of a better log. KA7FEF: Enjoyed the contest, looked for more VEs than I found though. NH6KF: Bad conditions to mainland. N3AOE: Good contest, lots of fun, had a chance to try out new voice keyer. N7CIX: Need separate awards for low power. W7FGT: Computer duper crashed twice! W6JTI: Tnx to all those who strained so hard to copy my 5 W QRP signal! AA4TE: This was my first contest. I must confess other operators were more friendly and courteous than I expected for a contest. I loved every minute and look forward to participating next year. KC7BS: Most enjoyable contest I ever took part in. Biggest thrill was working VY1CW. I'll be back next year. KE7QA: What a fiasco! Sprint and CAN-AM at the same time. Wish you guys could settle your differences off the air! WE7X: I was surprised by the small number of Canadian stations. It would seem that a contest sponsored by the CRRL would be dominated by VE stations, but very few were heard. I enjoyed the contest overall and I compliment the folks who put it together and designed the scoring structure. Best of luck! KJ4VH: Figured NL7DU must have been /4 when he called me, but he wasn't! AK on 40 was a nice benefit of the test. N6PLG: Was portable at 8200 ft elevation in Frazier Park, CA. N2AZS: There should be a low power and high power class. KAØZFX: Operating mobile, it's hard to keep track of time, QSO No. etc. NV7R: The absence of Canadian hams in a CRRL sponsored event is disheartening. WAØVBW: I really enjoy this contest; wish I had more time this year. KB4GID: I enjoyed the CW contest very much. It was a great opportunity for the "We the People WAS." AG7M: Would have been interesting to have been loud on 160. Still my favorite test.

Scores

Combined mode: Place, call sign, multiplier area (state/province), category (A—all band, Q—QRP, 7—7 MHz single band, M—multi-operator), *denotes certificate winner, combined score, phone score, CW score.

Phone and CW listings: Place, call sign, multiplier area, category, *denotes certificate winner, score, number of QSOs, multipliers.

US Combined Single Op

1	K6LL	AZ	A*	616092	319510	296582
2	WC4E	FL	A*	349150	135850	213300
3	K5NW	TX	A*	284714	65760	218954
4	WV5K	TX	A*	242560	96768	145792
5	N6JV	CA	A*	208727	27797	180930
6	N7CIX	AZ	A	174735	22386	152349
7	W7FGT	AZ	A	164587	65462	98125
8	K9LJN	IL	A	158644	6300	152344
9	KY7M	AZ	A	94960	2924	92036
10	W4WKQ	FL	A	92736	48660	44068
11	N2AZS	NY	A	92643	5883	86760
12	K5MK	MS	14*	83056	48840	34216
13	K9OSH	WI	A	82152	34650	47502
14	KG7Z	MI	A	64156	22831	41325
15	NV7R	MT	A	60137	29779	30358
16	KW2J	NY	A	49424	6696	42728
17	W3ARK	PA	A	46308	10556	35752
18	KØVGB	KS	A	46180	30115	16065
19	WA6FGV	CA	14*	44806	19656	25150
20	NW9F	KS	A	43252	748	42504
21	WA2LBT	NJ	A	41858	550	41308
22	AA4GA	GA	A	29700	13266	16434
23	K1UCA	MA	A	26198	1250	24948
24	NT8H	MN	A	24701	19152	5549
25	W8JRK	MI	A	22366	6731	15635
26	W5NR	TX	A	21852	836	21016
27	KJ4WH	FL	14	17230	7360	9870
28	N6NF	CA	14	15903	7128	8775
29	WK5P	OK	A	10035	5040	4995
30	N7JB	WA	A	8640	2128	6512
31	AA6EE	CA	14	5447	117	5330
32	NW4G	OH	A	5391	462	4929
33	K9OSC	WI	A	5000	350	4650
34	W9REC	IL	A	4764	660	4104
35	N7JLC	UT	A	2736	1080	1656
36	W0IZV	CO	14	2607	1767	840
37	WC7S	WY	1.8	1737	495	1242

Canadian Combined Single Op

1	VE7CC	BC	A*	826594	422394	404200
2	VE5UF	SK	A*	450858	163226	287432
3	VE7DLM	BC	A*	291411	151704	139707
4	VO1QU	NL	14*	185031	119416	65615
5	VE6DZ	AT	A	41343	13068	28275
6	VE2HN	PQ	A	19365	1725	17640
7	VE4MG	MB	14	9084	6204	2880
8	VE6RI	AT	14	8096	3456	4640

Phone, US Single Op, All Band

1	K6LL	AZ	A*	319510	1688	178
2	AG7M	OR	A*	215776	1159	176
3	WC4E	FL	A*	135850	966	130
4	KC7KU	NJ	A*	102805	666	145
5	WV5K	TX	A*	96768	724	126
6	WE7B	UT	A*	75114	598	117
7	W7FGT	AZ	A	66462	541	114
8	K5NW	TX	A	65760	614	96
9	N3AOE	MD	A*	56420	410	124
10	KD8EE	SD	A*	55692	438	117
11	W4WKQ	FL	A	48668	476	92
12	KB8C	IN	A*	47214	365	122
13	K9OSH	WI	A*	34650	301	105
14	KØVGB	KS	A*	30115	293	95
15	NV7R	MT	A*	29779	290	97
16	N6JV	CA	A*	27797	319	77
17	KG7Z	MI	A*	22831	259	79
18	N7CIX	AZ	A	22386	251	82
19	KAØZFX	ND	A*	21546	317	63
20	NTØH	MN	A*	19152	233	76
21	KE7QA	UT	A	17340	176	85
22	AA4GA	GA	A*	13266	183	66
23	KC1BS	ME	A*	12369	201	57
24	W3ARK	PA	A*	10556	161	56
25	KA1LMR	NH	A*	7616	110	64
26	W8JRK	MI	A	6731	113	53
27	KW2J	NY	A*	6696	95	62
28	WA6IYX	TX	A*	6375	105	51
29	K9LJN	IL	A*	6300	82	36
30	N1CC	CT	A*	6222	163	34
31	N2AZS	NY	A	5883	99	53
32	AA2Z	CT	A	5194	101	49
33	WK5P	OK	A*	5040	99	45
34	WK4F	FL	A	3192	65	42
35	KY7M	AZ	A	2924	75	34
36	KA2TWY	NY	A	2480	69	31
37	WA8HRK	CA	A	2232	51	36
38	N7JB	WA	A*	2128	46	38
39	K2RYI	NY	A	1620	45	30
40	K1UCA	MA	A*	1250	39	25
41	N7JLC	UT	A	1080	38	24
42	N6NRZ	CA	A	1050	33	25
43	W5NR	TX	A	836	28	22
44	NW6F	KS	A	748	29	22
45	WBØRJJ	NE	A*	736	26	23
46	W9REC	IL	A	660	23	20
47	WA2LBT	NJ	A	550	23	22
48	NW4G	OH	A*	462	26	14
49	K9OSC	WI	A	350	21	14
50	WA3JXW	PA	A	168	12	12

Phone, US Single Op, Single Band

1	K5MK	MS	14*	48840	806	55
2	N6PLG	CA	14*	26768	442	58
3	WA6FGV	CA	14*	19656	337	54
4	KE7KF	UT	7*	11115	229	45
5	KJ4WH	FL	14*	7360	169	40
6	N6NF	CA	14	7128	140	44
7	KB4WQO	KY	14	5814	133	38
8	W6TKF	CA	21*	5208	173	28
9	K1KA	NH	14	5092	130	38
10	WB5KYK	MS	1.8*	2945	93	31
11	KF4GW	NC	14	2233	67	29
12	KD9YB	IN		2046	57	31
13	W0IZV	CO	14	1767	46	31
14	KK4CP	NC	14	980	38	20
15	WC7S	WY	1.8	495	32	15
16	WD4PLF	SC	14	400	21	16
17	AA6EE	CA	14	117	10	9
18	NH6KF	HI	14	70	10	7

Phone, US Single Op, QRP

1	WA6VBW	IA	Q*	8100	120	60
2	KC3RT	PA	Q*	3362	70	41
3	W5TTE	NM	Q*	3268	76	38
4	W0NGB	MN	Q	2619	45	27

Phone, Canadian Single Op, All Band

1	VE7CC	BC	A*	422394	1226	178
2	VE5UF	SK	A*	163226	659	131
3	VE7DLM	BC	A*	151704	620	126
4	VE3AXV	ON	A*	58700	327	90
5	VY1CW	YT	A*	36894	233	86
6	VE6DZ	AT	A*	13068	126	54
7	VE3GRA	ON	A	2200	53	22
8	VE3FVW	ON	A	2044	39	28
9	VE2HN	PQ	A*	1725	36	25

Phone, Canadian Single Op, Single Band

1	VO1QU	NL	14*	119416	1053	59
2	VE3FGU	ON	7*	12800	160	40
3	VE4MG	MB	14*	6204	101	33
4	VE6RI	AT	14	3456	56	32
5	VE1AGZ	NS	7	1819	57	17
6	VE1AGE	NS	14	1120	30	20
7	VE3IPS	ON	21*	910	52	7

Phone, Canadian Single Op, QRP

1	VE3OOL	ON	Q*	3367	46	37

CW, US Single Op, All Band

1	K6LL	AZ	A*	296582	748	187
2	K5NW	TX	A*	218954	619	166
3	WC4E	FL	A*	213300	636	158
4	N6JV	CA	A*	180930	521	163
5	N7CIX	AZ	A	152349	562	129
6	K9LJN	IL	A*	152344	516	139
7	WV5K	TX	A	145792	504	136
8	W7FGT	AZ	A	98125	358	125
9	WD4AHZ	FL	A	95121	384	117
10	KY7M	AZ	A	92036	324	133
11	N2AZS	NY	A*	86760	342	120
12	WM4Z	OK	A*	84584	367	108
13	N6EK	CA	A	69054	322	102
14	WB1CNM	MA	A*	66976	306	104
15	W9HE	WI	A*	49395	261	89
16	K9OSH	WI	A	47502	244	91
17	K4BAI	GA	A*	44462	241	86
18	W4WKQ	FL	A	44068	221	92
19	KW2J	NY	A	42728	206	98
20	NW9F	KS	A*	42504	239	84
21	KB4GID	GA	A	42180	209	95
22	KG7Z	MI	A*	41325	224	87
23	WA2LBT	NJ	A*	41308	213	92
24	W1ACR	CT	A*	38368	207	88
25	W3ARK	PA	A*	35752	204	82
26	NV7R	MT	A*	30358	171	86
27	KJ4VH	KY	A*	26720	156	80
28	NØFFZ	CO	A*	26334	157	77
29	K1UCA	MA	A	24948	153	77
30	N8EA	MI	A	23714	153	71
31	W5NR	TX	A	21016	137	71
32	W3DYA	MD	A*	20196	144	66
33	KØERM	SD	A*	18000	188	45
34	AA4GA	GA	A	16434	114	66
35	KØVGB	KS	A	16065	120	63
36	W8JRK	MI	A	15635	121	59
37	W4RVU	FL	A	13920	108	60
38	WD4JHY	VA	A*	12710	97	62
39	KA9IMX	IL	A	11417	108	49
40	K5DP	OK	A	8800	91	44
41	W4XD	VA	A	7786	107	34
42	KA7FEF	OR	A*	7191	70	47
43	K6MBV	CA	A	6726	82	38
44	N7JB	WA	A*	6512	70	44
45	NTØH	MN	A*	5549	84	31
46	KS7P	OR	A	5382	67	39
47	WK5P	OK	A	4995	61	37
48	NW4G	OH	A*	4929	73	31
49	WA5VBE	AR	A*	4680	62	36
50	K9OSC	WI	A	4650	72	30
51	KI8W	MI	A	4650	69	31
52	W9REC	IL	A	4104	49	36
53	NC7O	WY	A*	3330	50	30
54	N3CZB	PA	A	2744	46	28
55	KA2YAT	NJ	A	2430	43	27
56	KA9YWE	IN	A*	2125	38	25
57	N7JLC	UT	A*	1658	32	24
58	KJ4TK	VA	A	840	28	14
59	KH6JAT	HI	A*	784	27	14
60	WA4VAP	KY	A	750	22	15

CW, US Single Op, Single Band

1	K5MK	MS	14*	34216	305	52
2	NA9J	IL	7*	32780	282	55
3	WA6FGV	CA	14*	25150	236	50
4	AA4TE	NC	7	21056	215	47
5	WS4E	FL	14	19693	198	47
6	K2SX	NY	7	18377	185	47
7	W2KTF	NY	14	12852	113	54
8	W6UQF	CA	3.5*	11938	120	47
9	KJ4WH	FL	14	9870	132	35
10	N6NF	CA	14	8775	100	39
11	KB1VL	MA	7	8246	104	38
12	AA6EE	CA	14	5330	62	41
13	W7HO	NV	14	3240	50	30
14	WE7X	ID	7	2700	52	25
15	WC7S	WY	1.8*	1242	33	18
16	KT2D	NJ	3.5	901	25	17
17	W0IZV	CO	14	840	25	15
18	NL7DU	AK	7	216	12	8

CW, US Single Op, QRP

1	W6JTI	CA	Q*	66164	261	119
2	KØSCM	NE	Q*	33896	211	76
3	W2JEK	NJ	Q*	6300	46	35
4	W8IQ	OH	Q	5577	65	39
5	W8EAO	OH	Q	5120	60	40
6	KN1H	NH	Q	1694	37	22
7	KK7C	UT	Q	420	17	12

CW, US Multiop

1	N8LM (+WB4SPB,KØHLB,W8MHS)	GA	M*	187367	566	141
2	WD4IIO (W4ILE,op)	FL	M*	20010	137	69

CW, Canadian Single Op, All Band

1	VE7CC	BC	A*	404200	741	188
2	VE5UF	SK	A*	287432	672	152
3	VE3KP	ON	A*	178500	438	140
4	VE7DLM	BC	A	139707	374	129
5	VE2AHI/3	ON	A	119040	331	124
6	VE2RO	PQ	A*	37050	164	78
7	VE6DZ	AT	A*	28275	197	75
8	VE6AGM	SK	A	21960	124	61
9	VE5AAD	SK	A	20986	125	58
10	VE2HN	PQ	A	17640	109	56
11	VE4ABZ	MB	A*	10557	77	51

CW, Canadian Single Op, Single Band

1	VO1QU	NL	14*	65615	410	55
2	VE3OEQ	ON	7*	11840	109	37
3	VE1BXI	NS	7*	8138	69	31
4	VE6RI	AT	14	4840	56	29
5	VE4MG	MB	14	2880	42	24
6	VE3TEE	ON	7	2331	40	21

CW, Canadian Single Op, QRP

1	VE6CSE	AT	Q*	13034	90	49
2	VE1CBP	NS	Q	60	5	4

Checklogs: KA1NXT, N7HJM

Contest Corral

Conducted By Mark R. Burke, KA1MIS
Contest Assistant, ARRL

August

31

West Coast Qualifying Run, 10-35 WPM, at 0400Z **Sep 1** (9 PM PDT Aug 31). W6OWP prime, W6ZRJ alternate. Frequency is approximately 3.590 MHz. Underline one minute of the highest speed you copied, certify that your copy was made without aid and send to ARRL HQ 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.

September

4

LZ-DX Contest, see Aug *QST*, p 103.

10-11

European DX-Contest, Phone, see Aug *QST*, p 102.

10-12

ARRL VHF QSO Party, see Aug *QST*, p 101.

11

North American Sprint, CW, see Aug *QST*, p 103.

12

W1AW Qualifying Run, 10-35 WPM at 0200Z **Sep 13** (10 PM EDT Sep 12). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Aug 31 listing for more details.

17-18

ARRL 10-GHz Cumulative Contest, Jun *QST*, p 102.

CAN-AM Contest, Phone, see Aug *QST*, p 103.

Scandinavian Activity Contest, CW sponsored by the Finnish Radio Amateur League, from 1500Z **Sep 17** until 1800Z **Sep 18.** (Phone contest from 1500Z Sep 24 until 1800Z Sep 25.) Work LA-LB-LG-LJ, JW, JX, OF-OG-OH-OI, OHØ, OHØM, OX, OY, OJØ-OHØM, SJ-SK-SL-SM and TF stations on 3.5, 7, 14, 21 and 28 MHz only. Work stations once per band; no crossmode QSOs. Categories: single op, all band; single op QRP (max input 10 watts); multiop single transmitter; and SWL. Multi-single stations may have only one transmitted signal at any given time and must remain on a band at least 10 minutes after a band change. Exchange signal report and serial number starting with 001. EU stations count one point per Scandinavian QSO on any band. Non-EU stations count 1 point per Scandinavian QSO on 14, 21 and 28 MHz, and 3 points on 3.5 and 7 MHz. Multiply total QSO points by the number of different Scandinavian call areas worked per band. (LA1 = LB1 = LJ1 and portable stations without call area numbers count for the 10th call area, ie W1XX/OZ = OZØ, etc) for final score. Avoid contest traffic in these subbands: 3.560-3.600, 3.650-3.700, 14.060-14.125 and 14.300-14.350 except when this conflicts with national regulations. In that case, split operation must be used. Mail entries for both modes by Oct 30 to SRAL Contest Manager, Erkki J. Korhonen, OH4NRC/OH7RS, PO Box 44, 57131 Savonlinna, Finland.

18

North American Sprint, SSB, see Aug *QST*, p 103.

21

W1AW Qualifying Run, 10-35 WPM, at 1300Z **Sep 21** (9 AM EDT Sep 21). See Aug 31 listing for more details.

24-25

All Mode 10-Meter QSO Party, sponsored by the Calumet Area Radio Enthusiasts from 0000Z **Sep 24** until 2400Z **Sep 25.** Single op only. Work each station once. Exchange call sign, name, QTH, Ten-Ten number (if any), and Steel City number (if any). Score 1 point per contact without Ten-Ten number, 2 points per contact with Ten-Ten number. Multiply QSO points times total number of Steel City numbers worked. Suggested frequencies: 28.100-28.500. Cover sheet containing name, call sign, Ten-Ten number (if any), expiration date, chapter assignment, total contacts and total points claimed is required. Dupe sheet required if over 200 QSOs. Logs must be postmarked no later than Oct 25 and sent to Glenn Yerby, ND9Y, 11023 Ave D, Chicago, IL 60617.

CAN-AM Contest, CW, see Aug *QST*, p 103.

CQ World-Wide RTTY DX Contest, sponsored by *CQ Magazine,* from 0000Z **Sep 24** until 2400Z **Sep 25.** Single-ops may operate more than 30 hours, but only first 30 count for contest credit. Rest periods must be not less than 3 hours and noted in logs. Multiop stations can operate 48 hours. Classes: single operator, all band; single operator, single band; multioperator, single operator, all band. Modes: Baudot, AMTOR (FEC/ARQ), ASCII and AX.25 (no digipeated QSO allowed). Bands: 80, 40, 20, 15, 10 meters. Work stations once per band regardless of mode. Exchange RST, state or VE area (W/VE only), and CQ zone. Count 1 point per QSO with own country, 2 points per QSO with same continent, 3 points per QSO with different continent. Multipliers: 1 per each state (48), VE area (13), DX country (DXCC and WAE lists), CQ zones per band. For final score multiply QSO points times total multipliers. Separate log, a dupe sheet and a multiplier check list for each band. Awards. Send logs before Dec 1 to CQ RTTY Contest, Roy Gould, KT1N, PO Box DX, Stow, MA 01775.

Italian YLRC International Contest, sponsored by the Italian YLRC "Elettra Marconi," 1300Z **Sep 24** until 1300Z **Sep 25.** Phone and CW. YL and OM work Italian YL. Classes: single YL operator; single OM operator; SWL. Bands: 1.8, 3.5, 7, 14, 21 and 28. No crossmode or crossband QSOs. Work stations once per band. Exchange RS(T) and QSO number. RC members add RC to exchange. Count 1 point for each QSO within the same country. Count 3 points for QSO between different countries. Count one multiplier for each DXCC country and call areas of W/VE, JA, VK. Count two multipliers for each YL worked per band. Count five multipliers for each Italian YLRC member worked. SWLs count one multiplier for each YL heard. Final score is total QSO points times total number of multipliers. Separate logs per mode and band and must indicate if sender is YL or OM. Send logs before Nov 30 to Ornella Torri, ISØTUE, Sez ARI, Box 22, 09012-Capoterra, Italy.

Wyoming QSO Party, sponsored by the University of Wyoming ARC, from 0000Z **Sep 24** until 2400Z **Sep 25.** 160, 80, 40, 20, 15, 10-meter bands and all VHF/UHF bands. No crossmode/crossband QSOs. Work stations once per band/mode. Non-WY stations exchange RS(T) and state/province/DXCC country; WY stations send RS(T) and county abbreviation (first three letters). Non-WY stations multiply total WY counties per band/mode by total WY QSOs for final score; WY stations multiply total number of states/provinces/DXCC countries by total contest QSOs for final score. Awards. Logs and entry forms (available for SASE to address below) should be postmarked by Nov 1 and sent (with SASE for certificate) to Bill Stacy, K7EY, 1912 Custer Ave, Laramie, WY 82070.

25

SARL HF Contest, CW, sponsored by the South African Radio League, 1200Z-1500Z **Sep 25.** 80, 40 and 20 meters. Categories: Single operator, single transmitter; multioperator, single transmitter. Exchange RST and progressive serial number starting with 001. Count one point per contact per band. Count two points for each call-area worked per band (1—ZS1; 2—ZS2; 3—ZS3; 4—ZS4; 5—ZS5; 6—ZS6; 7—C9 Z2 3D6 7Q7 9J2; 8—A22 D2 H5 S42 S83 V9 ZD9 ZS7ANT ZS8MI 7P8). Count two additional bonus points for each station worked on all three bands. Final score equals total points. Awards. Separate sheet required for each band along with summary sheet containing band worked, number of QSOs, number of call areas, points claimed per band, number of 3-banders and total number of points claimed. Include name, call sign, full address and signed declaration. Postmark entries no later than 15 days after the contest and send (SASE for results) to SARL Contest, PO Box 382, Pietermaritzburg, 3200, Rep of South Africa.

25-26

Fall Classic and Homebrew Radio Exchange, sponsored by the *Classic Radio Newsletter* from 2000Z **Sep 25** until 0400Z **Sep 26.** Object is to restore, operate and enjoy old equipment at least 10 years old and home-brew equipment. Exchange name, RS(T), QTH, receiver and transmitter type (home-brew send final amp tube or transistor). The same station may be worked with different equipment combinations on each band/mode. Suggested frequencies: phone—3.880 7.290 14.280 21.380 28.320; CW—60 kHz up from lower band edges; Novice—3.720 7.120 21.120 28.120 28.320. 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 age in years of all your transmitters and receivers used (minimum three QSOs per unit). For transceivers, multiply age in years by 2. For home-brew, count as 25 years old unless older. Awards. Mail logs (include SASE for results) to Jim Hanlon, W8KGI, 5560 Linworth Rd, Columbus, OH 43085.

October

1-2

AGCW-DL Straight Key Party

California QSO Party, sponsored by the Northern California Contest Club, from 1600Z **Oct 1** until 2200Z **Oct 2.** Single ops limited to 24 hours, time off periods at least 15 minutes and noted in log. 160 through 2 meters, excluding 30 and 12 meters. Work stations once per band and mode. California stations may be worked again as they change counties. CW QSOs must be in CW subbands, except for 160 meters. No repeater or MCW QSOs. Suggested frequencies: CW—1805 and 50 kHz up from low end; phone—1.850 3.850 7.230 14.250 21.300 28.500; Novice—10 kHz up from band edges and 28.495. Try CW on the half hour; 10 meters on the hour 1700Z-2000Z; 147.54 at 2000Z, 0000Z, 0400Z; 160 at 0500Z; 80 at 0300Z and 0700Z. Exchange QSO number, state (county in CA), province or country. Scoring: phone—2 points, CW—3 points. Multiply QSO points times number of CA counties (max 58). California stations multiply by number of states and provinces. Awards. Submit entries by Nov 15 to NCCC, c/o Gary Caldwell, WA6VEF, 1830 Polk St, Concord, CA 94521.

Columbus Contest

International DX-HC Middle of the World Contest

VK/ZL/Oceania DX Contest, phone, sponsored by the New Zealand Assn of Radio Transmitters and the Wireless Institute of Australia, from 1000Z **Oct 1** until 1000Z **Oct 2** (CW contest 1000Z Oct 8 until 1000Z Oct 9). Single op and SWL classes. Operate only 12 hours in even one-hour blocks (1000-1100Z, 1200-1300Z, etc; not 1035-1135Z, etc). Work stations once per band. No crossband QSOs. Exchange signal report and serial number starting with 001. Count 2 points per VK/ZL/O QSO. Multiply by total VK/ZL/O prefixes worked per band. Use separate log for each band and mode. Mail entries to be received by Feb 15 to NZART Contest Manager, John Litten, ZL1AAS, 146 Sandpit Rd, Howick, New Zealand.

4

West Coast Qualifying Run, 10-35 WPM, at 0400Z **Oct 5** (9 PM PDT Oct 4). See Aug 31 listing for more details.

8-9

GARTG-SSTV Contest, part 2, sponsored by the German AR Teleprinter Group, from 1200Z **Oct 8** until 1200Z **Oct 9.** 3.5, 7, 14, 21 and 28 MHz only. Work stations once per band. Groups: A—SSTV transmitting and receiving stations; B—SSTV receiving stations (SWL). Exchange call signs, signal report and serial number. GARTG members also send membership number. Count 10 points per QSO. Multipliers: countries as defined by the WAE and DXCC lists and W/K, VE/VO, JA, PY, VK call areas. Final score is QSO points times multipliers worked per band times continents worked per band. Add 50 bonus points per GARTG member worked. Mail logs to be received within 2 months after contest to Wolfgang Pünjer, DL8VX, PO Box 90 11 30, D-2100 Hamburg 90, Fed Rep of Germany.

Pennsylvania QSO Party, sponsored by the Nittany ARC, from 1600Z **Oct 8** until 0500Z **Oct 9** and from 1300Z-2200Z **Oct 9.** Classes of entry: Single-op; mobile (multi-multi is OK); multioperator, single transmitter; multioperator, multi-transmitter; QRP (max 5 W output), Novice (identify with /N or /T and must operate in Novice frequencies). Phone and CW. CW contacts in CW subbands only. Work stations once per band and mode. No repeater QSOs. Work mobiles again as they change counties. Exchange serial number and QTH (county for PA stations, ARRL Section for others). Suggested frequencies: CW—40 kHz up from low end and 1.810 MHz, SSB—1.880 3.980 7.280 14.280 21.380 28.580; Novice—10 kHz up from low end; mobile window—5 kHz below listed frequencies. Try 160 around 0300Z Oct 9. Count one point per phone QSO, 1.5 points per CW QSO and 2 points per 80/160 meter CW QSO. PA stations multiply by total ARRL sections plus PA counties, plus max 1 DX country. Others multiply by total PA counties (max 67). Stations on county lines count for 1 QSO credit but multiple county multipliers. Multiply total QSO points by total multipliers for final score. Mobiles add 500 bonus points for each county from which 10 or more QSOs are made. QRP entries multiply final score by 2. Novice/Tech entries multiply final score by 3. Entries with more than 100 QSOs must include dupe sheet. Official summary sheet is required (available from W3HDH). Awards. Mail entry by Nov 15 to Chuck McMullen, K3CM, 7 Holly Cir, State College, PA 16801.

QRP ARCI Fall QSO Party, CW

Radiosporting Championship Contest

VK/ZL/Oceania DX Contest, CW, see Oct 1-2 listing.

9

RSGB 21/28 MHz SSB Contest

9-10

Illinois QSO Party

11

W1AW Qualifying Run, 10-40 WPM at 0200Z Oct 12 (10 PM EDT Oct 11). Transmitted simultaneously on 1.818 3.58 7.08 14.07 21.08 28.08 50.08 147.555 MHz. See Aug 31 listing for more details.

15-16

Jamboree-On-The-Air

Simulated Emergency Test

16

RSGB 21 MHz CW Contest

22-23

ARRL International EME Competition, this issue, p 96.

30

W1AW Qualifying Run

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 **October 1** to make the **December** 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 Mark R. Burke, KA1MIS
Contest Assistant, ARRL

Houston, Texas: The Clear Lake ARC will operate club member stations during the month of **Sep** to commemorate the club's first anniversary. Operation will be on all bands and all modes. Ask sponsor for details of event. Send QSL information with contact numbers and SASE to Jim Heil, KB5AWM, CLARC, 15415 Diana Ln, Houston, TX 77062.

Titusville, Pennsylvania: The Cathedral Prep RC will operate N3GCN **Sep 3-4,** 1400Z-2230Z each day, to commemorate the Titusville Railroad's third consecutive year of operation. Suggested frequencies: CW—lower 25 kHz of all Novice subbands; SSB—lower 25 kHz of General 80, 40, 20 and 15-meter bands; Novice SSB—28.350. For special QSL, send QSL and no. 10 SASE to N3GCN, RFD 1, Box 143-G, Titusville, PA 16354.

Waterford, Connecticut: The Tri-City ARC will operate KA1BB, from 1700Z **Sep 3** until 2300Z **Sep 5** in conjunction with the sixth annual Stayawake Coffee Shop offered by BSA Troop 24, Niantic, CT. Operation will be in the middle of the General 80, 40, 20 and 15-meter phone and CW bands and talk-in on 146.52. For QSL, send QSL with letter-size SASE to Tri-City ARC, PO Box 686, Groton, CT 06340.

Prosser, Washington: The Lower Yakima Valley ARC will operate WB7WHF from 1700Z **Sep 5** until 0700Z **Sep 6** to commemorate Prosser States Day. Operation will be SSB in the General portion of each band and on 28.400. For special QSL, send QSL to Steve Weidner, WB7WHF, 1025 Hemlock St, Prosser, WA 99350.

Motherwell, Scotland: The Mid Lanark ARS will operate GB2WVR **Sep 5-11,** 1000Z-2200Z each day, at the World Veteran Rowing Championships. Operation will be 80-20 meters and 2-meter FM and SSB. For special QSL, send QSL and SASE to GB2WVR, PO Box 20, Motherwell, Scotland.

Atlantic City, New Jersey: The Southern Counties ARA will operate K2BR **Sep 7-10** from the Miss America Pageant. Suggested frequencies: CW—65 kHz inside lower band edges; phone—25 kHz inside lower General class band edges. For QSL, send QSL and no. 10 SASE to SCARA, PO Box 121, Linwood, NJ 08221.

Corona, California: The Corona Norco ARC will operate N6MWH from 0000Z **Sep 9** until 2400Z **Sep 10** to commemorate the 75th anniversary of the first automobile race. Operation will be 80-10 meters. For commemorative QSL, send QSL and SASE to CNARC, PO Box 1783, Corona, CA 91718.

Put-In-Bay, Ohio: The Oliver Hazard Perry Expeditionary Force will operate WD8LKI **Sep 9-11** to commemorate the 175th anniversary of The Battle of Lake Erie. Suggested frequencies: 3.965 7.265 14.265 21.365 28.365. For certificate, send QSL and large SASE to Como Wills, 30372 Bates Rd, Perrysburg, OH 43551-3828.

Boone, Iowa: The Boone ARES will operate KØCY 1400Z-2300Z **Sep 10** in conjunction with the 12th annual "Pufferbilly Days" celebration. Suggested frequencies: 7.260 14.300 28.385; packet—145.010; FM—146.25/85. For special QSL, send QSL and SASE to Pufferbilly QSL, PO Box 127, Boone, IA 50036.

Milford, Connecticut: The Greater Bridgeport ARC will operate WA1RJI 1400Z-2200Z **Sep 10** at the 17th annual Engine 260 Antique Fire Apparatus Show and Muster. Operation will be on 14.300. For special certificate, send 9- × 12-in SASE to Sterling House Community Center, 2283 Main St, Stratford, CT 06497.

Tuscaloosa, Alabama: The West Alabama ARS will operate KC4GS 1300Z-2300Z **Sep 10** honoring college football and its greatest coach in history, Paul "Bear" Bryant. Operation will be the bottom 25 kHz of the General 80, 40, 20 and 15-meter bands. For commemorative certificate, send QSL and 9- × 12-in SASE to WAARS, PO Box 1741, Tuscaloosa, AL 35403.

Belgium: The Radio Amateur Assn of Verviers and Eastern Belgium will operate ON4USA **Sep 10-11** to commemorate the Liberation of Belgium in 1944. Operation will be 20, 15 and 10 meters, both phone and CW. For special QSL, ask operators for QSL information.

Bethlehem, Connecticut: The Hen House Gang ARS will operate W1FHP **Sep 10-11,** during daylight hours, celebrating the 64th annual ARGI Fair. Operation will be 40- and 20-meter SSB and Novice 10 meter. Send QSL and SASE to Hen House Gang, Hard Hill Rd, Bethlehem, CT 06751.

Clay Center, Nebraska: The Hastings ARC will operate WØWWV from 1800Z **Sep 10** until 1800Z **Sep 11** at the Old Trusty Antique and Collectors Show. Suggested frequencies: 3.980 7.280 14.250 28.400. For QSL, send no. 10 SASE to Hastings ARC, PO Box 128, Hastings, NE 68902.

Salem, Indiana: The Washington Co ARC will operate WD9GBA from 1300Z **Sep 10** until 0300Z **Sep 11** in conjunction with Old Settlers Days. Suggested frequencies: upper portions of the General 80, 40, 20 and 15-meter phone bands and 10-meter Novice SSB. For commemorative certificate, send large SASE or no. 10 envelope to Frank Nicholson, WD9GBA, RR 1, Salem, IN 47167.

Los Angeles, California: The Los Angeles Area Council of ARCs will operate W6LAF from **Sep 15** until **Oct 2,** 1700Z-0500Z each day, to commemorate the Los Angeles County Fair. Suggested frequencies: 3.900 7.250 14.250 21.350 28.450; 2-meter packet and phone; 220-MHz phone; 432-MHz ATV and phone. For certificate, send QSL and SASE to W6LAF, PO Box 1770, Covina, CA 91722.

Rock Springs, Wyoming: The Sweetwater ARC will operate N7ERH and N7IQO from 1800Z **Sep 16** until 1800Z **Sep 17** to commemorate the Centennial of the City of Rock Springs. Suggested frequencies: 3.923 7.260 14.300 21.400 28.300. For commemorative certificate, send QSL and 9- × 12-in SASE with two US postage units to Richard A. Auble, N7IQO, 5020 Springs Dr #34, Rock Springs, WY 82901.

Clyde, Ohio: The Clyde ARS will operate NF8E 1600Z-2400Z **Sep 17** and 1600Z-2200Z **Sep 18** from the Winesburg Fall Fair. Suggested frequencies: CW—3.720 7.125; phone—3.890 7.250 28.400. For certificate, send QSL and business-size SASE to Steve Karr, NF8E, 302 Hamer St, Clyde, OH 43410.

Muskegon, Michigan: The Muskegon Area Amateur Radio Council will operate W8ZHO from 1300Z **Sep 17** until 1900Z **Sep 18** from aboard the *USS Silversides.* Suggested frequencies: 3.850 7.250 14.250 21.320 28.490. For certificate, send QSL and

9- × 12-in SASE to Robert Wright, KB8APS, 3160 Walker Rd, Muskegon, MI 49444.

Washington, Pennsylvania: The Washington Amateur Communications will operate N3FHG 1400Z-2100Z **Sep 17** and 1600Z-2100Z **Sep 18** in honor of the Washington County Covered Bridge Festival. Suggested frequencies: 3.740 7.250 14.250 21.350 28.333. For special certificate, send QSL and SASE to WACOM, PO Box 1386, Washington, PA 15301.

Boulder, Colorado: The Southern Hills Jr High School ARC will operate NØIYP and KAØIKQ 2030Z-2400Z **Sep 18** to celebrate the re-formation of SHARC. Suggested frequencies: SSB—14.260 21.350 28.350; FM—146.10/70. For commemorative QSL, send QSL, QSO number and SASE to Southern Hills ARC, c/o Devin Laiho, NØIYP, 1500 Knox Dr, Boulder, CO 80303.

Durham, Connecticut: Local ARCs will operate various stations **Sep 23-25** commemorating the 69th Annual Durham Agricultural Fair. Suggested frequencies: lower 20 kHz of the General bands; Novice SSB; 2 meters. For commemorative QSL, send QSL and SASE to KA1RDX, RR 1 Box 306-D, Durham, CT 06422.

Springfield, Ohio: Amateur Radio operators from the West Ohio Conference of the United Methodist Church will operate WB8JQR and ND8U 1300Z-2000Z **Sep 24** to celebrate its second annual "Festival of Sharing." Suggested frequencies: lower 25 kHz of the General 40, 20 and 15-meter bands; 28.350. For certificate, send QSL and no. 10 SASE to Chuck Kirkpatrick, WB8JQR, 121 W Main St, Medway, OH 45341.

Antioch, California: The Delta ARC will operate KA6SIP 1900Z-0100Z **Sep 24** and 1900Z-2400Z **Sep 25** to celebrate the Antioch Rivertown Jamboree. Suggested frequencies: SSB—7.260 14.260 21.360 28.360; FM—146.540; packet—145.010. For commemorative QSL, send QSL and no. 10 SASE to Tom Deeble, KA6SIP, 2224 Carmel Ct, Pittsburg, CA 94565.

Drumnadroghit, Scotland: The Mid Lanark ARS will operate GB2LNM **Sep 24** until **Oct 24** on the banks of Loch Ness. For certificate, send QSL to J. McGill, GM3MTH, 9 Ramsey Pl, Old Monkland, Coatbridge, Lanarkshire ML5 5RE, Scotland.

Sarnia, Ontario and Port Huron, Michigan: The Lambton Co ARC and the Eastern Michigan ARC will operate XL3IG from 2000Z **Sep 30** until 2400Z **Oct 2** in commemoration of the 50th anniversary of the International Blue Water Bridge. Operation will be 30 kHz up from the bottom of the General CW bands and 10 kHz up from the bottom of the General phone bands. For beautiful certificate, send QSL and SASE to XL3IG, 801 Range Rd, Port Huron, MI 48060.

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 **Oct 1** to make the **Dec** issue. Please include the name of the sponsoring organization, the call sign of the special-event station, the city location, dates and times (Z), suggested frequencies and QSL information. Requests for donations will not be published.

QSLing Special-Event 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.

Rules, ARRL International EME Competition

Rules

1) **Object:** Two-way communications via the earth-moon-earth path on any authorized amateur frequency above 50 MHz.

2) **Contest Period:** Two full weekends, Oct 22-23 and Nov 26-27; full 48-hour period UTC each weekend.

3) **Categories**

A) **Single operator:** One person performs all operating and logging functions, equipment adjustment and antenna alignment.

(1) *Multiband.*

(2) *Single-band:* Single-band entries on 50, 144, 220, 432, 902 and 1296-and-up categories will be recognized in awards offered. Contacts may be made on any and all bands without jeopardizing single-band entry status. Such additional contacts are encouraged and should be reported. Also see Rule 8, Awards.

B) **Multioperator:** Two or more persons participate; includes neighboring amateurs within one call area, but with EME facilities for different bands on different team members' premises, as long as no two are more than 50 km (30 miles) apart. Multioperator neighborhood groups cannot use the same call signs at each location; all calls will be listed in the results.

C) **Commercial equipment:** Stations using equipment that is not amateur (such as a dish antenna for lab equipment owned by an institution or government agency) will have their scores listed separately.

4) **Exchange:** For a valid contact to occur, each station must send and receive both call signs and signal reports in any mutually understood format, plus a complete acknowledgment of the calls and reports. Partial or incomplete QSOs should be indicated on your log, but not counted for contest credit. Stations may be worked once per band for credit.

5) **Scoring**

A) QSO Points: Count 100 points for each complete EME contact.

B) Multiplier: Each US and Canadian call area, plus each DXCC country (not US/Canada) worked via EME on each band.

C) Final Score: Multiply QSO points by sum of multipliers worked on each band for your final score.

6) **Miscellaneous**

A) Fixed or portable operation is permitted. Stations operating outside traditional call areas *must* indicate so, identifying the call area of the operating site.

B) Contacts may be on CW or SSB. Only one signal per band is permitted.

C) A transmitter, receiver or antenna used to contact one or more stations under one call sign may not be used subsequently under any other call sign during the contest, except for family stations where more than one call has been issued, and then only if the second call sign is used by a different operator.

D) There is no specified minimum terrestrial distance for contacts, but all communications must be copied over the moon-bounce path, regardless of how strong (or weak) a nearby station's terrestrial signal may be.

7) **Reporting:** Entries must be postmarked no later than 30 days after the contest and must include complete log data. Your summary sheet should show a band-by-band breakdown of QSOs and multipliers, and include details of your station setup and a photo.

8) **Awards:** Certificates will be issued to the top five stations worldwide in each of the entry categories: single operator, multiband; single operator, single band (separate awards for each band); and multioperator. Additional awards will be issued where significant achievement or competition is evident. In addition, each station that successfully completes at least one EME contact during the contest period will receive a certificate commemorating that achievement.

9) **Disqualifications:** See January 1988 *QST*, page 86.

Strays

I would like to get in touch with...

☐ anyone who has a WEFAX program for the VIC 20™, Hal Gardenhour, K3QIF, 9305 Over Ct, Waynesboro, PA 17268.

☐ anyone with a manual for an Inoue Communcation Equipment Corp FDFM-2 2-meter crystal FM transceiver. Karl Peterson, KA3JYW, 17732 Caddy Dr, Derwood, MD 20855.

☐ anyone with a manuals and/or schematics for the following: Amphenol/Color Commander model 860 TV bar/dot/color generator with color killer, Heathkit SB-610 single-sideband monitor, General Radio Co 1840-A power output meter; service manuals for ICOM IC22-S 2-meter transceiver and Eddystone S850/2 VLF receiver. Fred Wantland, K9EFM/5, Box 1821, Rockport, TX 78382.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

DELAWARE: SM, Bob Pegritz, KC3TI—Is summer over already? Time to start thinking antennas and such to give out those "rare" Delaware contest reports. Congrats to Nanticoke on their recent Smith Island Mini DXpedition. DVARS now has a remote receiver on 146.955 accessed thru PL in Claymont. Kent County ARC newsletter now *bi*-monthly due to increased cost of production. A big welcme to Delaware Packet Radio Society! With the interest so great in this mode, it is great to see a "user group" emerge. Congrats N3DLU on your recent "hitching." AWARE continues to teleconference with many repeaters from US monthly on 147.225. Thanks to all who participated in the many summer events using Amateur Radio in Public Service roles. DTN stns 313 Tfc 30 in 22 sessns. SEN stns 40 tfc 2 in 3 sessns. Traffic: W3QQ 54, WB3DUG 32, K3YBW 22, KA3GRQ 21, K3JL 16, W3FEG 14, WA3WIY 13. Del Tfc Net 3905 @ 1830 local!!

EASTERN PENNSYLVANIA: SM, Kay Craigle, KC3LM—ASM: WA3PZO, KA3A, KO3B, K3ZFD. SEC: KB3YS. ACC: KC3QB. OOC: W3IS. SGL: WA3IAO. STM, BM: KB3UD. PIO: W3ZXV. TC: W3FAF. Amateur Radio volunteer communicators contributed to the wellbeing of thousands of participants in the historical re-enactment commemorating the 125th anniversary of the Battle of Gettysburg. Compliments were received from history-buff participants, whose medical emergencies were handled much faster because hams were there, and from members of the State Police. There is PR you can purchase, but you can't buy the kind of goodwill that comes when people know hams made a difference in their lives. N3ECL and his team, Penn-Mar Radio Club, and over 130 individual hams served not only the public but also Amateur Radio well. We're also very grateful for the cooperation of hams in neighboring Sections. In NTS news, ORS N3AZW was named an interim 3RN Net Manager. All are welcome to check into the Section Nets:

EPA	3610 kHz	Dly 7 & 10 PM	AA3B, Mgr
EPAEPTN	3917 kHz	Dly 6 PM	WA3EHD Mgr
PTTN	3610 kHz	Dly 6:30 PM	WB3EPU, Mgr

September 24-25 brings us the York Hamfest, our only 2-day test in EPA. At that time we'll honor W3AQN on 60 years of ARRL membership. Put the Pack Rats' October 2 hamfest on your calendar now. On October 1, KC3LM is scheduled to speak on VHF Emergency Communications at a conference on "Advancing and Emerging Radio Technologies" at Indiana U. of Pennsylvania. ASM WA3PZO and EPA's ARES contributed a great deal to this presentation, which will feature our National Disaster Medical System Amateur communications plan. The Pack Rats made a donation, and Murgas ARC's hamfest included a fund-raising activity for W1AW's renovation. We know some other clubs have passed the hat at meetings. This is very much appreciated. Contact WA2ORG for info on Hilltop Transmitting Soc.'s classes for Tech, General, and Advanced, starting early next month. We're counting down to the Pennsylvania QSO Party, October 8-9. Let's get every county of EPA on the air that weekend, and stir up some club efforts that will drop our good friends in Western PA right in the soup. In ARES news, N2DPV is Skywarn coordinator for Dist. 5 and W3FTZ does the job for Dist. 1. KD2NW is EC in Lackawanna County. SEC KB3YS encourages you to plan an SET exercise that will be of value to your local area, and make sure to send in the reports. Traffic (June): N3AZW/594, N3DRM/100, N3CD/80, W3JKX/58, KA3DLY/54, W3KAG/51, W4UQ/42, KD3AO/37, KU3R/35, W3IPX/34, AA3B/26, KO3M/20, KA3RGF/16, K3TX/16, N3EFW/15, WA3CKA/14, W3AQN/13, W3BNR/13, K3WPI/10, W3FAF/7, W3VA/6, KA3QYH/4, W3HK/2, W3GJC/2. NETS (June QNI/QTC): D5ESN 81/16, MARCTN 113/16, MARCARES 60/9, D6ARES 72/11, SEPATN 84/23, EPAEPTN 453/122, EPA 429/114, PBBS: K3RLI 151, KB3UD 118, WA3TSW 102, WB3JOE 64, AG3F 54.

MARYLAND: SM, Philip E. Battey, W3FZV—Field Day was as popular as ever and most clubs had ARES members among their operators . Notifying the SM were Frederick ARC, NBS Brass, Laurel ARC, Carroll Cty ARC, Tricounty ARC, HAREM Club, Rock Creek ARC, Anne Arundel Club, Mountain ARC, South Carroll AR Group, Harry Diamond Labs ARC. W3FZV worked a few from the GWU club station, WA3SQU. The Chesapeake Bay Club had a great picnic organized by N3ERT and Yf. Don't forget the Gaithersburg hamfest on Sept. 11. Several members of the MD Mobileers ARC provided two-meter comms for the May 7 "Heart Walk" in Annapolis and some operated special event station WA3PJQ aboard the USS Torsk on Armed Forces Day. WA1QAA is busy at work these days, but still remains active with emergency work. Walt, KX3U, was recently in Paris for several weeks on his job. W3ZZ, Gene, concentrates most of his energy on VHF and UHF while maintaining his antenna farm. KM3I is starting an SSB net around 28490 kHz at 8:30 PM. KA3KIF is the new EC in Southern PG County. He and KN3U have been busy with a new antenna on the roof of the Natl. Weather Service building. KN3U works with FEMA on emergency preparedness. W3HII renewed his Assistant Technical Coordinator appointment. Old Timer, W3CVE, is active with traffic handling and is a FB operator. W3CU, Royal Mumford, a real old timer, just celebrated his 90th birthday. He is still active and is a friend of the Anne Arundel Club. And, another old timer is Liz Zandonini, W3CDQ, a grand friend of many hams in this area. She recently returned from a stay in the hospital and is back on the air, chipper as ever. The SM remembers taking code practice in 1951 at the old Wash. Radio Club from Liz and others. The Frederick Radio Club had a hamfest in June; the SM apologizes for failing to make an appearance. KJ3E has gone totally bananas with packet and has a portable station in his briefcase. W3LDD is a point champ. WITH THE NETS: NET/MGR QND/QTC/QNI: MSN/KC3Y 30/48/289, PON/WB3BFK 20/13/154 MDD/W3FA 60/175/487 (TOP BRASS W3FA 97, W3QQ 83, K3GHH 80, K3NNI 62, NC3V 60), MEPN/K2EB 31/130/765, HOCARES/WA1QAA 2/0/21.PSHR: W3FA 95, N3EGF 75, KC3Y 72, KJ3E 69, W3YVQ 68,K3GHH 63, NC3V 62. Traffic:K3GHH 139, W3FA 130, KJ3E 112, NC3V 110, W3LDD 80, NB3P 78, K3NNI 66, N3EGF 59, WD4MNP 52, KC3Y 50, K2EB 43, WA3YLO 39, W3FZV 34, W3DQI 24, W3YVQ 20, WB3BFK 18, W3ZNW 9, WA3GYW 4, WA1QAA 2.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—ASM: N2CER. SEC: K2OIJ. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO: VACANT. SGL: VACANT. BM: WB2UVB. OOC: WA2HEB. ATC's: K2JF, KA2RJA and WB2MNF. VE testing this month: Thursday, Sep. 15 in Bellmawr. See June, 1988 QST SNJ column for further info. I recently spoke to Senator Richard Zimmer's office recently about re-introducing the bill to exepmt amateurs from having radios in their vehicles CAPABLE receiving police frequencies. The Senator will NOT re-introduce the bill until we can get assurances from the NJ Assn. of Police Chiefs that they will not lobby against it, as they have always done in the past. I've tried to talk to people at the Chiefs Assn., but to no avail. What the Senator's office suggests is that we contact our local police chief and explain our problem. This looks to be our only alternative right now. Please. Get an appointment with your local Police Chief and explain our position. I have some reference material that is yours for the asking. Also, please spread the word on your nets, club meetings, etc. Not to sound redundant, but these new radios, which have receive capability of 138-174 MHz bands make us ILLEGAL every time we put one of these radios in our vehicles. Until next month, 73. Traffic: WB2ZJF 255.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—HAMFESTS: Niagara Falls 9/10, Elmira 9/24, Syracuse 10/15. PSHR: N2ABA N2EIA N2EVG WA2FJJ W2FR NN2H KC2JW W2MTA WB2OWO KA2QOO WB2RBA ND2S NJ3V K2YAI KA2ZNZ. Field Day messages received: AF2A K2ECQ W2FR NT2F K2GUW K2IQ K2JD WA2L W2LZ K2MP KA2OQB W2PE WG2R W2RCX W2SAM K2SA W2SB NW2X W2ZJ WA2ZXS. Club officers: Boonville KA2GWY WD2ADX KA2SJG KA2FOR; Champlain Valley WA2JPM KA2KUI KA2MLQ KA2MOO; Gram KC2QQ N2FPW WA2HED KA2OVA; Squaw Island K2TDZ WA2ENW N2AFZ K2BWK. Club Annual Reports: Fulton and Rome—there are still eight clubs that have not filed since 1986 (Binghamton, Carlton, Webster, Champlain Valley, Drumlins, Fort Herkimer, Ostego, Rochester DX, Syracuse University) C'mon, keep your affiliation up to date, keep getting club mailings! Appointments: (EC) KA2OTS KA2QBQ KI2Y, (OES) WF2S, (OO) KA2CHX.

Net Name	Mgr	Time/Day	Freq/Mode	QNI/QSP/QND
NYSEMO	N2AGO	0900 Sn	3993.5 SSB	078-008-04
NYSR	W2MTA	0930 Sn	3530 CW	010-003-03
WDN/M*	WB2OWO	1100 Dy	04/64 FM	403-145-30
NYS/M*	N2EIA	1000 Dy	3677 CW	298-201-30
NYPON*	KA2UBD	1700 Dy	3913 SSB	525-299-30
ESS	W2WSS	1800 Dy	3590 CW	297-052-30
NYSPTEN	KA2Q	1800 Dy	3925 SSB	493-059-30
LCARES	WA2OEP	1800 Dy	7.015 FM	032-000-04
OCTEN/E*	WB2HLY	1830 DY	32/94 FM	621-081-30
Q Net	N2AGK	1830 Dy	31/91 FM	30
STAR*	NE3B	1830 Dy	13/73 FM	202-030-30
WDN/E*	WB2OWO	1830 Dy	57/17 FM	466-154-30
NYS/E*	KU2N	1900 Dy	3577 CW	30
BLUELINE	WA2SEF	2000 Dy	93/33 FM	064-005-08
TIGARDS	W2SEF	2000 Sn	16/76 FM	044-004-04
VHF THIN	WB2OWO	2100 TU	04/64 FM	052-001-05
BRVSN	WB2OFU	2100 Dy	6.655 FM	315-002-30
CNYTN	WA2PUU	2115 Dy	90/30 FM	257-089-30
OCTEN/L*	WB2HLY	2130 Dy	28/88 FM	218-057-30
WDN/L*	WB2OWO	2130 Dy	04/64 FM	484-128-30
NYS/L*	KU2N	2200 Dy	3577 CW	30

*NTS Net. Oneonta Roundtable Net 28.375 kHz Th 2100, 030-000-05. Field Day had an added challenge in the Southern Tier—NWS had SKYWARN activation with combination of severe weather and tornado watches. Several counties including Steuben-Chemung-Tioga-Chenango-Cortland-Broome saw collected Field Day Groups disperse to man EOC and SKYWARN patrol watch positions. Fortunately storm front split in two with only mild lightning and rainstorms. The "on-the-rivers" shows in downtown Binghamton were concluded just before the storm hit. Interest in Statewide VOAD (Volunteer Organizations Assisting In Disasters) was expressed at conference hosted by American Red Cross in Albany. This meeting, attended by SEC NN2H and SM W2MTA, was strongly supported by New York SEMO. Traffic (June): NJ3V 477, W2MTA 370, WB2OWO 308, WA2FJJ 303,N2EIA 297, ND2S 228, KA2UBD 195, NN2H 158, N2ABA 138, WB2QIX 136, W2FR 128, KA2QOO 125. WB2IJH 118, WB2RBA 98, K2YAI 94, KA2DBD 90, KA2ZNZ 75, KC2JW 71, WB2OEV 62, WB2ACV 45, KC3BQ 30, K2QR 27, AF2K 20, N2EVG 16, K2BWK 6, KA2TWY 6, WA2OEP 2, K2VR 1. (May) KC3BQ 37.

WESTERN PENNSYLVANIA: SM, Otto L. Schuler, K3SMB—SEC: WA3UFN. STM: N3EMD. BM: KC3ET. TC: N3EFN. OOC: KX3V. ACC: AK3J. SGL: KA3OEM. PIO and ASM: N3DOK.

Net	QNI	QTC	Ses	kHz	T/D
WPACW	244	130	30	3585	7:00 P/D
WPAPTN	78	338	30	3983	6:00 P/D
KFN	145	67	22	3983	1:00 P/D
PFN	191	174	30	3958	5:00 P/D
WPA2MTN	263	57	30	146.28/88	8:00 P/D
NWPA2MTN	596	44	29	44.53/4	9:00 P/D

I am sorry to announce a Silent Key. He was Red Rask, W3ATS, and was an old, old timer having been licensed long before World War 2. He was a member of Steel City ARS. His friends will miss him, and we extend our condolences to his family. Field Day appeared to be a success in the WPA section. I received reports from the following clubs: Fort Armstrong Wireless Assn, Carnegie Mellon RC, Fort Venango Mike and Key RC, Huntington County ARC, Two Rivers ARC, North Hills ARC and The Triple ARA. If other clubs sent messages they go lot in the routing. If your club wasn't listed, please give a call. I would like to have my reports sent on the regular traffic nets until my packet is in operation and I can get rid of the intermod in my area. WE have so much junk on the air that my location is known as intermod hill. I would like to congratulate all for a job well done. Our traffic nets are losing stations and any suggestions to improve participation would be welcomed. Traffic for June: KQ3T 372, N3EMD 160, W3OKN 149, N3FM 112, N3AES 111, WA3UNX 88, N3NGO 74, WD8PUH 74, KC3GO 74, KC3ET 60, K3SMB 60, KC3YE 49, NO3M 35, WA3DBW 33, KA3OEM 33, W3RUL 30, KA3GXP 27, KD3AC 27, KC3JQ 12, N3COR 7, K3LTV 6. We need more stations on the traffic nets epecailly in the rural areas. Please consider joining. WE NEED HELP.

CENTRAL DIVISION

ILLINOIS: SM, David E. Lattan, WD9EBQ. SEC: W9QBH. STM: K9CNP. OOC: W9TT. BM: K9EUI. SGL: K9IDQ. PIO: N9EWA. ACC: WB9SFT. TC: N9RF. ASM: AA9D.

Net	Freq	Times (Local Illinois)
ISN	3905	1800 DAILY
ILN	3690	1830 +2200 DAILY
ITN	3705	1900 DAILY
CTN	147.69/09	2100 DAILY
ILARES	3905	1630 1ST AND 3RD Sun
IEN	3940	0900 SUNDAYS
ILPN	3855	1645 M-F,0830 Sun
NCPN	3915	0700 M-SAT
NCPN	7270	1215 M-SAT

Ex WA9ZRV dropped me a note indicating that he would like to hear from any of the Chicago gang he used to work in the late 60s. Kirt is now VK2DOJ and holds KE9JI for trips to the US. Contact VK2DOJ at: Kirt Fanning, 15 Carlotta St., Greenwich, N.S.W. 2065 Australia. Six years and 72 Section Activities columns ago... Well, it hardly seems like it has been that long. I first ran for SCM (later to become SM) in 1982 after some prodding from Illinois hams who held views similar to mine regarding the importance of service to the public through the structure of the ARRL Field Organization as an integral part of Amateur Radio's ongoing effort to continue to justify the spectrum it commands. I had some pretty high ideals at that time, some have become reality, some have not. A wise ham and close friend pointed out to me early in my Field Organization career that progress cannot be measured from a time standpoint too close to the effort. Looking back, we have come a long way. Looking forward, we have a long way to go. The progress which has been made is not due to the efforts of any one person, but to the team effort of the faithful members of the Illinois ARRL field organization. I am looking forward to going back to serving IL ARRL as a station appointee after a stint as SM without having been burned out on ham radio or the ARRL in the process. I am deeply in debt of all appointees, the Section Cabinet members, and especially W9QBH who has been a guiding light and cornerstone of the Cabinet during my tenure. Our new SM, AA9D, is of much greater experience and broader background than I. Dave was one of my Elmers, getting me interested in radio and giving me my Novice test while we were both in college. Dave is a dedicated amateur and deserves your fullest cooperation. As I suspect most of the readers of this column are involved in the field organization in some way, writing it is a bit like sermonizing for the choir. I would ask each of you to work toward bringing one individual who is not active in the field organization "into the fold" in the next year. There is much work to be done, and we need more folks to help with the load. 73 and may God richly bless each of you and your families! Traffic: W9HLX 135, WA9VLC 131, KE9KS 105, K9CNP 99, W9LWH 66, W9HOT 43, WB9TVD 41, K9UEI 40, NC9T 39, W9KR 37, WD9HQW 34, WD9CIR 30, KA9CTW/T 21, K9WMP 12, W9LNQ 11, W9RTD 9, W9VEY/M, WA9RUM 8.

INDIANA: SM, Bruce Woodward, W9UMH—SEC: WD9AVQ. STM: NX9I. ACC: K9ZBM. TC: WA9JWL. SGL: WA9VQO. BM: W9OCL. PIO: KA9WXT. Net Mangers: ITN KA9EIV. QIN KJ9J, ICN KD9ER, VHF W9PMT. IWN KA9ERC. June Net Reports:

Net	Freq.	Time Daily UTC	QNI	QTC	QTR	Ses.
ITN	3910	1330/2130/2300	2545	315	1943	82
QIN	3656	1430/0000/0300	505	237	1698	87
ICN	3705	2315	68	22	379	20
IWN	3910	1310	1748		344	30
IWN VHF	Bloomington		720		150	30
IWN VHF	Kokomo		978		175	30
IWN VHF	Ligonier		677		210	30
Hoosier VHF Nets(8)			2329	161	2999	100

Silent Keys: WB9THF Richmond, K9LXD Brazil, and K9YQA Mishawka. Appointments: BM Robert C. Bud Webb W9OCL. STM Benton Mullins NX9I. TC Frank Dick WA9JWL. ATC Bert Boon KD9MI. OBS Noel Taylor N9CJT, Tom Bowen KA9ERC, Edwin Bills WB9TFD, Steve Gerke KA9MRI, John Wallace WA9OHX, Margk Logsdon K9ML, Dan Miller N9DOP, Blanch Elpers KA9EIV. PIO and PIA Dick Elliott KA9WXT. ITN Net Manager KA9EIV. EC Hendricks Co. KD9ZM, EC Noble Co. W9BT. ORS W9BTZ, KD9ZN, and KB9SU encourage all Novices to participate in the Indiana Code Net on 3705 at 2315 UTC. Our thanks to KD9ER and NR9K and all others that are helping with this net. I have started generating Indiana ARRL

(continued on page 102)

Bulletins via Packet as of May 27th. I read them on Sunday morning on 3910 after the Wet Net and before the ITN at app. 13:20 UTC. If you need to know about VE Testing or Hamfest dates, you may check with me. If you have information you wish to have published, please send it to me. If you are a club newsletter editor or read bulletins on your local two-meter net but do not have access to Packet, let me know and we will arrange something. If you are a Packet station and would like to become an OBS, let me know. I am sure many clubs are now gearing up for fall Novice classes. Please let me know the particulars, and we will spread the word. EC report for June: WB9NCE, N9FMO, KA9MNR, WB9LRR, and N9DTG. OO reports: N9CJT, KA9FFO, KA9DZM, KN9GHT, KA9QYK, KA9PCT, and WA9VQO. Traffic handling for the month of June 1988. (YES traffic information is being submitted by the STM.) Traffic: KD9QB 1903, W9ZRX 686, W9ZRX (May) 868, W9JUJ 535, NJ9S 189, KA9LQM 178, KJ9J 159, KA9FFO 137, W9UMH 132, N9BS 79, W9UEM 75, WB9PFZ 66, WA9QCF 53. N9CJT 52, W9WWJ 51, WB9IHR 51, KA9RNY 46, KD9ER 42. KB9HH 38, W9ZGC 37, KA9EIV 27. KA9QMI 23, WB9SYK 13, WD9DWD 12. K9KTB 11, W9PMT 10, K9ET 7, W9BTZ 7. WA9OHX 6, N9FMO 6, AB9A 6, WD9CIV 5, W9RTH 5, KD9CC 5, K9OUP 4, W9KMY 3, W9FC 2, K9DKB 2, WA9JNC 2, W9OZZ 1.

WISCONSIN: SM, Richard R. Regent, K9GDF—The Wisconsin Nets Association will hold its Annual Picnic on September 10th at North Wood County Park. The picnic festivities are at noon and meeting at 1:00 PM with door prizes, refreshments, and awards later. Bring a friend or your entire family. You don't have to be a traffic handler or WNA member; everyone is welcome at the WNA Picnic. September 10th at 9 AM, Fox Cities ARC exams at Roosevelt Junior High School, Appleton, more information from KD9IA. September 11th, Tri-County ARC Fall Fest at Blackhawk Technical Institute between Beloit and Janesville on Highway 51. September 17th at 1 PM, Milwaukee Area exams by Badger Examiners, 5353 North Green Bay Avenue, registration with KB9G. September 24th exams at Wisconsin Rapids, contact K9UTQ. Get a copy of the new ARRL Technical Coordinator Manual, a nine-chapter book written and illustrated by yours truly, includes an index of QST technical articles, available from ARRL for only five dollars. You can get it free by volunteering as an Assistant Technical Coordinator or if you now are an ATC. New Assistant Technical Coordinators are WB9ULA, AD9W, and WB9RUK. Let me know if you wish to volunteer for the ARRL State Government Liaison appointment for Wisconsin. Sorry to report Silent Keys: traffic handler KD9XE (ex N9DHT), and EAA Fly-in ham W9KKK. Thanks to K9ZZ, our Public Information Officer, for his excellent volunteer work writing and editing the Badger State Smoke Signals. If you would like a copy of BSSS, write to K9ZZ, 412-1/2 Ash Street, Barabook, WI 53913. WB9WKO assigns his science class students to prepare radiogram messages for sending to learn about Amateur Radio, with 115 sent this year. Everyone in the class gets ARRL Archie Comic books to study as homework. Traffic: WB9YPY 1886, KC9CJ 746, KA9VII 522, W9CBE 181, K9GDF 175, W9YCV 151, N9BDL 105, WA9WYS 101, KA9RII 96, W9KLN 93, W9DND 91, W9CXY 90, AG9G 83, W9CXY 70, K9AKG 74, W9EIM 69, W9UCL 69, KA9KLZ 67, W9NGP 52, NS9Q 52, W9ODV 50, K9BED 31, K9EP 30, NB9H 22, W9UW 20, KA9WWT 17, WD9DNQ 10, N9BYS 6. (May) KC9CJ 873, W9DND 82, WB9ICH 36, W9UW 14, K9LGU, N9BYS 3, W9PVD 2.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—No question that it's a long, hot and dry dry summer. And yet, there have been enough storm systems around to cause plenty of QRN. And, the low bands haven't been all that great as a result. Of course, the DXers are having a great time and those who are into sporadic E. But for traffic, it can be a struggle. Nonetheless, June was a good month for Minnesota traffic with a total reported traffic handled as 2965. Nice going, gang—keep it up! And, our quotable Mel, NØFOO, of Brainerd says that when he gets hot he goes out into his lake, digs a few holes in the water, piles it up and then gets into it. The only way to go...What next Mel? Our Amateur of the Month—we are pleased to announce that Sherlee Gregg, WDØBZU of Marshall as the Amateur of the Month for June. Sherlee has done a super job as EC for Lyon and Lincoln Counties as well as the Sioux District. In addition, Sherlee writes and publishes the WØBMJ Newsletter each month. Congratulations, Sherlee, and keep up the good work. CU next time, GL es 73, Jim Swisher, KAØEPY, STM.

MN EMERGENCY FREQ 3860 kHz BULLETINS 3860

NET	TIME	QNI/QTC/Ses.	NET MGR.
MSN/1	6:30 PM	298/88/30	WØUCE
MSN/2	10:00 PM	290/63/30	KDØNH
MSSN	6:00 PM	232/35/30	KAØSBY
MSPN/N	12:05 PM	344/191/30	WBØWNJ
MSPN/E	5:30 PM	653/263/30	KCØT
MNWXNT	6:00 PM	Resumes Sept.	KØOGI
PAW	No report		WDØBAC

Traffic: WBØWNJ 958, KT9I 746, WAØTFC 349, KAØEPY 310, NØFOO 115, WØGRW 95, WDØGUF 59, KCØT 52, KAØSBY 51, KØQBE 50, KAØARP 39, KAØPDM 38, NØJP 28, NØBPE 24, KØHJC 24, KØKYG 14, KØOGI 7, NØHWD 6. Total Traffic: 2965.

NORTH DAKOTA: SM, Bill Kurtti, WCØM—From KAØQWI in Napoleon, we received the report that it is so dry that a gopher found a blade of grass and 2 cows were chasing it (tnx Chiff.) The Boy Scout Camperall at Camp Grafton went off well with WFØV planning the amateur station with the assistance of KAØSLI and others (more on this in another section of QST). Regret to report that WØAYJ is now a Silent Key. Roger has been an inspiration to all hams in our division. Special thanks to Marlene, his XYL, for her help so he could continue to operate as long as possible. Congratulations to upgrades Tech KBØCCW, KBØBHZ &KAØNEM. General NØHUU & KAØZII. When the telephone lines in the Cooperstown phone line went out, NØDIR and WAØQBN provided emergency phone patch communications between doctors in Cooperstown and St. Lukes hospital in Fargo.

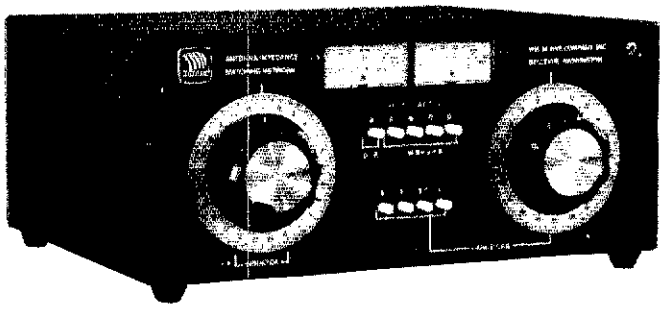
Traffic:

Net	Freq.	Time	Sess/QNI/CTC	Mgr.
Goose River	1.990 kHz		4/84/0	WØCDO
Data	3.885 kHz	6:30 DA	24/1510/18	KAØFSM
WX Nets	To Resume Next Fall			WØGFE
Storm Net	Whenever Needed			WCØM

(continued on page 105)

NYE Takes the fear out of full power antenna tuners, and the guesswork out of PEP measurement with these two MUST SEE PRODUCTS!!

MB-V-A



Discover this durably built, feature packed MB-V-A Antenna tuner. You'll find operating conveniences that make antenna tuning a snap and value engineered to do the job over wide operating ranges. Compare quality, features and the NYE VIKING TWO YEAR WARRANTY.

RFM-003

Get correct easy to read measurements of PEP for SSB, AM, and Pulse along with full time completely automatic SWR display with this unique Power Monitor System. Two models to choose from: The RFM-003 for 3KW indication and The RFM-005 for 5KW.

CHECK THE FEATURES:

- **Pi Network.** Low Pass Pi Network tuning 1.8-30 MHz. Heavy duty silver plated continuously variable inductor with 25:1 vernier dial 7000 volt variable capacitor and 10,000v switch selected fixed capacitors on output side. Tunes 40-2000 ohms loads. Good Harmonic suppression!
- **Automatic SWR.** Hands free metering of SWR No reset or calibration needed. Separate power meter—300 or 3000 w f.s. automatically switched. Easy to read 2.5" recessed and back-lighted taut band meters.
- **Antenna Switch.** PUSH-BUTTON antenna switching to (4) antennas (2 coax, single wire and twin lead). Coax bypassed on first coax output. We designed this switch to take the power. Rated at 10KV and 20 amps.
- **3 KW Balun.** Trifler wound triple core torroid gives balanced output to twin feeder from 200 to 1000 ohms and unbalanced output down to 20 ohms.
- **Maximum Power Transfer.** Match your transmitter output impedence to almost any antenna system for maximum power transfer. Amplifiers only run at their designed Q when properly matched.
- **Model Options.** MB-IV-A1 includes all MB-V-A features less antenna switch and balun. MB-IV-A2 is identical to MB-IV-A1 with the addition of a triple core balun.
  - **1.8 MHz** will not tune on some antennas.
- **[3] Modes** — Peak Average and Peak and Hold with a unique non-drift Sample & Hold Analog memory circuit.
- **[2] Ranges** — Automatically switched power scales to 5 KW.
- **Fully Automatic SWR** — Full time meter displays ratios directly without drift.
- **Built-in ALC** — Protect your amplifier tube investment with this fast acting lockout.
- **Remote Couplers** — Six feet remotes the interchangeable calibrated couplers.
- **True RMS Conversion** — H.F. couplers use forward biased full wave detection.
- **Rugged Construction** — Heavy gauge aluminum construction. Top quality glass epoxy PCB. This meter is built to last.
- **Accuracy** — Guaranteed to ± 5% F.S.
- **Warranty** — TWO FULL YEARS.
- **Added Features** — Switchable reverse power all mode metering — Full status LED Display — Adjustable ALC is switchable SWR/REFL power — Heavy duty Nicad batteries charged by the applied RF for the field and a charger is supplied for fast charging and backlighting of the taut band meters for the ham shack.

OTHER NYE VIKING PRODUCTS

Phone Patches — Electronic and Memory Keyers — Squeeze Keys — Straight Keys — Code Practice Sets — SWR Wattmeter for the blind — Low Pass Filters — All Band Antennas and more . . .
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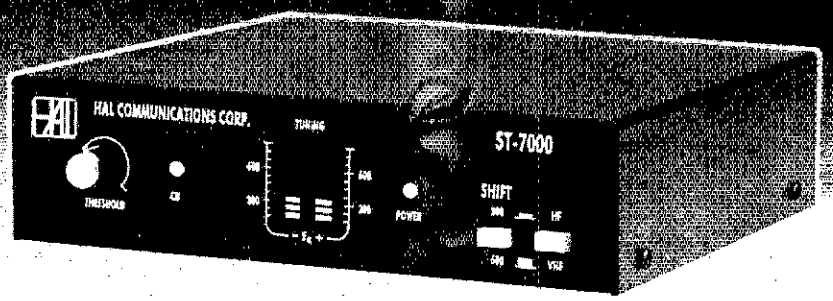

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The ST-7000 has three different packet controller (TNC) interfaces: RS-232C, TTL, *and* TNC audio. The audio interface connects to *any* TNC VHF radio connector and converts the VHF tones to HAL HF standards. TNC audio is switched to a separate VHF radio connector when the ST-7000 is turned OFF.

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SOUTH DAKOTA: SM, R.L. Cory, WØYMB—Asst SM: NØABE, WAØFPR. SEC: KAØKPY. STM: KDØYL. The Black Hills Amateur Radio Club Hamfest is now history. They put on an excellent convention, and we had a great time. I received Field Day messages from Clubs at Watertown, Aberdeen, Redfield, Yankton, Hot Springs and Mobridge. Statewide, we had good representation on Field Day. Hub City ARC at Aberdeen now has a very good news letter. Our congratulations to its editors Vivian, KEØPI and Joan, KAØFIF. On Field Day, a packet link was attempted between Aberdeen and Mobridge with a Digi at Bowdle, but a link did not go between Bowdle and Aberdeen. Send notice of all packet activity to NØABE at Sioux Falls so he can update the state map. It will be available for a sase. KCØLI is installing a digi at Glad Valley and hopes to link with Rapid and Bismarck. Total traffic reported for the month of June was 1128. Traffic: NØDPF 784, KØERM 205, KAØKPY 50, KAØAIE 35, WBØOMF 26, WØYMB 15, KDØYL 13.

DELTA DIVISION

ARKANSAS: SM, Dale Temple, W5RXU—ASM: K5UR. SEC: N5BPU. STM: W9OK. ACC: NI5D. SGL: W5LCI. TC: W5FD. OOC: NR5Q. BM: W5LL. PIO: K5TML. Rpt Coord. WB5FDP. Packet Coord. WD5B. The Dog Days of Summer are upon us and activity seems down. Traffic: Don, W9OK 90; Jabe, KF5YV 234. Arkansas represented 75% of time on DRN5 by W5QFU, KF5YV, WA5WVF, KA5WXU. Arkansas represented 100% on CAND by KF5YV. You can see Jabe, KF5YV, Joe, W5QFU, George WA5WVF & KA5WXU are carrying the CW traffic load. More CW operators are needed on the traffic nets. Ark. CW Net Manager W5MYZ, Mockingbird Net Mgr. W5QFU, Ark Razorback Net Mgr. W5QFU. Attendance on these nets is welcomed by these dedicated traffic handlers.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. SEC: N5ADF. ACC: K5DPG. SGL: KD5SL. TC: W5RWF. OOC: KE5QK. Packet: NE5S. Well done to the New Orleans Hamfest in their new location at the Bonnabel High School in Kenner. They enjoyed a surplus of space with both new dealers and swap tables in one very large air-conditioned area. Joel Harrison, Sr. WB5IGF. ARRL Delta Division Director, and Rick Roderick, K5UR, ARRL DX Advisory Committee member were on hand for membership surveys, "eyeball QSOs" as well as conducting forums. There was a standing room only full house at the Louisiana Council of Amateur Radio Clubs meeting considering the recommendations of the recently-appointed Repeater Coordination Committee. The policies and procedures recommended by the committee were approved and the present committee members were continued as a permanent committee. Repeater owners previously coordinated and applicants for coordination can obtain a copy of the LCARC Frequency Coordinating Policies and Procedures by a request to LCARC, P. O. Box 182, Rosedale, LA 70772. From all indications, there was a large number of Field Day Stations operating throughout the state. I received several Field Day messages addressed to the Section Manager and hope you added in the 100 bonus points. 73 & GL de "Wondy," K5KR.

MISSISSIPPI: SM, Jim Davis, KK5Z—ASM: W5TRD. SEC: KA4PKA. SGL: KA5WRX. PIO: WN5M. STM: KB5W. BM: W5EPW. TC: KF5DE. OOC: KK5K. ACC: NC5Y. VHF/UHF Coord: N5DWU. Packet Mgr, WA5DVV. Pse write your U.S. Senators and Reps regarding House Concurrent Resolution 317 and Senate Concurrent Res 127. The enactment of these resolutions into law could sure solve a lot of problems that we've been facing. GCSBN: SESS 30, QNI 732, QTC 12. MSBN: SESS 30, QNI 1907, QTC 58. MTN SESS 30, QNI 157, QTC 78. MAG SEC NET: SESS 30, QNI 350, QTC 9. DRN5 W/60 SESS, QTC 721; MISS REPRESENTED 100% BY N5AMK, KT5Z, W5HKW, KB5W, N5HGN and WB7CQQ. Propo f'casts 4; ARRL nr bulletins 16 and CRRL Bulletins 2 (Tnx to W5EPW, Miss BM.) Traffic: N5AMK: R-109, S-142, D-1, TOTAL 252. KK5Z R-18, OR-5, S-5, TOTAL 19. W5JDF: OR-5, S-9, R-4, D-1, TOTAL 19. KT5Z: S-60, R-49, TOTAL 109. W5DEJ: 0-9, S-9, R-6, D-2, TOTAL 26. KB5W: OR-6, S-172, R- 131, D-7, TOTAL 316. Packet radio really growing fast: WA5DVV BBS, QTC 290. N5DWU QTC 25, KF5IZ BBS, QTC 30. WB5SXK BBS, QTC 32. W5VZF BBS. QTC 2. Welcome to new packeteers, N5DHF and WB5VCI. Have a great summer in southern two thirds of Mississippi. New packeteers urgently needed in North Mississippi (Tnx to WA5DVV, PKT Manater, and KB5W, STM Miss.)

TENNESSEE: SM, Harry Simpson, W4MI—Eastern Assistant SM and PIO: W4TYU, Central Assistant SM: WA4GLS. Western Assistant SM and ACC: K4CXY. STM: NG4J. SEC: K4UVH. OOC: K4LSP. SGL: N4PQY. TC: W4HHK. The TN Phone is on 3980 kHz with early sessions at 6:40 AM Eastern, Regular sessions at 7:45 AM Eastern Monday thru Friday, at 9 AM Eastern on Saturdays, Sundays and Holidays. Evening sessions are Monday thru Saturday at 7:30 PM Eastern. CW Net Sessions are on 3635 kHz at 8 PM Eastern, Monday thru Friday. There are many othe nets for your convenience, just ask anyone on 3980 or 3635. Field Day seemed to be great all over the state. Messages were received from the Germantown Club, the Springbrook Club and WA4ZZU, Smoky Mountain ARC and NG4J, Kingsport ARC and N4OPX, the Tri-County ARC and NA4T. As this is being written, many TN hams are leaving for the great Atlanta Hamfest, others are making plans for the growing Huntsville affair at Von Braun Civic Center (you see more TN hams than those from AL), and others are making their plans for Lebanon, Gray and Chattanooga. Hearty congratulations to KB4GFK and Mid-South ARA for upgrading the Memphis Area Hamfest to the Convention Center, with underground parking, etc. It will prosper in that location. I will attend Huntsville, W4TYU and I will be at Memphis, Gray and Chattanooga. WA4GLS will attend Lebanon, K4CXY will attend Huntsville and Memphis. If you have a problem, we will help you solve them at any one of these fine Hamfests. New subject: Several years ago, W4KGH and others, including this writer, formed Mid-South Volunteers, Inc., a VEC group. We were one of the first to go into business, and operated regularly until ARRL was available, at which time we changed over to ARRL. I have been Liaison for the group since that time, and on this our third anniversary, I must say a word about these fine people who give up their Saturdays every six weeks and who have been responsible for many hundreds of new hams and upgrades. WD4LFD is contact, others who never miss are K4CXY, K4HPP, K4PPN, K4WOP, W4OVN and WD4HZQ. Traffic: WA4FMR 129, W4DDK 81, W4MI 42, K4WOP 39, W4TYV 36,

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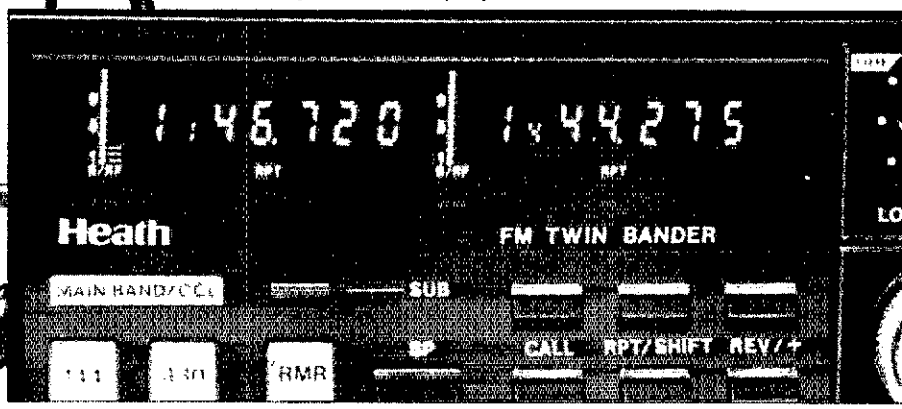

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GREAT LAKES DIVISION

KENTUCKY: SM, John Themes, WM4T—Asst. SM: KC4WN. SEC: WB4NHO. STM: KA4MTX. PIO: WA4SWF. (June) Many amateurs worked long and hard during the train derailment in Crofton. The following calls participated: NU4O KI4QO N4OID WA4LSD WA4EGQ KA4WEA W4RNI WA4TTC KA4I KE4YS WA4KPE WA4RDS AA4PL WA4VND K4IQR KM4C WA4VAN WB4ANL WB4NHO KA4YBL KA4BCM WA4MXD N4EKG AA4RL W4TOY WD4IMK KA4FWI WD4IYI N4RLU N4RYV W4OYI N4PEN KA4NIP AA4VL and KK4XE. Thanks to all who took part. This is what all those drills are all about! N4NMA is a new OO. Field Day messages were received from K4CO, W4CN, KZ4G, W4NJA, AA4OR, K4VHF, AA4SB, N4NCN, WA4IGS, KE4KE, KD4SS K4HY and KI4B. Tom Lyking, WD4RWU, is the acting manager for KTN until a replcement can be found. We need new blood and more NCS for all nets. Give it a try and help build up the various nets. Two forums have been set for Louisville Hamfest on Saturday September 10. One will be on repeater coordination and packet. The other will be on emergency coordination and packet. The forums start at 3:00 PM. SAR (June): KI4QH 375, K4VHF 143, WD4RWU 96, N4GNL 79, WA4EBN 56, K4AVX 31, KB4UJA 24, KA4MTX 22, WA4NOG 11, KU4A 10, N4PEK 10, WB4AUN 6, WD4CQF 4, K4HOE 3. PSHR: N4GNL 102, KI4QH 80, KA4MTX 71, K4AVX 65.

MICHIGAN: SM, George E. Race, WB8BGY (@ N8FTY). ASM: WA1LRL (@ WA1LRL). STM: WD8KQC (@ NT8R). SEC: N8AYQ. SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. BM: KE8JG. Silent Keys, with deep regret: W8QBE, W8DT, W8ECK, WB8ITX. New EC appointments from our SEC. WD8DJA-Marquette, KA8QVH-Grand Traverse, N8CGY-Ogemaw. At the very last moment, I am pleased to announce that the MI ARRL Convention will be held in Saginaw on Aug 28. Pre-Convention activities will take place at the Florentine Inn the evening of the 27th. Net meetings, an ARRL Forum and FCC Forum are schedueld for Sunday. Hats off to the 5-County group for all of the convention arrangements. Your League Leadership will be there, and we look forward to seeing all of you. Happy 10th anniversary to the Michigan QRP Club. Organized in January 1978, the group has grown to include members from all parts of the country and Canada. Their weekly net meets on 3.535 MHz each Tuesday evening at 9:00 PM EST, output power 5 watts or less. Non members are crdially invited to QNI. They publish a very FB quarterly mag, The Five Watter, full of QRP information and projects. For more information, write to the Membership Chairperson, Michigan QRP Club, 5346 W. Frances Rd, Clio, Michigan 48420. If you have a regularly scheduled VHF or low-band net, it is time to send in form FSD-85 for listing in the 1989 ARRL Net Directory. Much of the information in the 1988 issue is out of date or incorrect in some area. Any listing dated prior to 1987 will be purged from the 1989 issue. Two ARPSC Workshops are scheduled. Sept. 10th in the Grayling area, and Sept. 24th at the American Red Cross in Lansing. These are full-day workshops, and will provide training and planning for the 1988 SET on Oct. 15th. For more details, contact your County EC. MI Net Mangers, or check in to the Sunday ARPSC Net at 5:00 PM, 3.932 MHz. Skip, WD8KQC, our STM, has scheduled on-the-air traffic training for Sept. 18th and 25th, and Oct. 2nd and 9th, on the ARPSC Net. Take the opportunity to record these sessions and use them for training on your local VHF Nets. Your Section Leadership has started a quarterly joint mailing to all League Appointees in MI. If I receive your club newsletter, you will also be on the mailing list. These mailings will keep you up to date on the League programs being orchestrated by your MI League Officials. Please support the following MI area Nets:

Net	Freq	Time/Day	QNI	QSP	Ses	Mgr
UPN*	3921	5:00 PM Dy	987	77	34	WA8DHB
MACS*	3953	11:00 AM M-Sa	310	59	29	K8OCP
MITN	3953	7:00 PM Dy	586	210	30	WD8EIB
QMN*	3663	6:00 PM Dy	524	133	59	WB8R
SEMTN	145.33	10:15 PM Dy	348	73	27	N8HSC
GLETN	3932	9:00 PM Dy	1015	61	30	KA9EIZ
WSSBN	3935	7:00 PM Dy	573	30	30	W8NDI
VHF Net Totals for May			695	8	45	NO8Q

*QMN Fast-6:30 PM Dy; QMN Late 10:00 PM Dy.; MACS-1PM Sun.; UPN-12PM Sun. June traffic as follows: KA8CPS 383, N8HHH 186, WD8KQC 142, K8GXV 118, NW8M 63, W7LVB 60, WA8DHB 56, WB8R 50, WB8SYA 45, WB8BGY 41, K8ZJU 37, N8FPN 37, W8YIQ 36, W8IHX 34, NY8W 32, K8UPE 32, KA8PWM 26, K8OCP 26, W8RNQ 25, KI8Q 23, N8CNY 18, WB8WJV 14, W8URM 13, W8BEZ 12, KA8LAR 11, KD8LZ 10, W8YZ 7, W8CUP-7, WA8MVH-7, N8EXS-7 WD8MJB 4, N8FIZ 1, N8GGO 1.

OHIO: SM, Jeffrey A. Maass, K8ND (@W8CQK)-Asst. SM: David Kersten, N8AUH (@KB8CI) Phone: (216) 221-6740. SEC: WD8MPV (@ KB8CI). STM: KF8J (@N8ET). BM: W8ZM (@N8NN). ACC:KJ3O (@ KB8CI). TC: KB8MU. OOC: WB8ZCE. SGL: N8CVK.

Net	QNI	QTC	Ses	Time(local)	Freq	Mgr
BN(E)	249	100	30	1845	3.577	WD8C
BN(L)	195	110	30	2200	3.577	K8TVG
BNR	178	65	30	1800	3.605	W8EK
BSSN	171	51	28	1900	3.873	KD8FW
ONN	153	26	26	1825	3.708	WD8KBW
OSN				1810	3.577	N8AEH
OSSBN	1801	937	90	1030,1615,1830	3.9725	KA8CGF
OSSN	179	71	30	0645 M-F	3.577	KA8GJV
				0800 S-SN	3.577	KA8GJV
Ohio Section ARES Net				1700 Sun	3.875	WD8MPV

Hamfests in September: Findlay 9/11; 20/9 ARC 9/18; Cincinnati 9/18; Champaign-Logan 9/24; Cleveland Hamfest 9/25. Contact Affiliated Club Coordinator KJ3O to list your hamfest on our schedule. Amateur Radio Examinations: Dayton 9/10; Columbus 9/10; Ravenna 9/10; Maumee 9/10; Portsmouth 9/24; Barberton 9/24; Point Place 9/26; North Olmsted 10/8; Wickliffe 10/8; Maumee 10/8; Lima 10/9; Akron 10/29. Contact me or Assistant Section Manager N8AUH (phone number above) for details on any session listed above: we can provide names and phone numbers for VE session contact persons. Field Day 1988 has come and gone, with 100-degree temperatures the general rule for Ohio! Judging from the number of messages that I received via packet, this is the FD traffic-handling mode of choice! Our Field Day group, operating as W8LT, was planning to operate from the Fire Tower at Blue

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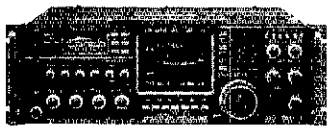

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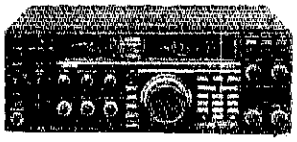

ICOM IC-761
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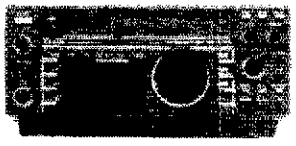

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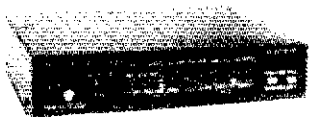

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Rock State Park, South of Zanesville, as has been our habit for many (more than 15) years. When we arrived at the site, with letters from officials ranging from the State Department of Natural Resources office to the local park and forest managers, we found another Amateur group already set up, armed with similar letters! The Zanesville ARC, out for its first FD in many years, though it would be a good site, too! Our group moved on to another spot in the Forest, not as nice but fitting into the image of FD as an exercise in the unexpected! I had the honor of attending a meeting of the Newark ARC and presenting a plaque to Otto Geyer, W8EA, recognizing his 50 years of continuous membership in the ARRL! Actually, Otto's membership is continuous back to 1934, the longest continuous span in memory at ARRL Headquarters. First licensed in 1924 as 8CBI, Otto was also W8LEA and W8MMY along the way. Otto had some tales to tell of the early days of our hobby, and I was glad to be able to recognize his commitment to OUR League! Is your club ignoring one of your greatest resources: the "Old Timers" who have years of history and personal experience to share? It seems like our meetings focus a great deal on new technology, and ignore some of the valuable lessons to be gained by reviewing where we've been! Invite some OT's to your meetings (offer transportation, too: many folks don't like to drive after dark!) and take advantage of our rich past! Section Emergency Coordinator (SEC) Larry Solak, WD8MPV, reports the following recent appointments: George Henzler, WB8HHZ, is the new District Emergency Coordinator (DEC) for District 1, which includes NW Ohio. George has done a great job as Emergency Coordinator for Lucas County for several years, and Tex Crider, N8FPH, has been named to succeed him in that position. Bob Cashdollar, NU8R, is the new EC for Licking County, Howard Guenther, KA8VVE, is the new EC for Ottawa County, and Charles Ake, WD8PRH, is the new EC for Butler County. Congratulations all! The stations listed below have practiced their traffic handling skills in preparation for disaster during June 1988: KD8KU 424, N8BO 363, K8TVG 291, W8PMJ 275, W8SKP 239, KA8CGF 213, K8JDI 197, KD8HB 172, WD8KFN 166, N8AUH 184, KF8J 153, WA8SBI 144, W8ZOL 139, W8QZK 131, N8IIP 118, N8FWA 113, WB8JGW 110, NF8X 104, K8ALV 102, N8GEC 96, KA8GJV 92, W8CXM 89, K8CMR 82, W8EK 80, KC8YV 78, KE8CV 74, N8CEI 72, WA8HED 69, K8DHD 69, K8IOW 68, KA8YIT 67, N8EFB 60, WD8IKC 56, W8JLW 52, N9AUG 47, WD8GXT 45, N8GOB 42, WB8KWC 42, KA8SOM 41, WA8EYQ 38, N8GPU 36, WD8JAW 30, KA8BNQ 30, WB8HHZ 28, KD8XL 28, WB8KWD 27, KA8RIX 25, WB8DPZ 22, WD8RIO 21, KA8TNT 21, N8FPH 20, NW8E 20, WB8VNV 20, KB8EIW 18, WD8DKQ 18, KB8ABO 16, KC8JV 15, N8HRW 14, KB8EDL 12, N8CW 12, K8DXZ 12, N8HSE 12, N8AJU 12, W8XT 11, N8HJB 11, KA8OQF 10, W8FPA 10, K8ES 10, KA8SON 10, KE8DQ 10, K8CKY 9, WB8WTR 8, N8CJS 8, N8GZX 8, W8ZM 7, WD8QXT 7, KA8VYT 7, KB8DIL 6, NF8B 6, NC8Q 5, N8RG 4, K8EF 4, K8VOY 4, WB8JYE 3, W8GDQ 3, W8BHL 3, K8BYR 3, KB8DYW 3, KA8UVU 2, N8GIO 2, WD8PWG 2, N8HBF 1, WD8CSP 1. (May) W8PMJ 287, KA8UYM 43, N8CDN 18, KD8IC 16, KB8ABQ 15, KA8BNQ 8, WD8DYQ 8, W8LDU 6, KA8TNT 5, WB8AWM 2.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—ASM & STM: K2ZM. SEC: WA2ZYM. BM: WB2IXR. PIO: KB2TM. TC & OO/RFI: KC2ZO. ATC: WA2VGM. SGL: KB2HQ. ACC: KV2A NWSLTR ED: WB2NHC.

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ESS	2200Z	3.590	W2WSS
NYS/E/L	2300/0200Z	3.677	KU2N
NYS/M	1400Z	3.677	N2EIA
NYPON	2100Z	3.913	KA2UBD
CDN	2230Z	146.34/94	WB2ZCM
HVN	2330Z	144.535/135	N2FTR
SDN	0130Z	147.66/06	K2ZVI

NET REPORTS FOR JUNE(QNI/QSP): AESN 53/1 CDN 558/47 ESS 297/52 HVN 253/33 NYPON 525/299 NYS/M 299/201 SDN 214/94. CLUB NEWS: Albany ARA, Rip Van Winkle ARS and Mt. Beacon ARC worked together on communications for the Multiple Sclerosis Bike-a-thon between Albany and Poughkeepsie June 11th and 12th. WA2YBM, WA2WQZ, WB2FMB, WD2AJS, WA2OAD, WE2G, WD2K, N2HRC, AA2Y, K2DPL, N2HDL and N2FRZ all participated. PEARL held elections in June: Pres.-KC2TF, V.P.-N2EGS, Secy-N2EPT, Treas- KD2JQ, Dirs-K2LBG, KA2BCD, WB2HOL, WB2EAG. Based on the report sent to STM K2ZM, the 1988 Empire State Regatta in the Capitol District Area was held with 1200 entries, 535 boats and 79 races and over 42 amateurs assisting with communications. Packet radio assisted. Everyone had nothing but praise for the amateur communications. WA2DHF, Hudson Division Director, gave a presentation to WECA on current hot topics in amateur radio. Enjoy the rest of the summer. Hope to see you at club meetings in the fall. JUNE PSHR: WA2JBO WB2VUK K2ZVI N2HIF WB1BTJ WA2GYY KB2EPU. JUNE TFC: N2HIF 181, K2LYE 151, WB2VUK 128, K2ZVI 86, N2FTR 72, WA2JBO 56, K2ZM 53, KB2EPU 27, WA2GYY 27, WB1BTJ 16, W2CJO 11, W2PKY 11, KA2NGJ 8.

NEW YORK CITY-LONG ISLAND: SM/SEC: Walter M. Wenzel, KA2RGI—ASM: N2GQR. ASM VE: W2NL. ACC: KA2WIJ. STM: K2MT. OOC: NB2T. TC: WA2YNH. BM: W2JUP. PIO: KA2LCC. The following are traffic nets in and around the section that handle NLI messages with the June report figures:

Net	Freq	Time	Day	Mgr	Ses	QNI	QTC	QSP
BAVHF	145.350/R	2000	Dly	K2YQK	30	469	99	99
NCVHF	146.745/R	1930	M-F	KB2BKE	30	260	65	64
SCVHF	145.370/R	2000	S-F	KA2JMA	28	228	41	39
NYPON	3.913	1700	Dly	KA2UBD	30	525	357	298
NYS/M	3.677	1000	Dly	N2EIA	30	...	N/A	...
NYS/E	3.677	1900	Dly	KU2N	30	...	N/A	...
NYS/L	3.677	2300	DLY	KU2N	30	...	N/A	...
NLT	28.450	2100	Wed	KB2BKE	5	81	3	3
ESS*	3.590	1800	DLY	W2WSS	30	297	—	52
PNS	145.01	24HR	DLY	AI2Q-4			N/A	
PNS(ALT)	145.03	24hr	Dly	WB2IBO-4	N/A			

*Independent Net, recognized by NTS, all times are local. Access AI2Q-4 (Packet Node Station) via WB2QBP-2 Net-Rom Node (NRN). If for any reason AI2Q-4 is down, WB2IBO-4 on 145.03 is the official PNS alternate. Access WB2IBO-4 via K2LSX-7 (NRN) or KA2RGI-1 (Digi). Check into the NYC-LI Ten Meter Net (NLT) for additional traffic handling training. Novices please take note that this net is designed for your participation. EXAM SESSIONS: LIMARC-second Saturday

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10, 15, 20, *40 meters

Whether busting pileups, rag chewing or hunting rare DX, the A3 stands out from the crowd with the perfect combination of easy assembly, the right size, rugged durability and great performance.

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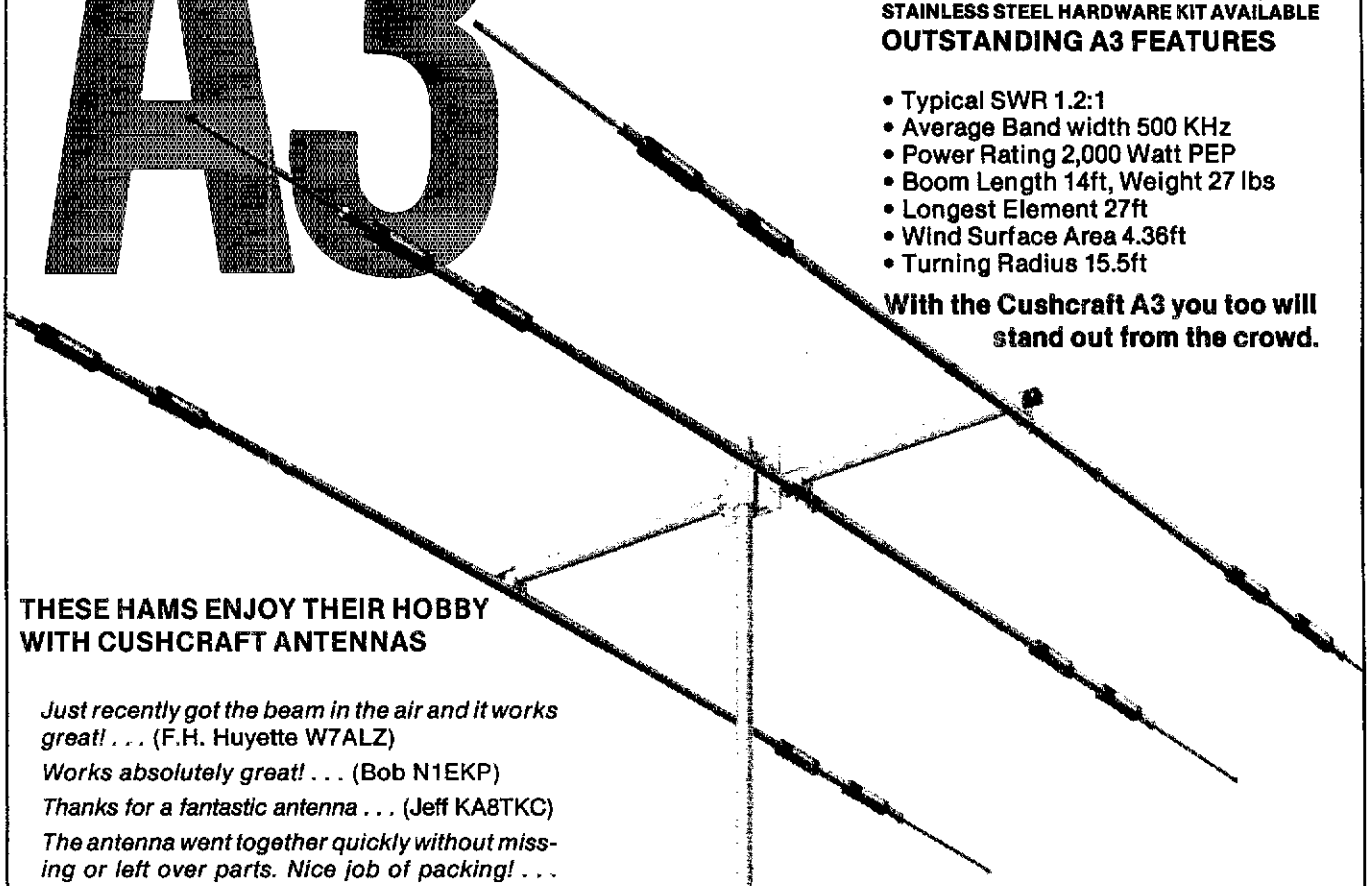


THESE HAMS ENJOY THEIR HOBBY WITH CUSHCRAFT ANTENNAS

Just recently got the beam in the air and it works great! . . . (F.H. Huyette W7ALZ)

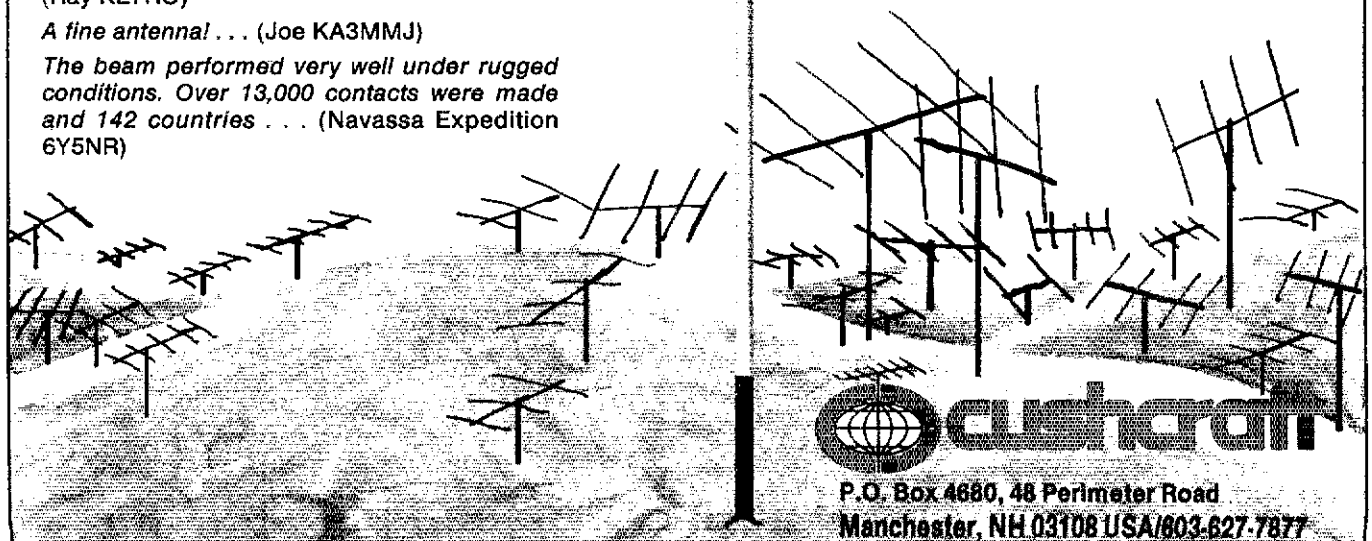
Works absolutely great! . . . (Bob N1EKP)

Thanks for a fantastic antenna . . . (Jeff KA8TKC)

The antenna went together quickly without missing or left over parts. Nice job of packing! . . . (Ray KE7RO)

A fine antenna! . . . (Joe KA3MMJ)

The beam performed very well under rugged conditions. Over 13,000 contacts were made and 142 countries . . . (Navassa Expedition 6Y5NR)



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of each month at NY Inst. of Technology, Old Westbury - contact Joe, W2NL, 516-541-2450; SUFFOLK COUNTY VE TEAM-second Saturday of each month at Suffolk County Community College, Selden-contact George, WA2VNV, 516-751-0894; GRUMMAN ARC-WILL BE RESTARTING NEXT MONTH at Bethpage High School, Bethpage-contact Howard, W2QUV, 516-354-6861; GREAT SOUTH BAY ARC-normally fourth Sunday of each month (date shifted for holidays) at the Babylon Town Hall Annex-contact Walt KA2RGI, 516-957-6726. If your group holds regularly scheduled license exam sessions and/or classes, let me know at least three months in advance so they can be added to the column before the printing deadline. REMINDER TIME: If you can assist with emergency communications for the Long Island Jewish Arts Festival on Labor weekend (Sunday and Monday) please contact me A.S.A.P. so we can get you the proper information and clearance. Also do not forget to volunteer for the New York City Marathon which will be held on November 6. There are still positions that have to be covered for the event and one of them might be just right for you. Congrats to the new officers of Suffolk County ARC and they are: Pres. Jim, KA2LCC; VPres. Brad, N2HLZ. Treas Lou, KA2YKT. Corr Secy. Joe, WD2X. and Rec. Secy.-Bryson, WB2BFE. Warning: with the summer we have just had, be prepared for the unexpected this fall. Make sure that you are ready to assist in the event of an emergency. Early signs show we could be in line for some big storms this fall. Don't forget that the Simulated Emergency Test is next Month (Oct. 15-16). Let's see more participation this year than last. For more information on how you can become part of ARES or the NTS please contact me. It's that time again petitions for New York City/ Long Island Section Manager and Hudson Divison Director and Vice Director are due this month with ballots to be mailed out no later than October 1. At the time of the writing of this column, I do know that all incumbents are running for office again. I don't know who else is running. I will have more in next months column. Sept. 18 is the LIMARC Outdoor Hamfest in Greenvale. Traffic: N2AKZ 165, K2YOK 142, KB2BKE 141, KE2GX 74, N2HLZ 50, W2GKZ 42, NB2D 39, K2TWZ 39, N2GNQ 22, KA2JMA 14, WA2UKM 10, KA2UIU 10, N2ETO 6, K2MT 2.

NORTHERN NEW JERSEY: SM, Robert R. Anderson, K2BJG—ASMs: N2EXX (SE), N2WM (NW), WB2NQV (SW), N2XJ (Cen and VE). SEC: N2BMN. STM: KA2F. OO/AAC: KA2BZS. ACC: KY2S. SGL: W2KB. TC: K2BLA. BM: WA2UPK and PIO: NW2L. H Crawford, NV2V replaces N2WM (now ASM) as DEC Sussex County effective 7/88. Appointment endorsements for the next two-year term starting 9/88 are: KA2FXS EC Dumont and WD5JPM EC Hillsdale. OESs: K2IDH, KA2FXS, KS2O, and WD5JPM. More NNJ PIA appointees are needed. PIO Rich Moseson, NW2L, has established an ideal goal of one PIA from each club. This will take some time to achieve. Our interim goal for 1988 which is considered a minimum is at least one PIA for each county. For further info and to apply for appointment, please contact NW2L at 680-1585. Ocean-Monmouth ARC has been officially renewed as a Special Service Club. Congratulations to the following who were newly licensed or upgraded during June sessions conducted by: Bergen ARA (26/16), Major Armstrong Memorial ARC (10/6), NNJ VE Board (21/5), Ocean/Monmouth ARC (8/8), and Raritan Bay ARC (6/4). Novice (1): H Frank. Technician (14): KB2FAX, KB2FUG, KB2FYR, KB2DTI, KB2FMZ, KB2CEW, KB2FUP, KB2FUY, KA2UPD, J Benniger, R Bookbinder, G Steinmetz, KB2FUJ and A McKenzie. General (8): KB2AGY, N2HVM, N2IBJ, KB2FDW, WA2OJO, KA2RLN, KB2FKB, and N2HYU. Advanced (8): N2IBT, W2IDD, N2COO, N2GMA, WB2KML, KB2FBK, KB2FLD, and KB2FQE. Extra (8): N2CEC, KB2ECW, N2IFO, WA2RYC, N2GPK, WA2HHM, N2IEU, and KD2QN. Total applicants (71). Total New or Up-Grade (39) 54.9% As of their 8/24 session BARA has passed the milestone of over 1000 VE applicants. MAARC has now swung over to ARRL/VEC making the NNJ section 100% ARRL/VEC. Field Day messages were received from K6ANP Bellcore Pioneers ARA, K2ZO Bergen ARA, NR2R Cherryville Repeater Assoc., W2VY Edison Municipal Park ARES, K2ND Englewood ARA, W2GSA Garden State ARA, W2CVW Individual, K2YNT Metuchen ARC, W2OYH Morris County OEM/ Morris RC/ RAVEN, N2GT Neptune ARC, NA2R New Providence ARC, KC2Q Ocean/Monmouth ARC, KO2K Piscataway ARC, KX2O Sussex County ARC, NN2T Ramapo Mountain ARC. Traffic and Statistics for May 1988:

Net	Mgr	Freq	Time	Sess	SES/QSP/QNI
NJM	WB2ZJF	3695	1000	DY	
NJPN	W2CC	3950	1800	DY	Data
NJN/E	NZ2R	3695	1900	DY/P	
NJN/L	WA2EPI	3695	2200	DY/P	
NJSN	KA2INE	3735	1830	DY	not
OBTTN	KA2F	147.12	2000	DY	
NJTTTN	WA2EPI	223.88	2100	DY	available
NJVN/E	WB2FTX	146.895	1930	DY/P	
NJVN/L	N2FGC	146.49	2230	DY/P	
NNJ/PL	W2QNL	145.01	24 hr	via WA2SNA-1	

Packet NTS activity for June, 1988: Total 91. WA2SNA-1 auto forward (47) plus liaison (44) by NZ2T (15), W2QNL (23), WB2FTX (6).

MIDWEST DIVISION

IOWA: SM, Wade Walstrom, WØEJ—ASM, WBØAVW. SEC: KDØBG. STM: KCØXL. ACC: NUØP. OOC: WAØQMU. BM: KØIIR. TC: KØDAS. PIO: WEØM. Conditions for Field Day were hot, both for temperatures and band conditions. There was plenty of activity from Iowa, judging from the number of messages received by your SM and SEC. Reports were received by your SM from the Nodaway Nighthawks, the Hamilton County ARC, the Central Iowa ARC, the Cedar Valley ARC, the Eastern Iowa QRPers, Ft. Madison ARC, Mt. Pleasant ARC, the Independent ARC, the Turkey Island DX Club, the Jones County ARC, Humboldt ARK, WØJV, NYØO, and KØCY. The Iowa-Illinois ARC assisted in the Snake Alley Bike Race by providing communications as did the Cedar Valley ARC at the 8K Run, the July 4th Bike Race and fireworks display in Cedar Rapids. KBØBKP recently upgraded to Technician. Recent new calls include KBØCXB, KBØCTV, KBØCKC, KBØCJS, KBØCJX, and KBØCLA. Congratulations to WEØM and NUØP who turned in a super score in this year's phone County Hunters Contest. Tom and Steve operated mobile from many counties in eastern Iowa. Regretfully, KØIQM became a Silent Key. Thanks to all who participated in the American-Soviet Peace Walk as it passed through Iowa. The request for assistance came very late, but your efforts were timely. Traffic: WØSS 233, KØNPT 116, KAØADF 111, KØGP 86, WØYLS 71, WBØMCX 26, WBØOKA 18, KAØVBA 13, WBØAVW 13, WØOMV 5.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: NØBLD. STM: WØOYH. Net Manager KSBN/KPN, WØFRC. Net Mgr QKS, WBØZYN. Ks RTTY Mgr, open. District Emergency Coordinators are WØOAG, WBØYJT, WØEB, WØFRC, NKØV, WAØCVR, WBØMDF. State Govt Liaison, NØBLD; Tech Coord. open; Bulletin Mgr KØJDD. ACC, KØBXF. PIO, WBØWSG. Manager of QKS-SS is WØMYM. WX Net Manager, WBØYWZ. I believe all 250 plus. people attending the CKARC hamfest at Salina did enjoy the event. Considerable attention was given to promotion of a KANSAS NEWSLETTER in the very near future. Most every Amateur we talked with was in favor of and willing to support same. More info in the very near future. Some one asked why so much attention was given to PUBLIC SERVICE activities (traffic and ARES) in the Section column. Well, no one reports much of anything else. If you have anything for the column, let me hear from you. Net activity for May: KSBN QNI 1470 QTC 182, KPN QNI 476 QTC 6. KMWN QNI 821. QTC 654. KWN 966 QTC 682. CSTN 1951 QTC 62. QKS QNI 219 QTC 64. QKS-SS QNI 39 QTC 9. WØMYM extends an open invitation to all, especially the new hams to join the Kansas Slow Speed net M-W-F at 7:30 PM local time. 3735 kHz. Bring a new Novice and join the net a time or two a month. Traffic: WØFIR 243, NZØM 186, WØFRC 146, KØBXF 114, WØOYH 99, WBØZNY 75, WØFDJ 68, WØQMT 57, NBØZ 53, KAØRCH 51, NØBDG 19, WØMYM 19, WAØYXK 14, WØCHJ 7, WØRBO 3, NØDJT 3, KAØE 2.

MISSOURI: SM, Ben Smith, KØPCK—Carl Hohenberger, WBØBZP, has been appointed OO Coordinator for the Missoun Section. Carl lives in the St. Louis area and would like to hear from anyone interested in an OO Station appointment. Thanks to WBØRHK for his work as OO Coordinator the past five years. The Indian Foothills ARC of Marshall assisted officials at the Airshow 88 with over 8000 in attendance. Club members helping were: KØBVB, WBØSZI, WØKNF, NCØL, NØEZS, NØIOX, WBØSZH, WAØZIY, WØABW, KAØCZH, NØIWU, KBØBWB, WØVZK, NØIQH, NØINH, KBØYG, WBØMGI and WAØI. The Kimberling City ARC operated a message booth at the Aquafest 88. Nearly 200 messages were sent from the booth for those attending the Aquatest. The St. Charles ARC provided communications for the St. Louis Triathalon. KBØBCM, NØAB, KAØKU, NYØM, NFØQ and KEØQJ were the operators for the event. Five members of the Heart of America ARC provided communications for the Human Race, a five-mile run and walk combined. The event is a fund-raising project sponsored by 13 human-service agenices in the Kansas City area. NØHBH organized the ham participation. New Field Appointments for the month, NØHFD PIA and ATC. The Heart of America ARC assisted with safety coordination for the Heritage Park Triathlon with more than 400 contestants. KØUAA was in charge of the amateur operation.

Net	Ses	QNI	QTC	Day	Time PM	Freq	Mgr
MOSSB	30	568	87	D	6:00	3.963	KØOHB
MON	60	257	168	D	7/9:45	3.585	AIØO
MEOW	31	536	67	D	5:30	3.963	WDØELL
RRABN	30	402	5	D	8:00	146.79	KBØANP
LOZBC	26	353	0	M-SA	6AM	146.73	NØHVO
HBN	22	332	22	M-FR	12:05	3.980	KØDSQ
SLAN	4	235	2	M	8:00	146.91	KØWEX
CMEN	5	76	4	W	9:00	146.76	KØPCK
PHD	4	117	9	M	8:00	143.43	WAØKUH
HARC	—	—	—	—	—	—	KAØSXY
LOZFM	4	90	0	F	9:00	146.73	NØHVO
SWMSW	4	56	1	—	—	—	KØKXC
KCARES	4	50	0	—	—	—	KØUAA
ZAEN	—	—	—	T	8:00	147.24	NCØE
JCCCN	4	51	0	W	8	147.00	WBØDZX
MXARES	5	40	0	TH	8	147.255	KAØTGL
CARL	4	26	0	W	8:30	146.46	WBØWLU
MM1OM	4	36	0	SU	-	28.325	NSØB
CMOZYL	4	16	0	MO	8:00	147.285	NØHVO
SEDARES	4	35	0	—	—	147.030	WØENW
TRICOUNTY	5	58	0	TH	8:00	—	NZØS

Traffic: NDØN 214, AIØO 186, WØBMA 174, WAØHTN 131, WAØYJX 131, KØORB 70, WØOUD 48, KØPCK 38, K9OCU 36, KDØAJ 12, WAØKUH 5.

NEBRASKA: SM, Vern Wirka, WBØGQM—As of July 9, 1988, the state of Nebraska began collecting a higher fee for callsign license plates. The additional fee for callsign license plates is now ten dollars, included in Legislative Bill 1038 which was passed by the unicameral and signed into law by the Governor on March 23, 1988. L. B. 1038 changed two provisions of the statutes for Amateur Radio call-sign license plates. First, self- propelled mobile home was added to the list of motor vehicles eligible to have Amateur Radio Callsign plates. Second, the words "one dollar" were deleted and the words "ten dollars" were added in reference to the required additional fee. Plans are being made to try to introduce a bill in the next session of the unicameral, to change the additional fee requirement. Comments regarding the fee increase are best directed to your local state senator. 1988 marks the 33rd anniversary of the Western Nebraska Net and Emil Van Bargen, WØNIK, of Alliance, Nebraska, has been the Net Manager for all 33 years. Several Amateur Radio operators from the eastern part of Nebraska participated in a June drill to test emergency response procedures to a nuclear power plant incident. This drill was in conjunction with the Omaha Public Power District, operators of the nuclear plant at Ft. Calhoun, the State of Nebraska and various local governmental agencies. Packet radio was used extensively during these drills. Amateur Radio operators will also participate this fall in the same type of drill at the Cooper Nuclear Plant near Brownville, which is operated by the Nebraska Power District.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Dick Pechie, KB1H—STM: K1EIC. SEC: N1DCS. OOC: NA1I. ACC: NK1J. PIO: WA1CMF. TC: W1HAD. SGL: K1AH.

Net	NM	Time	Freq(MHz)	Sess	QNI	QTC
CN	WB1GXZ	7 & 10 PM Dly	3.840	58	363	159
CPN	NK1J	6 PM M-SAT 10:00 AM Su	3.965	30	323	88
NVTN	NM1K	9:30 PM Dly	146.880	30	584	184
WESCONN	N1EDD	8:30 PM Dly	147.180	30	446	121
RASON	KY1F	9:00 PM Dly	146.730	30	222	69
CSTN	K1CE	24 hr BBS	145.010			
CSN	WB1GXZ	7:30 PM M-F	3.720			
TMRCN	NM1K			2	4	60

around the section that handle NTS messages with the done

SCARA, for the second year provided the emergency communications for the Milford Triathlon. CSN continues to be an excellent training ground for up and coming traffic handlers. New to the instructor ranks on CSN is KB1ZC. W1BDN back pounding brass after recent illness. Did you go to the Traffic Handlers Picnic August 20th? There is more than passing traffic happening in the CT Sections's nets. Southington ARA recent donor to W1AW renovation fund. SARA also received funds from town to improve 145.17 antenna. Look for Waterbury ARC to be operating special event station KA1BSA in October from Camp Mattatuck Scout Reservation. KA1YP and KA1GKJ are collecting children books and through the International Missionary Net, sending the books to a needy organization. RASON has presented ARRL book sets to Montville High and Raymond Library. SARC upgrading class produced six graduates and one 20 WPM certificate. Prepare for your group's participation in the Simulated Emergency Test in October. Local ARES nets are the beginning of the Section's activity. DECs and ECs will be providing details for this year's event. Hopefully there will be a Ct Section meeting at the NE Convention in Boxboro. All Section officials and member clubs will be welcomed. Have your club send a representative. Finally, next month will start the two-year term of new SM, N1CDS. I wish Ceasar good luck and thank all those who have supported me in this interim period. Traffic: N1DMV 259, WB1GXZ 199, W1EFW 168, NM1K 165, KA1JAN 114, NQ1P 91, KA1GWE 84, KA1FVY 81, KB1ZC 62, KY1F 58, NK1J 58, W1YOL 45, KA1KP 42, W1WP 28, WA1NLD 20, K1AQE 17, W1BDN 15, NK1J 14, KA1RVI 13, K1CE 12, WB1ESJ 11, W1QV 9, WB4FCC 6.

EASTERN MASSACHUSETTS: SM/SEC: Barry Porter, KB1PA—STM: KW1U. PIO: K1HLZ. BM: KB1AF. OO/AA: AG1F. SGL: K3HI. TC: KA1IU. ACC: Open. EMass Hotline: 437-0111 Westlink: 449-2226

Net	Mgr	Freq	Time(EDT)	Day	Sess	QTC	QNI
EMRI	N1AJJ	3658	1900/2200	DY	45	101	134
EMRIPN	WA1FCD	3880	1730	DY	25	41	69
EM2MN	KA1MDM	63/23	2000	DY	29	130	377
NEEPN	K1BZD	3945	0830	SUN	3	1	26
HHTN	NG1A	04/64	2230	DY	30	234	412
EMRISS	N1CVE	3715	1600/2030	DY	35	21	57
CITN	KB1AF	745/045	1930	DY	28	68	314

It was a pleasure to visit some of the Field Day sites around the section on Field Day weekend. The Wellesley ARC had the largest operation, operating in category 8A. The combined Sturdy Hospital/Foxboro ARC had the largest participation. When I visited their site on Sunday morning they had 45 Hams doing various tasks. The largest antenna was at the Sharon ARC site, a 20 meter rhombic that barely fit the baseball field where it was mounted. By the time this is out, it will be almost time for the New England Division Convention in Boxboro. It should be the largest ever. Much has happened in our hobby since the last convention, so there should be many first-time attendees and much to discuss. I hope to meet you there. Also the Hoss Traders flea market will be about that time. In addition, the Club meeting season will be getting underway. If you is looking for a program, don't forget that the section staff is all available to talk on their specialties. The position of Affiliated Club Coordinator is open and needs to be filled. If you are interested, please let me know. This is an important post, with responsibilities for maintaining the speakers bureau, and working with clubs to help them affiliate or become special service clubs. Also the ACC is in charge of CEMARC (Council of Eastern Mass Amateur Radio Clubs) which works the Science Museum Demo. We lost a valuable ally at the science museum when Richard Morse passed on. When the weather turns cold and Hams gather round the heaters and tell tall tales, surely they will tell of EMass'new legend, "Lightning Jim" Morrison, K1UGM. Jim, who keeps the K1UGM BBS/Digipeater system running in his basement learned first hand that you don't mess with nature. Jim visits clubs with some very fascinating presentations, so when you see him, ask him to tell you the story. There was a couple of thousand dollars of damage done to his station. Thanks to some generous friends, the station was not off the air long. It has been a busy season for the SKYWARN nets so far. When severe weather threatens the National Weather Service depends upon the human eyes of the SKYWARN volunteers to help them track severe weather. If your club wants to get SKYWARN training let me know and I will put you in touch with KA1NMY, the New England Area Coordinator. Recently, as part of a State CD Hurricane Drill, a panel of local meteorologists held a discussion on Hurricane Preparedness. One of their recommendations was to increase the use of Hams to keep everyone informed of what is happening. During the drill, Ham Radio once again proved its' flexibility and adaptability. The Red Cross in Boston lost its' telephone service and needed to establish a communications link with the regional chapters that were participating in the drill. A request was made on the 146.64 repeater and within 30 minutes, the links were in place. Thank you to those that helped. Also during the drill, a real Severe Weather Emergency developed, and the hams were able to handle the situation and handle both the SKYWARN net and the drill successfully. The drill was the first test of the packet link at State CD Hq, and should help work out the kinks and procedures needed to use packet successfully. K3HI should be back from a well deserved vacation. KB1AF reports that there were 343 transmissions of ARRL bulletins in June. The traffic handlers continue their amazing daily record. It is nice to hear some new callsigns checking in to the traffic nets. Thank you to all who give of their time so our hobby can thrive. Have you expressed your opinion on Amateur radio issues to you section or division staff lately?? Please do! Traffic: KW1U 510, KN1K 376, KB1AF 196, WA1TBY 196, WA1FCD 174, NG1A 125, K1GGS 75, N1CVE 63, K1ABO 59, N1AJJ 47, KA1NOI 44, WA1FNM 40, KA1MDM 34, KA1LIH 29, W1TC 24, K1SEC 23, KA1EID 19, N1EGN 18, KA1EDY 11, WA1CRE 6, KA1KCU 1.

MAINE: SM, Bill Mann, W1KX— SEC: KA8UVQ. STM: WA2ERT. ASM (Packet): N1AHH. BM: W1JTH. SGL K1NIT. TC: KQ1L. New leadership appts: Affiliated Club Coord: W1RWG. Official Observer Coord: K1WWT. Congrats and thanks to W1RWG on completing 8 years as SCM/SM for Maine, a record for this section. Only 8 of the current 67 SMs were in office when Cliff started in July 80! The Windsor Hamest will be held Sat., Sep. 10. The ARRL session will be 9-10 AM. During the 4th Annual Am. Lung Assn. of Me. Bike Trek Across Me. 26 Hams provided communications to insure safety to the 352 bikes, June 17-18-19. The trek ran from

Bethel to Rockport. Over the July 4th weekend, Hams assisted in the Kennebec River Whatever Race and parade and the Nobleboro Bicentennial Parade. Many groups active in Me during Field Day. Some operated from public places such as U. of Me. Presque Isle (Aroostook ARA) and Mt. Blue JHS (Sandy River ARC); others received TV coverage (Androscoggin ARC, Pen Bay/Waldo Co.) Midcoast AR Rptr. Club officers: Pres: N1CBA, VP: KA1LPW, Sec: N1EBC, Treas: W1PXE, Trustee: KQ1L, Dir: N1DXM W1BWM ND1M. Silent Key: KA1OQM, Augusta. VE Exams: Sep. 10, Windsor Hamfest, 9 AM (KQ1L) Sep 18, Pattern Free Library, Bath, 9 AM (ND1O).

Net	Sess	Checkins	Tfc	Mgr
Aroostook Emer	4	0	78	WA1YNZ
Cen Me Emer	8	8	132	N1EUK
Cumberland Co	4	0	50	KA1ODT
Hancock	4	1	45	WA2ERT
Kennebec ARES/RACES	4	1	52	KA1LPW
Pine Tree	30	76	271	ND1A
Sea Gull	26	102	714	K1GUP

Maine's 7 OBSs transmitted 22 ARRL Bulletins and 4 Maine Bulletins during June. Traffic: KA1JOJ 78, ND1A 69, WA2ERT 50, W1RWG 50, AK1W 42, W1KX 38, W1BMX 32, N1BCF 25, N1EZR 25, W1JTH 17, KI1B 11, N1BJW 11, WA1YNZ 9, KA1ENM 4.

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE– ASM/Youth activities: KX1L. ASM/Contest and DX: W1NH. It's hard to know where to start with June's activities! From a visit to ARRL HQ to the 10 Field Day club and group activities around the section, we had the busiest month in a long time! From June 3-10, we celebrated the Constitution Bicentennial with club stations W200WQM/PCARC, WB200CAG/GBRA, and W200OC/Concord Brasspounders operating throughout the week to a global audience! The competition for making W200 contacts was reported by many operators to be intense! NHARA, our state organization operated W200NH from the EMC in Concord during the week. Thanks to all operators who supported the Bicentennial stations. Governor Sununu read the proclamation of "Amateur Radio Week in NH" from Concord over the 34/94 repeater. 35 NARC members bused to Newington for a visit to League HQ and a visit to the local Ham flea market. Many first-time operators on W1AW! This was NH month in QST- congrats to Dick Steven, W1QWJ, for his feature article on Grounded- Grid Amp and to Dot, KA1LDS, for her article in the YL column. Dennis, K1YPP, was in Western Canada on his Arctic Circle motorcycle expedition (with QRP rig). Meanwhile, back in Manchester, 4-H ARC President Sean, KA1KGB, announced that the club has been awarded a matching grant from the Victor C. Clark Youth Incentive Program for a club project! In what may be understatement of the year, Jay, KA1POK of the Univ of NH ARC reports that the new club hasn't been very active yet, so far they have only had an organizing meeting showing the new ARRL tape, held a fox hunt, traveled to Kingston and camped overnight, and they were planning a VHF hilltop activity and a station for the University's International Fiesta! What's it gonna be like when they get going?! During June, I visited the W200NH station for the Gov's proclamation, and got to a meeting of the CNHARC and new president, Bob, N1BVI. They have an active emergency comm program in process. Field Day arrived with visits to the CNHARC, Twin State, Contoocook, SVARC and NARC sites this year. Good setups and lots of operating and good food at all sites. SEC K1ACL and NHARA Pres WB1HBB traveled with me and also visited other sites during the weekend. Dale, AF1T, arrived back in NH abt a week before FD and put one together in Mason with 5 ops—welcome back, Dale. At the Contoocook site, I spoke with new Novice Phil, KA1RZF, who had just made his first contact at FD on 10M with N1FSR! Phil is 9 years old and he was a little excited! Welcome, Phil! In the area of community support, the CVFMA announced the award of 2 scholarships to Gary Kelly of VT and Patricia Adams of Lebanon, NH. Thanks to the club members for their tangible support of higher education. Somewhere in the midst of all this activity, Bill, KB1DL, reports that comm support for a walk/run fund raiser for the N London Hospital was provided by W1GUX, WB5DLV, N1DRE, N1FSR, N1EKC and KB1DL. Don N1AKS reports that NARC held a VE session with 24 of 31 applicants upgrading. 12 of the upgrades were to Tech. Fred, K1ACL, reports that GBRA and PCARC members supported State EMC Emergency Comm tests in the coastal area during June. A team of Field Org. members is looking for Hams who are interested in joining the SKYWARN program in NH. Training will be provided by the National Weather Service. Contact K1ACL, WB1GXM or N1EMF for more information. We hope to establish a state-wide network of resource people for this effort. Would you like to be part of the NH Field Organization and help support the growth and expansion of Amateur Radio? Contact me by letter, Packet (WB1DSW-1), tel 882-0021 or repeater. See you next month!

Nte	Time	Freq	Mgr
GSPN	6 PM	3942	WA1YZN
NHN	7 PM	3547	KB4N
NHNTN	7 PM M-F	28330	KA1OU
GSFMS	8:30 PM	146.94	N1ALM
GSFMN	8:30 PM	146.475	N1ALM

Traffic: GSFM 119, GSPN 106, NHN 37, NHNTN 30, W1PEX 1455 BPL, WA1FHB 862 BPL, N1CPX 367, KB4N 296, K1TOY 184, W1FYR 93, KK1E 67, W1ALE 60, N1ALM 48, KA1OU 43, KA1COZ 38, WA1YZN 15, KA1HPO 15, WB1HBB 14, KA1OLK 13, KA1JOU 9, W1TN N1DQZ 7, KA1KFX 4, KA1LMR 3, N8HTJ 2.

RHODE ISLAND: SM, William Foss, KA1JXH—OSARG provided communications for the Gaspee Day Parade. They now own the Packet BBS (N1DFK) on 145.07 MHz. They have 9 new members and had its summer outing Aug 7th in Slocum, RI. BVARC will have VE exams on Sat. Sept 17th. Contact KV1O at PO Box 36 Cumberland, RI 02864. BVARC also has 56 active members. NPRA will hold a Novice class on Thursdays starting Sept. 15 for 12 weeks. RI ACC is WB1FDY. RI Field Day stations, ARASNE, W1AQ in E. Prov. BVARC, W1DDD in Burrville. NCRC, W1SYE, in Newport. NPRA, KY1G, in Warwick. OSARC, KZ1C in S. Kingstown. Traffic: W1EOF 206, KA1KML 149, KA1JXH 98, PSHR 60, WA1CRY 37. If anyone is interested in traffic handling, contact Jim, KA1KML.

VERMONT: SM, Peter G. Drexel, AE1T—ASM (Packet): N1CQE. ASM (RFI): W1CTM. SGL: W1KRV. The Part 97 rewrite is on everyone's minds of late. The text is available locally via hard copy or in electronic form, check your local

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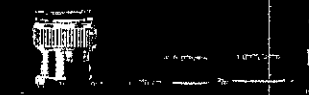

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PBBS. The findings of the ARRL working committee should be out by now as well. The new TSRC officers are: Vern-KA1OXS (President), Jeff-KA9GCE (VP), Bill- N1EMF (Sec-Treas), Mike-WA3ECT (OAM), Dick-W1FN (Trustee). Congratulations to all. Communications for the Audrey Proudy bike-a-thon was organized by WA1GYS. W1CTM provided similar support for the triathalon in Burlington. Preliminary Field Day results: K1VT-8450, NN1D-4213 (both 2A). Murphy and Mother Nature provided some "interesting" operating conditions this year. Other scores will be listed as received. ATV is alive and well in Vermont. N1QG, KU1H, KA1LEX and K7IJH are active on UHF. KA1MNH recently gave a slow-scan demonstration. Contact N1QG or KA1MNH for more information. 'Tis the season for repeater enhancements. The W1KOO, K1VT, K1VKN, N1CIV (224.22 MHz in Norwich), and K1MOQ machines have all received some attention of late. Joe, W1KRV, gave an informative presentation at the June Volunteer Organizations Assisting in Disasters (VOAD) meeting. This was the first ever VOAD meeting in Vermont. The meeting was called by the Burlington Red Cross and was attended by VOAD people from 3 states. Joe did a great job of discussing ARES, its organiztion in Vermont, which organizations it serves and our abilities to provide communications in times of need. Thanks Joe! Contact AE1T for copies of the text. The 2nd VPRO meeting was held at the KA1NZA QTH. All the VT groups were represented. KB2HQ (NYSPF) and WA1FHP (sysop) were also in attendance. The 144.95 MHz AX.25 backbone is taking shape. ROSE shoftware will be used later. An organizational meeting will take place at the Essex Junction hamfest. WB2MIC, KA1NZA, WB1HHG, KA1PMS and KA1DLK all have battery powered packet capability. Any others? Congratulations to KA1BSZ for having Hints and Kinks item published in QST. Welcome K7MB and N7AMJ to Vermont. Jim, NR1Z, has a new call and is active again after a long hiatus. Listen for AB2L and AD2Y from an exotic OD5 QTH. Our section is fortunate to have a selection of excellent newsletters. Thanks to N1EMF, WB2JSJ, W1KRV, WB2MIC, WA1OZE and NK1A for your efforts. Ed, KT1Q, has some good reference material regarding passing NTS traffic on phone. Contact him for more information. VSSN is on summer sked: 7 PM on 3707 kHz. Look for the RTTY net on 3623 kHz, 7 PM on Thursdays. Vermont had 98% participation on 1RN/2 and 93% on 1RN/3. Five stations attained PSHR. WA2SPL and KT1Q achieved BPL. NTS node: 2142 messages. June traffic: WA2SPL and KT1Q achieved BPL. NTS node: 2142 messages. June traffic: WA2SPL 846, KT1Q 534, WA1JVV 144, N1DHT 67, W1KRV 63, AE1T 52, KA1PUJ 33, NB1A 24, WA1VXW 12, N1FHY 3, NN1D 1, K1VT 1. Net reports: VTN 30/142/127, RCAN 4/37/4, W1KOO SEN 4/49/2, CVFMN 4/90/3, TSFMN 4/49/2, TSEN 5/63/6.

WESTERN MASSACHUSETTS: SM, Bill Voedisch, W1UD—OO/RFI: N1CM. PIO/ACC: K1BE. SEC/SGL: WB1HIH. TC: KA1JJM. STM: W1KK. Field Day has passed and now the MARA group went to Mt. Wachusett for the weekend. Imagine, a 40-meter delta loop on the top of Mt. Wachusett. A 2006-foot high antenna. From the top of the fire tower a tag line was run down to a tree and two full wave elements were hung from it. If it didn't work the first time, my title of "antenna expert" would have went down the tube. 40 came alive and on 20 it performed as well as the tri-band yagi. Reflections of Clarence Moore, W9LZX, and HC3B in Quito back in "40." Guess I still have the title as the antenna was packed away for next year. I wonder if the Watchgoose got anyone at the Mt. Tom Field Day site. It would be a little difficult to explain how you got bit by a goose at midnight relieving another operator. The guys and gals of CMARA operated from Green Hill Park in Worcester. That should really promote PR. CW and running generators seems to draw the public. In NOBARCs Squelch Tale were ten peices of advice an xyl gave her om: 1. Look at your wife once in a while so you'll recognize her at club meetings. 2. Thou shalt not show more concern for your ailing rig than your ailing wife. 3. Do not say "good night" to the repeater and turn off your wife. 4. Love, honor and cherish your wife—not your radio. 5. Thou shalt not steal...time from thy family to spend on thy radio. 6. Thou shall not commit idolatry of thy radio. 7. Honor thy volume control and keep it low. 8. Harmonics are to be talked to...and not reduced. 9. Field Day is not a family picnic. 10. Extra pocket money can be spent as well on flowers and toys as on capacitors and crystals. Great advice. Traffic: KA1IFC 746, KA1EXJ 32, WB1HIH 47, KA1KRJ 109, KB1TH 39, WA1YYK 65, K1JHC 20, W1SJV 27. KA1QFV 38, NM1V 4, W1ZPB 2, W1KK 83, KC1DI 26, WA1OUZ 23, N3FSM 6, W1UD 183.

NORTHWESTERN DIVISION

IDAHO: SM, Don Clower, KA7T—SEC: K7REX. STM: W7GHT. OOC: WB7CYO. ACC: N7BI. PIO: WG7E. Well, Field Day has come and gone and one group had a wild night. The Eagle Rock ARC had heat, 102 degrees, high winds, and thunderstorms. Then to top it off, they had a lightning strike about 100 ft away. Luckily only blew a fuse. The Twin Falls ARC also had a good turn out at their site. They even got up a small 3 el tribander. Thanks to everyone who went out and helped on Field Day. The Idaho Lung Association is having a 3-day bicycle ride through the sawtooths on Sept. 24, 25, and 26th. They have asked Amateur Radio to help with their communications. We will be sending five hams out to join their group of 150 riders with VHF and HF gear. See you in Portland. 73, Don. Nets: CD net had 22 sess, 701 QNI and 21 QTC. Farm Net had 30 sessions and 1078 QNI and 43 QTC. Traffic: W7GHT 332.

MONTANA: SM, Ken Kopp, KØPP—SM KØPP visited with 80+ at Fathers Day in Miles City. Many across No. Montana helped with Trans-America bicycle trek's 300+ riders again this year. Thanks! FD turn out low this year and only two clubs (CCARC & AARC) sent SM Msg for extra points. HARC (Missoula) elected KE7WR/P, WA7WVP, KA7LEB/S-T. They have new rptr (146.80) 30 Mi 2-day trip for 700 bikers-big job. Don't miss ARRL Nat'l Convention in Portland Sept 9-10-11. It's not often we have a Nat'l so close. Silent keys: KA7MWS, K7PFQ, W7DOV. Trivia: There are 468 AR license plates in Montana. Wanted: your news for column. Traffic: W7TGU 1016 (PSHR), WB7WVD 26 (PSHR).

NET	SESS	QNI	QTC	MGR
IMN	30	298	118	KA7EEE
MSN	3	40	0	KØPP
MTN	30	1294	65	KF7R

OREGON: SM, Randy Stimson KZ7T—ASM: KM7R. STM: W7VSE. SEC: W7FBP. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. RFI: AK7T. OO: WN7W. STC: N7ENI. Field Days, Field Days everywhere. From a peak called Triangulation Point where you had a hard time finding enough flat space to put a tent to an EOC in a county courthouse. From plugem in the wall power to bicycle driven power. I hope that the Tillamook ARC will send in an article about their antenna system. They are the ones that used the EOC in the courthouse. On top of the courthouse is a fenced area for the prisoners to exercise and what the hams did was to try to load the fence for an antenna, after the prisoners were back in their cells. I will find out how it worked. The City of Portland had one of the largest SETs in the nation. It took them one and a half years to set it up and involved one hundred and twelve agencies. The hams had a role in the communication. There were twenty five Hams manning nine locations including the State Capital. They used two meter and packet for the messages and it seemed to go fairly well. I would like to thank John White K7RUN, who did a great job in setting up the communication. Traffic (P)[2] Packet W7VSE 392, N7BGW 264, WB7VSN 159, KA7EEE 132, W7LRB 114, N3ELF 93, W7LNE 79, WB7EMO 78, WG7H 74, KZ7T 56P, KA7SYG 49, W7ODG 48, N7CPA 43P,WB7SZM 43P N7DRP 29, KA7AID 10, KD7YJ 9, N7IXS 5. Late May: WG7H 139, KA7SYG 66, WJ7E 60, N7DRP 20.

WASHINGTON: SM, Brad Wells, KR7L—STM: KD7ME. SEC: KA7INX. TC: W7BUN. OOC: N7DVR. SGL: KD7AC. BM: N7CAK. PIO: N7FVK. ACC/ASM: KC7PH. ASM: KD7G. ASM: KA7CSP. ASM: W7UOF. ASM: K7CLL. The main attraction this month for most Pacific Northwest hams is the ARRL National Convention in Portland on September 9-10-11. However, don't forget the final Washington Hamfest of the year: The Walla Walla Valley ARC W7DP Hamfest on September 24-25. There will be commercial displays, VEC testing, demonstrations, and a potluck luncheon Sunday Noon. Both the admission and swap tables are free. Prizes to be given away include an ICOM 228H, ICOM SGAT, and Commodore 64C. This will be your last chance until next year to buy or sell good junque. For more information, contact: Paul Hamon, KA7VHL; POB 321; Walla Walla, 99362. (509) 525-0512. Congratulations to KA7INX, who was appointd to the Washington State Disaster Assistance Council representing Amateur Radio and ARES. W7UVP is retiring as the EC for Clallam County. Alan is moving out of the area and many thanks are due him for his fine work in this position. K7RBT has resigned, after years of activity, as the EC for Jefferson Couty. ECs and DECs sending their monthly reports to KA7INX via packet can reach him on either KE7OM or WØLVJ during the first 7 days of each month. All ECs and DECs take note: Luck Hurder, KY1T, will be conducting an ARES forum at 9 AM on September 10 at the National Convention in Portland. This is your chance to provide much-needed input to the ARRL Field Services Department on how they may better serve you. I received Field Day messages from the Panorama ARC (W7JTC), Olympia ARS (WM7V), ARA of Bremerton (W7VE), Issaquah ARC (W7BI), North Kitsap ARC (WO7B), 807th Magnetic Storm Troopers (K7SS), CUBS ARS (WI7V), Kenneydale Key Klicks (W7JIE), Clallam County ARC (W7FEL), Mount Baker ARC (K7SKW), Mike and Key ARC (K7LED), Twin Cities ARC (W7LA), Clark County ARC (W7AIA), Central Washington ARC (W7GB), Lower Columbia ARC (W7DG), Island County ARC (W7PN), and K5LER. Many thanks to WA7MCV who continues to pick up packet messages for me. N7CAL noted that during its 4 years of operation, the BEARS VEC processed 3385 applicants. A job well-done by the original pioneer in VEC testing. New officers for the Evergreen ARS are W8FFN (Pres), KD7FX (VP), K8DUC (Secy), N7JGT (Treas). A very special thanks to those of you who gave freely of your time and resources to provide communications for the Special Olympics this year. Projections now indicate that Solar Cycle 22 may be the most intense in history andits peak may be as early as late 1988. Affiliated Clubs receive $2.00 for every ARRL membership renewal they process. PUBLIC SERVICE HOURS: Cowlitz 3; Garfield 1; King 1550; Kitsap 185; Thurston 825; King/Pierce/Thurston (Special Olympics) 759. Traffic: K7AJT 10, WA7CBN 92, K7CLL 4, N7DIP 10, KE7EO 28, N6EQZ 52, KF7FF 20, W7GB 41, N7GGJ 83, K7GXZ 96, W7IEU 10, W7IGC 220, N7IU 8, W7LBK 20, W7LG 64, W7PRT 8, K7SUX 52, KA7TTY 25, K7UQH 59, WB7WOW 268, WA7YEN 34, KD7G, KD7ME, KR7L.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: NY6Z. TC: N6AMG. Field Day messages were received from the Livemore Amateur Radio Klub, East of Livermore, with 25 LARK/RACES members participating and the East Bay Amateur Radio Club, from Juan Crespy Jr High in El Sobrante, with 25 members of whom 17 were RACES. K6APW has discovered the DX call signs have changed a lot since he last chased them! MDARC welcomes KB6WNK, N6RNF, AC6Y AND KB6YKM as new members and congratulates the following on upgrades - K6QPN/Adv, Bert Dawson/ Tech, Paul Dickey/Gen, Paul Edwards/Adv, KB6YFX/ Tech, Vicki Zumwalt/Ext, and KJ6GV. LARK congratulates N6GRF on making Extra and KB6WAE on passing his General and getting code credit for Extra. The club is working on reinstating their incorporation status. HRC members KG6MH, N6GWL, N6JRF, W6ZTG and KB6HLX participated in a Kaiser Hospital drill. BARC new officers are N6ERR/Pres, KA6NQJ/VP, N6KVI/Sect and KJ6FY/Treas. They welcomed new member WA1HFN. CCCC mourns the loss of founder and charter member KD6LL. EBARC mourns the loss of member Mae Clark, xyl of WA6KTL. June traffic: WB6DOB/147, W6VOM/122, K6APW/110.

NEVADA: SM, Joe Lambert, W8IXD—ASM: Curly, K7HRW. At least 5 clubs in Nevada demonstrated their emergency preparedness on Field Day, and a good time was had by all. SIERA Net is Monday, 6:30 PM on 147.27. SIERA Fall classes will commence Sept. 9 for Novice class, and Septmeber 10 for Extra Class. Contact W7QO. They will continue until December 3, when exams will be given. SNARS supported the Jr. Olympics again this year. There is now a Reno area NETROM packet on 147.05. LVRAC had its July meeting combined with a tour conducted by NK7N of the Clark County Office of Emergency Mgmt. This is the Emergency Operation Center for Clark County. K7HRW holding VE exams in Reno, October 22. Congrats to Bob Vogelpohl, NR7A, as a new OBS in the Tahoe area. Thanks again, to the 32 Las Vegas area hams who assisted in the Henderson disaster. Truckee Meadows ARA is doing extensive planning for support of the

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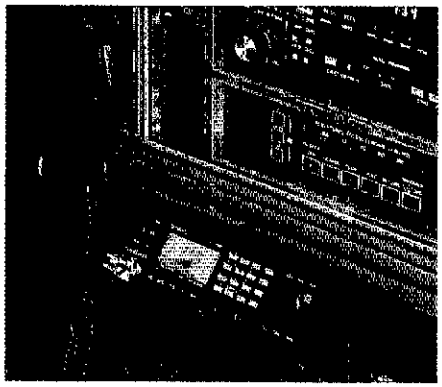

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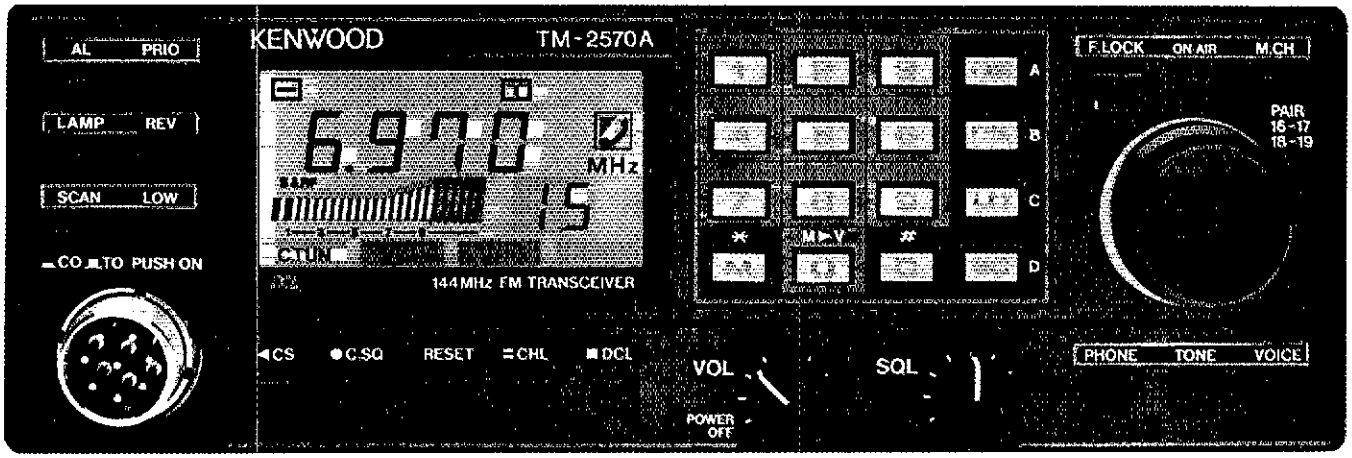
- The TM-3530A is a 25 watt version covering 220-225 MHz. The first full featured 220 MHz rig!

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!



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

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1989 International Winter Special Olympics. Contact WA7MOF for info. Attention all Nevada Hams: The DEADLINE FOR ITEMS OF STATEWIDE INTEREST FOR THE QST COLUMN IS THE FIRST OF THE MONTH.

PACIFIC: SM, Wayne Jones, NH6GJ—Sadly, we had to bid Aloha to Jon, AH6GJ, my predecessor, and Helen, AH6GQ, ASM. I ask everyone to bear with me as I attempt to get my feet on the ground in this new position. I hope to carry on what Jon has started, at least until I get my programs started. I have asked all of Jon's appointees to stay with me until I can get to talk with everyone to find out his or her wishes. Along with the loss of Jon and Helen, the HF Packet Gateway station closed down on July 10. I am trying to locate another station to carry the load. Hope to have one soon. Well, Field Day has come and gone. I hope everyone had as much fun as I did. I managed to visit most of the clubs here on Oahu and they seemed to be having a ball also. Kailua held their 4th of July Parade. The EARC provided communications, coordinated by KH6BI and KH6IS. Participants were NH6IN, WH6BIU, KH6KL, AH6BW, KH6BIO, WH6BKQ, N4ESX, WX4J, WH6I, NH6GJ, KH6CI, NH6OY, KH6JCA, NH6IG, NH6GT, NH6OR. Traffic: KH6GNP 19, KL7IVQ 2, KH6H 45.

SACRAMENTO VALLEY: SM, Bob Watson, W6IEW—Sacramento's River City ARCS is doing fine in their program to equip schools with Novice HF stations. With donated equipment and money raised via a pancake breakfast (publicized in Worldradio) they have enough to equip three schools. In addition, the donation of a computer will allow packet operations at Highland High School. Many clubs do not get around to doing everything that they hope to in a year, but most keep quiet about it. You have to admire the frankness of the Mt. Vaca Radio Club; they have a whole list of uncompleted items in their newsletter. They ARE celebrating their 20th year of existance. The new Butte Amateur Radio Club is celebrating their ARRL Charter as an affiliated club with a picnic. From the Kiskiyou Repeater Association, I learn that the "Old Etna Days" group needs four operators to help in their packing event. What is a "packing event"? Does it have anything to do with packet radio? See—I do read your newsletters, and thanks to those clubs that send them so I can keep up with things in the section. The Sierra Foothills ARC has donated $105 to the W1AW Renovation Fund. That is a worthwhile project that more clubs should consider. Our Technical Coordinator, Jettie, W6RFF has finally solved his own problems with SSB causing telephone interference, now he can advise others how to do it. Just ask him! Sorry to report that Art Fingerle, WA6UZR, has resigned as Public Information Officer for the Southern Counties. Too many other things to do. Traffic: N6LUY 252, WA6WJZ 199, K6SRF 111, WD6BZQ 34, WA6ZUD 80, W6RFF 21, WB6SRQ 6.

SANTA CLARA VALLEY: SM, Glenn Thomas, WB6W—SEC: WA6OCV. TC: WA6PWW. STM: N6JLJ. PIO: WB6OML. ASM: N6JQJ. ACC: W6MKM. BM:(vacant) OOC:(vacant) JUNE - We are doing a number of things to promote training in the area. One of these is the ARRL Class Hotline (listed below). This is a listing of all current license classes that I am aware of. It's only as good as the info I get from YOU about classes, so be sure I know when your club is having licenses classes so I can publicize it. Another of these things that we are doing as part of the section level ARES operation is the weekly training forum. This net is held at 2040L on a number of linked repeaters, including WB6ADZ (146.115+), N6ITW (440.1), W6ASH (145.27-and 224.36) and others. The net is run by Clay NG6A. It's not easy to come up with topics each week, however Clay does an excellent job. The net was started by Dave N6JQJ, our ASM for training. Give it a try if you're interested in emergency service work... The F.O.R.M. group went out for the June VHF QSO party. In one weekend they worked enough six meter contacts for VUCC on 6 meters, along with hundreds of other contacts on 144, 220, and 432MHz over several hundred miles ... There were many service events this month. On one of them, Dave N6KL coordinated Amateur Radio support for a bike ride for the Multiple Schlerosis Foundation. Says Dave, "It's a lot like doing communications for a fire, with coverage needed back into several canyons"... Many area clubs and groups went out for Field Day this year. I received Field Day messages from many groups, including (but not limited to) W6YL, W6UW, KE6N, W6OTX, WA6GFY, K6YA, KF6VB, W6LMN, N6WG (in the East Bay section!?!), KA6ASV, WA6TOW, K6IS (in non-standard format), N6BIS, WA2IBM, K6TM, and K6DYX. Congratulations to KB6BA and WB6MLC on their upgrades to extra class! Once again, no traffic reports this month, where are you guys? OO reports: WN6I, KB6FFW. Phone numbers: Amateur Radio Classes (408) 971-1424. License Exams (408) 984-8353 (ARRL VEC) or (408) 255-9000 (Sunnyvale VEC).

ROANOKE DIVISION

NORTH CAROLINA: SM, W. Reed Whitten, AB4W— ASM: AB4S. SEC: N4MYB. STM: K4NLK. BM: K4IWW. ACC: WC4T. TC: K4ITL. SGL: KE4ML. PIO: AB4FW. My apology for lack of NC Section News last month. SARs & PSHRs were sent in, however. [BT] Danny Hampton, K4ITL, has served as NC Technical Coordinator (TC) for over 4 years. Danny was one of the pioneers of repeater development in NC and has served as Technical Director of SERA. The linked repeater system (PCRN), which he conceived and implemented (with help from MANY Amateurs throughout the state), has been a MAJOR factor in our emergency communications activities. In 1984 Danny received the Order of the Long Leaf Pine from former Governor James B. Hunt Jr. for his role, and the role of PCRN, in emergency communications after the tornados of March 1984 and during Hurricane Diana. In 1985 Danny received the NC Chapter of APCO's Annual Award for his statewide contributions to the development of repeaters and enhancing their role in emergency communication. This award was presented by chapter president Mick Rankin, W4ZUS. Contact Danny if you are interested in an Assistant TC appointment. [BT] A telephone outage in Charlotte on May 21 resulted in loss of 911 service in many counties, long distance and local service between exchanges and many teletype and computer circuits. Emergency communication was provided locally for hospitals and counties; and statewide for Red Cross and NWS. [BT] Hurricane exercise held on June 15 covered 26 counties and had extensive Amateur radio participation. HF link to National Hurricane Center was established for NWS Office in Wilmington. Simulated loss of telephone service and power outages at repeater sites made the exercise authentic and challenging for the participants. Officials praised our performance which resulted in good media coverage for Amateur Radio. Although WE Amateurs often measure our performance by traffic count, we need to realize that EM officials evaluate our contribution by our presence and the number of communication links we can provide. When you are at a strategic location, and are prepared to handle traffic, you are meeting the expectations of the officials!! [BT] Shelby ARC (which has 100% ARRL membership!) will hold their 31st Annual Shelby Hamfest ("the grand-daddy of them all") on Sep 3 & 4. Any other clubs in NC with 100% ARRL membership? [BT] Field Day traffic recieved from: Robeson Co. ARES, Johnston Co. ARS, Cape Fear ARS, Mecklenburg ARS, Union Co. ARS, Brightleaf ARC, Kinston ARS, Cary ARC, Onslow Co. ARC, Transylvania Co. ARC, Wake Tech ARC, Wilson & Rocky Mt. ARCs and KM4AK. TNX to all FD participants. [BT] Traffic for May/June: K4NLK 215/252, AA4TE 203/308, AA4ZV 196/191, K4IWW 137/124, WD4HTE 124/, KA4EYF 99/98, WB4WII 73/66, N9CGD 70/28, KB4OKB 67/ , N4MQU 42/ , KA4TLC 41/ , N4JRE 40/29, WD4MRD 38/52, AB4EO 36/39, KI4YV 32/45, W4EHF 27/23, N4LST 27/25 , WA4MNR 27/26, AJ5F 23/15, N4CJJ 16/11, N4UE 15/26 , WA2EDN 14/23, WB4TOP 7/30, W2JDB 7/ , NC4K 1/14, KA4OJN /56, WD4RMQ /47, W4LWZ /14, W8KLF /2, N4TCH /1

SOUTH CAROLINA: SM, Jimmy Walker, WD4HLZ— ASM: WB4UDK. ACC: WD4HLZ. BM: WØIKT. OOC: W4NTO. PIO: KJ4DT. SEC: K4SUG. STM: W4ANK. TC: WA4UNZ. Our Section had quite a turn out for FD. The reports I received indicated that everyone had a great time. If your club was active and didn't send me a message, you lost out on those easy points. Did you or your club get involved in any type of public relations with your operating activities? Don't forget, good grass roots public information and public relations do a great deal to help us by providing visibility for Amateur Radio. There are other events you can stage other than FD: message booths at malls; solicitation of traffic from local service clubs; regular and frequent dissemination of info about amateur activities through the local media as well as community activities; school programs; presentation to service clubs and community organizations. Exhibits, demonstrations and publicity are essential to Amateur Radio survival. Your club, net or group should have a PIA hard at work involving your members in this effort. Our Section PIO, KJ4DT, can assist your PIA - start a first rate public awareness program. Nets (Apr - Jun): Blue Ridge 6192/198, SCSSB 2581/213, York 2036/228, Greater Pee Dee 1359/154, Lancaster 403/49 Traffic: K4ZN 117, W4ANK 116, KB4BZA 113, N4MEJ 68, KA4LRM 65, W4DRF 32.

VIRGINIA: SM, Mark Witt, NN4I—OOC: W4HU. BM: AB4U. SGL: W4UMC. PIO: AA4VP. TC: WX4C. STM: KB4WT. SEC: N4EXQ. ACC: NT4S.

VTN	1PM	3907	KB4NGO
VSBN	6PM	3947	KI4BR
VSN	6:30PM	3680	N4KSO
VN(EARLY)	7PM	3680	N4GHI
VN(LATE)	10PM	3680	WB4KSG
VLN	10:15PM	3947	W4JLS
SVEN	7:15PM	146.82	NT4S
STARES	9PM	146.97	KJ4VT
DEC/EC	9:45PM (3RDWED)	3910	KA4NWK

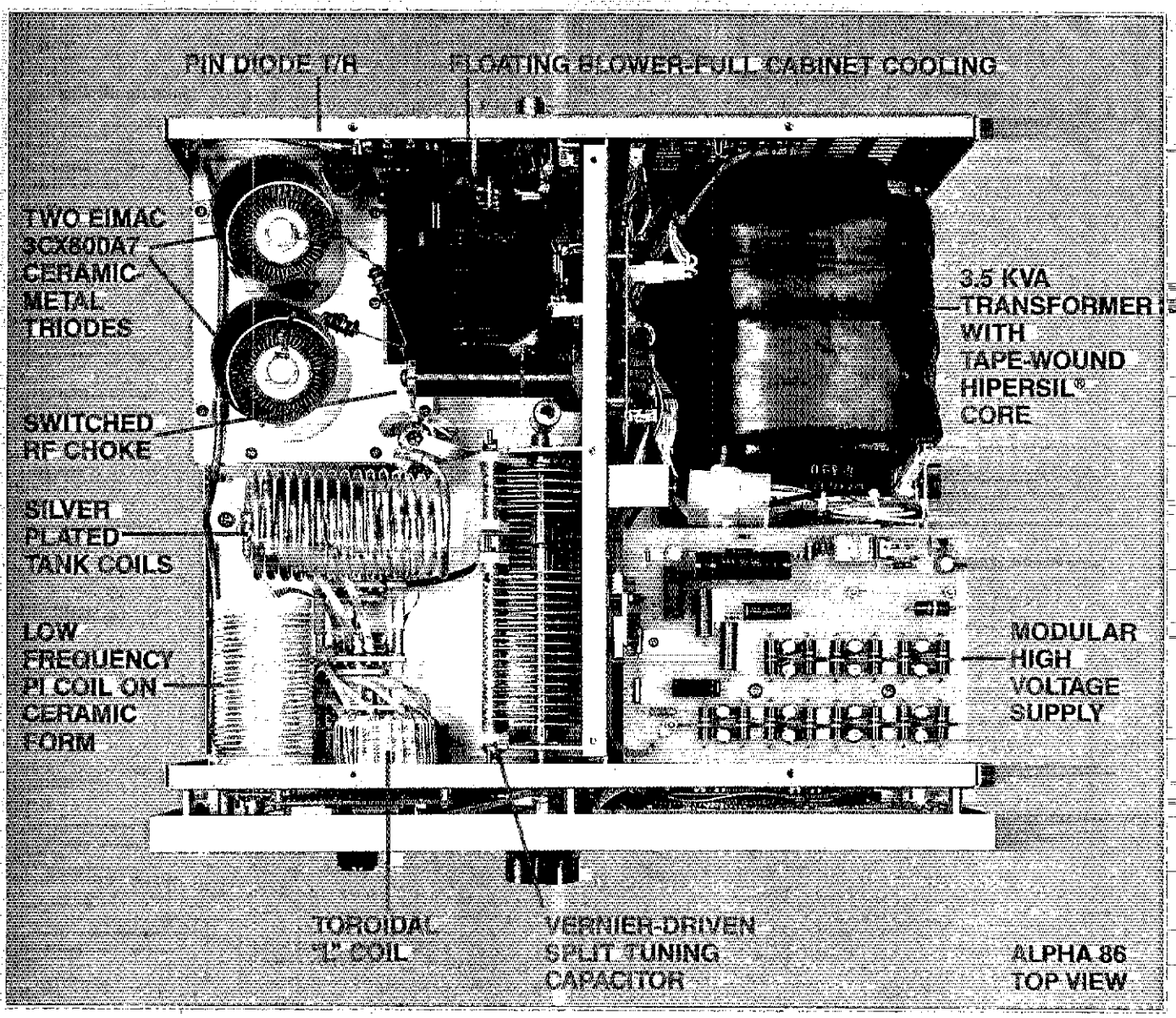
June was busy month for Virginia Hams. Seventy-two Richmond ARES members provided communications for the Special Olympics for the third successive year. The group has been asked to continue on a permanent basis. A plaque was presented to SEC Earl Bishop in appreciation of ARES participation. The plaque will hang in the newly acquired emergency communications van. Later in the month, Amateurs in central and eastern Virginia provided communications for the annual North Anna Nuclear Plant disaster exercise. State officials expressed great pleasure in the drill's success and were especially impressed with packet radio usage. Technical Coordinator Don Landes, WX4C, has built a cadre of Assistant Technical Coordinators with particular strength in RFI/TVI. With the increase in the amount of RFI, we have a strong resource within the state to counteract the problems. Refer problems to Don. The newest Assistant Techincal Coordinators appointments are president of the Valley Amateur Radio Association (Waynesboro) Charles Garner, WA4ITY, with particular interest in TVI/RFI and Dr. John M. Mathis, WA5FAC, of the Southwestern Virginia Wireless Association. John has twenty-nine years of Amateur Radio experience with general technical expertise. (You should see his shack!) September 17-18 is the Division Convention at Virginia Beach. Since we are host Section, I hope all appointees will attend the Saturday noon meeting. Sixteen Field Day messages were received by the SM or SEC. All but two were sent by packet. The accuracy of format of all cannot be vouched for, but the extensive use and accuracy of the packet system was encouraging. Some messages had been relayed by CW and phone thus showing the importance of an interactive system. Packet sysops are encouraged to submit monthly reports to the Section Traffic Manager with a traffic count so that their participation in traffic can be included in ARRL reports. The reports must be in proper ARRL message format submitted by the fifth of the month. Only those messages sent and received in proper message format should be counted by Sysops. Traffic for June: K4DOR 502, N4GHI 447, N4EXQ 346, W4JLS 209, K4MTX 166, W3ATQ 156, WB4PNY 144, KB4WT 96, KB4NGO 82, WD4MIS 81, WB4KSG 73, K4OJH 61, KB4OPR 57, W4TZC 49, KJ4VT 45, KB4PW 42, K4BGZ 40, WB4ZNB 39, WA4LTO 37, K4JM 30, K4GR 30, NN4I 28, N4SMB 26, KK4FV 26, KI4BR 26, N4KSO 21, N4FNT 20, W4HDW 19, W4HU 18, KK8L 18, KI4W 17, K4VWK 16, K4MLC 15, WB4EDB 15, WB4KIT 13, WA4TVS 5, KB4UED 4, WB4ZTR 4, WA1VRL 2.

WEST VIRGINIA: SM, Karl S. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. ACC: WA8CTO. SGL: K8BS. TC: K8LG. Rept Coord: WB6GDY. Jax Mill HF was fairly well attended. WX was great and everyone seemed to have a good time. Tnx to N8FMD and committee. WD8DHC is new WVFN Mgr, WD8V is new WVMD Mgr. Tnx to W8YP and W8FZP for their years of dedication. KU8C was chosen outstanding amateur for 1988, congrats Bob. MARA was FD winners for 1987.

NET	FREQ	TIME	QNI	QTC	SESS	NM
WVFN	3865	6:00	796	149	30	W8YP
HILLYBILLY	14290	Noon Su	108	6	4	W8YP
WVRN	3640	6:30	163	28	30	K8LG
WVN	3567	7:00	332	102	30	KZ8Q

(continued on page 148)

BIG GUN



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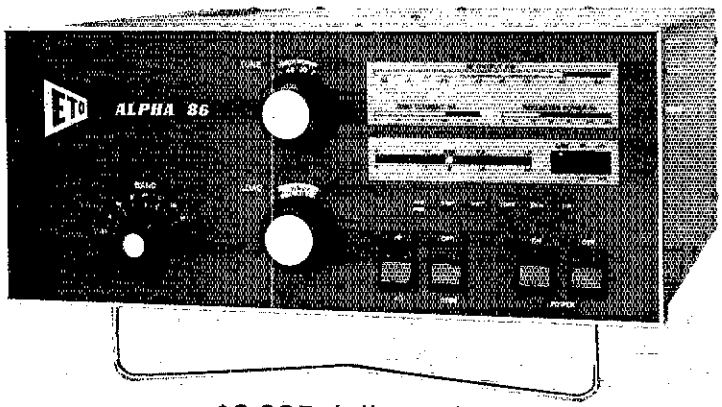

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Phase Noise: What It Means To You

Continuous forward progressions in electronic technology often bring to light new characteristics and measurements associated with modern innovations. Some of those parameters are relatively easy to visualize and understand. Others are more complex and difficult to define, leaving open-ended areas for self-interpretations. A recent example of such vagueness is phase noise: a convention-attending amateur asks a manufacturer's representative about a transceiver's phase noise: then, after hearing a figure, asks if it is considered good or bad. Recognizing the need for tangible descriptions and how they relate to real-life operations, this Tech Talk overviews phase noise from a straight fact rather than heavy technical standpoint. Your understanding of modern technology is important to Icom simply because you are important to us.

Simply explained, phase noise is a spin-off of using frequency synthesizers for generating local oscillator/mixer injection signals in modern transceivers (the heterodyne signal that beats with incoming/outgoing signals and selects frequencies as you turn a transceiver's main dial). Circuitry within that synthesizer includes a reference oscillator, one or more Phase Locked Loops, and several Voltage Controlled Oscillators for covering various bands. Phase noise results when a small amount of the reference oscillator's signal reaches the VCO with a random phase differential. Resultant undesired/spurious signals on the VCO's output appear at the synthesizer's frequency and harmonics of the VCO. They are then applied to mixer stages where they produce random noise both within a utilized bandpass (near-in phase noise) and quite remote to that bandpass (far-out phase noise).

Translated into plain language, that means phase noise on a synthesizer's output injects noise into a transceiver's mixer stage. The noise, in turn, is amplified by subsequent transceiver stages. If a "T/R-common" or front-end mixer is affected, phase noise can be measured not only on the transceiver under test but also on a nearby transceiver as well (via over-the-air radiation during transmit mode). This situation of "one rig getting into another rig", incidentally, is probably the only real-life time when phase noise may be detectable: a multi-multi contest set-up with several transceivers operating simultaneously in one room (and assuming we are not considering kw amplifier noise: a malady that's been around many years).

Since the previous discussion left open ends for drawing misconceptions, lets now consider what is and is not phase noise. We can then consider its techniques of reduction. **Phase noise should not be confused with excessive noise blanker insertion levels with its resultant hash, computer-generated noises picked up by adjacent located transceivers, general band noises (like magnetic storms) and transmitted linear amplifier hiss.** As pointed out in March 1988 **QST**, almost every modern transceiver includes a high gain amplifier strip that boosts low level signals to one hundred watts output (an external power amplifier can increase that power to 1500 watts). An amplifier's circuitry is influenced by internal characteristics like thermal agitation and shot effects, consequently its output is not absolutely quiet. One station's output signal can thus contain a small amount of (amplifier) noise or hiss that can degrade the noise floor of nearby receivers. Should that noise/hiss be accredited to transmitting gear, receiver circuitry, or phase noise? The only true answer to that question is derived through carefully controlled laboratory tests and measurements, as **phase noise is an extremely low level characteristic** and measuring equipment must not introduce extraneous noises for misinterpretations. Indeed, the very low level of phase noise in most transceivers is seldom noticed during usual on-the-air operations.

Effectively minimizing phase noise in modern transceivers involves assuring a spectrally pure and clean sine wave is output from its frequency synthesizer. Icom's outstanding engineers accomplish that most important objective through advanced electronic circuit designs, extensive shielding and incorporation of special bandpass filters within the frequency synthesizer. Additionally, various frequency-related components within the synthesizer are operated near their maximum capacitance values. These techniques yield a very good signal-to-noise ratio mixer injection signal which in turn assures an exceptionally low phase noise level.

While Icom transceivers consistently exhibit low phase noise levels in laboratory tests, considering that parameter as a standard technical measurement like noise floor or dynamic range may prove an overkill. Low levels of phase noise are difficult to evaluate accurately and, with the exception of precision laboratory instruments, easily mistaken for other noises.

Conversely, amateurs seriously concerned with minimizing phase noise in modern transceivers are encouraged to review Icom's superb noise reduction techniques and designs. They are simply one more example of the best in quality, design and overkill performance!

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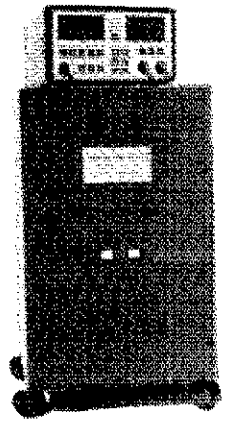

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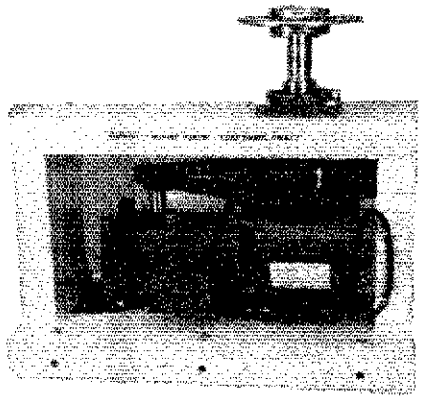

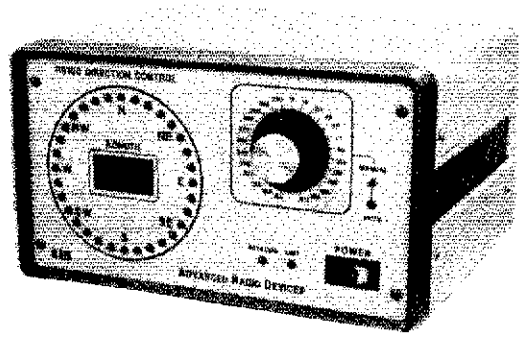

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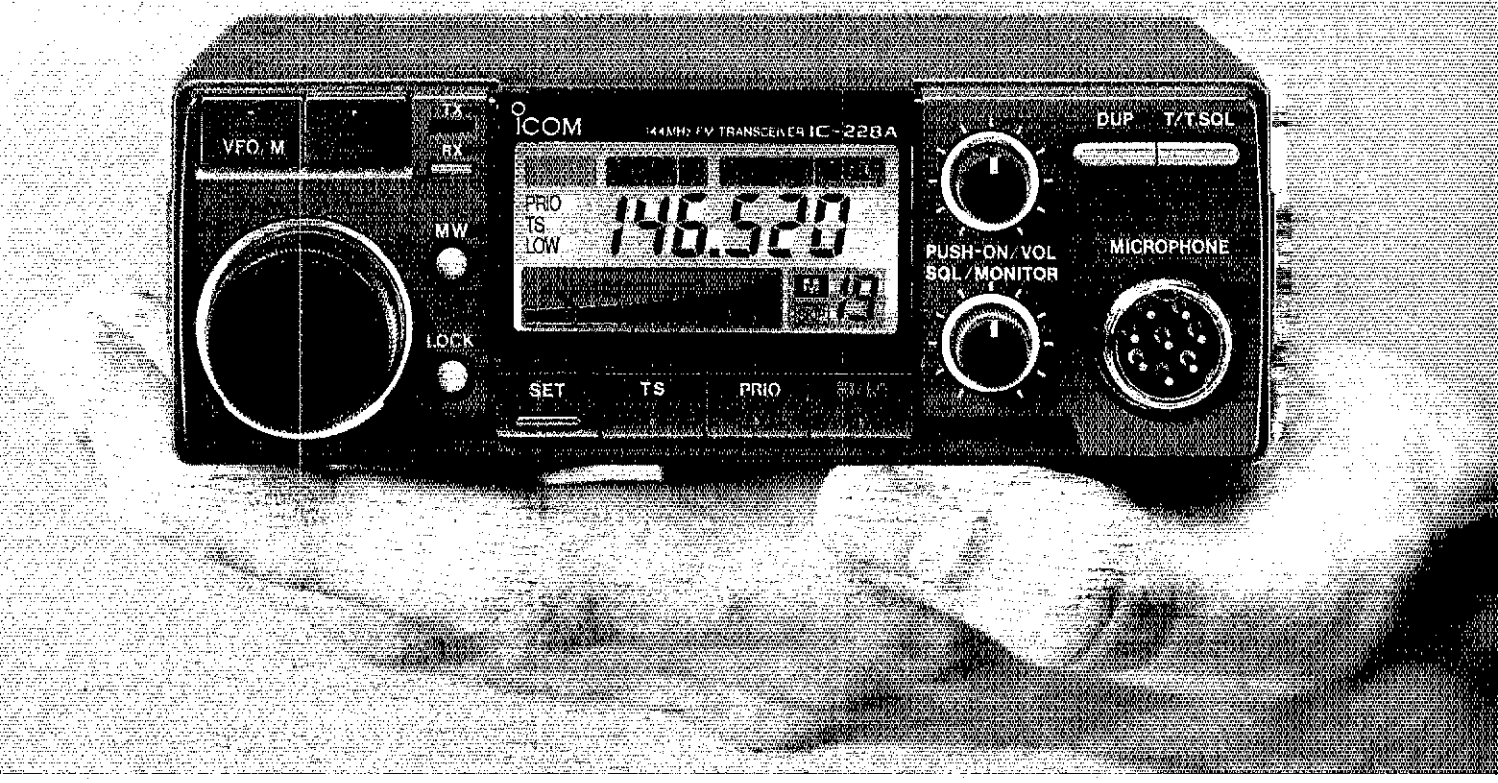

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The IC-228H delivers 45 watts; the IC-228A 25 watts. Both include selectable low power.

20 MEMORIES
Each memory stores any Tx offset and subaudible tone.

SRF INDICATOR
Shows signal strength when receiving, and relative output power selection when transmitting.

MEMORY LOCKOUT
Lights when a memory channel is programmed as a skip channel.

- Wideband Coverage 138-174MHz Rx
- 20 Memories with Memory Channel Lock-Out
- 45/25 Watts
- Color Keyed LCD
- Band and Memory Scanning from Supplied DTMF Mic
- Call Channel
- Optional Beeper
- Priority Watch

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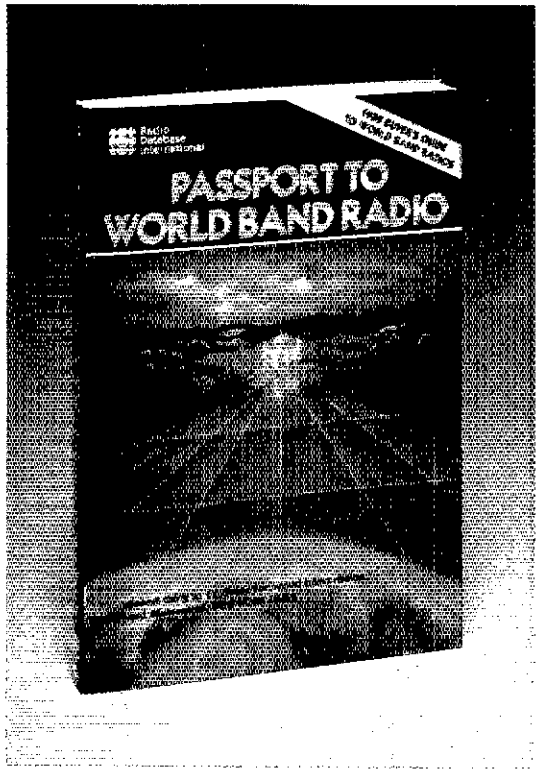

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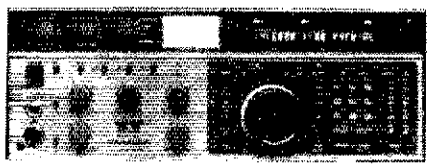

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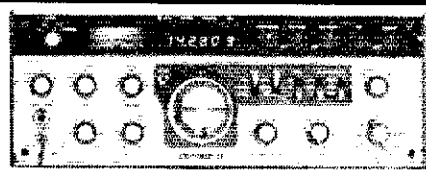
585 9-band xcvr w/.1-30 MHz rcvr	2245.00	1899
960 Deluxe 22A ps w/speaker	239.00	219.95
256 FM transceive module	65.00	
257 Voice synthesizer	89.00	
258 RS-232 interface	65.00	
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
700C Electret hand microphone	37.00	
705 Electret desk microphone	69.00	
1140 18/24.3A DC circuit breaker	18.00	

TITAN	List	SALE
425 1.5kw PEP output linear w/QSK	2685.00	2299



CORSAIR II	List	SALE
561 9-band digital transceiver	1445.00	1249
960 Deluxe 22A ps w/speaker	239.00	219.95
263G Remote VFO	269.00	249.95
282 250 Hz 6-pole CW filter	69.00	
285 500 Hz 6-pole CW filter	69.00	
288 1.8 KHz 8-pole SSB filter	69.00	
603 KR-1B Dual keyer paddle	69.00	
700C Electret hand microphone	37.00	
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1140 18/24.3A DC circuit breaker	18.00	

ACCESSORIES	List	SALE
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3130 30m mobile antenna	28.50	
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3115 15m mobile antenna	25.00	
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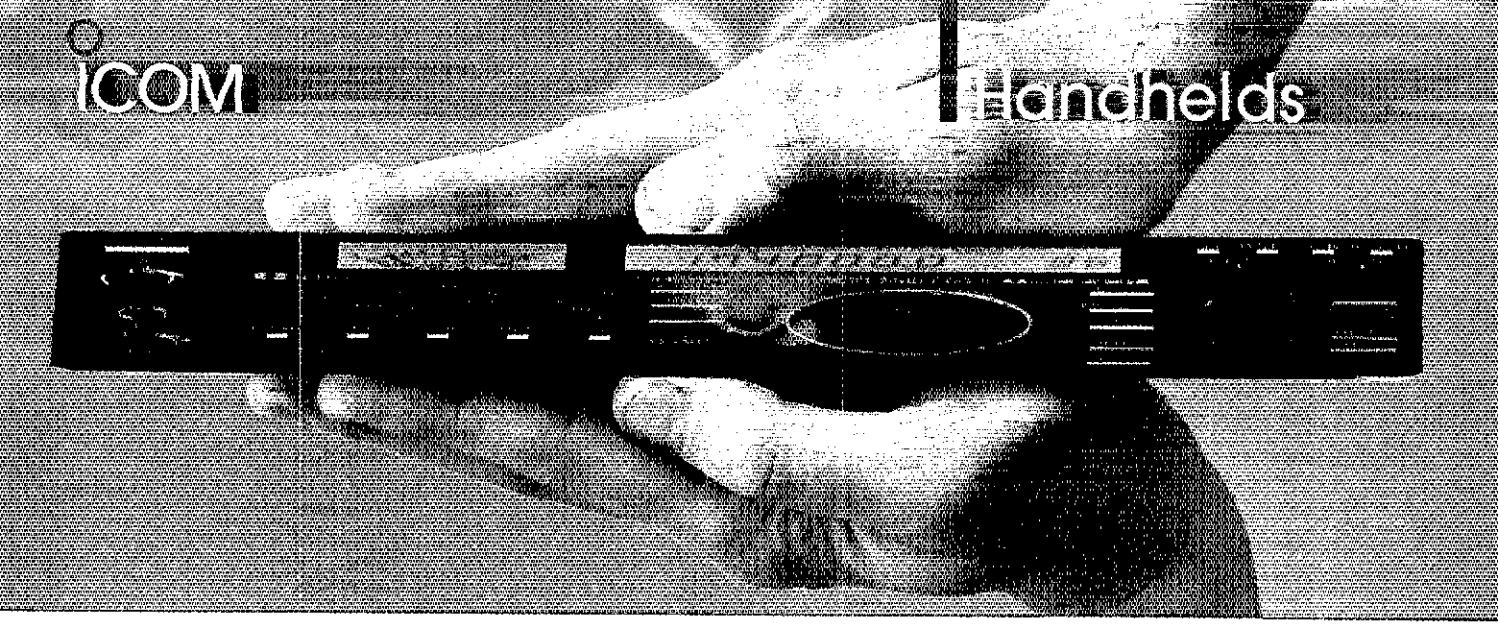
Handhelds



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IC-4GAT: 6 Watts 440-450MHz
IC-32AT: 5 Watts Rx 138-174MHz/440-450MHz; Tx 140-150MHz/440-450MHz

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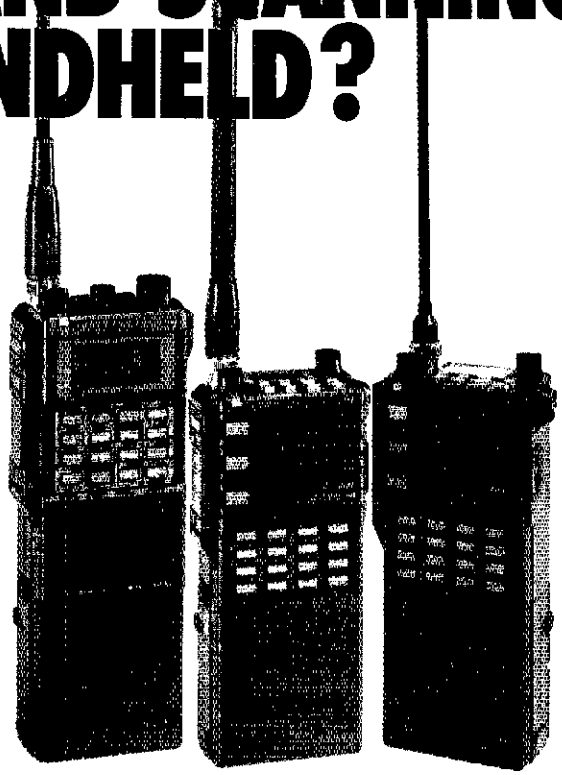
- **20 Memories.** Store any frequency, Tx offset and subaudible tone in any memory. Total flexibility!
- **Programmable Scanning** of band and memories plus easy lockout and instant memory recall.
- **Additional Features.** Battery saver, call channel, all subaudible tones, multi-function LCD readout and DTMF pad.
- **Compatible Accessories.** All ICOM IC-2AT/02AT series battery packs, headsets and speaker mics are interchangeable.
- **Optional UT-40 Beeper** silently monitors a busy channel for your calls. When the pre-programmed subaudible tone is received, the unit beeps and the LCD flashes.



IC-32AT 2 Meters and 440MHz
IC-2GAT 2 Meters
IC-4GAT 440MHz

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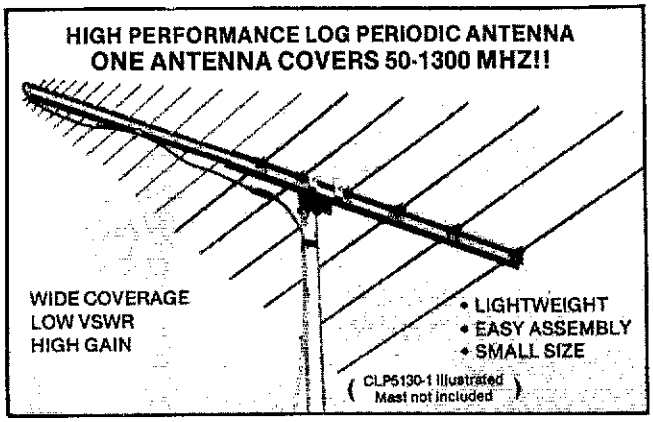
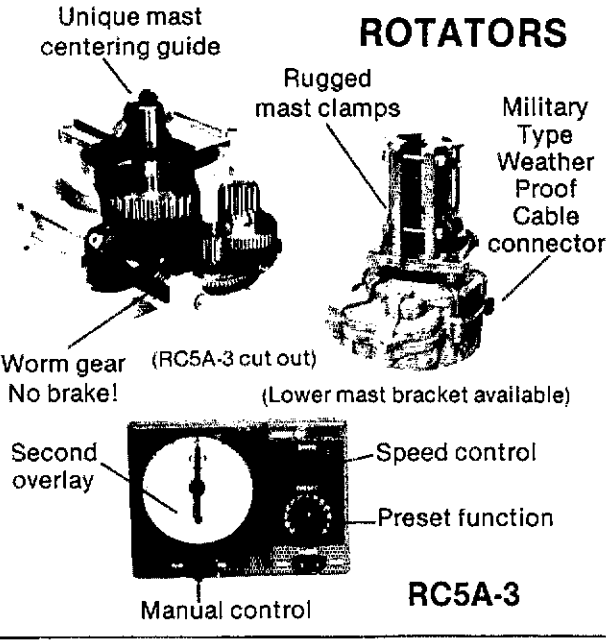


CLP5130-1 50-1300 MHz 25 el. 500W 6' Boom $239 + shipping
CLP5130-2 105-1300 MHz 20 el. 500W 4'6" Boom $139 + shipping

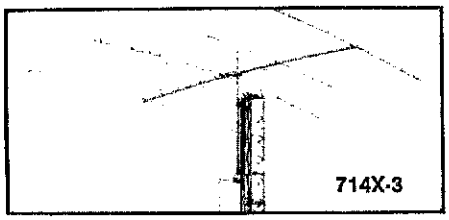
Operate on 6m, 2m, 1¼m, 70cm, 900 MHz and 1.2 GHz using only one antenna and one feedline. No tuning is required and the VSWR is 2:1 or less across the entire frequency range with excellent forward gain. The boom is made of high quality aluminum and the elements are precut for easy assembly. Each model can be mounted for either vertical or horizontal polarization. Create VHF/UHF log periodics are great for the amateur bands, scanners and numerous other applications.

ROTATORS



RC5-1	10 sq. ft.	**$251**
RC5-3	10 sq. ft. preset	**$328**
RC5A-2	25 sq. ft.	**$399**
RC5A-3	25 sq. ft. preset	**$459**
RC5B-3	35 sq. ft. preset	**$736**

All rotators will fit most towers. Please call for additional information.

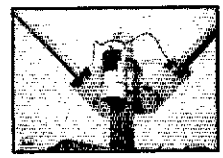


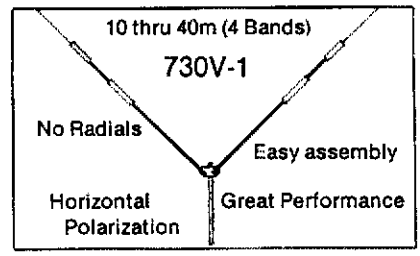
714 Series Tribanders
15-20-40 Meters
On One Boom!

Model	Elements 40-20-15	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
714T	2/4/4	28'6"	43'	25'3"	71	2 kw	$574.
714X	3/4/4	32'5"	44'	26'2"	75	2 kw	$762.
714T-3	2/4/4	28'6"	43'	25'3"	75	3 kw	$707.
714X-3	3/4/4	32'5"	44'	26'2"	80	3 kw	$928.

(Prices include balun)

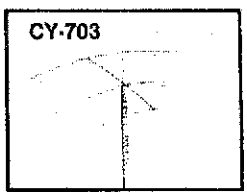
730V-1 DIPOLE!

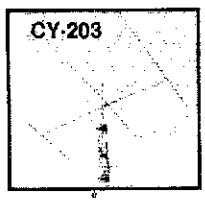


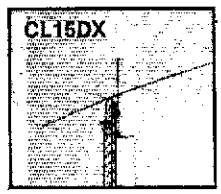


Find out why more and more people are replacing their lossy verticals and moving up to the super performing 730V-1 dipole. The 730V-1 consists of two 19 ft. heavy duty, self-supporting elements and bracket with an efficient balun that is ready for mounting on a standard TV mast. Rotation is not necessary! The V-dipole is superior to standard vertical antennas in gain, noise and efficiency. $159 + shipping.

Rugged High Performance Mono Banders!

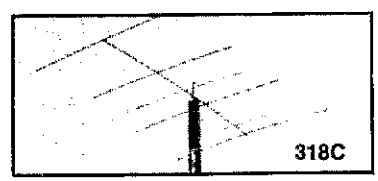






Mono Bander Data

Model	Freq MHz	El.	Boom Length	Longest El.	Turning Radius	Wgt. Lbs.	Power	Price
CY104	28.0	4	18'8"	18'4"	12'11"	19	2 kw	$185.
CL10DX	28.00	6	30'6"	18'½"	16'1"	33	2 kw	$310.
CY154	21.00	4	18'8"	24'5"	15'5"	21	2 kw	$205.
CL15DX	21.00	6	40'8"	24'3"	24'3"	58	3 kw	$559.
CL20	14.00	4	30'9"	36'8"	36'8"	58	3 kw	$495.



318 Series Tribanders
10-15-20 Meters

Model	Elements 20-15-10	Boom Length	Longest Element	Turning Radius	Wgt. Lbs.	Power PEP	Price
318JR	3/3/3	13'1"	31'1"	15'9"	28	1.2 kw	$289.
318	3/3/3	16'4"	31'1"	17'4"	40	2 kw	$345.
318B	3/4/4	20'11"	31'1"	18'4"	49	2 kw	$434.
318C	5/5/5	29'10"	31'1"	21'	58	2 kw	$643.
318B+7	1/3/4/4	20'11"	37'7"	19'11"	52	1 kw	$606
						2 kw	

(Prices include balun)

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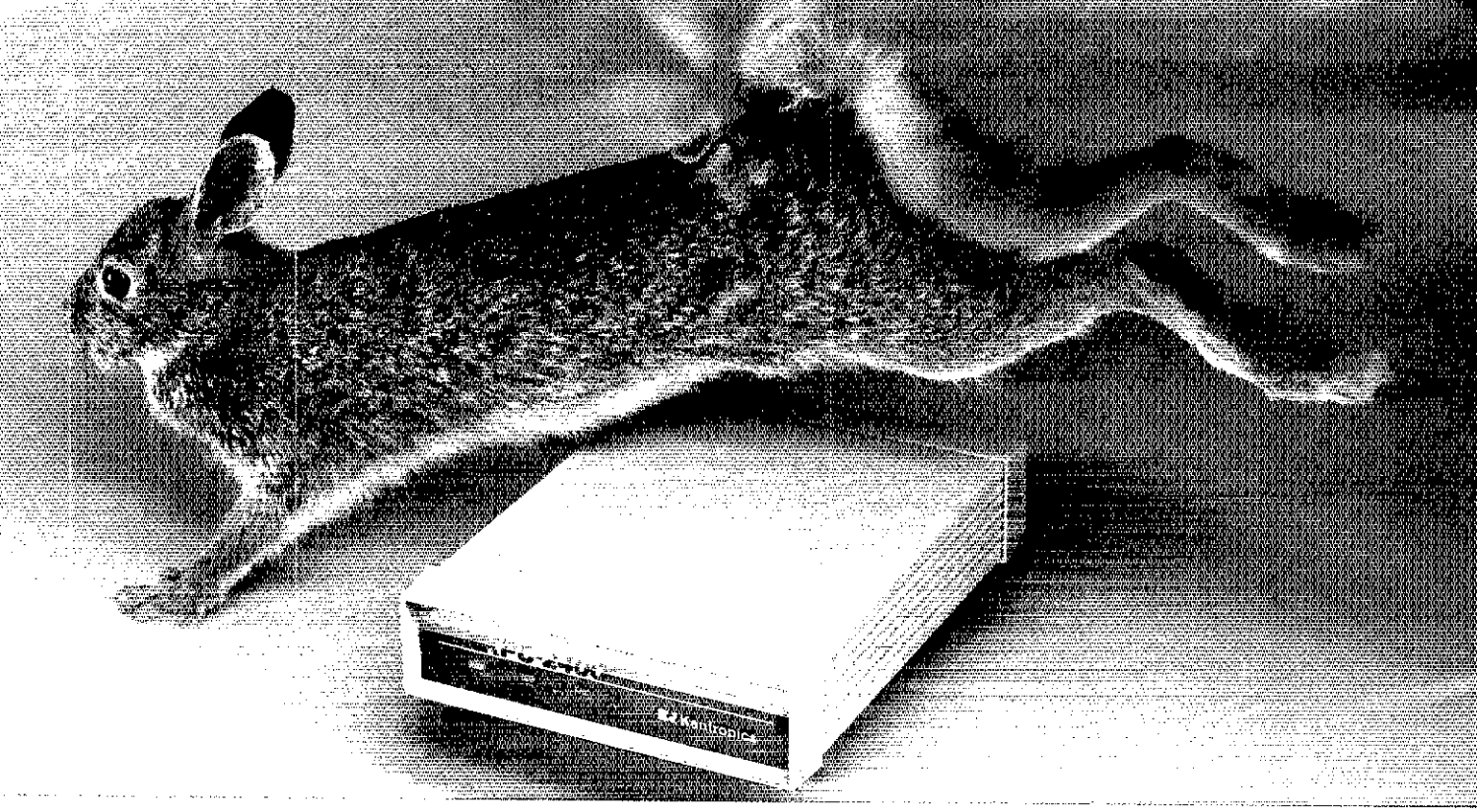

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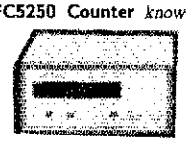

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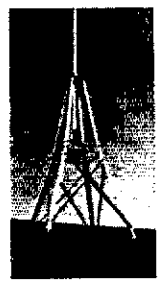

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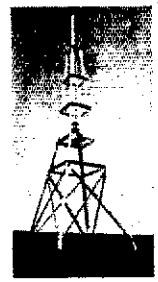
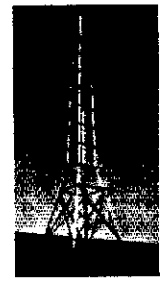


CR-30



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30M	26 ft. (7.95 A.)	
40M	26 ft. (7.95 A.)	≈40 ft. (12.2 A.)
80M	26 ft. (7.95 A.)	≈65 ft. (19.8 A.)

Electrical and Mechanical Specifications

Shipping weight: 12 lbs./5.4 kg
Height: 26 ft./7.9 m
Feedpoint impedance: nominal 50 ohms through included matching line (includes RF connectors for direct connection to any length of 50-ohm cable terminated in PL-259).
VSWR at resonance: 1.5:1 or less on all bands in typical ground level or above ground installations
Bandwidth for VSWR of 2:1 or less*: 10 meters - 1500 kHz; 15 meters - entire band; 20 meters - entire band; 30 meters - entire band; 40 meters - 350 kHz; 80/75 m. - 40 to 100 kHz
NOTE: These SWR bandwidths are what may be expected over ground systems of more than average conductivity. Over average or less efficient systems even greater bandwidths are likely.
Power Rating: Legal limit SSB and CW all bands
Wind loading: 1.8 sq. ft./.48 sq. meters
Unguyed wind survival rating: 80 m.p.h./128 k.p.h. assuming no icing and precipitation

Installation

Comes complete with 2 ft./79 cm. tubular mounting post (1-1/8 in. O.D.) for direct placement in earth or into standard steel TV mast (1 1/4 in. O.D. with .058 in. wall) or Buttemut Mounting Post (Model MP5). Eye-level adjustment of 80, 40 and 30 meter resonator coils, length adjustment on 15 and 10 meters, 20 meter adjustment is a function of 40 and 30 meter tuning. Coils for 80/75, 40 and 30 meters are 3/16-in. diameter aluminum wire, air wound and self supporting, typical spacing between adjacent turns is 1/2 in. or greater.

Model HF6V-X, an export/DXpedition version suitable for surface parcel post shipment to most countries is available. Electrically identical to the standard model. Shipping weight 12 lbs./5.4 kg.

HF6V 127.00

MISC ITEMS

UXA	160, 80, 40 dipole	49.95
AP151-3G	2m on glass	36.95
UGM	1/4 λ mag	21.95
HB144BN	2m duck	16.95
MONR51	scanner mag	39.95
BL1500	9:1 balun	46.95
Coaxseal		2.95
GR6	6' gnd rod	6.00
5RG58N	5' jumper	4.99
M5	5' mast	5.95
CS3G	3-way switch	33.95
LAC2	Blitz Bug	8.95
4UU	4" jumper	8.95
TRT60	5' tripod	19.95
AR300XL	TV rotor	59.95
258XUU	25' cable	9.95
508XUU	50' cable	15.95
758XUU	75' cable	20.95
1008XUU	100' cable	25.95
CS201	coax switch	26.75
CS401	coax switch	109.95
	AND MORE!	

ROHN

20G	10' sect.	45.95
20AG	top sect 9'	56.95
25G	10' sect	57.95
25AG2	top sect 9'	67.95
45G	10' sect.	137.95
45AG2	top sect 9'	140.95
AS25G	access shell	22.95
AS45G	access shell	56.95
TB-3	thrust bearing	53.95
M200	10' mast	19.95
SB25G	short base	26.95
SB45G	short base	56.95
EP2545G	gin pole AND MORE!	324.95

HUSTLER

6BTV	6 band trap vert.	147.95
5BTV	5 band trap vert.	125.95
4BTV	4 band trap vert.	95.95
G7-144	Fix stat 2mt collinear	125.95
MO-1/MO-2	mobile masts	22.95
RM10/RM15	10m-15m resonator	12.95
RM10S/RM15S	super resonator	17.95
RM20/RM20S	std & super resonator	16.95/22.95
RM30	30mt std resonator	17.95
RM40/RM40S	std. and super	18.95/26.95
RM75/RM80	75 or 80 std.	19.95
RM75S/RM80S	75 or 80 super	37.95
BM-1	bumper mt	16.95
SSM-2	stainless ball mt	18.95
SSM-3	spring	16.95
QD-1	quick disconnect	15.95
SGM-2	2mt. 5/8 mag. mt	28.95
H0T	trunk mt. w/swivel ball AND MORE!	17.95

VAN GORDEN

PD8010	80-10 dipole kit	35.95
PD8040	80-40 dipole kit	33.95
PD4010	40-10 dipole kit	31.95
SD80	80 shortened dipole	29.95
SD40	40 shortened dipole	26.95
ALL BANDER	160-10mt.	28.95
GR5V	AND MORE!	49.95

KLM

KT34A	triband 4 el	
KT34XA	triband 5 el	
2M-14C	2mt. satellite	
2M-22C	2mt. satellite	
435-18C	70cm satellite	
435-40CX	70cm satellite	
432-30LBX	70cm satellite	
2M-13LBA	2 meter	
2M-16LBX	2 meter	

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		per/ft.
Belden 9913	Low Loss	.54
Columbia RG213	50 Ω (OHM)	35cts
RG8/U	Foam	30cts
RG 8X	Mini	22 cts
RG59/U	72 OHM	14 cts
PL259/Silver		99/1.39
N-Male for 8/U		4.00
BNC(M)-UHF(F)		4.80
Columbia Low Loss		39cts

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A4	4 el. triband	363.95
A3	3 el triband	259.95
AV5	5 band trap vert	117.95
32-19	19 el. 2mt. boomer	107.95
215WB	15 el. wide band 2 mt.	85.95
424B	24 el. 70cm boomer	85.95
416TB	16 el. OSCAR 435 MHz	67.95
A144-10T	10 el. OSCAR 145.9 MHz	57.95
AOP-1	OSCAR pack 2mt & 70cm	167.95
AR-2	2mt. vert. ringo	27.95
ARX-2	2mt. vert. ringo ranger	34.95
ARX-2B	2mt. vert. ringo ranger II AND MORE!	41.95
R4	4 band vert AND MORE!	214.95

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HF6V	80-10 vertical	127.00
HF2V	80-40 vertical	119.00
2MCV5	2MT vertical	54.00
RMKII	roof mtg. kit	45.00
TBR160S	160m add on	47.00
MPS	mtg. post sleeve	6.00
HF5B	HF mini beam	199.95

HY-GAIN

TH7DXS	7 el. triband		
TH5MK2S	5 el triband	C	
EX-14	4 el triband	A	P
TH3JRS	3 el 750W pep	L	R
18AVTS	5 band trap vert	L	I
14AVQS	4 band trap vert.		C
V2S	2mt omni-direct	F	E
V4	70cm omni-direct	O	S
HB144MAG	2mt. mag. mt. AND MORE!	R	

HY-GAIN ROTORS

T2X	20 sq. ft.	359.95
HAM IV	15 sq. ft.	299.95
CD45II	8.5 sq. ft.	213.95

DAIWA ROTORS

MR750E	16 sq. ft	319.95
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MR750U	motor	99.95

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440 MHz	64.95

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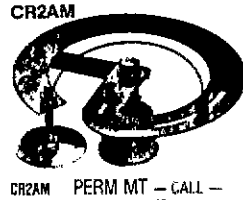
LM150	2m coil & whip	29.95
NMOMM	mag mt.	19.95
NMO150	2m coil & whip	27.95
NM02/70	coil & whip	38.50
KD4270	dual band duck	26.95
LM220	220 coil & whip AND MORE!	25.95

UNTENNA

CR2AM



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CR4A	140MHz Mag MT	34.00
CR2RD	Radome Cover — CALL —	12.00

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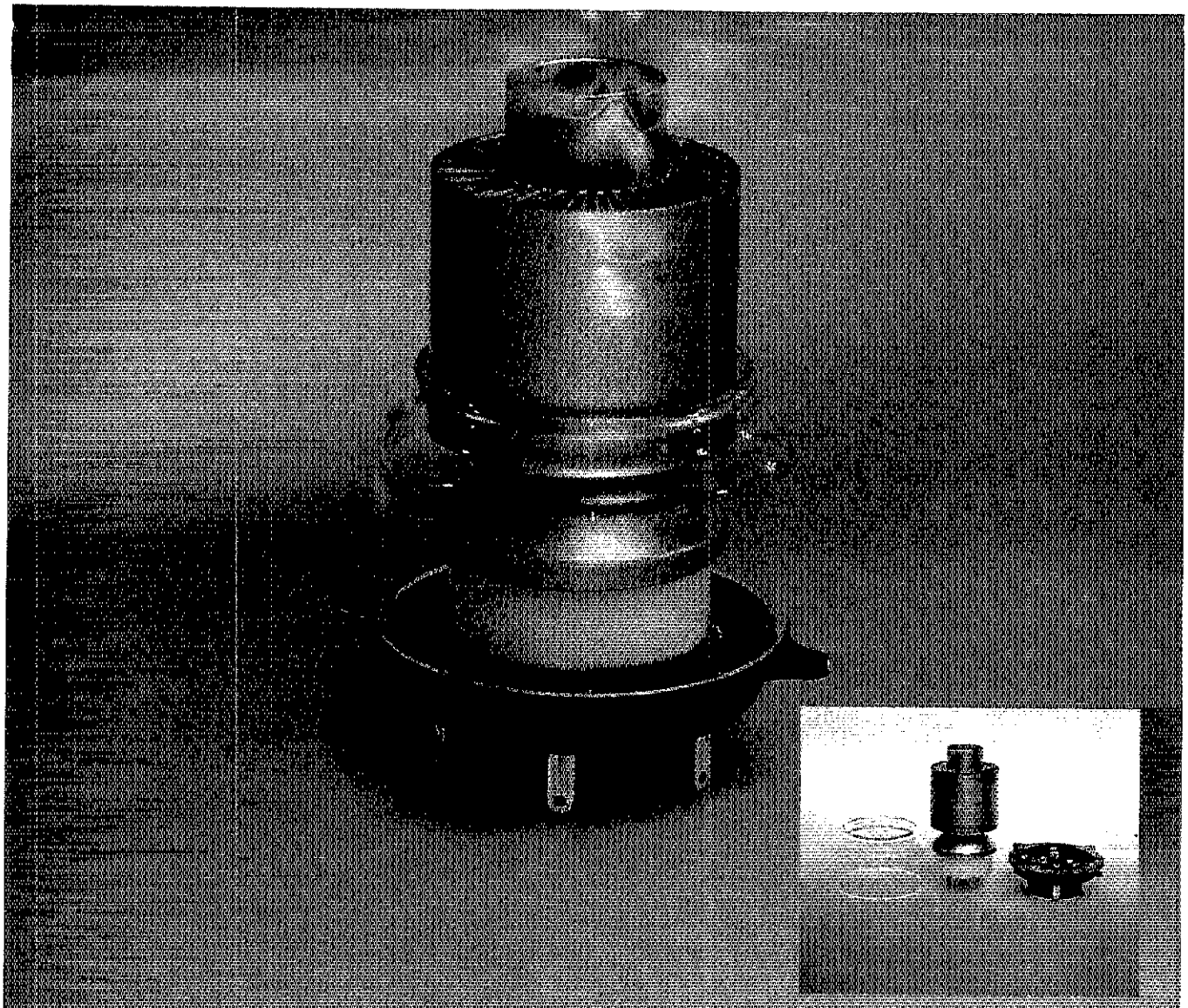

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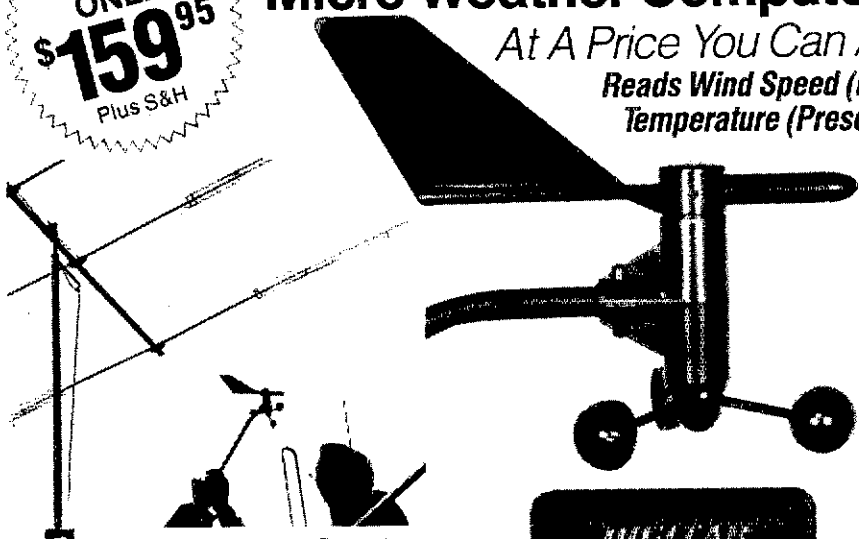

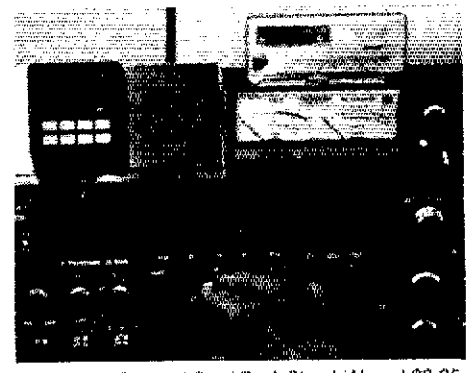

Optional Steel Desk Stand (Above) $9.95

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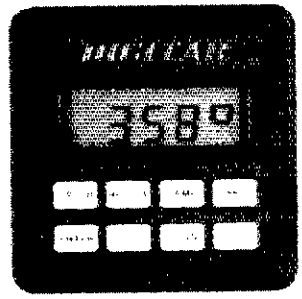

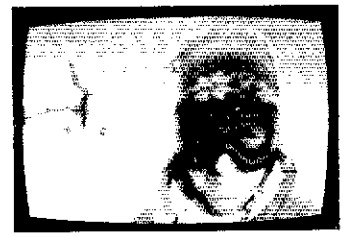

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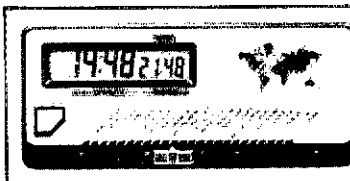

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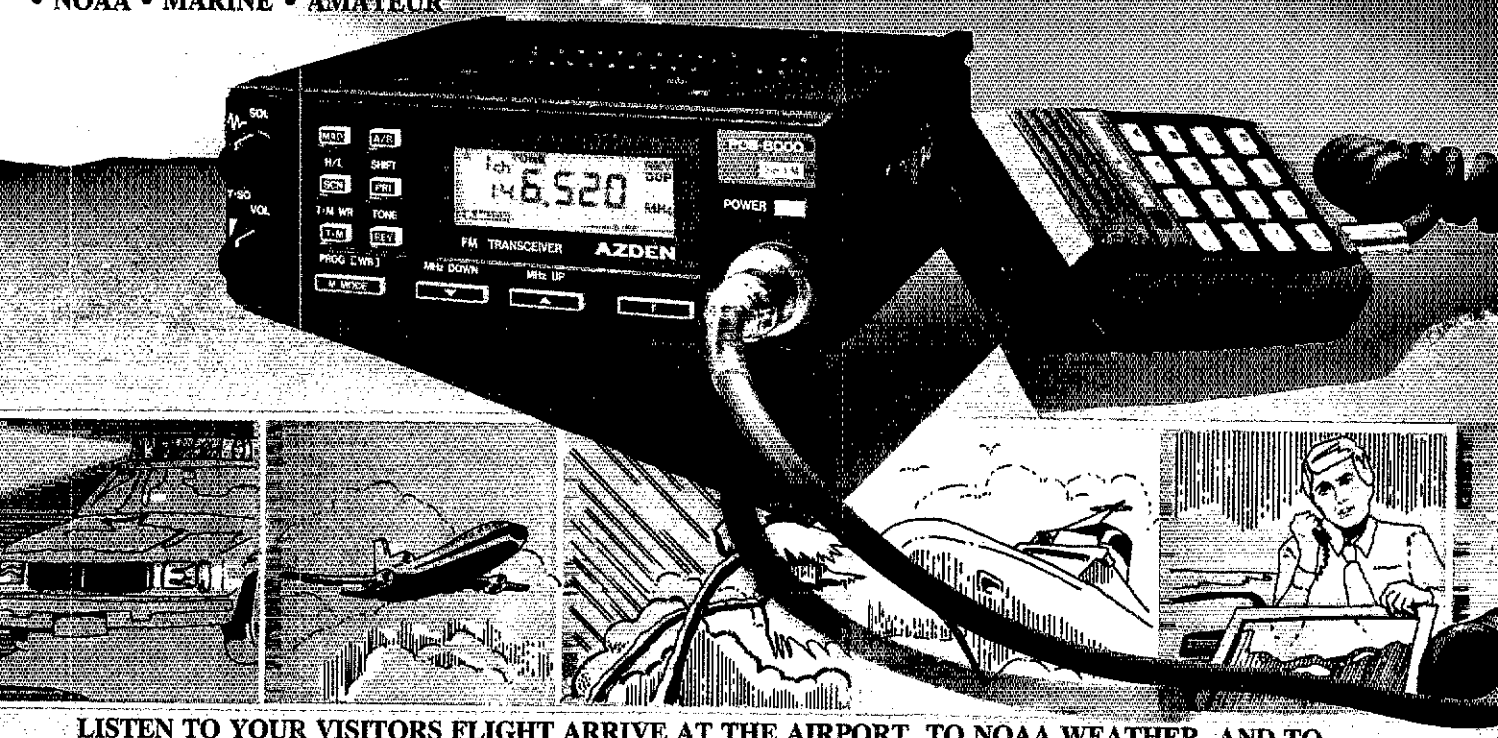

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20 CHANNEL MEMORY IN TWO BANKS PLUS 1 TEMPORARY CHANNEL (TM): Two memory banks, A and B have 10 memory channels each. The memories store frequency, shift width, offset information, and PL tone frequency as programmed. *An extra memory channel (that we call TM-temporary memory) is provided to allow you to store any operating condition instantly again and again!!*

UP TO 21 NONSTANDARD SPLITS: Program any split in any channel.

VERSATILE SCANNING FUNCTIONS: Dual memory scan, programmable band scanning, hold scan and delay scan functions are provided, with selectable delay time. ALL memory channels are tunable independently.

PRIORITY CHANNEL MONITORING: Memory Channel B0(the first channel in memory bank B) is monitored every four seconds regardless of any operating condition. When a signal is received, a beep is heard.

DISCRIMINATOR CENTERING (AZDEN EXCLUSIVE PATENT): Always stops on frequency desired when scanning.

PROGRAMMABLE FREQUENCY STEPS: In memory, frequency steps can be set at 5KHZ to 20KHZ in any increment.

BUILT-IN PROGRAMMABLE TONE ENCODER: 57 different tones are built in for instant programming of PL tones into memory channels and microcomputer. Tone frequency can be entered independently in RX and TX. A tone decoder is available as an option.

LITHIUM BATTERY BACKUP: Memory information can be stored for up to 5 years even if power is removed.

FREQUENCY REVERSE: Allows you to listen to repeater input frequency.

FEATHER-TOUCH TUNING CONTROL KEYBOARD: The LED backlighted light touch keyboard performs all tuning operations simply by pushing the key(s) and key actuation is audibly verified.

LARGE LCD (LIQUID CRYSTAL DISPLAY): The LCD display shows the operating frequency, S/RF, memory channel in use and various other operating functions. The LCD is back-lighted by green LEDs, making it possible for you to read the display even in total darkness.

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MICROPHONE CONTROLS: Up/Down memory and frequency control.

TRUE FM, NOT PHASE MODULATION: Unsurpassed intelligibility and audio fidelity. High/Low Power: 25W/45W or 5W/10W (6000/6000H). Output-Fully adjustable.

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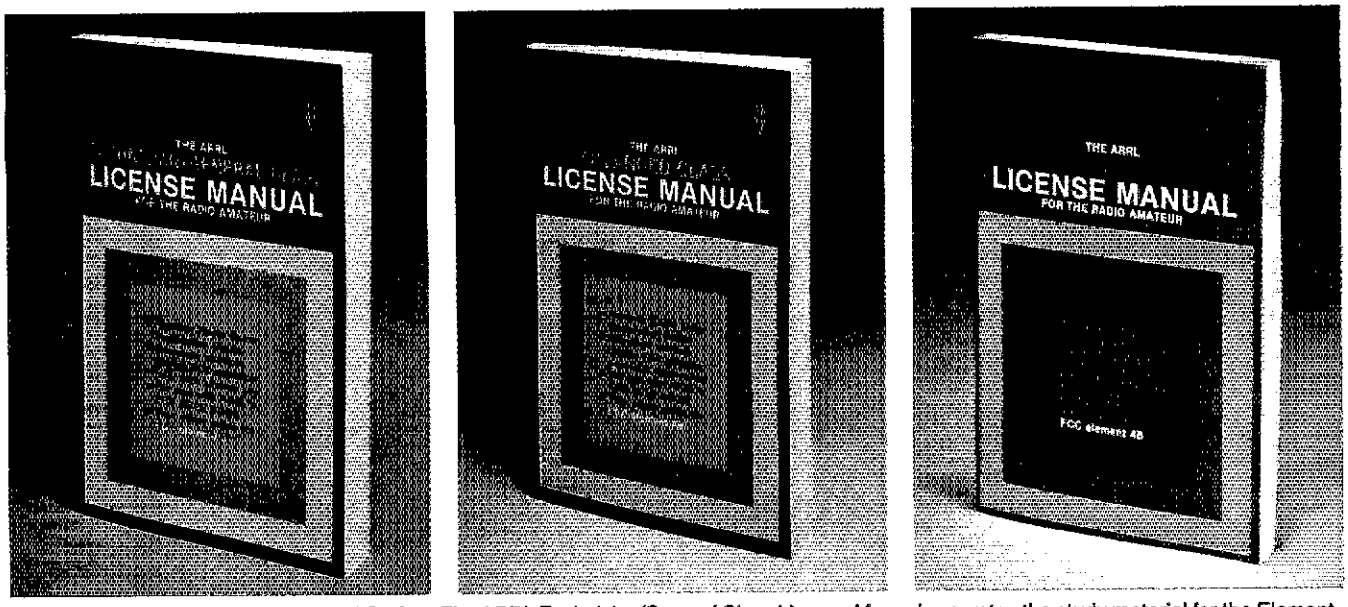
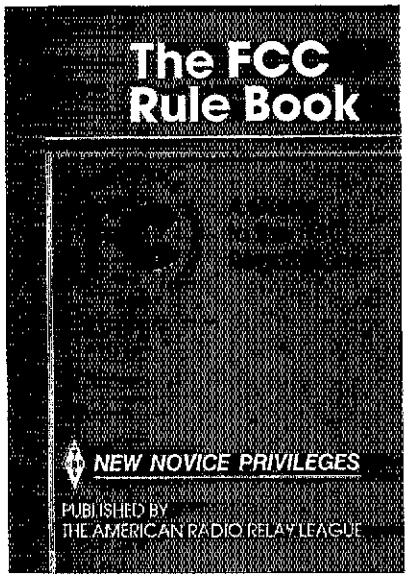


The popular **ARRL License Manual Series.** *The ARRL Technician/General Class License Manual* separates the study material for the Element 3A (Technician) and Element 3B (General) exams for easy study. The material covering the Technician Class is good for exams given through Oct 31, 1989; the General Class material is good through Oct 31, 1990. *The Advanced Class License Manual* is good through Oct 31, 1990 and *The Extra Class License Manual* shown is good for exams given Nov 1, 1988 through Oct 31, 1991.

New Extra Class License Manual

The latest of the **License Manual Series** to be updated includes the new Element 4B (Extra Class) question pool that will be used on exams given from Nov. 1, 1988 through Oct. 31, 1991. The text is organized in the order of the new Study Guide Syllabus released by the VEC Question Pool Committee. There is an alphabetical glossary of key words and important terms in the text are highlighted in bold print. Problem areas on the exam are detailed.

Our popular **beginner's package,** *Tune in the World with Ham Radio* will be good through Oct. 31, 1989 and is just the "ticket" for the prospective Novice! Don't forget that it now comes with 2 90-minute cassettes that were revised with this edition to teach the code painlessly. Other publications like *The FCC Rule Book* which has current FCC regulations are listed below.



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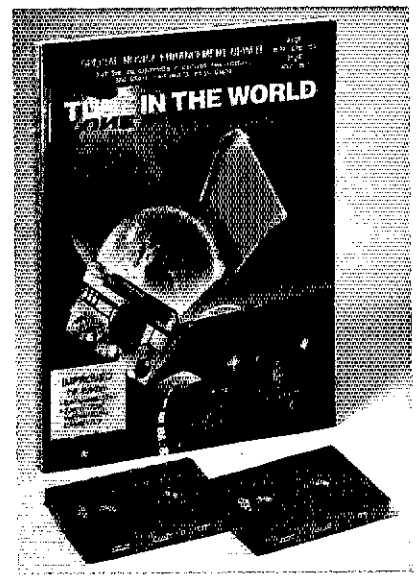

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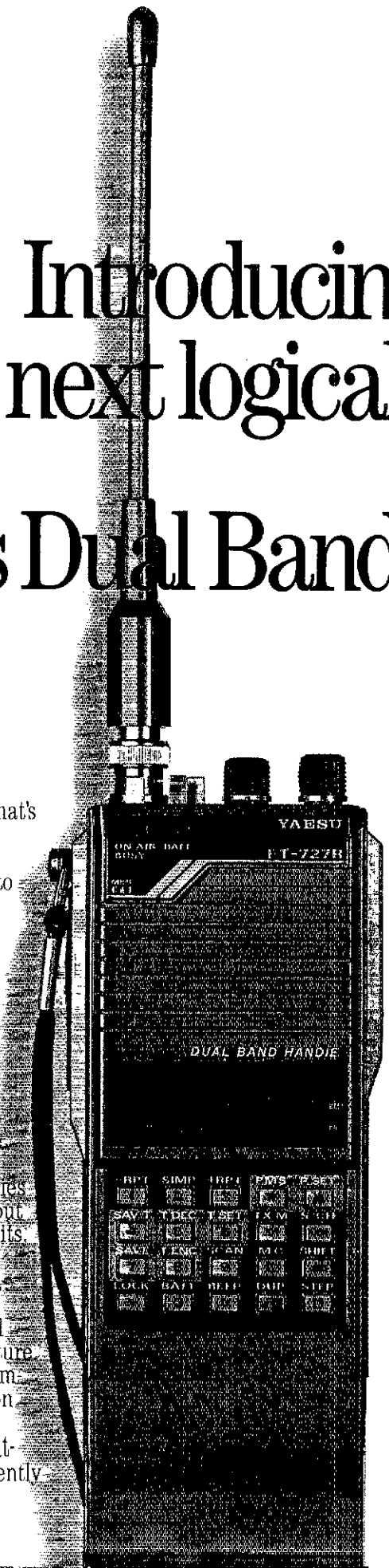

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Hit hard-to-reach repeaters with a powerful 5 watts on both 2 meters and 440 MHz.

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Jump between the separate VHF and UHF VFO registers. Program each of the ten memories for instant recall of repeater input and output frequencies, odd splits, and tone encode/decode.

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Finally, your operation is rounded out with features like VOX capability. A one-touch repeater reverse switch. An LCD readout with illumination lamp. A high/low power switch. Remote computer control capability. An optional CTCSS module. And Yaesu's full line of optional accessories.

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Prices and specifications subject to change without notice.

The New 688-page ARRL Operating Manual is HOT...

On July 8, 1986, a railroad tanker carrying toxic phosporous derailed and caught fire near Miamisburg, Ohio. The success of the Monsanto Amateur Radio Association's emergency plan in helping local authorities deal with this potential disaster is documented in November 1986 *QST*. The photograph above which was taken over the scene by Mike Carter, WD8BSI, shows what could happen in your backyard! Would you be ready for such a situation? The Emergency Communications chapter by Richard Regent, K9GDF, in the new *ARRL Operating Manual* tells how to prepare for such an eventuality. Emergency Communications and efficient message handling go hand-in-hand. Maria Evans, KT5Y, tells all about this subject and how you can become a part of the National Traffic System in the expanded Traffic Handling chapter.

Over forty percent of the radio amateurs licensed today were at one time or still are shortwave listeners. With modern transceivers, it's possible to hear what is going on outside our ham-bands. David Newkirk, AR7M, adds his enthusiasm for this closely related hobby in the SWL chapter. On a related subject, Paul Rinaldo, W4RI, tells us about the characteristics of the Amateur Radio Spectrum and how our bands are assigned.

Most hams are interested in just getting on the air and talking to someone. Even so, ham radio is a lot more than talking into a microphone or pounding a telegraph key. Carol Smith, AJ2I, and Bill Jennings, K1WJ, have prepared a chapter on Basic Operating. It is just what the newcomer needs in order to get started, and it's good review for some of us who have been away from ham radio for a while. Almost everyone can qualify for the Rag Chewer's Club Certificate, but do you realize that there are hundreds of Amateur Radio awards from throughout the world? Well you can see dozens of these awards in *full color* along with their requirements in the Awards chapter by Bob Halprin, K1XA.

Clarke Greene, K1JX, tells all about competitive operating. Clarke has won almost every major contest, HF, VHF/UHF, from home and away, using full power and QRP. Now he tells how it's done!

Almost everyone seems to be interested in digital communications these days. Stan Horzepa, WA1LOU, covers Packet Radio in detail; while Larry Wolfgang, WA3VIL, covers RTTY and other digital modes in a separate chapter. If you find SSTV or ATV of interest, Bruce Brown, WA9GVK, has put together a fantastic chapter on Image Communications.

If you still need to work the countries represented by the QSLs below, you're not alone; but you can pickup some good tips on working DX from well-known DXer and author Bob Locher, W9KNI. DX-peditioner Carl Henson, WB4ZNH, gives advice on how to operate from the "rare ones" without catching malaria or worse! You can find out when to work DX at anytime during the sunspot cycle by referring to the propagation tables which were newly incorporated in this edition. You'll also find sunrise-sunset tables for working DXCC countries around the world, and there is a great chapter on Antenna Orientation by *ARRL Antenna Book* editor Jerry Hall, K1TD.

Besides "packet," WA1LOU tells what is new in the area of FM and Repeater operation. This chapter is "must" reading for Novices who want to use repeaters for the first time or for those who want to upgrade their existing repeater operations. There is a lot doing these days on weak signal VHF/UHF work and Mike Owen, W9IP, shows how it's done from moonbounce to meteor scatter. Will you be ready for the OSCAR launch that may take place later this year? Dick Jansson, WD4FAB, captures us with his satellite operating techniques.

You'll also find numerous handy tables and charts in the third edition of *The ARRL Operating Manual*. It is edited by Robert J. Halprin, K1XA, Deputy Manager of Membership Communications at ARRL HQ. The new edition is available at your dealer or from ARRL for $15. (Please add $2.50, $3.50 for UPS for shipping and handling.)

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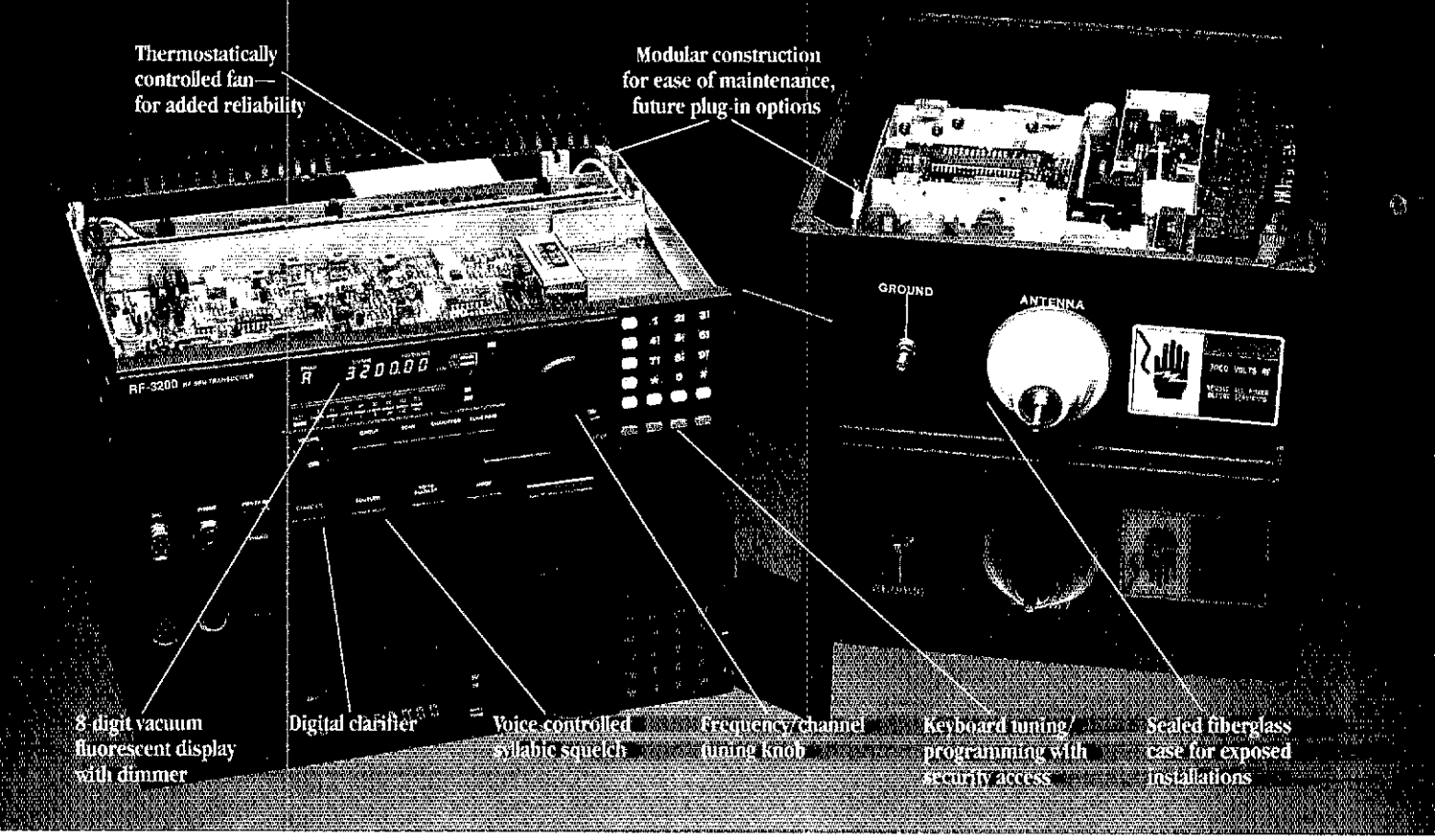

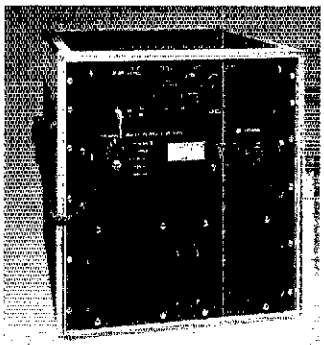

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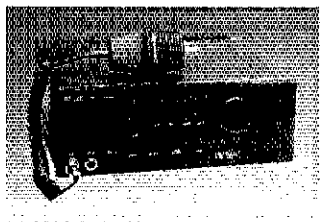

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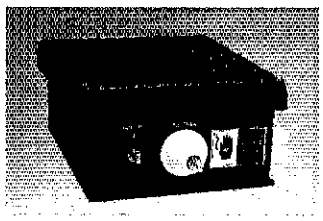

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Each of the following chapters is written to make understanding packet radio a breeze: The Radio Hacker, History, Theory of Operation, TNCs, Installation, Selecting TNC Parameters, Operating Procedures, VHF and UHF Communications, HF Communications, Time-Shifting Communications, Public Service Communications, Space Communications, and The Network. In addition there are these appendices: TNC 1 and 2 Commands, TNC 1 and 2 Control Characters, TNC 1 and 2 Messages, TNC Command Compatibility, ASCII Character Set, Bibliography and Sources, Glossary. Price of *Your Gateway to Packet Radio* is $10 plus $2.50 ($3.50 for UPS) shipping and handling.

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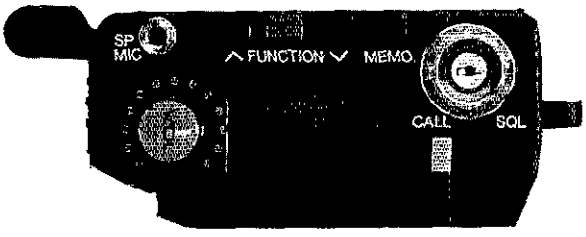

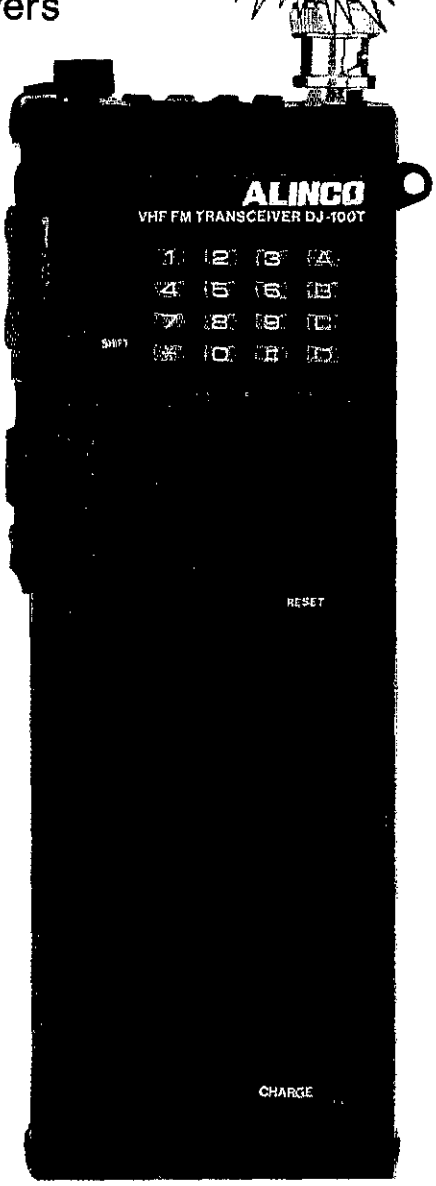

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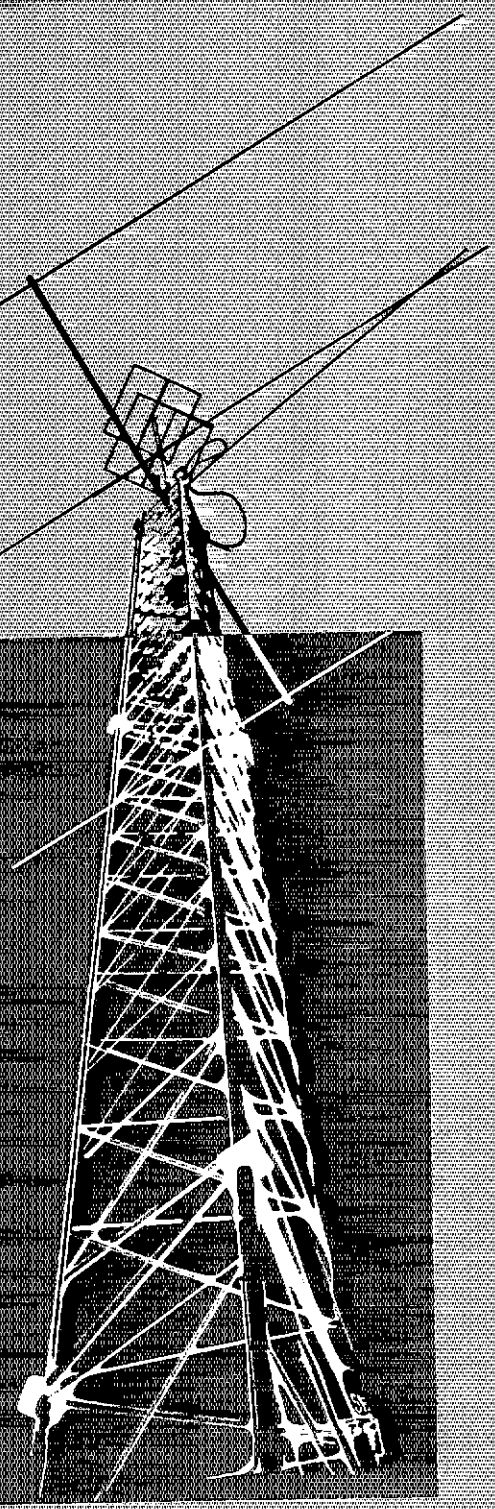

The 15th Edition of *The ARRL Antenna Book* has been dramatically expanded in a similar fashion to recent editions of the *ARRL Handbook* and the *ARRL Operating Manual*. We've drawn on material produced by the ARRL Technical Department and from 16 well-known outside authors who have done much to contribute to the state-of-the-art in antenna and transmission line design. Available in softcover only for $18 at your dealer or directly from ARRL (shipping and handling: $2.50, $3.50 for UPS)

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The number of pages appears in parentheses after the chapter title. Page counts may vary slightly. Safety First (18), Antenna Fundamentals (42), The Effects of the Earth (14), Selecting Your Antenna System (30), Loop-Antennas (16), Multielement Arrays (42), Broadband Antennas (12), Log Periodic Arrays (24), Yagi Arrays (26), Quad Arrays (14), Long Wire and Traveling Wave Antennas (18), Direction Finding Antennas (26), Portable Antennas (10), Mobile and Maritime Antennas (30), Repeater Antenna Systems (20), VHF and UHF Antenna Systems (44), Antennas for Space Communications (32), Spacecraft Antennas (8), Antenna Materials and Accessories (20), Antenna Supports (22), Radio Wave Propagation (26), Transmission Lines (26), Coupling the Transmitter to the Line (18), Coupling the Line to the Antenna (28), Antenna and Transmission-Line Measurements (36), Smith Chart Calculations (16), Topical Bibliography on Antennas (32), Glossary and Abbreviations (4), Contents, Index, etc (16).

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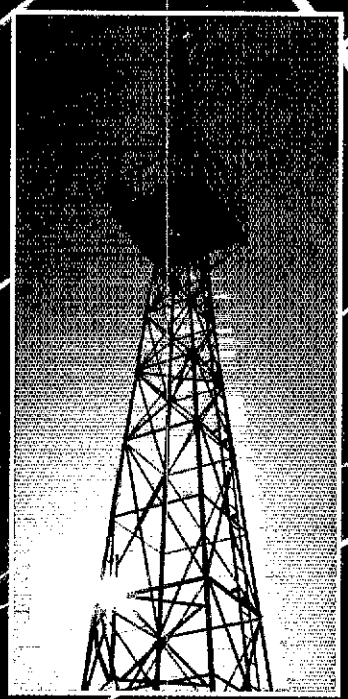

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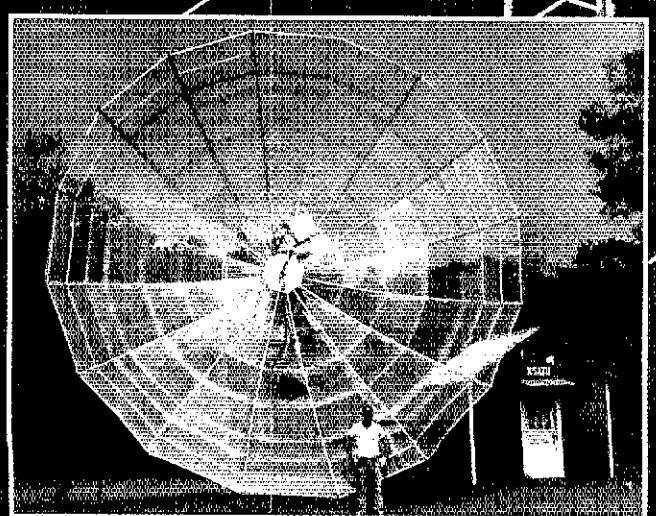

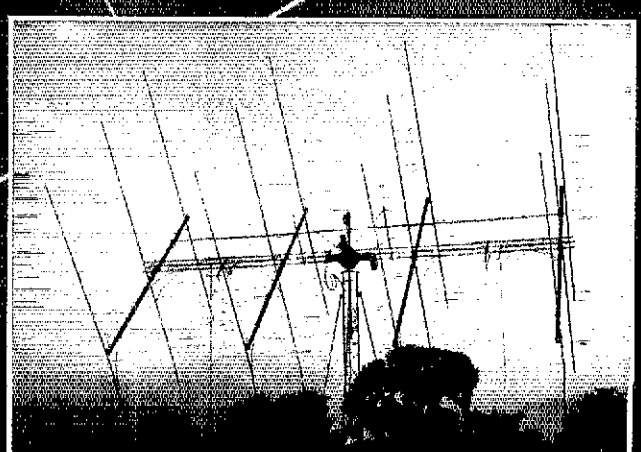

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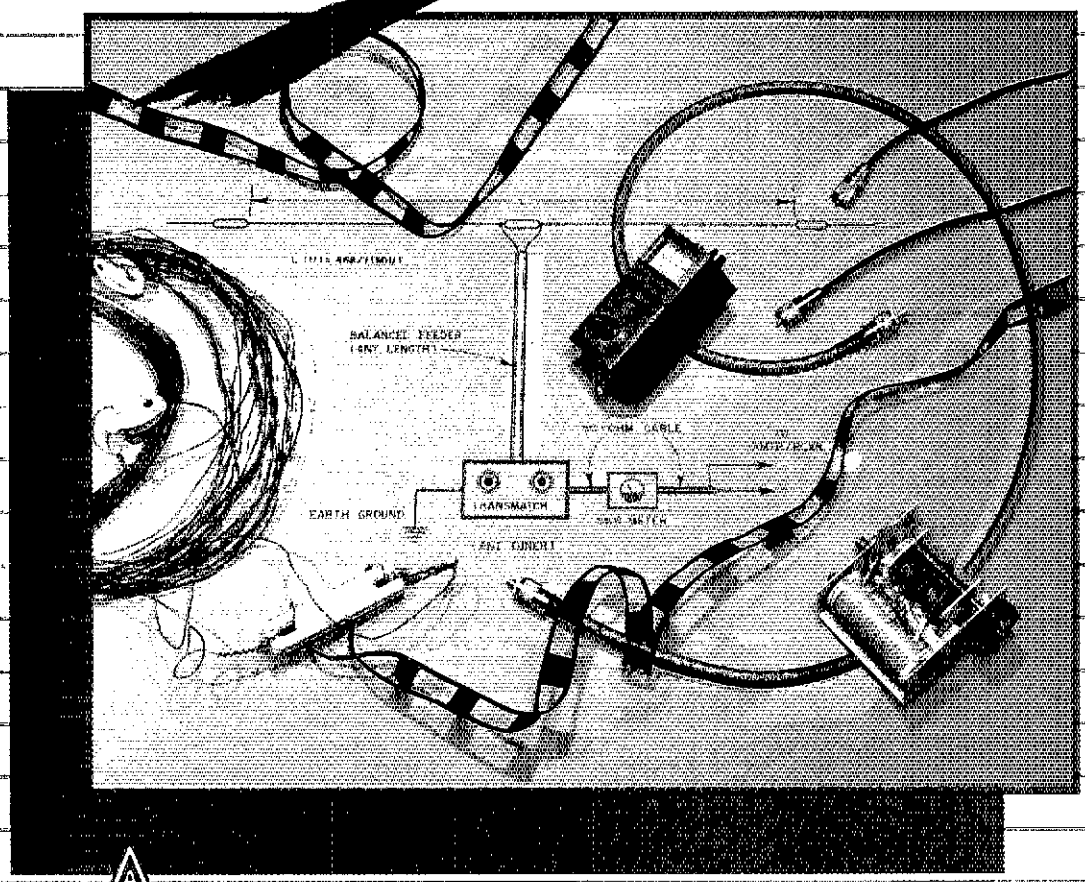

By Doug DeMaw, W1FB

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ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J—ASM: KA0MQA. SEC: WB0TUB. STM: KB0Z. ACC: WB0DUV. TC: W0LJF. OOC: KA0CDN/W0IJR. PIO: N0DZA. SGL: WB0FQB. Congratulations to two of our affiliated clubs who participated in the Bicentennial Celebration with special event "200" call signs. Denver Radio Club "W200TX" and Durango Amateur Radio Club, "NX200S." For our many traffic handlers, ARRL is looking for a NTS logo. Send your design to K1CE, FSM at ARRL HQ by October 1, 1988. Congrats to K0WOP and the many amateurs here on the front range who worked communications for the annual International Golf Tournament. Congrats also to E.C.H.O. for their communication efforts during the Jerry Ford Golf Tournament. It has been an active summer with swapfests and club picnics. The last swap of the season is scheduled for September 25th. Barkfest, this is a new location this year. Boulder County Fairgrounds. Hope to see you there. Attended the WIMU Convention in Macks Inn in Idaho for the annual Rocky Mtn. Division Section Manger meeting. It was very infomative and good to see some old friends, and meet many new ones. 73, KQ0J. NETS: Col: QNI 891, QTC 63-91, QNF 874, 28 sess. CWN: QNI 59, QTC 15, QNF 34, 26 sess. HNN: QNI 1689, QTC 132-373, QNF 1144, 30 sess. NCTN: QNI 207, QTC 86, QNF 324, 30 sess. SCTN: QNI 258, QTC 20, 29 sess. Traffic: N0HFZ 478, K0HOA 162, WB0FFV 66, KB0Z 56, KA0WIE 54, K0NI 31, KE0BI 18, W0NFW 03.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. DEC: WD5HCB. STM: ND5T. NMs: WA5UNO, KA5NNG, W5QNR. TC: W8GY. ACC: KA5BEM. Southwest Net meets daily, 3583 at 0230 UTC, handled 95 msgs with 181 checkins. NM Roadrunner Net meets daily, 3939 at 0100 UTC, handled 66 msgs with 1146 checkins. NM Breakfast Club meets daily, 3939 at 6:30 AM, handled 148 msgs with 868 checkins. Yucca 2-mtr Net, 78/18, handled 2 msgs with 380 checkins. Caravan Club 2-mtr Net, 66/06 with 111 checkins. SCAT Net, 66/06 handled 7 msgs with 556 checkins. Info Net 12/72, with 100 checkins. Sunday Noon Packet Net, ZIA LINK, 32. Alamogordo Hamfest Sept 3-4, Totah ARC Picnic Sept 10, Santa Fe Hamfest Sept 24, Albuquerque Balloon Fiesta Oct 1-9. So very sorry to report the passing of N5LIW. We will sure miss Art. Field Day was a huge success all over the state and a little damp at some sites. Traffic: W5DAD 78.

UTAH: SM, Jim Brown, NA7G-SEC: Rich Fisher, NS7K. STM: John Sampson, W7OCX. FD was fun again this year, rain showers and all. Hope you enjoyed it too. Kevin, N7IUN, is new NM for the Utah Code Net. Let's support Kevin and get on the net once in a while—the UCN National Security Exercise was held for 2 days in June, with hams in 15 counties participating. It was a good test (we learned some things. We used phone, CW, and packet. Tnx to RACES, ARES, and MARA ops! 73 de NA7G. Traffic: N7JLC 74, WA7KHE 62, WA7MEL 54, N7BQE 41, NS7K 37, N7IUN 22, NA7G 20, W7OCX 9.

WYOMING: SM, Jim Raister, N7GVV—ASM: Steve Cochrane, WA7H. SEC: Jim Anderson, W7TVK. STM: Dan Ransom, K7MM. A big thanks to Dan for agreeing to serve as STM. I've asked Dan to look at Wyoming's long-range traffic handling needs, etc. If you have any input, let Dan know. Received a very informative newsletter from the SHY-WY club. Their new club station is at 19th & Brent, stop in. Just a reminder, to get items in this column have them to me by the 5th of the month. Traffic: NN7H 106, W7TZK 220. Cowboy Net 22 ses/ 600 QNI/8 QTC; Pony Express 4 ses/ 158 QNI 5 QTC. W7ILL reports AREA V ARES held 4 sessions with 28 checkins. Congratulations to Dick Murdock, KC7AR, KC7AR, for being named 1987 Ham of the Year. 73 till next month.

SOUTHEASTERN DIVISION

ALABAMA: SM, James Spann, WO4W—ASM: W4XI. SEC: KB4GDN. STM: N4RT. ACC: AA4BL. PIO: KB4KCH. SGL: N4FRQ. OOC: KF4VS. TC: N4QQI. BM: KA4ZXL. The ALANET packet radio network in Alabama continues to expand with most areas now on separate LAN frequncies. Many NET/ROM and KA-NODE digis are on the air helping to speed the throughput. Packet radio is a very efficient method of handlings traffic and other important messages . . . with large BBS systems now on the air in Huntsville, Anniston, Birmingham, Montgomery, Robertsdale, and other locations across the states. Sorry to report Vic, WA4HBG, of Fayette is a Silent Key. Hams in Kentucky used our information on getting GTE phone rates lowered on repeater autopatch systems with great success—GTE there followed suit after initially saying no! Our PSC hearing here with South Central Bell will be coming up soon—let's hope we have the same luck with S.C. Bell as we did with GTE on getting our rates reduced to residential. We want input from you on a final plan to link FM repeaters in our section. Let, N4QII, KB4GDN, or me know your thoughts on this—we want to get the ball rolling soon! Look for our monthly Section News from KB4KCH on packet around the 15th of each month—it is a great way to stay in touch.

Net	Freq	Ses	QTC	Mgr
ATNM	3965	34	74	WO4E
AENB	3575	76	76	W4QAT
AEND	3725	30	39	KA4BPR

PSHR: WA4JDH, W4PIM, W4CKS, N4RT. BPL: WA4JDH. Traffic: WA4JDH 847, W4PIM 177, W4CKS 179, WO4W 26, N4RT 19, W4DGH 16, WB4TVY 2.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM & ACC: WA4ABY. SEC: NC4E. STM: NC4E. STM: WB4WQL. Asst STM (Packet) W4QO. BM: WB4ZOJ. OOC: W4TG. PIO: WB4DEB. SGL: WB4UVW & TC: WD4PAH. 1988 is the 125th anniversary of the Battle of Chicamauga, the most costly engagement ever fought by American Soldiers. To honor those who fought, on both sides, the Civil War battle will be re-enacted in Summerville, Georgia, on the weekend of Sept 16, 17 & 18. This is going to be BIG . . . 5000 plus infantry, calvary, artillery etc, 10 to 15 thousand craft & tradesmen, womenfolk, children & camp followers plus 25,000 spectators each day. *GEORGIA ARES* has been requested to assist with *COMMUNICATIONS* & the needs are many. Units are needed for internal communications & coordination, fixed & remote units for field communications & emergencies plus battlefield

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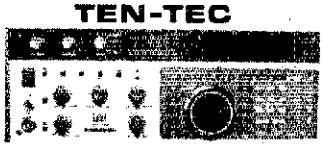

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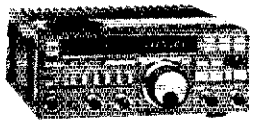

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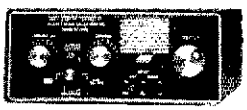

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coordination for the re-enactments. The organizers will provide meals & lodging & make available for supplementary activities, such as a SPECIAL EVENT STATION & commemorative QSLs. We will need all types of operators with all interests: net operators, ttc handlers, digital, installers, climbers etc. This is GEORGIA's opportunity to really show what we can do. Even if u can't participate, pass this info along on repeaters, BBS nets etc. WE NEED ALL THE HAMS WE CAN GET TO PULL THIS GREAT BATTLE OFF. Send info to: John Heard, N4JJK, 2003 Brookview Drive, Dalton, GA 30720 or by packet, WB4ZOJ @ WA4VMV. Let's all get out & support this great cause. PSHR nominees for June are: WB4DVZ, WB4WQL, W4RWB, KF4FG, KA4HHE, KB4JPN & W4HON. HAMFESTS in the SECTION are: MADISON on Aug 27 & 28, Augusta on Oct 22 & 23, Gainesville on Sept. 25 & Rome on Oct 2. A lot of effort is put into these affairs. Won't u help support them? W4TG informs me that he can still use some more OO's in the program & NC4E says to please fill out an ARES card at ur earliest convenience. TNX FER THE CONTINUED SUPPORT U HAVE GIVEN ME AND THIS FB GEORGIA SECTION. Traffic: WD4COL 163, WB4DVZ 121, WB4WQL 101, KA4HHE 56, K4JNL 30, KJ4NK 19, W4HON 16, W4RWB 16.

NORTHERN FLORIDA: SM, Roy Mackey, N4ADI—STM: Rip, AA4HT. BM: Dave, N4GMU. SGL: John, KC4N. SEC: Rudy, WA4PUP. PIO: Petey, WA4PUO. TC: Ed, W0RAO. OOC: John, AB6I. ASM: Bill, KB4LB. ACC: Giff, WD4RIQ. June was a sad month in our section. There were several Silent Keys who will be greatly missed in the days ahead, and we want the families and friends of those who are gone to be remembered in our thoughts. Eleanore, WA4ESS of Fort Pierce, a loyal member of FMTN, was one, and Al Suhr, WB4AID, who has been Manager of FMTN for about 20 years is one of the others that I know about. Al was dedicated to running a tight ship when it came to the net practices and procedures. He had collected a staff of willing workers to maintain liaison with Area and Regional Nets, and to have NCS to cover the 365 days a year that FMTN operated. In addition he was a flutist and a teacher of the flute at his home and at many Universities across the state of Florida. He conducted workshops in the care and cleaning of the flute, and was often invited to speak and give concerts along with his wife, Jane. The FMTN is (at this writing) conducting an election to find others who will help carry on the work of the net to meet the needs for passing traffic to the NTS as it has since 1957 when it was first formed. Al can never be replaced, but we will strive to organize ourselves to carry on the fine job he has done over the many years of his association with the Traffic Handlers of Florida. AR, Roy. Traffic: WX4H 530, WA4QXT 510, WD4IIO 434, KB4LB 336, AA4HT 306, N4SS 204, N4JAQ 200, N4GMU 142, WA4EYU 126, K4GY 120, AA4QC 114, WC4D 86, WA4PUP 62, KC4FL 61, W7WF 60, AA4FG 48, N4ADI 42, W4UEA 42, W4KIX 41, N4JHI 40, NF4O 37, N4DY 32, KA4KAH 29, KB4JNC 29, WB4AVZ 25, N4QYS 25, KI4NN 25, WB4TZR 24, W4DTV 23, KI4CQ 22, WB4JJH 22, N2AOX 21. KB4KFH 18, WBIM 12, W4AT 12, WA4SWX 10, KJ4HS 7, N4OZD 8.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—SEC: W4SS. STM: K4ZK. TC: KI4T. BM: WD4KBW. PIO: W4WYR. SGL: KD4N. OOC: W4TAH. ACC: K4EUK. WD4KBW reports 87 bulletins received and 182 sent by AA4BN 21, W4DL 43, WA4EIC 128, WT4F 23, K4IEK 26, and WD4KBW 28. It was with shock and sadness that the news was received that Al, WB4AID, Manger of the Florida Midday Traffic Net became a Silent Key dunng June. He was a driving force in the leadership of FMTN and will be sorely missed. I also am sorry to report that Eleanor WA4ESS, a member of FMTN became a Silent Key. The Broward ARC will miss WA1RXB who is moving to Connecticut. Dave has worked long and hard to maintain the high quality of the BARC Radio Bulletin and he will be sorely missed. W3UKS the Associate Editor is also returning north but hopefully will be back next winter. KK4WR has been working hard along with K4CY and others trying to solve some of the NTS problems associated with packet. The South Florida FM Assoc. reports that W4WYR, Vice Director, presented them with their Charter as an ARRL Affiliated Club "to make possible unity of action affecting the welfare of Amateur Radio and strengthen and advance Amateur Radio Communication and Experimentation." The Tampa Bay ARS reports that KR4X says the 705/105 repeater is moving to a new site atop Tampa Stadium—it will be 150 feet above the ground, only slightly higher than at the present site. However, it is 3 ½ miles from the tall downtown buildings and will provide more consistent coverage for the Tampa Bay area. Thanks to W4RH and W4WYR for the recent division newsletter. The Fort Myers ARC reports that K4KKP is starting up his last Novice class for the year on July 6. N4EL is heading up the 1989 hamfest committee for the City of Palms Hamfest in Fort Myers January 21, 1989. The Fort Myers ARC also had a talk on fiber optics at their last meeting—following the meeting WD4CHO and XYL once again furnished coffee and doughnuts. The Sarsota ARA reports plans are well underway for their 1989 hamfest to be held February 18 and 19. The Martin County Common Emitter noted that the new repeater is up and running—the unit is manufactured by Micro Control Specialties and is designated as a Mark 4 CR Repeater with a Mark 4C controller. It has 22 watts out to the antenna at 450 feet. The South Brevard ARC SPARK spoke of the CARL (PAT) LEVINGSTON, WA8EPH, FIELD DAY MEMORIAL TROPHY. The trophy is not only a memorial to a Silent Key but also an incentive for local clubs to work together and develop more community interest in Amtateur Radio. Amateur Radio groups within the boundries of Brevard County are eligible. The Tampa ARC stated that their regular banquet meeting will be held September 15, 1988, at the Tampa Elks on Gandy Blvd. Further details will be found in the September issue of "QRM." "A Physics Students' Survival Kit" by George Spahn, WA4WZH, a professor at Broward Community College is scheduled for November publication in Innovation Abstracts, of the National Institute for Staff and Organizational Development. WA4WZH administered the Novice exam for WA4PFK about 12 years agol Field Day messages were received from the Amateur Radio Association of Southwest Florida, South Brevard ARC, Everglades ARC, Motorola ARC, West Palm Beach ARC, Lakeland ARC, Fort Myers ARC, Harris ARC, Pinellas County Amateurs, Old Fruitville Amateur Radio Transmitting Society, and the Tampa ARC. AA4CH sent a message stating that the Everglades ARC held their Field Day exercise in a huge army tent at Harris Field, and that it created a good emergency communication atmosphere. Congrats to the following who are now managing the following nets as of July 1: KA1FZI, QFN; N4MML, FMSN; KC4FL, QFNS; WB3AVZ, TPTN. Many thanks to the managers who were relieved after a year of service: N4IWO, FMSN; KA4SIH, QFNS; WD4KBW, TPTN (WD4KBW continues as FAST net manager): WX4H, QFN. A special word is due WX4H—he works for QFN as few have—he is almost always there each session, 4RN two nights of the week, NCS late session Sundays, picks up the D4RN traffic on the late session and just generally exhibits the love for QFN that many have. Thanks and well done, Mort. Congrats to K4FQU who is manager of the Southwest Florida Traffic Net July 1—SWFTN is one of our outstanding two-meter traffic nets. Congrats also due W1AHD who received word that he passed the Amateur Auxiliary exam. W4DWN sent a message that he has put up a homemade 5/8 wavelength J pole for two meters—I took his message while he was on it! WB5YDD reports that DRN5 and CAND are in good shape. 73 de WA4PFK. Traffic: W3CUL 2943, W3VR 804, WA9VND 459, WA4PFK 326, W4NFK 268, WA4EIC 258, K4SCL 200, WA4RUE 194, K4ZK 180, KA4FZI 172, AA4BN 117, KK4WR 103, K4IA 102, K4EUK 100, KB4KXV 99, W4TLV 99, KD4GR 89,W4DL 89, N4HAP 80, WB4WYG 77, N4MML 73, WV5Z 72, KA4YHS 69, N4ET 67, KB4LPL 65, N4KFU 63, WD4KBW 62, N4ORZ, K4FQU 50, N4SDS 48, KF4RL 48, KY4U 46, KA4NXF 37, WD4CHO 36, KB4MON 34, KY8Y 31, KA4SIH 30, KB4UHC 29, KA9AKY 28, N4QER 27, WA4HXU 25, W4VWJ 24, KJ4WJ 24, WB4GCK 22, WA4LGT 20, WD4CHP 20, KA8GYF 18, K9EHP 16, KB4UIA 16, W3IJR 15, WD4NXK 15, KA4AJR 14, WT4F 13, N4FLG 13, K4GVI 10, N4OIA 10, KI4ZW 9, N4RHJ 8, W4MPV 8, N4COI 8, W4DWN 6, WA4PIL 6, KA4GDU 6, KB4TIU 6, AA4CH 5, KB4ABT 4, NX5Q 4, AB4BC 4, KB4YBS 3, KF4JA 2, AA4IF 1.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—STM: W7EP. NMs: K7POF, K6LL, WB7CAG. Field Day was quite a success for AZ Section clubs and groups. Received bonus messages from the following: NU7B on the Mogollon Rim, Tucson IBM Club from Mt. Lemon, Hughes Catalina ARC from Mt. Bigelow, QPRC from Lake Patagonia, Scottsdale ARC from Strawberry, and AZ ARC from Mingus Mtn. Over eighty operators participated. Hope everyone had a FB time and that lessons were learned and techniques used that will really pay off in case of a future emergency. AZ state-wide RACES net meets every Sunday at 0800 hrs local time on 3990.5 kHz followed by Pima County RACES at 0845 hrs on 3995 kHz. Both are dedicated groups. Keep up the good work. Your SM along with many other Phoenix and Tucson hams, is spending the summer mos. in the White Mtns. If you plan to be up here, bring your two-meter rig and call in on 146.01/61 which is on Green's Pk above ten thousand feet. It really blankets the area and there's always someone around to talk to. Also 146.04/.64 at Porter Mtn. near Show Low is usually up and connected to the ZIA link. Between QSOs you can trout fish, camp, picnic, play golf or just loaf in the cool mountain air. WB0KSW will be conducting radio classes again in Tucson this fall. Contact Bill at 622-1535 for info. Also W7EAH at 795-6955 Tucson will be conducting his training classes. Kathy, KA7FTZ reports that N6CRP, Oro Valley, became a Silent Key in April. (Tnx, Solid Copy.) The U. of A. ARC needs Elmers. Anyone willing to help, call Bill McGarvey at 888-1576. N7JOZ, KA7VUY, and KA7ARZ from Holbrook area helped provide radio communications in conjunction with search for an Air Force F-4C jet aircraft that crashed near Winslow in May, claiming the lives of two men. (Tnx, Holbrook Radio Telegraph.) The Northland Pioneer College plans to offer a Novice class in the fall. Contact is KF7DH, Dwayne Sparks of Navajo Co. ARC, POB 151, Holbrook, 86025. New EC in Prescott Valley, WF7J, sent in ARES reports on two events: Kiwanis Marathon and a radio equipment test for the Prescott Emergency Service's EOC. Amateurs participating were: WC7R, KA7YCI, N7KDZ, WB7TNC and WF7J. Congrats and FB! AI7Z reports new No. AZ Rptr Assn, Flagstaff should have their new repeater on Mt. Elden up and running by the time you read this. It's on 146.30/90 and will have autopatch. By the time you read this, Ft. Tuthill hamfest will be over and we'll be looking forward to the SW Division at Disneyland, Anaheim, CA, on 2-4 Sept. Also don't forget the ARRL National at Portland, OR, the following weekend, 9-11 Sept. In the meantime, keep those cards and letters coming in! 73, Jim.

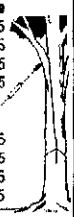
Net	Freq kHz	QNI	Tfc	Sess
SouthWest Net SWN	3583	181	95	30
Arizona Cactus Net(HF)	3715	587	49	30
Arizona Cactus Net(VHF)	145.37	213	46	30
ATEN	3922	861	127	30

Traffic: W7AMM 203, W7EP 159, W7KCM 92, K7VVC 82, KA7ARZ 44, W7KXE 39, W7GAQ 37, K7POF 26, W7OIF 24, K7JKM 17, N7ETP 17.

LOS ANGELES: SM, Phineas J. Icenbice, Jr. W6BF—The Los Angeles Council of Amateur Radio Clubs, Inc. is a great group and 17 different clubs have already paid their 1988 dues. Eight clubs have put up the seed money for HAMCON 89 & we are very pleased to say that our HAMCON 89 is launched. Joe Cira, KB6AXK, is the Chairman of HAMCON 89 (818) 584-9071. Joe is also th ARRL LA Affiliated Club Coordinator and the contact for the LATEST Amateur Radio exam and class site schedule. The Lockheed Club has agreed to conduct the VE program for HAMCON 89. The Hill Top Group has agreed to manage the EXHIBITS and the West Coast Club, the registration.—GET YOUR CLUB TO PARTICIPATE!!! Joe, KB6AXK, always needs help. Up-to-date information is always available from the Council of Amateur Radio Clubs, Inc. by checking in on the club-to-club NET every Wednesday at 7:30 PM on 147.705/ – 600, so stay up to date and chek into the club-to-club NET.—LA County has an 8.3 million population with over four thousands ARRL members. This is a potentially strong political force that should be directed toward two major concerns: (1) THE NEW FCC REGULATIONS (REWRITE) (2) LOCAL ANTENNA ORDINANCES. Both of these items need your immediate attention and action. The FCC's proposal to rewrite the Amateur Radio Rules is in PR Docket 88-139. (See June 1988 *QST*, page 53, for details.) What is your opinion on this proposal? Please take a good look at it and WRITE. (The FCC is accepting comments on PR 88-139 until August 31, with reply comments due October 31. Anyone with a good idea for helping develop

ALL BAND ANTENNAS

MULTI BAND TRAP ANTENNAS



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D-42	10/15/20/40	2	55'	$64.95
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D-56	10/15/20/40/80	6	82'	114.95
D-68	10/15/20/40/80/160	8	146'	149.95

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VS-41	10/15/20/40	1	28'	49.95
VS-52	10/15/20/40/80	2	49'	64.95
VS-53	10/15/20/40/80	3	42'	74.95
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*Can be used without radials
*Feedline can be buried if desired

*Permanent or Portable Use

ALL TRAP ANTENNAS are Ready to use - Factory assembled - Commercial Quality - Handle full power - Comes complete with: Deluxe Traps, Deluxe center connector, 14 ga Stranded CopperWeld ant. wire and End Insulators. Automatic Band Switching - Tuner usually never required - For all Transmitters, Receivers & Transceivers - For all class amateurs - One feedline works all bands - Instructions included - 10 day money back guarantee!

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D-15	15	22'	18.95
D-20	20	33'	19.95
D-40	40	66'	22.95
D-80	80/75	130'	25.95
D-160	160	260'	34.95

Includes assembly instructions, Deluxe center connector, 14ga Stranded CopperWeld Antenna wire and End insulators.

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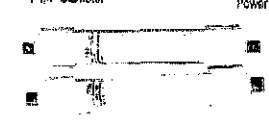

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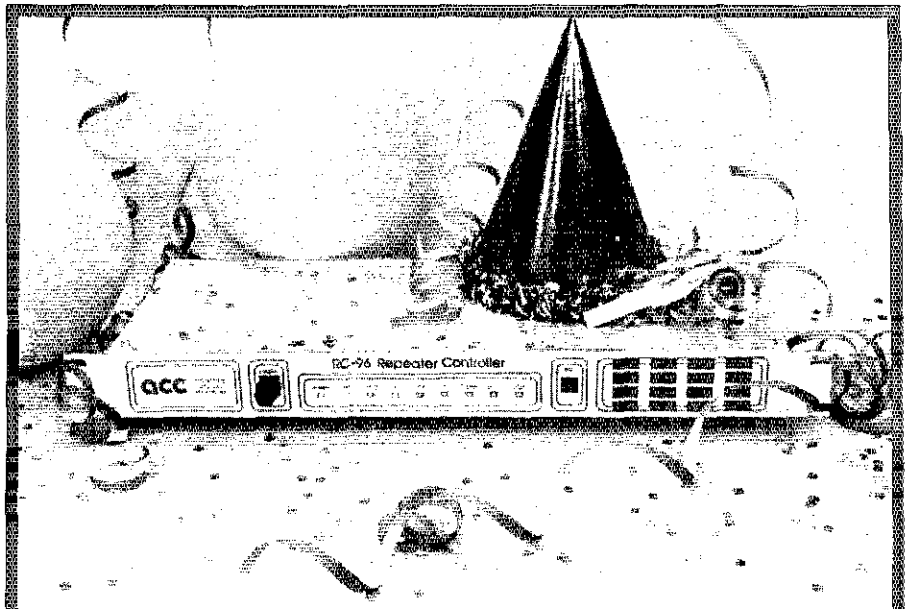

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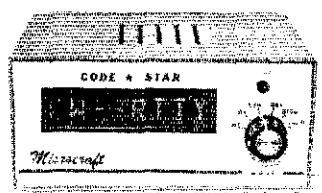

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antenna ordinances, please write to me. W6FNO/R Traffic for June 88 (via T. Mgr. N6MAD Kathleen) was N6AHT 34, WD6BKY 6, N6CUS, WA6HOB 2, K6IDU 37, KB6TLT 2, KB6MHZ 2, WA6MOD 9, N6NCG 2, N6NYK 221, KB6OOC 1, KB6ROC 2, KB6SPF 10, K6TOF 1, WB6VRN 2, KA6ZDL 6, for a total system operation of 339 msgs by 16 operators. 2 medical emergencies, 11 fire emergencies, 326 vehicular emergencies. Conclusion—Vehicles are prone to emergencies. STM News: Sorry to announce the passing of one of Los Angeles' oldest Amateurs, Stanley Hyde, K6LJ, has left us at the age of 96, less two months. He was one of the few first Amateurs in the Los Angeles basin. He was active up till the last two months on MARS. He served two wars in the Navy. Those of you who knew Stan will miss him. Terrible band conditions have slowed the nets down, bad fading and skip have reduced operations considerably. Traffic: K6UYK 413, W6INH 232, N6LHE 120, K6YBV 20, W6NKE 11.

ORANGE: SM, Joe Brown, W6UBQ—ASM: Riv. Co. W6LKN Bob (714-686-3823). ASM: Org. Co. WB6JBI, Ralph (714776-9272). ASM: San Ber. Co WB6QHB, Tony (714 981-1836) Sandy WA6WJZ, ACC rpt at the June meeting, the BPARC presented a donation of $100 to the W1AW renovation fund. Present to receive the check was WA6WZO, SW Div. Dir. The check was presented by club president Bob, WA6SVD. SOARA, in order to get membership input, Joel, WS6S, Pres. has donated a phone number which is attached to computerized voice mail system. Joel says we will record an outgoing message which will keep you informed of our current activities, offer proposals or suggestions. CLUBS, LISTEN UP: IT SOUNDS LIKE A GOOD IDEA. WARA gets high marks on school report card. The first semester was such a success, the second semester is now elective. GOOD SHOW. WARA can be proud of its participation. CNARC is still working on the W200TJV project, good luck! Jack Tunis, KD6PX, was honored as "Ham of the Year." The honor is awarded for participation, readiness for emergencies, years of experience and dedication. CONGRATULATIONS, JACK. SEC Ken, WA6ZEF: Propagation did not favor us this year, but again from the desert to the sea, Field Day was a good one in the Orange Section. From the Field Day messages received for SEC or SM, good training and fun was the order of the day. Even had a quake to help combat Murphy. The Inland Empire ARC was on Catalina Island. A H/W system was activated to Ariz, Nevada, and other western states. VHF simplex contact was made with San Diego, LA, Santa Barbara, Orange, Riverside. Damage information was handled. STM WF6O Dan, BPL for Packet NTS BBS? That is a question that must be answered soon.

Net	Freq	Time	Ses	QNI	QTC	NM
SCN1	3598	1830	30	264	305	AD0A
SCN2	3598	2015	25	144	38	AD0A
SCNV	146.645	2100	30	314	209	WA6QCA

Do not forget to put your club ARRL ID number on your ARRL renewal form. Traffic: WF6O 552, AD0A 157, WB6QBZ 130, W6SX 87, WA6QCA 86, K6DD 69, N6QXR 61, K6ZCE 60, N6GOT 54, KA6HJK 38, K6JT 27, KA6GND 27, KA6TND 26, W6NTN 13.

SAN DIEGO: SM, Arthur R. Smith, W6INI—STM: N6GW. SEC: W6INI. TC: N6JZE. The 1990 ARRL SW Div Convention will be chaired by Walt Hicks, W6UZL. SD County Amateur Radio Council (SANDARC) licensing tests are given weekly. Call 465-3926 for info. New SANDARC officers: W6GIC Chmn, W6JWU VChmn, KB5MU Sec. N6CQW Treas. American Legion 22nd Dist has designated Posts 149 Escondido (WA6YOO), 201 San Diego (N6IAQ, KR6K, W6BFQ), 365 Vista (WA6UTQ), 820 Imperial Beach (WD6CSS) to support the Red Cross in disasters. Each is equipped with TM-321A (220 MHz) equipment to tie in with the Red Cross. Field Day msgs received from WT8B (Poway ARS), K6HAI (N Shores ARC), W6NWG (Palomar ARC), K6QGQ (So Bay ARS), W6UUS (Convair ARC). Also WA6BCC, K6PD, KB6VGN. Escondidio ARS celebrated Escondidio's 100th anniversary with a display at the library and a special events station. Supporting a Heart Foundation bike event were N6CLO, N5ELP, WA6ILH, N6KVP, N6LFT, N6MAU, KB6NMK, N6QXE. Upgrades: to Extra WA6VNR, to General N6NZX, to Tech KB6WIO. ARES/CW 4 sessions, 10 ck-ins. NCTN 29 sessions, 446 ck-ins, 258 msgs. Traffic: KI6ZM 91, N6GW 79, KI6ZH 13, N6RVO 52.

SANTA BARBARA: SM, Thomas I Geiger, W2KVA—ASM/Ventura: N6MA. ASM/Sbar: WB6BYU. ACC: KB5AH. BM: KI6XG. STM: N6WP. OOC: W8AKF. PIO: N6FOU. TC: W6KFV. SEC: WB6IIY. DEC/Ventura: WB6RVA. DEC/So. Sbar: KA6KGF. DEC/No. Sbar: KI6XG. DEC/SLO: WB6IIY. June is nearly over and everyone is breathing a big sigh of relief. Field Day publicity here included about half of the FRONT PAGE (including two color photos) of the *Santa Maria Times* and a proclamation by Mayor Hobbs of "Amateur Radio Week" spanning the SWAPFEST to Field Day time period. Congratulations to KB6DUG/KB6DUH, K7NKF/KB6FHP and KA6MBB/KA6MKD for their excellent representation of ham radio. Congratulations also to W6PME and his crew for another great SWAPFEST. We're looking forward to the SBARC hamfest on August 21, and the Ventura Co. ARC hamfest on October 15. The next BIG event on the schedule will be the SW Div. CONVENTION (Sept. 2-4) at the Disneyland Hotel in Anaheim. We hope to present the new SBAR Field Day Awards at that time. You should have noticed, from the list of officers at the top of this column, that N6AJA is no longer District EC for Santa Barbara County. Business pressures have forced Tony to reduce his involvement for the moment, but he'll continue to be a valued member of the team. Our heartfelt thanks to him for the great job he's done these past few years. To give you an idea of the tremendous job Tony had been doing, we had to split the county and assign his position to two people. The geographic realities of SBar County make this the only reasonable approach and aligns our ARES structure with the county's own. Don, KA6KGF, has been Santa Barbara EC for a long time, and has great plans for his new district. Frank is Santa Maria EC, where he has worked wonders with re-organization and expansion of the ARES organization. Both will be worthy successors to Tony and I know they'll have your full support. Ending on a personal note, the expedition to VP2M was not as successful as hope, but it was fun anyway. My apologies to those of you who were listening for me. The rotator was only semi-functional, and I couldn't turn the beam stateside. If you have the idea that I was avoiding US QSOs, consider that I had only 157 stateside multipliers during the WPX contest. . .a disaster for my overall score. As of this writing, I still haven't had time to dupe the logs, but it looks like approx 1500 QSOs and 467 mults, for a score in the neighborhood of 1.8 million. Another 1500 stations were worked before and after the test, for a total of approx. 3000 Qs in 106 countries. That's not very impressive compared to other expeditions, but we're planning to go again and do much better. (Does anyone know of a school for "pileup management"?) 73 for now; hope to see you at the convention. Traffic: W6NOR 178, N6NLW 114, KB6IEC 27.

WEST GULF DIVISION

NORTH TEXAS: SM, Phil Clements, K5PC—Asst. SM: K5MXQ. STM: W5VMP. SEC: W5GPO. PIO: K5HGL. OOC: WB5JBP. SGL: N1CWP. BM: W5QXK. ACC: W5URI. TC: W5LNL. Field Day reports from Arlington ARC, General Dynamics ARC, Rockwall ARC, Denton Co. ARC, Lone Star DX Assn. Dallas ARC, Ham Assn. of Mesquite, WB5NVM (Lewisville), WM5U, K5LXR, N5HOY, KF5HZ, W5IU, N4RY, KF5O, and KD5DTA. I hope you all had much fun, great fellowship, and many QSOs. Let's not forget the real purpose of Field Day: showing our capabilities in setting up communications at a remote site, void of commercial power, antennas and shelter in a rapid fashion. Also, while we are having all this fun, we are honing our skills in operating, logging and reviewing all the logistics necessary in an operation of this type. I know of no one who has taken a shift in front of a Field Day rig that has not come away much sharper in communications skills! Let's not tuck all that gear too far away; let it remain in readiness for any emegency situation that might evolve. I am especially proud of our new Bowie Co. Emergency Coordinator, Harold Mayes, K5FVB. For many years, there was a great void in our ARES program in Far East Texas. Harold has come aboard with great vigor, and has set up a fine ARES program in record time. The Bowie Co. ARES TTF (Tfc. Training and Fellowship) Net has been meeting for two months now on 146.54 MHz daily, with 160 check-ins in 30 ssns! I am really impressed with the fine Richardson Wireless Klub newsletter, "The Chawed Rag," which is now published monthly as a bound book! The articles inside are just as impressive! Hats off to RWK Editor Britton Vincent, NA5M. The 1988 Texas Tfc Net picnic will be held Sept. 17 at Tyler State Park, Tyler, Texas. Programs, speakers, and a catered barbecue (noon) will be featured. For barbeque reservations, send $5.25 per plate ($2.65 12 yrs & under) and a $2.00 registration fee per adult to: Josiah Brown, K5UPN, P.O. Box 2936, Longview, TX. 75606. For details, monitor the Texas Tfc Net daily on 3873 kHz, 1830 to 1930 local time. New N. Texas High Freq Assn. (Denton) officers: Pres/KB5GBN V.P./KB5CWS Sec-Tres/KA5SKJ. New officers of the Longview-East Texas ARC: Pres/WB5DJE VP/WM5K Sec/N5KLB Tres/N5KGN Editor/KA5AZK Educ/N5LMS Comm/N5KBP. The Temple 146.22/82 Repeater is sporting a new antenna. This operator was able to copy the machine about 15 miles further north than before on a recent trip down to Bell Co. Great job, guys! I cannot thank our clubs too often for sending me their newsletters. They are all great and full of news to help make this column possible! PSHR for June: N5KCL W5YQZ KF5BL KA5ZWY K5UPN and K5MXQ. Traffic: W5YQZ 326, W5TNT 301, K5UPN 276, AJ5K 196, KF5BL 120, W5VMP 108, K5MXQ 103, KA5AZK 92, WZ5N 60, N5KCL 42, KC5NG 40, WA5EZT 29, KA5ZWY 16.

OKLAHOMA: SM, Bill Goswick, K5WG—ACC: WB5CDW, OOC: K5WG. SEC: W5ZTN. SGL: W5NZS. STM: KV5X. TC: W5QMJ. We were deeply saddened to learn that the Section Bulletin Manger, Howard Baker, W5AS, became a Silent Key in June. Howard was a dedicated and tireless worker, always willing to do his part and more. He could always be depended on for timely reports, rapid response to requests, and a can-do attitude in every task he encountered. In addition to his duties as Bulletin Manager, Howard was the Secretary-Treasurer of the QCWA Chapter 63, and the Division QSL Manager. He was a dedicated traffic-handler and an ardent supporter of the League. He will be sorely missed by his many friends. The Section is still in need of knowledgable, technically oriented amateurs to serve as Official Observers in the Amatuer Auxiliary. The qualifications are: full ARRL membership, Technician or higher class license tor at least four years, and a certification in the Amateur Auxiliary. If you are interested in this important field appointment, please contact me. June traffic totals: WB5OHK 132, N5IKN 113, WB5SRX 108, K5GBN 82, KF5RD 73, WA5OUV 65, W5LUH 29, WA5ZOO 22. Remember, Amateur Radio exists because it qualifies as a service. If your are interested in the Amateur Radio Emergency Service contact me or the SEC, Bennett Basore, W5ZTN.

SOUTH TEXAS: SM, Arthur R. Ross, W5KR—SEC: K5DG. ACC: WB5YDD. PIO: WA4UZB. STM: WR5O. BM: K5CVD. SGL: K5KJN. OOC: WA2VJL. TC: NZ5U. Texas Traffic Net (TTN) will have its annual picnic at Tyler State Park Sept 17; monitor TTN schedule for details. EC NO5E reports Hays County ARES quite busy during 13-inch rain and resulting flooding in late May; tornado alert in early June had them out again. Hill Country ARC, Kerrville, busy with Heart Assn Bike race; KC5ZT coordinated action; K5AZ, N7FSO, W0RKF, WB5TCB, KA5SOX and W5RKI staffed check points. PIA N5FIX, NW ARS, Houston, reports its oldest Ham, WA5FGH, will be honored for his 88 years; NARS has digipeater with NET/ROM installed in NW Harris County; March of Dimes presented plaque to club for its efforts in 1988 Walk-a-thon. OBS W5KLV reports 17 bulletins, 4 propagation facts given 25 readings on 7 nets in June. RN5 NM WB5YDD rpts 721 msgs passed in 60 June sessions; STX represented 100% by KD5KQ, W5SHN, W5KLV, WV5X, W5CTZ, KD5CB, WB5HZQ, WB5EPA, WB5FQU, WR5O, WB5YDD. STM WR5O completed move to Houston area; rprts WB5J elected NM for Texas CW Traffic Net (TEX). PIO WA5UZB busy with speaking engagements at Houston area clubs; gets new PIA appointees, talks for other appointments, club affiliation, etc. CAND ANM WB5YDD reports 708 msgs passed in 30 June sessions; RN5 represented 100%; STX stns were KE5ZV, KD5KQ, W5KLV, WB5EPA, WB5FQU, NX5V and WB5YDD. Deep East Texas ARC, Lufkin, reports KA5PNY, NI5R, WB5ROW, NE5K, N5GOS and N5MLH provided communication for 5k, 10k and Fun Run sponsored by Woodland Heights Hosp.; at another time NE5P, W5OLQ, KA5NPY,

(continued on page 156)

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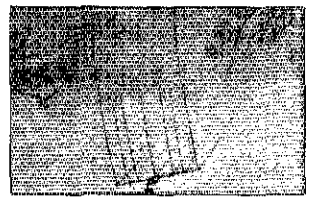

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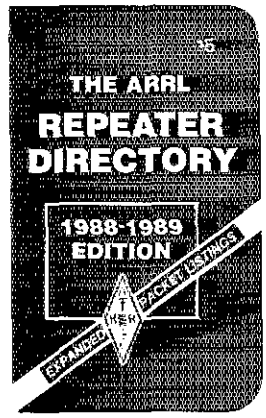

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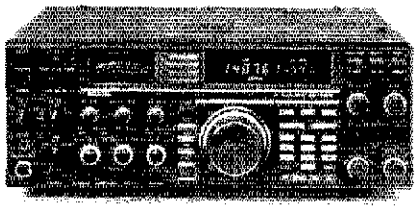

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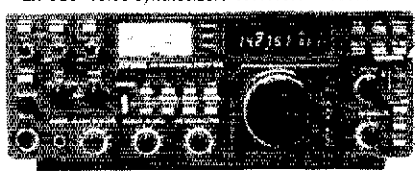

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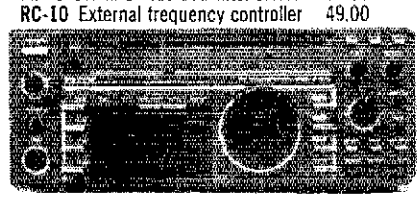

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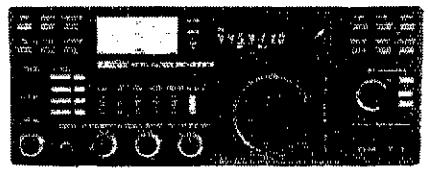
IC-475H 75W 440 FM/SSB/CW	1599.00	**1289**
IC-575A 25W 6/10m xcvr w/ps	1399.00	**1249**



IC-471H 75W 430-450 **Closeout**	1399.00	**989.95**
PS-35 Internal power supply	219.00	**199.95**
AG-35 Mast mounted preamp	99.95	
AG-35 (Purchased with IC-471H)	99.95	**9.95**
SM-6 Desk microphone	47.95	
EX-310 Voice synthesizer	59.00	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	34.00	
UT-15S UT-15S w/TS-32 installed	96.00	

VHF/UHF/1.2 GHz Mobiles	Regular	SALE
IC-37A 25w 220 FM/TTP mic **Closeout**	499.00	**349.95**
IC-47A 25w 440 FM/TTP mic **Closeout**	549.00	**399.95**
PS-45 Compact 8A power supply	145.00	**134.95**
UT-16/EX-388 Voice synthesizer	34.99	
SP-10 Slim-line external speaker	35.99	
IC-28A 25W 2m FM, **TTP** mic	469.00	**409.95**
IC-28H 45W 2m FM, **TTP** mic	499.00	**439.95**
IC-38A 25W 220 FM, regular mic	459.00	**369.95**
IC-38A 25W 220 FM, **TTP** mic	489.00	**389.95**
IC-48A 25W 440-450 FM, regular mic	459.00	**369.95**
IC-48A 25W 440-450 FM, **TTP** mic	509.00	**449.95**
HM-14 Extra TTP microphone	59.00	
UT-28 Digital code squelch	39.50	
UT-29 Tone squelch decoder	46.00	
HM-16 Speaker/microphone	34.00	
IC-228A 25W 2m FM/TTP scan mic	509.00	**449.95**
IC-228H 45W 2m FM/TTP scan mic	539.00	**479.95**
UT-40 Pocket beep function	45.00	
IC-900A Transceiver controller	639.00	**569.95**
UX-19A 10m 10W band unit	299.00	**269.95**
UX-29A 2m 25W band unit	299.00	**269.95**
UX-29H 2m 45W band unit	349.00	**319.95**
UX-39A 220MHz 25W band unit	349.00	**289.95**
UX-49A 440MHz 25W band unit	349.00	**319.95**
UX-59A 6m 10W unit	349.00	**319.95**
UX-129A 1.2GHz 10W band unit	549.00	**499.95**
IC-3200A 25W 2m/440 FM w/TTP	695.00	**529.95**
UT-23 Voice synthesizer	34.99	
AH-32 2m/440 Dual Band antenna	39.00	
AHB-32 Trunk-lip mount	35.00	
Larsen PO-K Roof mount	20.00	
Larsen PO-TLM Trunk-lip mount	22.00	
Larsen PO-MM Magnetic mount	22.00	
IC-1200A 10W 1.2GHz FM Mobile	699.00	**549.95**
IC-1271A 10W 1.2GHz SSB/CW base	1269.00	**1129**
AG-1200 Mast mounted preamplifier	105.00	
PS-25 Internal power supply	125.00	**114.95**
EX-310 Voice synthesizer	59.00	
TV-1200 ATV interface unit	139.00	**129.95**
UT-15S CTCSS encoder/decoder	96.00	
RP-1210 1.2GHz 10W 99 ch FM xcvr	1529.00	**1349**
RP-2210 220MHz 25W repeater	1649.00	**1469**
RP-3010 440MHz 10W FM repeater	1299.00	**1149**

All Prices in this list are subject to change without notice.

MasterCard VISA

Hand-helds	Regular	SALE
IC-2A 2 meters	289.00	**259.95**
IC-2AT with TTP	319.00	**279.95**
IC-3AT 220 MHz, TTP	349.00	**299.95**
IC-4AT 440 MHz, TTP	349.00	**299.95**
IC-02AT/High Power	409.00	**349.95**
IC-03AT for 220 MHz	449.00	**349.95**
IC-04AT for 440 MHz	449.00	**389.95**
IC-u2AT for 2m w/TTP	329.00	**289.95**
IC-u4AT 440 MHz, TTP	369.00	**299.95**
IC-2GAT for 2m, TTP	429.00	**379.95**
IC-4GAT 440MHz, TTP	449.00	**399.95**
IC-32AT 2m/440MHz	629.00	**559.95**

IC-u2A for 2m w/o TTP
Reg. $299 - **Closeout $259.95**

Aircraft band handhelds	Regular	SALE
IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP	473.00	**369.95**
A-2 5W PEP synth. aircraft HT	525.00	**479.95**
A-20 Synth. aircraft HT w/VOR	625.00	**569.95**

Accessories for all except micros	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	79.00
BP-8 800mah/8.4V Nicad Pak - use BC-35	79.00
BC-35 Drop in desk charger for all batteries	79.00
BC-16U Wall charger for BP7/BP8	21.25
LC-11 Vinyl case for Dlx using BP-3	20.50
LC-14 Vinyl case for Dlx using BP-7/8	20.50
LC-02AT Leather case for Dlx models w/BP-7/8	54.50

Accessories for IC and IC-O series	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	49.00
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	39.50
BP-4 Alkaline battery case	16.00
BP-5 425mah/10.8V Nicad Pak - use BC35	65.00
CA-5 5/8-wave telescoping 2m antenna	19.95
CP-1 Cig. lighter plug/cord for BP3 or Dlx	13.65
CP-10 Battery separation cable w/clip	22.50
DC-1 DC operation pak for standard models	24.50
MB-16D Mobile mtg. bkt for all HTs	25.99
LC-2AT Leather case for standard models	54.50
RB-1 Vinyl waterproof radio bag	35.95
HM-9 Speaker microphone	47.00
HS-10 Boom microphone/headset	24.50
HS-10SA Vox unit for HS-10 & Deluxe only	24.50
HS-10SB PTT unit for HS-10	24.50
SS-32SMP Commspec 32-tone encoder	27.95

For other HT Accessories not listed please CALL

Receivers	Regular	SALE
R-71A 100kHz to 30MHz receiver	$999.00	**869.95**
RC-11 Infrared remote controller	70.99	
FL-32A 500 Hz CW filter	69.00	
FL-63A 250 Hz CW filter (1st IF)	59.00	
FL-44A SSB filter (2nd IF)	178.00	**159.95**
EX-257 FM unit	49.00	
EX-310 Voice synthesizer	59.00	
CR-64 High stability oscillator xtal	79.00	
SP-3 External speaker	65.00	
CK-70 (EX-299) 12V DC option	12.99	
MB-12 Mobile mount	25.99	
R-7000 25MHz to 2GHz scan rcvr	1199.00	**1049**
RC-12 Infrared remote controller	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit	139.00	**129.95**
AH-7000 Radiating antenna	99.00	

(13)

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No Nationwide WATS

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WB5ROW, W5UVH, N5MFB, KB5EXN, NE5K KD5LG, KA5NAA, WD5EFY and N5KLV did same for the American Cancer Society Bike-a-thon. 7290 Traffic Net secy KB5DVF rpts 395 msgs in 50 June sessions; QNI 3017; NTS liaison 2 per session; NM KA5AZK. PIA NZ5J rprts W5FFG raising rptr tower by one section and installing new antenna. PIA KA5EEQ, Brenham ARC rprts club provided communication on 2 successive days for Junior and Senior Maifest (sic) parades; more communication given for first annual Washington County Chapter of American Diabetes Assn Bike-a-thon; KA5BLB, W5TZ, KA5EEQ, WD5GHJ, KA5KPT, KA5LEI, WB5RFQ, KF5SP, N5GCU, KA5UBS, WD5FGY active in one or more of the exercises. Each Saturday evening on TEX is "RN5 Liaison Training Night" in which newcomers may learn to carry traffic between the two nets in the NTS. Now is your chance to learn more of Amateur Radio traffic handling. OOC WA2VJL and BM K5CVD looking for volunteers for OO and OBS. Traffic: WB5J 322, WB5YDD 303, W5CTZ 154, W9OYL 154, NV5L 87, WR5O 80, WD5GKH 79, WB5FQU 74, WB5EPA 65, AC5Z 64, W5BGE 54, NZ5J 22, WA5UZB 16, WA2VJL 11.

WEST TEXAS: A. Milly Wise, W5OVH—Eldon Akin, AI5S, has been appointed Assist. Sect. Mgr. to replace John Webb who moved to Okla. Thanks to John for all his help. Everett Vance, WD5QFW, EC for Jones County, has met with KB5CDS, KF5GI, KD5IL, and W5VRE and have formalized and implemented emergency communication plans and presented them to Mike Middleton Sheriff of Jones Co. who is Emergency Management Director. They will be used during SET. OOC for West Tx Bill Brewer, K5KNC, is putting together a field force of Amateur Auxiliary members. Gordon KF5TH, Van WA7WZB, and Kim, KG5BL, have all upgrded to Extra. Very sorry to lose Ron, Ashmore, as DEC in Lubbock area. Have Bill, K5KNC, now as DEC and Radio officer in RACES—The "Relay" the bulletin of the Odessa ARC reports that Field Day was a big event as a fish fry was held, then Joe, KB5MM, and Nina were married the day before and spent their honeymoon at FD—only in West Texas could that happen. Thanks to all editors of newsletters who keep me informed of news events. In Alpine, the BBARC VEs upgraded to Tech: Karen, KB5FYW; Angie, KA5VEP. To General: Dick, KA5NJA; To Advanced: Doug, N5HYD. At Fort Stockton, upgrades were all to Tech; Lynda Cord KB5GLG; Fred, KB5GNU, Joseph, KB5GLE, and James, KB5GLL. DEC, Herb Gehring, N5FHR, of El Paso, has forulated plans for fall SET. The Big Spring ARC, W5AW, has a new RC 850 controller on their 146.82 repeater. The San Angelo ARC has a club van for emergency use. PIO Paul Gilbert, KE5ZW, won the grand prize at Ham Com, an ICOM 735. A new code and theory class will start at W5ES. The EPARC on Sept 10 taught by Jack, KB5QV, and Lou, K5CU. Upgrades Top of Panhandle; to Techn. Garry, KB5FAZ; Tom, KA5WSK ; Chester, KA5KQH, Carey, KA5SJI, and Grant, KB5GOM. To General: Jennifer, KA5WMJ, Daughter of ACC Jerome Doerrie, K5IS. VE exams are held in Midland and every second Saturday at Red Cross Bldg at 8:30 AM. 73, Milly, W5OVH.

It was worth buying . . .

It's worth insuring!

The ARRL "All-Risk" Ham Radio Equipment Insurance Program with expanded insurance protection!

The ARRL Ham Radio Equipment Insurance Program has paid over $1,000,000.00 in claim payments! That's important to you—for the hazards you face and the accompanying losses that can follow from loss or damage to your fixed station and mobile equipment by theft, accident, fire and natural calamity. This Program also includes flood protection—because chances are your homeowners policy will not cover your equipment for damage by flood.

But that's not all! You're now covered for the replacement cost of computer software such as disks and tapes including reimbursement for expense of reprogramming for up to $1,000 per claim if you have your computer hardware equipment scheduled on your policy. The computer equipment may include televisions, recorders or other monitoring systems you have as related ham radio accessories.

There's more! Your coverage includes protection from short circuiting and electrical disturbances due to fire. Your equipment and accessories are covered at home, in your car and even at a Field Day or Hamfest site. That's protection plus!

What's Covered?

Your mobile and home station equipment are covered from all risks of loss or damage—including fire, lightning, theft, collision and overturn or other accidents and natural hazards. (Loss or damage to antennas, towers or rotators is not covered.) Coverage is also provided for computer software for up to $1,000 AND hardware you have scheduled including related accessories.

New Property Coverage

If additional property is purchased, it will automatically be protected without any additional premium as long as the added value does not exceed $1,000. At your next policy renewal date, your total insurance coverage would be reviewed and your policy and premium charge adjusted for the additional coverage.

Low Cost

Your annual premium is just $1.25 per $100 of replacement cost value plus a $5 administration fee (minimum premium is $20). If your equipment is worth $4,400—your premium is $55 (plus the $5 administration fee).

Deductible

The program's deductible is just $50 for each loss. To assist you even further, the deductible for loss for repairs is just $25.

Exclusions

Loss or damage to radio towers, antennas or rotators is not covered. This program does not insure against the usual and customary exclusions such as loss or damage by mechanical or structural breakdown or failure, dishonest acts, wear and tear, damage occasioned by repairing or tuning.

To Enroll . . . simply complete the application at the right listing all equipment (except antennas, towers or rotators) valued over $50 each. Then, mail your application with your premium check to the ARRL Insurance Administrator.

Act today!

OFFICIAL APPLICATION

ARRL 301E

(Please type or print)

The ARRL "All Risk" Ham Radio Equipment Insurance Program

1. Name of Applicant: _____
2. Mailing Address: _____

   City _____ State _____ Zip _____
3. Other Locations Where Equipment Is Kept _____

   _____
4. Date of Birth: _____
5. QST Control No. (from QST Label) _____
6. **SCHEDULE OF EQUIPMENT**

   Use this listing to describe all radio equipment in your possession.

Description (Including Manufacturer's Name, Model and Serial Numbers or Other Identification)	Replacement Cost (Value at today's prices)
_____	$ _____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

7. To figure your premium complete the following:
   - Total amount of Replacement Insurance $ _____
   - Total amount of Miscellaneous Items (valued under $50.00 each) $ _____
   - Total amount of Insurance $ _____
   - Annual Premium (based on the rate of $1.25 per $100 of insurance. Minimum premium $20.00) $ _____
   - Add Annual Administration Charge $ 5.00
   - Total Amount Enclosed $ _____

Date _____ Signature _____

Mail your completed application and premium check payable to:

Albert H. Wohlers & Co., Administrator
ARRL Insurance Plans
1440 N. Northwest Highway
Park Ridge, Illinois 60068-1400
Tel. 1-800-323-2106

Your protection begins...on the first of the month following receipt of your application and premium check.

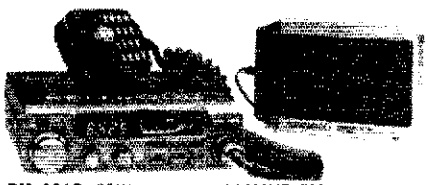
(Please photocopy this completed application for your records.)

Officially sponsored by the American Radio Relay League.

ENROLLMENT PERIOD ENDS: NOVEMBER 1, 1988

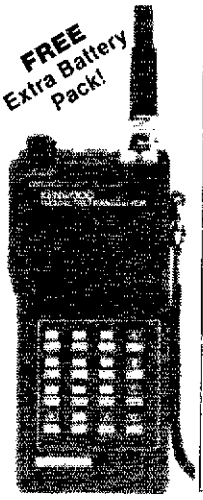
AES® / KENWOOD • Closeouts & Specials of the Month . .

AX-2 Shoulder Strap with Ground Plane Antenna Base* for TR-2400/2500/2600 3500/3600 handhelds . . . **$9.95**
*antenna not included



TM-401B 25W compact 440MHZ FM transceiver w/ext spkr and TTP mic . . . **Closeout $299.95**

CD-10 Call Sign Display **Closeout $49.95**
For DCL/DCS series trancevers. Stores call sign of calling station in memory and displays it on LCD display.



HANDHELD Closeouts

15/1W • with 180 ma. battery, wall charger and antenna . . *Complete!*
TH-21A 2m..... **$169.95**
TH-41A 440MHz... **169.95**
TH-41AT 440/TTP... **189.95**
TU-6 Encoder purchased with TH-41AT... *Only* $4.95
TH-21BT* 2m/TTP **$199.95**
TH-41BT* 440/TTP **199.95**
*Note: BT is latest model with built-in CTCSS encoder. Opt accessories ... Inquire
★ **FREE Battery!** Extra **PB-21** battery included with each of the above HTs.

220 MHz . . . Temporary Specials

TM-321A 25W 220FM xcvr w/TTP mic
TM-3530A 25W 220 FM xcvr w/TTP
TH-315A* 2.5W 220 FM HT/TTP
TH-31BT* 1.5 1W 220 FM HT/TTP
Call for Prices
*Special ... ... FREE extra std. battery
Limited Quantities - all prices and availability subject to change without notice. Check with your salesman.

TS-140S 160-10M Tranceiver with 150kHz to 30MHz general coverage reciever . . . **CALL FOR PRICE**

In Stock! . . . Call Now for Prices
TH-25AT 2.5W FM HT w/battery and charger
TH-215A 2.5W FM HT with batt/chgr/TTP/PG-2V

Miscellaneous Closeouts

KPS-7A 6A power supply..... **$49.95**
FC-10 Freq controller for TM-201B/401B..... **29.95**
LH-1 Leather case for TR-2400..... **29.95**
LH-2 Leather case for TR-2500/3500..... **29.95**
DF-180 Digital freq control for TS-180S..... **49.95**
MB-1A Mobile mount for TR-2200..... **2.95**
AM-599 AM filter for R-599..... **2.95**

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I have the following to TRADE (What's your DEAL?)

Rush me your quote - I understand that I am under no obligation

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Address

City/State Zip

Tandy National Parts

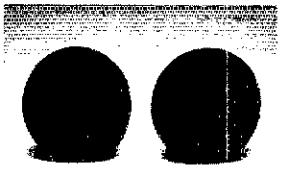
Super Values in Surplus Components From Radio Shack And Tandy Products. Limited Quantities—Order Today!

Power Supplies

ASTEC AC9355-01. 65 watts. Outputs: +5VDC/6A, +12VDC/1.5A, +12VDC/2.1A, and −12VDC/250 mA. 115/230VAC input.
NP-0001 . . . . . **79.95**

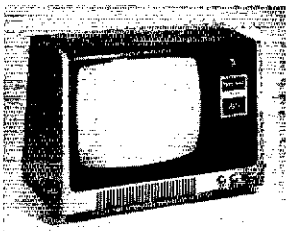
Aspen 20-Amp Regulated 13.8VDC Power Supply.
NP-0003 . . . . . **89.95**
Aspen 10-Amp Regulated 13.8VDC Supply. NP-0002 . . . . . **59.95**

Ear Pads



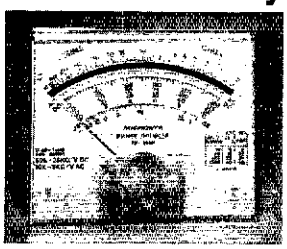
Black foam, 35 mm round.
NP-0007 . . . **Pkg. of 2/49¢**

Video Monitor



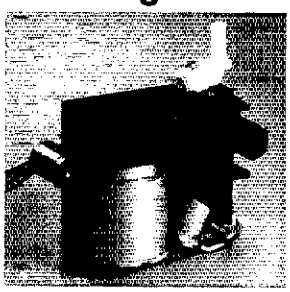
Here's the 12″ monochrome monitor from the original TRS-80 Model I computer.
NP-0010 . . . . . **24.95**

Meter Assembly



15 µA movement has a 4¼″, 3-color mirrored scale.
NP-0004 . . . . . **8.95**

Steering Servo



From radio-controlled toy vehicles. **NP-0005** **4.95**

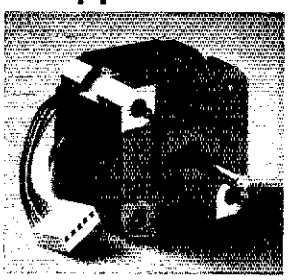
Piezo Buzzer

90 dB output. Operates from 3-10VDC. **NP-0008** . . . **1.19**

3″ Speaker

8-ohm speaker, rated 2 watts. **NP-0009** **1.99**

Stepper Motor

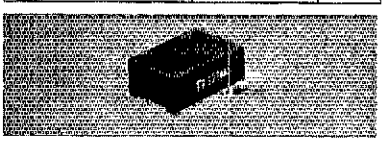


3.6-degree step. Operates on 12VDC.
NP-0011 . . . . . **10.95**

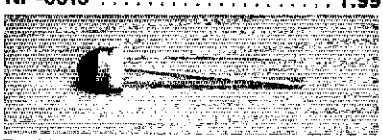
Trimmers and More

Horiz. PCB-Mount Trimmer Pots.

Type	Stock No.	Each
5K Semi-Fixed	NP-0014	.25
50K Semi-Fixed	NP-0012	.25
100K Trimmer	NP-0013	.25

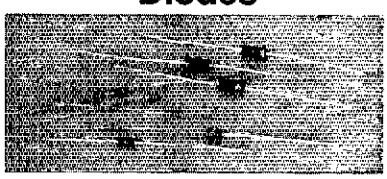


KLR321 LED Display. Dual seven-segment red display. Com. cathode.
NP-0015 . . . . . **1.99**



Red LED. 0.3mm size.
NP-0016 . . . . . **29¢**

Diodes



DBB10B Rectifier. Standard recovery bridge. **NP-0017** . . . . . **99¢**
1N4732A. 6.8V, 1-watt zener. **NP-0018** . . . . . **29¢**
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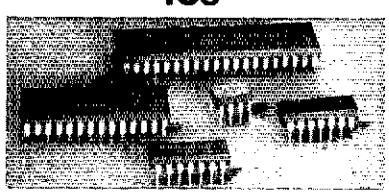

Device	Package	Stock No.	Each
TA7303 Linear IF	9-pin SIP	NP-0028	1.49
MC6822P MUX	40-pin DIP	NP-0029	2.49
HA17812P 12V Reg.	—	NP-0030	1.99
MC1458CPI Op Amp.	8-pin DIP	NP-0031	.69
D19436 R-C Transmitter	20-pin DIP Surface-Mt.	NP-0032	1.99
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78L12 12V Reg.	—	NP-0034	1.79
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TR1602 UART	40-pin DIP	NP-0036	4.99
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MRF238	12.50	2N5591	13.50
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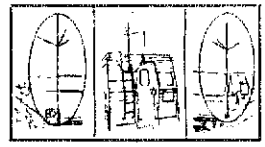

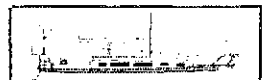

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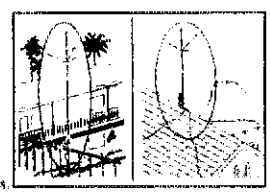

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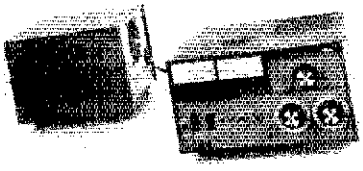

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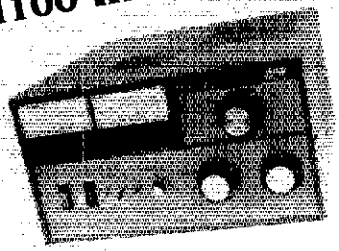

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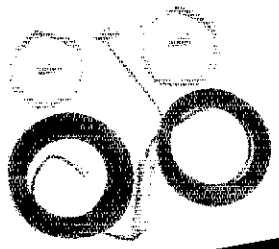

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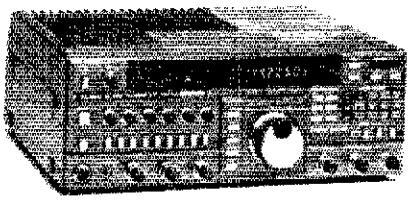

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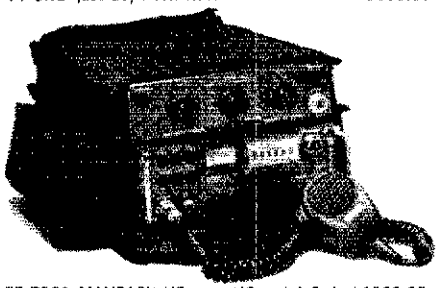

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FC-70P* Preset antenna tuner	199.95
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MH-17* Speaker/microphone	31.95
YA-70* Tripod antenna	269.95
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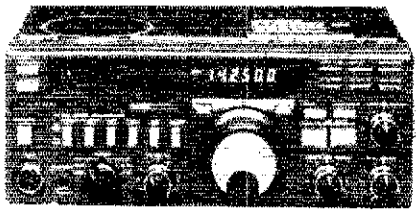

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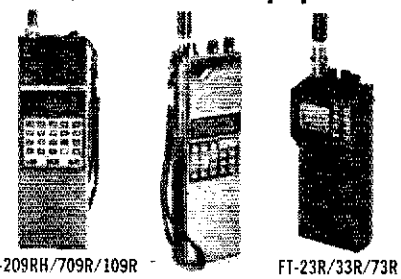

FT-209RH/709R/109R FT-727R FT-23R/33R/73R

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FT-109RH 220 FM HT/TTP/batt/cgr	399.95
FT-709R 4w 440 FM HT/TTP/batt/cgr	389.95
FT-727R 5w 2m/440 FM HT/TTP New CPU!	439.95
FT-23R 2.5w 2m HT	299.95
FT-23R/TTP 2.5w 2m HT w/TTP	334.95
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Acc. for 09-series/03-series/FT-727R	LIST
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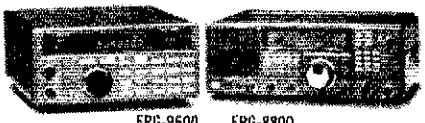

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FRT-7700 Antenna tuner	64.95
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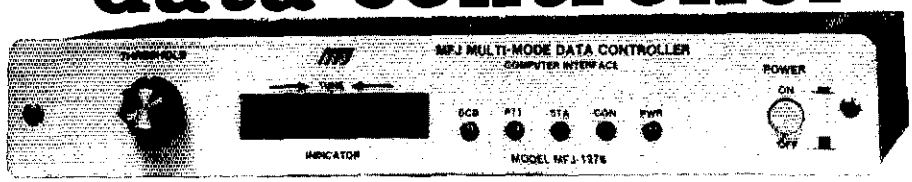

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Amateur radio's newest multi-mode data controller -- the MFJ-1278 -- lets you join the fun on Packet, AMTOR, RTTY, ASCII, CW, Weather FAX, SSTV and gives you a full featured Contest Memory Keyer mode . . . you get 8 modes . . . for an affordable $249.95.

Plus you get high performance HF/VHF/CW modems, software selectable dual radio ports, precision tuning indicator, 32K RAM, AC power supply and more.

You'll find it *the most user friendly of all multi-modes.* It's menu driven for ease of use *and* command driven for speed.

A high resolution 20 LED tuning indicator lets you *tune in signals fast in any mode.* All you have to do is to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

All you need to join the fun is an MFJ-1278, your rig and any computer with a serial port and terminal program.

You can use the MFJ Starter Pack to get on the air instantly. It includes computer interfacing cable, terminal software and instructions . . . everything you need. Order MFJ-1282 (disk)/MFJ-1283 (tape) for C-64/128/VIC-20; MFJ-1284 the IBM or compatible; MFJ-1287 for Macintosh, $19.95 each.

Packet

With MFJ's super clone of the industry standard -- the TAPR TNC-2 -- you get **genuine TAPR** software/hardware plus more -- not a "work-a-like" imitation.

Extensive tests published in *Packet Radio Magazine* ("HF Modem Performance Comparisons")prove the TAPR designed modem in the MFJ-1278 gives better copy with proper DCD operation under all tested conditions than the other modems tested.

Hardware DCD gives you more QSOs because you get reliable carrier detection under busy, noisy or weak conditions.

A hardware HDLC gives you full duplex operation for satellite work or for use as a full duplex digipeater. And, it makes possible speeds in excess of 56K baud with a suitable external modem.

A new KISS interface makes MFJ-1278 TCP/IP compatible.

Good news for SYSOPs! New software lets the MFJ-1278 perform flawlessly as a WORLI/WA7MBL bulletin board TNC.

New AMTOR mode!

Now MFJ-1278 has a new AMTOR mode, making it the only controller to feature eight digital modes.

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Baudot RTTY

You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300 baud. You can *copy not only amateur RTTY but also press, weather and other exciting traffic.*

You can transmit both narrow and wide shifts. The wide shift is a standard 850 Hz shift with mark/space tones of MARS and standard VHF FM RTTY.

ASCII

You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode and using the same high performance modem. You also get Autostart and selectable "Diddle".

CW

You get a Super Morse Keyboard mode that lets you send perfect CW effortlessly from 5 to 99 WPM, including all prosigns -- it's tailor-made for traffic handlers.

A huge type ahead buffer lets you send smooth CW even if you "hunt and peck".

You can store entire QSOs in the message memories, if you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

A tone Modulated CW mode turns your VHF FM rig into a CW transceiver for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW.

The CW receive mode lets you copy transmitted CW. Even with sloppy fists you'll be surprised at the copy you'll get with its powerful built-in software.

You also get a random code generator that'll help you copy CW faster.

Weather FAX

***You'll** be fascinated as you watch WEFAX signals blossom into full fledged weather maps on your printer.* Other interesting FAX pictures can also be printed -- such as some news photographs from wire services.

Any Epson or IBM graphics compatible printer will print a wealth of interesting pictures and maps.

Automatic sync and stop lets you set it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk.

Pictures and maps can be *printed to screen in real time or from disk* if you have an IBM or Macintosh with the MFJ-1284 or MFJ-1287 Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You'll not only see what your ham buddies look like but *you can send your own pictures* to them, too.

You can print slow scan TV pictures on any IBM or Epson graphics compatible printer. If you have an IBM or Macintosh you can print to screen in near real time or from disk with the MFJ-1284 or MFJ-1287 Starter Pack.

You can transmit slow scan pictures right off disk -- there's no need to set up lights and a camera for a casual contact.

You can save slow scan pictures on disk from over-the-air QSOs, audio tapes and other sources if your terminal program lets you save ASCII files.

The MFJ-1278 transmits and receives 8.5, 12, 24, and 36 second black and white format SSTV pictures using two levels.

Contest Memory Keyer

***Nothing** beats the quick response of a memory keyer during a heated contest.*

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

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Message memories let you store contest RST, QTH, call, rig info -- everything you used to repeat over and over. You'll save precious time and work more QSOs.

You get automatic incrementing serial numbering. In a contest it can make the difference between winning and losing.

A weight control lets you penetrate QRM with a distinctive signal or lets your transmitter send perfect sounding CW.

More Features

Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

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MFJ's innovative new Differential-T Tuner™ uses a differential capacitor that makes tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only *one* setting.

The new MFJ-986 is a rugged no-compromise 3 KW PEP Roller Inductor antenna tuner that covers 1.8-30 MHz continuously, including MARS and all the WARC bands. **The roller inductor lets you tune your SWR down to the absolute minimum** -- something a tapped inductor tuner just can't do.

A 3-digit turns counter plus a spinner knob gives you *precise* inductance control -- so you can quickly return to your favorite frequency.

You get a lighted Cross-Needle meter that not only gives you SWR, forward and reflected power at a glance -- but also gives you a **peak-reading** function! A new directional coupler gives you even more accurate readings over a wider frequency range.

You get a 6-position ceramic antenna switch that lets you select two coax lines and/or random wires (direct or through tuner), balanced line and external dummy load.

A new **current** balun for balanced lines minimizes feedline radiation that causes field pattern distortion, TVI and RF in your shack. Ceramic feedthru insulators for balanced lines withstand high voltages and temperatures.

New Antenna Tuner Technology

MFJ brings you **three innovations** in antenna tuner technology: a new *Differential-T*™ circuit simplifies tuning; a new *directional coupler* gives you more accurate SWR, forward and reflected power readings; and a new *current balun* reduces feedline radiation.

Differential-T Tuner™: A New Twist on a Proven Technology

By replacing the two variable capacitors with a single *differential capacitor* **you get a wide range T-network tuner with only *two* controls** -- the differential capacitor and a roller inductor.

That's how you get the new MFJ Differential-T Tuner™ that makes tuning easier than ever, gives you minimum SWR at only one setting and has a broadband response that ends constant re-tuning. You'll spend your time QSOing instead of fooling with your tuner.

The compact 10¾ x 4½ x 15 inch cabinet has plenty of room to mount the silver-plated roller inductor away from metal surfaces for maximum Q -- you get high efficiency and more power into your antenna.

The wide spaced air gap differential transmitting capacitor lets you run a full 3 KW PEP -- no worries about arcing.

A New Directional Coupler: Accurate SWR and Power Reading

MFJ's Cross-Needle SWR/Wattmeter gives you more accurate SWR and power readings over a wider frequency range with no frequency sensitive adjustments.

That's because MFJ's new directional coupler gives you up to an order of magnitude higher directivity and coupling factor than conventional circuits . . . *plus* it gives you a flat frequency response that requires **no** frequency compensation.

The cross-needle meter lets you read forward/reflected power in 2 ranges: 200/50 and 2000/500 watts. The meter lamp is front-panel switched and requires 12 volts.

A switch lets you select peak or average power readings.

A New Current Balun: Reduces Feedline Radiation

Nearly all commercially built tuners use a "voltage" balun. The "voltage" balun forces the *voltages* to be equal on the two antenna halves. It minimizes unbalanced currents *only* if the antenna is perfectly balanced --not the case with practical antennas.

The MFJ-986 uses a true **current balun** to force equal *currents* into the two antenna halves -- *even* if your antenna is not perfectly balanced -- so you get minimum unbalanced currents.

The *current* balun gives superior balance over the "voltage" balun.

Minimum unbalanced current reduces field pattern distortion -- which concentrates your power for a stronger signal -- *plus* it reduces TVI and RF in your shack caused by feedline radiation.

The MFJ-986 Differential-T Tuner™: Get *absolute minimum* SWR

Get the tuner that incorporates the latest innovations by the world's leader in antenna tuner technology.

See your dealer today for the new MFJ-986 Differential-T™ 3 KW Roller Inductor Tuner. Include $10 shipping/handling if ordering direct.

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First-rate Performance: MFJ tuners have earned their reputation for being able to match just about anything -- *anywhere.*

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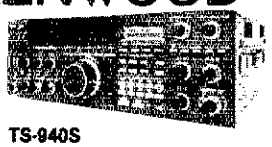

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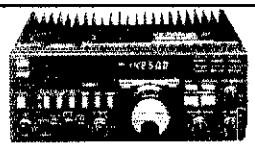

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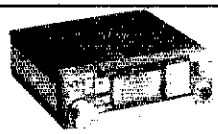

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Dual Band Transceiver
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Operation
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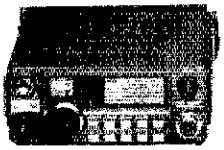

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NEW HIGH
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5W Output

New!
FT727 RH
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- 5w Output
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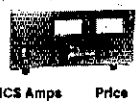

Model	Cont. Amps	ICS Amps	Price
RS4A	3	4	$ 39
RS7A	5	7	49
RS12A	9	12	69
RS20A	16	20	89
RS20M	16	20	109
RS35A	25	35	135
RS35M	25	35	149
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Microprocessor Controlled Multi-Scan
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561 Corsair II	$ CALL
960 Power Supply	$ CALL
229 2KW Tuner	$ CALL
425 Titan Amplifier	$ CALL

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A1015	6M	Yes	10W	150W	$289
B23A	2M	Yes	2W	30W	$129
B108	2M	Yes	10W	80W	$159
B1015	2M	Yes	10W	150W	$259
B3015	2M	Yes	30W	150W	$229
D1010N	440	No	10W	100W	$319

rfconcepts

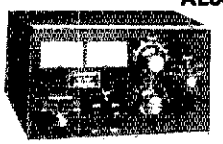
rfc 2-317 2M
30W in = 170W out
LIST $299.00

Model	Band	In-Out	List Price
2-23	2M	2-30W	$112.00
2-217	2M	2-170W	$299.00
2-117	2M	10-170W	$299.00
2-417	2M	45-170W	$299.00
3-22	220	2-20W	$112.00
3-211	220	2-110W	$299.00
3-312	220	30-120W	$264.00

Call For Sale Prices

AMERITRON

AL80A



AL80A	$985.00	ATR10	$325.00
AL84	479.00	ATR15	380.00
AL1200	1825.00	RCS4	134.50
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Model	List	Model	List
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LK500ZC	$1395	LK500NT	$1595
LK800A	$2695	LK800NT	$2995
LK550	$1895	AT 3000	$ 499

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ELH-2600		ALR-72T	
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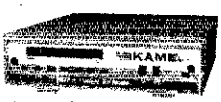
Kantronics



KAM All Mode Terminal Unit.....$289.95
KPC II Packet Controller.....$159.90
KPC 4 Node Controller.....$299.90

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WANTED: Maintenance Manual IC751. VE7CI, 604-588-0764.

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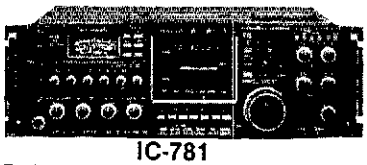

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IC-761 Loaded With Extras	2699.00	Call $
IC-735 Gen. Cvg Xcvr	1099.00	Call $
IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-575A 10m/6m Xcvr	1399.00	Call $
Receivers		
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz-30 MHz Rcvr	999.00	Call $
VHF		
IC-228A New 25W Mobile	509.00	Call $
IC-228H New 45W Mobile	539.00	Call $
IC-275A All Mode Base w/PS	1299.00	Call $
IC-275H All Mode Base 100w	1399.00	Call $
IC-28A FM Mobile 25w	469.00	Call $
IC-28H FM Mobile 45w	499.00	Call $
IC-2AT FM HT	319.00	Call $
IC-02AT FM HT, HP	409.00	Call $
IC-μ2AT Micro HT	329.00	Call $
IC-900 Six Band Mobile	639.00	Call $
IC-2GAT	449.95	Call $
New 2M HT	429.95	Call $
UHF		
IC-475A All Mode 25w	1399.00	Call $
IC-48A FM Mobile 25w	509.00	Call $
IC-4AT FM HT	349.00	Call $
IC-04AT FM HT	449.00	Call $
IC-μ4AT 440 FM HT	369.00	Call $
IC-3200A FM 2m/70cm 25w	649.00	Call $
IC-4GAT	449.95	Call $
IC-32AT Dual Band Handheld	629.00	Call $
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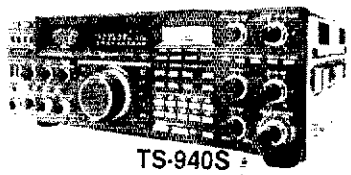
220 MHZ		
IC-375A All-Mode, 25w, Base Sta	1399.00	Call $
IC-38A 25w FM Xcvr	489.00	Call $
IC-37A FM Mobile 25w	499.00	Call $
IC-3AT FM HT	349.00	Call $
IC-03AT Deluxe HT	449.00	Call $
1.2 GHz		
IC-1271A All Mode 10w	1269.00	Call $
IC-1200 FM. 10w Mobile	699.00	Call $
IC-12AT Deluxe 1w HT	473.00	Call $



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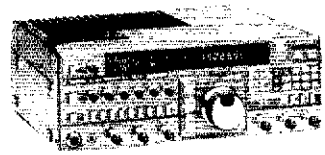
TS-440S/AT Gen. Cvg Xcvr	1379.95	Call $
TS-140S Compact, Gen. Cvg Xcvr	929.95	Call $
TS-680S HF Plus 6m Xcvr	1099.95	Call $
TL-922A HF Amp	1649.95	Call $
Receivers		
R-5000 100 kHz-30 MHz	999.95	Call $
R-2000 150 kHz-30 MHz	749.95	Call $
VHF		
TS-711A All Mode Base 25w	1029.95	Call $
TR-751A All Mode Mobile 25w	649.95	Call $
TM-221A Compact FM 45w	439.95	Call $
TM-2530A FM Mobile 25w	479.95	Call $
TM-2550A FM Mobile 45w	499.95	Call $
TM-2570A FM Mobile 70w	599.95	Call $
TH-215A, 2m HT Has It All	379.95	Call $
TH-25AT 5w Pocket HT NEW	349.95	Call $
TM-721A 2m/70cm, FM, mobile	699.95	Call $
New TM 621A 2M/220	699.95	Call $
UHF		
TS-811A All Mode Base 25w	1,229.95	Call $
TR-851A 25w SSB/FM	749.95	Call $
TM-421A Compact FM 35w	449.95	Call $
TH-415A 2.5w 440 HT	399.95	Call $
TH-45AT 5w Pocket HT NEW	369.95	Call $
TW-4100A, 2m/70cm FM	599.95	Call $
TH-55 AT 1.2 GHz HT	499.95	Call $
TR-50 1w 1.2GHz FM	629.95	Call $
TM-521A 1.2 GHZ 10W	599.95	Call $
220 MHZ		
TM-3530A FM 220 MHz 25w	499.95	Call $
TH-31BT FM, 220 MHz HT	299.95	Call $
TM-321A Compact 25w Mobile	449.95	Call $
TH-316A Full Featured 2.5w HT	399.95	Call $



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Receivers		
FRG-8800 150 kHz - 30 MHz	759.95	Call $
FRG-9600 60-905 MHz	699.95	Call $
VHF		
FT-212RH NEW 2m, 45w mobile	459.95	Call $
FT-290R All Mode Portable	599.95	Call $
FT-23 R/TT Mini HT	344.95	Call $
FT-209RH FM Handheld 5w	389.95	Call $
UHF		
FT-712RH, 70cm, 35w mobile	499.95	Call $
FT-711RH FM Mobile 35w	449.95	Call $
FT-73 R/TT Mini HT	349.95	Call $
FT-709RH FM HT 4w	389.95	Call $
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FEX-736-50 6m, 10w Module	259.95	Call $
FEX-736-220 220 MHz, 25w Module	279.95	Call $
FEX-736-1.2 1.2 GHz, 10w Module	539.95	Call $
FT-690R MKII, 6m, All Mode, port.	589.95	Call $
Dual Bander		
FT-727R 2m/70 cm HT	439.95	Call $
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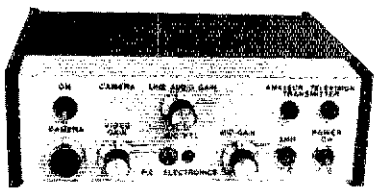

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SCHOOL CURRICULUM For Ham Radio by Carole Perry, WB2MGP. 26 lesson plans, code practice oscillator, audio cassette and VHS video tape. Suitable for all school grade levels with pull-out lessons. Can be used as separate course or as part of Social Studies or Science program. Also suitable for summer camp program, $99.95. Media Mentors Inc., P.O. Box 131646, S.I., NY 10313-0006, 718-983-1416.

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FOR SALE: 52/75 Non-Inductive Resistors, Jennings V/V's, Chokes, Transformers, Tubes, Sockets, Tank Coils, and other Linear Parts. Send $ one dollar for 20 page list. Bill, KA7VJO, P.O. Box 2030, Upland, CA 91785, 714-986-3515.

WANTED: Kenwood TS-940S/AT. Must be in mint cond. Wanted two 8874 and two 8877 new. WA6IKE, 916-991-7100, Calif.

STEEL TOWER, brand-new, never used, clean, in storage. Tri-Ex Model WT-51. Free standing, retracted 21', extended 51', accessories, $1300. 2M repeater, Spectrum Communications Model SCR1000, $900 or trade for solid-state HF rig. Tower and repeater together $2000. Write: Milton Onaga, KH6US, 434 Kaulana Street, Kahului, HI 96732-2050.

ATARI CW, RTTY, ASCII, and Packet Programs for 8 bit models. Each program available on disk for $15 and on cartridge for $35. SASE for info. Electrosoft, 1656 South California Street, Loveland, CO 80537.

WANTED: Vomax + 8874 + Swan WM3000. K4NBN, "No Bad News".

COLLINS Wanted: Modification kit to turn KWM-2 into a KWM-2A, 516F-2, 312B-4, 312B-5, 30S-1. Also need a Waters Q Multiplier-Notch Filter, and DX Engineering Speech Processor. If you know of sources of these, please pass the info to: James Hickox, AA5AO, Rt. 2, Box 950-A, Meridian, TX 76665, phone 817-435-2620.

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FOR SALE: Henry 2KD-Classic, 32S-1 (new), Antenna Tuners, Dummy Loads, Groth Turn Counters, Yaesu Model YR-901 CW/RTTY Reader (new), Swan 350 Transceiver (matching P/S), Swan 500-CX Transceiver (matching P/S), Collins KWM-2A (P/S), 75A-1, 32V1, Kenwood 21AT (many extras), Heathkit SB-104A, SB-634A, SB-614, SB-604, and HP-1144A (all new), many others. SASE for list. Bill, KA7VJO, P.O. Box 2030, Upland, CA 91785, 714-986-3515.

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INTERNATIONAL Radio Inc. ICOM, Kenwood, & Yaesu Newsletters Available. Send SASE ($.45) for details. International Radio Inc., 751 S. Macedo Blvd., Port St. Lucie, FL 34983, 407-879-6868.

ATLAS RADIO-Swan Repair Service: Factory trained technicians, fast service and reasonably priced. RF Parts Co., 1320 Grand, San Marcos, CA 92069, 619-744-0720, 800-854-1927.

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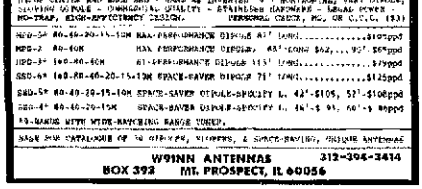

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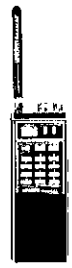

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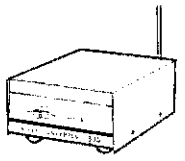

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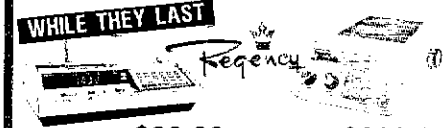

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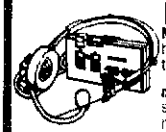

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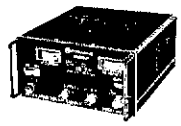

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WANTED: CE-600L Linear. Good condition and working. Chip Tilton, K5RSG, 513 Dorrington, Metairie, LA 70005, 504-456-0212.

WANTED: Yaesu FT-680R 6M Xceiver. Any condition. QSL w/price or call collect (best time 7-11 PM EST). Bob, KI4MB, 6608 N 18th Street, Arlington, VA 22205, 703-533-0650.

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WANTED: Bencher Paddle. J. Waskowitz, 580 83rd Street, Brooklyn, NY 11209.

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'N-TENNA Quad Kits, Boomless Tribanders, $64.50. Box 5332, Hickory, NC 28603.

KWM-380/HF-380 Repairs. Kirby, K7WOC, 713-320-2324.

WANTED: Collins KWM-2A, power supply, accessories, Heath Mohican, Apache, also Drake TR-4CW, E.F. Johnson Ranger II, Hammarlund SP-600. Very good to excellent shape only. Steve Stutman, KL7JT/1, 27 Lillian, Sudbury, MA 01776, 617-494-9393.

TUBES WANTED: I pay cash or trade for all types of transmitting or special purpose tubes. Mike Forman, 1472 McArthur Blvd., Oakland, CA 94602, 415-530-8840.

BLEEDERS—200K/50W 3-$15; Electrolytic Capacitors 130uF/330V 20-$12. Gary Paladino, 906 Hester, Harrison, AR 72601.

DXpedition to Montserrat for only $300/week, radio included. Complete details for SASE or call: Box 50, Fulton, CA 95439, 707-523-1001.

NATIONAL Radio Manual and NCL-2000 factory parts lists. SASE. Max Fuchs, 11 Plymouth Lane, Swampscott, MA 01907.

ATLAS 350-XL Wanted. N5NM, Box 2169, Santa Fe, NM 87504-2169, 505-988-2305.

TELEX HG52SS no base, TH5MK2S, you pick up Carlsbad, CA $550. Gordon, 619-438-4420 days.

SELL Drake TR4, AC Supply, Speaker, Mike. Good condition, $250. G5RV Antenna, $30. K2ONS, 516-334-3237.

COLLINS KWM-380 complete, all updates and mods done by Collins. Comes with all filters, SP/NB, direct entry interface, keypad, blower, SM280 microphone, service manual, mint, and nothing else to add, $2,500. Heath SS9000/PS9000 all filters and accessories, service manual, mint $850. Call KA2TMY, Vince, 201-669-1913.

WANTED—Tube Type 8122, New, Used. Ed Daley, W1HTK, 51 Peterson Road, Vernon, CT 06066.

JENNINGS Vacuum Relays—RJ1A $75, RJ2C $145. Vacuum Capacitors, Variable-UC8-300-7.5KV $135. Cardwell 2100PF-3KV $45. Eimac SK-2210/SK-2216 $85, 3CX1200A7 $365. (All-New.) Also: RB2A $85. A. Emerald, 8956 Swallow, Ftn. Vly., CA 92708, 714-962-5940.

WANTED: Need Service Manual for R-390A/URR Government Receiver. Bill Sigler, KA8VIV, 304-925-4388.

FOR SALE: Clegg FM-27B 2M Mobile-$50; ICOM-225A-$200; Yaesu FT-23/R TTP-$225; 2-Regency XL-2000 VHF-$100 each; RS PRO-2020 20CH VHF/UHF Scanner-$200; Datavue-25 MS-DOS 640K Portable-$250; RS DMP-130-$100; Everex Graphics Card-$50. KB4YKC 904-733-3692 after 6 PM EST.

LIST OF 75 Worldwide 10M Propagation Beacons Freq./QTH; Know when 10M opens to DX! $1 plus SASE. John Mahagan, WB4JHS/BCN, 2606 Red Pine Road, Hillsborough, NC 27278.

JOHNSON Navigator (VFO-controlled transmitter, covers 160-10). Solid state high-voltage and bias supplies. Recently checked out and tuned up, $75. Contact Bruce Hale, KB1MW at ARRL HQ. Call 203-666-1541, ex. 279, weekdays from 8 AM to 4 PM Eastern time.

HEATH HW100, HW101 specs, spare tubes, power supply, $200. HW8, PS, $85. Butternut HF6V, 160 coil, roof mount, $95. Tektronix 516 dual trace 15 MHz oscilloscope, two probes, $100. All work fine. You ship. Rob, NS6V, 3881 Winkle Avenue, Santa Cruz, CA 95065, 408-476-5986.

WANTED—Cushcraft 220MC Boomers & H Frame for 220MC 8 to 10 ft. square. K2LNS, 717-829-2695.

ICOM AH-2 Antenna Tuner/Whip $399. ICOM IC-20 2 FM Transceiver, AC Power Supply, Mic, Mobile Mount $99. K5DED, RR #5, Box 245A, Bemidji, MN 56601, 218-243-3103.

USED EQUIPMENT Needed. Missionary Amateur Radio Outreach needs used gear to recondition for missionaries. Write Paul, WB6VLA, P.O. Box 178, Garden Valley, CA 95633, 916-333-4597.

PALOMAR Tuner-Tuner. Palomar VLF Converter. Mint. $55 each prepaid. Mark F. Mitchell, W0APN, Box 223, Cassville, MO 65625.

ONE HAM IV Rotor, Control and Manual. Used six months, $225. WA2IDZ, tel. 407-269-2429.

WANTED: 510X Oscillator Accessory in good condition. Robert Jones, AB4HJ, 1150 Muirfield Drive, Stone Mtn., GA 30088, 404-469-4266.

WANTED: R390A Receiver 2 KHz Mechanical Filter, PM2 Circuit Schematic. Donald Fuller, 210 Utica Street, Tonawanda, NY 14150.

MORSE-A-WORD Code Copier 30 WPM Key or Rcvr. Input, $69. K4HHR, 813-595-6903.

WANTED: Drake B-1000 Balun and Drake L7 Amplifier. Call Betsy, KE7PL, 509-534-7750.

KT5X CONTESTER for PC's, now instant 4,000 QSO sweepstakes library. SASE details. Frederick Maas, Route 9, Box 86-H, Santa Fe, NM 87505.

KENWOOD 530S 20 hrs. factory box, book $415. Gordon, 3915 Trieste, Carlsbad, CA 92008.

WANTED: Motorola Motrac 2/6 Meter Rackmounted Receivers. QSL w/price or call collect (best time 7-11 PM EST). Bob, KI4MB, 6608 N. 18th Street, Arlington, VA 22205, 703-533-0650.

ALLIANCE U-100 Rotors and Control Boxes, $22.95. Includes shipping. K1BW, 508-797-4190.

HEATH HW9, PSA9 Pwr., Phones, HD1424 SWL Ant., 2 9V Pwr. Cubes, Micronta Fet. VOM (new), $100. Pickup preferred. Doug Frick, 6 West 9th, Pottstown, PA 19464, 215-323-1520.

REPEATER For Sale: Spectrum 2-Meter Model SCR77, 30 Watts. With Wacom Duplexer BPBR Model 641 4 Cavity. Together $1200. Bob, 24 W. Compress Road, Artesia, NM 88210, 505-746-6514.

WANTED: General Coverage Receiver, ICOM R70, R71A, Collins R390, R390A, 51J4, 51S1. Excellent to mint condition only. K8FD, 808 9th Avenue NE, Belmond, IA 50421, 515-444-4395.

HEATHKIT HR-1680 Receiver, factory aligned, mint condition, $125. Want MFJ-941-D Tuner. William Treiease, 408-372-4201.

KENWOOD TS940S, CW, SSB Filters. Mint con., $1500 firm. Don Hughes, KA8ZFT, 1909 Jennifer Lane, Findlay, OH 45840.

WANTED—West Coast & Mountain State dealers for WD4BUM's line of high quality, low cost mobile antennas & accessories. Write: Lakeview Company, Rt. 7, Box 258, Anderson, SC 29624, 1-803-226-6990.

WANTED: Collins Mechanical Filter (500 Hz) F455J05 Plug-In Type. Also, set of Xtal Earphones. K5AJZ, 7217 E. 65th Street, Tulsa, OK 74133, 918-496-7752.

R-390A RECEIVER Parts: Info SASE. CPRC-26 military manpack radio, 6 meter FM, with antenna, crystal, handset: $22.50, $42.50/pair. Military-spec TS-352 voltohm/multimeter, leads, manual: $12.50, $4.50/piece shipping, $9 maximum. Baytronics, P.O. Box 591, Sandusky, OH 44870.

WANTED: Harvey-Wells Bandmaster-Z-Match. State condition and price to include shipping. All mail answered. Elvis Curtis, KI6XK, 11692 Silverfox Road, Los Alamitos, CA 90720.

FOR SALE/Trade TS520 w/VFO & Mic. Good cond. Want QRP equip. for SSB/CW. Larry Shaw, N7JJQ/DU3, Box 63, FPO San Fran., CA 96654.

ARGONAUT 515, excellent condition, with manual, $300. N3DQN, 717-677-7438.

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YAESU FL-2100B 1.2 KW input 80 thru 10 M linear amplifier, none cleaner, $350 firm; Yaesu SP901P speaker/phone patch, mint in box, $59; PA-3 DC adapter/charger for Yaesu FT727R or FT209R, $25; unused pair 572B tubes, $110. Ron, N8IMZ, 614-774-2233 evenings.

VIBROPLEX SALE—New and Used. Best Prices on Keys, Bugs, Paddles and Keyers. SASE for list. "CW Forever" Key Co., P.O.B. 659, Manchester, MO 63011.

COMPUTER CODE Program. New. Best value. Does everything! Free details: SASE. Bahr, Box 15433-F6, Riorancho, NM 87174.

FOR SALE: Mint Yaesu FT102. MD1 Dynamic Mic. Just completely checked by Yaesu factory service. Both $675. You pay UPS. KD9IN, 312-447-4413 evenings.

NEW 6146B/8298A & 6146W, $20 pr., 12BY7A, $5 ea., min. order $25. Free UPS. K6GLJ, 805-396-2111.

NO ROOM IN New Home: Collins 32V3 $275, 75A4 with Filters $360, Hallicrafters HT44 $200, SX117 $175, Viking Ranger $115, HQ180 $150, Heath HW16 $60, HT 32B $190. Cliff Fleury, AI7Y, 64174 Tumalo Rim Drive, Bend, OR 97701. 503-382-9162.

WANTED: Zenith Transistor Oceanic Radio Model 7000. Wade, 657 14th Avenue, Prospect Park, PA 19076.

RECHARGEABLE Batteries: NiCd Packs/Inserts/Rebuilding. Exact Replacement Packs: Yaesu FNB2 / Wilson BP4 $22.95, Santec 142/1200 $21.95, Motorola: HT220-Slim $29.95, HT220-Omni $34.95, GE: PE/MVP $48.75, RCA TacTec $59.95, Battery Inserts: ICOM BP2/CM2 $17.95, BP3/CM3 $16.95, BP5/CM5 $23.95, BP7/BP8 $29.95, Kenwood: PB21 $11.95, PB24 $19.95, PB25/25H/26 $24.95, Azden 300 $19.95, Tempo S1/270 $21.95, S1, 2, 4, 5, 15/450 $22.95, Ten-Tec 2991 $24.95, Standard BP1/C118 $24.95, Regency 1000 $19.95, 3XAA Phone $5.75, Inserts Installed: ICOM/Ken add $4, Rebuilding: Yaesu FNB3 $34.95, FNB4 $37.95, Standard BP11 $27, others available. SASE/Catalog. In PA add 6%. Add $3 Shipping/Order. Cunard Associates, Dept. A, RD 6, Box 104, Bedford, PA 15522.

SELL Operating QTH: 3 brm., 3 bath, house with walk-out basement on ½ acre, view lot in Escondido, CA. 50 foot tower and rights in deed. Send for details, W6RFM.

WANTED: The Address for International Electronic Supply, so I can have my Azden PCS-2000 Repaired. Write: Robert Brown, N4HRR, 97th Signal Bn., APO, NY 09028.

WANTED: Original VFO for Kenwood Transceiver TS-520S. W4KHZ, 933 North Patrick Henry Drive, Arlington, VA 22205.

WANTED: "New" Kenwood VFO. Must be in mint condition. WG0M, 407 Monroe Place, Hopkins, MN 55343.

FOR SALE: Drake TR-7, MS-7. Good condition with manual, $750 OBO. Bob, W6YMR/KL7, P.O. Box 473, Anchor Pt., AK 99556, tel. 907-235-8262 after 9/15/88.

HAM/COMPUTER Classified Advertiser For Sale. Good part time or retirement business. Accounts, system, etc. Serious write only. Brooks Publications, 222 Cedar Avenue, Arlington, MA 02174.

COLLINS FTR24, KWM2AR Wanted. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

WANTED: Heathkit SB-644A Remote VFO, SB-614 Station Monitor. KE2DJ, 2108 Thomas View Road, Reston, VA 22091, 703-860-1305.

YAESU FT102 250W HF Transceiver w/FM, FV102DM VFO, SP102P Speaker/Phone Patch, YO-100 Monitor Scope, MD-1 Desk Microphone w/Up-Down. All mint condition with manuals. $1100 + shipping. K7GFL, 702-456-9048.

CUSHCRAFT R-3 Halfwave Vertical 10-20 Meters. With Transmatch, $85. WD6V, 415-433-6881.

SELL: Heathkit HW-101, HP23C PS, Microphone. Vg. working condition, $325. Write Dan, KA4KUE, 13000 Wooded Acres Court, Manassas, VA 22111 or call 703-791-6903.

DXER'S Delight! Spectacular views from new contemporary vacation rental home on Garden Island of Kauai. Fully equipped, three bedroom, golf course QTH, with secluded beaches nearby. Write NH6NG, POB 177, Hanalei, HI 96714.

QSL ARRL and Reader Responses, to my Stray, in *QST* July 1988. W5TJT.

1989 CALLBOOKS: Prepublication orders this month; either, $24. Both, $45. Any four or more, $21. Postpaid USA. Century Print, 6059 Essex, Riverside, CA 92504-1588, 714-687-5910.

1987 ROHN 25G 50 foot tower. Includes four ten foot sections— one top section. Guys, turn buckles and hardware included as is. Best offer. Wallingford Transit District, contact Brenda, 203-294-2160.

WANTED: Hallicrafters HA-6 Transverter and Manual. Working or not. 3 page list Radios, Magazines, Tubes. K4UJZ, 608 W. Thompson Lane, Murfreesboro, TN 37129, 615-893-5344.

FOR SALE: Yaesu FT-757GX with FP-757HD Power Supply, Alliance HD-73 Rotator, Cushcraft A-3, Butternut HF-6V, 15 ft. Roof Tower, Ham-Key HK-3M, Lo-Pass Filter, Heath Antenna Switch, Coax RG-213, and ICM PC Jr. with Dual Floppy Drives, 128K, Color Monitor, Tech Manuals, DOS 2.1, Cartridge Basic. Call Larry, KSØV after September 7 at 503-626-6198.

TEKTRONIX 2215 60 MHz dual channel scope with delayed sweep. New condition, with probes, service manual, $700. Roy Lewallen, W7EL, 5470 SW 152, Beaverton, OR 97007, 503-646-2885.

DRAKE 4 NB Noise Blanker $95. Sherwood CF 600/6 $85. Drake R-4C $220. SB200 $325. Stan, K5GO, 501-741-1825.

WANTED—CRT Tube, PN 5083-0552, for HP Model 175 Oscilloscope. John, WB2SWP, 212-688-9436.

COMMODORE and AMIGA Chips, Parts, Diagnostics. Heavy Duty Power Supply, ($27.95 + UPS), for the C64. We ship worldwide. Kasara Microsystems Inc., 32 Murray Hill Drive, Spring Valley, NY 10977, 1-800-248-2983 or 914-356-3131.

WANTED: WW2 German, Japanese, Italian military radio apparatus and all related items. Any US gov't manual on same. Some US military radios pre-1946, examples ARR-16, ARQ-1, MBM, PPN-1, PPN-2, RAX, TBY, BC-1139, BC-1209, PRC-1, PRC-5. Forest Service pre-FM radios, types S, SV, T, etc. and info on same. Civil aircraft non-VHF radios WE 10A-20A etc. Any issues USN "Electron", "Bendix Radio Engineer". Also your excess manuals, factory training and advertising materials in general. Thanks! Hugh Miller, KA7LXY, 6400 Maltby, Woodinville, WA 98072-8375.

ICOM AT500 Automatic Antenna Tuner Wanted. K6DL.

WANTED: Mint Collins 75A-4 Filters, Speaker, 32V3. W5NZR, 3303 Savell Drive, Baytown, TX 77521, 713-422-0472.

FERRITE Cores to Suppress RFI/EMI. 36 different sizes and shapes from 1/8" to 2-½" as well as, sample kits available from stock for immediate delivery. If you find problems with your radios, computers, TV's, etc., our cores suppress or eliminate the unwanted signals. Keep yourself and your neighbors happy buy our cores. Please identify yourself as a Ham. Kreger Components, P.O. Box 8506, Roanoke, VA 24014, 703-989-4738.

COLLINS KWS-1 comp. station 75A4, SC-101 control, PS, 4-250B spares, offer, sked. Can del. w/i 1000 mi. @ .10/mi. W6RTD, 31 Celine Drive, Santa Barbara, CA 93105, 805-687-3742.

JOBS FOR HAMS

WANTED: Experienced Radio Communications Specialists and Electronic Mechanics for positions in mobile response units. Ham experience a +! Submit Standard Form 171 to: FEMA, Office of Personnel, Attn: Judy South, 500 C Street SW, Washington, DC 20472. For additional information contact Ms. South @ 202-646-4035. An Equal Opportunity Employer.

ADVERTISING DEPARTMENT STAFF

Bruce O. Williams, WA6IVC, Advertising Manager
Angela M. Beebe, KA1SER, Advertising Assistant

203-667-2494 is a direct line, and will be answered only by Advertising Department personnel.

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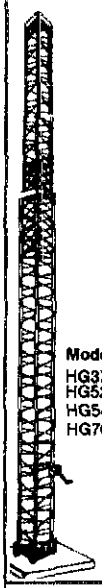
ANTENNA/TOWER SALE!



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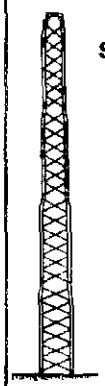
CRANKUP SALE!

All Models Shipped Factory Direct—Freight Paid*!

Check these features:
- All steel construction
- Hot dip galvanized after fabrication
- Complete with base and rotor plate
- Totally self-supporting—no guys needed

Model	Height	Load	Sale Price
HG37SS	37 ft	9 sq ft	$CALL
HG52SS	52 ft	9 sq ft	$CALL
HG54HD	54 ft	16 sq ft	$CALL
HG70HD	70 ft	16 sq ft	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price to Continental U.S.A.!



ROHN

Self Supporting Towers On SALE!

FREIGHT PREPAID

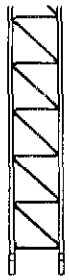
- All Steel Construction—Rugged
- Galvanized Finish—Long Life
- Totally Free Standing—No Guy Wires
- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HBX40	40 ft	10 sq ft	228	$379
HBX48	48 ft	10 sq ft	303	$489
HBX56	56 ft	10 sq ft	385	$569
HDBX40	40 ft	15 sq ft	281	$459
HDBX48	48 ft	15 sq ft	363	$559

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

ROHN

Guyed Tower Packages

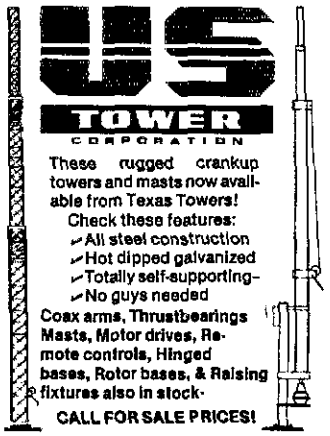


- World Famous Rohn Quality and Dependability
- Rugged high wind survival-provides safe installation
- Multi purpose towers satisfy a wide range of needs
- Complete packages include: guy hardware, turnbuckles, guy assemblies, w/torq bars, concrete base, rotor plate and top section per manufacturers specs.

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.

	Model 25G	Model 45G	Model 55G
50'	$ 699	$1239	$1529
60'	769	1399	1718
70'	829	1539	1879
80'	989	1719	2079
90'	1059	1999	2249
100'	1149	2179	2439
110'	1359	2329	2839
120'	1429	2499	3039

US TOWER CORPORATION



These rugged crankup towers and masts now available from Texas Towers!

Check these features:
- All steel construction
- Hot dipped galvanized
- Totally self-supporting-
- No guys needed

Coax arms, Thrustbearings Masts, Motor drives, Remote controls, Hinged bases, Rotor bases, & Raising fixtures also in stock.

CALL FOR SALE PRICES!

Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
MA40 mast	21'	40'	10 sq ft	$629
MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3569

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

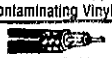
- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X

$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield • 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!

½" Alum. w/poly Jacket	$.79/ft.
½" LDF4-50 Andrew Heliax®	$1.79/ft
⅞" LDF5-50 Andrew Heliax®	$3.99/ft

select connectors below

Heliax® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
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	$25	$25	$33	$33
½" Heliax®	$29	$29	$29	$29
⅞" Heliax®	$55	$55	$55	$55

COAX CONNECTORS

Amphenol Silver PL259	$1.25
UG218 N Male	$2.95
9086/9913 N Male Connector	$4.95

ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga	$.10/ft.
¼ mile 18ga copper-clad steel wire	$30
Dog bone end insulator	$.79 ea.

Van Gorden

1:1 Balun $15 Center Insulator $8
Dipole kits D80 $31.95/D40 $28.95
Short Dipole Kits SD80 $35.95/SD40 $33.95
All-band Dipole w/ladder line $29.95
G5RV all band antenna $49.95

ALPHA DELTA

DX-A 160-80-40 Sloper	$49

CUSHCRAFT

A3 3-el Tribander	$259
A4S 4-el Tribander Beam w/S.S. Hdwre	$349
A743 & A744, 30/40 mtr KIT for the A3 & A4	$ 89
AP8 80-10 mtr Vertical	$139
AV5 80-10mtr Vertical	$119
D40 40mtr Dipole	$159
40-2CD 2-el 40 mtr Beam	$339
A50-5 5-el 6 mtr Beam	$ 98
215 WB NEW 15-el 2 mtr Beam	$ 89
230 WB NEW 30-el 2 mtr Beam	$229
4218 XL 18-el 2 mtr Beam	$129
3219 19-el 2 mtr Beam	$109
220B 17-el 220MHz Beam	$109
424B 24-el 432MHz Beam	$ 89
ARX2B 2 mtr Vertical	$ 45

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CALL FOR SPECIAL PRICES!

Discoverer 2-el 40-mtr Beam	
Discoverer 3-el Conversion Kit	
EXPLORER-14 SUPER-SPECIAL	
QK710 30/40 mtr. Add-On-Kit	
V2S 2-mtr Base Vertical	
V4S 440MHz Base Vertical	
TH5MK2S Broad Band 5-el Triband Beam	
TH7DXS 7-el Triband Beam	
TH3JRS 3-el Triband Beam	
205BAS 5-el 20-mtr Beam	
155BAS 5-el 15-mtr Beam	
105BAS 5-el 10-mtr Beam	
204BAS 4-el 20-mtr Beam	
64BS 4-el 6-mtr Beam	
12 AVQ 20-10 mtr vertical	
14 AVQ 40-10 mtr vertical	
18 AVT/WB 80-10mtr Vertical	
18HTS 80-10 mtr Hy-Tower Vertical	
23BS 3-el 2 mtr Beam	
25BS 5-el 2 mtr Beam	
28BS 8-el 2 mtr Beam	
214BS 14-el 2-mtr Beam	
2BDQ 80/40 mtr Trap Dipole	
5BDQ 80-10 mtr Trap Dipole	
BN86 80-10 mtr KW Balun W/Coax Seal	

HUSTLER

6BTV 80-10 mtr Vert $149 5BTV 80-10 mtr Vert $129
4BTV 40-10 mtr Vert $99 G7-144 2-mtr Base $129
G6-144B 2-mtr Base $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

Bumper Mounts - Springs - Folding Masts in Stock!

BUTTERNUT ELECTRONICS CO

HF6V 80-10m Vertical $129 Delivered
- Full Legal Power
- Highest Q Tuning Circuits

HF2V 80-40m Vertical $129 Delivered
- Full Legal Power
- Automatic Band Switching

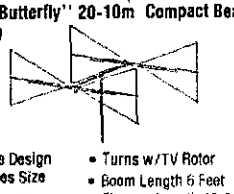
Accessories:

RMK II Roof Mtg. Kit	$49
STR II Stub-Tuned Radials	$29
TBR160 160m Coil Kit	$49
30m Add-on Kit	$29
20m Add-on Kit	$39
17/12m Add-on Kit	$27

HF6V HF2V

FREE UPS on ACCESSORIES when purchased w/antenna

HF5B "Butterfly" 20-10m Compact Beam $199.00



- Unique Design Reduces Size
- No Lossy Traps
- Turns w/TV Rotor
- Boom Length 6 Feet
- Element Length 12.5 Feet

FREE UPS Shipping In Continental USA

MIRAGE/KLM

KT34A 4-el Broad Band Triband Beam	$399.95
KT34XA 6-el Broad Band Triband Beam	$589.95

ROTORS

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
Telex HDR300 Heavy Duty (25 sq ft rating)	$Call

ROTOR CABLE

Standard 8 cond cables $.19/ft (vinyl jacket 2-#18 & 6-#22 ga)
Heavy Duty 8 Cond cable $.36/ft (vinyl jacket 2-#16 & 6-#18 ga)

ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS

20G	$48.00	45G	$133.00
25G	$56.00	55G	$165.00

ALL ACCESSORIES IN STOCK—CALL

ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	$1049.
FK2558	58 ft.	13.3 sq. ft.	1099.
FK2568	68 ft.	11.7 sq. ft.	1149.
FK4544	44 ft.	34.8 sq. ft.	1389.
FK4554	54 ft.	29.1 sq. ft.	1469.
FK4564	64 ft.	28.4 sq. ft.	1579.
25G Double Guy Kit			$279.
45G Double Guy Kit			$299.

*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.

TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating)	$ 15/ft
1/4 EHS Guywire (6650 lb rating)	$ 18/ft
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
3/8 EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8 EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2 × 9EE (1/2" × 9" Eye to Eye Turnbuckle)	$9.95
1/2 × 9EJ (1/2 × 9" Eye & Jaw Turnbuckle)	$10.95
1/2 × 12EE (1/2" × 12" Eye & Eye Turnbuckle)	$12.95
1/2 × 12EJ (1/2" × 12" Eye & Jaw Turnbuckle)	$13.95
5/8 × 12EJ (5/8" × 12" Eye & Jaw Turnbuckle)	$16.95
3/16" Preformed Guy Grip	$2.49
1/4" Preformed Guy Grip	$2.99
6" Diam - 4 ft Long Earth Screw Anchor	$14.95
500 D Guy Insulator (5/32" or 3/16" Cable)	$1.69
502 Guy Insulator (1/4" Cable)	$2.99
5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.32/ft
HPTG4000 Guy Cable (4000 lb rating)	$.52/ft
HPTG6700 Guy Cable (6700 lb rating)	$.72/ft
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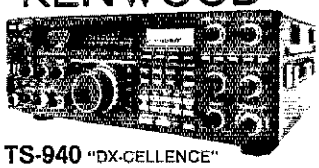

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- Direct Keyboard Entry
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- Its Got It All!

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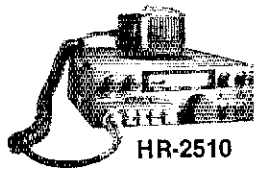

HR-2510
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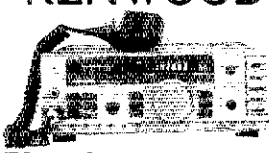

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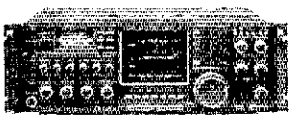

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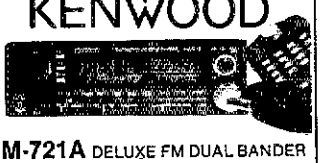

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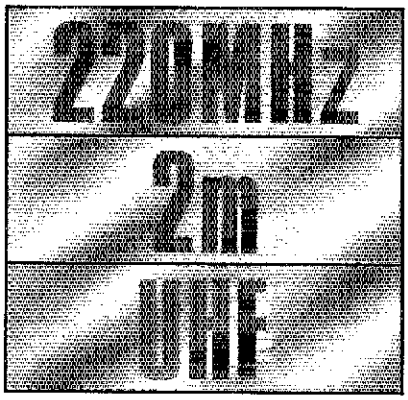


Whether you're a Novice or Extra class operator, you're sure to appreciate the high power, durability and size of Yaesu's FT-23R Series mini-HTs.

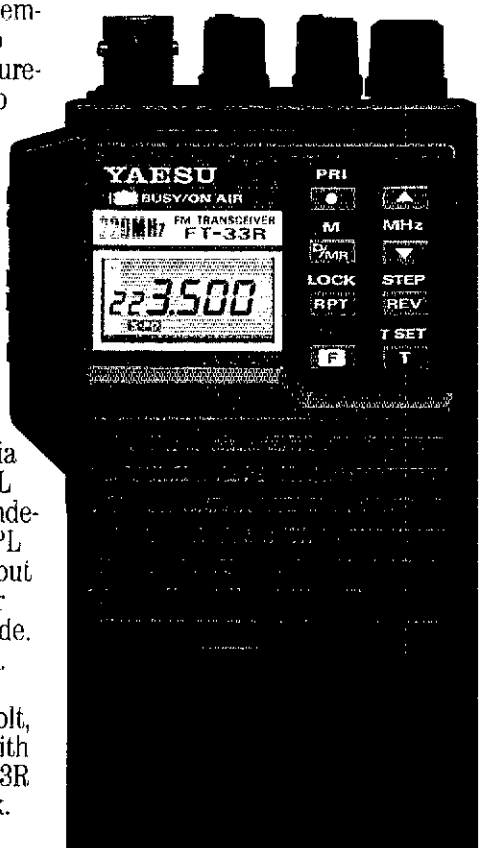
To begin with, you'll find a model that's right on your wavelength. The 2-meter FT-23R. The 220-MHz FT-33R. Or the 440-MHz FT-73R.

Whichever you choose, you benefit from incredibly small packaging. (Take a look at the actual size photo.) Aluminum-alloy cases that prove themselves reliable in a one-meter drop test onto solid concrete. And moisture-resistant seals that really help keep the rain out.

But perhaps best of all, each radio blends sophisticated, microprocessor-controlled performance with surprisingly simple operation. In fact, it takes only minutes to master all these features:

Ten memories that store frequency, offset and PL tone. Memory scan at 2 frequencies per second. Tx offset storage. Priority channel scan. Channel selection via tuning knob or up/down buttons. PL tone board (optional). PL display. Independent PL memory per channel. PL encode and decode. LCD power output and "S"-meter display. Battery-saver circuit. Push-button squelch override. Eight-key control pad. Keypad lock. High/low power switch.

The FT-23R comes with a 7.2-volt, 2.5-watt battery pack. The FT-73R with a 7.2-volt, 2-watt pack. And the FT-33R with a powerful 12-volt, 5-watt pack.



You can choose the miniature 7.2-volt, 2-watt pack shown in the photo below. And all battery packs are interchangeable, too.

And consider these options: 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 more.

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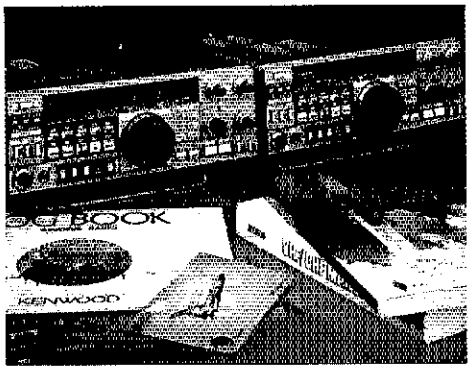
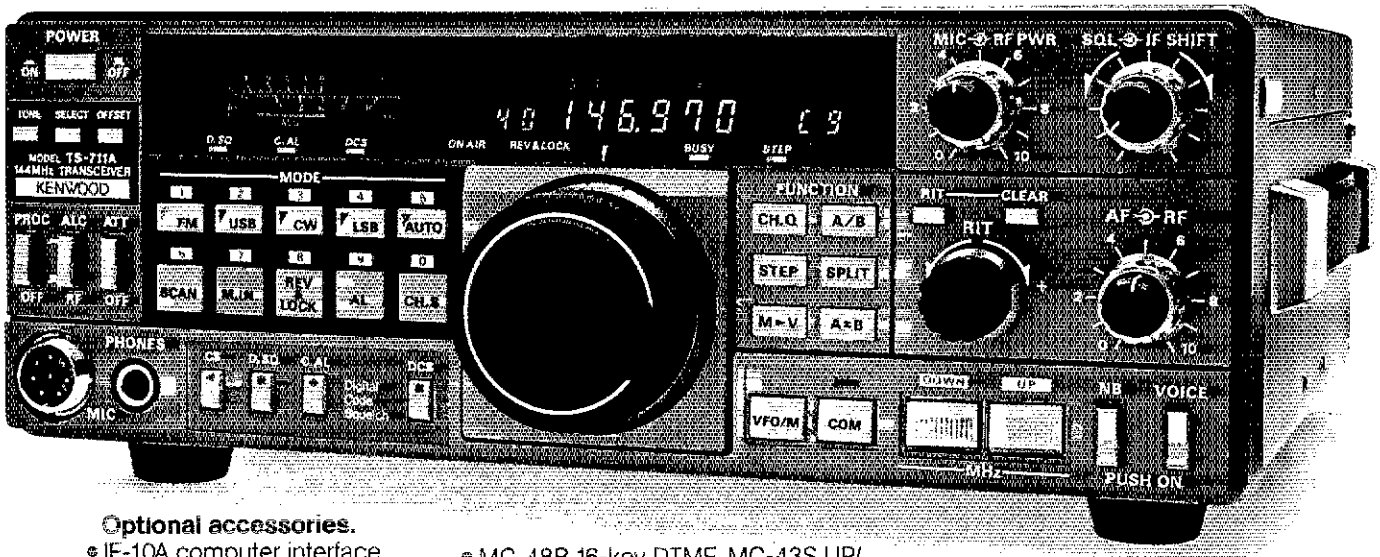
The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.** The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
- **Large fluorescent multi-function display.** Shows frequency, RIT shift, VFO A/B, SPLIT, ALERT, repeater offset, digital code, and memory channel.
- **40 multi-function memories.** Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.



- **Versatile scanning functions.** Programmable band and memory scan (with channel lock-out). "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.** Continuously adjustable from 2 to 25 watts.
- **Automatic mode selection.** You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
- **High performance noise blanker.**
- **Speech processor.** For maximum efficiency on SSB and FM.
- **IF shift.**
- **"Quick-Step" tuning.** Vary the tuning characteristics from "conventional VFO feel" to a stepping action.
- **Built-in AC power supply.** Operation on 12 volts DC is also possible.
- **Semi break-in CW. with side tone.**
- **VS-1 voice synthesizer (optional)**

More TS-711A/811A information is available from authorized Kenwood dealers.



Optional accessories.

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48B 16-key DTMF, MC-43S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:
  SW-200A 1.8-150 MHz
  SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2U DC power cable

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