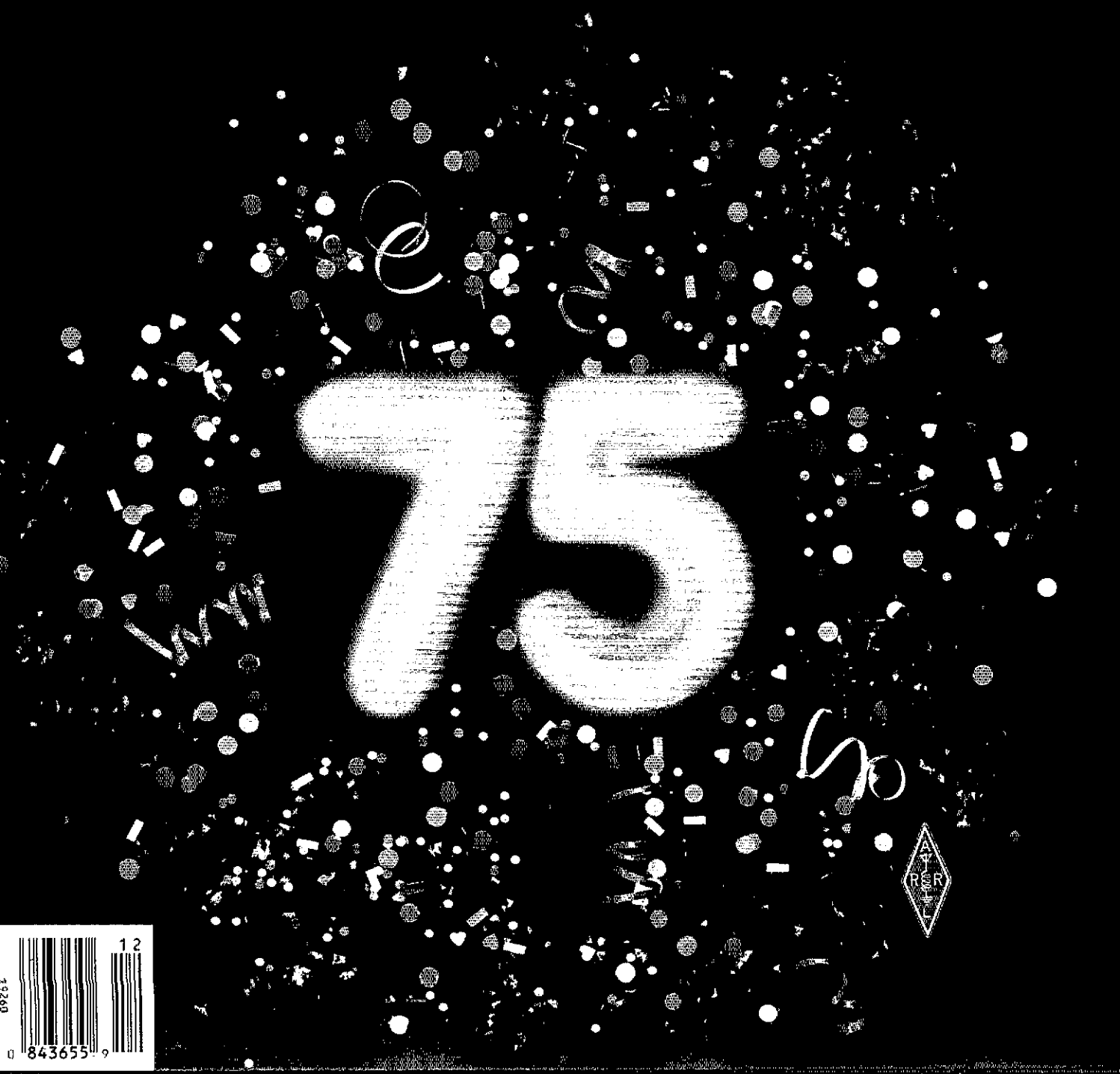
QST

December 1990 $3.00

75 Years Serving Amateur Radio



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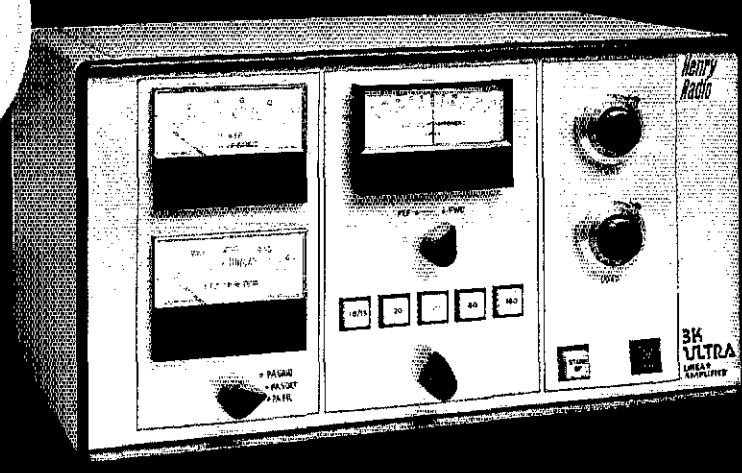
Congratulations to QST on its 75th anniversary

The League can look back with pride on its years of commitment to the growth and enhancement of the world-wide amateur fraternity. Today Amateur Radio fully reflects the dedication to public service and personal communications that little group of pioneers foresaw so many years ago.

For 64 of those 75 years Henry Radio has been serving that same world wide amateur community. Now to honor this special anniversary Henry Radio is proud to announce the introduction of the finest amateur linear amplifier it has ever produced, possibly the finest ever made. . .the new Henry 3K ULTRA.

Introducing the 3K Ultra . . . in celebration of QST's 75th



The 3K Ultra is every amateur's dream amplifier. It is rugged, reliable, remotely tuned and offers full power and efficiency on all bands between 1.8 and 24 MHz. Frequencies above 24 MHz are available on export models. The amplifier offers 6 memory channels for automatic tuning on your choice of frequencies. A small, light-weight, remote control cabinet sits at the operating position, while the amplifier itself can be across the room, in a closet, or in the next room. Production on the 3K Ultra will begin in January, so write for full specifications, or for our complete amplifier package.

We manufacture many other HF, VHF, and UHF amplifiers, all still available as before. All domestic and foreign inquiries are invited. Don't wait any longer to own the amplifier you have always wanted.

64 YEARS OF SERVICE

Henry Radio

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KENWOOD

The HT with More!

- Priority alert function
- Large, easy-to-read multi-function LCD display with night light
- Audible beeper to confirm keypad operation. DTMF monitor also included

- BT-5: AA cell, manganese/alkaline battery case
- BC-7: rapid charger
- BC-8: compact battery charger
- SMC-30: speaker microphone
- SMC-32: mini speaker microphone
- SC-52, 13, 27: soft cases
- RA-3, 6: telescoping antennas
- RA-8B: Stubby Duk antenna
- TSU-4: CTCSS decode unit
- VB-2530: 2m, 25 W amplifier (1-4 W input)
- LH-4, 5: leather cases
- MB-4: mobile bracket
- BH-5: swivel mount
- PG-2A: extra DC cable
- PG-3E: cigarette lighter cord with filter

TH-225A

The all new TH-225A brings you all the convenience of a mobile rig, with the portability of an HT.

- Five watt output battery pack (PB-12) supplied
- Odd split on all ten memory channels
- Six watts with 13.8 VDC input
- Wide receiver frequency range. Receives from 141–163 MHz, includes the weather channels! Transmit from 144–148 MHz. Modifiable to cover 141–151 MHz (MARS or CAP permit required)
- CTCSS encoder built-in
- TSU-4 CTCSS decoder optional
- 10 memory channels
- Nine types of scanning, including new "seek scan" and "priority alert." Also memory channel lock-out
- Intelligent "wave" battery saver circuit extends battery life.
- Easy memory recall. Simply press the channel number.
- DC input terminal for direct mobile or base operation
- New Twist-Lok Positive-Connect locking battery case
- Monitor switch to defeat squelch. Used to check the frequency when CTCSS encode/decode is used.

- **Supplied accessories:** Belt hook, rubber flex antenna, wall charger, DC cable, and dust caps.

Optional Accessories:

- PB-1: 12 V, 800 mAH NiCd pack for 5 W
- PB-2: 8.4 V, 500 mAH NiCd pack (2.5 W)
- PB-3: 7.2 V, 800 mAH NiCd pack (1.5 W)
- PB-4: 7.2 V, 1600 mAH NiCd pack (1.5 W)
- PB-12: 12 V, 500 mAH NiCd pack

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

TH-315A/TH-415A

- TH-315A covers 220–225 MHz
- TH-415A covers 430–449.995 MHz
- 5, 2.5, or 1.5 W output, depending on the power source. Supplied battery pack (PB-2) provides 2.5 W output.

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Accessories for Amateur Radio

WORLD CLASS PERFORMANCE

IC-765

HF TRANSCEIVER

Selected as the official radio of the World Radiosport Team Championships, a cultural exchange event of the 1990 Goodwill Games™, the IC-765 exemplifies ICOM's commitment to excellence in performance. The IC-765 incorporates the finest technology with the best designs to produce unbeatable HF operation for competitors worldwide.

The IC-765 sports: **Band Stacking Registers.** Each band's VFO's retain the last selected frequency, mode and filter choice when changing bands. Produces the equivalent of 20 VFO's; two per band. Great for multiband DX'ing! **99 Fully Tunable Memories.** Store frequency, mode and filter selections. **Direct Digital Synthesizer (DDS).** Assures ultra-fast PLL switching and lock-in for excellent PACKET, AMTOR and CW QSK operations.

Unlimited Operating Capability! The three step attenuator cuts multi-station overloads. Additional features include a **Built-in AC Supply, 100 percent duty cycle** for consistent high quality operation, **Fully Automatic Antenna Tuner, Iambic Keyer, Narrow 500Hz CW Filters** and **CW Pitch Control.**

The IC-765 general coverage receiver covers all bands and all modes.

Backed by ICOM's full **one-year warranty**, the IC-765's world class performance and superb reliability make it . . . the Choice of Champions!

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ICOM

First in Communications

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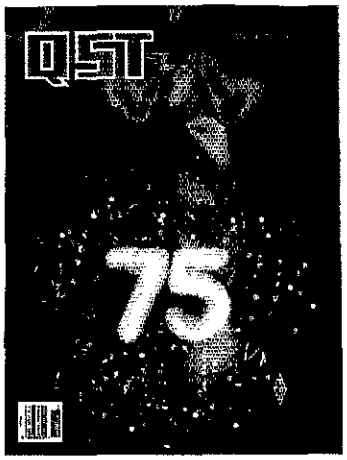

OUR COVER

In December 1915, two visionary radio amateurs crossed their fingers and published the first number of a magazine they could not guarantee beyond a three-issue trial. This month, that magazine, *QST*, celebrates *its 75th year of service* to Amateur Radio! Every *QST* reader has a personal stake in that success—so take your seat as a guest of honor at *QST*'s 75th-anniversary bash, already in progress on page 13.

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December 1990
Volume LXXIV Number 12

TECHNICAL

NEWS AND FEATURES

OPERATING

DEPARTMENTS

KEEP YOUR COOL

with AEA's NEW LA-30 HF Linear Amplifier

WHAT DO HAMS EXPECT WHEN THEY SEE THE AEA NAME ON A PRODUCT?

Quality and Value.
They expect mechanical and electrical integrity.
They expect the best possible physical construction.
They expect a product that will look and perform as advertised for years to come.
They expect the support they need, before, *during and after* the sale.
They don't expect promises that can't or won't be delivered.
They don't expect the frustration that comes from products that don't perform as advertised, or technical support that's less than supportive.
They don't expect to spend their hard-earned money, just to lose their cool.

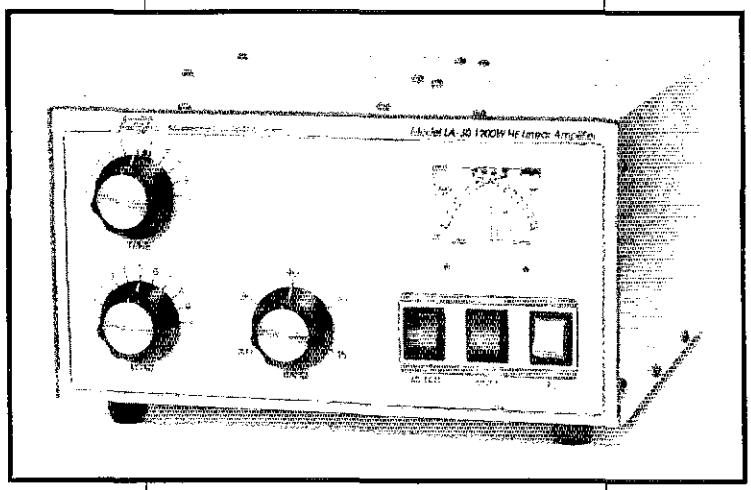
THE LA-30 DELIVERS!

The LA-30 HF Linear Amplifier delivers what hams expect from AEA.

Designed to provide reliable, stable, high RF output power, the LA-30 is equipped with a pressurized plenum and chimney cooling system to ensure extended periods of continuous use and longer tube life. We use a low-noise "squirrel-cage" blower that moves 30 cubic feet of air per minute past the tube and its base seal to help the LA-30 keep its cool. Others use computer type "muffin" blowers that don't cool the tube seals, and therefore shorten tube life.

Have you priced RF power tubes lately? They're not cheap. And when one goes out before you expect, you're bound to lose your cool.

QUALITY
We install parts that are designed to last, rather then cutting corners to reduce costs.



You won't find any shortcuts in our amplifiers. The LA-30 is the latest in a long line of high quality AEA products, going back over 12 years.

All aluminum parts are "alodized" to keep your LA-30 looking new. Alodizing is an expensive priming process that improves the metal's appearance and helps protect against scratching and corrosion. Make sure the amplifier you choose has alodized aluminum to keep it looking new for years to come.

We could cut manufacturing costs in other ways—such as using cheaper "self-tapping" screws and lower-quality aluminum—but then the unit just wouldn't meet our standards. Remember, only AEA amplifiers are built with AEA quality.

EASY TO USE.
With the LA-30's patent-pending cross-needle tuning bar meter system, we've eliminated the guesswork. You always know at a glance if the LA-30 is in tune. One dual-movement meter measures both plate and grid current simultaneously, which are both crucial to proper operation and extended tube life. The front panel controls are logically arranged and are marked with clear, easy-to-read markings and scales.

KEEP YOUR COOL!
Don't be fooled into buying an imitation when you can own an AEA. This compact self-contained tabletop unit will provide you with years of excellent performance. The LA-30 Linear Amplifier is the best HF amplifier value on the market today, because of AEA.

Engineering Makes the Difference!

SPECIFICATIONS:

Freq. Range	Amateur Bands 160-10 meters*
RF Input Power	SSB 1.2 KW P.E.P. CW/RTTY/AM/FM/ SSTV 1.0 KW
Power Tube	3-500Z zero-bias triode
Supply Voltage	110 VAC
Dimensions	14"W × 7½"H × 16½"D (36 × 19 × 42 cm)
Weight	35 lbs. (15.9 Kg.)

QSK modification available.
*10 meter mod. requires amateur license.

Advanced Electronic Applications, Inc.
2006-196th St. S.W./P.O. Box C2160 Lynnwood, WA 98036 (206)775-7373

10, 12, 15, 17 and 20 Meters

cushcraft R5

HERE'S WHY

Performance is always your top criterion, and when space is at a premium the R5 is your best choice. It needs no ground radials and stands 17 feet tall.

10, 12, 15, 17 and 20 meters are yours with fully automatic band selection and RFI supression. The only connection needed is the 50 Ohm coax from your transceiver.

The unique counterpoise has four 48" x 0.1" stainless steel rods for excellent ground independence. This allows the antenna to be mounted anywhere from ground level to roof top.

With the R5 you get quick assembly, easy installation and the highest "performance to size" ratio of any antenna available to the amateur today. Whether your space is large or small, the R5 will make ham radio more fun.

YOUR FELLOW HAMS AGREE THAT R5 IS THE PERFECT CHOICE.

"Best vertical I have used...Great antenna for hams with smallest of back yards." G4DTK

Only 7' off the ground and have worked over 50 countries in a month." W2JD

"R5 covered the whole world with only 100 Watts." JA1VJL

"Some stations find it hard to believe I'm not using a beam." GW0MOI

"A masterpiece of quality engineering and performance." N4OEQ

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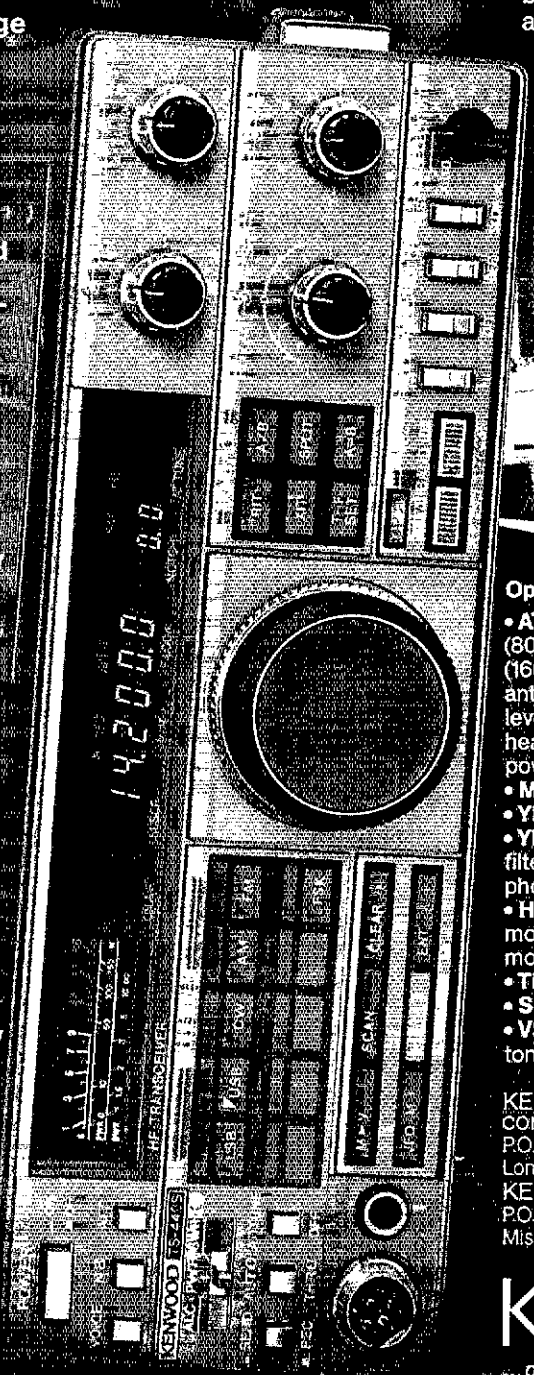
The DXpeditioner!

TS-440S

Compact high performance HF transceiver with general coverage receiver

Portable reliable performance and ease of use makes the TS-440S your obvious "low bands" choice. It is "Every Ham's" rig to go — ham shack, portable or mobile. But don't let the small size fool you — there's lots of "big rig" performance packed into this package. Built-in antenna tuner option. Continuous duty transmitter. Super DynaMix™ front end. Five filter functions. The TS-440S is at your service wherever you wish to operate.

- **Covers all Amateur bands** General coverage receiver tunes from 100 kHz–30 MHz. Easily modified for HF MARS operation.
- **Direct keyboard entry of frequency**
- **All modes built-in** USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.
- **VS-1 voice synthesizer (optional)**
- **Built-in automatic antenna tuner (optional).** Covers 80–10 meters.
- **5 IF filter functions**
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m.)
- **100% duty cycle transmitter** Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)
- **Computer interface port**
- **Adjustable dial torque**
- **100 memory channels** Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.
- **TU-8 CTCSS unit (optional)**



- **MC-43S UP/DOWN mic. included**
- **Superb interference reduction** IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and opt. filters fight QRM.
- **Dual SSB IF filtering** A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, **dual** filtering is provided.
- **VOX, full or semi break-in CW**
- **AMTOR compatible**

Optional accessories:

• **AT-440** internal auto. antenna tuner (80 m – 10 m) • **AT-250** external auto. tuner (160 m – 10 m) • **AT-130** compact mobile antenna tuner (160 m – 10 m) • **IF-232C/IC-10** level translator and modem IC kit • **PS-50** heavy duty power supply • **PS-430** DC power supply • **SP-430** external speaker • **MB-430** mobile mounting bracket • **YK-88C/88CN** 500 HZ/270 Hz CW filters • **YK-88S-88SN** 2.4 kHz/1.8 kHz SSB filters • **MC-60A/80/85** desk microphones • **MC-55** (8P) mobile microphone • **HS-4/5/6/7** headphones • **SP-41/50B** mobile speakers • **MA-5/VP-1 HF** 5 band mobile helical antenna and bumper mount • **TL-922A** 2 kw PEP linear amplifier • **SM-220** station monitor (no pan display) • **VS-1** voice synthesizer • **TU-8** CTCSS tone unit • **PG-2C** extra DC cable.

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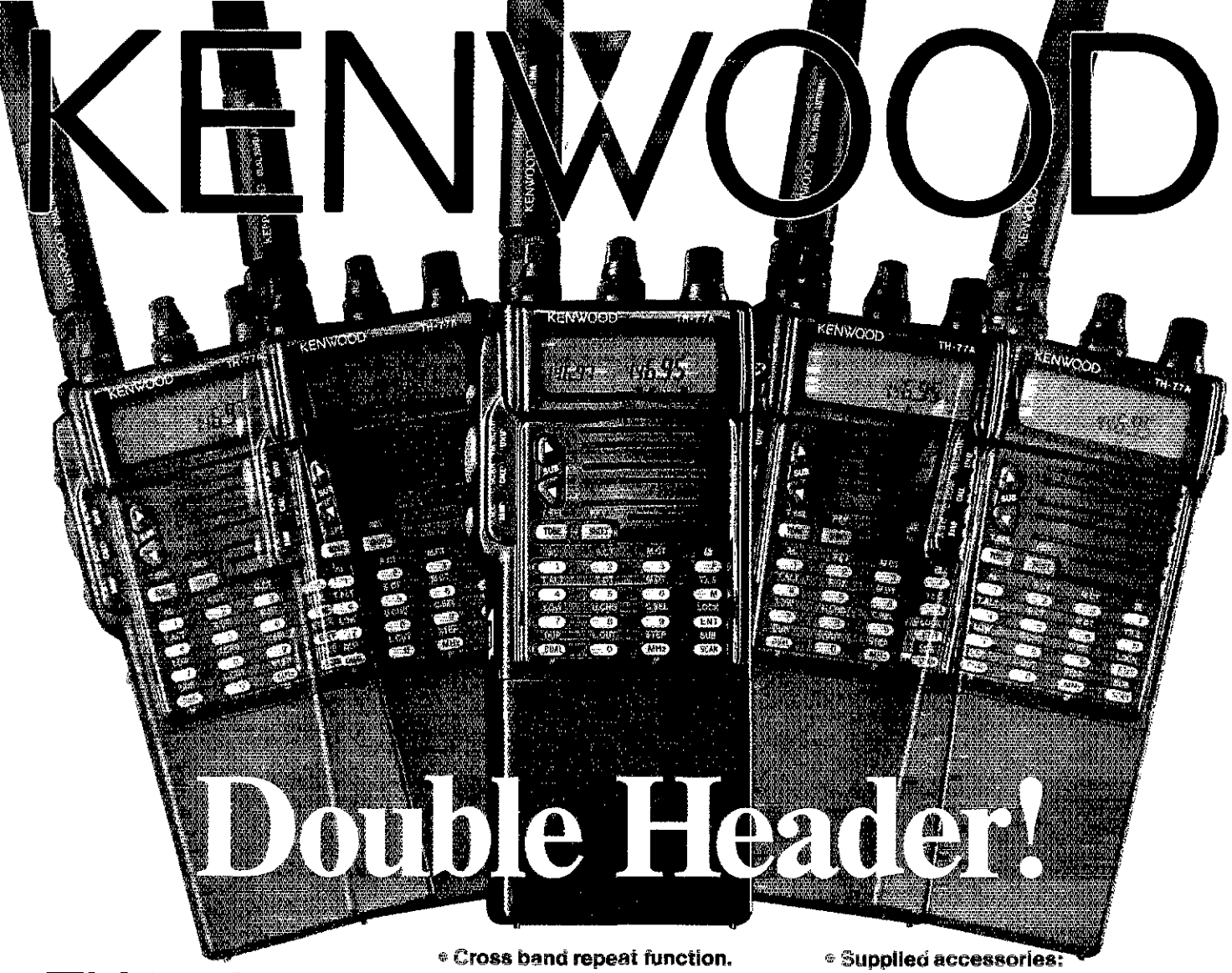

Double Header!

TH-77A

Compact 2m/70cm Dual Band HT

Here's a radio that deserves a double-take! The TH-77A is a feature-packed dual band radio compressed into an HT package. The accessories are compatible with our TH-75, TH-25, and TH-26 Series radios. Repeater and remote base users will appreciate the DTMF memory that can store *all* of the DTMF characters (*, #, A, B, C, and D) that are usually required for repeater functions!

- **Wide band receiver coverage.** 136–165 (118–165 [AM mode 118–136] MHz after modification) and 438–449.995 MHz. TX on Amateur bands only. (Two meter section is modifiable for MARS/CAP. Permits required.)
- **Dual receive/dual LCD display.** Separate volume and squelch controls for each band. Audio output can be mixed or separated by using an external speaker.
- **Cross band repeat function.**
- **Dual Tone Squelch System (DTSS).** Uses standard DTMF to open squelch.
- **CTCSS encode/decode built-in.**
- **Forty-two memory channels.** All channels odd split capable.
- **DTMF memory/autodialer.** Ten 15-digit codes can be stored.
- **Direct keyboard frequency entry.** The rotary dial can also be used to select memory, frequency, frequency step, CTCSS, and scan direction.
- **Multi-function, dual scanning.** Time or carrier operated channel or band scanning.
- **Frequency step selectable for quick QSY.** Choose from 5, 10, 12.5, 15, 20, or 25 kHz steps.
- **Two watts (1.5 W on UHF) with supplied battery pack.** Five watts output with PB-8 battery pack or 13.8 volts. Low power is 500 mW.
- **DC direct-in operation** from 6.3–16 VDC with the PG-2W.
- **T-Alert with elapsed time indicator.**
- **Automatic repeater offset on 2 m.**
- **Battery-saving features.** Auto battery saver, auto power off function, and economy power mode.
- **Supplied accessories:** Flex antenna, PB-6 battery pack (7.2 V, 600 mAH), wall charger, belt hook, wrist strap, keyboard cover.

Optional accessories:
• **SC-10:** Compact charger • **BC-11:** Rapid charger • **BH-6:** Swivel mount • **BT-6:** AAA battery case • **DC-1/PG-2V:** DC adapter • **DC-4:** Mobile charger for PB-10 • **DC-5:** Mobile charger for PB-6, 7, 9 • **PB-5:** 7.2 V, 200 mAh NiCd pack for 2.5 W output • **PB-6:** 7.2 V, 600 mAh NiCd pack • **PB-7:** 7.2 V, 1100 mAh NiCd pack • **PB-8:** 12 V, 600 mAh NiCd for 5 W output • **PB-9:** 7.2 V, 600 mAh NiCd with built-in charger • **PB-11:** 12 V, 600 mAh OR 6 V, 1200 mAh, for 5 W OR 2 W • **HMC-2:** Headset with VOX and PTT • **PG-2W:** DC cable w/fuse • **PG-3F:** DC cable with filter and cigarette lighter plug • **SC-28, 29:** Soft case • **SMC-30/31:** Speaker mics. • **SMC-33:** Speaker mic. w/remote control • **WR-1:** Water resistant bag.

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Mississippi — Vessen "Butch" Magee, KF5DE, 2120 Belvedere Dr, Jackson 39205 (601-373-4325)
Tennessee — Harry Simpson, W4MI, 1830 Macaulay Ave, Memphis 38127 (901-357-8148)

Great Lakes Division
Kentucky — John A. Thernes, WM4T, 60 Locust Ave, Covington 41017 (606-331-0331)
Michigan — George E. Race, WB8BGY, 3865 Gibbs Rd, Albion 49224 (517-531-4758)
Ohio — David Kersten, N8AUH, 2197 McKinley Ave, Lakewood 44107-5432 (216-221-6740)

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NYC-Long Island — Walter M. Wenzel, KA2RGI, 373 Fifteenth St, West Babylon 11704 (516-957-5726)
Northern New Jersey — Richard S. Moseson, NW2L, 19 Linden Ave, Bloomfield 07003 (201-680-1585)

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Kansas — Robert M. Summers, KØBXF, 3045 North 72nd, Kansas City 66109 (913-299-1128)
Missouri — Bill McGrannahan, KØORB, 4826 Jarboe, Kansas City 64112-1335 (816-753-7100)
Nebraska — Vern J. Wirka, WBØGQM, 3106 Vinton, Omaha 68105 (402-341-4572)

New England Division
Connecticut — Caesar Rondina, N1DCS, 5 Bailey Dr, West Haven 06516 (203-934-2477)
Eastern Massachusetts — Barry Porter, KB1PA, 47 Erin Rd, Stoughton 02072 (617-341-2639)
Maine — Jeff Weinstein, K1JW, PO Box 646, Yarmouth, 04096 (207-846-0700)
New Hampshire — William Burden, WB1BRE, 11 Briand, Nashua 03063 (603-889-9322)
Rhode Island — William Foss, KA1JXH, 70 Mayfair Rd, Cumberland 02864 (401-334-3058)
Vermont — Mitchell Stern, WB2JSJ, PO Box 99, Essex 05451 (802-879-6589)
Western Massachusetts — Jean Hurtle, KA1IFC, 10 Hospital Rd, Baldwinville 01436 (508-939-8108)

Northwestern Division
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Montana — A. F. "Pete" Peters, KF7R, Rte 38, Box 2017, Livingston 59047 (406-222-2601)
Oregon — Randy Stimson, KZ7T, 9890 SW Inglewood St, Portland 97225 (503-297-1175)
Western Washington — Mary Lewis, W7QGP, 10352 Sand Point Way NE, Seattle 98125 (206-523-9117)
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Pacific Division
East Bay — Bob Vallio, W6RGG, 18655 Sheffield Rd, Castro Valley, CA 94546 (415-537-6704)
Nevada — Joseph D. Lambert, W8IXD, PO Box 1201, Boulder City 89005 (702-294-0505)
Pacific — Ronald Phillips, AH6HN, SR-6637, Keaau, HI 96749 (808-966-8113)
Sacramento Valley — Jettie Hill, W6RFF, 306 St Charles Ct, Roseville, CA 95661 (916-783-0383)
San Francisco — Richard Wilson, K6LRN, PO Box 4212, San Rafael, CA 94913
San Joaquin Valley — Byron Smith, WA6YLB, 504 S. Joyner, Exeter, CA 93221 (209-592-1038)
Santa Clara Valley — Steve Wilson, KA6S, 813 Berryessa St, Milpitas, 95035 (408-946-7410)

Roanoke Division
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South Carolina — Charles E. Moeller, N4FVU, 116 Willow Winds Dr, Columbia 29210-4454 (803-772-1186)
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Southeastern Division
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Northern Florida — Rudy Hubbard, WA4PUP, PO Box 843, Milton 32572-0843 (904-626-0620)
Southern Florida — Richard D. Hill, WA4PFK, 12380 NW 30 St, Sunrise 33323 (305-572-3172)
Puerto Rico — Luis Lopez, WP4EPC, PO Box 20719, Rio Piedras 00928 (809-765-6867)
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Orange — Joe H. Brown, W6UBQ, 5444 La Sierra, Riverside, CA 92505 (714-687-8394)
San Diego — Arthur R. Smith, W6INI, 4515 Melisa Way, San Diego, CA 92117 (619-273-1120)
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West Gulf Division
North Texas — W. W. "Dan" Dansby, W5URI, 5805 Walla Ave, Fort Worth 76133 (817-292-5019)
Oklahoma — Joseph Lynch, N6CL, PO Box 73, Oklahoma City 73101 (405-528-6625)
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)

THE AMERICAN RADIO RELAY LEAGUE, INC

The American Radio Relay League, Inc, is a noncommercial association of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the representation of the radio amateur in legislative matters, and for the maintenance of fraternalism and a high standard of conduct.

ARRL is an incorporated association without capital stock chartered under the laws of the State of Connecticut, and is an exempt organization under Section 501(c)(3) of the Internal Revenue Code of 1986. Its affairs are governed by a Board of Directors, whose voting members are elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is noncommercial, and no one who could gain financially from the shaping of its affairs is eligible for membership on its Board.

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

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

Membership inquiries and general correspondence should be addressed to the administrative headquarters at 225 Main Street, Newington, CT 06111 USA.
Telephone: 203-666-1541 Telex: 650215-5052 MCI.
MCI MAIL (electronic mail system) ID: 215-5052
FAX: 203-665-7531 (24-hour direct line)

Canadian membership inquiries and correspondence should be directed to CRRL Headquarters, Box 7009, Station E, London, ON N5Y 4J9, tel 519-660-1200.

"It Seems to Us..."

The WARC-92 Model Microwave Pressure Cooker

How will the 1992 World Administrative Radio Conference (WARC-92) affect Amateur Radio? That question is on many minds these days. We can't know the answer yet, of course, any more than we can know who's going to win the next Super Bowl. But we're beginning to see how the WARC-92 "season" is shaping up. A two-page article last month described the US first-draft proposals for WARC-92. Here's a closer look at what may be our greatest WARC challenge.

An indication of how much the world has changed since the last "general" WARC in 1979 is that the strongest pressure is on our secondary allocation at 2390-2450 MHz. Our problems at WARC-79 were mostly at lower frequencies; in little more than a decade, technology and spectrum congestion have combined to make the 1-3 GHz range the most attractive for a variety of new services.

Even if you don't presently operate in the so-called "S band," you probably have a high-power transmitter right in your kitchen: your microwave oven. Most microwave ovens are designed to operate on 2450 MHz, with energy confined to within 50 MHz of that center frequency. They're broad and unstable; also, they're shielded only to protect nearby people and animals from excessive exposure to RF energy, not to prevent interference. Other noncommunications use is made of the 2450-MHz frequency for industrial, scientific, and medical (ISM) purposes; communications services must tolerate any interference that may result.

Historically, most amateur operation at 2300-2450 MHz (that's the full international allocation, with 2310-2390 MHz unavailable in this country because of alleged flight test telemetry requirements) has been at the low end, in part to avoid the microwave oven interference problem. Before WARC-79 the Amateur-Satellite Service had no access to spectrum between 438 MHz and 24 GHz. One of our objectives in 1979 was to get at least a 10-MHz slice somewhere in the 2300-2450 MHz range, but sufficiently far removed from the 2450-MHz ISM center frequency to avoid interference. The good news was that we achieved 50 MHz of access; the bad, that it was entirely within the ISM band.

Still, the bad news wasn't all that bad. Even within the ISM band, the farther you venture from the 2450-MHz center frequency, the [illegible] making good use of the allocation. Their future plans place even greater reliance on this band.

The 1987 Mobile WARC showed that we weren't alone in our thinking. Following much the same reasoning we had applied at the opposite edge of the ISM band, a new Radiodetermination-Satellite Service (RDSS) was established with a downlink at 2483.5-2500 MHz.

Despite the obvious problems with ISM, several proposals for new uses of 2390-2450 MHz are floating around the US. The band has been suggested as an option for a new digital audio broadcasting (DAB) system using both satellite and terrestrial transmitters; however, system proponents see it as an undesirable option for several reasons. The band they really want is now occupied by aeronautical flight test telemetry, whose representatives insist they need pristine, nationwide spectrum—in other words, they say they can't share with anybody. Where would they be moved if the DAB folks get what they want? Well, 2390-2420 MHz is one possibility....

Mobile-satellite proponents envision dramatic increases in demand for their services, and are looking for another 350 MHz or so of spectrum in which to put their uplinks and downlinks. One place they're looking is 2390-2450 MHz. They say they'd be willing to share; we don't yet know how practical that would be.

Advocates of future land mobile systems are looking to have their needs met between 1.4 and 2.7 GHz, preferably below 2 GHz. Lots of shared primary mobile allocations already exist in this range in the international Table of Frequency Allocations, so the issue here is what to do with the other services (mostly fixed microwave) now operating there that would not be compatible with intensive mobile use.

For the companies developing these new systems, the financial stakes are high. Revenues could be measured in the hundreds of millions of dollars; so could the additional costs if they end up having to use less-desirable spectrum.

We have our work cut out for us defending against this onslaught. It won't be easy, but we must succeed if amateurs are to have adequate satellite systems and adequate access

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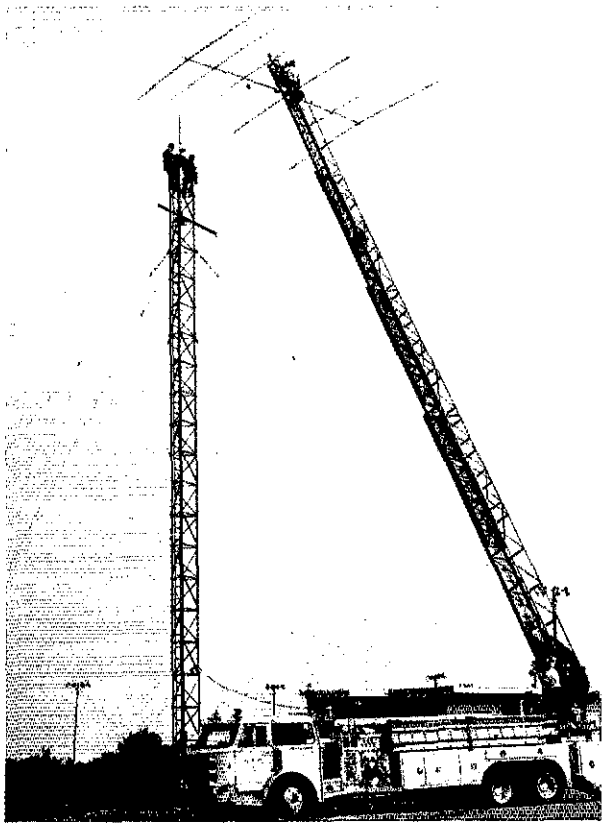
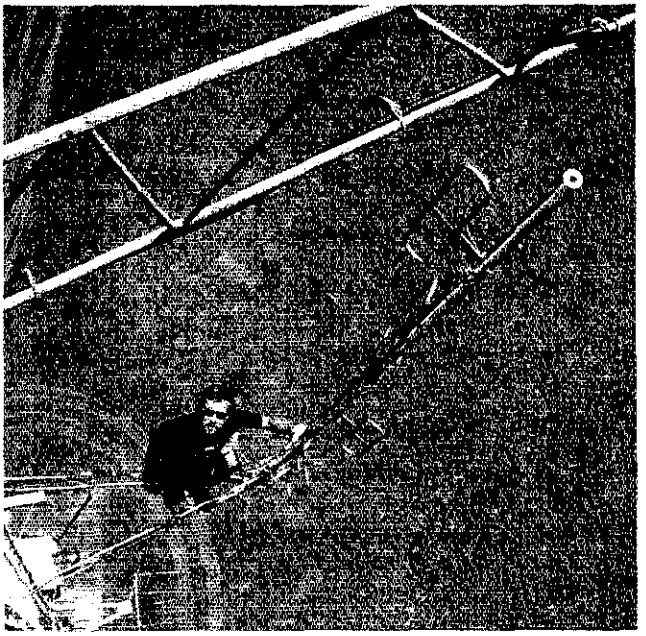
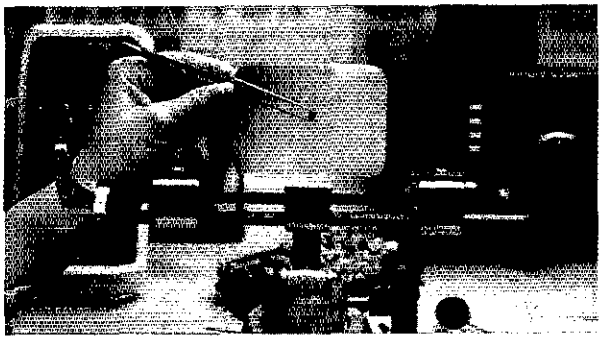
UP FRONT in QST



Some guys aren't satisfied with a simple whip: You can't beat the signal from this mobile antenna. Actually, the only trip this skyhook made was up. Two volunteer public service organizations work together in Hamburg, New York, as the Hamburg Volunteer Fire Department gives the South Towns Amateur Radio Society (STARS) a lift with its antenna. *(KA2RFW photo)*



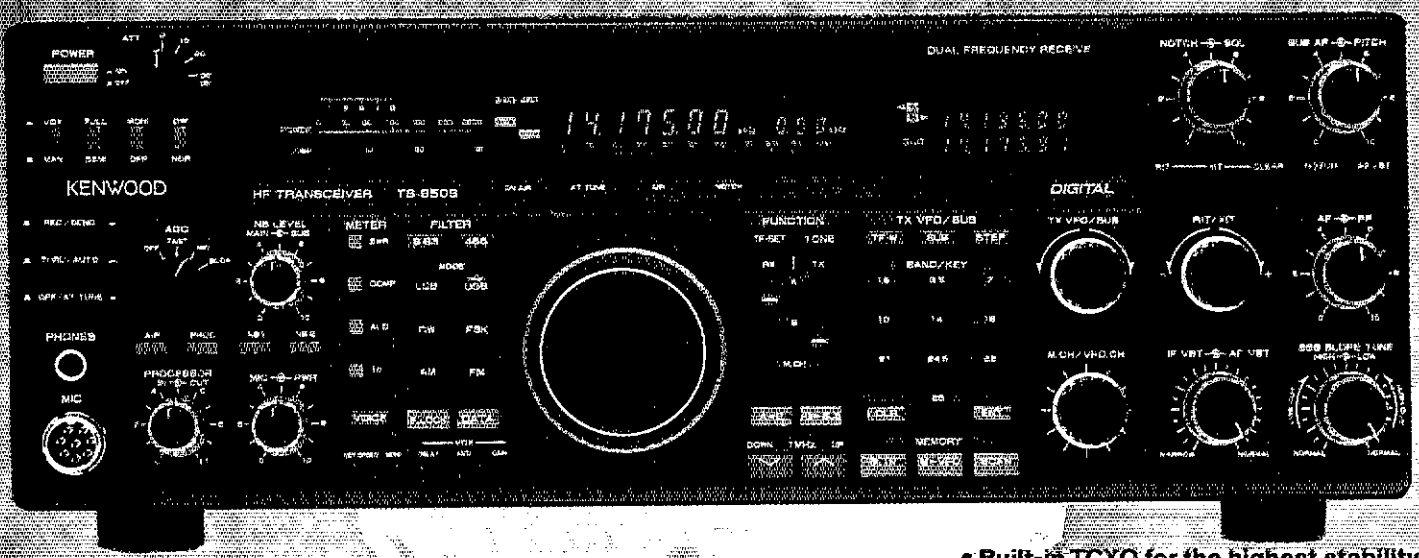
"I can almost see Albania from here!" Does this guy take "DX-spotting" literally? Securely belted to the crossarm, Jerry Rosalius, WB9Z, of Crescent City, Illinois, installs his station's packet antenna at the 250-foot level on a commercial tower. The Midwest DX Packet Association has a dedicated digipeater operated by K9CW and WB9Z that connects nodes in central Illinois and Indiana to Chicago, Wisconsin and Iowa. *(Scott Bohlmann photo)*



Tiny Technology: Gently clamped in the tweezers is an NTE2428 NPN transistor in an SOT-89 surface-mount package. Surface-mount technology, recently reserved for expensive commercial and military hardware, is now firmly entrenched in today's Amateur Radio products. See Bryan Bergeron's "A Surface-Mount Technology Primer—Part 1" elsewhere in this issue for a comprehensive introduction to SMT. *(NU1N photo)*

Armstrong Remembered: December 18, 1990, marks the 100th anniversary of the birth of Major Edwin Howard Armstrong, who, in his prolific yet troubled career, invented much of what makes radio what it is today: the regenerative receiver; the vacuum tube CW oscillator; the superheterodyne receiver; and the "static-free" FM system (still in use today). Endless legal struggles to protect his valuable patent rights drove the New York City inventor to suicide on February 1, 1954. *(painting by Douglas Groupp; photography by Jason Groupp)*

KENWOOD



TS-950SD

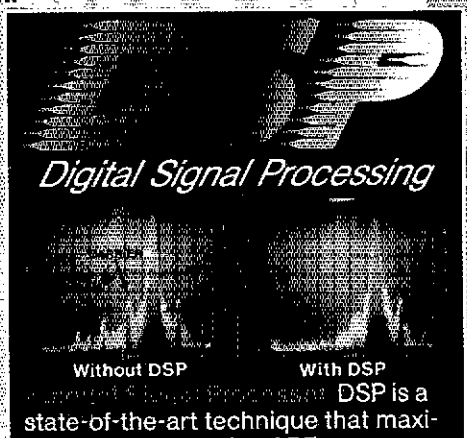
"DX-clusive" HF Transceiver

The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

- **Dual Frequency Receive Function.** The TS-950SD can receive two frequencies simultaneously.
- **New! Digital AF filter.** Synchronized with SSB IF slope tuning, the digital AF filter provides sharp characteristics for optimum filter response.
- **New high voltage final amplifier.** 50 V power transistors in the 150-watt final section, resulting in minimum distortion and higher efficiency. Full-power key-down time exceeds one hour.
- **New! Built-in microprocessor controlled automatic antenna tuner.**
- **Outstanding general coverage receiver performance and sensitivity.** Kenwood's Dyna-Mix™ high sensitivity direct mixing system provides incredible performance from 100 kHz to 30 MHz. The intermodulation dynamic range is 105 dB.
- **Famous Kenwood interference reduction circuits.** SSB Slope Tuning, CW VBT (Variable Bandwidth Tuning), CW AF tune, IF notch filter, dual-mode noise blanker with level control, 4-step RF attenuator (10, 20, or 30 dB), switchable AGC circuit, and all-mode squelch.

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

The Ultimate Signal.



DSP is a state-of-the-art technique that maximizes your transmitted RF energy.

- **High performance IF filters built-in†** Select various filter combinations from the front panel. For CW, 250 and 500 Hz, 2.4 kHz for SSB, and 6 kHz for AM. Filter selections can be stored in memory!■
- ***Multi-Drive Band Pass Filter* (BPF) circuitry.** Fifteen band pass filters are available in the front end to enhance performance.

- **Built-in TCXO for the highest stability.†**
- **Built-in electronic keyer circuit.**
- **100 memory channels.** Store independent transmit and receive frequencies, mode, filter data, auto-tuner data and CTCSS frequency.
- **Digital bar meter.**

Additional Features: • Built-in interface for computer control • Programmable tone encoder • Built-in heavy duty AC power supply and speaker •Adjustable VFO tuning torque • Multiple scanning functions • MC-43S hand microphone supplied

Optional Accessories

- DSP-10 Digital Signal Processor*
- SO-2 TCXO* • VS-2 Voice synthesizer
- YK-88C-1 500 Hz CW filter for 8.83 MHz IF*
- YG-455C-1 500 Hz CW filter for 455 kHz IF*
- YK-88CN-1 270 Hz CW filter for 8.83 MHz IF
- YG-455CN-1 250 Hz CW filter for 455 kHz IF*
- YK-88SN-1 1.8 kHz SSB filter for 8.83 MHz IF
- YG-455S-1 2.4 kHz SSB filter for 455 kHz IF*
- SP-950 External speaker w/AF filter
- SM-230 Station monitor w/pan display
- SW-2100 SWR/power meter
- TL-922A Linear amplifier (not for QSK)

* Built-in for the TS-950SD
† Optional for the TS-950S

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Seventy Five Years of *QST*

1915-1917

75 DECEMBERS ago, when the American Radio Relay League was only 19 months old and numbered 635 members, ARRL cofounders Hiram Percy Maxim, 46, and Clarence D. Tuska, 19, wrestled *QST* Number 1 out of Maxim's old Franklin motorcar and into the US mail. With 24 pages between its covers, selling for a dime a copy ("25 cents for a three months' trial subscription"), and sent "to all the League members and to all the other stations listed in the government call book"—perhaps 3700 addressees all told—that first *QST*, subtitled "December Radio Relay Bulletin," was a first-rate gamble.

Months earlier, Tuska had declared that the ARRL needed something other than message relaying to hold its membership, that a magazine would serve ARRL members in many ways. Maxim, a renowned inventor with shrewd business sense, agreed but foresaw many difficulties. Tuska's main worry was the possibility of running short of publishable material.

Naming the magazine was one thing—*QST*, the general call to all stations, came naturally—but publishing it was another. The League itself had no funds. Sales of ARRL member supplies (a 40-page *List of Stations*, eight maps and 50 message blanks, all for 50 cents) lagged, and many members neglected to pay ARRL's noncompulsory "station dues" (also 50 cents a year). Maxim and Tuska decided to risk "a few more dollars" on a different plan: to publish, independently of the League and at their own expense, three trial issues of *QST*.

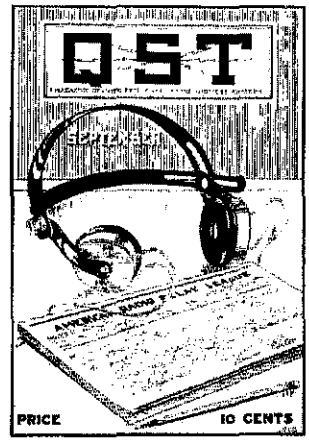
The risk paid off—for a while. The February 1916 number (not *issue* in those days) confidently offered a *year* of *QST* for a dollar. Regular columns appeared, graphics and photo content steadily improved, and technical articles increased in quantity and stature. *QST*'s straight-from-the-heart editorials strove—successfully—to rein in the rough-and-tumble Amateur Radio practices of the day.

But the larger world, of which *QST* and Amateur Radio are ever part, closed in. For one thing, thunderstorm static all but shut down Amateur Radio—which operated at long and medium waves, mainly with spark transmitters and frustratingly insensitive receivers—during the summer months, and *QST* advertising followed this trend. In June 1916 *QST*, Tuska wrote: "If the [advertising] droop keeps the upper hand, then we must acknowledge we are licked...and try to take a job waiting at some summer resort or driving an auto truck." Somehow, though, *QST* survived—expanding, even going to a two-color cover in October 1916, when Maxim and Tuska incorporated as the *QST* Publishing Company—and the advertisers returned.

Maxim, Tuska and *QST* overcame the summer doldrums through pluck and prayer. They beat subscription slumps by offering state-of-the-art prizes—DeForest Audion detectors, Brandes headphones, quenched spark gaps, Audion bulbs and Crystaloi detectors—to hams who brought in the most new subscribers. They proved, with each new *QST*, that Amateur Radio was not *amateurish* radio.

But in 1917—after Amateur Radio transmitting *and* receiving were shut down by Navy edict, after *QST* shrank from its peak of 96 pages to 48, then 36, then 32, finally ceasing publication in September—Maxim, Tuska and *QST* met their match: They could not outrun the First World War.

QST Nr 1, December 1915: Risk with a clear purpose.



Our square lettered logo—just one of countless icons, covers, column headers and schematics he would design over his half-century-plus association with *QST*—emerged from the pen of commercial artist Harry R. Hick in 1916.

The Old Man crashed *QST* with a disarmingly moderate "Running Tests Between Amateur Stations" in January 1916. Showing his true colors, he next cursed rotten sending, receiving, luck, articles, construction, relaying and ground leads before brandishing the dreadful Wouff Hong, Rettysnitch and Ugerumph in January 1917's "Rotten QRM." By then Amateur Radio's beloved yarn-spinner, conscience and gadfly all in one, T.O.M. turned out after his death in 1936 to have been somewhat more: He was Hiram Percy Maxim.

1919-1928

WITH THE WAR OVER, Amateur Radio transmitting and receiving still banned by the Navy, all ARRL memberships lapsed, and $33 to its name, in early 1919 the League reorganized and elected to buy *QST* from Clarence D. Tuska. A flierlike eight-page *QST*, paid for from League officials' personal funds and sent to former members, explained the reorganization and solicited memberships. Positive response encouraged the Board to authorize regular publication of *QST*. The board also elected Kenneth B. Warner, ex-9JT of Cairo, Illinois, as the League's paid Secretary (a post for which Tuska declared himself ineligible because he planned to go into radio manufacturing) and *QST*'s editor and manager. Banking on ham spirit, the Board voted to raise the funds necessary to restart ARRL and buy *QST* by borrowing money *from members* in the form of bonds payable in two years, with 5% annual interest. *QST*'s first "real" post-World-War-I issue, June 1919, advertised the bond issue. Ham spirit lived: Members bought bonds, and ARRL and *QST* survived.

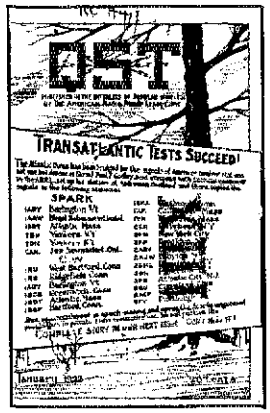
Amateur Radio restarted only after an act of Congress—at League request—lifted the transmitting ban in September 1919. With Amateur Radio roaring, *QST* once again beat the drums for progress, promoting continuous-wave (CW) transmission over spectrum-hogging spark (1919 on); emphasizing ARRL-organized message relaying and getting clubs to affiliate with ARRL (1919 on); encouraging participation in National Bureau of Standards signal-fading ("QSS") tests (1920-23); cheering the design and adoption of the ARRL logo (1920); flirting—briefly—with the notion of "going popular" to cash in on the 1920s broadcasting boom, during the early days of which *QST*'s cover declared it "devoted entirely to Citizen Radio"(!); and shouting with delight when readable US amateur signals first crossed the Atlantic—one way—in December 1921.

Two-way transatlantic Amateur Radio made headlines in November 1923, when Schnell, 1MO, and Reinartz, 1XAM, contacted France's Deloy, 8AB, *near 100 meters* (3 MHz)—a wavelength considered impractically short by amateurs and commercials alike. This triggered a wild grab for shortwave territory by nonamateur interests. League diplomacy through the middle 1920s secured and defended bands centered at roughly 171, 80, 40, 20, 10.3 and 5.2 meters. Now, *QST* had to help hams stay "in the band" instead of just "below 200"—and avoid government-imposed quiet hours through better key-thump suppression and high-voltage filtering.

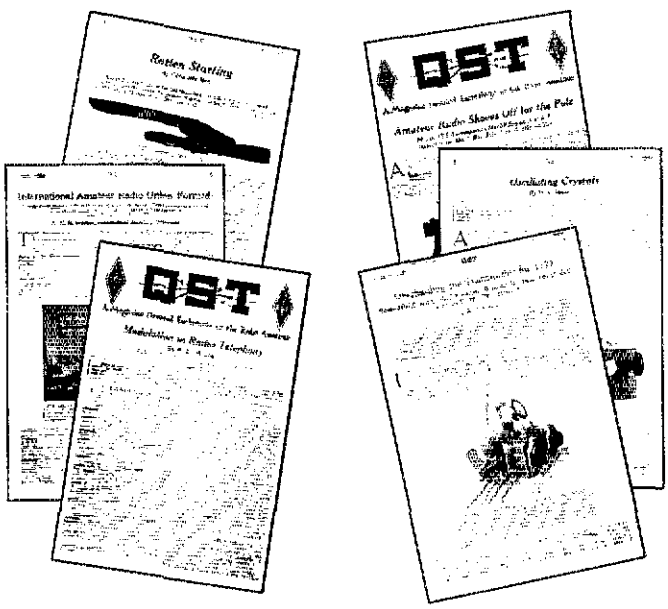
Out of its lamp, the shortwave genie irrevocably transformed Amateur Radio into an international pursuit. *QST* became a window on the world, celebrating the birth of the International Amateur Radio Union in early 1925 and the QRP DX boom in 1925-26, when hams discovered that less than a watt could work DX magic at 20 meters—even in daylight!

But international Amateur Radio stretched existing regulations. Hams in a few countries were prosecuted for working DX! The 1927 Washington Conference wrote Amateur Radio into international law, but for a price: *Half of our spectrum space* would go to other services as of January 1, 1929, leaving 16,900-plus US hams to improve their techniques *fast* or smother in interference. Throughout 1928, *QST* promoted ARRL's solution: a technical research and development program that pushed 1929 receivers, 1929 transmitters, 1929 signals, *1929 Amateur Radio.*

Post-World War I: A wistful ex-ham sparks dreams of paradise lost in just one of 69 exquisite covers by Clyde Darr, 8ZZ.



January 1922: "Oh, Mr. Printer, how many exclamation points have you got? Trot 'em all out, as we're going to need them badly, because WE GOT ACROSS!!!!!!"



February 1927 *QRT*: In collusion with the printer, a handful of these interoffice spoofs were produced with front and back covers interchanged to terrorize Editor Warner. To his relief, the main run carried its near-identical-twin *QST* "Haywire" cover on the *front*!

November 1928: With amateur frequency allocations to be halved as of 1929, the Technical Department's Ross A. Hull showed hams how to be more spectrum-efficient than ever before.

1929-1939

AMATEUR RADIO bounced back from the 1929 spectrum crunch with a boom. In 1929, there were 16,829 amateur licensees; by 1934, 46,390—an increase of 275%! *QST* pushed for amateur technical excellence with solid practical articles punctuated by unparalleled firsts: *100%* amplitude modulation (Hull, 1929); a modulation meter (Lamb, 1929); practical gear that put thousands of hams on 5-meter phone (Hull, 1931); Class-B amplification for modulators (Barton, 1931); single-signal reception, which did away with "the other side of zero beat" in CW reception once and for all (Lamb, 1932); the rationalized autodyne, a regenerative receiver that minimized detector radiation and maximized stability (Grammer, 1933); the Tri-Tet crystal oscillator, which kept transmitter tube lineups smaller by generating harmonics in the crystal stage (Lamb, 1933); a theory of tropospheric bending of u.h.f. radio signals (Hull, 1935); the Lamb noise silencer—the *original* noise blanker! (1936); amateur television (1938 and 1939); and Armstrong frequency modulation (1939). Ham-antenna historians still refer to *QST*'s firsts on the "Windom antenna" (Windom, 1929); the 14-Mc. rotatable beam (Shanklin, 1934); and amateur rhombics (Hull and Rodimon, 1936).

Amateur operating bloomed on this solid technical foundation. The Sweepstakes contest started up in 1930; the ARRL Trunk Line message-handling system was reorganized in 1931; June 1933 *QST* promoted the first Field Day; Arthur M. Braaten, W2BSR, introduced the R-S-T signal-reporting system in October 1934; January 1936 *QST* announced the Worked All States Award; the DX Century Club made the scene in September 1937; and the ARRL International DX Competition just grew and grew.

Amateur emergency communication came of age during the 1930s. Nearly every *QST* from 1931 on touched on emergency work in some way. The Communications Department (with "Calls Heard," separately paginated from December 1923 through April 1931 to allow its omission from newsstand *QST*s, for economy), announced the formation of the ARRL emergency corps in September 1935—just in time for its new members to tackle the great northeastern flood of March 1936 (coverage in May 1936 *QST*), the Ohio Valley flood of 1937 (April 1937 *QST*) and the 1938 New England hurricane (November 1938 *QST*).

In the 1930s, *QST* the Magazine offered a maturing blend of publishing savvy, experimentation and fun. Experimentation: From July 1932 through 1934, "Say You Saw It in *QST*—It Identifies You and Helps *QST*" appeared in left-hand advertising-section folios in over ten languages! Savvy: Board-meeting minutes appeared in *QST* beginning with the July 1932 issue. Beginning in 1933, *QST*'s annual index, theretofore a separate pamphlet, was bound into each year's December issue. April 1933 *QST* vowed to end "junk" advertising by applying new advertising-acceptance criteria. March 1935 saw the establishment of Eastern, Western, Northern and Southern editions of *QST*, each containing advertising and a Station Activities section tailored for its target region. Fun: April 1933 *QST* included a *nine-page* mini-*QST* spoof—*OST*—published by "the American Radiator Delay League" and "devoted...exclusively to Liberian Dog-Apple Growing."

So Amateur Radio, ARRL and QST flourished in the '30s. But in 1939, events in the larger world again indicated, as they had in 1917, that we might soon have to put all kidding aside: War exploded in Europe, and roughly 70% of amateurs outside the US abruptly disappeared from the air.

QST's Cover Evolves

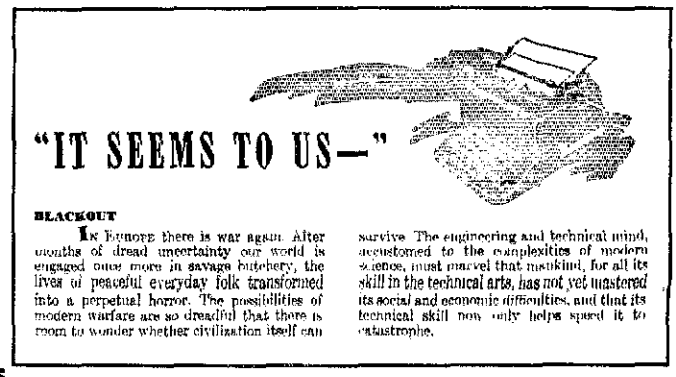
1929

1931

1931-1939

1939-1973

For almost forty years—in just about every issue of *QST* from June 1927 to early 1967—one man edged many of *QST*'s pages with comedic gold: Philip Gildersleeve, W1CJD (and ex-1ANE), better known to *QST* readers as "Gil." From his first *QST* cartoon—June 1927's "A Minute at the Hartford Convention"—Gil's ham-cartoon genius blossomed until, by the late 1930s, *QST* couldn't have been *QST* without him. Whether the cartoon involved was a filler, a "How's DX?" Jeeves or a Podunk Hollow Radio Club Field Day cover sequence (in which the PHRC gang, despite its best efforts, usually managed to lose its smug pre-FD self-assurance [June] in the depths of glum bedraggledment after a drubbing by Murphy [July]), Phil Gildersleeve helped us laugh at ourselves as no cartoonist had before, and as no other cartoonist has since.



"IT SEEMS TO US—"

BLACKOUT

In Europe there is war again. After months of dread uncertainty our world is engaged once more in savage butchery, the lives of peaceful everyday folk transformed into a perpetual horror. The possibilities of modern warfare are so dreadful that there is room to wonder whether civilization itself can survive. The engineering and technical mind, accustomed to the complexities of modern science, must marvel that mankind, for all its skill in the technical arts, has not yet mastered its social and economic difficulties, and that its technical skill now only helps speed it to catastrophe.

1940-1945

FOR A TIME, with the United States determined to maintain strict neutrality relative to the European conflict, it was *almost* business as usual in *QST*. ARRL strove to keep the "w-r" out of the magazine and the US ham bands with its own neutrality code. When FCC prohibited foreign DX work and severely limited portable/mobile operation below 56 Mc., ham doings at 56, 112 and 224 Mc.—"u.h.f." then—rose to new prominence. Domestic MF/HF operating events swelled. The 12th ARRL DX Contest (1940) ran—wanly, and aided by stateside-contact quotas.

By the latter half of 1940, *QST* got in gear with the US shift to "positive neutrality," preparing hams for the "job of work ahead" by promoting the League's new code-proficiency program and finding radio personnel for the Naval Communication Reserve, Army Air Corps, FCC and other agencies. New columns—"Army-Amateur Radio System Activities," "In the Services," "The Month in Canada" and "U.S.A. Calling"—appeared in 1941. Editorials, "What the League is Doing," "Operating News" and feature articles on military radio techniques and schooling wove war-preparedness into *QST*.

War came on December 7, 1941. FCC suspended US Amateur Radio eight hours later. January 1942 *QST* carried the grim details in a "WAR COMES!" insert. Its ink barely dry, K. B. Warner banged out a February editorial vowing that ARRL and *QST* would continue.

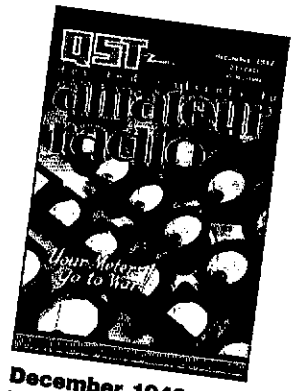
QST reconsolidated its four regional editions into one after May 1942. New war-related columns included "P.O.W.s," "Hams in Combat," "Gold Stars" and an Experimenters' Section that covered such non- or neo-radio pursuits as induction-field, light-beam, power-line and ground communication, and acoustic aircraft detection. "On the Ultrahighs" became "On the Very Highs" (1943) to concentrate on War Emergency Radio Service (WERS) doings.

Although WERS wasn't Amateur Radio, it offered another chance to put ham expertise to domestic use in the national defense, so *QST* the Organizer pushed WERS hard and well. *QST* the Teacher serialized John Huntoon's "Easy Lessons in Cryptanalysis" (1942), George Grammer's "A Course in Radio Fundamentals" (1942-1943) and "Elementary A.C. Mathematics" (1943), Clinton B. DeSoto's "Who Killed the Signal?" (1943) and Edward Noll's "Practical Applications of Simple Math" (1943). *QST* the Clearinghouse placed hams and ham materiel—meters, receivers and more—where they'd contribute most to the war effort. In 1943, *QST* the Respected won astounding support from its advertisers, who agreed, in the face of tight paper rationing, to pay *twice the rate for half the space* to keep *QST*—and ARRL—flying.

And *QST* the Faithful never faltered. Throughout the war, K. B. Warner and crew always found space, however modest, to declare that better days, and a revitalized Amateur Radio, would one day come. July 1945 *QST* professed this faith at a new high pitch by inaugurating "The Crystal Ball," a new column "Devoted to Postwar Brain Storms."

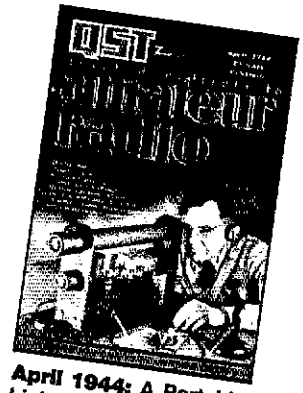
ARRL policymakers had decided well before Pearl Harbor Day that postwar normalization of Amateur Radio must not stall as it had after World War I. Their organization and planning succeeded. *Just four days* after hostilities ceased on August 17, 1945, FCC released 112-115.5 Mc. to amateur use. On November 15, 1945, WERS dissolved, 112-115.5 Mc. closed, 144-148 Mc. opened, 5 and 10 meters reopened, and portable/mobile and DX restrictions vanished. K. B. Warner shouted the news via an eleventh-hour "MORE BANDS!" insertion in November 1945 *QST*: "Huzzah and hooray!"

January 1942

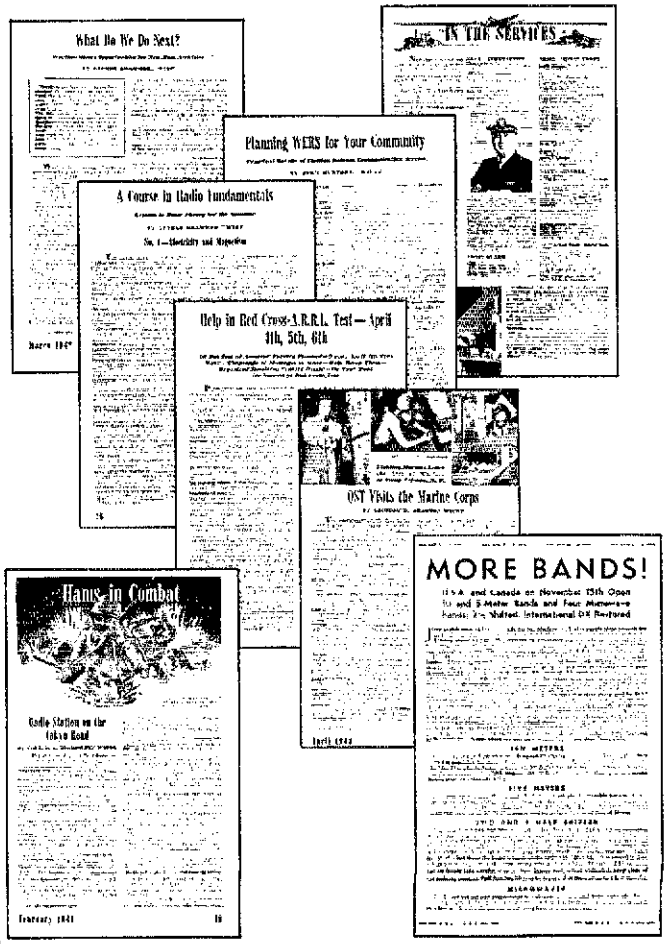


December 1942: Your Meters Go to War!

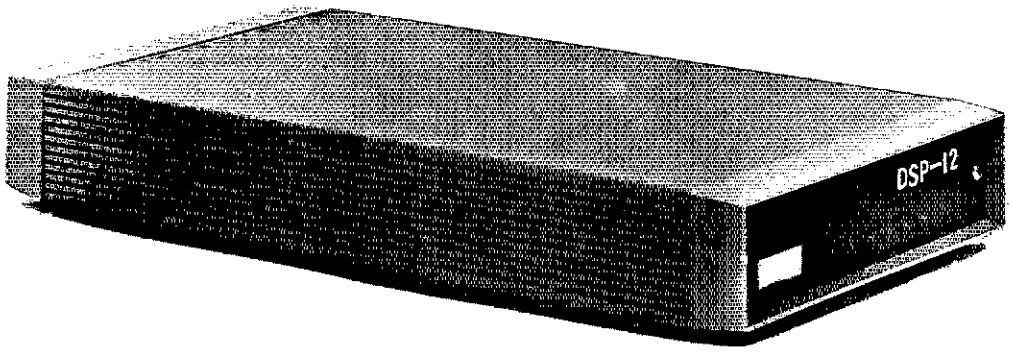
July 1943



April 1944: A Portable Light-Beam Transmitter-Receiver



VERSATILITY PLUS +



L.L. Grace introduces our latest product, the **DSP-12 Multi-Mode Communications Controller** (shown above). The **DSP-12** is a user programmable, digital signal processing (DSP) based communications controller.

FEATURES

- Multi-tasking operating system built in
- PC-compatible (V40) architecture allows development of custom applications using normal PC development tools and languages
- Motorola DSP56001 DSP processor
- Serial interface speeds from 110 to 19200 bps
- Optional 8-channel A-to-D & DAC for voice and telemetry applications
- 12-bit conversion architecture
- V40 source code available for custom applications to qualified users
- RAM expandable to one megabyte. Useable for mailbox feature, etc.
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- Low power requirements: 10-15vdc, 750ma
- 3 analog radio connectors. RX & TX can be split in any combination. Programmable tuning outputs are available on each connector.
- Over 40 modems available in the basic unit, including Packet, RTTY, ASCII, and PSK modems for high speed packet and satellite work.
- Both V40 and DSP programs can be down-line-loaded from your PC or a bulletin board. You can participate in new development!
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- Low cost unit
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- Morse Code
- Host interface supports PAKTERM

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- Message Store-and-Forward
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We accept MasterCard & VISA and can ship C.O.D. within the USA. All orders must be paid in US Dollars. Shipping & Handling: $5 ($20 International).

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Now, beam your antenna with just a few keystrokes!

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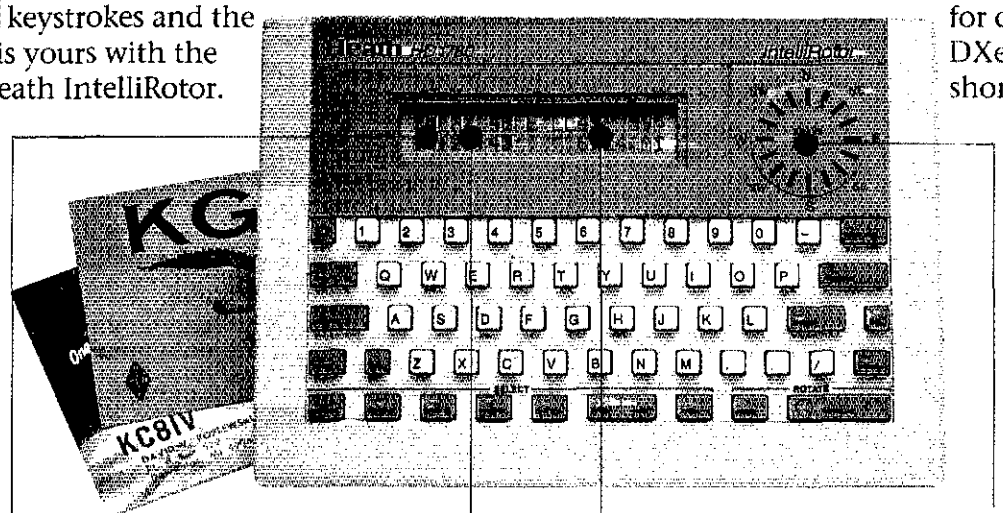
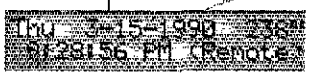
The most exciting ham innovation since digital displays replaced analog dials, the IntelliRotor is fast. It's easy. It's right on target for contesters, DXers and serious shortwave listeners.

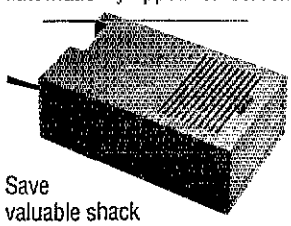




Glance at the screen in standby mode and instantly note the local day, time and bearing to 1°. Bearing is also displayed on a compass rose of 16 LEDs with a resolution of 32 points.

The IntelliRotor replaces your manual control box and works with your exisiting Ham-M (series 3, 4, 5 and 6), Ham-II, Ham-III, Ham IV, T²X, HDR-300, CDE TR-44, CD-45 (series 2) or M2 rotator.*

Push a few buttons and the selected country's latitude, longitude, grid square, bearing, time of day and distance automatically appear on screen.



Save valuable shack space with separate power unit. Six-foot umbilical lets you place power unit out of the way, even under the table.

Scan through the permanent database and quickly view more than 400 countries and prefixes. Or customize the list by editing the database — or adding up to ten of your own named and detailed bearings.

Control the IntelliRotor with your PC-compatible computer, either as a transient program or pop-up. Software comes on both 5.25" and 3.5" disks.

Concentrate on making that important DX contact instead of controlling the beam when you use the fully automatic brake control. Enter the first letters of the call. The IntelliRotor completes the call prefix and country's name. Press AUTO to turn the beam to that country.

Enter the name of the country (or first few letters), a prefix (or partial prefix), latitude and longitude, grid square or bearing in degrees on the built-in QWERTY-style keyboard. Press AUTO and the IntelliRotor beams the antenna to the country you want.

To end the last tedious part of a great hobby, see your nearby Heath dealer.

For a FREE HeathKit catalog call us toll-free at 1-800-44HEATH (1-800-444-3284).

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*Telex/Hy-Gain® honors rotator warranties when used with this controller. Telex/Hy-Gain is a registered trademark of Telex/HyGain.

AM-459

OVER 45,000 PK-232s SOLD!

The AEA PK-232 multi-mode data controller remains the most widely used radio data controller **anywhere.** More hams own the PK-232 than *any other* radio data controller. And AEA's hard-earned reputation for quality and service keeps them coming back. The '232 gained its popularity with features like these:

STATE-OF-THE-ART TECHNOLOGY.

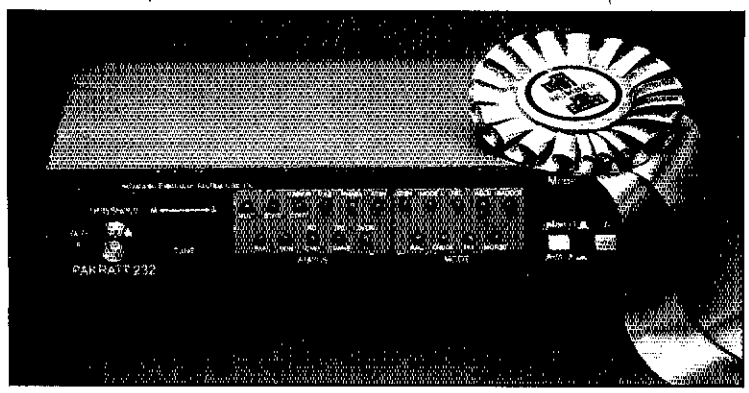
Since its introduction in 1986, the PK-232 has been updated **six times** to continue bringing you the breakthroughs. Six updates in four years! And even the very first PK-232 is upgradable to the latest model, with a relatively inexpensive user-installed kit. If you want a state-of-the-art multimode controller, you want the PK-232 MBX.

SUPERIOR FILTERING

The 8-pole Chebyshev filter in the PK-232 was designed from the ground up to work on HF **and** VHF. We didn't just add some firmware to a Packet modem to create our multi-mode. Our modem was **proven** superior by tests in Packet Radio Magazine over *all the others tested.* Read the fine print! You just can't beat the PK-232 for performance, quality and integrity. 45,000 PK-232 owners can't be wrong!

INNOVATION

The PK-232 has been the one to follow for technology advances. It was the *first* radio data controller with weather-fax, the *first* with Host mode, the *first* with NAVTEX, the *first* with Signal Identification, the *first* with TDM, the *first* with AMTOR v.625, the *first* with a WHYNOT command, etc, etc. AEA has always strived to "Bring You The Breakthrough," and while others have tried to imitate, only one can be the best.



The only data controller **designed from the ground up** to be a true multi-mode, the PK-232's tuning and status indicators work in all modes, not just packet. Make sure the multi-mode you buy isn't just a converted Packet TNC. There's only one number 1!

HOST MODE

Many superior programs have been written specifically for the PK-232 in Host mode language: **NEW** PC-Pakratt II for IBMs and compatibles, updated MacRATT for Apple Macintosh, and ComPakratt for Commodore C-64 and C-128 computers.

ALL DIGITAL OPERATING MODES.

The PK-232 MBX includes all authorized amateur digital modes available today...Packet, Baudot, ASCII, AMTOR/SITOR (including the **new** 625 recommendation) and Morse code, as well as WEFAX (receive and transmit). Other features include the PakMail 18K byte maildrop system with automatic normal and **reverse** forwarding, NAVTEX reception, KISS protocol support, binary file transfers and more. Also included is the TDM (Time Division Multiplex) mode for SWLing that few others have. No other multi-mode has all these features.

SIGNAL ANALYSIS.

The first multi-mode to offer SIAM (Signal Identification and Acquisition Mode) was, of course, the PK-232MBX. Indispensible to SWLers, SIAM automatically identifies Baudot, ASCII, AMTOR/SITOR (ARQ and FEC) and TDM signals, then measures baud rate and polarity. Once the PK-232MBX is "locked on" to the signal, a simple "OK" command switches to the recognized mode and starts the data display. You're even ready to transmit in that mode if applicable.
The PK-232MBX makes SWLing easy and fun, not difficult and frustrating.

REPUTATION

The PK-232MBX has helped AEA establish its hard-earned reputation for producing high quality amateur radio products. Anyone can **say** they have a good reputation, so it pays to ask around. Listen on the HF bands and see which multi-mode is getting *used.* You owe it to yourself to get the best possible value for your money. Don't settle for less!

Watch for the DSP-1232 and 2232 coming soon!

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1946-1956

US AMATEUR RADIO regained most of its frequencies by the end of November 1946. New amateur bands opened at 27.185, 235 (later 220), 420, 1215, 2300 and 5250 Mc., and 10 and 21 Gc.; our 56-60 Mc. allocation shifted to 50-54 Mc. The LORAN radiolocation system kept 160 meters out of amateur reach until the Coast Guard agreed to share the band. 1947's Atlantic City conference gave us a 15-meter band—but we couldn't use it until May 1, 1952! Passage of the Administrative Procedure Act by Congress turned FCC rule making into the complicated (but more open) process we know today. *QST*s of 1948-1951 devoted extensive space to proceedings surrounding FCC Docket 9295, which ultimately wrote "basis and purpose" text into the amateur rules, expanded 75-meter phone and narrow-band f.m. privileges, and created the Novice, Technician and Extra-class licenses.

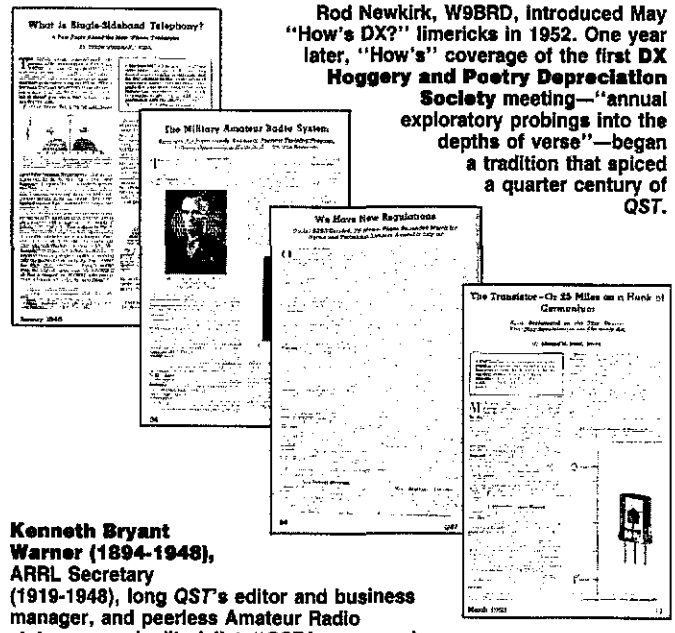
March 1949 *QST* reported the first amateur radioteletype contacts (W6PSW-W1AW). ARRL's new National Traffic Plan debuted in September 1949. January 1952 *QST* announced the first Novice Roundup. Amateur emergency know-how came through again and again in the November 1948 blizzard ("Deep Freeze," April 1949 *QST*), the great flood of 1955 (December 1955 *QST*) and its West Coast counterpart (May 1956 *QST*).

Ham enthusiasm for technology in general and war-related gear and developments in particular almost split *QST* at its seams. Military-surplus radar gear got us going at 2400 Mc. (July 1946) 21.9 Gc. (August 1946) and 10 Gc. (February 1947), with surplus-conversion articles abundant by mid-1947. K. B. Warner's August 1946 editorial presaged modern MF/HF-transceiver frequency agility right down to transmit-offset control. Amateur Radio's first direct-reading SWR meter, the Micromatch, appeared in April 1947. The threat implied by August 1947's "Curing TVI" didn't seem too ominous, but K. B. Warner's May 1948 editorial summed up the TVI situation as grim; sure enough, TVI became a major threat in the early 1950s. The Villard and Weaver "Selectoject," an audio peaker/notcher, appeared in November 1949. October 1947 *QST* heralded a near-miraculous twinlead-based SWR indicator, the Twin-Lamp.

January 1948 *QST* galvanized hams with a classic quartet—Warner's pro-single-sideband editorial in "It Seems to Us," Goodman's "What is Single-Sideband Telephony?," Villard's "Single-Sideband Operating Tests" and Nichols's "A Single-Sideband Transmitter for Amateur Operation," which outlined the voice mode that ultimately changed the way most MF/HF radio folk talked. From July 1948 through March 1954, a new *QST* column, "On the Air with Single Sideband," collated and spread the gospel. From 1950 on, hardly an issue appeared without a feature on sideband transmission, reception, linear amplification or filtering techniques.

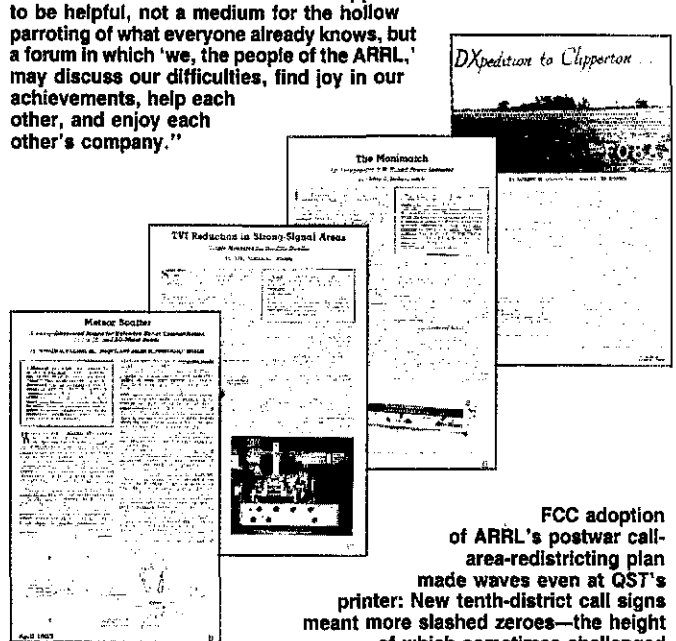
In October 1948's "The 'Transistor'—An Amplifying Crystal," Goodman concluded that "These clever little devices are worth keeping an eye on." *And how*, as evidenced by "The Transistor—Or 25 Miles on a Hunk of Germanium" (Rose, March 1953); "Solarized QSO" (Campbell, September 1955); "CQ TR" (Campbell, March 1956); "An Experimental All-Transistor Communications Receiver" (Heinen, May 1956); and "Transistorizing the Single-Side-Band Exciter" (Jennings and Alvernaz, September 1956).

QST's July 1956 introduction of the 1957-1958 International Geophysical Year gave considerable space to a seemingly non-Amateur Radio, receive-only project: monitoring signals from the Department of Defense's Project Vanguard. Hearing and tracking "the first man-made Earth Satellite" would require little more than some special 108-Mc. receiving hardware. But events proved otherwise.



Rod Newkirk, W9BRD, introduced May "How's DX?" limericks in 1952. One year later, "How's" coverage of the first DX Hoggery and Poetry Depreciation Society meeting—"annual exploratory probings into the depths of verse"—began a tradition that spiced a quarter century of *QST*.

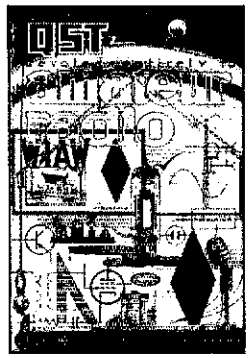
Kenneth Bryant Warner (1894-1948), ARRL Secretary (1919-1948), long *QST*'s editor and business manager, and peerless Amateur Radio statesman and editorialist: "*QST* is supposed to be helpful, not a medium for the hollow parroting of what everyone already knows, but a forum in which 'we, the people of the ARRL,' may discuss our difficulties, find joy in our achievements, help each other, and enjoy each other's company."



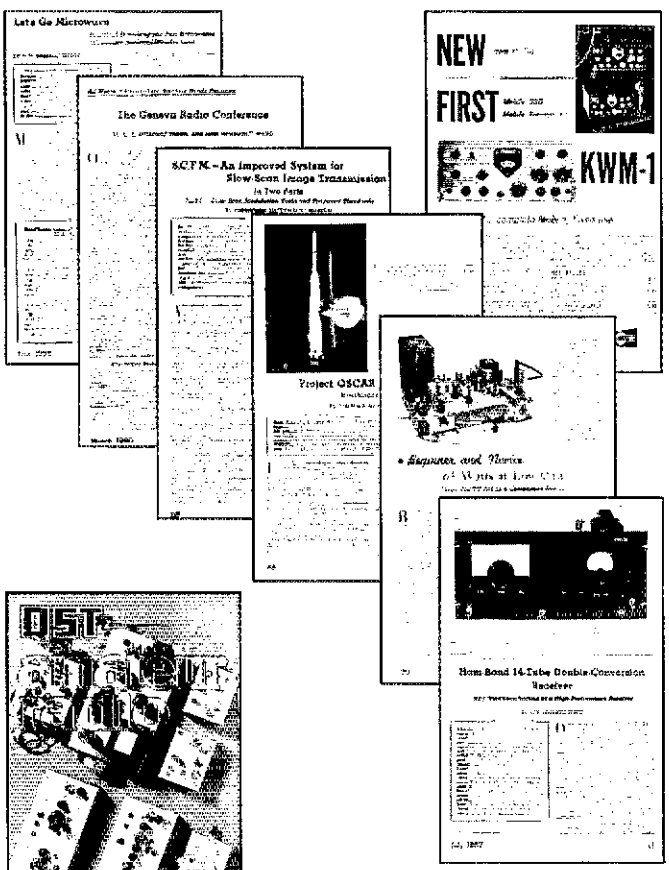
FCC adoption of ARRL's postwar call-area-redistricting plan made waves even at QST's printer: New tenth-district call signs meant more slashed zeroes—the height of which sometimes challenged typesetters, especially in close-spaced text—than ever before.

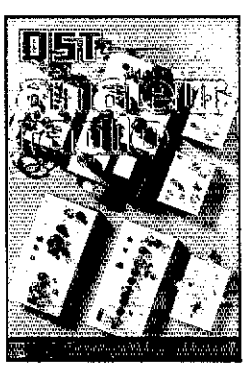
June and July 1952: The Podunk Hollow Radio Club women carry the day.

Sputnik barely made the November 1957 cover.



Harry R. Hick's December 1960 cover celebrated 45 years of *QST*.





July 1961 *QST* introduced a popular build-it-yourself V.H.F. station.

Something **had to be done after Larson E. Rapp, WIOU, victimized readers of April 1941 *QST* with "Putting Dynamic Prognostication to Work"—so the world had a war. Rapp somehow survived to regale April *QST* readers of the late 1940s, '50s and early '60s with spoofs on concentric and staggering bands, negative modulation, buried antennas and a ham store with a helipad. No one else in the history of *QST* maximized the current along a shortened antenna by using just the *electrical center* of a full-size element and throwing away its ends, used signal-induced temperature rise in a superconductive antenna to indicate spectrum loading, or proved, through statistics, the "QSL" or "DXCC" effect: "the increased strength of a signal when it originates from a country where there are relatively few amateurs." Every amateur owes something to Larson E. Rapp; few amateurs are sure of what.**

1957-1961

BEFORE the first satellite flew, though, Conelrad compliance—*Con*trol of *el*ectromagnetic *rad*iation—became law in 1957, requiring that radio transmitters in general, ours included, be silenced (to disallow their use for guidance of enemy bombing) if designated local broadcasters left the air. January 1957 *QST* carried the Conelrad rules. Also in 1957, Goodman provided "Better AVC for S.S.B. and Code Reception" (January); Morgan explained how to QSO via tropospheric scatter (March); Bain covered V.H.F. meteor scatter (April); Moser described a ham-built s.s.b. *transceiving* set-up (June); Crosby detailed the first of his popular HBR communications receivers (July); and Wright built hardware for the third (Weaver) method of generating s.s.b. (September). FCC proposed to delete Amateur Radio at 27 Mc. in favor of the Citizens' Radio Service (June) and so acted in 1958. *QST* ceased general newsstand distribution as of August. Hams stepped into the breach when Hurricane Audrey smashed the Gulf coast with 105-mi/h winds in June (White and Canfield, October 1957).

The US did *not* launch "the first man-made Earth Satellite" after all. That distinction went to the USSR's Sputnik I, launched October 4, 1957, and audible at 20.005 and 40.010 Mc. November and December 1957 *QST* described how US amateurs helped the US Naval Research Laboratory keep track of Sputnik's orbit during the few days of the satellite's life. "Sputnik fever" hit hard: December 1957 *QST* devoted *20 pages* to satellite topics!

In *1958,* amateurs' *QST*-inspired 108-Mc. receiving capability paid off when the US launched Explorer I on January 31. Bredon described simple 3500- to 3700-Mc. gear (May); LORAN expansion further limited our activities at 160 meters (June); KN4RID made Novice DXCC No. 1 (November); Taylor described how to use 50-Mc. meteor scatter (December); and Bateman and Bain explored "New Thresholds in V.H.F. and U.H.F. Reception" (December 1958 through March 1959).

QST's highlights for 1959 included "The World Above 20,000 Megacycles" (Sharbaugh and Watters, May); *effective* ignition-noise suppression for mobiles (Campbell, May); the background and mission of the 1959 World Administrative Radio Conference (Budlong, August/September); and log-periodic-antenna basics (Milner, November.)

1960 QST revealed how Amateur Radio held its own at WARC-59 (Budlong/Huntoon, March); speculated on communication with extraterrestrial civilizations (Atchley, March); reported on amateur color television (Shadbolt, September); and cheered the first amateur moonbounce QSO (W1BU-W6HB, 1296 Mc., September).

In *1961, QST* published *eight* humor pieces by Jack Troster, W6ISQ; chronicled Amateur Radio's role in Hurricane Donna, December 1960 (Hart, February); described the *f.m.*-based image system we now know as slow-scan TV (MacDonald, January/February); changed editors (Huntoon replaced the retiring Budlong in January); reported on the first amateur work on 52,000 Mc.—the highest frequency yet used by hams (Gale, January); featured a magnetic-core-memory-based code keyboard (Johnson, May); and got thousands of hams going on 6 and 2 meters with a build-it-yourself V.H.F. station (Tilton, July through October).

In February 1961, Orr and Stoner astounded *QST* readers with news of Project OSCAR—an undertaking intended to put hams "right into the middle of the space age" with the launch of their own Orbital Satellite Carrying Amateur Radio! The dream came true on December 12, when an Agena-Thor rocket launched from Vandenberg Air Force Base lifted OSCAR I, the world's first nongovernmental satellite, into the California sky.

1962-1970

ARRL asked its members to help fund a new Headquarters building in early 1962. OSCAR II flew on June 2. Conelrad was discontinued by July. The September 1962 editorial introduced The ARRL Program "to preserve amateur frequency bands"; ARRL staff responded with tutorial series on a.c. and antennas (1963), oscilloscope basics (1964); transmission lines (1965), v.h.f. antennas (1964), message handling (1964); public service communications, transmission lines, and testing s.s.b. transmitters (1965).

FCC turned a League petition to improve standards in the phone bands (November 1963) into a two-phase program that promised to affect phone *and C.W.* (May 1965). Phase one of the rules FCC adopted (October 1967 *QST*) went into effect on November 22, 1968. Phase two went into effect for phone in November 1969, but not for C.W. and 6 meters; FCC had decided in September 1969 to keep them in their phase-one states. FCC's Henry evaluated the overall effect in "Incentive Licensing—An Analysis and an Appraisal" (March 1970).

Guba and Zimmer described practical microwave pulse transmission (February-April 1963), April 1963 *QST* gave the lowdown on transequatorial (TE) propagation, and July 1963 *QST* promoted ARRL Headquarters' new address. *QST* ran a special historical section each month to celebrate ARRL's 50th anniversary in 1964. July 1964 QST described Amateur Radio's role in March 1964 Alaskan earthquake. The Post Office issued an Amateur Radio stamp on December 16, 1964 (January 1965). RTTY articles abounded in 1965. Transponder-equipped Oscar III lived a disheartening 18 days after its launch (Orr, May 1965). Anderson described "Amateur Reception of Weather Satellite Picture Transmissions" (November 1965). December 1965 inaugurated 12 months of *QST* Classic reprints in celebration of *QST*'s 50th anniversary.

1966 QST wondered if CB radio was siphoning off potential hams (February); made the most of a crippled Oscar IV (February); premiered "League Lines" and "Gimmicks and Gadgets" (July); editorialized on a national emergency communications plan (August); unveiled the HamQuest '67 ARRL membership drive (November); and revealed Rockwell's "Station Design for DX" (September-December).

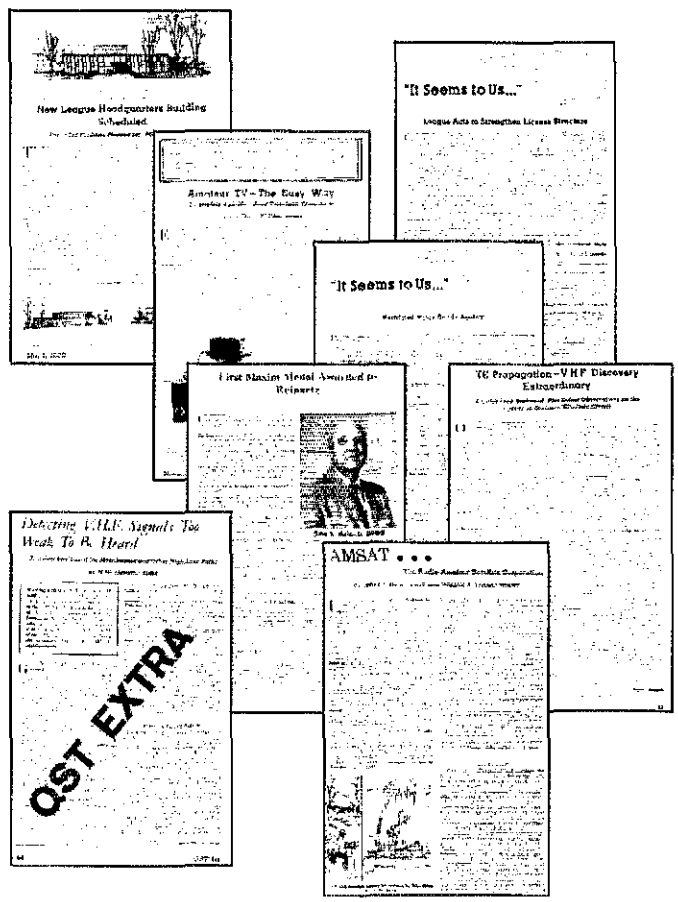
1967 QST presented "The Iambimatic Concept" (Gensler, January); and a MOSFET-based receiver (Daughters, Hayward and Alexander, April/May). *1968 QST* premiered "Behind the Diamond"; peered at integrated circuits (DeMaw, March); adopted hertz instead of cycles per second (March); cheered the adoption of slow-scan-TV rules by FCC and Canada's DOT; published a solid-state direct-conversion receiver (Hayward/Bingham, November); and opined that some CBers should be recruited into Amateur Radio (December).

1969: January *QST* reported that new phone tariffs legalized some phone patching as of January 1. July *QST* covered 2300-MHz moonbounce. The ARRL Board appointed a VHF Repeater Advisory Committee, directed that "The World Above 50 Mc." would henceforth carry repeater news, and directed that a repeater handbook be produced (July editorial). Canada now had trial repeater rules (December). DeMaw discussed "In-Line RF-Power Metering" (December). Stoffels's "Let's Talk Transistors" series ran from November 1969 through July 1970.

1970: Australis-Oscar 5 flew on January 23. HQ's new in-house typesetting gear changed *QST*'s longtime look (March). FCC proposed new repeater rules (April) that the ARRL Board felt it must oppose (June). Doug DeMaw became Technical Editor with the July issue.

January 1962: The first Amateur Radio satellite

August 1963: A new home for ARRL



May 1964: Harry R. Hick and *QST* celebrate 50 years of ARRL.

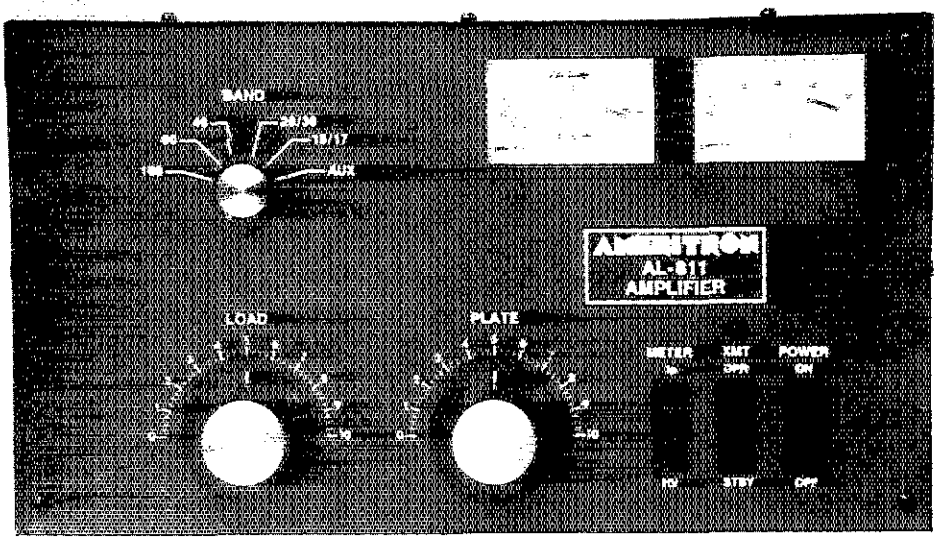
November 1968: New regulations on Friday the 22nd

600 WATTS OUT . . . $599

Ameritron's new AL-811 linear amplifier gives you plenty of power to bust thru QRM.

You get a quiet desktop linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there . . . until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet -- no special wiring needed.

You get three tough 811A transmitting tubes, extra heavy duty power supply, all HF band coverage, pressurized ventilation, tuned input, dual illuminated meters and much more . . . for an incredible $599 . . .



The first 600 watts makes the most difference

The AL-811 gives you 600 watts PEP output — that's nearly 2 full S-units over your barefoot rig.

That could mean the difference between hearing, "You're Q-5 armchair copy" and, "Sorry can't copy you, too much QRM."

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All band, all mode coverage

The AL-811 covers all HF bands (10/12 meters with easy user mod). There's no compromise on WARC and most MARS bands — you get a 100% rated output.

You can operate the AL-811 on all modes. You get 600 watts output PEP SSB and 500 watts output CW. You even get 400 watts on demanding continuous carrier modes like RTTY, SSTV, FM and AM.

How the low cost 811A tube resists premature failure - even when your amplifier is mistuned

811A tubes resist premature failure in two ways.

First, they're constructed with widely spaced elements that minimize the chance of elements touching and causing a short — even if the plate gets hot enough to melt.

Second, they use a directly heated thoriated tungsten filament cathode that prevents the electron emitting layer from instantly stripping off — even if mistuning causes a sudden, severe current overload.

Indirectly heated oxide cathode tubes (like the $400 3CX800A7) can be rendered instantly useless if their electron emitting layer is stripped off because of a severe current overload due to mistuning.

The Ameritron AL-811 is excellent for the newcomer because it's tough enough to withstand momentary mistuning. And the tubes are so inexpensive that you can replace one for mere pocket change.

The Ameritron advantage: extra heavy duty power supply that gives you peak performance year after year

The heart of the AL-811 power supply is its heavy duty power transformer with a high silicone steel core weighing a hefty 17 pounds.

A full wave bridge using 52.5 ufd of total capacitance (four 210 ufd, 470 volt capacitors) produces 1500 volts under full load and 1700 volts no load. That's excellent high voltage regulation!

Full height computer grade filter capacitors with screw terminals are used — not short stubby, light duty soldered-in "high technology" capacitors that can't dissipate the heat generated by high current.

The rectifier diodes are rated for a massive surge current of 200 amps. They won't blow even if you accidentally short the high voltage supply.

Wire wound, 7 watt, 50 K ohm equalizing resistors safely protect each filter capacitor — not 2 watt, 100 K ohm carbon composition resistors that can open and cause your filter capacitors to explode or fail.

The Ameritron AL-811 power supply is built tough so you get peak performance year after year.

Tuned input provides excellent load for any rig

A Pi-Network *tuned input* provides a 50 ohm load for your rig. Even fussy solid state rigs can deliver their full drive to AL-811.

Low loss slug tuned coils — tunable from the rear panel — let you optimize performance. High quality low drift silver mica capacitors maintain proper tuning.

Output tank: optimum Q on each band

The low loss pi-network output tank of the AL-811 has been carefully designed for optimum Q on each band and built with quality RF components.

The result is peak performance over each band, wide impedance matching range and exceptionally smooth tuning with efficiencies close to 70%. Even a 3:1 SWR load won't damage the tubes or tank components.

A ball bearing vernier reduction drive makes plate tuning precise and easy.

Quiet pressurized ventilation keeps your tubes safely cooled

A quiet fan pressurizes the cabinet with over 20 cubic feet per minute of cool air.

This large volume of air flow keeps the 811A tube temperature safely below the tube manufacturer's rating — even with a key down carrier at 500 watts output.

Two illuminated meters

Two illuminated meters give you a clear picture of your AL-811 operating conditions so you can tell right away if something is wrong.

The Grid Current meter continuously checks for improper loading. The other meter switches between high voltage and plate current to warn of abnormal conditions.

Ameritron exclusive Adapt-A-Volt™ power transformer

Too high line voltage stresses components and causes them to wear out and fail. Too low line voltage causes a "soft-tube" effect — low output and signal distortion.

Ameritron's exclusive Adapt-A-Volt™ power transformer has a special buck-boost winding that lets you compensate for stressful high line voltage and performance robbing low line voltage.

This makes your components last longer and gives you peak performance — regardless of your line voltage.

Plus more . . .

An Operate/Standby switch lets you run barefoot, but you can instantly switch to full power if you need it.

A transmit LED tells you when your rig is keying your AL-811.

A 12 VDC keying relay makes it compatible with all solid state and tube rigs. A built-in back-pulse cancelling diode protects your rig's keying circuit.

Shielded RF compartment. One year limited warranty. Compact 16" D x 13¾" W x 8" H. 30 pounds. UPS shippable. Shipped with transformer installed and wired for 120 VAC. Draws 8 amps at 120 VAC. Export model AL-811X wired for 240 VAC and includes 10 and 12 meters.

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1971-1980

BY 1971, FM and repeaters had become an integral part of *QST*, and Blakeslee's "Receiving FM—Basic Principles and Circuits" series ran from January through April. Amateurs established laser contact (July); the September editorial suggested that EIA's 220-MHz-CB request was little more than a marketing strategem, but FCC proposed a Class E license anyway. Over the next several years this issue would regularly grace *QST*'s pages until FCC quietly terminated the proceeding without action on October 13, 1977.

A. Prose (W4BW) Walker's long-held sentiments about new ham bands (relayed and amplified by the November 1971 editorial) picked up adherents, convinced the right people to do the right work, and we *got* new ham bands! Sumner and Baldwin chronicled the WARC-79 action in February 1980's "The Geneva Story."

In *1972*, Knadle's strip-line kilowatt for 432 MHz appeared as a *QST* Extra; a July *QST* Extra by Dome studied the DDRR antenna; and Oscar 6 achieved orbit (November). Daytime NTS, discussed in December, became permanent in January 1976.

1973: W2FMI put out full-sized signals with his ground-mounted short vertical (March). In *1974*, Hayward described a competition-grade CW receiver (March and April). "Learning to Work with Semiconductors" (DeMaw/McCoy) appeared from April through September; "Communicating at VHF Via Artificial Radio Aurora" (Frank, Fenwick and Villard, November) described man-made ionospheric heating.

1975: FCC's proposal to restructure Amateur Radio licensing (January) triggered an ARRL member poll. July *QST* carried the survey results and the ARRL Board's response to FCC: that we already had an excellent amateur service, and that *total restructuring* was not necessary or desirable to improve it.

In *1976*, *QST* went to a larger format—a change necessitated by economics, but temporarily regretted by members with bookshelves designed for the old size! "Learning to Work With Integrated Circuits" (Hall/Watts) ran from January-October. The March editorial relayed the Board's goals of a revamped club and training program, 100,000 new hams and 60,000 new League members by 1979. Reason: WARC-79. "Washington Mailbox" premiered in June.

1977: DeMaw's "Understanding Linear ICs" series spanned January through March. Olsen discussed "Designing Solid-State RF Power Circuits" from August through October. April 1977 *QST*, which included Overbeck's "The VHF Quagi," devoted most of its technical features to antennas. September's "CB to Ham in Two Easy Lessons" is emblematic of those times.

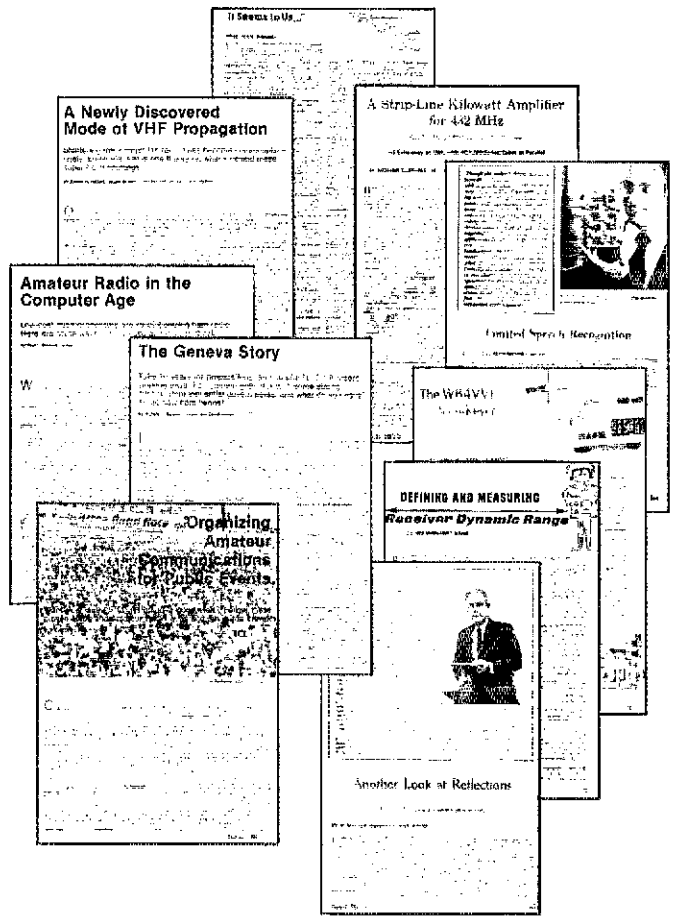
1978: FCC banned commercial 24- to 35-MHz (that is, 10-meter) amplifiers outright, and instituted type acceptance of commercially manufactured amplifiers in general (May). ARRL PR consultant Waters reported on the League's 1977 survey of amateur opinion (April). DeMaw explored solid-state transmitter-design from May-August. Rusgrove's 6-watt, VXO-controlled CW rig (December) is *still* popular with builders.

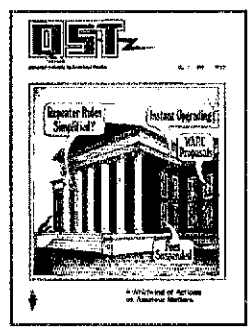
1979: The April editorial described ARRL's Long-Range Planning Committee. *Three* VMOS-transmitter articles (DeMaw, Hayward, Oxner) appeared in May. Powlishen's 432-MHz kilowatt appeared in abbreviated form (October).

1980: "The WB6ZNL Beacon" (January) offered *QST*'s first report on a sequenced 14.1-MHz beacon. FCC opened the gates on Amateur Radio's digital revolution by authorizing radio amateurs to use ASCII (April). Villard, Muldrew and Waxham explained the magnetosphere's role in one type of long-delayed echo (October).

August 1973: Final version of *QST*'s small-format cover

January 1976: Not only new from cover to cover, but larger—8¼ × 11 inches, trimmed





March 1977: The quickening pace of regulation and deregulation

August 1979: Killer tornado at Wichita Falls

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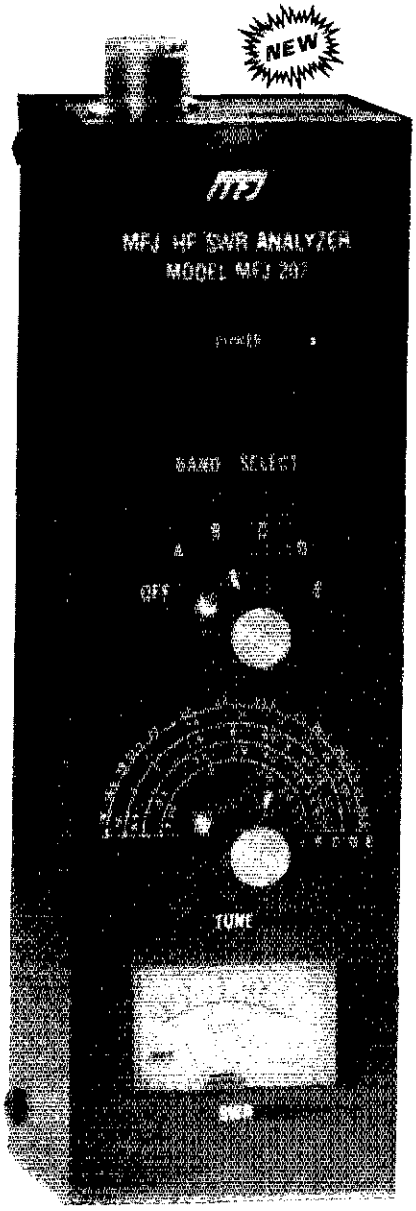

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You get a super value because several instruments are combined into a single portable handheld unit.

It has a low distortion RF generator that covers 10-160 meters, an SWR bridge that gives forward and reflected components and a computing circuit that automatically computes the SWR and displays it on the meter.

Everything is automatic. All you do is set the frequency and read SWR. It also has a frequency counter output so you can connect a frequency counter for precise digital readout.

Use 9 volt battery or 110 VAC with MFJ-1312, $12.95. 7½" x 2½" x2¼".

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Here's the best way ever to measure SWR . . . so get yours today!

MFJ VHF SWR Analyzer

MFJ-208

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If you operate 2 meters this new MFJ-208 VHF SWR Analyzer helps get your antennas in tip-top shape. Just plug in the coax to find the SWR of any antenna from 142-156 MHz. Use 9 volt battery (not included) or 110 VAC with MFJ-1312, $12.95.

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NEW

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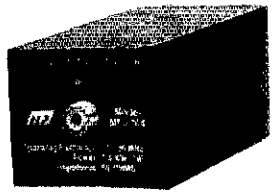
$39.95



Now you can eliminate or minimize TVI problems caused by harmonics with this new MFJ Low Pass Filter that connects between your transceiver and antenna. It's the best way to ensure that your transceiver does not cause harmonic interference to your neighbors' TVs -- you can operate in peace while your TV watching neighbors completely miss out on the fun of ham radio.

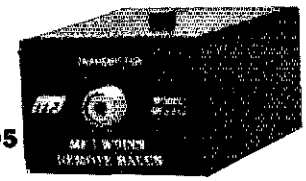
Handles full legal power from 0 to 30 MHz. SWR below 1.15:1 to 30 MHz. High harmonic attenuation. Low insertion loss. One year unconditional guarantee.

W9INN Balun Box

NEW

MFJ-912

$39.95



Permits using coax from your wide range T-network tuner to the MFJ-912 W9INN Balun Box mounted outside the building. The MFJ-912 then converts the unbalanced coax to the balanced transmission line (ladder line). Provides the same function as the internal balun except it is located remotely from the tuner.

With an adequate tuner will permit feeding any balanced transmission line this way.

Retains flexibility and efficiency of the ladder line feed without bringing the ladder line into the shack. One year unconditional guarantee.

DC-650 MHz Dummy Load

QRP thru 1500 Watts

MFJ-264

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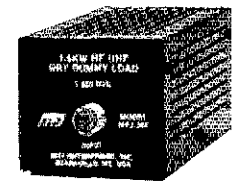

One dummy load that covers 160 Meters through 650 MHz and QRP through 1500 watts!

SWR is below 1.1:1 to 30 MHz, below 1.3:1 to **650 MHz.** Run 1500 watts for 10 seconds, 100 watts for 10 minutes. 3" x 3" x 7". Guarantee.

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1981-1990

COMPUTERS and digital techniques became more and more essential to Amateur Radio of the 1980s as FCC in turn authorized AMTOR (April 1983 *QST*), *any* digital code on any amateur frequency above 50 MHz not limited exclusively to CW (November 1982), and spread spectrum (April 1986). *QST*'s June 1984 editorial suggested what seemed like a pretty farfetched idea: that Amateur Radio's next great challenge might be something called *packet radio.*

1981: Shreve's "SKYWARN—A Design for Public Service" emphasized systematic communication for tornado spotting (April); Woodson preferred coherent CW (May and June); Borden and Rinaldo described "The Making of an Amateur Packet-Radio Network" (October 1981).

1982: Swail built "A Digital Readout System for the Visually Impaired Operator" (March); Monticelli fired up his 40-meter Cubic Incher (July); Chapman, Chapman and Lewison encouraged "Amateur Use of Solar Electric Power" (October and November). UoSat-OSCAR 9 made November headlines.

1983: Astronaut Owen Garriott, W5LFL, thrilled radio amateurs by hamming from space shuttle *Columbia* (February 1984 *QST*).

1984: January *QST* said goodbye to late ARRL President Vic Clark, W4KFC. DeMaw took "First Steps in Radio" from January 1984 through July 1985. FCC backed down on its 1983 no-code proposal after stiff ARRL opposition (February). Volunteer examining arrived *at last* (August). Williams published a direct digital synthesizer in April. "Up Front in *QST*" premiered in November.

October 1984 "Happenings" began coverage of a story that continues to this day in federal court: FCC's proposal, and subsequent report and order, on reallocating 220-222 MHz to Land Mobile—an action ARRL is still fighting.

1985: Price popularized packet (July and August). September *QST* said goodbye to the late Clarence D. Tuska, 1896-1985, cofounder of ARRL and *QST*. Astronaut Tony England, WØORE/*Challenger,* handled the first-ever exchange of TV images between ground stations and a manned orbiter (October). FCC agreed that federal laws preempted local antenna regulations (PRB-1, November).

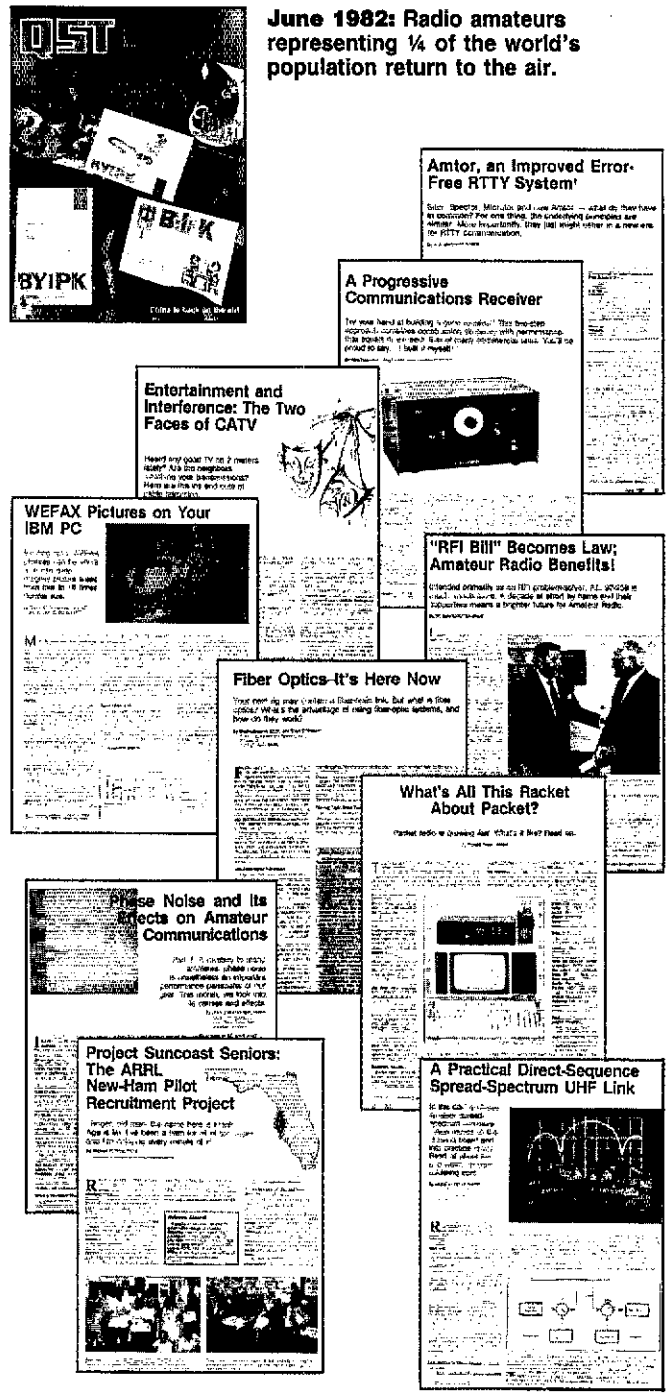
1986: Amateur Radio served well when a Colombian volcano triggered a killer mudslide (February 1986). The *Challenger* disaster stunned the world on January 28.

1987: Acting in a proceeding initiated by ARRL, FCC enhanced the Novice license by adding 10-meter phone and VHF/UHF privileges as of March 21. Ward demonstrated the beautiful simplicity of MMICs in February and March. "Novice Notes" premiered in February. Bussen authored "Amateur Radio and the Blind" (October 1987 through January 1988).

1988: Dillon's Neophyte receiver (February) pleased many. After more than 60 years as an ARRL division, the CRRL struck out on its own (April). W1AW renovation initiated an enchanting series of W1AW Vignettes and historical works in 1988 and 1989.

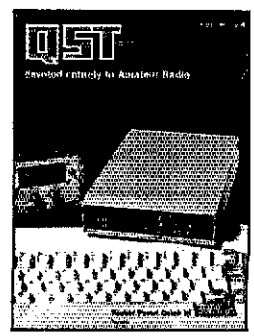
1989 QST celebrated 75 years of ARRL. FCC released a revised Part 97 in May, effective September 1. "At the Foundation" premiered in June; the ARRL Board voted in July to petition FCC for a codeless license; Loughmiller and McGwier introduced microsats, the next generation of OSCARs; and Shulman wondered if Amateur Radio was hazardous to our health (October).

1990: No longer content to be just a "technoid" journal, *QST* sought to embody a more comfortable blend of people, places and radio. Six microsats made it into orbit on January 22. Amateur Radio—as the Shuttle Amateur Radio Experiment—was slated to orbit anew as early as December. *QST* premiered a new Op-Ed page in October and celebrated 75 years of service to Amateur Radio with a special color section in December.

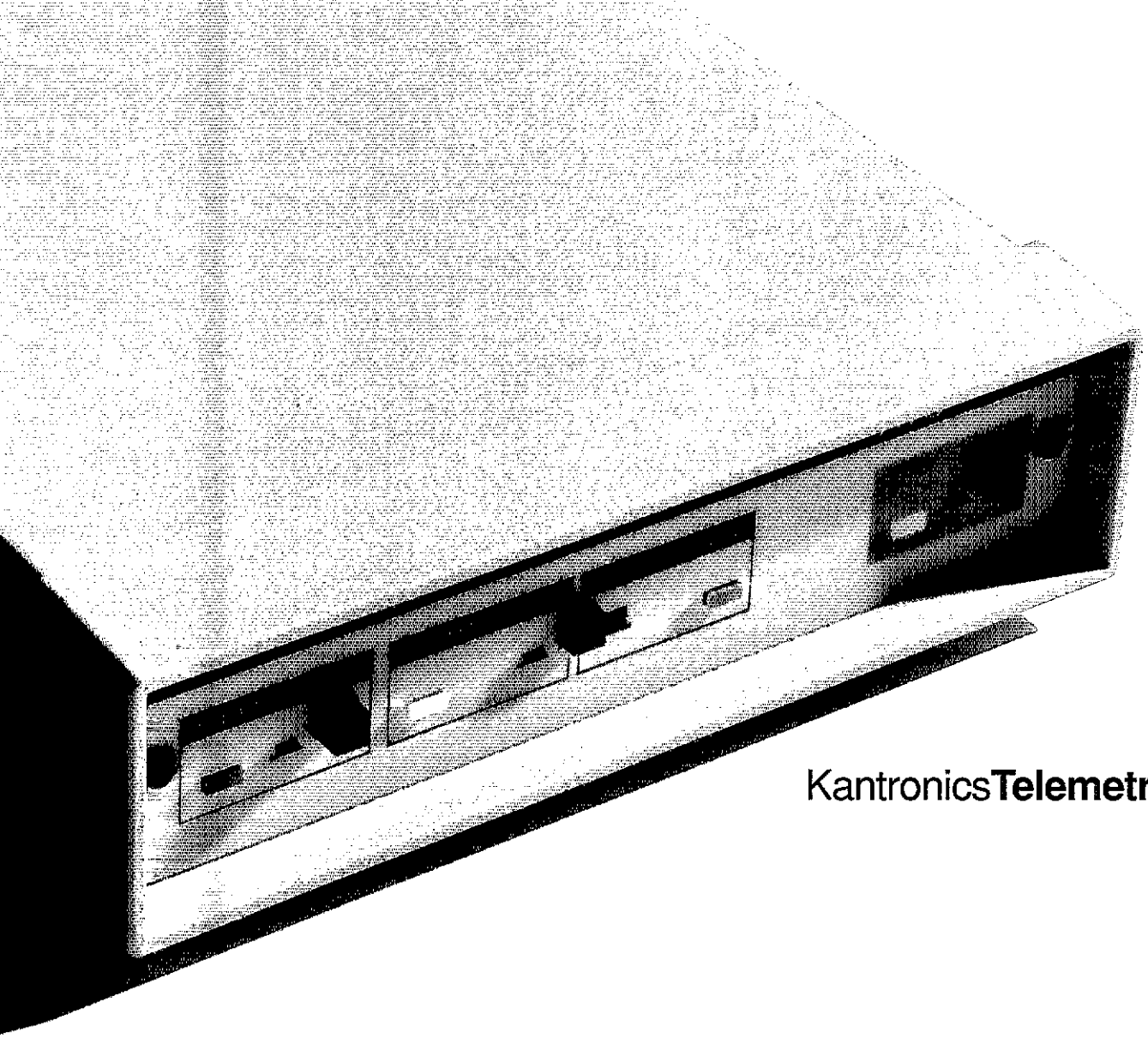


June 1982: Radio amateurs representing ¼ of the world's population return to the air.

August 1983: Owen Garriott, W5LFL, trains for the pileup of his life.



August 1985: *QST* does its bit for packet radio.



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KTU remote sensor

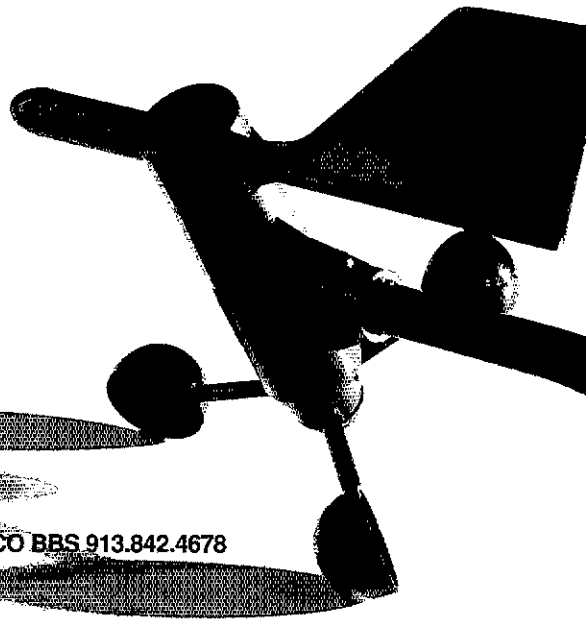
Designed for the growing number of new communication applications, the Kantronics Telemetry Unit (KTU), for the first time, brings remote data gathering and distribution within reach.

Accepting input from up to 7 sensors and working with special purpose EPROMS, the KTU can collect a range of environmental data and distribute it, through an external TNC, to users in a Local Packet Network.

Included with the KTU is the Weathernode EPROM (the first in a series) which provides temperature sensing and, with the optional weathervane, can supply wind speed and wind direction data.

The KTU connects to the serial port of any TNC or may be connected directly to a computer's serial port. It is easily adapted to multi-site installations and may be remotely accessed, with password protection, and programmed for specific requirements.

The Kantronics KTU, the first to provide remote data sensing to a Packet LAN.



Kantronics 1202 E. 23rd St., Lawrence, KS 66046, 913.842.7745 TELCO BBS 913.842.4678

The Joy of *QST*

YOU ARE Ross A. Hull, QST's Associate Editor, and the year is 1931. The task at hand is "simple": Make ARRL Headquarters doings, and the people behind them, enjoyably *visible* to the ARRL membership through *QST*. Ah, here's a proof of that drawing you ordered. A caption suggests itself. You type

THE LASALLE ROAD OFFICES AS SEEN FROM ABOVE—AFTER-EFFECT OF A CONVENIENT IMAGINARY CYCLONE

Had the reader been blown eighty feet into the air astride a flying roof timber one second after the roof lifted, he would have seen . . .

. . .He would have seen what the writer of that caption saw: a workplace enlivened by a spirit we now know was present in *QST* from the moment of its birth.

You are James Millen of the National Company, Inc, and in late 1936 you decide to modify your company's already-famous series of essay-ads as of January 1937. Only when World War II renders the necessary manpower a luxury do you explain in 1944 that

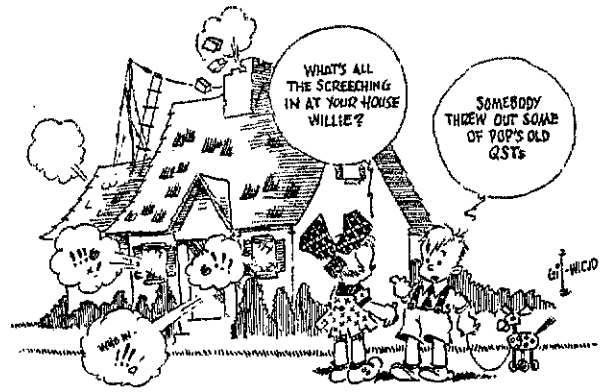
> For seven years it has been our custom each year to buy National Tuberculosis Society Christmas Seals and have *QST* stick one on this page in each copy of the January issue. But it takes a lot of girlpower to do this tremendous job of stamp-licking and this year we must use girlpower for only the most essential jobs—so we are simply making our contribution in the same amount as if we had bought the necessary 60,000 Christmas seals and the printed reproduction above is a symbol of the stamp we wish were there.

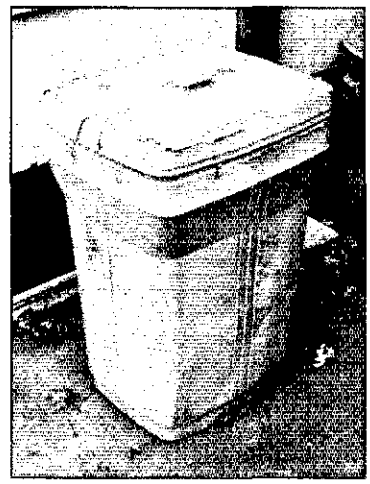
You are *QST*'s Managing Editor. Sometime between the deterioration of passenger train service and the advent of economical overnight couriers, you hit upon a madcap but workable scheme for ferrying manuscripts, proofs, photos and engravings between ARRL HQ and *QST*'s printer in Concord, New Hampshire: For 10 to 15 years, the entire guts of *QST* passes through a nondescript *trash can* beside a diesel garage along Newington's Berlin Turnpike. A trucker pulls HQ-to-printer traffic *out* of the can in the evening on his NYC-to-Concord run; he puts printer-to-HQ material *into* the can on his Concord-to-NYC run each morning. Aside from some bucks to the garage owner "for the use of the hall," there is no security—but *nothing* ever gets lost!

A risky arrangement? Maybe, but consider, please, The Original *QST* Risk: You are Clarence D. Tuska and Hiram Percy Maxim. Believing in the young League you hope will enliven the Amateur Radio that you pursue *purely as a hobby*, you move to print and mail 11,000-plus *QST*s—a blind, gratis subscription sent to over 3700 souls for three months. *Maybe* enough of them will pony up after you rubber-stamp "Last Free Copy—Subscribe Today" on your February 1916 number.

You are *QST*. You were conceived as a risk, born as a gamble, survived on a prayer, and grew on a promise. The hobby that never could have organized without you, you nurtured into a service. To the League that grew to depend on you as its journal, you gave widening life and the resonant voice of a leader.

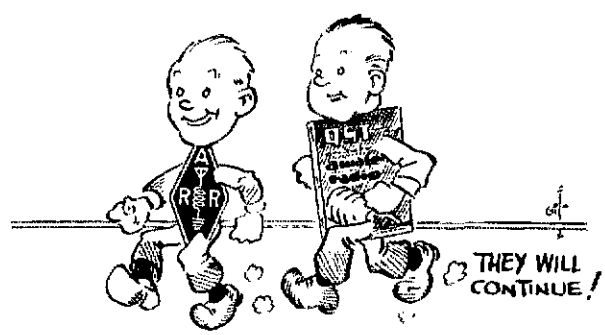
Flying far enough above the earth allows us to see its curvature; taking the measure of 75 years of *QST* history enables us to sense the motive force that propelled Amateur Radio from spark to space. *QST* records far more than the life and times of "our ARRL": It chronicles, in Amateur Radio terms, humanity's yearning to better itself purely for the joy of self-betterment. *That* is the spirit embodied in 75 years of *QST*.—*David Newkirk, WJ1Z*





Now It Can Be Told: For about 15 years, all *QST* editorial, graphic and advertising matter passed between ARRL HQ and *QST*'s printer via this trash can until *QST* switched printers and went to a larger format in January 1976. *(NJ2L photo)*

No December *QST* is complete without its holiday cover. Seeing as how this month's cover is devoted to other business, we oblige with this luminous scene from 1920.



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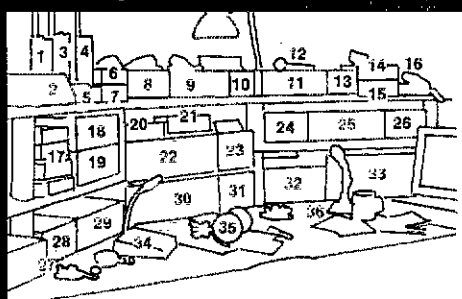
Kenwood – producing the finest Amateur Radio products for over three decades – introduces you to our world of affordable, high-quality, high performance products for today's active Radio Amateur. From HF to VHF, from base to mobile to HT, there's surely a Kenwood radio that will fit your needs and budget.

Being Number One means that we are committed to offer you the finest line of Amateur Radio products in the world. Take a look at the station equipment most winning contest and DXCC Honor Roll operators use. Read the Product Reviews. Compare our rigs against the rest. You'll see that we really are the best.

As the "pacesetter" in Amateur Radio, Kenwood continues to incorporate tomorrow's techniques and innovations into practical products today. Digital Signal Processing (DSP) in the TS-950SD is only one example. SSB Slope Tuning, the original "Dual Bander" concept, built-in antenna tuners for HF rigs, and many other techniques were all developed by Kenwood, and imitated by others. Leading edge technology, and superior field-proven performance. That's the Kenwood Experience!



1) **TH-26AT:** Compact HT. 2) **BC-11:** Rapid Charger for TH-26AT. 3) **TH-315A:** 220 Deluxe HT. 4) **TH-75A:** Dual Band HT. 5) **BC-10:** Compact Charger. 6 & 7) **TM-631A/731A:** 144–220/144–450 MHz FM Dual Banders 8) **PS-50:** Heavy Duty Power Supply. 9) **TS-440S:** HF Transceiver w/AT-440 (shown w/supplied MC-43S). 10) **SP-430:** External Speaker. 11) **R-5000:** High Performance Receiver. 12) **HS-6:** Small-size Headphones. 13) **SP-430.** 14) **TM-2530A:** Deluxe 2m, 25 W FM Transceiver (w/optional MC-48B mic.). 15) **TM-3530A:** Deluxe 220 MHz, 25 W FM Transceiver. 16) **TM-701A:** 144/450 MHz Compact Dual Bander Mobile Transceiver. 17) **TM-231A/331A/431A/531A:** 144, 220, 450, 1200 MHz Compact Mobile Transceivers. 18) **TS-811A:** 70 cm, 25 W and 19) **TS-711A:** 2m, 25 W, All Mode Base Station Transceivers. 20) **PC-1A:** Phone Patch (FCC part 68 Registered). 21) **SW-2100:** SWR/Power Meter. 22) **TS-940S:** Deluxe HF Transceiver w/AT-940 installed. 23) **SP-940:** Matching External Speaker. 24) **SP-31:** External Speaker. 25) **TS-790A:** All Mode Tri-band Satellite Transceiver. 26) **PS-31:** Matching Power Supply. 27) **PS-430:** Power Supply. 28) **AT-250:** External Automatic Antenna Tuner. 29) **TS-680S:** 160-6 m Multi-Bander. 30) **TS-950SD:** HF Transceiver w/DSP. 31) **SP-950:** Matching External Speaker. 32) **SM-230:** Deluxe Station Monitor. 33) **TL-922A:** HF Linear Amplifier. 34) **MC-85:** Multi-function Desk Mic. w/3 outputs and tone controls. 35) **HS-5:** Deluxe Headphones. 36) **MC-60A:** Base Station Mic.

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...pacesetter in Amateur Radio

League Lines

Contributions to the WARC-92 fund drive continue to arrive at ARRL HQ. It's not too late to respond to the mailing that went to all ARRL members in early September. All contributions are being used for the defense of amateur frequencies at the World Administrative Radio Conference, to be held in February 1992. For a WARC-92 update, see the editorial and page 71.

A special effort to speed up DX Century Club processing has begun at ARRL HQ, with more staff members helping to process applications. If you have a DXCC application pending, please stand by!

The FCC has denied three petitions, including one by the ARRL, regarding power input in amplitude modulation, A3E, radiotelephone operation. The petitions had requested that grandfathering of the AM limit of 1000 watts dc input, which expired on June 2, 1990, be reinstated. The FCC, which received more than 820 comments, was not persuaded that interest in AM significantly exceeds the Commission's 1983 estimate. The ARRL had argued that interest in AM was steady or even increasing, and that the new rule would result in a loss of privileges for amateurs. As a result of this FCC ruling, the maximum legal power on AM remains 375 watts carrier power output, with 100 percent modulation. At the same time, the FCC also denied a petition seeking to remove amplitude modulation from the list of legal modes of operation.

An ARRL Educational Workshop will be held in Miami February 1, 1991, just before the Miami Hamboree. Instructors and teachers who use Amateur Radio in the classroom and wish to participate in this five-hour session should write to the ARRL Educational Activities Department for details.

The YL column returns to QST in January. Conducted by Connie Dunn, KB5LES, it's slated to run every other month.

At The Front: The New Bern (North Carolina) ARC will sponsor a ham radio licensing class using ARRL materials. Not news? The Novice class will be conducted in Saudi Arabia, under the direction of US Marine Mark Bitterlich, WA3JPY, who asked for study materials "to relieve the boredom and inactivity of those serving in 'the sand pile.'" US amateurs are reminded that handling traffic to or from Saudi Arabia is not permitted in the ham bands; MARS stations are carrying the load.

The maximum reimbursement fee for amateur Volunteer Examiner tests for 1991 is $5.27, as set by the FCC. The ARRL VEC will charge $5.25.

The 1991 ARRL VHF Sweepstakes is January 19-21, the lightest football weekend of the month (just one NFL playoff game). Complete rules are on page 101.

FCC Commissioner Ervin Duggan has called for sweeping reforms to disperse the "concentrated" power of the FCC chairman and restore "truly collegial decision making" at the agency. The FCC has evolved into "a top-down, one-option process of deliberation, a frustrating and often stultifying parody of collegiality," Duggan told a meeting of the Federal Communications Bar Association.

The Microwave Update Conference, sponsored by the Colorado Front Range Microwave Society, will be held January 30, 1991, at the Ramada Conference Center in Denver. The conference will provide an informal forum for the exchange of ideas, designs and operational experience. More information appears in *QEX*.

The newest addition to the ARRL library is **The DXCC Companion,** ***by Jim Kearman, KR1S.*** The *Companion* is a beginner's guide to DXing—it covers everything from station layout to antennas and propagation. It makes a fine gift for that new ham you know. The price is $6 (plus shipping—$2.50 for US mail or $3.50 for UPS).

Leonard L. Jezorek, W4LC, has joined a handful of other old-timers as a 70-year ARRL member. Jezorek will receive an engraved plate to add to his 60-year plaque. Recent recipients of 60-year plaques include W7YU, W6BPH, W2VV and W6BUY.

New Amateur Radio licensees and license upgrades showed healthy increases in the past year. FCC statistics for the fiscal year ended September 30 are on page 72.

Jim Smith, VK9NS, visited ARRL HQ on his way home to Norfolk Island from Europe and the Far East. During his visit, members of the Connecticut DX Association arranged an exam session, at which Smith passed all US amateur elements except the Extra Class written (which he missed by two questions—"All those band segments!"). He passed the Extra Class written exam in Dallas a few days later.

Jim

A Tug at Your Memory

By John C. Flippin, W4VT

QST has been privileged to carry the work of masters in many aspects of the radio amateur's craft, but precious few of our pages have been devoted to masterworks of ham fiction. *John C. Flippin, W4VT, a Silent Key since 1988, was responsible for only a handful of those pages, yet rare is the old-timer who does not remember at least one of Flippin's 1930s classics with a special fondness. As* QST *celebrates its 75th year of service to hamdom, we think it fitting to reunite W4VT with his longtime admirers, and to give younger hams a chance to experience Flippin's magic firsthand. Here, then, from April 1935, is a* QST *holiday treat: John C. Flippin's "Jim."*

The fire in the shack of the university radio station burned low and conversation lagged. Every now and then someone yawned lustily. The hands of the old clock pointed to five minutes after two, yet half a dozen seniors lingered, for the fire was magnetic, the walk back to the dormitory and fraternity houses long; and the night was cold. Lazy, feathery flakes, beginning to drift down at midnight, had changed to a fine, peppery mist swirling in from the north, and the wind moaned down the chimney in icy cadences.

Jug Southgate stood up and stretched.

"See you mugs in church," he grunted, looking around for his overcoat.

"Wait a minute. I will let you walk with me. Hey! Get your big feet off me!"

"Freshman, where are the earmuffs?"

"Right here, sir."

"Put them on at once. Anybody would think you had no modesty at all."

"Get up! Get up!"

"Coming, Ivy?"

"Let's go."

Exiled in a shadowy corner, a group of freshmen had been listening in respectful silence. Now they rose, after a discreet interval, and removing their sky blue caps from their hip pockets placed them carefully on the backs of their heads. Beside them stood a little fellow who was busily engaged in wrapping a rather frayed scarf around his small neck. Judging from his stature he could not have been much older than fourteen, and he looked very small and out of place beside them. The shadows from the fire treated mercifully the worn places on the elbows of the coat which was so obviously designed for a larger occupant; they shielded understandingly the worn, cracked shoes with the scuffed toes.

His name was Jim. Nobody knew much about him except that he lived up in town somewhere, and that every Saturday night he appeared at the shack, slipping quietly into a seat amid the shadows in the corner, and listened with rapt attention to every word that anyone uttered. He always stayed until the group of fellows broke up. Jim replied feebly and shyly to those who would talk to him, apparently embarrassed at the attention. His face and hands were very thin and his eyes were very bright. He was a small outsider looking in on a gathering with which he could join only in spirit. College would never be for Jim.

The wind whined savagely. A flurry of snow beat a faint tattoo on the window.

"Ouch!" muttered Ivy. "Listen to that!"

Jug cast his gaze around as he pulled on his gloves. The staccato clatter of the keying relay in the adjoining room reminded him to caution Parkes about playing the end of the band too closely since the multivibrator was down for revamping. Turning back, his glance rested for an instant on Jim stretching his hands out to give them a last warming. Something about the little fellow's appearance arrested Jug's attention. Maybe it was the tattered edge of that scarf about Jim's ears.

"What do you say over there, sport?"

Jim didn't notice.

"You over there by the fire! Got a way to get in?"

Jim looked up, and saw Jug looking at him. He straightened up quickly and thrust his hands into his coat pockets.

"Sir?"

"Got a ride into town with somebody?"

"No."

"What are you going to do—walk?"

"Yes," answered Jim.

"Pretty long way, isn't it?"

A pause.

"Not so much."

Jug embarrassed Jim a great deal, because Jug was the chief operator and wore sterling crossed bars of chain lightning on the shoulder of the navy blue jersey. There was no greater this side of Heaven, save perhaps the three comprising the transmitting staff.

Jug shoved his pipe in his mouth and turned the bowl down. He squinted up at the clock.

"Hold on, frosh!"

He pulled off his gloves and searched in his hip pocket, producing nothing but a handkerchief and a crumpled pack of cigarettes.

"Can't find 'em. Listen! You know where the Sigma House is? OK—you go over there and look around in the back. My iron ought to be there, but if it isn't, get any of them that will start. You know mine?"

"Yes, sir."

"Look around in the front seat and find you a hairpin or something and short around the switch under the dash. You know?"

"Yes, sir."

"And hurry up, frosh!"

Rather bewildered, Jim listened.

"I can get there all right," he said finally.

Jug grunted and sat down.

"Where do you live in town?"

"Er—down by the depot. The third house from the corner.

"Guess you know all the trains."

"I guess so. The freights make an awful lot of QRM when I'm trying to listen."

Jug stuffed his pipe slowly and extracted an ember from the hearth.

"You one of these amateurs, too?"

"Yes, that is—I mean, I have a station, but it's not much good, I guess."

A flicker of surprise crossed Jug's persistently sunburned countenance.

"Didn't know there was another station within fifty miles of here," he admitted. "What do you use? Never heard you."

"A 201-A," answered Jim.

The rectifiers down below howled faintly.

"Any DX?" asked Jug, quizzically, glancing at the little chap out of the corner of his eye.

"No, I—you see, I never worked anybody."

"What's the trouble?"

Jim stopped the nervous movements of his small hands and wiggled his thumb, just to see if it would wiggle.

"I don't know."

"Just don't come back, eh?"

"No."

"Call many of them?"

"Yes, I—well, I call a lot of fives and nines and fours."

"Sure you're in the band?"

"Yes."

"How do you know?"

"I cover up my receiver with a cracker box and then I can hear the transmitter. After I take off my receiving aerial," he added.

Jug looked at Jim for an instant, and then gazed again into the fire. There was a pause while Jim twisted his small, thin hands nervously.

"I know it's putting out," said Jim, faintly, "because I get a burn."

"Burn, eh?"

"Yes."

"Just don't come back."

"No."

The pity of it.

"Much of a burn?"

"Well, I can feel it on the back of my finger." Jim held up the radio frequency detector.

"How long have you been trying to raise them?"

"Since about May—I mean, April."

"Nine months."

"Yes," answered Jim after a pause.

Jug exhaled a cloud of smoke through his nose and regarded the fire. Some game, this! Nine months and never a break.

There was a dull rattle of contactors down below, followed by a volley of clicks in the adjoining room.

"What made that?"

"Sounds like he switched in the '7'—the forty-meter rig."

"You mean he's using another set, now?"

"Just the amplifier. Switched over the exciter from the 80-meter to the 40-meter amplifier."

"Oh!"

"Sit down! Sit down! Make yourself comfortable. Guess it'll be about fifteen minutes, yet."

Jim slid cautiously into the nearest chair. Suddenly he turned and regarded Jug inquiringly.

"Would you mind—I mean, would it be all right if I looked in there?" he asked, pointing to the transmitter room.

"Sure! Go ahead. Help yourself. Wouldn't get too close, though, to the one nearest this side."

Jim opened the door cautiously and craned his small neck. He stood transfixed for long minutes.

"Gee!" he whispered.

"Look all right?" Jug asked, pulling his pipe apart and blowing through it with two short snorts.

"Gee!" said Jim again.

Five minutes passed with only the wind, the old clock, and the keying relay breaking the silence.

Jug looked at the swirl of smoke ascending the broad black throat of the chimney, and his thoughts traveled back to a day—so long ago, it seemed—when that UV-202, its plate glowing brightly, brought the antenna ammeter to life. As he recalled, the pointer moved over about a thirty-second of an inch, but at the time, it looked like a foot!

And then that red-letter day. He had just called CQ. It was just one of many scores of CQ's. There was nothing to distinguish it from all the others except that on this occasion 9EKY in St. Louis came back. The wild shout that brought the gardener, the chauffeur, and both maids breathless to the sanctum over the garage was not, as they feared, Mr. Edward Southgate III getting a mortal shock from his peculiar conglomeration of wires and sparkling Mason fruit jars, but merely the result of Mrs. Southgate's youngest son making contact number one with his trusty bottle!

Jug looked at Jim standing in the door. The frayed scarf. The worn old overcoat hanging awkwardly from his small body.

"Know the code pretty well?" Jug asked, rising slowly, and returning the tobacco pouch to his pocket.

"Sir?"

"Can you copy pretty well?"

"Yes—well, I guess I can copy ten words a minute, I guess."

"Want to go upstairs?"

"Upstairs?"

"Want to see the operating room?"

"Oh! Yes!"

Jug led the way with Jim following at his heels. A series of coughs escaped Jim at the top of the flight, and alarm possessed him that he would disturb the operator. He tiptoed in behind Jug, his small face radiant with excited expectation.

"What say, Jug?"

"Lo, Bohunk. How goes it?"

"Fair."

"Where you working now?"

"Using 7005. Don't worry, it's inside."

"Did you check it with the oven?"

"Yes, it's right on the line."

Jim was all eyes. He looked at the Single-Signal receiver, at the typewriter, at the 100-kc. secondary frequency standard, at the steel front control panel alongside the operating desk. The shiny brass handwheel on it. The meters. All the relays in the back. The lacing on the cable runs. Resistors standing upright in groups. Jim's excited inspection saw it all!

"Anything coming through?"

"Few. Good many VK's and ZL's. Heard J2GX a minute ago. May be pretty fair later on."

Jug rested his elbows on the operating table and said something to Collier Parkes. Jim didn't hear. Jim was busy. He was looking intently at a Kleinschmidt perforator partially disassembled, wondering what manner of thing it was.

Parke grinned.

"Sure! Sure!"

Jug's voice dropped lower.

"No," said Collier, "I got one with K6BAZ in fifteen minutes. Plenty of time for that, though. You go ahead while I go out here and look up another pad of message blanks—or something," he added.

He disappeared, clattering down the stairs.

"Want to listen in?" Jug asked, motioning to the receiver.

Jim came over to the operating desk and looked at Jug, then looked at the receiver. A great fear came over him. It was too beautiful to get close to; the baffling controls marked "R.F. Gain," "Selectivity," "A V C" "Voice—C W," and "Crystal Filter" were formidable. It was only to be looked upon from a distance.

Jug pulled the swivel chair up with his foot.

"Sit down. Sit down."

Jim let himself down slowly and looked around at the control panel. His elbow touched the shiny handwheel, and he hastily pulled it back, and then let it slide down again. This was real. It was not a dream.

Jug tripped one of the switches up with his thumb and motioned to the knob in the center.

"Turn that one."

Jim looked up at him inquiringly and touched the knob timidly. The shadow scale above it moved slightly. How easily it turned! Encouraged, he moved it a lit-

tle more. A faint hiss which had begun to evidence itself in the dynamic speaker was at that instant ripped asunder by a kaleidoscope of crisp, bell-like signals which caused the moving coil of the speaker to wiggle perceptibly. Jim looked at it quickly. The sound seemed to hit him in his stomach, like when the bass drum passed in a parade. Just listen! A procession of grunts, drones and crystal ringing notes shrilled slowly by.

"Slow! Slow! Back this way."

Jim turned the knob back. Gee! It turned so easily, just seemed to glide! Entranced, he watched the shadowy divisions and numbers slip across the sloping, ground glass window. Was this real? His elbow slid back against the handwheel inquiringly. Yes, it was real, all right.

Slowly the dial moved back toward the 7000-kc. end. The terrific honk of W6's tore through. A myriad of faint signals in between that a touch of Jug's finger on the gain transformed into ear-splitting intensity.

"Whoa!"

A faint lisping note. Jug brought it up to a good level. It seemed to stand out on top of all the rest, miraculously. The lisp increased in intensity. It signed.

"Hear that?"

Jim nodded.

"Japanese."

Jim's heart skipped a beat.

"Go on."

The dial crept back up the scale. A terrific shot of 100-cycle rectified a.c. A fluttering rattle.

"Alaskan."

A hollow ringing crystal note with a peculiar wavering undertone.

"Get this one."

It was a long, slow CQ DX. It signed.

Jim's hands were trembling.

"KA1HR. Get it?"

Jim nodded.

"Philippines."

Jim's trembling increased.

The signal faded in slowly, dying away into the background roar, returning.

Jim's heart was pounding so hard it shook him.

"Calling DX."

Thousands of miles of black, tumbling ocean intervened. Outside, the two great towers, outlined irregularly in white, rose up and up into the swirling snow; downstairs the input reactors sang monotonously in the ghastly glow of the rectifiers. The filaments of the push-pull stage in the 7-mc. amplifier imparted a dull radiance to the polished edges of the neutralizing condenser discs. All were waiting, ready to hurl the dynamite.

"AR," grunted Jug, and with his thumb tripped a breaker closing switch at Jim's side. "OK! Go after him! Use the straight key over there."

Little Jim was shaking noticeably. He reached hesitantly over the battery of Vibroplexes strewn before him and grasped the key knob. He felt paralyzed. An hour seemed to pass. Suddenly the knob gave. Awkwardly he sent "KA" and stopped.

"What was his call again? Oh, yes—er . . . ."

He began to call slowly and erratically. After a little he steadied a bit, but his heart was pounding so hard he couldn't control his arm. He was trembling as with a chill.

Downstairs, the pair of 204-A's, no respectors of persons, fired skyward all the savage energy that 4400 volts could impart. At every closure of the relay, the burnished plates of the tank condenser paled fitfully in the semi-darkness.

"Give him a long buzz."

Jim heard, but couldn't obey. The strength was gone out of him. Suddenly he found himself signing. He signed twice. K.

"Boy, you sure must believe in this signal all right," grunted Jug, tripping the breaker release.

For an instant only the background roar. Then the wavering drone started up.

Calling them.

"Well, what do you say now?" muttered Jug, glancing quizzically at Jim.

He didn't answer for a moment. Two large drops deposited themselves suddenly upon the log.

A faint sob came from the little fellow.

"I worked somebody," whispered little Jim. QST

Strays

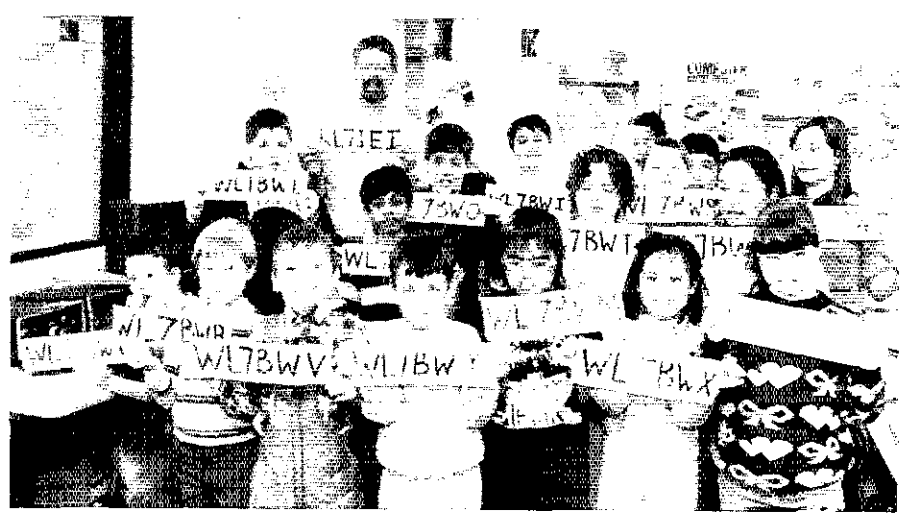
IMPROVING THE ODDS IN ALASKA

With a high alcohol- and drug-related crime rate and long, dark winters (about 4-5 hours of daylight), it's easy for kids to get bored and drift into unsavory activities. Rather than standing by and watching children grow up with problems brought on by those circumstances, schoolteacher Allen Wintersteen, KL7IEI, started an Amateur Radio class and has more than two dozen new hams to be proud of. Wintersteen teaches 2nd-8th graders at Kilbuck Elementary School in Bethel, Alaska (pop 4000). In the first year of the ham classes, Wintersteen had 13 students and one book, which they all shared. The Anchorage ARC bought a set of books each for the town and school libraries and the Bethel Lions Club donated a portable ham station the students use.

I would like to get in touch with . . .

☐ radio amateurs who play harmonica. Al Boehnlein, W8BEZ, 29146 Sheridan, Garden City, MI 48135.

☐ anyone who lives near the Mexican-American border from El Paso to Alpine, Texas, or farther east. I plan to visit the "Zone of Silence," a desolate lozenge-shaped area in northwestern Mexico the size of the state of Delaware. This is known as a terrestrial "Bermuda Triangle," because humans and animals vanish in the Zone. I plan to operate a 10-meter mobile radio and a QRP homebrew rig, while gathering information for a book about the place called "Land of the Giants." Michael Landwehr, KE7T, 4746 Scotty Dr, Kingman, AZ 86401.



The latest gang of young WL7s are shown with the teacher, Allen Wintersteen, KL7IEI, holding their call signs. *(Craig Lester photo)*

Confessions of a Boyhood Bootlegger

"Boys will be boys" is a truism that fits almost any decade. These ingenuous Illinois youngsters, who whetted their appetite for wireless in the early days of radio, are a case in point!

By Robert E. Hall, W1IN
27 Boulder Road
Hillsboro, NH 03244

It all started when I was a Boy Scout in Winnetka, Illinois, a suburb of Chicago, on the north shore of Lake Michigan.

In 1920, there was an article in the Chicago *Tribune* about the "wireless transmission of messages between distant points" and how Morse code was used to communicate with ships on the Great Lakes. It explained how those signals could be received with a coil of wire wound around an oatmeal box and a variable condenser, a catwhisker detector and a pair of Baldwin earphones. The picture in the paper made it look so simple that a group of us thought it would be a good Boy Scout merit badge project to listen to the grain barges and whaleback ships we could see wallowing through the waves in the lake.

We discussed the project with our Scoutmaster and he suggested that we see a friend of his who ran a company called MESCO, in Chicago, that sold wireless equipment. We went to MESCO and the gentleman there spent a good part of the day showing us the equipment and explaining how everything worked. He even gave us a list of things we'd need to get started.

The cost seemed prohibitive to a group of 12-year-old boys. The Scoutmaster came to our rescue again by suggesting that we hire ourselves out to rake leaves and mow lawns. That was a tough decision for a bunch of lazy kids during summer vacation. The weather was hot, the cool Winnetka beach was inviting and most of our friends were soaking up the sunshine. But we had a "mission," and with a little prodding from the Scoutmaster, we scraped together the money for the bare essentials. Because we belonged to the Boy Scouts, our friend at MESCO thought we should be entitled to a commercial discount. This made it possible to forget the oatmeal box and buy a fancy commercial loose coupler, an impressive-looking thing more than a foot long, consisting of a large outer coil wound with shiny green wire and with a sliding brass contact on top. It had a smaller inner coil with a multiple-contact switch on one end. The small coil could be moved in and out of the larger coil. Impressive!

We debated about the crystal for the catwhisker detector. Some people said galena was better, while others said no cat whisker could work properly without silicon. We decided to take one of each. At that point, our friendly MESCO man said, "Never mind, boys, they're on the house."

Feeling like a group of successful business tycoons, we headed home with our loot, including antenna wire, insulators and a tremendous knife switch the MESCO man said we'd need to protect the house from burning down in case of lightning.

The biggest part of the project was the antenna. We were advised to make it as long as possible, with four wires equally spaced on eight-foot spreaders and insulators at the end of each wire. The wires were joined together at one end and connected to a heavy wire leading to the knife switch on the side of the house. The wire from the ground end of the switch was connected to eight feet of pipe driven into the ground. Our friend at MESCO impressed us with the importance of the ground system and said we might enjoy watching it during a thunderstorm by leaving a one-inch gap to ground. We did just that during an exceptionally intense thunderstorm. It was an impressive demonstration that taught us a lesson about lightning that none of us would ever forget!

Unfortunately, we weren't told how to solder the wires. We tried to make the solder stick by heating it with one of my mother's flatirons and letting it drip onto the wire. After many frustrating attempts, we concluded that soldered connections simply weren't necessary.

The receiver worked and we were able to hear code from the lake ships, but it didn't seem to make any sense. We couldn't recognize any letters that were shown in the Scout manual. We were sure it was poor sending—much too fast! Unfortunately, the ARRL wasn't there to help us out!

Because we had no luck with the ship operators, we decided to get some Ford spark coils and see if we could hear each other from our houses.

After more leaf raking and mowing and more trips to MESCO, we could communicate with each other by picking each letter out of the book and transmitting at about two words per minute. At least we could understand each other, even if we couldn't copy the ship operators. We had no idea that the signals from our little spark coils were even getting out of town!

One afternoon, a blue truck with *US Navy* printed on its side and a diamond-shaped wire sticking out the top stopped in front of our house. A Navy officer got out of the truck, but before he came to our door he looked up at the antenna and examined the knife switch by the window. He said he wanted to see my father. I told him Dad wouldn't be home from his office for another hour. The Navy man went back to his truck to relax.

Something didn't seem quite right and I thought it best to find a safe place in the attic to hide the transmitting equipment, which at that time included a bicycle wheel with contacts on the rim for a rotary spark gap (it made a delightfully "professional" sound).

When my father, a retired naval officer, arrived home, the two men had a pleasant chat. My father loved the opportunity to tell the man about his days in the Spanish-American War on the *SS Monitor Jason*.

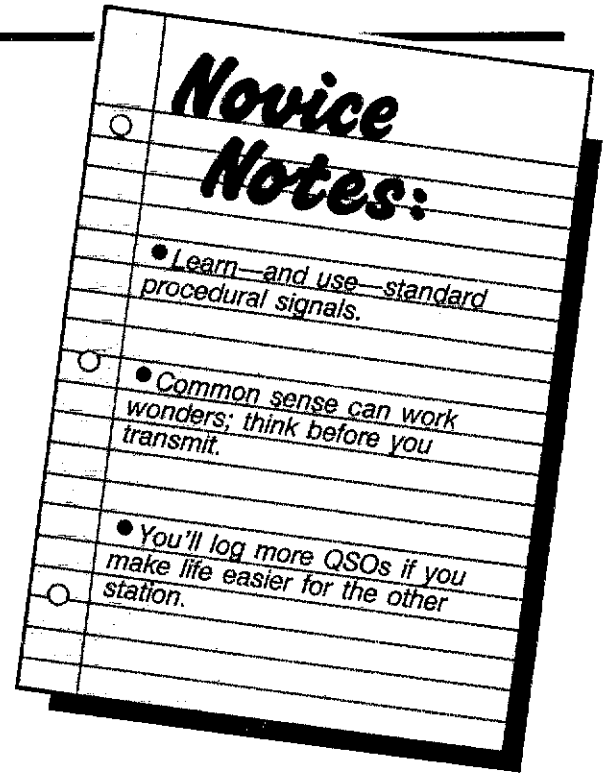
After their congenial chat, the officer asked to see his wireless equipment. My father explained that he knew nothing about any wireless equipment. It was his son's "toy." A trip to the room revealed nothing but a loose coupler, detector and a pair of phones. He explained that strong signals from this area were being heard at the Great Lakes Naval Station, 60 miles away.

While I'm sure he hadn't been fooled, he knew that he had made his point. Later, my father made his point to me, and that was very clear. "Don't ever use that stuff again!"

No more transmissions were made until years later when I had a son in high school and we got our licenses together. It was then that I actually learned the code properly—thanks to W1AW.

Your Novice Accent

Written in the days when the Novice license was in its infancy, this classic *QST* article (modernized a bit) provides solid CW operating info for all hams, Novice or otherwise.



This article, originally published in QST *in November 1956 (p 59), was widely distributed as a reprint. Before you acquire bad habits that will be difficult to break later, read how author Keith S. Williams, W6DTY, of Oxnard, California, now a Silent Key, explains how an inexperienced CW operator can make a smooth debut on the air.—Ed.*

A language is a means of communication. It is most efficient when all who speak it follow the same grammatical rules and pronounce its words the same way. Isolated groups of a given linguistic stock tend to develop differences in speech habits. They speak with different accents, follow different rules of grammar, the difference growing with continued isolation until each group finds it difficult to understand others even though all speak the same basic language.

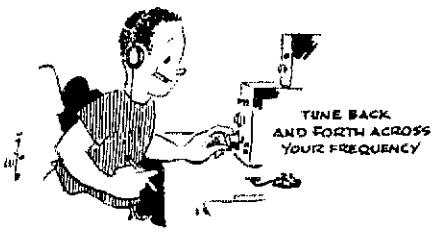
International Morse code is, in a way, a language. It has been efficient because all of us have followed the same procedure and used the same "English."

In pre-Novice days, an amateur launched forth in the mainstream and in short order lost his beginner's accent and was taken for a native. Now, on the other hand, many beginning CW ops start out on 80, 40, or 15 meters confined, by their Novice license, to band segments populated almost entirely by other Novices. They are the isolated linguistic group mentioned above. People speak a language with the same accent as those with whom they live and work. New hams pick up habits and operating procedures of the gang they chew the fat with.

It is easy to pick out a new operator on CW bands. His speed may be up to par and he may have an excellent fist, but his procedure is apt to be rather odd. He has difficulty in understanding just what is going on and his transmissions can be confusing to the general run of amateurs. Standard ham operating procedure has been established by years of usage. In many cases, it is established because it is the most efficient or intelligent way of doing it. In other cases, a certain procedure is used because it has always been done that way and everybody understands what everyone else is doing.

Tune Around

When you prepare for a session of brass pounding, don't be too hasty. It is not good practice to start calling CQ before you've checked out the band—take a few minutes to listen first. See what's going on near your own frequency and then tune back and forth a bit. More than once I've heard some good DX going to waste while the brethren are busy honking out CQs without, apparently, having listened more than two seconds after turning on the rig. Pick some station that is already calling CQ and answer his call rather than adding to the bedlam with a CQ of your own. On the remote chance that you hear no CQs, go ahead and try one.



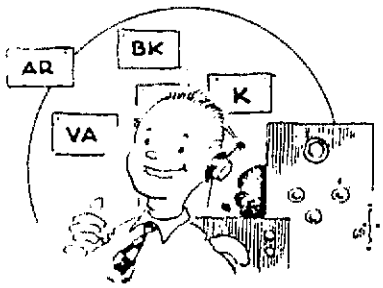
Two things are important: (1) Your receiver has a tuning dial; use it—it keeps corrosion from setting in and you may hear someone calling you slightly off your frequency. Many a time I've heard a Novice station call CQ time after time and be answered by stations slightly off frequency with no QSO resulting. If a fellow calls CQ, signs and says K, then starts another CQ in three seconds, you know he's not tuning to either side of his calling frequency. He just sits there like a lump, expecting a loud call exactly on his own frequency. He has few QSOs and he creates *beaucoup* QRM with his useless calling. (2) Don't make your calls too long. Contrary to your first impression, a long call does not attract eager prospects. Rather, just the opposite . . . the longer you call, the fewer the answers you receive.

People are a restless lot. After waiting through ten or twelve CQs, the average operator will lose patience and start looking for someone else. One night, by actual count I heard one Novice operator send 57 CQs before signing his call—this is pure madness! Make your calls short. With a little thought you will learn that if the other station hasn't heard you in fairly short order, he's probably not going to hear you at all.

Three-by-Three

A CQ pattern that has proved successful over a long period is the old three-by-three. Call CQ three times, sign your call three times and repeat the whole thing three times. Personally, I punch out four CQs, sign three times and repeat three. This is sufficient and results have been satisfying. When answering a CQ, make your call as short as conditions warrant. For instance, on 40 meters, on a weekday morning about ten o'clock, you hear W6DTY calling CQ with practically no activity on the band, you only need call once, sign your call three

times and you're in. On the other hand, when QRM is heavy, make your call somewhat longer because it takes a receiving operator longer to comb through the mess. Make the length of your call suit conditions.



KNOW YOUR OPERATING SIGNALS AND USE THEM PROPERLY—

Don't fall into the habit of expecting all call signs to begin with K. There are hundreds of other call prefixes in use throughout the world. Once I heard WH6AWU call CQ half a dozen times on the 40-meter Novice band, putting in an S9 signal. Now, while most Novices would dearly love to work the Hawaiian Islands, no one answered until finally some poor soul came up calling W5BAWU!

Procedural Signals

Many Novices misuse the procedure signal DE. DE means "from" and it is sent only once before each series of a call sign. Do not repeat it before each transmission of your call sign in a series. It is common to hear something like this: CQ CQ CQ DE KA6ZZZ DE KA6ZZZ DE KA6ZZZ CQ . . . and so on. This is not good practice. Under poor receiving conditions, it is confusing to the receiving operator who is trying to make out your call letters. The extra DE throws him every time.

When you sign for the last time on a CQ, don't be fancy. Just send the procedural signal K. This invites anyone who heard your CQ to answer. Do not send $\overline{AR}$, by itself or followed by K. When making calls, $\overline{AR}$ is used only when you have called another station but are not yet in contact with him. $\overline{AR}$ is a procedural signal sent as one character, di-dah-di-dah-dit. It is not sent as the two separate letters A and R. Examples of standard procedure are (1) CQ CQ CQ DE KA6ZZZ KA6ZZZ KA6ZZZ K, and (2) WA4YYY DE KA6ZZZ KA6ZZZ KA6ZZZ $\overline{AR}$.

When you have established contact, there are certain preliminaries you should get squared away before you begin discussing the weather. At the beginning of a QSO, on the first transmission from the other station, the other operator is interested in two pieces of information first. He wants to know how his signals are being received and where the other station is located, in that order. Most operators want to know the other fellow's name, but that is third in importance. Until recent years, all hands were happy to be called OM or OB and nobody cared what your name was. Giving the signal report, location and name, in that order, has become standard throughout the world and is always sent first, prior to everything else. It saves time and avoids confusion if you follow that standard. Example: WA4YYY DE KA6ZZZ R GE OM ES TNX FER CALL $\overline{BT}$ UR RST 579 579 HR IN PODUNK PODUNK CALIF $\overline{BT}$ NAME IS BILL BILL $\overline{BT}$ RIG HR. . . and so on. Once the preliminaries are out of the way, proceed with the QSO as it may develop. Rag chewing is lots of fun.

Abbreviations

Ham radio is full of abbreviations. There is good reason for this. It saves time. You can say more with less wear and tear on the key. A great many abbreviations are standard the world over. You'll find them listed in *The ARRL Operating Manual*. Don't go overboard, but learn to use the universally understood shortcuts in operating. A good example is "and." This is a word heard only on the Novice bands. Learn to send ES instead of "and." It's standard practice; it's quicker and easier to send. While you're at it, learn the proper use of abbreviations. If in doubt, look them up!

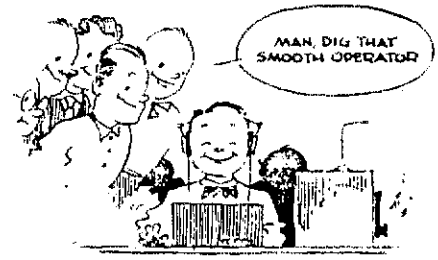
Signals for period and comma were practically never heard on the ham bands until Novices got going. They are still not all that popular. You may need to know them to pass a code examination, but they are clumsy and awkward in ham communications. All punctuation can be handled by the question mark and by the signal $\overline{BT}$ (dah-di-di-di-dah). What do you need with a comma? Nothing! Don't bother to use it. Anyway, some of the old-timers might not recognize it (unless they thought it meant an exclamation mark, which is what it used to stand for way back when). Most Novices send a comma between the name of their town and the name of their state. This is a waste of time and effort. No punctuation is needed there at all. Forget the lengthy, time-consuming period. Just use the long break sign $\overline{BT}$ between sentences or thoughts. It is much easier to send and sounds smoother.

When you sign over to the other station, make it quick and easy and use one of the standard methods. I have heard Novices say . . . NOW I AM TURNING IT BACK TO YOU SO HERE IT COMES . . . . Long-winded guff is okay in its place, but it shouldn't become a habit on CW. Some are now sending . . . SO BK TO YOU . . . . This is an improvement, but it's not universally understood because BK means *break*, not *back*. All you need to say, really, is HW? That signal, short for "How Copy?" indicates to the other fellow that you are through for the moment and are about to sign over to him.

If it's your last transmission, it is customary to part with a certain amount of goodbye wishes. Don't drag it out into an absurdity. Haven't you heard someone send: WELL BILL NOW I MUST QRT AND WISH YOU MANY 73S 73S TNX FOR THE SWELL QSO BILL AND 73S BEST OF LUCK AND LOTS OF DX AND BEST WISHES TO YOU AND THE FAMILY SO 73S AND I WILL SEE YOU AGAIN SOON BILL 73S . . . ? All you have to say after you've told Bill you must QRT is something like this: TNX QSO OM 73 GN $\overline{SK}$ WA4YYY DE KA6ZZZ. Note that it is not necessary to add an "s" to 73. By itself 73 means "best regards." If you say 73s, you are, in effect, saying "Best Regardses," which is just plain silly.

More Procedure

Now, some additional words about correct procedure when signing over to the other station or when ending a QSO. It's simple but much confusion is evident. When you are turning the QSO over to the other operator, you proceed as follows: SO HW? $\overline{AR}$ WA4YYY DE KA6ZZZ K. The $\overline{AR}$ indicates that you are through for the time being. The K says, "go ahead and transmit to me." Incidentally, there is a variation of the K signal. You may have heard it and wondered what it meant. I'm referring to the procedural signal $\overline{KN}$. This signal indicates that you're engaged in a QSO, that you are inviting the other operator to go ahead with his transmission and you do not wish a third station ("the breaking station," so called) to interrupt by calling either of you. This signal was originated as an aid in DX operating. It is definitely not a substitute for the plain signal K. I have heard Novices end a CQ with $\overline{KN}$. This is obviously simple-minded. Translated to English it means, "I am calling a CQ, a general call, inviting anyone to answer, but please do not call me!"



When ending a QSO, use the signal, $\overline{SK}$. This is easy. $\overline{SK}$ is never the last signal sent. The last item is either your call sign or the letter K. If you have made your last transmission but will stand by for the other station's closing remarks, send: 73 ES CUL GN $\overline{SK}$ WA4YYY DE KA6ZZZ K. The $\overline{SK}$ indicates that you have made your last transmission. If you have completely finished the QSO and wish to remain open for business, you just naturally don't put anything at all after your call. If you intend to "close station" and hit the sack you should indicate this by adding the signal CL immediately after your call. Listening operators are thus informed that you will not be in the market for another QSO. It saves them needless calls.

CW operating procedures are fixed by long usage and in part are called for by law. The correct procedure is just as easy to learn and use as is the Sloppy Joe type. If

you are just starting on your ham career, you might just as well start right. Bad habits are difficult to break. If you find it hard to remember what to send and when to send it, make up a sheet with standard forms and keep it on your operating desk. Refer to it when in doubt; soon your procedure will be automatic. Once learned, it isn't forgotten.

Miscellaneous

Being long-winded, I don't mind adding a few items that can be classed as miscellaneous (or, The Bleatings of an Old Goat). First on the agenda is an ancient complaint about birds who come back with R when they have copied only part or perhaps nothing at all of your last transmission. This particular scream of mingled rage and pain has been heard since Marconi first sent three dots across the Atlantic. You'd think that, after all these years, the R-for-Roger pest would have become extinct, but it is not thus. Every day, some fellow manages to come back to you with something like this: WA4YYY DE KA6ZZZ R R R OK OK BUT PLEASE REPEAT MY REPORT AND YOUR QTH ALSO MISSED YOUR NAME AND DID NOT COPY YOUR LAST QUESTION IN THE QRM. The simple fact is, if you send R, you are indicating that you copied solid everything the other operator sent. Do not send a single R if you missed any part of his transmission. Just send a break sign, BT, after your call when you go back to him, if you missed anything, and tell him what you missed. There is nothing more exasperating than to hear R BUT MISSED EVERYTHING OM.

In connection with this business of receipting (R), one other point might be mentioned. If you have copied the other fellow's transmission solid and have so indicated by R when you go back to him, he can be expected to have sense enough to know that you got what he sent. Therefore it is a waste of your time and his to go through this rigmarole of OK ON THIS, OK ON THAT, OK ON YOUR RIG, OK ON YOUR WX, OK ON YOUR DOG HAVING JAUNDICE, etc. Just proceed with your remarks and comments. If he asked a question, answer it. If he made a statement that requires no answer, make no answer. It's simple.

Sloppy Sending

Topping the list of the Ten Most-Wanted in ham radio is the ham with the sloppy fist. He makes life a horror for those who try to copy him. He has no idea how many dots he's sending—he just throws in plenty so that you can take your pick. He runs letters and words together or, just the reverse, he separates parts of letters and chunks of words. He sounds as though he's using a loose toggle switch for a key and sending in Japanese. On top of all this, he fouls up his spelling and procedure continually and fills the air with strings of dots to indicate errors. Some operators (?) go on for years blithely unaware that their fists are bad. They may even fancy themselves as artists on the key. They get huffy if anyone suggests that they are not 100% readable. They believe the receiving operators need a little practice. If you're one of these boys, you are probably a hopeless case. If you know that your sending leaves something to be desired and you're sincerely interested in developing a readable fist, however, you can cease worrying—it's simple. Just practice sending. But not on the air.

CW operating can be pleasant and easy. It's not, as often averred, a lost art. You're welcome to dive right in and flail away at the old brass pump handle. But, please, use genuine international Morse and standard procedures! It will make life a pleasure for you and your contacts. QST

Strays

CAAR RACES AHEAD IN NEW YORK CITY

The Council for the Advancement of Amateur Radio in the New York City Schools was established in 1986. Its main purpose is to foster Amateur Radio activities in the New York City public school system. As anyone who has tried to bring Amateur Radio to a school can tell you, it can be a lonely and frustrating process to convince a school administration to support or even allow such a program. The CAAR/NYCS has been working so each of us doesn't have to go it alone. We have succeeded in getting funding from the New York City Board of Education for *You're on the Air; Amateur Radio in the School Curriculum*, a guide to assist teachers in using Amateur Radio in various subjects in kindergarten through 12 grade (copies are available for $6 from the NYC Board of Education, Curriculum Publications, 131 Livingston St, Brooklyn, NY 11201, tel 718-935-3990).

CAAR/NYCS members share experiences, problems and successes. A means has been established for having antennas installed on school buildings with a minimum risk to the ham/teacher. In 1989, the CAAR/NYCS started holding joint Field Day operations to improve the diversity of experience for staff and students. As part of the activities, several of our member groups have made contact with other school groups outside New York City and maintain regular contacts via phone nets, schedules and packet. Several have students in regular packet pen-pal relationships. Membership in CAAR/NYCS is open to anyone interested in helping to enhance Amateur Radio in education. Send inquiries to CAAR/NYCS, c/o Lew Malchick, N2RQ, Brooklyn Technical HS, 5 Elliott Pl and Dekalb Ave, Brooklyn, NY 11217.—*Lew Malchick, N2RQ*

PLEASE, DON'T EVERYONE CLIMB UP AT ONCE!

Norm Carignan, W1LKH, of Providence, Rhode Island, found his friends eager to assist when he asked local hams for support while installing his new tower. John Szelka Jr, A1IK, of Johnston, Rhode Island, volunteered to do the climbing while this support crew vigorously observes from below. Tactical ground "supervisors" are (l-r) Henry Tomaszewski, NB1V; George Bowder, KC1C; Armand De Fusco, W1WKO; Peter De Quattro, W1VDI; "crew chief" Norm, W1LKH; and Vincent Blas, N1BUA; standing by to be sure it gets done right. It's a rough job, but somebody's got to do it! *(W1NEH photo)*

SB-220 is of no value, because your rig can't overdrive the amplifier.[16]

Operation on the 12- and 17-Meter Bands

One of the main problems with using older-design, ham-band-only amplifiers on the 12- and 17-meter bands is choke fires. Here's what happens: When a high-voltage RF choke is operated at or near one of its series-resonant frequencies, an extremely high RF voltage appears across the choke. This voltage can easily exceed four times the supply voltage, and can cause the insulation on the choke windings to break down and ignite. Amplifier manufacturers are careful to design RF chokes so that no resonances occur near the bands on which the amplifier is designed to operate, but the SB-220 was designed years before we acquired the 12- and 17-meter bands at WARC-79.

To prevent choke fires, all operating frequencies should be more than 5% away from any of the choke's series-resonant frequencies. The SB-220 operates well on the 12- and 17-meter bands because, fortunately, its HV RF choke doesn't have any series resonances below 40 MHz.

If you use a transistor-output transmitter to drive an SB-220, the amplifier's tuned input circuits for the 10- and 15-meter bands should be optimized for this purpose. (More on this later.) The only potential problem associated with 12- and 17-meter operation with the SB-220 is the increased current burden on the output band switch.

Here's why: In order for the amplifier to tune to the new frequencies without increased output-circuit inductance, the tuning and loading capacitors must be adjusted for about 35% more capacitance than optimum for the band-switch settings involved (15 m for 17-m operation, and 10 m for 12-m use). This increases the operating Q of the output π network by about 18%, which increases the RF-circulating current in the band-switch contacts by the same factor. Because power is proportional to the square of current, the increase in band-switch-contact dissipation is 1.18^2, or 1.39—a 39% increase in the power (heat) dissipated by the band-switch contacts.[17]

This is unlikely to be a problem for normal SSB operation without speech processing. For higher-duty-cycle operation, the amplifier should be switched to the lower-voltage **CW/TUNE** position in order to reduce the average heat dissipation in the output-band-switch contacts during operation on 12 and 17 meters.

Improving Input SWR

The tuned input circuits (Fig 6) in the SB-220 typically exhibit a maximum input SWR of about 1.9:1 (referenced to 50 Ω resistive). This is satisfactory when tube-output radios (and some solid-state rigs, such as those with internal antenna tuners) are used to drive the amplifier. Nowadays, though, transistor-output rigs with high-SWR protection are used extensively. Many transistor-output radios are so particular that they begin to cut back output when operating into a reactive load with an SWR as low as 1.2:1. Translation: The amplifier will not receive full drive power unless it has a very low input SWR. On many bands, this is the case with stock SB-220s. For those bands where this isn't the case, fortunately, the input SWR can be easily improved.

The job of a tuned input circuit is more complicated than just matching the input resistance of the amplifier tubes to 50 Ω. Here's why: The instantaneous input resistance of a class-B grounded-grid amplifier fluctuates wildly during the voltage swings of the sinusoidal input signal. When the input cathode voltage swings positive, the grounded grid looks negative with respect to the cathode, the tube is completely cut off; thus, the input resistance is nearly infinite. During the negative input-voltage swing, the grid looks more positive and a large current flows in the tube—the input resistance is very low.

For example, when the voltage driving a pair of 3-500Zs peaks at −117 V, the anode current is at its peak, the instantaneous anode voltage is swinging to its lowest point (about +250 V), and the total cathode current is 3.4 A.[18] Thus, the driving resistance at this point, R_{in}, is −117 V ÷ 3.4 A = 34.5 Ω and, incredibly, P_{peak} = −117 V × 3.4 A = *397 W*.

Thus, the resistance swings from nearly infinity with positive driving voltage, all the way down to 34.5 Ω.[19] The drive-power requirement varies from 0 W to 397 W over the positive and negative travel of the input signal! This is *not* the type of load that makes for contented transistor-output transceivers.

During the positive input-voltage swing, there is virtually no load on the driver, so the input circuit must store the drive energy until it is needed the most: during the negative input-voltage crest. Thus, the tuned input circuit's job is to act as a flywheel-like energy-storage system—*and* as a matching transformer.

Circuit Q is like the inertia of a flywheel. More Q makes for a better RF flywheel, which does a better job of smoothing the wild swings in input resistance. This results in a stable, lower input SWR. The trade-off is that higher Q means less bandwidth.

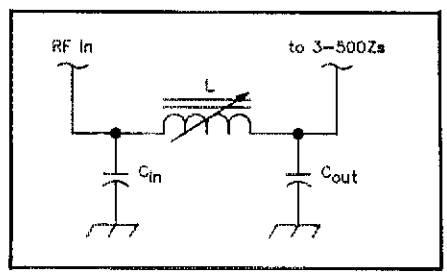


Fig 6—A typical SB-220 tuned input circuit. Changes in circuit Q, required for best amplifier-input SWR, are made by increasing C_{in} and C_{out}, and by removing turns from L.

With a too-high Q, the input SWR may be nearly 1:1 at the center of the band, but too high at the band edges. Thus, a compromise must be made.

Eimac® recommends using a Q of 2 for the tuned input circuits in a grounded-grid amplifier. As I will show, the SB-220 uses a Q of only about one. This is why the stock SB-220's input SWR is less than wonderful. (The SB-220 isn't the only one: Other commercial amplifiers designed in the era before transistor-output transceivers were common also used a Q of 1 *or even less.*)

Circuit Q is the ratio of the tuned input circuit's input resistance (50 Ω) to the reactance, in ohms, of the input capacitor ($X_{C_{in}}$). For example, in the SB-220, the 40-meter input capacitor (C42) is 470 pF. The reactance of C42 ($X_{C_{in}}$) at 7.15 MHz is $-j$47.4 Ω. Thus, the SB-220's input-circuit Q at 7.15 MHz is 50/47.4 = 1.05.

When the Q of a tuned input circuit is too low to start with, no amount of output-network adjustment can bring the input SWR down to an acceptable level. Improving the input SWR of an SB-220 is simple: increase the Q by decreasing $X_{C_{in}}$ in the tuned input circuits. Because X_C is inversely proportional to C, this means more C_{in} is needed.

The resistance-matching ratio of a tuned circuit like that shown in Fig 6 is quasi-proportional to the X_C ratio of C_{in} to C_{out}. If C_{in} is increased to increase circuit Q, C_{out} must also be increased to maintain the same resistance-matching ratio. (In this case, that ratio is 50 Ω to 69 Ω.) Increasing both capacitances lowers the operating frequency of the tuned input circuit, so L must be decreased to bring the operating frequency back up to where it started. This can be accomplished by removing turns from the inductor and/or by adjusting the inductor's tuning slug.

Keep in mind that the matching ratio of a tuned circuit like the one shown in Fig 6 cannot be changed by adjusting the inductor alone. At least *two* component values must be adjusted to change the matching ratio of such a circuit.

Another factor that affects SB-220 input SWR is inductor Q. Higher inductor RF resistance corresponds to lower Q and worse SWR. Smaller wire has more resistance than larger wire, so it's important to use adequately large wire for these coils. As frequency increases, skin effect becomes more predominant, resulting in increased wire resistance. To compensate for this, the wire diameter must be increased in proportion to frequency.

For example, in a tuned input circuit operating at 1.8 MHz with 100 W of applied RF, the wire should be at least no. 24. At 29 MHz, no. 16 or larger wire is appropriate. In general, you can't go wrong by choosing a larger-diameter wire—unless it won't fit on the coil form.

A Q of 2 is usually slightly more than optimum if you need to cover a large frequency spread with a single input circuit. Prime examples are coverage of 3.5 to

4 MHz and 18 to 21.5 MHz (so that the 15-meter tuned input circuit also covers the 17-meter band). In these cases, a Q of about 1.5 should be used. This also applies to a 10-meter tuned input circuit if the amplifier will be used on the 12-meter band.

A Q of 1.5 corresponds to a reactance of about 33.3 Ω ($X_{C_{in}}$ = 50 Ω/1.5 = 33.3 Ω) for C_{in}. At 3.75 MHz, this requires a 1275-pF capacitor.[20] (The nearest standard value is 1300 pF.) Of course, capacitors can be paralleled to arrive at the desired C.

Measuring amplifier SWR is a very vague science. For example, different SWR meters give different readings in the same circuit! Changing the length of coax between the SWR meter and the amplifier can also change the indicated SWR. Another complication is that modern transistor-output transceivers, in order to maintain clean output signals, generally use a set of switched, 1.5-octave output filters. At the extremes of such a filter's passband, such as at 29 MHz, the filter can introduce reactance into the transmission line. This reactance can cause some peculiar results when you're trying to optimize the SWR of an amplifier's tuned input circuits.

For those who can do so, the easiest way to avoid this problem is to use a tube-type exciter when optimizing the SB-220 input circuits. The exciter must be tuned for maximum power into a 50-Ω termination, and then should not be retuned during adjustment of the input network's inductance and C_{out}. Retuning the exciter may introduce a reactance that will affect the indicated SWR.

If the tuned input circuit's Q has been increased by increasing C_{in} and decreasing L, C_{out} will also need to be increased. The easiest way to find the new (higher) optimum value for C_{out} is by inserting a trimmer in parallel with the stock C_{out}. Then, with the maximum peak drive power applied, alternately adjust L and C_{out} for the best match at the center of the band. C_{out} can then be removed, its capacitance measured, and a fixed capacitor of that value permanently installed in its place.

Adjusting the amplifier's tuned input circuits is much easier with the front panel removed, but the meter leads need to be lengthened to facilitate this. Also, a chassis-ground wire must be added between the panel and the amplifier chassis so that the multimeter will function when the panel is separated from the rest of the amplifier.

If the amplifier is driven with a continuous carrier, considerable stress is placed on the HV power supply, and the RF compartment becomes very hot. This stress can be reduced if the driver is set to the CW mode and keyed with a string of 50- to 60-WPM dots. The amplifier's current-meter readings should be approximately doubled to determine the actual current (meter inertia affects the readings, though, so this technique can't be used for exact measurements).

It's very important to avoid contacting the nearby HV feed-through insulator while you're adjusting the input networks. Doing so could result in your untimely appearance in Silent Keys. A reasonable way to avoid this is to use insulated tuning tools and to stand on a plastic mat with one hand behind your back during tuning. It's also advisable to wrap some 1-inch (25 mm) plastic electrical tape around the nuts on the HV feed-through insulator before plugging in the amplifier.

If you would prefer not to work around lethal voltages, you can adjust the tuned inputs without applying high voltage to the anodes of the 3-500Zs. Here's how:

1. Make the appropriate changes in the tuned input circuits with the amplifier unplugged (removing the inductors for modification is described shortly).

2. Disconnect the red secondary wire of the HV transformer from the rectifiers. Insulate the loose wire.

3. Reconnect the amplifier to the electric mains, key and drive the amplifier with about 5 W initially.

4. Observe the grid-current meter and apply only enough drive to obtain 250 mA or less grid current.

5. Adjust L and C_{out} for the best SWR.

This method is not as accurate as the full-power adjustment method, but it is safer. Table 1 shows the optimum values I found for the tuned inputs, using the full-power adjustment method. Other experimenters have reported finding slightly different optimum values, especially on 10 meters, so the best values for your amplifier may be slightly different than those listed in Table 1.

Table 1

Starting Points for Optimizing the SB-220's Input Networks

Band	C_{in} (pF)	L (turns removed)	C_{out} (pF)
80 m	2 × 680	4	1300
40 m	820	4	680
20 m	360	1	270
15 m	270	2	180
10 m	180	2	130

Notes

1. This amplifier did not have a pair of series-resonant RLC parasitic suppressors (25 pF/1 Ω) from the cathodes to ground. (These parts are supplied with some of my retrofit kits.) If these suppressors are installed in your amplifier, subtract 50 pF from each C_{out} value shown.
2. This amplifier was equipped with two 10-Ω (5 Ω net) cathode resistors (R_C). (See R. Measures, "Amplifier-Driver Compatibility," *QST*, Apr 1989, pp 17, 18, 20.) These resistors increase the input resistance of the 3-500Zs by about 8%.
3. The ALC circuit had been removed from this amplifier. This slightly reduces the load capacitance on the tuned input circuit.
4. The capacitors are 500-V mica units.

Removing the Tuned-Input-Circuit Inductors

It's much easier to remove turns from the inductors when the inductors have been removed from the amplifier. The inductors are fastened to the chassis by two spring tabs in the base of each inductor. When the inductor base is pushed through its mounting hole, the spring tabs are compressed as they pass through the hole. After passing through the mounting hole, the tabs spring out and lock in the inductor base.

To remove an inductor, both spring tabs must be compressed. The upper spring tab can be easily compressed with a screwdriver blade; the lower tab is difficult to reach without a special tool.

I made this tool out of 1/8-inch-diameter piano wire, which can be purchased in 36-inch lengths in many hobby shops. Here's one method of making the tool: Using a bench grinder or a hacksaw, cut off about 12 inches of wire. With a pencil-point flame from a propane torch, heat a spot on this 12-inch piece about an inch from one end of the wire, and when the metal is glowing red, grasp the end near the flame with pliers and bend an 85° angle in the wire. Let the thing cool.

The long end of this wire tool is the handle. Hook the short end under the inductor base and pull straight up to compress the lower spring tab.

Adding 160-Meter Coverage to the SB-220

Unfortunately, a number of technically unsound 160-meter conversions for the SB-220 have been published. Most of these conversions unnecessarily discard the original filament and/or HV RF chokes and ignore RF-design rules. A better 160-meter conversion can be found in January 1989 *QST*.

Conclusion

The Heath SB-220, and its younger cousins, the SB-221 and HL-2200, can provide many years of trouble-free service. All they need from their owners are a few circuit improvements, annual cleaning and regular fan oiling. If you have questions or comments about this or any of my articles, feel free to telephone me at 805-386-3734.

Notes

[14]In later models, the grid-to-chassis capacitors were changed to 115 pF.

[15]If you would like a copy of the original, 6340-word unedited, unexpurgated article with three pages of diagrams, which contains corrections and a better list of parts suppliers than the *HAM RADIO* version, I'll send you one for $2 (postpaid) via First-Class mail. For overseas airmail delivery, add $2.

[16]For more information, see R. Measures, "Amplifier-Driver Compatibility," *QST*, Apr 1989, pp 17, 18, 20.

[17]During use, the metal in the contacts gets hotter because of the increased current. This probably increases contact resistance, and thus, contact dissipation probably increases by more than 39%.

[18]At the instant of peak current, the grid current per tube is about 0.5 A, and the anode current per tube is about 1.2 A. Thus, the peak cathode current is 1.7 A per tube. This represents a meter-indicated anode current of about 800 mA for two 3-500Zs.

[19]The average input resistance for a pair of 3-500Zs is twice this value (about 69 Ω).

[20]The capacitors used should be 500-V silver-mica or 1-kV ceramic NP0 units.

A Portable QRP CW Transceiver—*Part 1*

Here's a small, inexpensive transceiver suitable for just about any outing. Designed for 20 meters, it's adaptable to other bands.

By Gary A. Breed, K9AY
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Littleton, CO 80122

Colorado and QRP-portable ham radio are made for each other. Camping, backpacking or just picnicking can be even more fun when you relax with a rag chew or chase a little DX with an antenna strung in a tree. The Arapahoe Radio Club, of which I'm a member, has an annual mountaintopping event where several of us climb 14,000-plus-foot peaks and operate 20-meter QRP stations. (The 14,000-kHz band, of course!) These "fourteeners" expeditions were the reason I first started working on this rig.

I designed this transceiver because I needed a portable 20-meter CW rig for these mountain outings. Then I made a list of features needed for unusual operating locations on this busy band. These items got top priority:

- A single-signal receiver.
- Transceive operation and VFO tuning.
- AGC for listening comfort.
- 5 watts output.
- Semi-QSK TR switching.
- CW sidetone.

Of course, there are always features that can be deemed "nice, but not absolutely required." I kept these in mind as development progressed:

- Design adaptable to other bands.
- A signal-strength meter.
- Best possible receiver performance.
- Operating conveniences (RIT, metering, digital display, etc).

Most of these features are included in the final design.

This project began as a one-time effort to make a single rig. As its development progressed I added two more priorities at the top of the list: The transceiver had to be easy to build, and it had to be available to other hams.[1]

In this article, I'll cover the details of the receiver. Part 2 will cover the transmitter section and interconnecting the transmitter and receiver.

The Receiver Circuit

At the heart of the receiver is a multifunction VHF FM receiver IC, the Motorola MC3362. This chip provides all the functions of a complete dual-conversion superhet VHF FM receiver, requiring no other active devices except an audio power amplifier (see the block diagram in Fig 1). The MC3362 has two oscillator/mixer sections with buffer amplifiers at the outputs, a six-stage limiting amplifier, quadrature detector, RSSI (received-signal-strength indicator) output, and a comparator for use in data reception. I breadboarded a few designs with this chip to determine how it performs at HF for CW and SSB. Performance is good, and I was amazed at the simplicity of the external RF circuitry requirements.

The receiver schematic is shown in Fig 2. Starting at the antenna input, a double-tuned preselector provides input selectivity. The coupling method uses tapped capacitors instead of the more common link or tapped-coil approach. I chose this method so that shielded, slug-tuned inductors could be used for easy construction and repeatable performance. Light coupling is used between the two parallel tuned resonators. With only a narrow band to cover, a sharply peaked response is desirable.

The capacitors in the parallel tuned circuits are selected so that the total capacitance (in series) resonates with the coils, while the ratio of capacitance matches the 50-Ω antenna impedance and the 200-Ω input of the MC3362 (U1). The same formula used for tapped coils yields the appropriate capacitor-value ratio:

$$C1/C2 \text{ or } C3/C4 = \sqrt{(Z_{in} \div Z_{out})} \quad \text{(Eq 1)}$$

At 20 meters, the circuit's loaded Q (about 32) and the reactance of the resonating elements (125 Ω) result in an impedance across the coils of around 4 kΩ, requiring a 0.11 ratio for C1/C2 and 0.22 for C3/C4. I selected standard-value capacitors close to this ratio, and I modeled the circuit using a network-analysis program.[2] The result is a filter with a −6-dB passband of 13.4 to 14.3 MHz and a low input SWR.

The mixers in U1 are the doubly-balanced Gilbert-cell type used in virtually all IC mixers (like the MC1496, SL6440C and NE602). The first mixer is internally connected to a unique differential oscillator that has on-chip varactor tuning diodes. The oscillator requires only a parallel tuned circuit to operate. That's all—just one capacitor and one coil. Tuning is accomplished by adjusting the voltage at the junction of the varactors. VFO construction is typically quite critical, but almost anyone can build this simple VFO.

The VFO is tuned using a voltage taken from a +6-V bus that's stabilized by a 78L06 regulator (U5). Frequency increases with tuning voltage, but according to a nonlinear function. Two resistors are used to set the tuning range: R1 limits the upper range and R2 avoids operation at zero volts, keeping the tuning control in the most linear range. The varactors have a

[1]Notes appear on page 47.

linear range of only about 5 pF, so the tuned-circuit LC ratio determines how wide the tuning range will be. The varactors don't exhibit great temperature stability, so a smaller tuning range (high C) gives the best stability.

Two pots do the tuning. One serves as the main tuning control, covering about 50 kHz from end to end. This tuning rate is too fast for me, so I added a second pot as a fine-tuning control. It allows ±2-kHz adjustment. Smaller tuning ranges could be covered with a single tuning pot. It's possible to use a vernier drive and a single-turn pot in this application, but most inexpensive verniers have a lot of backlash, and better ones would dramatically increase the cost.

The mixer is followed by a buffer amplifier whose output goes to a four-crystal filter. The filter is of a Cohn design described by Wes Hayward, W7ZOI.[3] For this filter, I selected four 8.0-MHz microprocessor crystals from the same manufacturing lot, with oscillation frequencies within 25 Hz of each other. I then chose capacitors to obtain about a 400-Hz-wide −3-dB passband (I like narrow filters). The impedances of the buffer stage output and next mixer input are 180 and 330 Ω, respectively, which are in the ballpark range for the Cohn filters. I didn't attempt any additional impedance matching. Some operators may prefer a wider bandwidth, such as 600 to 800 Hz, and might try 220-pF capacitors in the filter. Details on selecting appropriate capacitors are given in Hayward's article.

The second mixer stage in U1 is used as the product detector, and its associated oscillator serves as the BFO. This oscillator is a conventional Colpitts type. Because the active devices involved are biased internally, the crystal and feedback capacitors at pins 3 and 4 of U1 are the only external components required. The 8-MHz BFO crystal is from the same batch as the filter crystals, "rubbered" with a trimmer capacitor to 800 Hz above the center of the filter passband to get the desired CW beat note.

The product-detector output goes to the audio stages. None of U1's other functions are used. If desired, the limiting IF can be used as an audio amplifier or a second low-frequency IF (it's good up to about 500 kHz), and the quadrature detector can be pressed into service as a product detector, or can be latched in its on state to pass audio. Although these functions would be useful in a minimum-component design, I didn't use them in this receiver.

The audio stages provide three functions: bandpass filtering, AGC and power amplification. Two sections of an LM324 quad op amp (U2A and U2B) are used as an active filter with two low-pass poles (1200-Hz cutoff), and two high-pass poles (600-Hz cutoff). I chose this high-pass/low-pass combination because of its excellent ultimate rejection, and to avoid the ringing that occurs in most narrow bandpass filters. Scaling the capacitor values in these filter sections allows use at other bandwidths, such as 2.7 kHz (300 to 3000 Hz) for SSB.

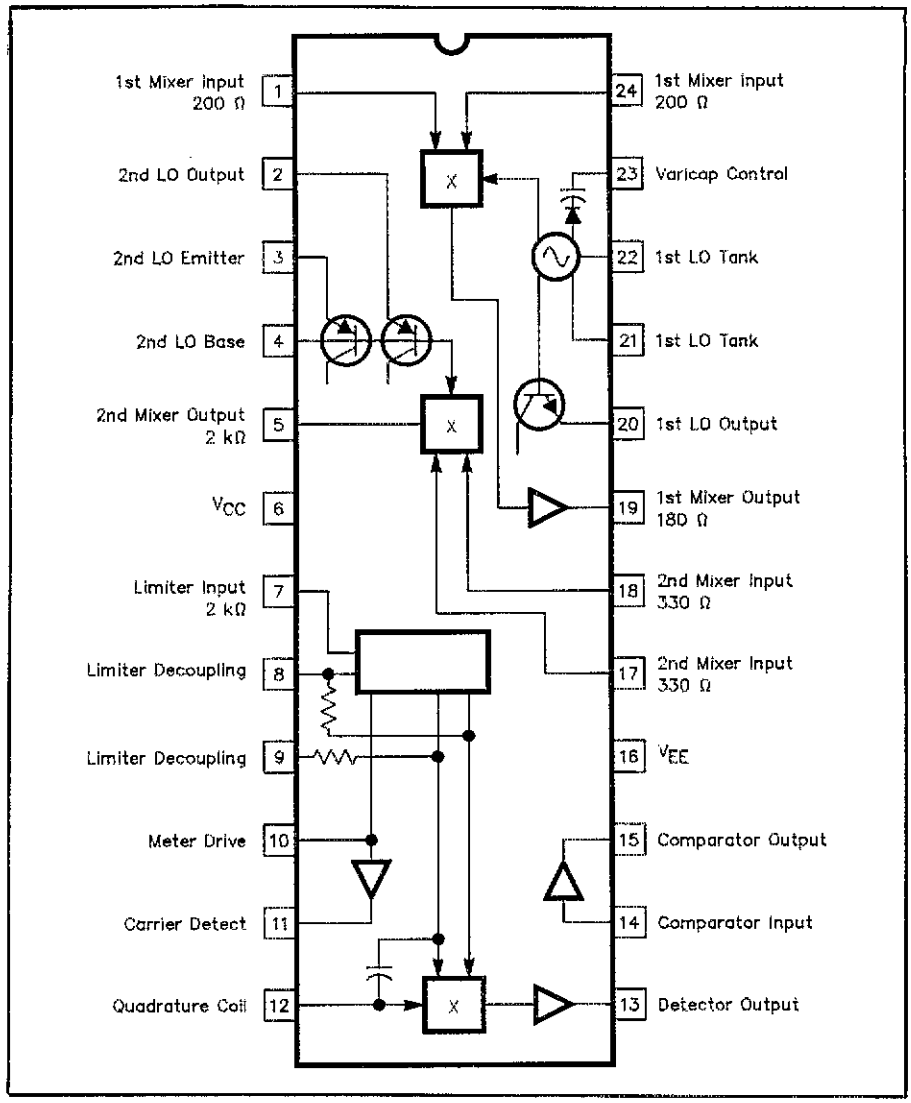


Fig 1—Pinout and block diagram of the MC3362 receiver IC. Input and output resistances are indicated for the ports of the MC3362's two mixers.

An MC3340P audio-gain-control IC (U3) is used with U2C and U2D as an AGC circuit. I have used this basic design previously[4] with good results, and have refined the gain distribution and dc levels for smoother operation. One op-amp section amplifies U3's output and isolates the AGC rectifier from the audio path. Another op amp serves as a dc amplifier that drives U3's gain-control pin and the S meter.

The low output impedance of the buffer (U2C) allows a fast attack time by rapidly charging the 470-kΩ/4.7-μF resistor/capacitor time-delay circuit. The high input impedance of the following dc amplifier (U2D) follows the natural decay time of the RC network, giving a fast-attack, slow-release AGC. The attack time is slow enough to be audible on the first code element of a strong signal, but a fairly long decay time eliminates much subsequent popping until the signal ceases long enough for the RC network to discharge. The AGC control range is 50 dB or more.

The 2.7-kΩ resistor at pin 2 of U3 sets the no-signal gain, and is chosen so there is a bit of linear range before the onset of AGC action. (This keeps the receiver quiet when it's tuned between stations.) Receiver muting is provided by applying +12 V to U3's gain-control pin through an isolating resistor, pulling gain to minimum. The resting potential at the op-amp output is around 0.8 V; a 1N4148 diode in series with this output eliminates the offset. A surplus 200-μA meter serves as an S meter.

A conventional audio power amplifier, using an LM386 (U4), is included. The keyed sidetone from the transmitter is fed to U4 *after* the AGC and AF-gain control, so its level is unaffected by their actions.

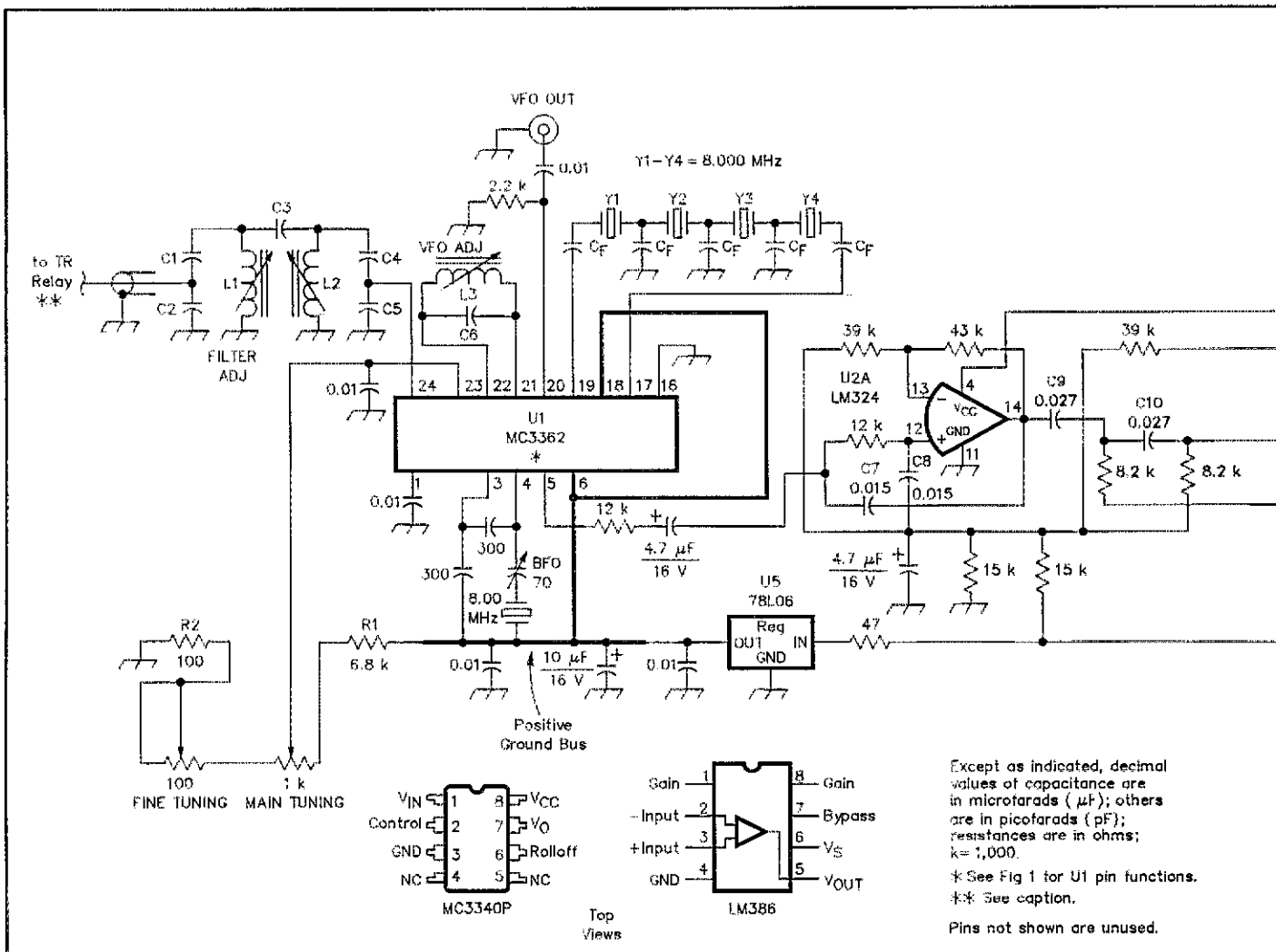


Fig 2—Circuit diagram of the receiver. Values shown are for 20-meter operation. Capacitors are disc ceramic unless noted otherwise. The following lines connect to the transmitter (to be described in Part 2): to TR Relay, VFO OUT, Sidetone In, Mute.

C1, C4—100 pF.
C2—820 pF.
C3—2.5 pF.
C5—560 pF.
C6—470 pF, silver mica or NP0.
C_F—300 pF (see text).
L1-L3—1.4 µH nom.

The speaker or headphones should match the low (4 to 16 Ω audio-output impedance).

Construction and Tune-Up

I designed a 3- × 5-inch PC board for the receiver.[5] The low parts count in the RF stages allows plenty of ground-plane area on the single-sided board. Construction is ordinary through-the-hole PC-board assembly. Use sockets for the ICs. The shielded coils require no special treatment, and because most of the circuit operates at audio, construction is not critical. Keep leads short; components should be mounted as close to the board as possible.

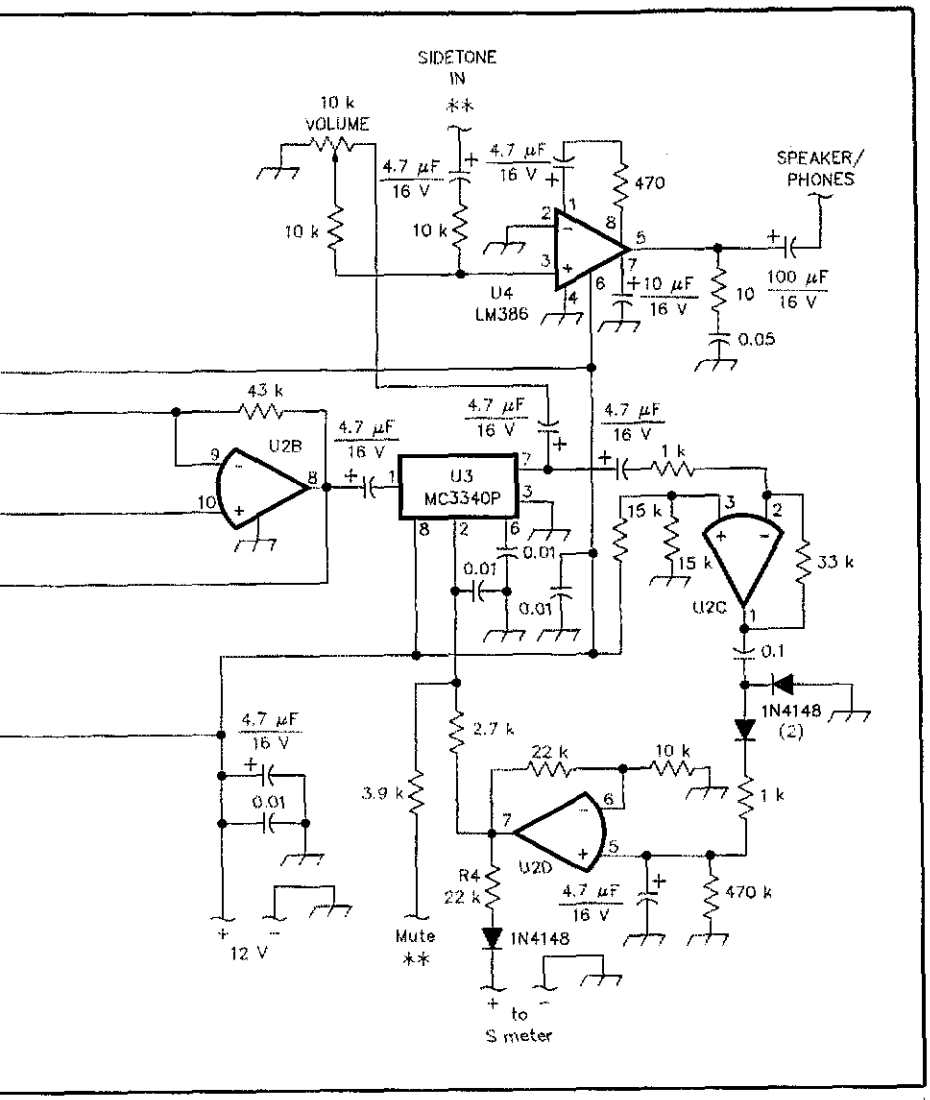
To adjust the receiver, a stable signal source in the band is required, along with a frequency counter or receiver to indicate the VFO frequency. With patience, it is possible to use only the in-band signal source—if you know its frequency. A transmitter (such as your main rig), running a few watts into a dummy load with a nearby pickup wire for coupling to the receiver's antenna input, represents the minimum required test equipment.

Tune-up is simple; there are only four adjustments. First, adjust the VFO-coil (L3) slug for the lowest desired frequency with both tuning pots set to minimum resistance (lowest tuning voltage). The receiver uses an 8000-kHz IF and the VFO tunes from about 6015 to 6065 kHz, which corresponds to 14015- to 14065-kHz coverage. Using the values shown, the tuning range is about 50 kHz, with ±2-kHz fine tuning. A frequency counter connected at the VFO output terminals is the best calibration setup to use. If a counter is unavailable, a strong signal at the desired frequency can be tuned in using the VFO slug, but this approach takes patience and the right touch with a tuning tool.

Once the range is set, adjust the input coils (L1 and L2) for a peak at the band center. Before their final adjustment, adjust the BFO trimmer so the signal peaks with a 750- to 800-Hz note. Input tuning can then be completed. The coils are best tuned for a peak S-meter reading using a reasonably strong signal. (I've found this easier than tuning by ear with weak signals.) Mark the **MAIN TUNING** dial in the desired increments (I marked mine every 5 kHz).

At this point, the job is almost done. All that you may need to do is change R4 to obtain the deflection range you prefer on the S meter. The 22-kΩ value shown was what I used for a 200-µA meter. Other meters may need a different resistor value for the desired deflection range. In some cases, a second 1N4148 diode in series with the meter may be needed to get a proper zero.

The dial can be calibrated using either a counter or the calibrated external signal. The even-megahertz IF also makes it possible to use a counter as a frequency display. Just drop the megahertz digits (ie,



6042-kHz VFO = 14042-kHz receiver frequency). The counter described by Doug Bainbridge, NØHPK, in February 1989 *QST*,[6] would work well here. If you use such a counter, be sure to shield it to keep the harmonics of its clock and display-multiplexing signals out of the receiver.

Performance

This receiver is plenty sensitive, with a minimum discernible signal of about −123 dBm. Its measured third-order IMD dynamic range is 70 dB; not exceptional, but it's good for such a simple receiver. The AGC operation is reasonably smooth for an audio-derived system, and despite its limitations, it is a vast improvement in operating comfort over no AGC at all.

Selectivity is good, with the crystal and audio filters resulting in a 400-Hz-wide passband at −3 dB and 1325 Hz at −30 dB. However, opposite sideband rejection is only a little under 40 dB. With an 8-MHz IF, the isolation of the chip and filter circuitry is insufficient to allow better performance. The pins on the IC for filter input and output are only 0.2 inches apart, and some coupling across the filter occurs. Versions constructed for other bands, using lower-frequency IFs (with proportionally less coupling), demonstrated much better skirt selectivity. Fortunately, the AGC action pushes down the weaker unwanted signals and minimizes the problem.

This receiver's only real weakness is temperature stability. In a stable environment, such as a ham shack, there is no trouble with VFO stability; it holds within a few tens of hertz for hours on end. When operated in the variable outdoor weather, however, noticeable frequency changes can occur, although short-term stability is still good as long as the temperature is fairly constant. The problem is due to the temperature variation of the varactors, with some contribution from the other VFO components. Dial calibration can be off by a few kilohertz in extremely cold or hot situations. Attempts to correct this problem with temperature-compensation capacitors severely worsened short-term stability, so I decided to live with the problem.

This transceiver has a built-in band-edge warning. Because the rig uses an even-megahertz IF with a BFO operating just above the passband, a strong spurious signal is located about 1.5 kHz above the lower band edge. This is an annoyance when operating at the band edge, but it's also a convenient reference point. Of course, if you don't select coverage down to the lower band edge, you'll have to live with some calibration error (General and Advanced operators need to be careful). Accepting this shortcoming is a small price to pay for simplicity.

Additional Possibilities

This receiver can be adapted to almost any frequency range, as long as a few limitations are observed. The MC3362 first mixer and oscillator will go to 200 MHz or higher, but the first IF is designed for operation below 12 MHz, with internal roll-off capacitors limiting its upper frequency. Also, the small capacitance range of the varactors limits tuning range at lower VFO frequencies. I've used the VFO as high as 9 MHz with excellent short-term stability. Operation up through 15 meters should be possible.

Because this design does not use the limiting IF and quadrature detector in the MC3362 (and their associated limiting of the signal waveform), this receiver works very well for SSB. Excellent results were obtained in experiments with commercial crystal and ceramic IF filters on several HF bands. All that is needed for SSB is a widening of the audio-filter passband and impedance matching for the SSB filter. AGC parameters are fine as they are for voice operation. This receiver makes an excellent net monitor, or it can be used as a bedside monitor for your favorite DX frequency. If the band isn't open, you needn't waste time wandering to the shack!

The voltage-tuned VFO lends itself to synthesizer control. Some of the synthesizer chips on the market could probably be made to work with relatively simple circuitry. Another way to make use of voltage tuning is to add RIT. A small relay driven by the transmit/receive control could switch a pot in and out of the circuit, connected like the one used for fine tuning. I tried this, and it works great.

It seems like this explanation of how the receiver works and how to build it takes longer than actually putting it together! Next month, we'll take a look at the accompanying 5-watt transmitter, making this a complete QRP rig. Just add batteries, an antenna and a key!

Notes

[1]PC boards and parts kits for the transceiver are available from A&A Engineering, 2521 W LaPalma, Unit K, Anaheim, CA 92801, tel 714-952-2114.

[2]RF Notes No. 4, ETRON RF Enterprises, PO Box 4042, Diamond Bar, CA 91765.

[3]W. Hayward, "Designing and Building Simple Crystal Filters," *QST*, Jul 1987, pp 24-29.

[4]G. Breed, "A New Breed of Receiver," *QST*, Jan 1988, pp 16-23.

[5]See note 1.

[6]D. Bainbridge, "A Low-Cost Frequency Counter," *QST*, Feb 1989, pp 21-26. Also see Feedback, *QST*, Apr 1989, p 43.

A Surface-Mount Technology Primer—*Part 1*

What makes today's compact electronics gear possible? SMT.

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The most obvious difference between traditional and surface-mount (SM) components is size. Note the relative sizes of the stamp, a conventional TO-92-case transistor on the left, and the three SM transistors on the right. Of the three SM transistors, the largest—about 4.5 × 2.5 × 1.5 mm—(in an SOT-89 package) is a general-purpose NPN silicon transistor, with a V_{CBO} of 90 V and a P_D of 1 W. The two smaller SM transistors (in SOT-23 packages) are general-purpose PNP silicon devices with a V_{CBO} of 80 V and a P_D of 200 mW.

How do manufacturers of amateur communications equipment manage to consistently offer products that provide more features, in smaller packages, with each new model? In part, this progress has been achieved through the judicious use of surface-mount devices (SMDs). SMDs provide not only significant size and weight advantages over conventional components, but are also more easily handled by automated manufacturing systems, resulting in lower manufacturing costs.

Amateurs interested in designing or maintaining their own communications equipment should know something about surface-mount technology (SMT).[1] In this article, I'll introduce you to SMT and SMDs. In Part 2, I'll discuss some of the practical aspects of working with SMDs.

Smaller, Tighter, Cheaper

Evolution in PC-board technology centers around developing different board compositions, producing thinner and more-exactly positioned traces, and minimizing production costs. The demand for denser electronic assemblies has pushed conventional PC-board technology to its limit.

Increasing circuit density by designing boards with finer and finer traces is expensive and can result in decreased reliability. Physical limits are imposed on trace width by the circuit requirements. Traces carrying power must be considerably wider than those carrying signals; a 10-mil (0.01-inch) trace can handle only about 1 A.[2] Even trace can handle only about 1 A.[2] Even the width of traces carrying only small signals cannot be reduced indefinitely. Increased path resistance—along with the crosstalk associated with more closely spaced traces—can render a circuit inoperable.

Similarly, increasing circuit density by using more circuit-board layers has practical limits. Not only do costs increase as layers are added, but board thickness and weight begin to get out of hand when more than 12 layers are used.

Surface-Mount Technology

Although SMT has received a great deal of attention lately, the surface mounting of components dates back to the hybrid assemblies of the late 1950s.[3] SMT was not fully exploited until the 1980s, however, when circuit complexity reached the point that through-hole component-mounting techniques were no longer economically or technologically feasible. Faced with the limitations of conventional PC-board technology, circuit-design engineers turned to other PC-board technologies, including SMT. SMT makes minimal use of plated-through holes and multilayer boards. In its broadest interpretation, SMT keeps components—and their interconnecting leads—on one PC-board surface, rather than feeding the component leads through the circuit board.

Modern SMT is distinguished from the surface-mount (SM) work of the 1960s and 1970s in that it involves the cost-effective methods of automated component soldering. SMT employs solder to provide electrical *and* mechanical connections between components and PC boards.[4] See Tables 1 and 2 for a summary of the benefits and limitations of SMT.

Many equipment manufacturers enter the SMT field by making mixed-technology boards—PC boards that contain SMDs and conventional devices (see Fig 1).[5] Mixed technology, or underside attachment of SMDs, has been used for almost 25 years in Japan to reduce the size and cost of electronic products.[6] This approach is also especially attractive to amateurs who would

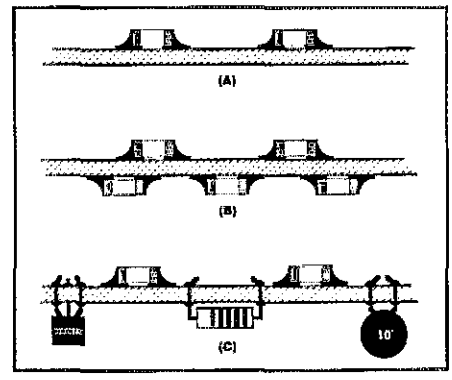

Fig 1—SMT can be used alone in single-sided board designs (A), in double-sided board layouts (B), or—more commonly—mixed with conventional leaded components (C). These so-called "mixed-technology" boards are typically populated by conventional components on one side of the board and SMDs on the other.

[1]Notes appear on p 51.

Table 1

Benefits of SMT

Of the many benefits ascribed to SMT, the most prominent include:

- Reduced component size—SMDs can be made two to five times smaller than conventional leaded components because there are no drilling tolerances to be concerned with, and no need to design components that can survive a stressful insertion process.
- Increased circuit density—pocket-size VHF transceivers, pagers and electronic watches would not be feasible without the increased density SMT affords.
- Reduced board size—smaller components and greater circuit density allow for smaller circuit boards, lowering board-material costs.
- Reduced weight—the decreased board and component size translates to lighter, more compact circuits.
- More rugged—SMD-based assemblies can be smaller, lighter and more resistant to shock and vibration than boards based on the use of conventional components.
- Less EMI—the leads of conventional components can serve as antennas that radiate and receive unwanted signals. SMDs can help minimize this problem.
- Greater interconnectivity—SMDs can be mounted with a higher number of interconnections per given area than can conventional leaded components. For example, DIPs are inefficient for components having more than 28 leads—the maximum lead count for a DIP is only 64 (the Motorola 68000, used in the Apple® Macintosh® computer is a 64-pin DIP device). By comparison, space-efficient SMDs, with *hundreds* of leads, are readily available.
- Greater reliability—as the number of board layers and interlayer connections (vias) decreases, circuit reliability increases.
- Improved high-frequency performance—the shorter interconnection paths afforded by SMDs support better high-frequency performance, in part because lead inductance and capacitance are reduced. Shorter leads and interconnections, as well as smaller package-propagation delays, also allow increased processing speeds.
- Reduced manufacturing costs—automated assembly of SMD boards and components is not only easier and less expensive, but yields are also much higher than with conventional leaded components. The pick-and-place machines used with SMDs are also less expensive than the automatic insertion machines used with conventional components.† In addition, boards designed for SMDs do not require as much drilling.
- No other options—some components are available only as SMDs, simply because their high pin count demands SM packaging.

† T. Pruce, "Make a Start with SMDs," *Electronics & Wireless World,* Dec 1989, pp 1182-1183.

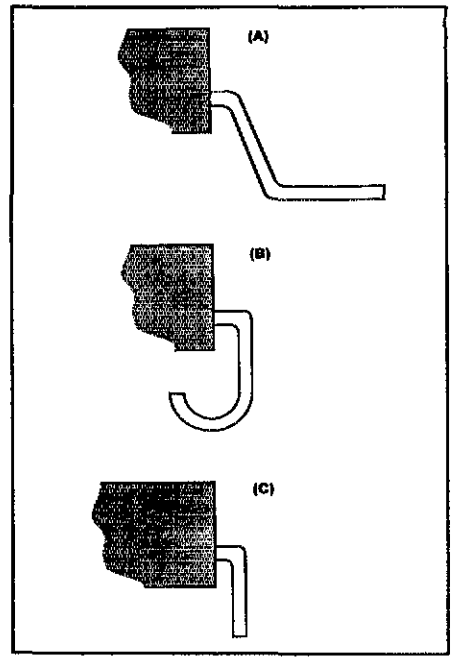

Fig 2—Popular SM lead types include gull-wing (A), J lead (B), and I lead (C). Gull-wing leads provide excellent lead access, at the cost of a considerable circuit board area requirement. Although hidden J-lead solder joints are difficult to certify visually, J leads absorb stresses due to differences in thermal coefficients of expansion and occupy less space than do gull-wing leads. I leads are more compact than either J leads or gull-wing leads, and the solder joints are easily verified visually.

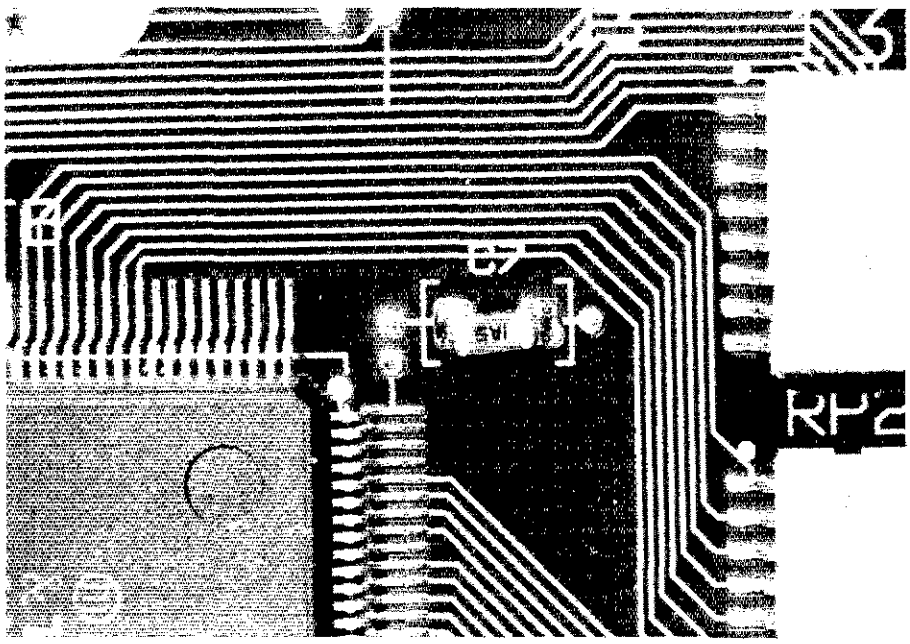

Fig 3—When troubleshooting a circuit board populated with SMDs, pay particular attention to component alignment. The alignment of the SM ceramic capacitor (C7, in the center of the photo) with its solder pad is barely within limits established for high reliability. Also shown in this photograph are sections of two 16-pin, gull-wing SM ICs (white ceramic SO packages, right) and one corner of quad flat pack IC with a few of its 196 gull-wing pins visible (black plastic package, lower left).

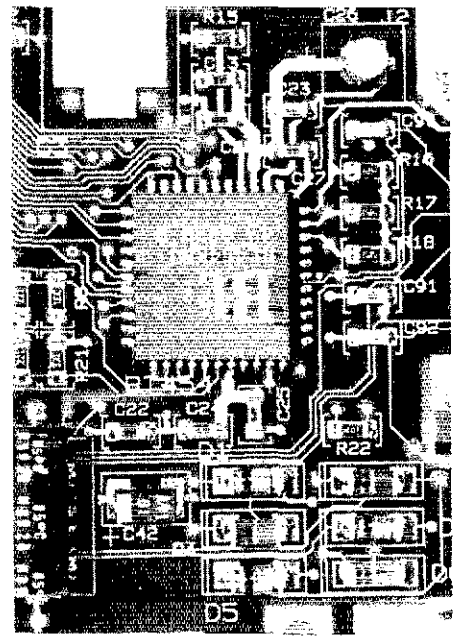

Fig 4—SMDs are available in a variety of sizes and package configurations. Note the 44-pin SM IC with I leads (center), the numerous SM resistors and ceramic capacitors (on all sides of the IC), the 10-μF tantalum capacitor (C42, lower left), and the cylindrical metal-electrode face (MELF) diodes (lower-right corner). In the lower-left corner, a conventional leaded electrolytic capacitor is also visible adjacent to C42.

Table 2

Limitations of SMT

No electronic construction technology can satisfy all circuit-design constraints. The more significant limitations of current SMT include:

- Higher component costs. Though some SMDs cost less than their conventional counterparts, many SMDs can cost up to 50% more (in the US) because their usage volumes are currently lower. Component cost is the largest single expense in an SM assembly.†
- Lack of component availability. High-power (greater than 1-W) diodes, precision (1% or better) resistors, some digital ICs, and capacitors rated at more than a few hundred microfarads are currently hard to source. This situation is expected to improve in the near future, as the industry moves to 100%-SM assemblies.
- Evolving packaging standards. With the exception of passive devices, relatively little standardization of SM packaging has been achieved.‡ Whereas there are only about a dozen different, well-established DIPs to choose from, there are over 120 different SM packages in use.†† Since each manufacturer may produce a given component in a different package, second-sourcing becomes difficult, if not impossible. In general, a given circuit must be designed with a specific SMD supplier in mind.
- Retooling costs. Because one machine or one technique cannot be used with all SMDs, costs for conversion from conventional components to SMDs can be prohibitive for some manufacturers. For the amateur, additional expenses can be incurred as well—for visual aids, fine-tipped, temperature-controlled soldering irons, precision tweezers, etc.
- Poor heat dissipation. The higher component density made possible by SMT translates to more heat per unit area, which must be dissipated in order to avoid premature component failure. In addition, the SMD's smaller leads make heat conduction away from components more difficult. That is, SMD packages tend to exhibit higher thermal resistance than conventional packages. More-efficient devices and more-aggressive cooling techniques, including forced-air cooling, must be employed with some SM assemblies. In some cases, the demand for SM versions of particular components, eg, SM power diodes, cannot be met until packaging capable of greater dissipation is developed.‡‡
- Thermal mismatch. SMDs and the PC boards they are mounted on typically have markedly different coefficients of thermal expansion (the coefficient of thermal expansion for a ceramic component is less than half of that of an organic PC board), which can result in board warping and fracturing with normal thermal cycling. New circuit-board substrates and SM packages are being developed to minimize this problem.
- Difficult testing. The poor node visibility and tight lead spacing associated with some SM packages make manual testing difficult. Visual aids, microtip probes, and a steady hand are mandatory for testing SM assemblies.
- Decreased mechanical strength. The solder-only connections associated with SMDs are less robust than the conventional through-the-board mounting. Because the difference in expansion of the components and the PC board (over a board's operating-temperature range) must be entirely absorbed by these solder joints, soldering must be performed with much greater care than with conventional components.
- New learning curve. Working with SMDs requires an understanding of how to best match components and PC-board substrates, how the layout of PC-board pads and traces affect performance, and how to work with new soldering techniques and tools.

†S. McClelland, "What is Surface Mount Technology?" *Advancing Surface Mount Technology: An IFS Executive Briefing,* ed. S. McClelland (New York: Springer Verlag, 1988), pp 3-5.

‡B. Richards, "The Sensitivity of Surface Mount Technology to Component Quality," *Advancing Surface Mount Technology: An IFS Executive Briefing,* S. McClelland ed., (New York: Springer Verlag, 1988), pp 143-154.

††P. McCormic, "Integrated Circuit Design for Surface Mount Technology," *Advancing Surface Mount Technology: An IFS Executive Briefing,* S. McClelland ed., (New York: Springer Verlag, 1988), pp 29-34.

‡‡A. Turner, "SMT—Dream or Reality," *Electronics & Wireless World,* Dec 1989, p 1179.

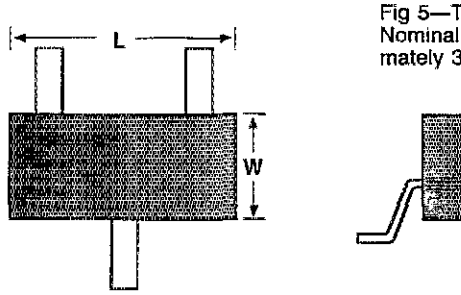

Fig 5—The SOT-23 package outline. Nominal package dimensions are approximately 3.0 (L) × 1.5 (W) × 1.0 mm (H).

like to gradually work SMT into their repertoire of construction options.

Surface-Mount Devices

A number of SMT packaging alternatives have been developed, each for a particular class of applications.[7] The packaging used for active SMDs (transistors and ICs) tends to be quite different from that used for resistors, capacitors and other passive SMDs.

Active-Device Packaging

The most common SMD packaging alternatives available for multiple-lead, active devices include small outline (SO), quad flat pack (QFP), plastic-leaded chip carrier (PLCC), tape-automated bonding (TAB), and leadless ceramic chip carrier (LCCC) packaging. In addition to variations in the SMD body, packaging alternatives include component-lead configuration. The three lead configurations most commonly used with SM packages are the gull-wing, J-lead, and I-lead (see Fig 2).

The gull-wing lead (used on the large ICs shown in Fig 3) flares out and downward from the device body. Virtually all SO IC packages employ gull-wing leads. While lending itself to easy visual inspection and probing, the gull-wing design is susceptible to lead damage during handling and its footprint is relatively large.

The J lead (Fig 2B) is protected against damage because the lead is rolled under the package. The J-lead configuration provides higher mounting densities at the expense of reduced manufacturing yields,[8] difficulty in examining solder connections and increased package height.

The I lead (used on the large IC in Fig 4) provides most of the advantages of the J lead, including greater possible mounting densities, but requires that the leads be tinned prior to use.

Of the SM IC packages, the SO configuration, developed by Philips in 1971 for the watch industry, is the oldest. It also remains the most common mounting package for SM ICs with up to 28 pins (see Fig 3).

The QFP package, designed to handle devices with 64 to 196 pins, uses gull-wing leads to achieve extremely close lead spacing (see Fig 3).

PLCC packages were developed for components with up to 84 pins, using J-lead pins on all four sides to minimize mounting area and for ease of handling.

LCCC packages rely on metallized pads on the underside of the chip, instead of leads, for soldering to PC boards. Although the LCCC is the ultimate SM package in terms of compactness, touch-up and repair are virtually impossible, because of the many blind, uninspectable solder areas that bond an LCCC device to its board. In addition, because there are no leads to absorb the stresses of thermal expansion, LCCC components must be mounted on special substrate materials, such as copper-clad Invar, which have

coefficients of thermal expansion near that of the ceramic component body. As a benefit, the heat dissipation qualities of an LCCC/Invar board combination are excellent.

SM transistors are most commonly available in molded plastic SO packages, with gull-wing leads that can be directly mounted on the PC board. The particular small-outline-transistor (SOT) packaging used for a given component is generally a function of the device's lead count and power-dissipation requirements. For example, the three-terminal SOT-23 package (see Fig 5 and the title-page photo), is generally used for small-signal transistors and diodes capable of dissipating up to 200 mW. In comparison, the larger three-terminal SOT-89 package (see the title-page photo) is used for devices requiring power dissipations up to 500 mW.

Next Month

In Part 2, I'll discuss passive-device packaging and how to work with SMDs, and will provide a list of SM device and tool suppliers.

Notes

[1]For those who'd like a hands-on approach to learning more about SMT, Heathkit® offers a surface-mount technology course (EI-3135) for $99.95. Contact Heath Co, PO Box 8589, Benton Harbor, MI 49022-8589, tel 800-253-0570.

[2]C. Simon, *Computer Aided Design of Printed Circuits*, 1987 (San Francisco: Abbot, Foster & Hauserman Co, 1987), pp 1-12.

[3]These hybrid units, built for their small size and improved high-frequency performance, were constructed by interconnecting chip resistors, capacitors, and bare semiconductor dies on rigid ceramic substrates. Similarly, the IC flat-pack, commonly used in the 1960s, predated the popular dual inline package (DIP). See R. Clark, *Planning the Printed Circuit Manufacturing Environment*, (New York: Van Nostrand Reinhold, 1989), p 178.

[4]Contrast this with hybrid circuit design, in which components are first mechanically attached to a ceramic or other rigid substrate with adhesives, and the components are then electically connected to pads on the substrate using fine gold wires.

[5]B. Morris, "SMD Reworking," *Electronics & Wireless World*," Dec 1989, pp 1176-1178.

[6]T. Takei, "Soldering Techniques for Manufacturing Surface Mount Devices," *Advancing Surface Mount Technology: An IFS Executive Briefing*, S. McClelland ed., (New York: Springer Verlag, 1988), pp 95-102.

[7]Although this situation has improved in the past few years with the formalization of standards, at least between American and European semiconductor manufacturers, it is not uncommon to see component package types referenced to standards proposed by the IPC (Institute for Interconnecting and Packaging Electronic Circuits), JEDEC (Joint Electronic Device Engineering Council), EIA (Electronics Industries Association), and the EIAJ (Electronics Industries Association of Japan)—all in the same components catalog.

[8]S. Hinch, *Handbook of Surface Mount Technology* (Essex, England: Longman Scientific & Technical, 1988).

Season's Greetings

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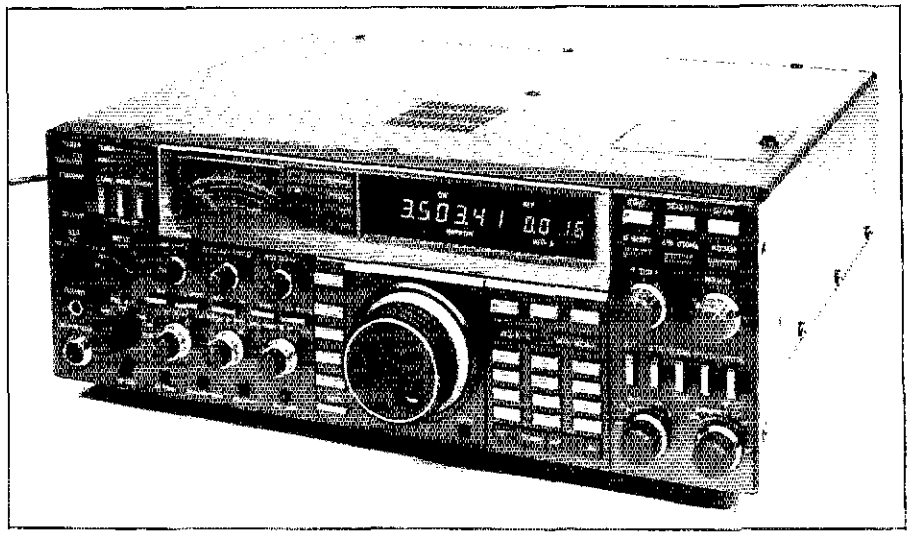
ICOM IC-765 160- to 10-Meter Transceiver

Reviewed by Mark J. Wilson, AA2Z

In September 1988 *QST*, we reviewed the ICOM IC-761.[1] Although it was generally favorable, the review pointed out a number of rough edges we found. Some of these rough edges were matters of personal preference; others affected the performance and usefulness of the transceiver. Our IC-761 review suggested that ICOM smooth the rough edges and release a revised rig (perhaps as the IC-761A, much as ICOM improved the IC-751 and released the IC-751A). ICOM did that, and more, with the introduction of the IC-765.

The IC-761 review described the functions and operation of that radio in detail. Most of the information in that review applies to the '765 as well, so it won't be repeated here. Although the IC-761 and IC-765 are virtually identical in appearance, careful comparison shows some subtle—but important—differences. This review will concentrate on those differences.



The Synthesizer

One of the features we liked best about the IC-761 was its quiet synthesizer. Ironically, the biggest flaw we reported in the '761 review was a synthesizer-related problem. In a nutshell, when the IC-761's transmitter and receiver frequencies were offset more than about 500 Hz during QSK CW operation, the synthesizer lockup time was longer than the rig's TR-switching time, so the radio transmitted RF *before* synthesizer lock. This made for a chirpy signal and all manner of ugly spurious outputs. ICOM developed a fix that improved the situation dramatically, but didn't completely solve the problem.

I'm happy to report that ICOM has a new synthesizer design (introduced in the IC-781) that completely solves the QSK problems, yet is very quiet. When you tune the band with the IC-765, you don't hear clicks, pops and other synthesizer-generated garbage present in some other radios. In addition, we found no discrete spurs in any of the ham bands. The result is an exceptionally clean-sounding receiver, even under crowded band conditions.

Frequency Control

The '765 has the same large, white fluorescent display as the '761. The '765's display shows frequencies to the nearest 10 Hz (the '761's display resolved frequencies to the nearest 100 Hz). The display-calibration control, located on the front panel of the IC-761, is located under a panel on top of the IC-765. Unfortunately, ICOM didn't include a front-panel display-intensity control.

As in the IC-761, the '765's frequency display indicates carrier frequency in the AM, FM, SSB and CW modes (mark frequency for RTTY). Unlike the '761, the '765's control program is smart enough to keep the rig tuned to the same carrier frequency when jumping from mode to mode.

Normal tuning speed is a comfortable 5 kHz per revolution (10-Hz steps). If you prefer a more leisurely trip through the bands, you can change this to 2.5 kHz per revolution by means of an internal switch. A press of the **TS** button changes the tuning speed to 100 kHz per revolution (in 1-kHz steps) to speed up long-distance excursions. This scheme is a bit different from the '761, which switched to 25 kHz per revolution when the tuning knob was turned rapidly, and 500 kHz per revolution when the **TS** button was pressed.

I thought that the band-selection scheme on the '761 left a lot to be desired. That radio had no band switch; you could use the keypad for direct frequency entry, or the **UP/DOWN** switches to step through the bands. In the general-coverage mode, these switches moved the frequency up or down 1 MHz. In the ham-bands-only mode, these keys allowed you to step up or down to the next frequency band. Annoyingly, when you moved up or down to the next ham band, you always ended up about 50 kHz above the lower band edge.

For my style of operating, the '765's band switching scheme is right on target: It's flexible, yet easy to use. Like the '761, the '765 has a keypad and **UP/DOWN** switches to the right of the main tuning knob. Unlike the '761, the '765's keys have two labels (and two functions). During normal operation, the keypad serves as a band switch; there are keys for each amateur band from 1.8 through 29 MHz. Press the **1.8** key, and you're on the last frequency and mode you used on 160 meters. Press the **18** key, and you're on the last frequency and mode you used on 17 meters. If you prefer, you can still use the keypad for direct frequency entry: Simply press the **FUNC** switch and enter the new frequency (to 10-Hz resolution, if you like). The **UP/DOWN** switches move the frequency up or down 1 MHz.

Memory features are expanded in the IC-765. I really liked the '761's 32 tunable memories; the '765 is functionally the same, but has 99 memories. The IC-765's memory channels 1 through 89 can store frequency, mode and wide/narrow filter selection. Channels 90-99 offer a new feature: They can store separate transmit and receive frequencies for split-frequency operation.

The Receiver

Overall, the receiver in the IC-765 is similar to that in the '761. The test results in Table 1 are generally within a few decibels of those measured for the IC-761. There are two noticeable improvements, though: (1) Blocking dynamic range now ap-

[1] T. Miller, "Product Review: ICOM IC-761 160- to 10-Meter Transceiver," *QST*, Sep 1988, pp 36-41.

Table 1

ICOM IC-765 160-10 Meter Transceiver, Serial No. 02143

Manufacturer's Claimed Specifications	*Measured in the ARRL Lab*
Frequency coverage: 1.8-1.99999, 3.4-4.09999, 6.9-7.49999, 9.9-10.49999, 13.9-14.49999, 17.9-18.49999, 20.9-21.49999, 24.4-25.09999 and 28-30 MHz.	As specified.
Modes of operation: AM, USB, LSB, CW, RTTY, FM.	As specified.
Power requirement: 100-120 V ac. Receive, 80 W max (at 100 V); transmit, 650 W max (at 100 V).	Not measured.
Receiver	*Receiver Dynamic Testing*
Receiver sensitivity (preamp on, bandwidth not specified): SSB, CW and RTTY, 10 dB S/N: 0.1-0.5 MHz, 0.7 μV (−110 dBm); 0.5- 1.8 MHz, 1.0 μV (−107 dBm); 1.8-30 MHz, 0.15 μV (−123 dBm).	*Minimum discernible signal (noise floor) with optional 250-Hz filters:* Preamp on / Preamp off 1.0 MHz — / −126 dBm 3.5 MHz −142 dBm / −135 dBm 14.0 MHz −142 dBm / −135 dBm
AM narrow, 10 dB S/N: 0.1-0.5 MHz, 4.4 μV (−94 dBm); 0.5-1.8 MHz, 6.3 μV (−91 dBm); 1.8-30 MHz, 1.0 μV (−107 dBm).	10 dB S+N/N: Preamp on / Preamp off 1.0 MHz — / −111 dBm 3.8 MHz −124.5 dBm / −118 dBm 14.2 MHz −125.5 dBm / −119 dBm
FM, 12 dB SINAD: 28-30 MHz, 0.30 μV (−117 dBm).	12 dB SINAD: Preamp on, 0.26 μV; preamp off, 0.64 μV.
Receiver dynamic range: 105 dB (signal spacing not specified).	Blocking dynamic range†: Preamp on: 3.5 MHz, 148 dB; 14 MHz, 146 dB. Preamp off: 3.5 MHz, 152 dB; 14 MHz, 151.5 dB.
	Two-tone, third-order intermodulation distortion dynamic range†: Preamp on: 3.5 MHz, 98 dB; 14 MHz, 96 dB. Preamp off: 3.5 MHz, 99 dB; 14 MHz, 97 dB.
Third-order input intercept: Not specified.	Preamp on: 3.5 MHz, 5 dBm; 14 MHz, 2 dBm. Preamp off: 3.5 MHz, 13.5 dBm; 14 MHz, 10.5 dBm.
S-meter sensitivity (for S9 reading): Not specified.	Preamp on: 24 μV at 14 MHz. Preamp off: 65 μV at 14 MHz.
FM squelch sensitivity: <0.3 μV.	As specified.
Notch filter attenuation: Not specified.	More than 30 dB.††
Receiver audio output: More than 2.6 W at 10% distortion with an 8-Ω load.	As specified. 3.125 W at 10% total harmonic distortion (THD) with an 8-Ω load.
Receiver IF/audio response: Not specified.	365-2415 Hz at −6 dB with 2.2-kHz SSB filter.
Transmitter	*Transmitter Dynamic Testing*
Transmitter power output: 100 W max on SSB, CW and RTTY; 40 W on AM.	Output power: 111-124 W (CW, SSB, RTTY—output varies slightly from band to band); AM, as specified.
Spurious-signal and harmonic suppression: >60 dB below peak power output.	As specified. See Fig 1.
Third-order intermodulation distortion products: Not specified	See Fig 2.
CW-keying waveform: Not specified.	See Fig 3.
Transmit-receive turnaround time (PTT release to 90% audio output): Not specified.	S1 signal, 30 ms; S9 signal, 18 ms.
Composite transmitted noise: Not specified.	See Fig 4.
Size (height, width, depth): 5.9 × 16.7 × 15.4 inches; weight, 38.6 lb.	

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

††Test-equipment limitations inhibit ARRL Lab measurement of notch-filter attenuations of more than about 30 dB.

proaches *150 dB;* and (2) Blocking and IMD dynamic ranges vary only slightly *with the preamp on or off*. ICOM has scored a victory in designing the '765's preamplifier; its use *barely* degrades receiver dynamic range. Overall, the IC-765's is one of the five best receivers we've ever tested in the ARRL Lab.

A welcome addition is an attenuator that offers 10, 20 and 30-dB settings. Having these choices makes low-band operating much more enjoyable.

The IC-765's improved mode switches take the place of the IC-761's **FILTER** switch and the older rig's complicated filter-selection scheme. SSB selectivity is fixed at 2.2 kHz. Pressing the **SSB** switch toggles between USB and LSB. Press the **CW/N** switch once and you get the SSB filter (2.2 kHz). Press it again and you get the stock cascaded 500-Hz CW filters. Pressing the **CW 250Hz** switch kicks in optional 250-Hz filters in the 9-MHz and/or 455-kHz IFs. Although somewhat expensive, the 250-Hz filters have excellent ultimate rejection and a good shape factor.

The **RTTY/N** button toggles between the 2.2-kHz and 500-Hz filters. There is no provision for using the 250-Hz filters on RTTY. **AM/N** toggles between 6-kHz and 2.8-kHz filters. FM selectivity is fixed at 15 kHz. Pressing the **FM/TONE** switch twice enables a continuous subaudible tone for repeater access (the optional UT-30 tone encoder is required to use this feature).

The IC-765's switchable IF-shift circuit works in the CW, SSB and RTTY modes. The '765's IF shift moves the center frequency of the filter passband without substantially changing its width, attenuation or shape factor. (See "Rough Edges.") The IC-761's passband tuning (PBT) control, which narrowed the passband from the high or low side, was eliminated from the '765.

Optional IF filters are easy to install in the rig. Simply remove the cover, plug in the filter(s) and flip a switch for each installed filter. The whole operation takes about 15 minutes, case removal and reinstallation included, no matter how many

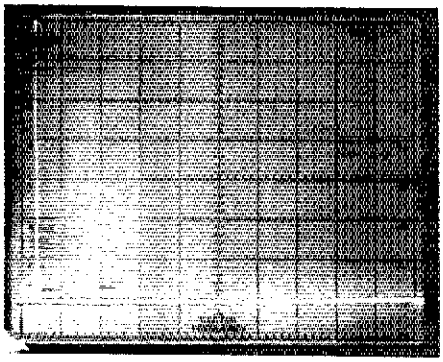


Fig 1—ICOM IC-765 worst-case spectral display. Horizontal divisions are 10 MHz; vertical divisions are 10 dB. Output power is approximately 121 W at 3.52 MHz. All harmonics and spurious emissions are at least 64 dB below peak fundamental output. The IC-765 complies with current FCC specifications for spectral purity for equipment in this power-output class and frequency range.

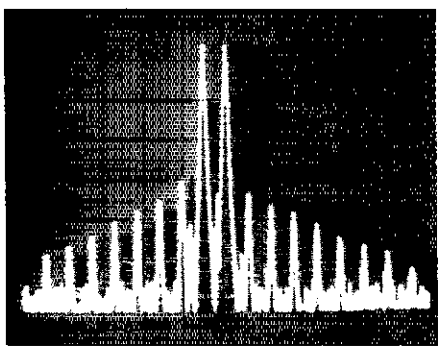


Fig 2—Worst-case spectral display of the IC-765 transmitter during two-tone intermodulation distortion (IMD) testing. Third-order products are approximately 40 dB below PEP output, and fifth-order products are approximately 45 dB down. Vertical divisions are 10 dB; horizontal divisions are 2 kHz. The transceiver was being operated at 100 W PEP output on 3.8 MHz.

filters you're installing.

The Transmitter

Figs 1 and 2 show the results of the ARRL Lab spectral-purity tests. All harmonics and spurious emissions are greater than 60 dB down (Fig 1). Two-tone IMD tests (Fig 2) show an improvement of a few decibels over the IC-761; third-order products are about 40 dB below PEP output. This is one of the cleanest transmitters we've tested.

One IC-765 feature I really like is the built-in antenna tuner. It's fast because it remembers and returns to the previous settings for a matched condition each time you change bands. The big change from the IC-761 is that the manual tuning controls for presetting the capacitors are gone; the radio automatically finds the best settings.

A minor gripe I had with the '761 was that the paddle input for the internal electronic keyer and the key line for an external keyer were handled by the same ¼-inch, three-conductor phone jack. The IC-765 has separate ¼-inch phone jacks for these functions, and you can connect internal and external keyers to the rig at the same time. This is useful when you're keying the rig with a paddle and a computer in parallel, as many operators do in contests.

ICOM has added a new function that many serious CW operators find essential: a **PITCH** control. Except for high-end Kenwood rigs and some others, most transceivers offset the transmitted CW signal a fixed amount (usually 600 to 800 Hz), yet many serious operators prefer an offset of 400 Hz or less. Ideally, the **PITCH** control should allow the operator to adjust the offset for personal preference, *and the sidetone pitch should match the offset.* But the IC-765's **PITCH** control does only half the job: It varies the offset from about 300 to 900 Hz, but the sidetone is fixed at 700 Hz. Here's one area where ICOM can improve the IC-765.

As shown in Fig 3, the IC-765's keying waveform is well-shaped. Like the IC-761, though, the '765's transmitted CW sounds choppy at moderate and high speeds during QSK CW operation. The IC-765 sounds better than the '761 on the air, but still has some sequencing problems. The dots are shorter in QSK mode than in VOX mode, but, as you'd expect, the sidetone weighting doesn't change. At higher speeds, I find a transmitted QSK signal with lighter-than-normal weighting easier to copy because there is more space between the dots, but the radio shouldn't change the weighting "behind your back"! Slightly increasing keyer weighting provides good keying during QSK operation, but it also increases the sidetone weighting. (The internal keyer's weighting is adjustable via a control under a panel on top of the rig.)

General Comments

During the review period, I used the '765 on SSB, CW and RTTY. The rig uses standard connectors (phone and phono jacks, mostly) and two DIN accessory jacks (for which plugs are provided), and the rear-panel layout is very clean, making for easy installation. AM-broadcast reception with the general-coverage receiver is a joy, although serious listeners will want to add the optional 6-kHz filter at the 9-MHz IF.

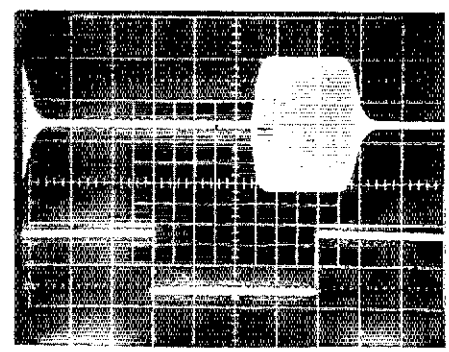
The only problem I encountered with the IC-765 occurred when I connected the radio to a power amplifier. The relay-control circuit in the '765 can switch loads up to 24 V dc (open circuit) and 1 A (closed circuit), or up to 120 V ac (OC) at 0.5 A (CC)—a big improvement over the IC-761. The amplifier's TR relay is rated at 12 V dc at 100 mA, so I was dismayed when, after keying the amplifier smoothly a couple of times, the rig's keying line shorted. ARRL Laboratory Engineer Ed Hare, KA1CV, traced the problem to an uninsulated key lead that lay directly on a PC-board ground trace in the rig. The PC board's solder mask was the only thing between the key line and ground, and the line shorted with use. Moving the wire a bit and adding heat-shrink tubing solved the problem. Apparently this was an isolated incident; other IC-765 owners haven't reported similar problems.

ICOM has improved their instruction manuals over the last few years. The 56-page IC-765 owner's manual is filled with illustrations and concise explanations of the transceiver's features. The explanations are generally clear, but don't provide much technical detail. Full schematics and block diagrams are included, but theory of operation isn't covered.

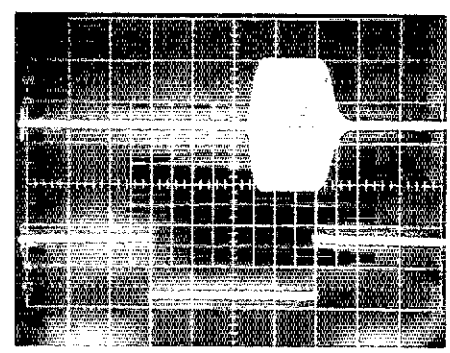
The transceiver's construction quality is excellent, and the rig has been trouble-free other than the amplifier-key-line failure.

Rough Edges

In the IC-761 review, we complained



(A)



(B)

Fig 3—CW-keying waveforms for the ICOM IC-765 in the semi-break-in mode (A) and the full-QSK mode (B). The lower traces are the actual key closures; the upper traces are the RF envelopes. Horizontal divisions are 5 ms. The transceiver was being operated at 121 W output on 14.02 MHz. The IC-765's CW keying shaping is good, but requires a keyer-weighting increase to preserve a 1:1 dot-to-space ratio at speeds above about 25 WPM in full-break-in mode.

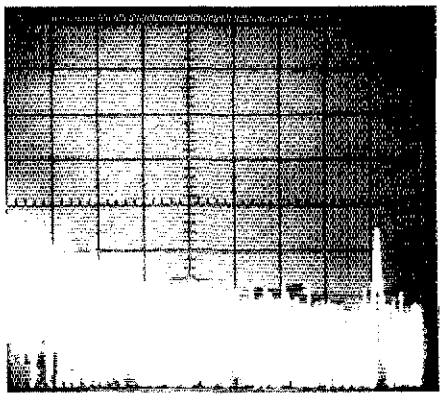
Table 2

IC-765 Dynamic-Range Measurements†

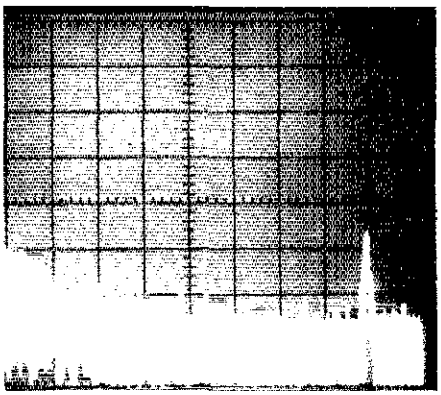
Signal Spacing (kHz)	Blocking DR (dB) IF Shift Off	Blocking DR (dB) IF Shift On	IMD DR (dB) IF Shift Off	IMD DR (dB) IF Shift On
5	120	91	85	73
10	130.5	105	90	88
20	151.5	139.5	97	95
50	152	152	99	99

†All measurements were taken at 14 MHz with the preamplifier off and the optional 250-Hz CW filter(s) selected.

about the rig's excessively hissy receive-audio amplifier. ICOM hasn't fixed this in the IC-765. For those with good high-audio-frequency hearing, the hiss is annoying, particularly when you're using high-quality headphones with broad frequency response.



(A)



(B)

Fig 4—Spectral display of the IC-765 transmitter output during composite-noise testing. Power output is 100 W at 3.52 MHz (A) and 100 W at 14.02 MHz (B). Vertical divisions are 10 dB; horizontal divisions are 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) represents −60 dBc/Hz and the baseline is −140 dBc/Hz. Composite-noise levels between −60 and −140 dBc/Hz may be read directly from the photographs. The carrier, off the left edge of the photographs, is not shown. These photographs show composite transmitted noise at frequencies 2 to 20 kHz offset from the carrier.

As mentioned earlier, the IC-765 has a switchable IF-shift feature. When enabled, this function allows moving the filter passband, which is helpful in eliminating close-in interference. But the IF-shift circuit is flawed: As shown in the block diagram in the IC-765 owner's manual, IF shift is implemented by *removing the 9-MHz IF filters from the IF chain*. So the stock 500-Hz filter (or, if you have it, the accessory 250-Hz IF filter) in the 9-MHz IF is disabled when IF shift is turned on. The problem with this approach is that removing the 9-MHz IF filtering severely degrades close-in dynamic range. See Table 2 for particulars. The bottom line: During a CW contest, don't push in the **IF SHIFT** button! Under crowded band conditions, the advantage cascaded CW IF filters provide is *far* more valuable than what you get from the IC-765's IF shift.

Summary

Even with its many features, the IC-765 is one of the most straightforward radios I've used. The front-panel layout is relatively clean, and the basic controls are conveniently placed and work as I intuitively expect them to (even the memories are easy to use). It's big on basic radio performance, without a lot of useless frills.

I enjoy DXing, contests and other weak-signal work, so I appreciate the IC-765's quiet synthesizer and excellent receiver performance. And, I can connect the IC-765 to my computer for use with K1EA's *CT* (*Con*Test) program. In short, this radio is just about right for my interests and activities in Amateur Radio. I'll like it even better if ICOM fixes the CW **PITCH** control (the **PITCH** control in the IC-781 works correctly—what happened?) and modifies the IF-shift circuit so that you don't lose 9-MHz filtering to use that feature, but otherwise this radio is a winner. It will be interesting to see how long ICOM will continue to develop and refine this basic product before changing to a different platform.

Thanks to Dave Newkirk, WJ1Z, Bill Myers, K1GQ, and Rus Healy, NJ2L, who used the IC-765 and contributed to this review.

Manufacturer's suggested retail price: IC-765, $3149; FL-101 250-Hz filter (first IF), $73.50; FL-53A 250-Hz filter (second IF), $115. Manufacturer: ICOM America, 2380 116 Ave 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 from anyone involved with the sale or manufacture of items presented in the Product Review or New Products columns.—*Ed.*]

The ARRL-purchased Product Review equipment listed below is for sale to the highest bidder. Prices quoted are minimum acceptable bids, and are discounted from the purchase prices.

Ten-Tec Omni V MF/HF transceiver, matching power supply/speaker, desk microphone, 500-Hz CW filters (6.3- and 9-MHz IFs) and 250-Hz CW filter (6.3-MHz IF). See Product Review, November 1990 *QST*. Sold as a package only. Minimum bid: $1690.

Sealed bids must be submitted by mail and must be postmarked on or before December 27, 1990. 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.

In your bid, please clearly identify the item you are bidding on, using the manufacturer's name, model number, or other identification number, if specified. Shipping charges will be paid by the successful bidder, FOB Newington. The successful bidder will be advised by mail. No other notifications will be made, and no information will be given to anyone regarding final price or identity of the successful bidder.

Please send bids to Bob Boucher, Product Review Bids, ARRL, 225 Main St, Newington, CT 06111.

Strays

I would like to get in touch with...

☐ anyone who has attached an external VFO to a Yaesu FT-7 QRP rig for split-frequency transceive operation. Dale Hall, KBØWZ, PO Box 9609, Kansas City, MO 64134-0609.

☐ anyone who has software to transmit *Print Shop*® graphics via SSTV or fax using an MFJ-1278 and a Commodore C-64. I also need a stable design to use an Eimac 4-400 tube in grounded-grid HF service. Carter Rae, WA8YVM, 6366 W Stanley Rd, Mt Morris, MI 48458.

☐ anyone who has a schematic or manual for a Gonset model MSB-1 HF transceiver. Mario Gutierrez, WQ2F, 81 Clapham Ave, Manhasset, NY 11030.

Hints and Kinks

Conducted By David Newkirk, WJ1Z
Assistant Technical Editor

A TNC MESSAGE-WAITING ALERTER

☐ After recently becoming active in packet radio, I almost immediately became frustrated with having to connect my Tandy® 102 computer to the TNC to see if any messages had been left for me. Because I'm not in the shack most of the day, an audible alarm, such as that presented in February 1988 Hints and Kinks,[1] would have been most trying for my wife. Thinking there must be a better way, I decided to try an approach used in hotel and motel telephone systems.

My solution (Fig 1), a TNC message-waiting circuit, uses exactly the same number of parts as the February 1988 audible alarm. It automatically indicates that a message has been left in the TNC, and automatically resets when the message is delivered to the local terminal. The TNC operates normally all the time, except when the local terminal interface has been "turned off" with the XOFF command character (usually Control-S). When the TNC is in XOFF mode and a remote station connects, the TNC stores received data. When the operator returns the TNC to the XON mode, the TNC responds by sending the message to the local terminal. If a station leaves a message at the TNC while it's in XOFF mode, the **CON**nect LED flashes (0.5 second on, 0.5 second off) after the station disconnects and until the message is delivered to the local terminal. The flashing **CON** LED gives the operator a visual indication that the connect occurred, and that a message is probably waiting for him. I built the prototype version on a 1-inch-square piece of "experimenter's" PC board in about an hour; part placement and layout are not critical.

[1]G. Kammerer and P. McLeod, "A TNC Connect Alarm," Hints and Kinks, *QST*, Feb 1988, p 39.

The Circuit

The message-waiting alerter uses both timers in a 556 dual-timer IC to monitor the status of a connect within the TNC. The first timer (U1A) is configured as an RS flip-flop, using active-low inputs. The second timer (U1B) serves as an astable multivibrator that is controlled by the first timer.

Under normal conditions, the TXDB line carries data to the local terminal. Each data "space" pulls the **RESET** input of U1A low, resetting the internal flip-flop, and keeping the **DISCHARGE** output low. This output is wired to U1B's **RESET** input, which in turn keeps U1B, the multivibrator, disabled, and the output of Q1 floating in a high-impedance state. Q1's collector is paralleled across that of the TNC's **CON** LED driver transistor; this point is also fed to U1A's **TRIGGER** input.

When a connect occurs, the DTRB output of U21 goes high. This output turns on the TNC **CON** LED driver transistor, triggering U1A's internal flip-flop, which in turn toggles U1A's **DISCHARGE** output high. U1A's **DISCHARGE** output is connected to the **RESET** input of U1B. When U1A's **DISCHARGE** output goes high, it allows U1B to start up as an astable multivibrator, switching Q1 on and off at a 0.5-second rate. This continues until U1A is reset by local-terminal data on the TXDB line.

When a disconnection occurs with the TNC in XON mode, data transmitted to the local terminal on TXDB automatically resets U1A and U1B. The TNC's **CON** LED also goes out, of course.

When the TNC is in XOFF mode, no data is sent to the local terminal, hence, U1A and U1B are not reset. After disconnection, U1B continues to operate, switching Q1 on and off. This flashes the **CON** LED to indicate the likelihood that a message is waiting. As soon as the local terminal commands the TNC into the XON mode, the data flowing on the TXDB line resets U1A and U1B, and the **CON** LED stops flashing.

Installation

Installation is easy. Remove the cover of your TNC and connect the alerter to the following sources:

+5 *V dc* is available at many spots in the TNC. In my MFJ-1274, this voltage is available at the hot side of R34 (the dropping resistor on the TNC's **PWR** LED).

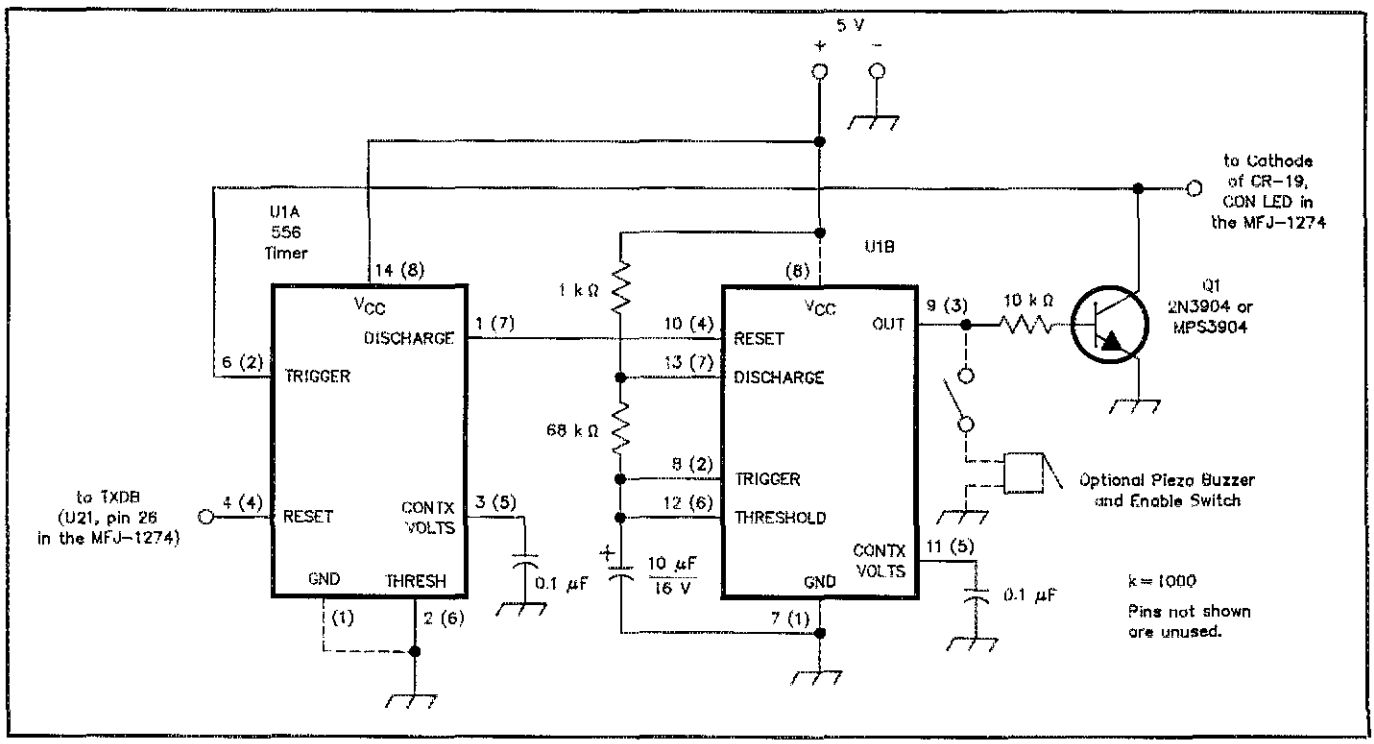


Fig 1—Lynn Hansen's message-waiting alerter flashes his TNC's **CON**nect LED at a 0.5-second rate to indicate that a connection has occurred. The pin numbers outside parentheses refer to a 556 dual-timer IC; use the parenthesized pin numbers if you substitute two 555s for the 556.

Ground. This is another easily accessible point. I found it on pin 3 of connector J5, the TTL serial port on my MFJ-1274.

A connecting point for the collector of Q1 on the alerter board. Make this connection to the CON LED cathode (in the MFJ-1274) or to the collector of its driver transistor.

RESET input for U1A. Use the TNC's TXDB output (in the MFJ-1274, this is pin 26 of U21 or pin 2 of IC3). Another signal, suitable for Reset (the SIO chip's RXDB input) can be found on pin 1 of J5, the '1274's TTL serial port. Try both signals to see which works best for you.

This circuit operates completely in the background—no operator control is required. It also makes a great little evening project, since all of the parts can be obtained for under $5 at your local Radio Shack® store. One other advantage is that this modification does not deface your TNC should you want to sell it later, and is easily removable.

If you want, you can add a piezoelectric buzzer to this circuit: Just hang it on the output (pin 9 or 3) of U1B. If you do this, you may want to put a switch on it—to help keep peace in the family!

I hope that you find this circuit as useful as I have. It's nice to have packet-mail capability, but it's even nicer to have a flag on the mailbox!—*Lynn H. Hansen, KU7Q, 741 E 300 N, Soda Springs, ID 83276*

MATTE FINISH AND PANEL LABELS FOR HOMEMADE PROJECTS

☐ When we construct a radio/electronics device and put it in a box, its front panel often ends up looking shabby, with handwritten names for control labels. A nice-looking front panel reflects the quality of the project inside the box. Here is a simple way of making an attractive front panel that has a matte-finish silver hairline design. If your project box already has an aluminum front panel, great. If not, cut an aluminum plate the same size as the box's front panel and attach it to the box. Before beginning, make all necessary holes and cuts in the front panel(s).

Step 1. Wrap fine sandpaper around a piece of wood and sand the aluminum panel in one direction until fine hairlines begin to appear. If the panel is coated with paint, be patient and do this *until the paint comes off* and the hairlines appear.

Step 2. Thoroughly clean the panel surface. Now, spray the panel with clear *lacquer* paint. The purpose of this is to make the surface of the panel smooth for applying dry rub-on lettering. Wait until the lacquer dries completely, then apply the lettering.

Step 3. Spray the panel with clear *enamel* paint. (*Important:* Use a different type of paint than you used in Step 2. Otherwise, this coat may mix with the Step 2 paint, causing the lettering to float around in a sea of clear paint!) Spray a few coats until the paint completely covers the lettering.

Step 4. Heat the front panel from *behind* the painted side until it is almost too hot to touch. You can do this over a gas stove, but be careful to keep the painted side from making direct contact with the flames. Remove the panel from the heat source and *immediately* spray on another coat of clear enamel from some distance away (1 foot or more), so that the paint particles land on the panel spread widely apart. As the panel cools, the paint particles will shrink, giving a matte finish on the panel.

This is not an original idea, but something I learned back in Tokyo many years ago when I was a kid, making a lot of projects and looking for neat ways of making a good-looking front panel. I hope this technique gives you a handsome front panel that the device inside the box truly deserves!—*Kunio Mitsuma, KA3RRF, Calder Sq, PO Box 10407, State College, PA 16805*

CURING KEY CLICKS IN THE YAESU FT-102 TRANSCEIVER

☐ My FT-102 had quite a case of key clicks. In supplemental information indicating that this could be a problem in units serial-numbered between XX030001 and XX069999, Yaesu also provided an answer: Cut the white wire at J4017 on the local-unit board (accessible from the bottom of the transceiver) and add a 1-μF, 50-V electrolytic capacitor between G1 and ground (*positive* lead to ground) on the FT-102's RF-unit board. (The necessary ground connection can be made at the R1045 lead nearer to the 12BY7A driver tube.) Although this modification certainly made an improvement, I felt that I could further improve on the FT-102's keying. Increasing the value of the capacitor suggested by Yaesu from 1 to 4 μF is part of my solution; adding the circuitry shown in Fig 2 completes the fix and results in a textbook-perfect keying-waveshape decay.

Find the single white wire at KEY 3 on the FT-102's RF unit board, trace it back up the harness about 3½ inches and cut the wire. Connect the Q1-C1 assembly between the two wire ends as indicated in Fig 2. (The ground lead can be a 4½-inch wire clamped beneath the head of one of the final-amplifier-cage screws.)

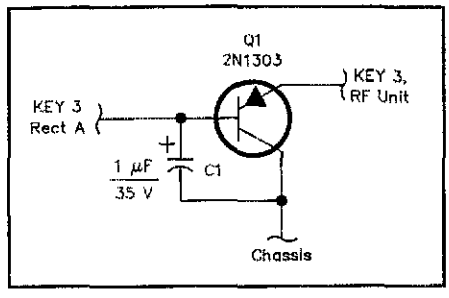


Fig 2—Pat Lacey cured key clicks in his Yaesu FT-102 by increasing the value of a capacitor called for in a manufacturer-suggested fix and adding the circuitry shown here. Pat used a 2N1303 at Q1 because it was handy; he writes that many general-purpose PNP switching transistor types should suffice. See text.

Now, on-the-air comments on my modified FT-102 range from "good copy" to "beautiful signal."—*Pat H. Lacey, VE3DIT, 114 Merner Ave, Kitchener, ON N2H 1X6*

A NEAT PANEL MOUNT FOR LEDS

☐ Finishing washers, commonly available in hardware stores, make professional-looking LED mounts (see Fig 3). Two dabs of hot glue between the back of the LED and the panel hold the assembly in place.—*H. L. Van Ness, W7MPW, 8005 Sand Point Wy NE, Apt A34, Seattle, WA 98105*

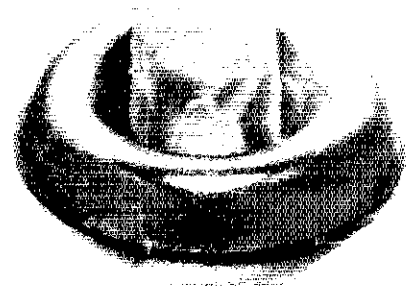


Fig 3—W7MPW's finishing-washer LED mount looks just fine.

New Products

YAGI-DESIGN SOFTWARE

☐ Lew Gordon, K4VX, author of the popular *YAGINEC* program for IBM® PCs and compatible computers,† has written another software package for the same application. Dubbed *YAGIMAX*, Lew's latest programming effort runs 50 times faster than *YAGINEC*, supports CGA, EGA and VGA displays, allows element-by-element optimization, and generates patterns for Yagis stacked in free space in either the E or H plane. On computers with CGA displays, the program can handle Yagis with up to 20 elements; on machines with EGA and VGA displays, *YAGIMAX* can handle up to 45 elements. *YAGIMAX* and accompanying programs for matching-network design and element tapering (two diskettes— specify 5.25- or 3.5-inch media), are available for $8 postpaid from K4VX, PO Box 105, Hannibal, MO 63401.—*NJ2L*

†See Technical Correspondence, *QST*, Mar 1989, p 44, and Feb 1990, p 37.

Technical Correspondence

Conducted By Paul Pagel, N1FB
Associate Technical Editor

PROPAGATION PREDICTIONS AND PERSONAL COMPUTERS

☐ With the proliferation of personal computers, many radio amateurs now have the ability to make propagation predictions with relative ease. The first program published for this purpose was *MINIMUF*.[1] An excellent program of more recent vintage is *MINIPROP*.[2]

IONCAP (for *ION*ospheric *C*ommunications *A*nalysis and *P*rediction) is generally considered by amateurs and professionals alike to be the most comprehensive and best currently available HF prediction program. Originally written for a mainframe computer and used by the US government, *IONCAP* is now used to obtain the monthly prediction curves that appear in *QST*'s How's DX? column. More information on these curves appears in the references.[3-6] The detailed series of curves appearing in the latest editions of *The ARRL Operating Manual* was also prepared with *IONCAP*.

Because of its recognized reliability, *IONCAP* is a good standard of comparison for HF predictions from other programs. You may want to use the published How's DX? and *Operating Manual* propagation curves as your standard for comparison. If you do, the following information will be helpful.

Some programs (including *IONCAP*) allow the specification of a minimum radiation angle. This is because, for given propagation conditions, signals at frequencies near the maximum usable frequency (MUF) travel farther with lower radiation angles. For the How's DX? curves in *QST*, the radiation angle was specified as greater than 2° from January through August 1977, and as greater than 5° beginning with September 1977. For the curves in *The Operating Manual*, the angle was specified as greater than 3°. All curves are based on dipole antennas at both ends of the radio path.

For determining the predictions in *The Operating Manual*, the latitude and longitude for both ends of the path are specified at the top of each page. For the monthly *QST* predictions, the actual points for the general locations are those shown in Table 1.

The curves for *QST*'s How's DX? charts are based on a smoothed sunspot number (SSN)[7] that is estimated ten months in advance. (The calculation of a smoothed value requires sunspot-count data for six months after the month under consideration [and six months before]. Another month is required for the data to be assembled and disseminated, and another three months for *QST* lead time, totaling ten months.) Estimating SSN values that far in advance can be a bit tricky, especially when changes are rapid—such as at the beginning of a new sunspot cycle.

So how accurate *are* the *QST* estimations? Quite good, actually, as June 1989 *QST* shows.[8] Fig 5 on p 20 of that issue plots the *QST*-estimated value against the true smoothed value that later developed for a given month. It may come as a surprise that an error of as much as 25% or 30% in the SSN value usually makes only a small difference in the resulting curves, as Fig 1 shows. Short-term propagation changes resulting from several days of solar dormancy or bursts of solar activity will likely have a greater effect on band conditions than errors in estimating the SSN.

Unfortunately, a few mechanical errors have crept into the How's DX? curves over the years. Knowing about them will help you in comparing the output of your favorite propagation-prediction program. For November and December 1987 and January 1988, the plotting mechanism slipped—the curves for all paths are plotted 4 MHz too high. (The correct frequency values may be obtained by subtracting 4 MHz from the scale value of each plot.) And the curves published in the July, August and September 1990 issues are erroneous; they are actually those for earlier months. (Corrected copies are available from ARRL HQ.[9]) Other occasional minor errors have been mentioned in the Feedback section of earlier *QST* issues.

How's DX? propagation curves for a given *QST* issue cover a period from the

[1]R. B. Rose, "MINIMUF: A Simplified MUF-Prediction Program for Microcomputers," *QST*, Dec 1982, pp 36-38.

[2]*MINIPROP* is available commercially from Sheldon Shallon, W6EL, 11058 Queensland St, Los Angeles, CA 90034-3029. (The ARRL and *QST* in no way warrant this offer.)

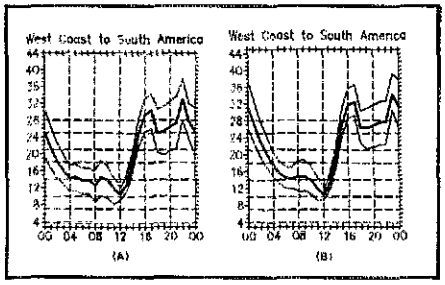


Fig 1—A difference of as much as 30% in the smoothed sunspot number (SSN) value usually makes only a small difference in the resulting curves for a given month and path. These curves, for the West Coast to South America, are for Dec 16 to Jan 15. See this month's How's DX? for details of what the curves indicate. At A, predictions for an SSN of 100, and at B for an SSN 30% higher, or 130.

[3]D. Sumner, "Chart Your Way to Better DX," *QST*, Jan 1977, pp 58-60.

[4]H. J. Sartori, "Update your HF MUF Predictions Daily," *QST*, Sep 1977, pp 35-37.

[5]C. Bixby and J. Morris, "The Art and Science of DXing," *QST*, Jan 1979, pp 11-14.

[6]E. White, "Those Propagation Charts," How's DX?, *QST*, Apr 1983, pp 63-64.

[7]Smoothed sunspot numbers are discussed in *The ARRL Antenna Book*, 15th edition (1988), pp 23-23 and 23-24.

[8]E. Pocock, "Propagation Forecasting During Solar Cycle 22," *QST*, Jun 1989, pp 18-20.

[9]Send a business-size SASE with one First-Class postage stamp and your request for DX Predictions to the Technical Department Secretary, ARRL HQ, 225 Main St, Newington, CT 06111.

Table 1

Terminal Points for How's DX? Propagation Curves

General Area	*Nearest City*	*Lat, Long*	*General Area*	*Nearest City*	*Lat, Long*
Alaska	Anchorage	61.00 N, 150.00 W	Midwest	Kansas City	39.00 N, 95.00 W
Australia	Melbourne	37.75 S, 145.00 E	Puerto Rico	San Juan	18.50 N, 66.00 W
Central Asia	New Delhi, India	28.50 N, 77.50 E	South America	Asuncion, Paraguay	25.00 S, 57.50 W
East Coast	Washington, DC	39.00 N, 77.00 W	South Pacific	Pago Pago, Am. Samoa	14.33 S, 170.70 W
Eastern Europe	Kiev, Ukraine	50.50 N, 30.50 E	Southern Africa	Lusaka, Zambia	15.50 S, 28.00 E
Hawaii	Honolulu	21.33 N, 157.80 W	West Coast	San Francisco	38.00 N, 122.00 W
Japan	Tokyo	35.75 N, 139.80 E	Western Europe	London, England	51.50 N, 0.20 W

middle of one month to the middle of the next. For example, those in the December issue cover December 16 to January 15. The calculations are performed by specifying the later month for *IONCAP*, January in this case. An exception to this procedure was December 1989 *QST*, where December was specified for the curves that appear. It is also significant to note that all paths designated as West Coast to..., Midwest to..., and East Coast to...are actually calculated for the reverse direction. In *IONCAP* this can make a notable difference in the results for some paths. One-way propagation is not a myth, as DXers will attest!

For serious work with HF propagation probabilities, *IONCAP* is available in the US and Canada for IBM® PC XT and AT computers.[10] The program is not menu driven, however, and requires a knowledge of FORTRAN input-file structure. (A hard disk is required to run the program.) The program does far more than merely provide data for plotting the maximum and lowest usable frequencies (MUF and LUF). By taking various communications-system parameters (such as antenna gain, antenna height, ground conductivity, ground dielectric constant, transmitter power, signal bandwidth, and noise environment at the receiver) into account, the program can determine probabilities for variables such as path geometry, ionospheric layers involved, layer heights, layer density, signal-to-noise ratios, and path reliability. For example, *IONCAP* data indicates that, for a given amateur band and radio path, the optimum antenna height changes with the level of solar activity.—*Jerry Hall, KITD, Associate Technical Editor, ARRL HQ*

CONVERTING THE HY-GAIN 204BA FOR 17-METER OPERATION

☐ The increased activity on the 17-meter band prompted me to see if it was possible to scale the Hy-Gain 204BA from 20 to 17 meters. The only obstacle I saw was the 204BA beta match. This matching network consists of two L-shaped, 0.25-inch diameter rods. They are attached to the driven element and the boom with self-tapping screws, making adjustments nearly impossible.

I substituted new beta rods and clamps of the style used in the Hy-Gain 402BA and Discoverer series of 40-meter beams. With the new beta rods cut to a length of 30 inches, the SWR on the 204BA was less than 1.1:1 at 18.11 MHz. Also, the replacement hardware is stainless steel (rather than zinc-plated steel) for greater corrosion resistance.

I used several computer programs to check my 204BA scaled to 17 meters: *NEC-2PC, NEC81, MININEC3* and *YO*. On the first try, *NEC-2PC* and NEC81 gave me 8.4 dBi and 26 dB F/B at 18.1 MHz, while *MININEC3* and *YO* gave approximately the same gain and F/B, but at 18.7 MHz! Because I'd read that NEC does not work properly with tapered elements,[11] I assumed that the *MININEC3* and *YO* results were more accurate. I modified the scaling factor and (using *MININEC3* and *YO*) came up with another design that gave 6.17 dBd (8.32 dBi) and 25 dB F/B at 18.1 MHz. The element construction schedule for this antenna is shown in Table 2.

Table 2
Hy-Gain 174BA Version 2.1 Tapered-Element Schedule for 18.11 MHz
(All dimensions are in inches and are for one-half of each element.)

Spacing from Reflector	Element-Section Lengths (Element-Section Diameters)				
	1.25	1.125	0.875	0.625	0.4375
0 (Ref)	44.5	46.0	25.0	24.0	30.75
97.5 (DE)	35.0	46.0	25.0	24.0	29.5
168.0 (D1)	21.0	46.0	25.0	24.0	36.5
244.0 (D2)	16.75	46.0	25.0	24.0	35.75

With the new beta match adjusted to 18 inches between the driven element and clamp, the SWR of an antenna built to these dimensions was less than 1.10. The measured radiation pattern of this antenna (now the HG174BA Rev 2.1) also agrees very closely with the results predicted by *MININEC3* and *YO*.

Production runs of the 204BA after September 1990 will include an adjustable beta match and dimensions for the HG174BA Rev 2.1.—*Roger A. Cox, WBØDGF, Antenna/Project Engineer, Telex Communications, Inc, 8601 Northeast Hwy 6, PO Box 5579, Lincoln, NE 68505*

Note: All correspondence addressed to this column should bear the name, call sign and complete address of the sender. Please include your daytime telephone number.

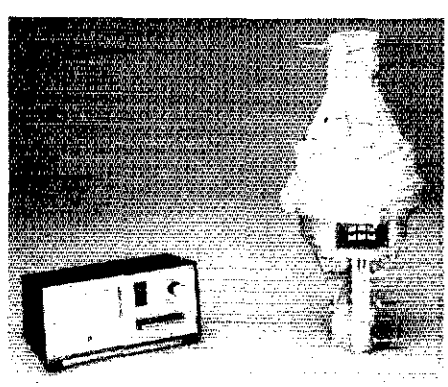
[10]Available from National Technical Information Service, 5285 Port Royal Rd, Springfield, VA 22161. *IONCAP* program for the IBM XT/AT Micro: NTIS order no. PB87130993; *IONCAP* program for the IBM AT: order no. PB89106777. Each program costs $125 plus $3 handling, for three diskettes and documentation. Order desk tel: 703-487-4600 or 703-487-4650. All major credit cards accepted. (The ARRL and QST in no way warrant these offers.)

[11]J. Breakall and R. Adler, "Pandora's Box," *The Applied Computational Electromagnetics Society Journal and Newsletter*, Vol 2, No. 2, Fall 1987, pp 47-54.

New Products

HD-73 ROTATOR AVAILABLE AGAIN

☐ After discontinuing production over a year ago, Philips ECG has resumed manufacturing the popular HD-73 dual-speed rotator. Able to handle antennas with up to 10.7-ft² wind loads, the HD-73 includes cast upper and lower mast mounts accepting 1-3/8- to 2½-inch OD masts. Maximum balanced vertical load is 1000 lb, starting torque is 400 in.-lb, and brake torque is 1600 in.-lb. The HD-73 control box requires 120 V ac.



Philips ECG products are available through Philips ECG distributors around the country. To locate the nearest distributor, look under "Electronic Equipment and Supplies" in the telephone directory yellow pages, or contact Philips ECG, 1025 Westminster Dr, Williamsport, PA 17701, tel 800-526-9354.—*NJ2L*

Strays

UP, UP AND AWAY

Listen around 28.866 MHz for a distinctive CW beacon and message from N9JL/B, as a group of hams from White Heath, Illinois, launches a high-altitude experimental balloon on Saturday, December 1, 1990 at 1530 UTC (backup date is December 2). The balloon and its 1-W payload is expected to reach 100,000 feet. The ground tracking net will convene on 7.155 MHz, with NCS WE9E. Send reports and QSLs via Jim Lutz, KA9WWA, 2032 Adams St, Rolling Meadows, IL 60008.

QST **Profile:**

April (WA6OPS) and Joe (KØOV) Moell—At Your Service

This ham radio couple is serious about public service, but they're the first to admit that helping others is infinitely rewarding—and a lot of fun!

By Lenore Jensen, W6NAZ
14867 Round Valley Dr
Sherman Oaks, CA 91403

They met because of radio—but it wasn't the amateur kind. That was his hobby but not hers (at first). Today, it's a consuming interest for both April, WA6OPS, and Joe Moell, KØOV. And Amateur Radio is mighty proud of them. More about that, later.

"I was hired by an FM radio station in Lincoln because I was familiar with classical music and they urgently needed an announcer," Joe recalls of his summer job gained after his first year at the University of Nebraska. "I was eager to work somewhere in electronics and that was the closest I could get." He'd become KNØOVV at age 11 and spent every spare moment in high school experimenting with the fascinating world of radio.

April remembers hearing his classical music programs and admiring his voice. She says, "I used to keep track of selections that I liked but didn't have on records, so I thought I'd call in a request. Apparently, my choice was unique and he liked it, too."

She called again. Short calls turned into long conversations. They met, this time at his request, about three months later. She was enrolled at the University to study zoology and physiology. They continued to see each other and enjoy musical activities. By graduation, April had her own program at the classical music station while Joe announced and was Chief Engineer (there, and at a country western station, too).

Not surprisingly, they married in 1969. And lived happily after, pursuing their

rigs and try new modes.

As a teenager, he had convinced his folks to let him add a 75-meter mobile converter to the family car radio; he added a BFO in an attempt to understand the new-fangled mode called SSB.

Earlier, he had "learned by experimenting" with all sorts of home-brew ideas. He even tried bicycle mobile and building his own oscilloscope. Joe marvels that he "survived some high-voltage experiments" and now advises students never to try them!

April's interests are in working with people. Her joy is assisting patients in regaining their physical or mental skills for everyday living, helping victims of strokes, accidents or certain diseases. She didn't realize then that Amateur Radio would help her in an unusual way.

It took almost seven years of observing Joe's fascination with "his gadgets" before she decided to join in. "I always thought ham radio could be helpful in an emergency, but T-hunting did it," April admits. Joe, who is now an ARRL Technical Advisor specializing in radio direction find-

It wouldn't be Christmas for the Moells without the North Pole Network. April, WA6OPS, introduces a hospitalized youngster to Santa via Amateur Radio.

ing, invited her to accompany him on a T-hunt (hidden transmitter hunt) put on by the Fullerton Radio Club. April found the event to be a lot of fun. "It was something we could do together," she says.

April earned her ticket in 1976 and plunged in deeply; because of her dedication to helping others, she was always alert to opportunities for public service. One day at the hospital, a newly hired nurse, Mrs Carl Young, not knowing of April's ham license, mentioned that her late husband, WB6ECW, had left a complete set of Kenwood "twins" and a Hustler 4BTV antenna. "Is there any way this equipment could be of any benefit to patients?"

Could it! Myra Young is amazed at what happened. With encouragement and support from Administrator Sister Jane Frances, April founded "Rehab Radio" so that each week patients could be brought down to WD6BPT ("Bed Pan Trainers") to participate in the Amateur Radio station operation as part of their treatment program. All were encouraged to speak by the microphone to the "outside world."

"Remarkable results have happened," reports April, "such as one unmotivated stroke patient who had lost the use of one side of his body. He talked to a quadriplegic ham in Idaho who had earned a PhD, a professorship and the ability to drive a car! Suddenly, our patient exclaimed, 'Well, if he can do all that without the use of four limbs, I darned well better do something for myself with my two!' With that, he charged off to his physical therapy session with renewed confidence."

Of course, not all QSOs produce such dramatic results, but more than 1000 patients have been "motivated, stimulated and oriented" by Radio Time. Although April is now in private occupational therapy practice, she continues to maintain the Radio Time station as a volunteer, assisted by Joe and other hams from the Fullerton Radio Club. They're also taking the Rehab Radio program to Children's Hospital of Orange County (CHOC).

But there's more: On the day in November 1979, the St Jude's telephone system suddenly went out, leaving the staff without the ability to call from one unit to another, April used her hand-held to alert nearby hams who rushed to help. "That was the impetus for the birth of Hospital Disaster Support Communications System, now a part of Orange County's ARES. There are presently 34 hospitals, including HDSCS, in the disaster plan. HDSCS members have been willing to drop what they're doing and rush to where they're needed. Even more importantly, they have been eager to learn about the uniqueness of hospitals' communications needs and medical disaster planning."

Because of this training, they have proven their value to the local hospitals in such incidents as the Whittier earthquake and a recent 23-hour hospital phone outage. Hospital emergencies are not rarities—HDSCS has responded to two earthquakes, eight telephone failures, one bomb search and one hazardous material spill in its ten years as a formal organization. "We didn't search for the bomb or clean up the spill," said April, "but we provided important communications and were ready in case coordination of patient evacuation was required."

April has been asked to give talks and write articles on the role of Amateur Radio not only for amateur publications, but medical ones as well, such as the *Journal of Emergency Nursing Services* and the *Federal Emergency Management Agency Newsletter*.

Christmas is a special time for Joe and April, when Santa appears via the "North Pole Network." Joe was not content merely to let children confined to the hospital converse with the man in the red suit via radio. He worked out a scheme for "Santa Vision" via the institution's audio-visual studio, so the old boy could be seen in all his glory, waving and calling the kids by name (to their surprise) as he appeared on the TV set in their rooms. April and other North Pole Communicators carry VHF hand-helds so the children can talk directly to Santa. This has been a regular event at St Jude and CHOC every December since 1976.

The Moells are regular participants in Field Day through their clubs, strong believers in publicizing our hobby/service whenever possible, organizing classes and providing welcome "Elmer" help. They serve on the Board of Directors of Fullerton's Youth Science Center, encouraging youngsters to get involved in science activities and Amateur Radio.

Joe's written a section on practical T-hunting techniques for the *1991 ARRL Handbook*, as well as articles for several magazines, including *Mobile Radio Technology* and *WorldRadio*. He and Tom Curlee, WB6UZZ, have coauthored a book, *Transmitter Hunting—Radio Direction Finding Simplified*. He's used his direction-finding skills many times to track down electrical interference for other hams, locate RFI sources in solar pool heater controllers, TV booster amps, thermostats on kitchen ovens and other such terrors.

He feels that "every time you go out on a T-hunt, it's a fresh new game, always a different challenge. You never know where you'll end up and what you'll find when you get there."

Oh yes, April and Joe still find time to enjoy music together. She plays her oboe in the Anaheim Community Band and the Bellflower Symphony Orchestra. Joe goes to all the concerts and plays the recorder—the tape recorder, that is.

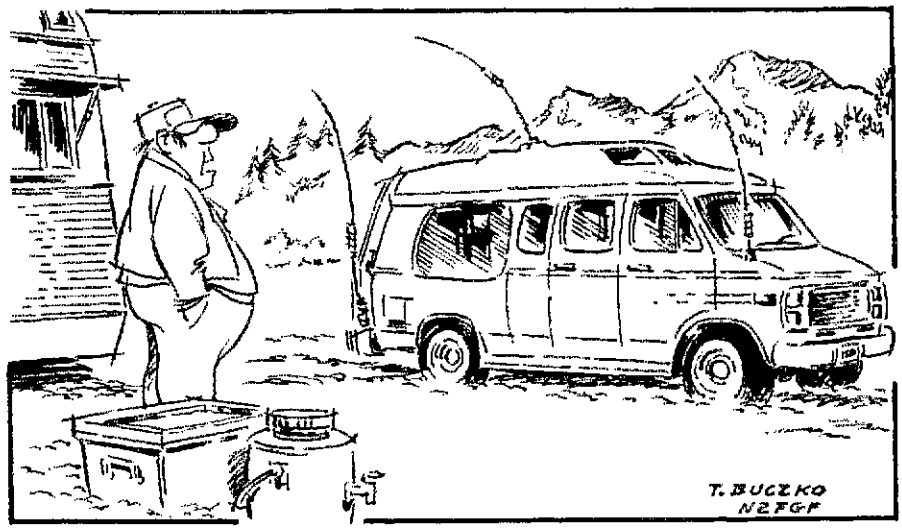
One of April's hobbies is her collection of nine birds: a canary, an umbrella cockatoo, three finches and four parakeets. One of the latter learned to chirp CW after too much listening to the ID on a local repeater.

They're definitely a happy ham family.

Christmas Regained

A road trip leads to a rewarding Christmas celebration—in a most unusual way. . . .

By Bruce Vaughan, NR5Q
504 Maple Dr
Springdale, AR 72764



Ted was somewhat apprehensive as he climbed aboard the new motor home. He'd been driving the old pickup camper for years, but this was his first experience with a 32-footer. He waved to the dealer and, with a look of confidence he didn't feel, pulled into the afternoon traffic.

The 45-mile trip home was good experience. By the time he rolled into the driveway, Ted was sure he and Lois would be spending a lot of time in this RV. It was so plush he almost felt guilty, but he remembered how he and Lois had worked and saved for their retirement. Ted had put in 34 years with the Fire Department and Lois had worked 15 years at the hospital. Now, with their son Kevin living in Wyoming and daughter Melissa in Utah, they decided that an RV would mean more trips to see their children and grandchildren.

It's quite a distance from Oklahoma City to Salt Lake, then on to Cheyenne. It would be a pleasure to make the round trip in such luxury. Ted even had room for his old Kenwood TS-520S and the 2-meter rig, and the motor home came equipped with a CB. It was standard equipment on this model.

Ted hurried into the house shouting, "Lois, Lois, come here and look at what we're giving each other for Christmas. Better put your jacket on, it's rather chilly today."

Lois was excited as she stepped into the big coach. "I love the colors in the bath and bedroom," she said. "When we placed the order, I was hoping the colors would be the same as those in the sample book. The large freezer and refrigerator are so nice; we can prepare meals ahead of time. All we'll have to do is pop them in the microwave."

The next few days were busy ones for Ted and Lois. Ted installed his radios and antennas, checked all the systems and stocked the RV with food, clothing and enough tools to do a major overhaul on the motor home and the radios.

Lois prepared food, wrapped Christmas presents and ironed and folded clothes. At night, they planned their route and the stops they wanted to make along the way.

Ted and Lois called Kevin on the phone and suggested he, Sally and their five-year-old, Alan, fly to Salt Lake. There they'd spend Christmas, then travel to Cheyenne with Ted and Lois in the motor home. The motor home had two full-size beds and a pull-down bunk. After a brief discussion with Sally, Kevin said, "That's a great idea, Dad. We've thought about buying some kind of RV. This would give us a chance to try RVing and spend some time with you and Mom. Alan will love it. We'll meet you in Salt Lake on the 23rd of December."

"There are so many places I want to visit along the way," Ted told Lois, "We'll have to leave by the 10th if we're to get to Salt Lake by December 23rd. I've been thinking . . . I'm going to rent a Santa Claus suit and do the thing up right. Won't they be surprised to see this motor home drive up and Santa get out with his sack of presents?"

Ted was so excited, he hardly slept the night before they left. He went over the route they had planned until he knew every village and town along the way. They planned to stop at Albuquerque the first night, then on to Santa Fe, Taos, over the mountains to Chama, then west to Farmington, Shiprock, Kayenta and north to Moab, arriving at Salt Lake two days before Christmas.

The December weather began to turn wintry during their stop in Taos. Ted watched the weather reports on TV and decided they should leave a day early for the trip over the mountains to Farmington. The morning of the 21st, Ted and Lois were awakened by a gusty north wind rocking the motor home. Light snow began to fall as they ate breakfast.

"Let's spend the day here in Farmington. Maybe this snow will stop. We'll still have two days to get to Salt Lake," said Ted.

"That's fine with me," replied Lois. "I don't like to travel in bad weather."

The snow had stopped by morning, but dark clouds still covered the sky. The icy north wind made it seem much colder than the 22 degrees indicated by the thermometer. Only small patches of snow were on the road, most having been blown off during the night.

"Let's get underway," said Ted. "I'd like to make it to Moab today. Then, if the roads stay clear, it'll be an easy drive to Salt Lake."

The drive to Shiprock was easy. The traffic was light and the crosswinds didn't cause any problems for the large motor home. About 40 miles west of Shiprock, snow started falling—sometimes so heavy that it was difficult to see the road. Ted was worried. He knew he could turn back, but he remembered there was plenty of RV parking up ahead at Mexican Water. He decided to keep going, even though the roads were getting slick. If he came to a place where he could park off the road, he would.

As she peered through the windshield, Lois saw an oncoming pickup skid off the road and yelled, "Ted, look out!"

Ted had already started bringing the motor home to a slow stop. He snapped on his hazard lights, grabbed his coat and jumped from the coach.

A young Navajo man stepped from the pickup. "Is anyone hurt?" asked Ted.

"No, I don't think so," answered the

Navajo. "I'm taking my wife to the clinic in Shiprock. She's going to have a baby. Do you think we can pull my pickup back on the road?"

Ted remembered he had considered ordering a winch on the motor home. Now he wished he had done so. "I'll give it a try," said Ted. "I have a tow cable. I'll tie it to the hitch and you tie it on to the rear bumper of your truck."

With the cable secured, Ted placed the transmission in low gear and started pulling ahead slowly. When the tow cable was taut, he could feel the wheels start spinning. Ted knew it was hopeless. The snowstorm was getting worse.

"Let me get on the radio and see if we can get some help," said Ted. "You and your wife come on into the motor home. I'll have Lois put on the coffee pot. If your wife isn't feeling well, she can lie down on the bed."

Ted had been monitoring the Farmington repeater since early morning and knew he was almost out of range. He keyed the mike and was relieved to hear the machine identify. "Mayday, Mayday," spoke Ted into the mike, "This is N5GIY mobile, does anyone copy?"

Ted heard the speaker come to life. "N5GIY mobile, this is KA5QJO, what is your problem and how can I help?"

Quickly, Ted told of their situation.

"Sorry, Old Man, but I'm afraid you're on your own for a while. The roads are closed to all but emergency traffic. I'll contact the State Police and see if I can get help on the way. Meanwhile, keep your radio on and I'll keep in touch. N5GIY mobile, this is KA5QJO."

"Okay, thanks," replied Ted. "Please hurry, I don't think we have all night."

Lois passed a cup of hot coffee to Ted and the radio crackled, "N5GIY mobile, this is KA5QJO."

"Go ahead, KA5QJO," answered Ted. "Have you any help on the way?"

"I contacted the State Police and they said to tell you they'd be there as quickly as possible. The snow drifts have the road impassable to all but four-wheel-drive vehicles," replied KA5QJO. "They said to tell you not to expect them for a few hours."

Ted thought a minute, then replied. "Just in case the baby decides to get here before the police, could you get a doctor to come to your shack and stand by in case we need some advice?"

"Tell you what," replied KA5QJO. "I think I can do better than that. I'll give Doc, N5HAP, a call on the phone. If he's home, I'll have him monitor you from his place."

"Great!" replied Ted, "N5GIY, standing by."

In a few minutes, Ted heard, "N5GIY, this is N5HAP. My name is Doc. Tell me about your situation. Do you have heat, food and water? What medical supplies are you carrying? Do you have a generator? How is your fuel supply? And the lady who's expecting . . . is this her first? What is her age? Over."

Ted turned to the young man and said, "In all the confusion, I didn't even ask your name. I'm Ted."

"My name's Joe," answered the Navajo. "My wife's name is Mary. We have two children. Our boy's six and our little girl's four. My younger brother is staying with them, so they'll be fine."

Ted gave Doc the information he wanted.

"One more thing, Ted," answered Doc on the radio, "Time her contractions and call me right back."

"N5HAP, this is N5GIY mobile. Her pains are coming about every four minutes. By the way, I've had a little medical experience with the Fire Department and my wife is an LPN. Things could be worse."

"They sure could," answered Doc, "And you're about to deliver a baby."

The baby came at 9 PM, fifteen minutes before the State Police arrived. During the delivery, Doc offered advice and encouragement. They must have done it right, because Mary and Joe's children now had a new baby brother.

Joe and Mary decided to stay in the motor home, rather than go into Shiprock. Mary didn't relish the 40-mile ride in the snowstorm with her newborn child.

Before leaving, the police pulled Joe's pickup back on to the road. "The snowplows will be through tomorrow," said the trooper. "You'll be fine here tonight. You won't be bothered with traffic."

Ted called KA5QJO and asked him to phone the kids in Salt Lake City to tell them they'd been delayed. About noon the next day, as promised, the snowplows came through clearing the roads. Joe, Mary and their newborn son prepared to return home. "We live down the road about 20 miles," said Joe, "You had the ham in Farmington call your kids and tell them you'd be late. Please stop at our place. I want you to meet our other children—you can leave in the morning for Salt Lake."

"I'd like that," replied Lois. "And I'm sure Ted would like it too."

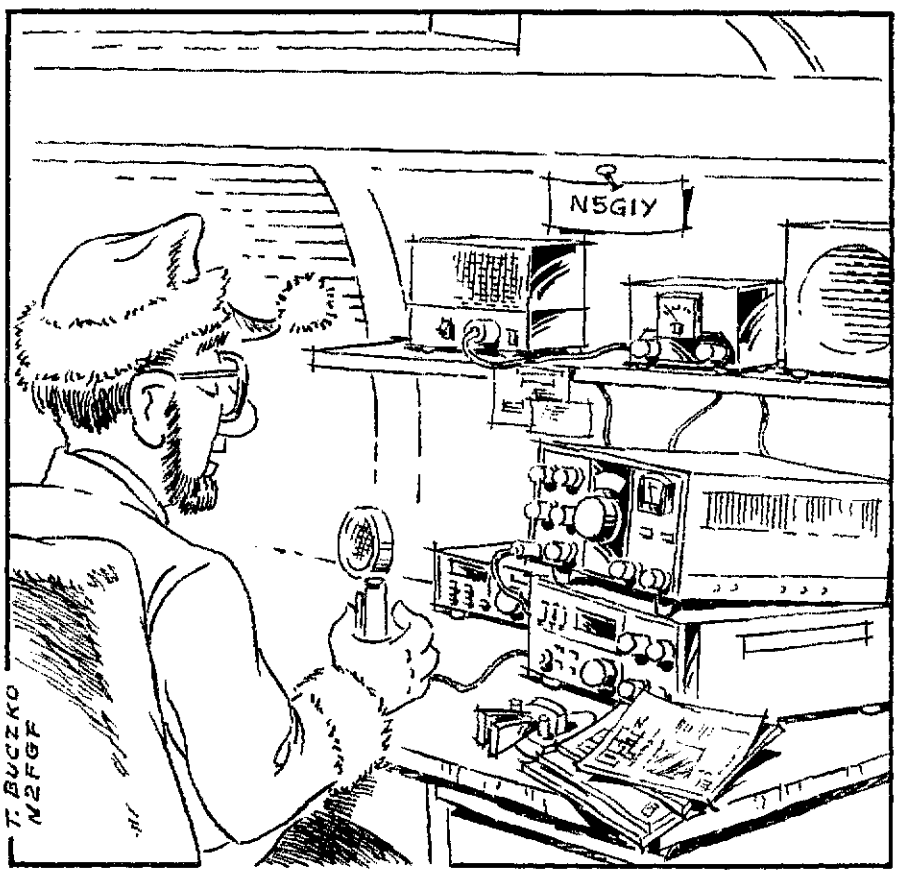
"I have a better idea," said Ted, calling Joe aside, they talked for several minutes.

After Joe and Mary left in their truck, Ted turned to Lois and said, "Dig into those presents and choose a couple for a six- and four-year-old while I slip into my red suit. Santa is about to pay a visit."

On a bright and sunny Christmas Eve morning, the motor home pulled back onto the highway. "That was some experience," said Lois. "I really enjoyed last night. Did you ever see two children so excited?"

"No," answered Ted. "We tried so hard to spend Christmas in one place, only to find the true meaning of Christmas in another. There's probably a lesson here, if we stop to think about it."

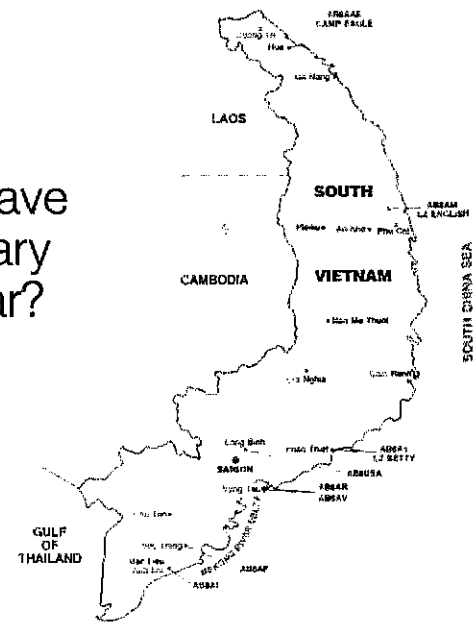
Lois smiled. "You figured it out long ago, Ted. That's why I've put up with all those antennas on top of the house for these past forty years."



Calling Home from Vietnam—*Part 2*

Could Field Day and NTS traffic handling have prepared anybody for serving with the Military Affiliate Radio System overseas during a war?

By Dennis R. Vernacchia, N6KI
8993 Covina St
San Diego, CA 92126



By the end of July 1968, Jack Winning, WA6WDB, had secured a new site for AB8AY and had a concrete pad poured for a permanent building. We got materials through "midnight supply," but still needed permission to erect the building. When we didn't get it, we put up a 16- × 20-foot Quonset hut Jack had found.

He did more horsetrading and came up with two telephone poles to support the antennas. As I dug the holes for the poles, I kept hitting old artillery-round canisters. I later learned that the station was sitting on an old—unexploded—ammunition dump site.

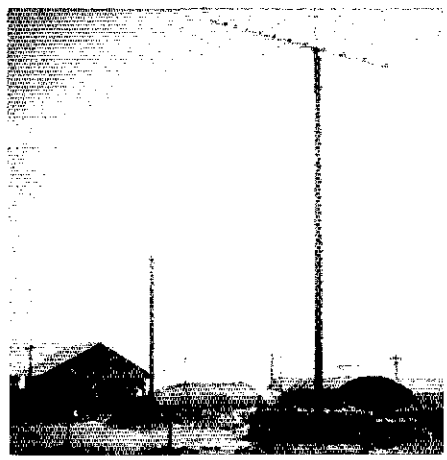
I erected two poles, 60 and 37 feet tall, and put the quad on the taller one. I was nervous about my first transmission, not knowing what effect 500 W of RF would have on the unexploded armament below me...fortunately, none.

After fruitless requests to US Army Vietnam (USARV) headquarters for new equipment, Jack contacted the Pentagon. In a few days, I picked up two new Collins KWM-2As, 30L-1s, 312B-4 station controls with patches and other equipment. I could have gotten Collins 30S-1 (2-kW) linear amplifiers, but my ac power came from diesel generators and 220 V ac was not available.

Our quad antenna was demolished by mortar fire in September 1968. Fortunately, I got wind of some Hy-Gain LP-1007 log-periodic antennas in storage in Long Binh.

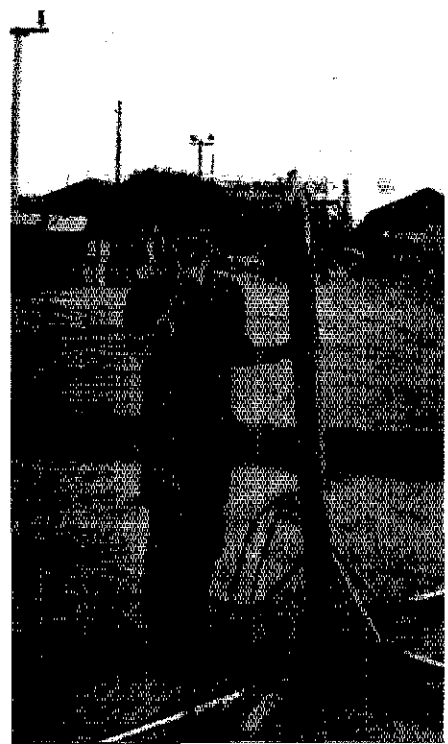
I talked the pilot of a Bell UH-1 "Huey" chopper into flying down to get the two antennas; I neglected telling him that the shipping crates were 17 feet long and weighed more than 200 pounds each. The chopper looked like it had wings when it lifted off.

While trying to figure a way to get the first LP-1007 up, I got on the air with the antenna about three feet off the ground and ran stateside patches with it!



Both log-periodics in place at AB8AY. To the right of the building is the concrete pad on which permission to build a permanent structure was never granted.

The author assesses damage to the AB8AY quad.



A "cherry picker" got the first LP-1007 up on the short pole, but we had to talk a chopper pilot into airlifting the other antenna to 60 feet with the help of a brave pole climber. Yankee was soon on the air with the loudest signal from Net No. 5. Even AB8AV, running a 30S-1 amplifier with twice our power into a 5-element 20-meter monobander, couldn't outdo us. Yankee was the first to make and the last to lose CONUS contact.

In October, I finally got a permanent second operator, Mel Ure, from the 116th Combat Engineering Battalion. Mel came to Yankee with no radio experience, but a strong carpentry background. Mel became a good radio operator and we put his building skills to use.

By December, personnel at Landing Zone Betty could call home at least once a month. Line troopers on stand-down and resupply were given priority, because it was almost impossible to patch them through while they were out on missions. We operated mobile, too—one of the 101st Airborne MARS stations operating near Hue installed an HF transceiver and whip antenna on a jeep to run patches in the field and from remote bases.

There was a floating MARS station in Vietnam, AB8AR, on the *USNS Corpus Christi Bay*. This ship was stationed just off the coast of Vietnam near Vung Tau and was assigned to our Net No. 5. "Alfa Rowboat," as we called her, was a floating aircraft frame and engine repair and overhaul facility. Tim Stone, WB6YCQ, and Roosevelt "Rosie" Hall, WB4IEZ, were two of her Army radio operators.

Aboard the *USNS Corpus Christi Bay* and AB8 "Alfa Rowboat." Hams shown here are Tim Stone, WB6YCQ (in the foreground), and Roosevelt "Rosie" Hall, WB4IEZ (on the far right behind the console).

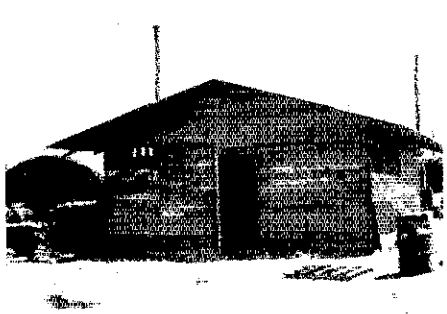
Whenever our primitive troposcatter phone system wasn't busy with tactical communications, I'd set up a link to bases as far away as the Cambodian border. These remote base camps had no MARS stations and their personnel rarely got to call home. Links to Gia Nghia (80 miles northwest) and Ban Me Thuot (150 miles north) were set up every few weeks. The links often fell prey to tropo conditions, equipment breakdowns and enemy attack.

We could run 10 patches per hour on a good day or as few as two or three on a bad one. Patch totals approaching 1000 were common for December because of Christmas calls. Patch contents ran from mundane subjects such as, "How's the dog or cat?" to a couple getting married over the airwaves. Future marriages were planned and newborn babies' cries were first heard over the radio by proud fathers.

No tactical or injury information was permitted, as it was easy for the Viet Cong and Army of North Vietnam (NVA) to listen in. One never mentioned exactly where one was calling from, but could get around that restriction by saying "I'm calling from the place I write to you from." By providing the caller a small booth and a Model 500 dial telephone (with a lantern battery for talk power), a sense of privacy was achieved.

Even though the radio operators at both ends of the circuit were privy to every word spoken, we were usually too busy tuning out interference or getting the next party on the line to remember much, other than the word "over" being said so we'd know when to flip switches.

Whenever any of our base camps came under mortar or rocket attack, we'd utter the code words "Roman Candles," terminate the patch immediately and head to bunkers or fighting positions. All five stations in Net No. 5 were hit at least once during my one-year tour. AB8AF at Soc Trang was severely damaged in November of '68. Luckily, operators Al Fromm, AL7C, and Greg Pronobis, WA9NWK,



The new and final AB8AY building, with the old bunker on the left.

"Pirate" Radio from Vietnam

By James E. Kearman III, KR1S

After graduating high school, I joined the US Air Force in late 1965, becoming a radio repairman. I went to Vietnam in the middle of the Tet Offensive of February 1968, to join the 21st Tactical Air Support Squadron.

My training took place at "Tiger Town," the South Koreans' gigantic division headquarters. The USAF detachment radio room was atop a mountain adjacent to the base, reached by negotiating a narrow, twisting road. Our radios were aircraft sets, installed in cabinets that could be sealed against dust and water, and mounted on a pallet that replaced the back seat of a jeep. The HF radio operated AM, CW and SSB, on 1-kHz channels. It ran about 400 W to a 40-foot sectional whip, with the same setup serving for fixed-station use at division and regiment headquarters.

After a few days' training, I was put on the midnight shift. As we had no *operations going at the time, after an hour or so I yielded to temptation and* tuned up to 20 CW. I heard signals here and there: JAs, VKs and ZLs, coming through like locals!

I found a dusty J-37 straight key in the desk (we used only voice) and went back to a VK's CQ. Not knowing what else to do, I signed my stateside call! I must have been pretty loud and I hadn't heard any US stations when I was listening, so I had a *big* pileup when I signed with the unsuspecting VK!

But my transceiver was designed for fixed-channel use and it was impossible to pick out one signal. So much for CW DXing.

A few weeks later, I was transferred to a Korean regiment whose base camp was near Phu Cat air base. The air base had a MARS station, but a range of mountains to the east made running phone patches impossible most of the time. When our team was in the field, however, our command posts were usually on top of those mountains to provide better security and visibility, right out to the South China Sea. (We transported the radio jeep by helicopter).

Sometimes there was nothing to do for several hours, and I'd get on 15 or 20 meter SSB. By then, I had decided to append "aeronautical mobile" to my call—being in the Air Force, I wasn't about to use "maritime mobile!"

I wish I could have signed "/XV5," but I was afraid I'd be court-martialed! Besides, the inevitable pileups would have been impossible to work with that radio, and I wouldn't have counted for DXCC because I was unauthorized.

My most memorable contact came in the summer of 1968. I hadn't heard from my girlfriend in a few weeks, and I was bored and lonely. It was 10 PM back home, so I got on 20 and called "CQ Buffalo, New York, for a phone patch."

A ham in Baltimore called and offered to help. Although the propagation was poor, I was able to talk with my YL friend for a few minutes, which helped my morale considerably.

I never kept a log over there, so I have no idea who this fellow was. Only later *did I learn that he paid for the call himself. On the off-chance that you're reading* this now, OM, many belated thanks!

Jim Kearman, KR1S, formerly WB2EDW and W1XZ, is a freelance technical writer and author of The DXCC Companion *(Newington, Connecticut: American Radio Relay League, 1990). He lives in Canton, Connecticut.*

were not injured.

AB8AI had been hit so many times we decided to call them "Alfa Incoming" instead of Alfa India. They were never able to erect and keep a decent antenna in the air for any length of time. One of my most terrifying experiences was when a VC suicide squad penetrated our perimeter defenses and came within 300 feet of the MARS station before being stopped.

By the end of January 1969, Yankee's Quonset hut was too small to handle our walk-in business. The cement pad nearby was still empty—we couldn't get permission from the Post Engineering Officer (PEO) to erect a permanent building—so we prefabricated as much of the building as we could. Then we waited for the PEO to leave the base camp for a few days, knowing that an "acting" officer might be easier to deal with.

Our golden opportunity came at the end of February. In five days, Mel and his crew of combat engineers put the building up. Jack ramrodded all the necessary paperwork through with phony signatures. We even had an official ID number painted on the building. When the regular PEO came back, he was furious, threatening to tear down the new MARS station.

After receiving many "fragging" threats from MARS users, he backed off.[2]

Our new 20- × 30-foot building had a larger waiting room, two soundproof calling booths, two complete operating positions so we could run two frequencies at a time, a small workshop and sleeping quarters for the radio operators. Our smallest operating position was larger than the original MARS bunker.

The author inside the bunker at AB8AY, Phan Thiet, Vietnam, in 1968.

In April 1969, the station license was transferred to the 101st Airborne Division and in May 1969, I left Vietnam and the Army.

By the end of 1970, the MARS program appeared to be under better administration than when I was operating Yankee in Vietnam. A MARS Operating Instruction manual had been published by the Department of the Army and most of the problems in obtaining new or refurbished equipment seemed to have been resolved. There was still no mention of how Army MARS operators in Vietnam were assigned to stations. To this day, I know of no Military Occupational Specialty ever being created specifically for Army personnel, although Air Force and Navy/Marine Corps operators in Vietnam were permanently assigned to stations.

In January of 1971, while attending Arizona State University near Phoenix, I signed on as a volunteer operator with AFA7UGA. This station belonged to US Senator Barry Goldwater, K7UGA, and was manned by area hams who kept the Air Force MARS station operational from 6 AM to midnight daily.

Between 1965, when the first MARS stations were established in Vietnam, and 1973, when US forces left, an estimated 2,830,000 phone patch calls were made to and from Vietnam—about one call for every man and woman who served in Vietnam. Hundreds of thousands of radioteletype messages (MARS-grams) were also handled on the system.

At its peak, MARS comprised 80 stations on the air from Vietnam: 46 Army, 22 Navy/Marine and 12 Air Force. From 1965 to 1973, 1800 hams in uniform manned MARS stations in Vietnam. More than 50 military MARS stations and 250 civilian MARS stations were in operation in the US during the war. Upwards of 2500 stateside hams served as MARS operators "on the receiving end." And MARS operators are once again running phone patches for military personnel in a troubled area: this time, Saudi Arabia.

Dennis Vernacchia, N6KI, lives in San Diego, California, and works as an electronics consultant. He's active on HF and VHF.

Jack Winning, WA6WDB, lives in California City, California, and works as a field engineer at Edwards Air Force Base.

Mel Ure lives in Baker, Oregon, where the author recently located him after 20 years. They are "catching up on old times."

Al Fromm, AL7C, lives in Anchorage, Alaska.

Calling Ex-MARS Operators:

MARS officials have asked Paul Scipione, AA2AV (also Army MARS operator AAR2WH), to write a book on the official history of MARS operations during the Vietnam era (1964-73), the most active period in the 65-year history of MARS. Dennis Vernacchia, N6KI, and Scipione have interviewed 100 Vietnam-based and 50 US-based MARS operators, but there are thousands more who haven't been heard from. If you're a Vietnam-era ex-MARS operator or know one, write Scipione for a questionnaire. Remembrances, photos and your present call sign and QTH will be compiled and listed in a special section of the book to help reunite old friends. Contact Paul Scipione, AA2AV, 5 Burr Dr, Metuchen, NJ 08840; tel 908-548-8096.

[2]"Fragging" is a term that referred to assassinating one's own officers by throwing a live fragmentation grenade into their quarters. Soldiers stressed by prolonged combat occasionally threatened superiors with this fate when the latter issued extremely dangerous or unpleasant orders.

The author in his shack in San Diego, California, 1990.

M-V Island?

An intrepid group of veteran hams braves the elements on a remote offshore DXpedition—and lives to tell the tale!

By Anthony Spino, WF1N
47 Madison Avenue
Waterbury, CT 06706

What is it that makes grown men leave the warmth and comfort of their homes, the loving environment of their families and a fully equipped shack (whether of the "big gun" or "little pistol" variety) to brave ill winds, frigid weather, weeping skies, storm-tossed ship passages, personal discomfort and even danger to put a "rare one" on the air?

The answer is the lure of Amateur Radio and the chance to be in demand from the multitudes around the world who want to put another notch on their belts, or coax. When our own station doesn't cause thousands to come calling, yielding the sounds that only a pileup can generate, the need to be on the other end can grow to unbearable proportions. Operate W1AW, as I have, and that taste of being wanted further sharpens the appetite for operating from a QTH much in demand. The adrenalin rush becomes addicting and the need to visit a truly out-of-the-way place in order to be wanted grows! And so it went, the need growing until I could no longer ignore it.

A Plan is Hatched

To undertake such a momentous task requires more than one pair of hands. One must seek out other like-minded individuals to share the burdens and joys. Dear old Dad, Sam, K1SCN, and Rich, NT1I, fit that bill. A DXpedition was born, and planning began.

So much to consider; the early stages of talking yielded the first major obstacle to overcome—the pitiful state of our collective checkbooks. Actually, it didn't involve our checkbooks at all, but rather our "squirrel funds." Ham radio expenses do not have any impact in any measure on the household budget. While our XYLs are tolerant of towers, wires, weird hours of operation and telephone calls in the wee hours of the morning heralding a "new one," the house's money is *the house's money*. Thus, the importance of our individual squirrel funds. There isn't an amateur alive who doesn't have such a fund.

Christmas Island, South Sandwich Island and other QTHs of that ilk were quickly ruled out. Our combined resources limited our range of travel to New England. Not wanting to give up what is, admittedly, every DXers dream, we talked on. Several years ago, during the sunspot lull, I had learned about the Islands On the Air (IOTA) Program administered by Roger Ballister, G3KMA, for the Radio Society of Great Britain. I'd been chasing islands casually since that time and had even gotten Rich interested. While the bulk of our frenzied calls to each other revolved around an all-time new one for DXCC, we did call each other during more civilized hours, to announce a new island, too. IOTA telephone calls tended to be longer and about other subjects, as opposed to DXCC calls which resulted in a mad dash down the stairs at full speed while repeating over and over the frequency (both TX and RX) of the DX station.

A study of the *IOTA Directory*,[1] much like the DXCC List, yielded several possibilities within range of our pocketbooks: the Maine Islands, Block Island, or Martha's Vineyard. Thus began planning in earnest for what we came to call our Poor Man's Mini-DXpedition.

Not unlike the legendary Babe Ruth, Rich, NT1I, executes a "called shot," placing sinker and monofilament line square over the intended tree branch. The home-brew G5RV antenna was up in no time. *(WF1N photo)*

To Rent a Shack

A place to operate from was the first order of business. Given our quirks and oddities, we decided that operating from a tent on a beach, cooking over an open fire, to the steady hum of a generator, did not suit our styles. Sam and Rich had enough of that while in the service of their country and were not about to inflict it on themselves voluntarily. I'd never experienced life close to nature. Hardship was having the showerhead massager go on the fritz. I get testy if I can't shower quickly after beginning to perspire—ask my DXpedition mates. In other words, we wanted solid walls, running water, ie, plumbing connected to incoming and outgoing lines and electricity for cooking supplied by a faraway, quietly operating utility company; oh yes, it would also come in handy to run the rigs.

A colleague at work had just bought a condo on Martha's Vineyard. That helped us to narrow the choice of "DX QTHs" from three to one. I spoke to Gail at the salt mines the next day, described what we wanted to do and what our requirements would be for antennas, etc. Her condo and the complex sounded nice, but when you factor in antennas, it wasn't going to work. As it turns out, we wound up renting a house on the Vineyard owned by a friend. DXpedition planning resumed in earnest.

All Ahead Full

We decided on two stations using

[1]For the latest copy of the *IOTA Directory* and a complete information package about the Islands on the Air program, send $4 to Chod Harris, c/o *The DX Magazine*, PO Box 50, Fulton, CA 95439.

Kenwood TS-940AT HF transceivers, Dad's and mine. Antennas would be the club's Cushcraft A3, a vertical for 40 meters and a home-brew G5RV. As the house was fully equipped with a deck, outdoor grill, dishwasher and microwave oven, logistics would be easy. Our wives contributed a complete meal we could toss into the microwave. Lest you think we had it too easy, let it be known that the microwave was a model with which none of us was familiar; there were stressful moments when we were truly worried about being able to eat. Fortunately, being hams and, therefore, technically inclined (meaning it took the three of us to get it operating), we were able to provide ourselves with hot, nourishing food.

There was one aspect of our trip we felt was overdone, namely, the round trip fee for the ferry from Woods Hole, Massachusetts, to Martha's Vineyard. It was the better part of $100. I don't suppose the 3Y5X Club Bouvet team would be sympathetic over our marine transportation costs, though.

The Friday morning of our departure dawned cloudy, accompanied by snow and freezing rain. We comforted ourselves with the fact that temperatures would moderate as we left inland Connecticut for the shores of distant (about three hours) Massachusetts. The drive was uneventful, if slow, and we arrived at the ferry slip with plenty of time to make our 1:00 reserved time. The crossing was a bit rough. I'd have felt a whole lot better if I hadn't seen three 18-wheelers drive onto the ferry behind us. One of them was a flatbed loaded with bricks. I'm no maritime engineer, but I do know that a tractor-trailer loaded with bricks on one side of the ship and another one—probably loaded with goose-down vests or potato chips—does not balance. Thankfully, we didn't sink.

Seeing our weekend QTH calmed our wave-tossed stomachs; the house was in a perfect setting. We chose to erect the vertical in the front yard, the tribander in the back and the wire in the vacant lot to the side. As is required for erecting antennas, the weather was cooperative; equal parts of snow, sleet and freezing rain blended with steady rain. The antennas went up without too much trouble. We only had to run inside a few times to thaw numbed fingers, although we did assemble the vertical in the kitchen...and the dining room and the living room.

We set up radios in two locations, one on the dining room table. It was the main station and was used mostly on 20 meters. By rearranging the furniture, which required disassembling the kitchen table and rebuilding it in the downstairs bedroom, the second operating position was set up. The first order of business was to check the SWR to the antennas. Wet things are good conductors of electricity and RF: 1.6 to 1 or less on all skyhooks. At this point, I refused to do another thing until I took a hot shower.

Being Wanted

Supper and showers completed and a state of dryness regained, it was time to put Martha's Vineyard, IOTA NA-46 (the island designator from the directory) on the air. It was about 5:30 PM. Because the IOTA program is popular in Europe, we aimed the beam northeast. Even at this time, we expected a good pileup in no time. Thirty minutes of calling CQ netted us zero contacts. We'd notified the IOTA manager far in advance. In fact, I had talked to Roger on 15 meters only two weeks earlier; during the QSO he said we could easily make 3000 contacts from Martha's Vineyard. While it isn't truly rare, there'd be many "island chasers" who'd need us. Beyond having notified Europe, we were listed in the major ham magazines as a special-event station. Unfortunately, it wasn't until late Sunday night when we learned that the island is a very rare county (Dukes) for those pursuing USA-CA.

Tony, WF1N, and Sam, K1SCN, perform an ancient mystical rite to exorcise the demons that have infiltrated Sam's transceiver. *(NT1I photo)*

When we got on the air, we hadn't bothered to tune carefully across the bands. We just stopped at the first clear spot, checked to make sure the frequency was not in use and began calling CQ. If we had tuned around first, we'd have learned that the entire band wasn't in use, let alone the frequencies we were on! Tuning to WWV brought unwelcome news: a major flare and disturbed conditions. More than conditions were disturbed, I assure you. The only consolation was that we were warm, dry, full and clean for all our efforts. We hoped the next day would bring improved conditions.

Day Two

It did and we were relieved, particularly after that expensive boat ride. While the pileups were absent, the QSO rate was steady with time to chat with those so inclined. The NA-46 confused a lot of operators and we ended up doing many promotional speeches for the IOTA program. Those who chase special-event stations also kept busy. This was turning out to be fun. As we told one fellow, leaving our families (kids) to spend a long weekend on the radio is a dirty job (as dirty as I'll get, that is), but someone has to do it!

We received three calls from W1 operators who were surprised about all the contacts we were making; again we explained the IOTA program. It turned out that all three were full-time residents of the island, but had never heard of the program nor experienced any heightened interest in their QTH when they did get on HF. One of the ops lived 1000 yards from our position. Though we extended invitations for a visit, they never did drop by.

The highlight of the weekend was 2 o'clock Sunday morning. The bands were finally starting to wake up and so was Europe. The first few contacts included lovely words, we had been "expected and were being eagerly looked for." Within ten minutes, it happened: Every DXer's dream, an honest-to-goodness pileup. Two-meter, packet and landline spotting networks exist in Europe just as they do here. We'd work a G3, or EA1, or DL2 and in less than a minute, four or five stations in the same area would be in the log. Even though we gave our call, NT1I, and QSL route every ten contacts, we could still hear people asking the age-old questions: "What's his call?" "What's the QSL information?"

The pileup grew so quickly it was impossible to pull a call sign out of the noise after our QRZ. Rich and I looked at each other and decided to behave like a real, big time DXpedition; we'd operate by call areas. We took ten calls from each area and assured the multitudes that we'd continue "around the numbers" until everyone was worked. Our QSO rate was 125+/hour for nearly three hours. When we finally said, "QRZ anyone," and no one came back to us, it was 5:15 AM. It had happened; we had generated a pileup and had worked it down to nothing. Talk about a high, it was incredible.

A Grueling Weekend Ends

Rich started again at 7 AM. Sam and I regained consciousness about 9 AM. Rich had been on the IOTA Net (Sundays at 1300 UTC on 14.160 and/or 21.260 MHz, depending on conditions) and was the star attraction until a rare, Russian Arctic island came up. Sunday passed much like Saturday; contacts were unhurried but steady. With the weekend coming to a close, we didn't stay up past 1 AM Monday morning. We slept later on Monday morning, made a few contacts and started disassembling the stations and antennas. Our Poor Man's DXpedition had come to an end. It was, however, everything we'd hoped it would be. We made 1000 contacts—not bad for a bunch of beginners.

As important as the QSOs were the good times we had. We laughed often, at times until we had tears in our eyes. The pictures show serious operating, serious eating and hotshot DXers sacked out on the couch. We had it all on this trip: a good time, cushy accommodations, lots of time in front of a rig and, as I said at the beginning, being wanted.

We think we're ready for Peter I Island. Does anyone know how much the ferry will cost? QST

In the Spotlight—Amateur Radio Education

1989's award-winning ham instructors and professional teachers are recognized for their outstanding efforts—congratulations!

By Tracy Simpson and Rosalie White, WA1STO

We've all had teachers who put forth that extra effort—unfailing patience and an exemplary dedication to their students and their profession. And we've all thought of ways to show our appreciation and express our *gratitude*.

The Lake County (Indiana) Amateur Radio Club thought of recognizing, in coalition with the ARRL, those special Amateur Radio instructors for being outstanding volunteers. We've passed this honor on for 12 years. Each year, the selection process becomes more difficult; each year, more and more deserving instructors are nominated.

In 1988, the ARRL expanded the program to include another category for professional classroom teachers, coinciding with the trend toward using Amateur Radio in the classroom. We're proud to present this year's winners in each category, along with the other special nominees.

Lyle B. Aufranc, AA6DJ

The 1989 ARRL Herb S. Brier Instructor of the Year award goes to Lyle B. Aufranc, AA6DJ, of Sacramento, California. Lyle, a volunteer instructor, encourages past students to teach new students. "I believe that the satisfaction one gets from helping others get their license is an undeniable thrill, and so my philosophy is to let others taste this bit of pleasure."

Gerald L. Kasselmann, KD4QA

Gerald (Jerry) L. Kasselmann, KD4QA, of Fort Wright, Kentucky, chosen as the 1989 ARRL Professional Teacher of the Year, teaches Electrical Engineering Technology at the University of Cincinnati OMI College of Applied Science. Student Michael Rowell, N8HIC, demonstrates Jerry's student/teacher relationship by saying, "Professor Kasselmann's office is very easy to find. It's the one with the door open and students inside."

About the Winners

Lyle Aufranc, AA6DJ, who "wanted to give something back for the privilege of becoming a ham," began teaching Amateur Radio to handicapped students in 1976 with friend Cecil Gronvall, WB6ROS, also a 1989 Herb S. Brier award nominee. From there, they began teaching regular Novice classes. Currently, Lyle serves as club administrator for the River City (California) Amateur Radio Communications Society and publishes the club's monthly newsletter. He also acts as liaison for Volunteer Examiner tests.

Gerald L. Kasselmann, KD4QA, 1989 ARRL Professional Teacher of the Year.

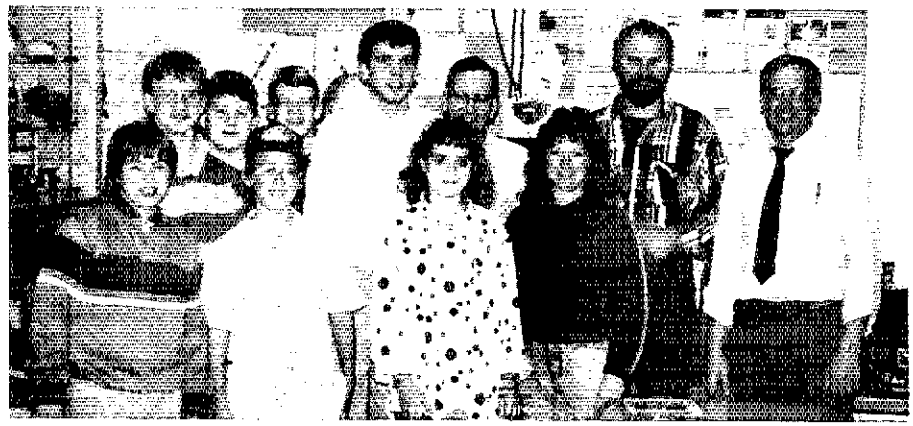
Lyle Aufranc, AA6DJ (standing), 1989 ARRL Herb S. Brier Instructor of the Year, assists students at his evening Amateur Radio class.

While busy with class scheduling and promotional work, Lyle still makes time to prioritize his class instruction. He emphasizes to his students that it's important to know not only that an answer is correct, but why. After teaching for two years while suffering from arthritis in both knees, Lyle was forced to have surgery. But that didn't slow him down! Recently, he helped 73-year-old Laurence James, KC6DMB, who has a hearing deficiency, complete his *Novice, Technician, and General class* licenses. Laurence graciously states, "My ability to communicate, which has been all but lost, is now reopening." All agree that Lyle, with his encouragement and dedication to Amateur Radio and the people around him, is well deserving of this award.

Students and colleagues have nothing but nice things to say about Gerald Kasselmann, KD4QA, too. Active in Amateur

Radio for many years, Jerry took on the position of repeater advisor at the university in 1985. He reestablished a 2-meter repeater system and used it as the focus of several student design projects. Student Thomas Bayes, KD8TD, says, "Professor Kasselmann has the unique ability to use Amateur Radio as a vehicle, taking learning far beyond the classroom." Jerry now serves as faculty advisor for the college radio club. He involves the community in club activities such as publicizing Amateur Radio slow-scan television transmissions from *Voyager II*'s fly by of Neptune. Professor Kasselmann believes in including as many people as possible in Amateur Radio.

His students find his teaching methods to be unsurpassed. Helen Meyer, KA8YTZ, a former student of Kasselmann, says, "The support and belief he places in his students allows them to believe in themselves and enter the world accordingly." Professor Kasselmann proves to be an exceptional person both in the classroom and out.



Students of all ages smile after becoming hams with the help of instructor Myron Jackson, WB9BBI (r).

This Year's Nominees

The ARRL received a record number of nominees this year—32, compared to 22 for 1988. Those nominated for the 1989 ARRL Professional Teacher of the Year include: Dean Albertsen, KØTVJ; Charles Bryan, KBØCUS; Barbara Edwards, KC4PBB; Peter Kemp, KZ1Z; Myron Jackson, WB9BBI; Harry Lewis, W7JWJ; Larry Luchi, W7KZE; Loraine McCarthy, N6CIO; Robert Mullen, KC7UH; Allen Pooley, N5OEO; and William Ruth, W3HRD.

For 1989 ARRL Herb S. Brier Instructor of the Year, hams nominated: Nick Callas, K6DBJ; Harry Cieszki, KD9AJ; Lou Davis, K5CU; Fernando "Luiz" Diaz, KP4DX; William Falk, K7WJF; Gary Gabrick, WZØG; Cecil Gronvall, WB6ROS; Dean Haworth, ACØS; Jack Hedrick, KB5QV; Ralph Hirsch, K1RH; Bob Leo, KJ6B; Mildred O'Brien, W6HTS; Dan Rabb, N4MPX; Horace Rand, AA5MA; Don Rawlinson, WA7VNQ; Vern Stark, KBØSK; Don Stickles, K2OX; Pat Wilcox, KFØAD; and Jim Yeager, K3EBZ.

We received many letters from hams who wrote highly of our nominees. Pat Wilcox, KFØAD, also a Herb S. Brier nominee, says of Vern Stark, KBØSK, "He takes the time to understand a student's problem, motivational or physical, then attacks the cause." Neil Henderson, KA2WFH, describes Don Stickles, K2OX: "This man personifies 'Elmership' in every sense of the word." Caesar Rondina, N1DCS, says about Peter Kemp, KZ1Z, "I only wish we could clone him so our wonderful hobby could grow as fast in all areas of the country."

Chris Brady, KA3VHL, gratefully thanks Jim Yeager, K3EBZ: "Jim's helpful outlook on the code and theory made passing [the Novice exam] a breeze!" Bill Ronay, KM4LS, wrote: "Mr. Rabb, [N4MPX] stands out head and shoulders above the rest by virtue of his positive attitude and outstanding results." Darrell Nichols, AA5OC, says about Horace Rand, AA5MA: "He has opened a new door for visually impaired and sighted people, as well." B. W. Ortmann, N6UBO, wrote: "Loraine McCarthy, N6CIO, took on the tedious task of teaching code and theory and turned it into an interesting, rewarding experience." Roberta Lofthouse, N7NJS, feels this way about Don Rawlinson, WA7VNQ: "Don represents what ham radio is all about."

> ***"I only wish we could clone him [KZ1Z] so our wonderful hobby could grow as fast in all areas of the country."***

Ellen Utschig, N6UWW, says about Nick Callas, K6DBJ: "His enthusiasm is contagious." Harry Cieszki, KD9AJ, "brings a very good outlook to the students," says David DeFebo, WB9BWP. Jim Massara, N2EST, says about teacher Barbara Edwards, KC4PBB: "She took it upon herself to bring our hobby into her classroom. Amateur Radio needs more boosters like her." Joe Brown, W6UBQ, praised Luiz Diaz, KP4DX, for his support, interest, dedication and operating skills that he displays while teaching. Marilyn Pinkerton, WB7QKH, says about William Falk, K7WJF: "It's hard to say who's luckiest—Bill for having found a hobby that has proven rewarding, or ham radio, for having found a man like Bill."

Wayne Pennings, WD9FLJ, wrote: "Myron Jackson, WB9BBI, presents Amateur Radio in such a way that all age groups find it easier to understand." Norman Chichester, Denver Radio Club secretary states: "Dean Haworth, ACØS, has developed our school into one of the most effective in the state of Colorado." Richard Kekahuna, KC6BZO, wrote: "I could tell you much more about my Elmer, Gary Gabrick, WZØG, especially how much time he volunteers." Charles Reiss, KA1QGH, says about Ralph Hirsch, K1RH: "He has been great in helping me and many others get their license." Bill McGrannahan, KØORB, says about school teacher Charles Bryan, KBØCUS: "Most teachers in our community are overworked and underpaid, yet here we have a man who is giving even more of his time."

John Eckert, Canton School District principal, Canton, South Dakota, wrote of teacher Dean Albertsen, KØTVJ, "He always shares with students and staff those ideas and projects that add to the total school experience." Carle Graffunder, N7KZF, says of Larry Luchi, W7KZE: "Larry's positive attitude passes on to his students; you feel that you just can't fail." "Robert Mullen, KC7UH, expresses an individual concern and interest for the students involved in Amateur Radio," states Helen Jackman, WA7QQN.

E. Ray Taylor, Central Texas Traffic Net Manager, wrote of Allen Pooley, N5OEO: "It's a notable task to have involved over half of the school's students in the Amateur Radio class." Carl Foley, N3AKT, and Walter Lafferty, KX3U, spoke admiringly of William Ruth, W3HRD: "A number of his graduates have gone on to careers in engineering or science as a result of their hamming experiences."

1990 Nominations Welcomed

If you missed your chance to honor your instructor or teacher for 1989, nominate your favorite teacher for 1990, now. Do you know an outstanding Amateur Radio instructor or school teacher that you would like to nominate for the aforementioned honors? Show these people your appreciation for a job well done. Send your nominations before January 31, 1991 to your Section Manager, listed on page eight of every *QST*. Help us to recognize these hard-working people who give so much of their time to improve our educational systems and communities and further Amateur Radio.

League Protests Comment Deadline to FCC

The ARRL has filed an "Application for Review" with the FCC, requesting that the Commissioners overrule a staff decision. The League seeks more time to respond to proposals for new Morse code testing procedures for disabled persons.

This is the latest episode in PR Docket 90-356, which began with a public announcement by the FCC in early August and culminated in the FCC's denial, on September 28, of the League's request for more time—until November 15—to comment.

The League has from the very beginning stressed that, since new procedures were implemented for disabled applicants immediately upon the August announcement—and some other accommodations have been in effect for years—there is no urgency in formalizing them through rule making.

The League maintains that because of the unusually short time frame between public announcement and comment deadline, ARRL found it nearly impossible to study the proposal, seek comment from individual examiners to gain from their experience, and formulate comments on the proposal.

Furthermore, the Commission broke with tradition in this matter. In the past, proposals likely to have strong impact on the Amateur Service always have been afforded a reasonable comment period.

"This proceeding is not merely a simple matter of attempting to accommodate the needs of the handicapped by waiving an inconsequential examination element," the Application for Review said. "It is, rather, a reversal of stated policy, and an action which stands to jeopardize the integrity of the volunteer amateur radio examination program."

The Application went on to again point out that procedures already in place for accommodating disabilities are producing applications for waivers, some of them frivolous.

The League also noted again that the FCC, in 1982, held that "(s)electing a particular group of license applications for favorable treatment in terms of less stringent amateur operator requirements would not be sound licensing policy...if such a policy were instituted, the Commission ultimately could find itself in the untenable position of deciding which applicants actually qualified for telegraphy exemptions and which did not. Commission personnel clearly are not trained to make such judgments..."

And so it is that the FCC now proposes to turn what, in 1982, was "not sound licensing policy" into a rule eight years later.

The Application for Review asked for an additional 48 days for comments to be accepted by the FCC.

WARC GROUPS CONSULT

The technical foundations for WARC-92 are being laid at a series of meetings under the auspices of the International Radio Consultative Committee (CCIR). The CCIR is the part of the ITU structure responsible for making recommendations on technical and operating matters relating to radio communication. The meetings ultimately will result in a concise reference document that will be used as a basis for decision making at WARC-92.

A CCIR Joint Interim Working Party meeting was held in Geneva October 22-25 to draft the section of the report dealing with the compatibility of various high-frequency (below 30 MHz) radio services. This section of the report is important to amateurs because of the different regional allocations to the broadcasting and amateur services at 7 MHz, and because broadcasting expansion may result in increased sharing of HF spectrum between other services.

ARRL Technical Development Manager Paul Rinaldo, W4RI, attended the meeting as a member of the US delegation. *Participating as an observer for the* International Amateur Radio Union was IARU Region 1 Vice Chairman Wojciech Nietyksza, SP5FM.

Another important CCIR Interim Working Party meeting, this one dealing with the mobile and mobile-satellite services and their present and potential sharing partners (including the amateur and amateur-satellite observers) will open in Helsinki November 12. Rinaldo is on the US delegation to this meeting; representing IARU will be Capt Charles Dorian, W3JPT.

The outputs of these and other CCIR Interim Working Parties will be fed, for final review and approval, to a special "JIWP WARC-92," which is scheduled to meet in Geneva in March 1991. The objective of ARRL and IARU participation in the work of the CCIR is to ensure that the report adopted at that meeting adequately reflects the continuing spectrum needs of the amateur and amateur-satellite services.

CODE-FREE STANCE AFFIRMED

The ARRL has told FCC, in Reply Comments to the Commission's Docket 90-55 proposing a Communicator class license,

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This is an unofficial announcement of Commission action. Release of the full text of a Commission order constitutes official action. See MCI v. FCC, 515 F 2d 385 (D.C. Circ. 1975)

October 24, 1990

FCC FINES TWO AMATEURS FOR VIOLATIONS ON TWENTY METERS

The following enforcement actions have been taken by the Commission's Field Operations Bureau:

Gordon N. Skul, WB9BCL, of Crete, Illinois, and Glen Baxter, KIMAN, of Belgrade Lakes, Maine, were issued Notices of Apparent Liability to Monetary Foreiture (NAL) for $1,000. They were charged with violating Section 97.101(d) of the Commission's Rules which prohibit willful interference. Mr. Baxter's NAL included an additional amount of $ 500 for violating Section 97.113(c) which prohibits repeated incidents of broadcasting.

Questions concerning this release should be directed to John Hudak, Field Operations Bureau, telephone (202) 632-6977.

-FCC-

that it continues to support the concept, but only if the code-free license is an entry class "in parallel" with the traditional Novice license. The League also feels, it told the Commission, that currently proposed Communicator class privileges are adequate and should not be expanded at this time.

At all costs, there must remain strong incentives to upgrade from Communicator class and to assimilate Communicators into the mainstream of the hobby, the League said.

The Reply Comments conclude "The ability of the League to support the Communicator class of license is dependent upon its implementation as a parallel entry point to the Novice class, and not a substitute for it.

"The League strenuously opposes the Commission's proposal to substitute the Communicator class license for the Novice class, and opposes any change in the Technician license class as well. Any restructuring of present license classes must be premised on some experience with the Communicator class license, and should not be done in this proceeding."

NEWSMAN DOUGLAS EDWARDS

Douglas Edwards, television's first anchorman and a friend of Amateur Radio, died October 13 of cancer. He was 73.

As a boy in Ada, Oklahoma, in the 1920s, Edwards discovered radio with a crystal set. "It was a fascinating, mesmerizing new world," he wrote in a 1988 memoir.

Edwards began his career as a World War II radio correspondent, making the transition to television in 1948. For the next 40 years he worked in both radio and TV news. Steve Mendelsohn, WA2DHF, was engineer of one of Edwards' daytime radio news programs.

In the early 1980s Mendelsohn helped produce 12 radio spots on Amateur Radio for the ARRL; Douglas Edwards narrated them. Edwards' voice also can be heard on two ARRL films, "The World of Amateur Radio" and "The New World of Amateur Radio."

Edwards spoke at ARRL conventions in New York (1984) and Boston (1986). "He talked about how communications affect people," Mendelsohn remembers. Edwards asked the American hams "Would we be British today if electronic news gathering had brought the revolution in the Colonies into King George's living room?"

Edwards leaves his wife, May, and three children from a previous marriage. The funeral was October 17 in Sarasota, Florida.

CURTIS E. LEMAY, W6EZV

Retired US Air Force General Curtis E. LeMay, W6EZV, died October 1 in Los Angeles. He was 83, and in the 1950s was a leading proponent of single sideband techniques.

LeMay enlisted in the Army in 1928, advancing to the rank of major general. In 1948 he took over the Strategic Air Command, serving for eight years while SAC expanded from 600 bombers to more than 3000.

Gen LeMay in the mid-1950s was instrumental in convincing the Air Force to switch from AM to SSB for long-distance air-to-ground communications.

In 1961 President John F. Kennedy named LeMay Air Force chief of staff, a position he held only briefly. After he retired, LeMay became board chairman of Networks Electronics Corp of Chatsworth, California. He was fired in 1968 for serving as the running mate of George C. Wallace in the 1968 presidential campaign.

RADIO CLUB OF AMERICA ELECTS FELLOWS

The Radio Club of America, an organization of people who have contributed to the radio art, counts among its 1000 or so Fellows many radio amateurs. 1990 electees, who were inducted into the club at its annual awards banquet November 16, include the following League officials:

Frank Butler, W4RH (ARRL Southeastern Division director); Joseph Fairclough, WB2JKJ (1987 ARRL Professional Teacher of the Year); Robert Hajek, W9QBH (Illinois Section Emergency Coordinator); Stephen Mendelsohn, WA2DHF (ARRL Hudson Division director); John Obradovich, W3IS (ARRL EPA Section OO coordinator); Arthur Sowle, W7CX (ARRL Pacific Division assistant director); Hugh Turnbull, W3ABC (ARRL Atlantic Division director).

Other new fellows include Gerald Agliata, WA2WPR; Henry Fowler, W2FQF; Col. Gilbert Houck, W3BXO; J. Peter Maehling, W3TQO; Gerald Martin, K4DI; Robert Morris, W2LV; George Murray, WB4DYQ; Joseph Schaap, K4IWF; Louis Tischler, W2EMM; and Frederick Witt, K2HUY.

FCC CALL SIGN UPDATE

The following is a list of the FCC's most recently issued call signs as of October 1.

District	*Group "A" Extra*	*Group "B" Advanced*	*Group "C" Tech/Gen*	*Group "D" Novice*
Ø	AAØBZ	KFØMW	NØMLS	KBØHOR
1	WK1F	KC1WY	N1IAV	KA1WLE
2	AA2BI	KE2WH	N2LGM	KB2LEZ
3	WE3T	KD3TW	N3IOB	KA3WXD
4	AB4ZC	KN4PF	**	KC4TGW
5	AA5UU	KI5JP	N5RJM	KB5NUY
6	AA6YE	KK6QF	**	KC6ODO
7	AA7GI	KG7IS	N7PQH	KB7LRZ
8	AA8CG	KF8JJ	N8MXY	KB8KSH
9	WV9Q	KE9ZF	N9KDV	KB9FNS
Hawaii	**	AH6KP	NH6XP	WH6CJC
Alaska	**	AL7MK	NL7UZ	WL7BZK
USVI	NP2H	KP2BU	NP2DX	WP2AHF
PR	**	KP4RB	WP4ZC	WP4JLN

**All call signs for these groups have been assigned in these districts.
Note: N-prefixed Group "C" call signs in the 4th and 6th call areas have been exhausted. The FCC will now assign Group "D" (2 × 3) call signs in these areas.

GROWTH IN AMATEUR RANKS

Both new Amateur Radio licensees and license upgrades showed a healthy increase in the past year. FCC statistics for the fiscal year ended October 1 have been released (statistics actually were compiled through September 25) and are shown below along with the five-year trend.

	New	Upgrades
1990	26,134	29,699
1989	23,065	26,789
1988	21,080	26,342
1987	24,338	23,814
1986	20,979	22,228
1985	17,373	16,184

The total number of amateur operator licensees grew 6.1 percent, from 464,800 to 493,292. Here is the breakdown by license class:

Extra	52,847
Advanced	104,365
General	119,158
Technician	125,217
Novice	91,705
Total	493,292

ARRL COMMENTS IN PCS DOCKET

ARRL has filed comments in an FCC Notice of Inquiry in General Docket 90-314, concerning the possible establishment of a new Personal Communications Services (PCS) using devices such as advanced cordless telephones and portable radio systems for personal use. The notice discusses petitions filed by Cellular 21 and PCN America, Inc. Frequency ranges being considered are in the 800/900 MHz bands and between 1700 and 3000 MHz. The six-page ARRL comments argue for avoiding impact on amateur allocations.

Similar comments were prepared for filing in response to a NOI in General Docket 90-357, regarding the establishment and regulation of new digital audio broadcasting services. In that proceeding the band of greatest concern is 2390-

2450 MHz, including the amateur satellite allocation of 2400-2450 MHz. The comment deadline in this proceeding was November 13.

COMMUNICATIONS ACT CHANGES

The FCC Authorization Act which was signed October 1 includes several items of interest. Work begun by Senator Barry Goldwater, K7UGA (and others) before he retired has now been completed, with the addition of new Section 333 of the Communications Act of 1934 to include a prohibition against willful or malicious interference. The new Section 333 reads: "No person shall willfully or maliciously interfere with or cause interference to any radiocommunications of any station licensed or authorized by or under this Act or operated by the United States Government."

Until now, such transgressions were violations of FCC rules, rather than of Federal statutes.

A special subparagraph of the Act permits the Commission to spend up to $2,000,000 to upgrade their laboratory in Laurel, Maryland. The Act also permits the Commission to establish a volunteer examiner system for commercial radio operator licenses and endorsements, allowing the examiners to recover from examinees "such fees as the Commission permits, considering such factors as public service and cost estimates submitted by such person."

CANADA ADOPTS NEW RULES

Effective October 1 Canadian radio amateurs found their license structure revamped and all HF mode subbands eliminated. Before October 1, there were three classes of Canadian amateur licenses: Amateur, Advanced Amateur, and Digital. The Department of Communications now issues a single Amateur certificate, with up to four levels of qualification: Basic, Morse code 5 WPM, Morse code 12 WPM, and Advanced.

Canadian amateurs now may use any mode or emission on any amateur frequency as long as they abide by bandwidth limits. Concurrent with the licensing changes, DOC also eliminated subbands.

The Canadian Radio Relay League urges all Canadian amateurs to abide voluntarily by the band plans adopted by IARU Region 2, which recognize the traditional mode subbands. More information appears in *QST* Canada.

HARVARD CLUB HOSTS SOVIETS

Last May nine members of the Harvard Wireless Club (W1AF) traveled 6000 miles to Leningrad and operated for 10 days from club stations UZ1AWT and UZ1AWX. Working alongside Soviet operators under the call sign US1A, the group made some 21,000 contacts and many new Amateur Radio friends. The event was hosted by the Leningrad Institute of Aircraft Instrumentation.

Immediately upon his return, W1AF trustee Mike Manafo, K3UOC, resumed planning for a reciprocal visit by the Soviet club members. "An event like this is not to be taken lightly," Manafo said. "It was six months of very hard work.

"This also was probably the most significant happening of my life," he added.

In mid-October seven Leningraders arrived in Boston for Part Two of this exchange. Although the long-awaited US-USSR reciprocal operating agreement failed to materialize, the Soviets were able to participate in Amateur Radio at W1AF under third-party rules.

On October 23 the Soviet club members visited ARRL Headquarters, with hosts K3UOC and NZ1W. Following a tour of the lab, the QSL Bureau ("Box 88, Newington"), and W1AW ("It's a pileup!" one of the Soviets exclaimed), the group exchanged mementos with ARRL Executive Vice President Dave Sumner, K1ZZ, and W1AW station manager Eddy Pollock W6LC.

Back in Cambridge, five of the Soviet club members battled the language barrier to become US-licensed hams. They were: Dmitry Samrin, UA1CFL (Novice); Vladimir Alexandrov, UA1A1U (Novice); Sergei Hrapenok, UA1ABR (Technician); Victor Stroganov, UV1AA (Technician); and Alexandr Ivliev, UA1ALZ (Advanced).

The Leningraders' US visit coincided with a rebuilding program at the HWC station—which now includes new HF gear and antennas donated by several Harvard alumni—and with the *CQ* Worldwide SSB DX Contest. The Soviets joined eight US operators for a multi-single contest entry.

"The computerized operation, including both contest software and the PacketCluster™ spotting network, was pretty daunting for the Russians," Manafo said. (It's daunting for *anybody* using it for the first time—*Ed.*) "But they loved it," Manafo said. The W1AF operation netted 3.5 million points.

Following the contest, the group visited several expatriate Leningraders in the New York City area, and were scheduled to return to the Soviet Union November 1.

MIKE GIBBONS, W7KV, SK

Ralph J. "Mike" Gibbons, W7KV, of Seattle, died July 23. He was 82. He was ARRL Northwestern Division Director from 1933 to 1940. Gibbons, a retired pilot for United Air Lines, was known for his skills as a yachtsman and pilot. He had been an ARRL member since 1932. He leaves his wife, Pilor, five children and nine grandchildren.

SCHOLARSHIP WINNERS NAMED

The ARRL Foundation has announced its 1990-91 academic scholarship recipients. They are:

Kurt D. Schwehr, N6XWB; The ARRL Scholarship Honoring Barry Goldwater, $5,000.

Christopher C. Peters, KB4MRH; The L. Phil and Alice J. Wicker Scholarship, $1,000.

Douglas M. Benish, N3CXB; The You've Got a Friend in Pennsylvania Scholarship, $1,000.

Daniel C. Lawry, KA1PNE; The Perry F. Hadlock Memorial Scholarship, $1,000.

Robert J. Inderbitzen, NQ1R; The New England FEMARA Scholarship, $600.

Scott L. Young, N9FZS; The Edmond A. Metzger Scholarship, $500.

Dennis P. Ward, KT8X; The Edward A. Jaikins Memorial Scholarship, $500.

Gregory H. Laufman, N2GPA; The Dr James L. Lawson Memorial Scholarship, $500.

Christopher N. Haddan, NØGXB; The Paul and Helen L. Grauer Scholarship, $500.

HAM AIDS HUNT FOR JAMMER

A Manchester, Connecticut man faces 142 counts of interfering with police radio communications thanks in large part to an Amateur Radio operator. Manchester police raided the home of 35-year-old John D. Bertrand on September 25 and confiscated electronic equipment they believe had been used for some four months to interfere with the input of the Manchester Police Department's 465-MHz repeater.

Helping police—as well as engineers from the Federal Communications Commission's Boston office—locate the suspect was Bruce Marcus, WA1NXG, president of Marcus Communications of Manchester. Marcus, whose company specializes in land-mobile two-way radio, was called in as a consultant in August, when the jamming was in its third month, after the call for assistance of a police detective was not heard because of the jamming.

"I put my ham direction finding experience to use," says Marcus, who is vice president of operations for the Pioneer Valley Repeater Association. Using nonradiating equipment and a blacked-out Yagi antenna on his car, Marcus was able to observe the FCC's receiver "seeing" the jammer, without electronically revealing his own presence.

"When it was all over, the FCC was very interested in the 'stealth technology' equipment I was using," Marcus says.

According to the arrest affidavit, when Marcus and police officers entered the Bertrand house, they found a bedroom filled with electronic equipment. Marcus hooked up a modified VCR "extender" and rabbit-ear antenna found in the room, and was able not only to recreate the interference but also to communicate with the Manchester police dispatcher.

FCC engineers then examined the equipment and said, according to news reports, that its only purpose "is to jam the police radio system."

Marcus, 45, a ham since 1970 and a fellow of the Radio Club of America, was accompanied on the hunt by his 10-year-old son, Stephen. "Stephen is interested and will be a licensed amateur before long," Marcus said.

Bertrand, who faces 142 counts of first-degree criminal mischief and four counts each of reckless endangerment and interfering with a police officer, could receive five years in prison on each of the 142 counts, as well as a year imprisonment for each of the other charges. QST

Correspondence

Conducted By John Hennessee, KJ4KB
Regulatory Information Editor

VEs VENERATED

☐ The Volunteer Examiner program has been running since 1984 and has been a complete success. At first, there were fears that it might not work because of dishonesty and unfairness. I think these fears have been put to rest and we have a better system than ever before.

Many people have spent a lot of time making this come true and they deserve credit for their efforts. It's often not remembered that these dedicated people give up their free time at their own expense. They show up when the session is scheduled with smiles on their faces and words of encouragement for nervous candidates. This atmosphere often makes the difference between success and failure.

I suggest that those who have availed themselves of this service take a few minutes to write the simple phrase, "Thanks for being there when I needed you" on the back of a QSL card and mail it to the Volunteer Examiners responsible for the session. It won't take much time and it will make the VEs feel good.—*R. O. "Bob" Blankenship, W4KGH, Memphis, Tennessee*

PATERNITY ISSUE

☐ Referring to the Up Front in *QST* on page 11 of the October issue, I was disturbed by the news item captioned "Where Radio Began." As is too often the case, this falsely suggests that Marconi was the inventor of radio. Nothing could be further from the truth, for it was scientist and inventor Nikola Tesla who gave the world radio.

In 1893, Tesla conducted the first public demonstration of radio using a spark transmitter and a Geissler tube detector. Although this demonstration was set up on a stage, it perfectly demonstrated radio's fundamentals. Later, the power of politics and big money worked in Marconi's favor, ensuring his success and widespread fame. It mattered little at the time that he used the fundamental radio patent that was issued to Tesla in 1900.

It's wrong for the noncommercial amateur community to base radio's beginning on Marconi's unfair commercial exploit. It's regrettable how many still regard Marconi as the "Father of Radio." How many have heard of Tesla?

So far, the US Supreme Court ruling of 1943, which discredited Marconi in favor of Tesla, has had little effect. Text books, reference books and the media continue to misinform the masses. Perhaps, as Margaret Cheney says in her biography *Tesla: Man Out of Time*, "errors once committed to print are stubborn." It's time we amateurs, in the interest of historical accuracy, began easing up on the Marconi myth and become aware of radio's earliest roots.—*Greg Glevanik, KD3F, North Huntingdon, Pennsylvania*

FASTER THAN A SPEEDING IRC

☐ I'm surprised at the number of DXers who fret over how to get QSL cards from overseas contacts. You hear questions such as, "Should I send an IRC or a 'green stamp?'" Granted, there will always be people who will never answer a QSL card, but, over the years, a self-addressed stamped envelope (SASE) with mint stamps from the DX station's home country have given me a high rate of return.—*Don Richards, W7UPF, Tucson, Arizona*

[Several companies sell mint stamps for most of the countries of the world. These packages of foreign stamps include the correct postage for air-mail delivery to the US. See the Ham-Ads section of *QST*.—*Ed.*]

QSA?

☐ "Fantastic signal; 40 dB over S9," reported JH6AUS.

I checked my RF-power meter and found that I was running one watt. "Please turn off your preamp and give me a conservative report," I said.

"You are 59 with QSB to 58."

For two months, I've used one watt on 10 and 15 meters with a tribander at 62 feet. This produced contacts with 82 countries, all of which were first called with one watt. Requests to DX stations for realistic reports ranged from "51, you don't move the meter, but in the clear I copy every word" to "10 dB over S9." Most areas of the world averaged S5, with Australia S3 and Japan S7.—*Paul Bowden, W7PQE, Yakima, Washington*

PUBLIC SERVICE OR EGO TRIP?

☐ I've been a traffic handler for more than 20 years. I recently had my most humiliating experience ever in the time I've been handling traffic.

I received a message originated from one of the hams who used an organization's roster to send frivolous messages to enhance their "brass-pounders" standing. I called the addressee and tried to deliver the message. I sensed I was on thin ice by the questions asked of me. I was advised that the addressee had been a Silent Key since April 1989.

My inclination from now on is to refuse to take further traffic from this prolific source. This is not emergency preparedness as the NTS is supposed to be; this is a scheme to make the Brass Pounders League (BPL), because whether the message is delivered or serviced back, the originator is getting the desired two points. I believe BPL should not be awarded for this baloney. —*Bruce R. Pfeiffer, N7CPP, Carson City, Nevada*

DISABLED TESTING PROCEDURES: AN MD's VIEW

☐ I have a few comments with possible solutions regarding the article on page 60 of September *QST* concerning new eased CW requirements for disabled Amateur Radio license upgrade applicants.

I'm an oral surgeon on the medical staff of Hendricks Community Hospital. I just passed my Extra Class exam and plan to apply to be a VE. I also have chronic mylogenous leukemia (CML). I didn't ask for a waiver of the 20-WPM code exam because my disease doesn't interfere with my learning the code in any way. The answer to this code problem for the disabled is obvious—we need to have a medical consultant to the VEC who can rule on each case. This is not a new idea; in the insurance industry, every company has a medical director who makes such decisions.

We need to watch out for applicants who ask the physician for a letter excusing them from the 13- and/or 20-WPM code test because of some minor ailment. Most physicians don't understand what's needed to learn the code and would probably write such a letter. That leaves the burden of judgment on the VEC, who is not medically trained.—*Henry Heimansohn, DDS, WA9VLQ, Danville, Indiana*

QSL WITH FULL NAMES

☐ Because my home changes frequently, I decided to use the street address of my workplace as my mailing address. I knew that any mail with my complete name would be routed to the appropriate building and department.

Because the *Callbook* gets names and addresses from the FCC, nothing distinguishes a business or institutional address from an ordinary residence address. A QSL card addressed with my call sign, but not my full name, might never reach me. I now rent a post office box for Amateur Radio correspondence. I guess the moral of this story is to always use complete names on QSLs—*Ken Eric Nollet, KØEN, Rochester, Minnesota*

Conducted By Luck Hurder, KY1T
Deputy Manager, Field Services Department, ARRL

ARES/Data—A Packet Data Base for Emergency and Public Service Communications

By W. E. Moerner, WN6I; Sharon Moerner, N6MWD; and David Palmer, N6KL

Have you ever been in an emergency or public service situation where you felt a need for a packet radio program more flexible than a packet bulletin board system (PBBS)? In many situations, amateurs manage lists of information (eg, runner numbers, evacuee names and addresses, damage reports, lost and found children and operator assignments). You can have an on-the-air data base system that allows several packet operators to simultaneously share information.

ARES/Data is a multiple-connect, multiple-port, packet radio data base with a conference bridge tailored to store and retrieve basic information about people, places or things in an emergency or public service event. *ARES/Data* allows tracking of information that can be organized as four 20-character fields and a 72-character message for each record.

If you think of the data base as a five-column table, *ARES/Data* allows up to 20 characters in each of the first four columns, and the fifth column can be up to 72 characters long. Each row of the table (called a record) is used for each person, place or thing you'd like to organize. The number of columns and their lengths are deliberately limited, because providing real-time access to a complicated data base using 1200-baud packet radio channels would be slow and inefficient. The meanings of the five columns (called fields) are not predefined, so you can flexibly use the data base for a variety of public service and emergency operations.

The *ARES/Data* program stores and manages the table of information (ie, the data base) at a central computer with one or more packet radio ports. It provides a set of commands that allow remotely connected packet operators to enter new information, search for previously entered information, list entries and summarize what's stored. The system also provides a full-featured conference that allows all connected stations to converse with one another.

How to Use *ARES/Data*

We've prepared examples illustrating the flexibility of *ARES/Data* for managing information. In a specific event, the PBBS system operator issues a "labels" command that defines labels for each of the fields and the message, so all operators know how *ARES/Data* is being used for that event. An *ARES/Data* system can be left in unattended operation 24 hours a day and be put to use instantly, depending on the event or emergency at hand.

A. Ham Staffing Assignments (Resource Net Control)

Consider when hams are used as communicators in a large event or disaster. How often have you written down important notes about ham radio staffing and then discovered that the information never made it to the next shift? The ham in charge at the start of the event could define four columns and one message column (the field labels) by the following simple command (commas separate the various labels from one another):

LABELS = SHIFT, LOCATION, CALL, NAME, PHONE NUMBER

To use *ARES/Data* to manage this information, the ham assigns Field 1 to be the Shift (day and time), Field 2 to be the Location of the assignment, Field 3 to be the Call sign of the ham, Field 4 to be the Name of the ham, and the Message field to be the ham's phone number for cancellation. Because the message field is an optional freeform field up to 72 characters in length, it may contain a message (a phone number, in this case) or it can be any information deemed useful for the incident. (In *ARES/Data*, the distinction between the first four "fields" and the "message" is that the "fields" are organized internally by the program so that the packet operator can request searches and summaries on the information in any one of the four fields. Searches and summaries cannot be performed on the information in the message field.)

You can easily change the information in a particular field. This could be useful if you wanted to enter all the shifts and locations that need to be covered into the data base in advance without entering call signs and hams' names. When the assignment is made, you'd simply enter the call signs, names and phone numbers in fields 3 and 4 and the message, as required.

A nice feature of storing ham staffing information in *ARES/Data* is when a net control handoff occurs. The new net control simply connects to *ARES/Data* and uses the search and summary commands to examine which positions remain to be staffed.

B. Multiple-Casualty Incident

If there is a multiple casualty incident, such as a plane crash or train derailment, *ARES/Data* enables you to provide officials with information about which victim has been sent where. To keep track of victims, the *ARES/Data* labels could be defined as:

LABELS = NAME, SEX/AGE, HOSPITAL, TRIAGE#, CONDITION AND CONTACT PERSION

Using the search commands, you can see who went to a particular hospital, etc.

C. Evacuation

In an evacuation, you may want to keep track of evacuees at shelters. Labels that might be useful in this case could be:

LABELS = NAME, SHELTER, STATUS, PHONE NUMBER, CONTACT PERSON

D. Bicycle Tour or Foot Race

In public service events, it's often possible to have simple registration data available in advance. You can fill the data base with this data in one operation by using the import function of *ARES/Data*. (The import feature accepts data in the "comma-delimited format" used by many popular commercial data base programs. A corresponding "export" command is also available.)

Suppose the labels are defined as:

LABELS = NUMBER, NAME, ROUTE, STATUS CONTACT

Then, during the event, your packet radio stations can look up the name and information for a possibly injured rider for whom you only know the rider number.

Alternatively, you could use the *ARES/Data* system to keep track of riders that drop out of the tour and quickly put them in touch with waiting friends or relatives.

There are many possible applications of the *ARES/Data* system, limited only by your imagination. In any situation, more information than will fit into four 20-character fields and a 72-character comment field might be needed. On today's 1200-baud packet radio networks, however, not much more information per record can be accommodated without restricting the total number of records that can be handled in a reasonable time. Keeping it simple and tracking only the four most important data items results in less typing, fewer data-entry errors and less unneeded information. *ARES/Data* was intended to make information management during a disaster simpler, not more complex!

Perhaps you have (or will have) a need for a program like *ARES/Data*. What kinds of scenarios can you envision that might require handling large amounts of data? How might *ARES/Data* fit in? We leave that part to you. Give it some thought and be prepared to respond.

How to Obtain *ARES/Data*

ARES/Data was written by W. E. Moerner, WN6I, and David Palmer, N6KL, with the ideas and support of a committee of hams from the Santa Clara County ARES. It's a copyrighted program, available without charge to anyone interested. The authors will not accept remuneration for this program, which is provided as a public service only.

You can download the program from CompuServe's HamNET in data library 9. The program is also available from TAPR, DRSI and a few private telephone BBSs. You can also get a copy of the program directly from WN6I or N6KL by sending a blank, formatted 5¼-inch (360 kB) or 3½-inch (720 kB) floppy diskette in a mailer with return postage. All you invest is the cost of the diskette and postage. No other compensation can or will be accepted—please do not send money. Of course, you can also obtain *ARES/Data* from anyone who already has a copy.

Hardware Requirements

The *ARES/Data* program runs on IBM®-compatible personal computers under DOS 3.2 or later with at least 400k RAM. The TNC at the central computer must be (A) a Digital Radio Systems (DRSI) PC*PA packet adapter or (B) a TNC-1, TNC-2, PK-87 or PK-88 with the standard EPROM replaced by one with WA8DED firmware. EPROMs with WA8DED firmware are available from TAPR for a nominal charge.

Field Organization Reports
September 1990

ARRL Section Emergency Coordinator Reports

There are 33,361 ARES members accounted for in SEC records. The following sections reported this month: AL, EPA, EWA, GA, IA, KY, ME, MN, MO, NFL, NLI, NM, OH, OR, RI, SDG, SFL, UT, WNY, WPA, WV, WWA.

Transcontinental Corps

Area	Successful Functions	% Successful	TCC Function Traffic	Total Traffic
Cycle Two				
TCC Eastern	101	84.00	415	876
TCC Central	86	95.50	271	274
TCC Pacific	107	89.17	339	631
Summary	294	89.55	1025	1781
Cycle Three				
TCC Eastern				
Cycle Four				
TCC Eastern				
TCC Central	61	74.40	274	565
TCC Pacific	98	81.67	379	741
Summary	159	78.03	653	1306

TCC ROSTER

Eastern Area, Cycle 2: KW1U, Director. K1EIC W1FYR KT1Q KW1U WA2FJJ W2FR NN2H WB2MNA W2MTA N2XJ N3EMD N3FM NR3Q AA4AT W4FRR N4GHI K4MTX WB4PNY N4SS KA8CPS WT8L W8PMJ KA8WNO WB8YDZ W8YP KB9LT VE3ORN

Central Area, Cycle 2: NØFBW, Director. WA4JDH W5CTZ AE5I NS5M W5QFU KG5TL K5UPN KE5ZV WA9OHX WØFE VE5KZ

Central Area, Cycle 4: K5GM, Director. WB5J W5JDF N5TC K5TL W5TFB W5TNT KB5W W9CBE W9KLN KA9QCF KFØFI WØGRW AIØO NØSM NBØZ

Pacific Area, Cycle 2: ND5T, Director. K1EIC KY1F KA1IFC N3FM N4SS KF5BL K5CVD N5DST, W5FSP N5IIJ W5NRJ N5TC W5QWE W5YQZ KF5ZL WF6O N7HFZ W7YJ W9CBE NØIA WØBQH NØFSA WØGRW WØLVJ NRØS.

TCC Pacific Area, Cycle 4: KØDJ, Director. N2IC KA5NNG ND5T K6LL W6EOT W6VZT WF6O W7EP W7GHT W7LG W7VSE KA7CPT KN7B NN7H NR7E KØDJ KØTER KCØD KJØG

National Traffic System

Area/ Net	Sess	Tfc	Avg	Rate	% Rep	% Rep to Area
Cycle Two						
Area Nets						
EAN						
CAN	30	597	19.90	.576	100.0	
PAN*	60	421	7.25	.663	95.5	
Region Nets						
1RN	60	438	7.30	.467	92.0	
2RN	59	233	3.95	.362	92.5	
3RN	29	109	3.75	.356	90.0	
4RN						
5RN	60	784	13.04	.539	89.0	100.0
6RN	60	168	2.80	.317	100.0	
7RN						100.0
8RN	60	364	6.06	.334	97.2	
9RN						100.0
TEN	60	372	6.20	.300	91.0	100.0
TWN	60	162	2.70	.290	85.0	96.5
ECN						
Cycle Three						
Area Net						
EAN	30	281	9.37	.697	84.7	
Region Nets						
1RN	30	162	5.40	.446	96.7	100.0
2RN	30	136	4.53	.365	100.0	93.3
3RN						83.3
4RN						76.6
8RN						93.3
ECN						70.0
Cycle Four						
Area Nets						
EAN	30	127	37.57	1.196	97.1	
CAN	30	899	29.97	1.175	100.0	
PAN	30	546	18.20	.968	97.7	
Region Nets						
1RN	60	611	10.18	.704	96.0	100.0
2RN	47	213	4.53	.484	76.3	100.0
3RN						96.6
4RN	60	596	9.93	.385	96.3	100.0
5RN	60	430	7.16	.503	88.0	100.0
6RN	60	246	4.10	.480	94.2	98.3
7RN	60	187	3.11	.661	85.0	98.3
8RN	55	284	5.16	.320	86.0	100.0
9RN	60	321	5.35	.460	98.0	100.0
TEN	58	272	4.69	.485	54.0	100.0
TWN	60	148	2.46			96.6
ECN						96.6
ARN	30	99	3.30	.085		86.6

*PAN operates cycles one and two.

ARRL Section Traffic Managers reporting: AK, AL, AR, AZ, CT, EMA, ENY, EPA, GA, IA, IL, IN, KS, LA, MDC, ME, MI, MN, NC, NFL, NH, NLI, NNJ, NTX, OH, OK, OR, ORG, SB, SD, SFL, SNJ, STX, SV, TN, UT, VA, VT, WMA, WNY, WTX, WV, WWA.

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, one point each, max 30; (2) Checking into phone/RTTY nets, one point each, max 30; (3) NCS CW nets, three points each, max 12; (4) NCS phone/RTTY nets, three points each, max 12; (5) Performing assigned NTS liaison, three points each, max 12; (6) Delivering a formal message to a third party, one point each, no max; (7) Handling an emergency message, five points each, no max; (8) Serving as Emergency Coordinator or Net Manager for the entire month, five points max; (9) Participating in a public service event, five 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 written notification to the 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.

465	111	95	81
W8AKF	W2QNL	KB1AF	KØBXF
	K9CNP	WB7WOW	WAØTFC
211	W2MTA	WT8J	
KA1GWE			80
	110	94	WB5J
161	WB4DVZ	WB4IDB	
KF5BL	K4IWW	W2DMM	78
WTØG	WA4PFK	W5YQZ	N5NAV
	N4KFU		N7BGW
160		93	
N2JAW	108	NN2H	79
	AC5Z	KA7AID	KAØVQN
156	WB2ZJF		KDØNH
WA2SPL		92	
	107	KC3Y	78
151	NR9K	W7LBK	WA2PAC
WI2G	N1FLO		
		91	77
147	105	NØFOO	KJ9J
N5PGZ	KA1GEP	W7EJZ	NB2D
			WA2FJJ
137	104	89	
WB2UVB	WA4JDH	W2MTD	76
		WTØE	WB8FSV
131	102	KB9LT	KØERM
WA4QXT	W2RRX		WB4FDT
	N3EMD	88	W7LNE
129		KA1IFC	N8FPN
NZ2T	101		
	W4QAT	87	75
126	W4ANK	KC4BHX	KD8KU
W1PEX	WB6DOB		K7OVK
	WF6O	86	WB8WJV
124	WB8SYA	W1ALE	
KA1EXJ		KB5BNU	74
	100	KD2WP	K2VX
121	KT6A		KA2INE
KA2VZX/T	N1CPX	85	KB4CYC/T
	W9DM	WA2EPI	KB2JRT
115	WB8DPZ	WA1JVV	W4DWN
WA1TBY	KA2GJV		
W7LRB	WD4LOO	84	73
		WDØGUF	W6VOM
114	99	KA1S	WB8R
WX4J	WØOYH	W5CTZ	
		N7LVK	72
113	98		KØPIZ
W4PIM	WB4MMD	83	WB7WVD
N2EIA	N2XJ	WD5GKH	K4ZK
W7VSE	WA4EIC	W5SHN	NR3Q
		NY8W	W3YVQ
112	96		
N3DRM	N4XFX	82	71
KT1Q	W4CKS	N2HLZ	KA4RZZ
WA9VND	K2YAI	WA3YLO	K8JDI
		KM4JD	WD5ERG/T
			K4FQU

WA2ERT	W4MEE	KE2JX	54
	WA8DHB	N2AKZ	KB7KUH/T
70		N5LJF	
N4JAQ	65	KDØYL	53
KC4FL	K3ORW	N6CRV	N8JRV/T
K1ABO	WI8K		N2EVG/T
N1GZQ	WB2FTX	61	
N4WFU	WA2UKX	WA4RNP	49
K3RXK	KA7WFW	KA8ARP	KA2DST/T
		K2TWZ/T	KA2JMA/T
69	64	N5BFV	
KA4HHE	AA4XF		48
	AB4EZ	60	N2KBD/T
68	KC2HJ	KC4IVI	N5OWD/T
N8FWA	WA1FNM	KA2QOU/T	KA1VAX/T
W5FZH		N2DXP/T	
WB2OEV	63	W6RE	47
WA4RUE	WBØZNY	N8INP	N4LST/T
AA7CU	KC5NG	KØQBE	W1YOL/T
WB3BJM	KA2CQX/T	WBØWNJ	KA8YWV/T
K3GHH	WA4GYR	W9UMH	
	WD8KBW	WA2UKM	46
67	N5ILI	KB2IWN	N2KYE/T
W4IBU	WB2QIX	K5WOD	N2IKR/T
WB5YDD	W2FR	N1GRF	K1GGS
KA2QOD	W1TC		
K4ZUY	KC4MWT	58	45
	NØCYR	KA2ZNZ/T	N2JRS/T
66	KA8CPS		N6SPY/T
WB2ZIE/T		56	
K1UXB	62	N2KHU/T	41
KA4FZI	K2PBP/T	N5PSW/T	KA2UTI/T

The following station qualified for PSHR during the month of August but was not listed in last month's column: K5WOD.

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, ie, 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
W8AKF	403	2992	3190	441	7026
W3CUL	724	896	1368	94	3082
W1WP	1536	35	1254	5	2830
WA2SPL	29	874	874	55	1852
NØBQP	30	978	34	548	1690
W1PEX	0	537	1034	42	1613
W3VR	514	301	469	34	1318
KCØVL	29	663	0	411	1103
K1EIC	16	500	520	7	1043
N5DST	244	210	326	203	983
WBØWNJ	215	57	615	6	895
WBØYNS	0	418	418	0	836
KY1T	31	391	410	1	833
K1UGM	0	418	418	0	836
WBØTAX	33	388	388	7	816
WI2G	7	351	402	50	810
KF5BL	45	268	336	35	684
N4SS	2	307	332	4	645
WA4JDH	1	294	316	3	614
W1FYR	11	247	297	10	565
N5GHI	0	309	232	15	556
WØACH	30	246	276	0	552
NZ2T	185	59	258	45	547
K4DOR	37	225	260	2	524
N2JAW	61	193	192	76	522
K1TQY	171	69	272	8	520
WA1JVV	1	238	275	5	519
W2QNL	2	265	222	21	508
KA1JAN	4	271	219	13	507
KT1Q	0	254	240	11	505
KA1GWE	2	264	128	111	502
NM1K	101	197	190	13	501
WF6O	4	231	260	5	500
W3IWI	1	353	349	0	703
N4QQ	0	319	290	0	609
N2GTE	7	284	281	2	574

BPL for 100 or more points by originations plus deliveries:
N5PGZ 111 WØFIR 110 KA1VED 110

Independent Nets

Net Name	Sess	Tfc	Check-ins
Amateur Radio Telegraph Society	25	241	315
Bears of Manchester	30	319	444
Central Gulf Coast Hurricane Net	30	131	2977
Clearing House Net	31	207	183
Empire Slow Speed Net	30	139	390
Golden Bear Amateur Radio Net	30	45	1386
Great Lakes Emergency & Traffic Net	30	62	968
IMRA	25	685	1416
Mission Trail Net	30	157	890
NYSPTEN	30	65	465
Southwest Traffic Net	30	215	1435
West Coast Slow-Speed Net	30	57	426
7290 Traffic Net	45	303	3029
20-Meter ISSB Net	25	993	274
75-Meter ISSB Net	30	219	1070

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 DXCC Countries List. You may endorse your award in 25-country increments through 250, 10-country increments through 300 and 5-country increments above 300. The Satellite, 160 Meter, 80 Meter and 40 Meter DXCC awards are endorseable in 10-country increments through 200 and 5-country increments above 200. Presently, there are a total of 323 current countries on the official ARRL DXCC Countries List. The totals shown below are exact credits given to DXCC members from April 1-5, 1990. An SASE will bring you the rules and application forms for participation in the DXCC program. Send $1 to request the ARRL DXCC Countries List.

NEW MEMBERS

Mixed

DJ9MAF/104
JA1JMF/130
JR8KHA/277
OE2SCM/168
WA1IDU/108
W2EDC/130
WB3IIY/101
AD4M/108
WA4RPH/109
K6BLS/110
K6BZS/110
NR8J/100
WA8ZLE/100

Phone

F6IDZ/107
OE2SCM/167
YB1DYB/112
WB2JDF/107
KA4WUJ/102
KE6WX/112
N7KPX/110
WD8NWL/111

CW

JA1AS/108
SM6NFF/108
WP4FMH/107
KK6H/102
NW8F/124
KU8A/101

80 Meters

SV1ADG/312

40 Meters

NK7Y/100

10 Meters

K2BPQ/110
KA2CDJ/101
KA2JMA/101
KB2DLY/102
KA4WUJ/102
KF7RU/101

5BDXCC

K6IR
W4QCU
SM5APS
UC2ACZ
NF5Z

NEW HONOR ROLL MEMBERS

Mixed

314

AF5M/325
WB5LBJ/DU/319

ENDORSEMENTS

Mixed

DJ6DU/310
DL2FAG/243
G3HCT/356
G3JEC/341
G3PMR/175
HA8DU/319
JA1EOD/340
JG1OUT/300
JA2IVK/326
JJ2LPV/156
JH4JNG/287
JA5KT/319
JA7MFL/282
LA7JO/327
OH2BZ/349
PT2BW/335
SK6LU/209
VE3GQ/310
VE3IPR/320
VE3NLU/126
VE6EQ/275
YV5ANF/352
ZL3GQ/347
4Z4KX/306
AG1I/262
KR1S/203
W1BYH/252
W1HH/357
W1ZGP/200
W2HTI/362
WA1UDH/305
K2HVN/335
K2MFY/328
KA2CDJ/183
KA2HTU/203
KX2T/150
N2BI/226
N2JV/321
AC3D/152
K3II/359
K3ND/329
K3NN/331
W3IVG/279
W3KWH/200
W3YQ/299
K4JAG/310
K4LTA/340
KA4IIV/125
N4CID/313
W4DHZ/355
W4FDA/339
W4UFH/268
W4YCZ/188
W4YV/341
WA4GKR/315
WA4SFN/125
WB4HOK/322
WD4MBE/151
AF5M/325
KB5DQ/311
KU5B/282
N5AN/329
NN5O/286
W5DO/257
W5GC/347
W5HE/346
WB5LBJ/DU/319
KE6LT/307
KI6AN/249
KI6X/171
N6DN/201
N6RA/335
N6SYW/150
K8FF/351
AI9Y/260
AJ9C/271
AJ9D/320
K9HB/192
NA9A/225
WB9CPV/199
K9II/309
K9JGH/321
KE9Y/254
W9UD/341

Phone

CT1ZW/310
DF8NM/262
DL2FAG/236
FM5CL/301
G3JEC/341
HA8DU/299
HK1LDG/271
I4ZSQ/341
IK5EEG/265
IN3DYG/318
JA1EOD/338
JJ2LPV/150
JA5KT/262
LA1ZI/334
LA4HF/160
LA7JO/325
OH2BZ/337
PT2BW/332
PY2ED/339
PY2PC/341
SK6LU/209
TU2UI/213
VE3IPR/320
YC7DF/204
YV5ANF/352
ZL3GQ/317
4Z4KX/253
W1BYH/227
K2MFY/309
KA2CDJ/175
KS2I/344
W2HTI/361
WA2MIS/206
N4CID/309
W4AHR/155
W4UFH/262
WA4GKR/311
KB5DQ/301
W5GC/347
W5HE/340
WB5LBJ/DU/318
WM5O/130
KE6LT/306
KI6X/150
N6SFV/150
NX7W/225
WA7QQI/176
WBJTD/340
K9HB/186
KE9Y/211
W9YZL/201

CW

G3PMR/175
G4WVX/145
HA7RB/251
HA8DU/275
IK2ECP/175
JA1IVK/262
JG1OUT/233
LA3GI/178
LA7JO/214
VE3IPR/280
4Z4KX/220
W1BYH/187
W1YRO/150
K2MFY/291
WD4JHY/205
K5MOY/218
W7KT/174
WA9VGY/200
WA9GUD/250

RTTY

VE1BLX/125

80 Meters

K9II/169

40 Meters

K9IW/190
K9II/250
N8ZA/157

10 Meters

W2FR/178
N6SFV/150
K9IW/228

The ARRL Outgoing QSL Bureau System

Note: The ARRL QSL Service may not be used to exchange domestic QSL cards within the 48 contiguous states.

The ARRL Outgoing QSL Bureau is a convenient and inexpensive way to send DX QSL cards to foreign QSL bureaus.

QSL cards are shipped to QSL bureaus throughout the world, which are typically maintained by the national Amateur Radio society of each country. Although no cards are sent to individual QSL managers, what you might lose in speed is more than made up in the convenience and savings of not having to address and mail QSL cards separately. (In the case of DXpeditions and/or active DX stations that use US QSL managers, a better approach is to QSL directly to the QSL manager.) ARRL Members may send SWL reports to overseas stations.

How to Use the ARRL Outgoing QSL Service

1) Presort your DX QSLs alphabetically by call sign prefix (AP, C6, CE, DL, F, G, JA, LU, PY, 5N, 9Y and so on); addresses are not required. Do not separate cards with paper clips, rubber bands, slips of paper or envelopes.

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 $2 for each pound of cards—there are approximately 150 cards per pound. A package of 10 cards or less costs only $1. Please pay by check or money order, and write your call sign on your check. Send cash at your own risk.

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 and a note indicating 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. Affiliated clubs may also "pool" their members' QSL cards to effect 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 should be enclosed for each ARRL Member.

Recommended QSL Card Dimensions

Cards of unusual dimensions slow the work of the bureaus. Make sure your QSL cards are as close as possible to the 3½- × 5½-inch standard.

Countries Not Served by the Outgoing QSL Bureau

Approximately 270 DXCC countries are served by the ARRL Outgoing QSL Bureau, as detailed in the ARRL DXCC Countries List. In some cases, there is no bureau in a particular country and cards cannot be forwarded. QSL cards can, however, be forwarded to a QSL manager (eg, 3C1MB via EA7KF). The ARRL Outgoing Bureau **cannot** forward cards to the following countries:

A5	Bhutan
A6	United Arab Emirates
A7	Qatar
BV	Taiwan
C9	Mozambique
D6	Comoros
ET	Ethiopia
HZ	Saudi Arabia
J5	Guinea-Bissau
KC4	US/Antarctica
KC6	Belau
V6	Micronesia
KH1	Baker and Howland I
KH3	Johnson I
KH5	Palmyra and Jarvis I
KH7	Kure I
KH9	Wake I
KP1	Navassa I
KP5	Desecheo I
P5	North Korea
S9	Sao Tome/Principe
T2	Tuvalu
T3	Kiribati
T5	Somalia
TJ	Cameroon
TL	Central African Republic
TN	Congo
TT	Chad
TY	Benin
TZ	Mali
V4	St Christopher and Nevis
VP2E	Anguilla
VR6	Pitcairn
XT	Burkina Faso
XU	Kampuchea
XW	Laos
XX9	Macao
XZ	Burma
YA	Afghanistan
ZA	Albania
ZD7	St Helena
ZD9	Tristan da Cunha
ZK3	Tokelau
3C	Equatorial Guinea
3V	Tunisia
3W	Vietnam
3X	Guinea
4W	North Yemen
5A	Libya
5H	Tanzania
5R	Madagascar
5U	Niger
5X	Uganda
7O	South Yemen
7Q	Malawi
8Q	Maldives
9G	Ghana
9N	Nepal
9U	Burundi

Countries that forward QSLs only to members of that country's national radio organization:

Egypt
France
Germany
Japan
Monaco
Morocco
Portugal
USSR

The World Above 50 MHz

Conducted by Bill Tynan, W3XO*

VHF/UHF—At the Crossroads

VHFers in many parts of the country report a similar situation—lack of SSB/CW activity on the VHF/UHF bands. Even during major openings, as evidenced by TV and FM band signals, too many accounts repeat the same theme: "Few stations on to work." According to several prominent California VHFers with whom I talked at a recent Bay Area gathering, this situation seems to be particularly acute in that part of the country. What makes this especially critical at this time is the increasing pressure from amateurs using wideband modes such as FM voice, packet and ATV. In addition, commercial interests continue to cast envious eyes on any piece of amateur spectrum they believe is underused—whether it is or not.

Under FCC rules, amateur FM, voice or packet, can legally be used *anywhere* on the bands above 50 MHz except for the 100-kHz segments on 6 and 2 meters reserved for CW. Aside from the ARRL band plans, there is nothing to prevent any individual or group from landing on 144.200, 50.125 or 432.1, or any nearby frequencies, with FM voice or packet QSOs.

And it's been happening, especially in the segment between 144.3 to 144.5. Because of increasing FM occupancy, that part of the 2-meter band is no longer as available as it once was for meteor scatter skeds—for years one of its major uses. That band segment is also vitally needed for current and future space activities. Space use of these frequencies, especially for uplinks, is, in this conductor's opinion, considerably more compatible with weak-signal terrestrial users than are FM voice or packet nets. Thus, having the Amateur Satellite Service as a co-user is, I believe, far superior to sharing it with wideband modes.

Apparently, not everyone agrees. When intended Amateur Satellite Service use of 144.3 to 144.5 was proposed a few years ago, it did not receive a favorable response from some US VHFers, and many European VHFers were particularly opposed. Apparently, the Europeans make greater use of that part of the band than we do—which is not surprising, since their band is just 2 MHz wide. But, as already noted, various US FM operations are increasingly using the segment. Some of these have even been "sanctioned" by local frequency coordination groups.

What must we do to preserve the small slices of spectrum that have historically been understood to be intended for narrowband/weak signal use? Some have suggested a petition to the FCC to change the rules to make them consistent with those governing 10 meters—where wideband FM is allowed only above 29 MHz. Even if a Rule Making petition is an appropriate approach, however, there is a good possibility that, in these days of tight budgets and deregulation, the Commission may not act favorably on it by issuing a Notice of Proposed Rule Making (NPRM). If it does, you can bet that many FM interests would vehemently oppose any such modification to the Amateur Service rules. Others contend that the ARRL band plans are sufficient. There are also those who assert that the low level of SSB/CW activity, compared to other activity, and our continuing tendency to use only a few spot frequencies, does not justify the amount of spectrum set aside for SSB/CW. Whether such arguments are valid, we certainly need more activity and we need to get in the habit of spreading out to reduce interference between nearby stations. I have heard the argument that we must operate on the calling frequency or we won't find each other. We all have dials on our receivers, however, and some even have scan capability. I believe it's imperative that we get in the habit of using these features.

By whatever means, we must find ways to encourage SSB/CW activity on the VHF/UHF bands. For one thing, it will certainly force us to spread out. What is the formula for increasing activity and thus helping weak-signal VHFers to preserve and deserve their small slices of the spectrum? Next month, I will cover a few of the ideas advanced by some West Coast VHFers.

In the meantime, I'd like to hear suggestions from readers in all parts of the country.

ON THE BANDS

By the time you read this, the fall 6-meter DX season should be in full swing and the following reports won't seem like much. In the meantime, we'll have to be content with these first glimpses of a season for which we all have high hopes.

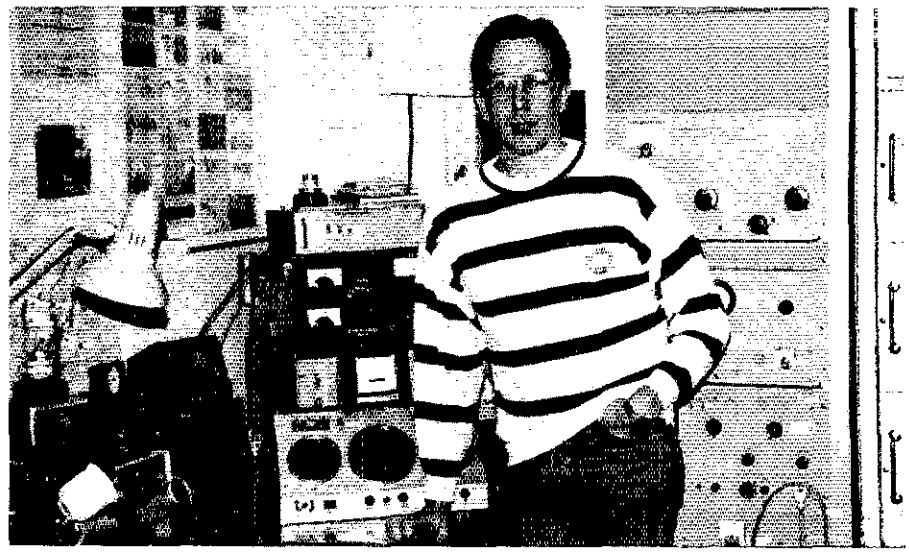
A particularly detailed report comes from KB6SL/CE3. Kevin says that September 10 was his best day so far. He was operating portable from a ski lodge in the Andes Mountains at 8200 feet.

This spot, about 40 km (25 miles) from Santiago, afforded him a clear shot to the US. Beginning about 0100Z, Kevin began working stations starting with YV4DDK, YV5ZZ, YV4AB and TI4JHQ. Then, about 0200Z, the band opened to the US yielding contacts with 2 5s, 37 6s, 8 7s, plus OA8ABT, YS1ECB, ZF1DC, KP4EOR and KH6s HI, JJK, IAA and NI6E/KH6. He also reports hearing the VS6SIX beacon for an hour and a half. Everything ended at 3 AM local time, when both the KH6 and VS6 beacons disappeared. KB6SL's address is Kevin Szot, c/o Citibank NA, Ahumada 40, Santiago, Chile. He would appreciate an addressed envelope and an IRC or other wherewithal to cover return postage.

In another report from a DX QTH, JA1VOK says that his first opening of the season was on September 8, beginning about 0000Z, when Hat worked NI6E/KH6, KH6JJK and KH6IAA with S7 to S9 signals. Both the KH6HI and KH6HME beacons were in until 0500Z. The following day, at 0300Z, Hat worked VK9CD on Norfolk Island (operated by ZL2CD). At 0730Z, it was XW8KPL and at 0815Z, BT4AG (China). On the 15th, KC6CW and KC6AX were worked and the FR5SIX beacon (50.021) was heard at S9. Quoting a report from JA1UT, Hat adds that the Laos group had over one thousand JA contacts by September 12.

From VK3OT comes news of a new country we would all like to work. At 0622Z September 29, Steve hooked up with BZ4SAA in China. The operator indicated that he expects to be active between 0600 and 1000Z each day. Seems that the People's Republic is becoming quite available on 6 meters.

WB2PMP writes from the Orlando area that 6 meters "began hopping with evening TE openings September 24." Dave worked PY5CC for



From this well-equipped shack, SM2CEW is active on all bands from 160 meters to 23 cm, including moonbounce on 2 meters, 70 cm and 23 cm.

*Mail reports to Bill Tynan, W3XO, at HCR 5 Box 574-334, Tierra Linda Ranch, Kerrville, TX 78028, or phone 512-257-1296 to make a voice recording regarding late-breaking information or to send a fax.

country number 66 and copied the ZD8VHF beacon for an hour beginning at 0030Z. Three nights later, on the 27th, he says that 6 meters sounded like 20, with CXs, LUs, CEs and a 6Y5 all in with strong signals. Dave even worked CX8BE while that station was putting in an S8 signal from a ½-W portable rig. Here in Texas, we have had other scattered openings, mostly evening TE to South America. On September 22, about 0030Z, W5OZI and this conductor worked PY5CC and CE3BFZ. And on the 30th, about the same time, CX8BE and KB6SL/CE3 were in with good signals.

As another sign that the band is coming to life, many of us listening on 28.885 about 0100Z October 8 were elated to hear a report that VK4BRG and 9L1US had completed a 6-meter contact. What is even more amazing, they did it on the long path over North America. An hour or so before, 9L1US had worked several Caribbean stations. Reports are that the same path was open the following evening.

As this is being written early in the second week of October, daytime F2 Europe-to-Africa openings are becoming commonplace. On Saturday October 6, W3OTC reports that the mid-Atlantic states were treated to their first South American opening this season, with several Ecuador stations putting in good signals.

G4AHM sends along his county list a little late for the November issue. Richard's total now stands at 92, which illustrates what can be accomplished on 6 meters from Europe.

NI6E has provided me with a most interesting four-page analysis of various 6-meter paths, especially emphasizing propagation between Europe and North Africa to the Pacific, at various time of day. Shel has also supplied the analysis to KA3B as well as a number of Europeans. So, those who receive the KA3B letter will probably see it. If you'd like a copy, send me an SASE with two units of postage or an addressed envelope and four IRCs.

VP2MO writes that he is still interested in 6 meters. His absence was due to losing his antennas and suffering great damage to his home from Hurricane Hugo last year. He had no sooner gotten things back up when he had to hurriedly take them down again to avoid a similar fate from Hurricane Gustav. Nevertheless, Bobbie wants it known that he will be back.

From the latest UK 6-meter newsletter comes a report on the results of the July 10 to 20 trip to the Azores by G3RFS and G3KOX. The two completed some 600 contacts with UK stations and 120 with the US. In all, they worked 35 countries on four continents.

KØDAS writes that he has been working 33 cm and 23 cm from a setup erected on his pickup truck. On 33 cm, Rod runs a KK7B transverter with 6 watts output. He is looking for customers—who are somewhat few and far between on that band in his part of the country. On 23 cm, KØDAS has an SSB Electronics converter running 6 watts to 4-bay F9FT array about 15 feet above the road. KØDAS also reports that he has become active on 70-cm EME from his home QTH, using 800 W and an array of eight RIW-19 Yagis. The preamp is an MGF-1302 in a WA7CJO ¼-λ cavity, which yields a noise figure of 0.25 dB.

K2UYH says that he is now up to six grids and four states on 10 GHz (see the October column). Al's best DX to date came during the September contest when he worked W2SZ/1 on Mount Greylock in western Massachusetts over a 200-mile path.

Speaking of the higher frequencies, K6LMN offers his laser transceiver as an example of what Roger terms "the ultimate frontier." The unit uses a solid-state laser diode for the transmitter and solar panels as the receive antenna and receiver. Future plans call for such exotic stuff as bouncing signals off clouds and building a laser repeater. I am sure that K6LMN would be glad to send any interested parties a copy of the write-up he has prepared on the unit. His address is Roger A. Wagner, 1045 S Manning Ave, Los Angeles, CA 90024. Please enclose an SASE with two units of postage.

ZAP!

I must apologize to those who attempted to use the answering machine or the fax during the past few months. Both sustained lightning damage and were out of commission for some time. They should be back on line by the time you read this. QST

FM/RPT

Conducted By Brian Battles, WA1YUA
QST Copy Editor

Reverse Autopatch

How can a local public service official reach a member of ARES in an emergency? Are any of your unlicensed friends or family members unable to contact you because they lack 2-meter privileges?

I receive messages from members who want to know if it's okay to set up a certain scheme to permit access to their repeater by reverse autopatch. In other words, is there a way for a nonham to get in touch with a ham via a repeater using a telephone?

Even with extensive publicity campaigns, vigorous recruiting efforts and solemn sacrifices to the Wouff Hong, there are going to be people who will never get Amateur Radio licenses, no matter how much we wish they would. So, while we hams can keep in touch with each other around the clock with base, mobile and hand-held transceivers, nonhams might need to reach you occasionally when you aren't near a telephone.

The question boils down to this: Why should nonhams be able to access ham radio frequencies? Most hams' instant response is, "What if there's an emergency?" Emergencies happen, but why is reverse autopatching seen by some people as a necessary solution? Today's communication technology makes it possible to use pocket pagers, cellular telephones and electronic mail to transmit messages. Even if local authorities need to activate a ham net in a disaster, it's best to rely on the telephone or pagers to call them up out of the woodwork.

There's a misperception that ham radio is a critical primary resource for emergency communications. Ideally, anything but personal remarks should be carried via commercial means. In emergencies, Amateur Radio is simply available as a backup, a last resort when other facilities fail. (In an emergency that threatens to harm a person or damage property, most FCC rules go out the window; a person bleeding from a severe wound or witnessing an airliner careening into the side of a hill could turn on a ham rig, police radio, broadcast station or the Voice of America to holler for help if no better means was available. Using a service one is licensed to operate is preferable, but the law is not designed to prevent people from summoning aid.)

One ham writes:

"Here in _____, the W_____ repeater has a reverse autopatch so people can call into the repeater from their telephones. The setup here, though, prevents anyone from getting on the air via telephone.

"When someone dials the repeater telephone number, the computer asks him to enter the autodial number or mailbox number of the ham they wish to reach. The caller enters this with the telephone TouchTone pad. *[Fine so far—Ed.]* The computer then announces over the air that there is an incoming autopatch for that particular call sign. *[No good!—Ed.]* The ham activates the patch via his radio. If the ham doesn't respond within 45 seconds, it automatically hangs up. While the ham is being 'paged,' there is also a ring sent over the air to indicate an incoming call."

The system described above could bring on problems because nonhams are able to activate the repeater. FCC rules do not permit unlicensed persons to cause an Amateur Radio station to transmit without direct supervision by a licensed control operator.

Many amateurs want to use repeaters to provide access for nonhams by using a reverse-autopatch system. FCC rules prohibit unlicensed persons from controlling or activating a repeater and they specify that Amateur Radio may not be used to facilitate the regular business activities of any organization, even nonprofit groups like the Red Cross or the Salvation Army.

The prudent solution is to arrange alternative means of communicating with emergency officials and other nonhams. Better yet, if a nonham spouse, friend or government official finds access to Amateur Radio useful and expedient, enroll him in a ham radio class to obtain an Amateur Radio license. When it comes to keeping in touch on ham frequencies, that's just the ticket. QST

Packet Perspective

Conducted By Stan Horzepa, WA1LOU
75 Kreger Dr, Wolcott, CT 06716-2702
CompuServe ID no. 70645,247

Packet Radio Basics—*Part 3:* The ABCs of TCP/IP

This is the third installment of Packet Radio Basics, the "column within a column" that answers the questions packet radio beginners often ask. If you have questions or topics you'd like addressed, please let me know.—WA1LOU

In "Packet Radio Basics—*Part 2*" (October '90 *QST*), I described how to obtain software for packet radio communications. At a minimum, you should have been able to find landline communications software that's usable with a TNC. At the other extreme, you may have found software expressly written for packet radio. Perhaps you came across the *KA9Q Internet Protocol Package*, *KA9Q TCP/IP*, *KA9Q NET* or just *NET*. If you wondered what *NET* is, why you'd want it or how to get it, the answers are here.

NET

NET is computer software that emulates many of the functions of a TNC. By doing so, the computer is no longer limited to the functions provided by the software ("firmware") programmed in the read-only memory (ROM) chip installed in the TNC. Unimpeded by ROM, *NET* is able to accomplish more. Not only does the software provide a terminal emulation function for packet communications, it also includes a bevy of other applications and "protocols" (procedures) for communications between computers via a network of *NET* nodes.

As standard AX.25 is Amateur Radio's embodiment of the landline data communications protocol known as CCITT X.25, *NET* is Amateur Radio's embodiment of the Defense Advanced Research Projects Agency's (DARPA) Transmission Control Protocol (TCP) and the Internet Protocol (IP) for landline data communications networking. These protocols permit different types of computers to communicate with each other. The DARPA protocols, commonly called "TCP/IP," are used on hundreds of landline networks to interconnect mainframe computers in universities, government research centers (typically, Department of Defense contractors) and other commercial interests throughout the world. Although the nickname TCP/IP implies that only two protocols (TCP and IP) are involved, other protocols are integral parts of the DARPA and amateur packet versions of the software.

As its various names imply, *NET* was written by Phil Karn, KA9Q, an engineer at Bellcore in New Jersey (see *QST Profile: Future Shock: A Conversation with Phil Karn, KA9Q*, Apr '90 *QST*, p 48). Karn wrote *NET* for the IBM PC and compatible computers. Others modified the software to run on Apple Macintosh, Atari ST and Commodore Amiga computers. Karn has rewritten *NET* from top to bottom and the latest incarnation is known as *NOSNET*.

Where to Get a Copy of *NET* (*NOSNET*) by Mail

IBM PC-compatible: Tucson Amateur Packet Radio (TAPR), PO Box 12925, Tucson, AZ 85732-2925.

Apple Macintosh: Doug Thom, N6OYU, c/o Tetherless Access Ltd, 1405 Greenwood Dr, San Jose, CA 95129-4778.

Atari ST: Mike Curtis, WD6EHR, 7921 Wilkinson Ave, N Hollywood, CA 91605-2210.

There's typically a nominal fee charged to cover the cost of disk(s) and postage.
Note: The ARRL and QST in no way warrant these offers.

Why You Want It

Imagine this: You're at your computer chatting with station A, while in the background, your computer is receiving a file from station B and delivering a message to station C. You don't have to imagine this scenario; *NET* allows your computer to perform these functions simultaneously!

The "RTTY mode" of TCP/IP comes to you by way of the "Telnet" protocol, which allows you to yak with other operators hunting and pecking at their computer keyboards. "FTP," or "File Transfer Protocol," allows your computer to send and receive (upload and download) ASCII and binary files over the air between itself and other computers.

The "Simple Mail Transfer Protocol" (SMTP) acts like a post office. Drop a message in the SMTP mailbox and it will attempt to deliver the message to its destination. The problem with SMTP is that, by itself, it's not easy to use (or "user friendly," as some would say). To alleviate this problem, Bdale Garbee, N3EUA, wrote a program called *Bdale's Mailer* or *BM*, which is included in the *NET* package.

Other features of *NET* include the ability to communicate with packet stations that use "plain vanilla" AX.25 instead of TCP/IP. Dan Frank, W9NK, wrote software that's built into *NET* to allow a packet station running *NET* to act as a NET/ROM node to transfer AX.25 and TCP/IP packets.

How You Can Get It

Assuming you already have the requisite computer and radio equipment, you need three other things to get started with *NET*: A "KISSable" TNC, an IP address and *NET* itself.

When I told you that *NET* emulates many of the functions of a TNC, you may have thought *NET* would allow you to get on packet radio without buying a TNC or that you could throw your old one away (or at least sell it). You still need a TNC that supports KISS mode. Almost all current TNCs support KISS and most older ones that don't can be made KISSable by updating the ROM. (If the software programmed in your TNC's ROM is compatible with TAPR TNC-2 software release 1.1.6 or later, it's KISSable.)

KISS is the acronym for "Keep It Simple, Stupid" and when you invoke the KISS mode, it makes your TNC dumb (or dumber, as some wise guys might crack). When KISSed, your TNC is essentially nothing but a modem that modulates whatever *NET* sends it and demodulates whatever it hears from your radio.

Next, you need an IP address. This is a unique number assigned to the computer used at your packet radio station for communications over the TCP/IP network. To get an IP address, contact your local IP address coordinator. A list of IP address coordinators is published regularly in the Gateway column of *QEX*. If you don't have *QEX* and can't locate your local IP address coordinator by other means, send me a packet message (WA1LOU @ N1DCS) and I'll let you know who the coordinator is for your area. Better yet, subscribe to *QEX*.

Finally, you need the software. You can download *NET* or *NOSNET* from a BBS or a commercial online service such as CompuServe. If you don't have access to one of these, you can obtain a copy by mail (see the sidebar).

When you get everything up and running, let me know. My IP address is 44.88.0.14.

Strays

ST NICK'S ATV VISIT

An exciting use of Amateur Radio during the Christmas season is having Santa Claus talk to children over a 2-meter FM repeater. How about adding the visual dimension? Scott Millick, K9SM, his wife Kathy, WB9QLY, and Jay Finn, WD9ENR, brought the jolly old elf to school children via ATV. Transceivers, monitors and cameras were set up on 430 MHz and 902 MHz for school-to-North Pole full-duplex operation. More than 200 children at Beckemeyer Grade School spoke to the gentleman in the red suit that day. Sounds like a great project to set up at a children's hospital, shelter or orphanage. If you'd like to try it, contact Scott Millick, K9SM, 907 Big Four Ave, Hillsboro, IL 62049.

Conducted By
Douglas A. Loughmiller, KO5I
PO Box 247, Brookston, TX 75421

RS-14: The Rest of the Story

As this column goes to press, 1990—"The Year of the Amateur Satellite Program"—is beginning to wind down while satellite enthusiasts around the world anxiously await the final amateur satellite launch of the year.

As outlined in the September column, RS-14 is expected to be launched before year's end. This will bring to eight the total number of amateur satellites placed into orbit during this extraordinary year.

In this month's column we'll continue to take a look at the capabilities of the new Soviet-German satellite. In addition to its linear transponders,[1] RS-14 also has a variety of digital store-and-forward capabilities. The basis for these capabilities is an experiment known as RUDAK-2. (See Up Front in *QST*, Nov p 11.)

The RUDAK experiment has been in the making since 1984. When OSCAR-13 was launched in July 1988, included among its many subsystems was a communications experiment known as RUDAK. "RUDAK" is a German acronym for "Regenerating Transponder for Digital Amateur Radio Communications." It was the desire of our German colleagues to include a digital store-and-forward system aboard OSCAR-13 that would be accessible for long periods of time, thus enhancing worldwide packet radio networks with a satellite-based system. Unfortunately, because of what is believed to be a single component failure in the system, RUDAK is not operational.

As soon as it became apparent that the experiment aboard AO-13 had been rendered inoperative, AMSAT-DL began to seek out another launch opportunity for a modified and enhanced version of RUDAK which has become known as RUDAK-2. This time, however, the experiment would be geared to a low earth orbit because flights to more elliptical Molniya orbits (similar to that of OSCAR-13) are hard to come by. If RUDAK was to be orbited in the short term, it would have to be placed in a low earth orbit.

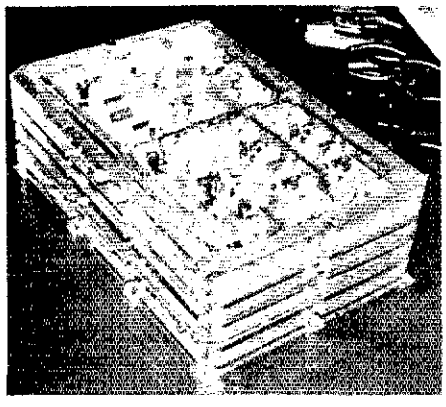
During the 1989 AMSAT-UK colloquium at England's University of Surrey, a contract was signed between AMSAT-DL representatives DJ4ZC and DK1YQ and AMSAT-U-ORBITA representative UA3CR to enter into a project known as RUDAK-2/RADIO-M1. A mere six months later, the hardware for RUDAK-2 was delivered to the AMSAT-U-ORBITA group for inclusion in the RS-14 satellite. Table 1 outlines the capabilities of the RUDAK-2 package.

RUDAK-2 is a versatile communications package that will undoubtedly be popular with satellite enthusiasts once it becomes operational. We wish our German and Soviet colleagues the best of luck in the launching of their jointly developed amateur satellite.

LOS

Jeff Ward, GØ/K8KA, and I would like to extend the warmest of season's greetings to satellite enthusiasts the world over. May the accomplishments of 1990, as great as they have been, serve as the basis for yet even more ambitious and productive advances in the '90s. 73 to you all!

[1]Loughmiller, "Introduction—*Part 2*," *QST*, Sep 1990, p 71.



RUDAK-2 is built in four modular trays that, after bench testing, are stacked into a single flight unit.

Table 1
Regenerative Transponder RUDAK-2

Two onboard computers with IPS operating systems drive a packet radio (AX.25) mailbox and a telecommunications experiment with digital signal processing (up to nearly 20 kHz). RUDAK-2 has a 1 Mbyte RAM disk and four uplink channels.

Gain of RX and TX antennas: 2.3 dBi each (dipoles)

Input sensitivity: < – 125 dBm (435 MHz)

UPLINK

SAT-RX-1:	435.016 MHz ± 10 kHz 1200 bit/s FSK, NRZIC Biphase-M (JAS, PACSAT)
SAT-RX-2:	435.115 MHz ± 10 kHz (AFC) 2400 bit/s BPSK, Biphase-S
SAT-RX-3a:	435.193 MHz ± 10 kHz (AFC) 4800 bit/s RSM, NRZIC Biphase-M
SAT-RX-3b:	435.193 MHz ± 10 kHz (AFC) 9600 bit/s RSM, NRZI (NRZ-S) + Scrambler
SAT-RX-4:	435.041 MHz ± 10 kHz (digital AFC) RX for RTX-DSP experiments

Note: Output signals of RX-4 are in-phase and quadrature components I(t) and Q(t), which are sent to the DSP RTX immediately after analog/digital conversion with 8-bit resolution. This supports various modulation modes, depending upon the software. All other receivers provide data (D) and clock (C) signals at their outputs.

DOWNLINK

The downlink can be switched to the following operating modes:

Downlink Frequency: 145.983 MHz

Output Power: 2 W nominal (10 W maximum)

Mode 1: 1200 bit/s BPSK, NRZI (NRZ-S) (PACSAT and Fuji compatible)

Mode 2: 400 bit/s BPSK, Biphase-S (AMSAT mode for OSCAR-13 beacon)

Mode 3: 2400 bit/s BPSK, Biphase-S (planned for OSCAR-13)

Mode 4: 4800 bit/s RSM, NRZIC (Biphase-M) (like 4800 bit/s uplink)

Mode 5: 9600 bit/s RSM, NRZI (NRZ-S) + Scrambler (like 9600 bit/s uplink)

Mode 6: CW keying (only for special events)

Mode 7: SK (F1 or F2B), eg RTTY, SSTV, fax etc. (only for special events)

Mode 8: FM modulated by D/A signals from DSP-RISC processor (speech)

Power Consumption: 14 V at 350 mA (max) = 4.9 W

Standby: 80 mA (RUDAK without power amplifier)

Mass: 6.2 kg

Dimensions: 230 x 320 x 120-mm

Note: Table 1 provided by AMSAT-DL from the *AMSAT-DL Journal*, Mar 1990.

Is Urban Amateur Radio Doomed?

By Bill Vandermay, W7ZZ
7169 SE Stark St
Portland, OR 97215

Having been an active radio amateur for some 55 years, I now believe that civilization and technology are closing in on us in the form of RFI and TVI. The incredible proliferation of RFI-prone consumer electronics makes operation tougher by the month for the city residential ham.

No matter how soundly you engineer your station—the latest gear, proper grounding and shielding, ac-line and low-pass RF filters—your clean signal, through no fault of yours, can *still* interfere with your neighbors' electronics in one way or another. So varied are the possible causes of RFI that many interference cases are practically unsolvable.

Among the greatest barriers to curing consumer-electronics RFI are neighbors' lack of understanding, their disbelief of technical explanations, and their often hostile, uncooperative and belligerent attitudes. "After all," they say, "we had no problem until *you* started transmitting!" *You*, therefore, are obviously at fault. They do not respect the fact that you are licensed by the federal government, are technically qualified, and are operating properly and legally. How could their wonderful equipment have anything to do with the problem? The salesman assured them it would be trouble-free! Your offers to help find a solution are spurned; neighbor relations are strained.

All of this, coupled with the consumer-equipment-RFI stance of an understaffed FCC, and the lack of clear and concise public policy, responsibility and positive information on RFI, can make Amateur Radio operating very difficult. Nowadays, we often operate with fear and trepidation while nervously waiting for the phone call or the knock on the door.

Picture your next-door neighbor with a lousy TV antenna or poorly installed cable system, several TV sets, a VCR or two, splitters, selector boxes, nonexistent or improper grounding, a few FM and AM radios, a burglar alarm system, cheap imported telephones, stereos, and a house full of kids demanding that their favorite cartoons not be messed up. How can you cope with this? Even if you *do* apply all the treatments prescribed in interference handbooks and FCC literature, will you solve the problem? And who pays for the cure?

So seriously is city dwellers' Amateur Radio threatened that some urban hams must journey to hilltops and boondocks to carry on their activities. Even this may not be enough to escape ham bashing by the media and neighborhood troublemakers, petitioners who seek to declare you a public nuisance, and the effects of the widespread confusion between Amateur Radio and CB. Looming on the horizon, or already in place, are severe measures by city and county bureaucracies to restrict ham radio antenna supports. And then there's what can happen when an uninformed public acts on its ill-founded fear of radiation hazards.

Short of more-positive industry policy and support, a concerted effort to educate the public by the FCC, EIA, ARRL, manufacturers and other concerned groups, the situation will only become worse. Proposed legislation to improve consumer receiver design by manufacturers seems to have fallen by the wayside. ARRL's proposals and efforts may be a step forward—but will the manufacturers listen and are such measures enough? The problem must be addressed at the highest possible level if we are to preserve our precious heritage and privileges.

Of course, amateurs can respond by operating at very low power, observing quiet hours or shifting to frequencies or modes that minimize interference. But the Amateur Radio you're left with after resorting to such stopgaps may be far from the Amateur Radio you *prefer* to enjoy—an unacceptably high price to pay for a non-solution to interference *that isn't your fault*.

The isolated hilltops and open spaces begin to look better all the time. Any way you look at it, our fight against consumer electronics RFI is an uphill battle—and it is questionable who will win the war. I am afraid that ham radio as we know it today may become as extinct as the dinosaur, and that unrestricted operating will be enjoyed only by a privileged and fortunate few.

QST Op-Ed Policy

1) Contributions may be up to two-thirds of a *QST* page in length (approximately 900 words).

2) No payment will be made to contributors.

3) Any factual assertions must be supported by references, which do not necessarily have to be included in the body of the article to be published.

4) Articles containing statements that could be construed as libel or slander will not be accepted.

5) The subject matter chosen must be of general interest to radio amateurs, and must be discussed in a way that will be understandable to a significant portion of the membership.

6) With the exception that the article need not be consistent with League policy, the article will be subject to the usual editorial review prior to acceptance.

7) No guarantee can be made that an accepted article will be published by a certain date, or indeed, that it will be published at all; however, only articles that we intend to publish will be accepted, and any article we have decided against publishing will be returned promptly.

8) Send your contributions to ARRL Op-Ed, 225 Main St, Newington, CT 06111.

QEX: THE ARRL EXPERIMENTER'S EXCHANGE

The November issue of *QEX* includes:

- "The Safari-4: A High-Integration, 4-Band QRP Transceiver," by Wayne Burdick, N6KR. Second in a three-part series, this installment continues with the circuit details for this compact 1-watt CW transceiver. Part 3, covering construction, operation and performance, will be in the next issue of *QEX*.
- "Initial Phase-3D Experimenters' Meeting." Minutes of the Phase-3D Experimenters' Meeting, held May 7-9, 1990, and sponsored by AMSAT-DL, in Marburg, West Germany. Covered are the reasons behind the decision to build a Phase-3D satellite, current development specifications and prospects for launching.
- Mark (KC9C) Forbes' Components column continues the discussion of digital fundamentals with the flip-flop or latch, and announces the Harris single-chip power supply and a microprocessor-compatible DTMF transceiver from California Micro Devices.
- Highlights of the Gateway column, by Stan Horzepa, WA1LOU, include: A report on the 9th Computer Networking Conference; Austrian Amateur Radio project to fly on *MIR;* PSK activity; better bulletins, and; ROSE packet-radio networking list.

QEX is edited by Paul Rinaldo, W4RI, and is published monthly. The special subscription rate for ARRL members is $12 for 12 issues; for nonmembers, $24. There are additional postage surcharges for mailing outside the US; write to HQ for details.

How's DX?

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

Gus

That name alone evokes a special feeling in those of us who learned our DXpeditioning lessons under W4BPD's tutelage in the mid-1950s and '60s. Gus worked the strong signals and the weak ones. He worked the savvy operator and made time for the not-so-proficient ham. Gus Browning, W4BPD, worked everybody in his down-home country-boy way, kept order in the fray and lectured about operating tactics in a meaningful, friendly manner. With a bottle of Coca-Cola in hand, somehow Gus managed to enjoy himself while affording us, the chasers, wonderful fun and excitement.

Dan McLean, WA4JTI, of Greeneville, Tennessee, manages to capture our feelings about W4BPD and a lot more, in the following, written after the Dayton HamVention® of 1979:

"For those who remember: At the Saturday DX Forum at Dayton this year, a scene took place that stirred the hearts of many of the deserving. Before the day's program began, the moderator canvassed the audience for those who had operated from other countries and asked them to stand and list their accomplishments. I thought to myself, 'There's one man who could turn this place upside-down if he was here and could tell us of all the places he had been.' Then, over to my left, my gaze stopped upon a familiar countenance and my heart skipped a beat. They passed the microphone quickly down the aisle to where he stood, almost hidden by the huge throng present in the hall. Yes, the hair was grayer (and maybe a little thinner), but the voice was still strong and for a split second, those old eyes once again sparkled like we remembered them from an era long ago. He spoke of his visits, such as Sikkim, Bouvet, Aldabra, Desroches and countless others, rare and exotic. Then the fellow announced, in that familiar sweet Southern drawl, that he'd held 169 call signs in his DXpeditioning career.

"The applause started as a low rumble from across the room and built to a shattering crescendo as the much-traveled-one received a long standing ovation. There was hardly a dry eye in the house when the tribute ended and the old gent silently slipped from the room, disappearing into the Dayton crowd. There were those with me in the audience that day who still don't know who our visitor was. His being there took us back several years, to a time when catching the new one was somehow more fun than it is now.

"Thanks, Gus, for helping us remember." *(Gus M. Browning Sr, W4BPD, of Cordova, South Carolina, passed away at the age of 82, on August 21, 1990.)*

CIRCUIT

☐ **Upcoming:** South Georgia, VP8SGI, is scheduled for Nov 23-Dec 10, and VP8SSI, South Sandwich, VP8SSI, for Nov 26-Dec 7, notes DXpedition coordinator Tony DePrato, WA4JQS. V31TI, Turneffe Islands, Nov 21-25 (IOTA NA-123), was operated by V31s KX SW YL. QSL via Scott Williams, Box 1522, Belize City, Belize, Central America (return-postage equivalents, please). Joe Adams, VE3CPU, hopes to activate the North Cooks, ZK1, in early 1991, starting a four-week South Pacific swing. Operation is planned for 160-6 meters, primarily CW, some SSB; QSL via VE3CPU. (Joe's other operations: VE3CPU/VP2M, 8P9CW, VP5CPU, CI8CPU, VK9ZM, VK9ZW, VE3CPU/J8.)

☐ **8P:** The Barbados bureau is holding thousands of cards from hams who have operated with 8P9 calls on holiday. Arrangements must be made before year-end for card shipments or the QSLs will be destroyed. Please send sufficient self-addressed envelopes, IRCs, etc. to cover postage and handling to Amateur Radio Society of Barbados, Box 814 E, Bridgetown, Barbados.

☐ **Kudos:** On October 14, Vic Uhlrich, WA2DIG, celebrated his 90th birthday in the company of members and friends of the North Jersey DX Association. Vic has lived through the spark days of shipboard-wireless communication, has worked 'em all, has possibly handled more cards through the bureau than any other living person, has collected more ham awards than can be told and with his wife, Anne, is held in the highest regard by those of us privileged to know "The Digger."

☐ **C6AFR:** Members of the Carolina DX Association went to the Bahamas for a spectacular June VHF Contest with a good 6-meter opening to the eastern US and the first 2-meter contact via meteor scatter with a North Carolina station. In six days, 700 contacts were made, a couple hundred on OSCAR-13 and a logbook full of QSOs on 20, 17, 15, 12 and 10 meters. Operators included AA4R, AA4SC, K4MQG (QSL mgr), KB4CSE, WA4UNZ, WA4VCC.

☐ **WØHGI/DU2:** During the summer earthquake in the Philippines, Bill, with his ham station on emergency power, was able to get the word out regarding the safety of students from a dozen nations and facilitated communications with the United Nations regarding relief supplies and local conditions. Bill prefers his cards be routed via his son, as follows: WØHGI/DU2, c/o Glen W. Menzies, 5828 duPont Avenue South, Minneapolis, MN 55419.

☐ ***St Peter/Paul:*** *The Natal DX Group is hoping* to amass resources for an early May PYØS adventure with five operators. The club's goal is to activate the Brazilian Oceanic Islands: Fernando de Noronha Island, Trindade, St Peter and St Paul Rocks. Check with club coordinator Karl Leite, PS7KM, Natal DX Group, Box 597, 59021 Natal, RN-Brazil.

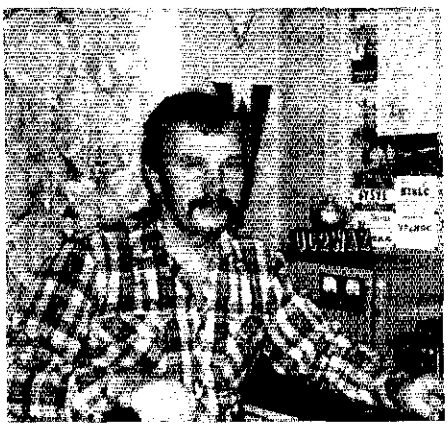
☐ **3D2AN:** DX is where you find it! Joe Dreher, W2TKG, ran into visiting 3D2AN at his Baldwinsville, New York, church one Sunday morning! Father Wooler, 3D2AN, has been on Fiji for 20 years and reportedly is easy to warm up to.

☐ **Routings:** Bob Chambers, NC6J, notes difficulty obtaining KC4AAA logs, etc. He says this leaves him no choice but to be listed as manager just for Aug 1988-Oct 1989. Route your cards to the Antarctic Support Association, 61 Inverness Dr East, Suite 300, Englewood, CO 80112.

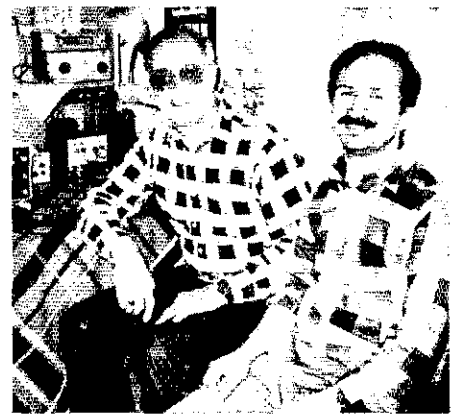
Al Goozner, 9J2AL, left Zambia in October, leaving his equipment to be operated by fellow 9J2 hams. Cards should go to his home call, WDØHHM. Al doesn't know where his next USAID assignment will be—stay tuned!

EXØS QSLs via UAØSAU, Box 2422, Irkutsk 664043, USSR.

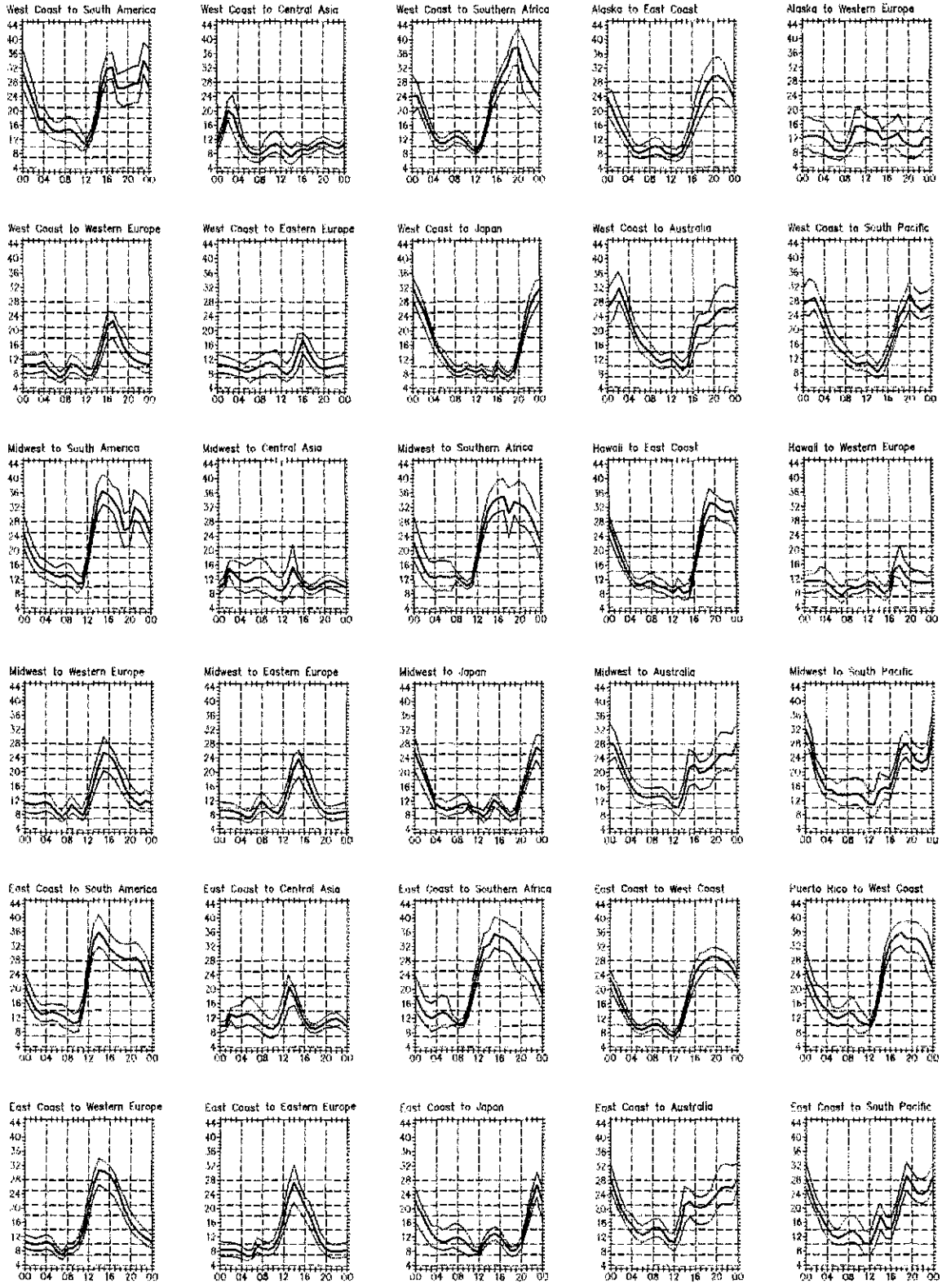
3B8FP Sep 6, 1987 to May 31, 1989, QSLs via Anita Keighley, KN2N, 4801 Warwick Way, Alexandria, LA 71303. For contacts outside this period, send to Rashid Karroo, Box 164, Curepipe, Mauritius Island, Indian Ocean.



It's winter and Top Band specialist UC2WAZ is looking for 160-meter skeds. Write Boris Besnosko via Box 8, Vietebsk 210023, Byelorussia, USSR.



Well-known QRP operator Don Shipman, TA6/W3RDF (l), visits Ahmet Kaynak, TA2D, in Zonguldak, Turkey. *(thanks N4VMG)*



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 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. Sunspot data is derived from *Solar Indices Bulletin*, National Geophysical Data Center (E/GC2), Boulder, Colorado. Curves are generated using IONCAP. These predictions, for December 16 to January 15, 1991, assume a smoothed sunspot number of 129, which corresponds to a smoothed 2800-MHz solar flux of 172.

IARU News

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

Maritime Mobile Net List

Over the years, there has been quite a bit of interest in nets for the maritime mobile operator—for those lucky and intrepid people who cruise the world in their sail and power boats. The following list, compiled by W6SOT, is listed chronologically. If you have any suggestions, additions or corrections, please send the information to Roger Krautkremer, W6SOT, 404 Oaklawn Ave, Apt C, Chula Vista, CA 92010.

Maritime Nets

Time (UTC)	Freq (MHz)	Net Name/Designator	Days	Area Covered	Contact
0000-0200	14.300/313	Mar Mobile Svc Net	Dly	PAC/CAR	KA8O
0100	3.935	Gulf Coast Hurricane	Dly	G/C USA	WD5CRR
0200	21.402	Gerri's Net (M/M)	M-F	PAC/Baja	K7YDO
0330/0230	7.294	Sandia (WTRMLN) Net	Dly	Baja-W/C MM	KA6HFG
0200/0100	7.290	Hawaii PM Net	M-F	Hawaii	KH6B
0220	14.300	John's Weather Net	MTThF	S/PAC-Norfolk Isl (M/M)	VK9JA
0230	3.905	CA Traffic Net	Dly	CA	W7FQ
0200-0400	14.300/314	Seafarers Net (M/M)	Dly	PAC/W Coast	WH6J
0300	14.106	Traveler's Net	Dly	Aust/IND OC	VK6ART
0400	14.115	Canadian DDD Net (M/M)	Dly	PAC	VE7DB
0400	14.318	Arnold's Net	Dly	S PAC	ZK1DB
0500/0400	14.314	PAC Mar Net—Warm Up	Dly	PAC	K7YRU
0500	21.200	VK/NZ/African Net	Dly	PAC/IND OC	VK3PA
0500	14.280	USA/Australia Tfc Net		PAC	
0530/0430	14.314	Pacific Maritime Net	Dly	PAC	K7YRU
0630	14.180	Pitcairn Net	Mon	S PAC	VR6TC
0630	14.320/105	S African M/M Net	Dly	ATL/IND OC.	
0630	14.313	International M/M Net		ATL/MED/CAR	DKØMC
0700	14.265	Pacific Island Net		C/PAC-W/PAC	
0700	14.310	Guam Area Net	Dly	W PAC	
0715	3.820	Bay of Islands Net	Dly	Aust/NZ/S PAC	ZL1BKD
0800-0830	14.315	PAC Inter-Island Net	Dly	S PAC/Sea	
0800	14.303	UK Maritime Net		PAC/MED	G8OS
0900	14.313	Mediterranean M/M Net	Dly	MED	5B4MM
0900	7.080	Canary Island Net		ATL	
1000	14.313	German M/M Net	Dly	ATL/MED	DKØMC
1030	3.815	Caribbean WX Net	Dly	CAR	
1100/1000	3.770	Maritime Prov WX Net	M-Sa	NE Canada	VE1AAC
1100	7.230	Caribbean M/M Net	Dly	CAR	KV4JC
1100	14.300/313	Intercon Net	Dly	NA/SA/CA	K4PT
1100	14.283	Carribus Traffic Net	Dly	E/C-CAR	KA2CPA
1110	3.930	Puerto Rico WX Net	Dly	PR/VI	KP4AET
1130	14.320/105	S African M/M Net	Dly	S ATL/IND OC	
1130 (also 2330)	21.325	S ATL Roundtable	Dly	S ATL/IND OC	PY1ZAK
1145	14.121	Mississauga M/M Net	Dly	E Can/ATL/CAR	VE3NBL
1200	14.320	Southeast Asia Net	Dly	Sea/Indonesia/Aus	WB8JDR
1230	7.185	Barbados Info Net	Dly	CAR	8P6DH
1245/1145	7.268	E/C Waterway Net	Dly	E/C-CAR	NU4P
1300	14.340/345	Indian Ocean Net	Dly	IND OC	WH6ANH/DU3
1300-1330	21.400	Trans-ATL M/M Net	Dly	NA	VE1ZL/VP5SL
1345	3.968	E/C Waterway Net	Dly	E/C,CAR	
1400	3.968	Sonrisa Net	Dly	Baja/CA	WA6VZH
1445	7.294	Cabasco Net	Dly	Baja/CA	XE2VJD
1600/1500+	7.238.5	Baja CA Mar Net	Dly	Baja/CA	N6ADJ
1600-2200+	14.300/313	Mar Mobile Svc Net	Dly	ATL/CAR	KA8O
1630	14.303	Swedish Mar Net	Dly	IND OC	
1630	21.350	Pitcairn Net	Fri	S PAC	VR6TC
1700	14.340	California-Hawaii Net	Dly	CA/HI	K6VDV
1700	7.240	Bejuka M/M Net	M-F	Cen Amer/Panama	HP3XWB
1700	14.313	International M/M Net	Dly	ATL/MED/CAR	
1730	14.292	Alaska-Pacific Net	M-F	AK/PAC	
1730	14.115	Canadian DDD M/M Net	M-F	PAC	VE7CEM
1800-1900	14.285	Kaffee Klatch Un-Net	MWSa	HI/Tahiti	KH6S
1800	14.303	UK Maritime Net		TL/MED	G4FTO
1800	7.076	S PAC Cruising Net	Dly	S PAC	
1830	14.342	Manana M/M Net-W/Up	M-Sa	W/C-E PAC	KB5HA
1900/1800	14.305	Confusion Net	M-F	PAC/AK	W7GYR
1900	14.342	Manana M/M Net	M-Sa	W/C-E PAC/Baja	KB5HA
1900	7.255	West Pacific Net		W PAC	
1900	21.390	Halo Net		N/S Amer	
1700-1900	14.280	Int Mission RA Net	M-Sa	C/S Amer/CAR	WA2KUX
1900	14.329	Bay of Isl Net	Dly	NZ-S PAC	ZL1BKD
1900	3.990	Northwest Mar Net		PAC NW (Wash)	
2000	7.095	Harry's Net	Dly	W/S PAC	KL7MZ
2000-2200	21.390	Inter Amer Traffic Net		N/S/C Amer	
2030	14.303	Swedish Mar Net	Dly	ATL	
2100	14.315	Tony's Net		Z/S PAC	ZL1ATE
2130	14.290	E/C Waterway Net		E/C USA	
2200	21.350	Pitcairn Net	Tues	S PAC	VR6TC
2200	21.402	Gerri's M/M Net	M-F	E PAC-Baja	K7YDO
2200	21.412	Pac Mar Net-15 Mtr	M-F	E PAC	KA6GWZ
2200-2400	14.300/313	Intercon Net	Dly	N/S/C Amer	K4PT
2330	21.325	S ATL Roundtable		S ATL	
2400-0200	14.300/313	Mar Mobile Serv Net	Dly	CAR/Baja/PAC	KA8O
2400	14.320	S E A M/M Net	Dly	S-W PAC/Sea	VS6BE
As Needed	14.325	Hurricane Net	A/R	ATL/CAR/PAC	

Notes:
Stations are cautioned to check appropriate band allocations, operator privileges, third-party agreements and net protocols.
Nets may vary over time and frequency based upon conditions, QRM, and seasons. If nets are not when/where listed, listen around plus or minus time/frequency.

QST

Strays

I would like to get in touch with...

☐ hams who were staff members at Boy Scout Camp Karankawa, W Columbia, Texas, from the late 1950s to present. David Ford, N5MRX, Rte 1 Box 64-B, Groveton, TX 75845.

☐ anyone who has made improvements to a Yaesu FR-101S/FL-101. Nick Benfaremo, WV2R, 2 Stenger Ct, Wappingers Falls, NY 12590.

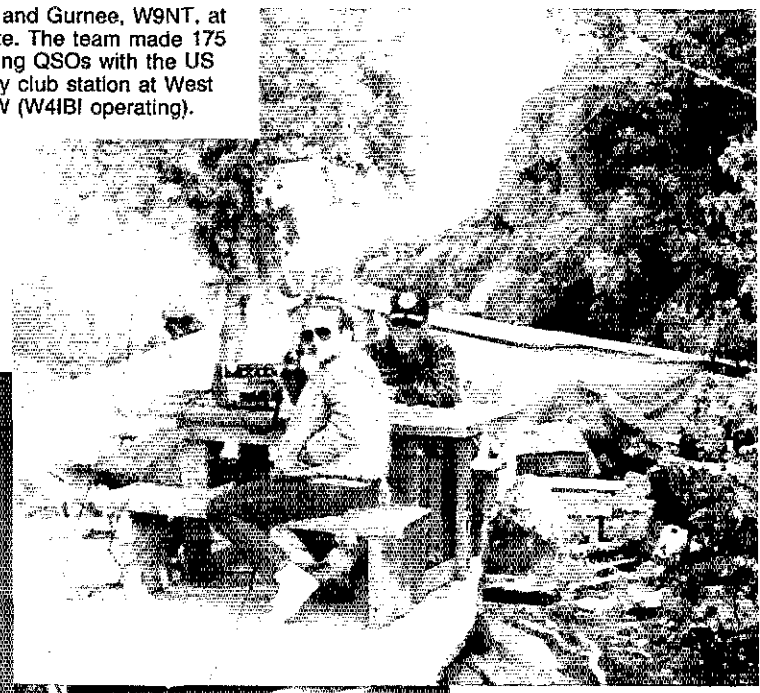
☐ anyone who is familiar with the assembler Scroll Screen Tracer for PCs from Scroll Systems, Tucson, AZ. Andre Pettelat, F9AP, 29 rue Saint-Maur, 75011 Paris, France.

☐ anyone who operates a Tandy 200 laptop computer with an MFJ-1278. Al Ogrizovich, NAS Bermuda, PO Box 2716, FPO NY 09560.

Conducted By Rick Palm, K1CE
Field Services Manager, ARRL

Thompson Island: DXpedition on a Budget

Every ham dreams about travelling to operate from an exotic DX spot, but, not every ham can afford it. Airfare, ocean travel, special equipment and other complex logistics expenses add up. With economy in mind, four members of the ARRL-affiliated Red River Radio Amateur Club sailed on one member's sloop to Thompson Island, in the middle of Lake Superior. Like its more exotic counterparts, the island is uninhabited and sports rocky bluffs, trails and even a homemade sauna left by previous voyagers. Last, but not least, it's in Canada, so it's DX!



Tim, KDØYX (l), and Gurnee, W9NT, at the operating site. The team made 175 contacts, including QSOs with the US Military Academy club station at West Point and W1AW (W4IBI operating).

Operator Nelson Stone, KAØWTZ, and logger Gurnee Bridgman, W9NT. The DXpedition operated W9NT/VE3 with ICOM IC-735 and Ten-Tec Delta transceivers. The primary HF antenna was a G5RV.

Tim Gooding, KDØYX, at the Thompson Island operating site, the DXpedition vessel *Windflower* in the background. The economy DXpedition cost members $99 each.

Gurnee, W9NT, operates aboard the DXpedition vessel *Windflower* en route to Thompson Island.

Thompson Island DXpedition team: (l-r) Gurnee Bridgman, W9NT; Tim Gooding, KDØYX; Nelson Stone, KAØWTZ; and Jerome Miller, KEØDJ, skipper of the *Windflower*.

Special Events

Conducted By Warren C. Stankiewicz, NF1J
Assistant Contest Manager

Bethlehem, Connecticut: The Hen House Gang ARC will operate W1FHP the month of **December** in celebration of Christmas. Operation is on 80-10 meters. For QSL, send QSL and stamp to W1FHP, HH Gang, Hard Hill Rd, Bethlehem, CT 06751.

Cobb Island, Maryland: The Southern Maryland ARC will operate KF3T **Dec 1-2** to celebrate the 90th anniversary of the first voice radio transmissions. Operation is in the General portions of 20 and 15 meters, and the Novice portion of 10 meters. For certificate, send QSL and SASE to Bill Rogers, N4ITE, Rt 1, Box 138, White Plains, MD 20695.

Flamingo, Florida: The Everglades ARC will operate W4SV1 1400Z **Dec 1** 1900Z-**Dec 2** to celebrate the 43rd anniversary of Everglades National Park. CW—7.030 14.030 21.130; phone—7.230 14.240 21.330 28.375. For certificate, send QSL and two units of postage to EARC, PO Box 113, Homestead, FL 33090-0113.

Gold Hill, North Carolina: The NC Chapter of TSRAC will operate N4KVF 1400Z-2200Z **Dec 8** from the Historic Spencer Shops. CW—7.050 14.050; phone—14.240 28.480. For certificate, send SASE to N4KVF, 3045 High Ridge Rd, Gold Hill, NC 28071.

Terre Haute, Indiana: The Wabash Valley ARA will operate W9UUU 1300Z **Dec 8** to 0300Z **Dec 9** to commemorate the founding of the William B. Gaskins Memorial Club Station. For certificate, send QSL and SASE c/o WVARA, PO Box 81, Terre Haute, IN 47808.

Christmas, Florida: The Coronado Wireless Assn will operate K4HML 1400Z-2200Z **Dec 15-16** to celebrate the Holiday Season. Operation is 15 kHz up from the bottom of the General and Novice bands. For certificate, send QSL and SASE to CWA, PO Box 1, Edgewater, FL 32132.

Alpine, New Jersey: The MAMARC will operate 1300Z-1600Z and 1900Z-2200Z **Dec 15-16** to celebrate the 100th anniversary of Major Armstrong's birth. 28.400. For QSL, send an 8½- × 11-inch SASE to MAMARC, PO Box 581, Alpine, NJ 07620.

Troy, New York: The North East Sector Aviation Society will operate KA2TFM 1300Z-2200Z **Dec 20-24** to commemorate the poem "A Visit From Saint Nicholas." 7.250 14.250 21.350 28.450 146.94. For certificate, send QSL and SASE to Arnie Fowler, 237 Belleview Rd, Troy, NY 12180.

Christmas, Florida: W1TRB will operate 1700Z-2400Z **Dec 22-23** to celebrate the Christmas Season. Operation is on the lower portions of the General subbands on 40 and 15 meters and the Novice portion of 10 meters. For certificate, send QSL and 9- × 12-inch SASE to Lou Hoekstra, Box 430, Christmas, FL 32709.

Albany, New York: The eleventh annual Number One Christmas Carol (N1CC) operation, in conjunction with the Albany ARA operation of K2 Christmas Tree (K2CT) is Christmas Day, **Dec 25**, 0000-0300Z and 1100-1500Z. For QSL, send QSL and SASE to John Yodis, K2VV, PO Box 460, Hagaman, NY 12086.

Pasadena, California: The Relay Repeater ARC will operate KE6PE 1600Z-0400Z **Dec 29-Jan 1** to commemorate the 102nd anniversary of the Tournament of Roses Parade. 14.260 21.335 28.450. For certificate, send QSL and a 9- × 12-inch SASE to Relay Repeater Club, PO Box 81, Arcadia, CA 91066-5019.

Special Event Announcements: Items for this column can be sent on a MS-DOS-formatted 5¼- or 3½-inch floppy disk in ASCII format to ARRL HQ, via modem (203-665-0090, 2400-8-N-1), or in letter form. 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 **Jan 1** to make the **Mar** 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 (SASE). If sending for a certificate, use a 9- × 12-inch 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 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 often print their cards and/or certificates after the operation is over so they will know how many to order. QST

Coming Conventions

ARRL NATIONAL CONVENTIONS
August 23-25, 1991—Saginaw, MI
August 20-23, 1992—Los Angeles

1993 National Convention: Call for Applications

Would your group like to host the big Amateur Radio event of 1993? The ARRL is now accepting applications for the 1993 National Convention. Contact ARRL Headquarters in Newington, Connecticut, for information and application forms.

The Board of Directors may consider applications for the 1993 ARRL National Convention as early as the 1991 Annual Meeting, so forward your completed forms to HQ by December 31, 1990—*Bernice Dunn, KA1KXQ, ARRL Convention Manager*

Attention Hamfest and Convention Sponsors

ARRL HQ maintains a 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 granted by your Director and 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 advice on possible date conflicts before contracting for meeting space. Dates may be recorded at ARRL HQ for up to two years in advance. QST

Hamfest Calendar

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.

†**Florida (Okeechobee)—Dec 1,** 8 AM-4:30 PM. *Spr:* Okeechobee ARC. 1½ mi N of intersection of US Hwy 441 & SR 70 on US Hwy 441. VE session, refreshments, swap tables, tailgating. *TI:* 147.795/195. *Adm* adv $2, door $3. Sue Jackson, PO Box 2575, Okeechobee, FL 34973.

Indiana (South Bend)—Dec 30. *Spr:* Repeater Valley Hamfest Committee. Century Center downtown on US 33, one-way N between Society Bank Bldg and river. *TI:* 146.52. *Tables:* $5/5-foot round; $15/8 × 2½ rectangular; $20/8-foot (wall locations). Wayne Werts, K9IXU, 1889 Riverside Dr, South Bend, IN 46616; 219-233-5307.

Pennsylvania (Columbia)—Jan 28; set up 6:30 AM, public 8 AM-3 PM. *Spr:* Columbia Area ARC. Columbia Markethouse, 1 mi S of Rte 441 exit from Rte 30. Free parking, flea mkt, ham & computer gear, VE session, refreshments. *TI:* 146.715/115. *Adm* $3. *Tables:* $5. Hamfest Committee, Columbia Area ARC, PO Box 574, Columbia, PA 17512; 717-684-5603.

Wisconsin (Milwaukee)—Jan 12, 8 AM-2 PM. *Spr:* W Allis RAC. Waukesha Co Expo Center Forum, I-94 to Co J, S to FT, W to Expo. VE session 9 AM at the Red Carpet Lanes, refreshments. *Tables:* 4-foot $3 advance, $4 at door; additional 4-foot $4 advance, $5 at door; electrical outlet $5, as avail. *Adm* adv $3, door $4 (adv reg deadline Jan 4, 1991). Send an SASE to WARAC SWAPFEST, PO Box 1072, Milwaukee, WI 53201.

The Cabarrus Amateur Radio Society Hamfest Nov 11 in Concord, North Carolina, was cancelled because the Armory was closed when the National Guard was activated. QST

†ARRL hamfest

Strays

AMATEUR MEMORIAL

A granite monument remembering radio amateurs who died while performing civilian public service communications will be dedicated at the ARRL National Convention in Saginaw, Michigan, on August 25, 1991.

If you know of any amateurs who should be honored at this ceremony, please contact Joe Turner, K8CQF, Monument Committee, 1991 National Convention, 423 N Granger St, Saginaw, MI 48602. Information should include the fallen ham's name, call sign, date of death and a description of the circumstances surrounding the death and any supporting documentation, media reports, personal testimonials or other relevant materials. Nominations may only be made for US hams not killed in military action and may date back to the beginning of ham radio.

Donations to help defray the cost of constructing the monument may be sent to the address above. At this writing, donations are not tax-deductible.—*Joe Turner, K8CQF, ARRL Michigan Section Emergency Coordinator.*

Contest Corral

Conducted By Warren C. Stankiewicz, NF1J
Assistant Contest Manager

NOVEMBER 30-DEC 2

ARRL 160-Meter Contest, see Nov *QST*, p 85.

DECEMBER

4

West Coast Qualifying Run, 10-35 WPM, 0500Z Dec 5 (9 PM PST Oct 4). 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.

8-9

ARRL 10-Meter Contest, see Nov *QST*, p 84.

9

W1AW Qualifying Run, 10-35 WPM, 0300Z Dec 10 (10 PM EST Dec 9). Transmitted simultanously on 1.818 3.5815 7.0475 14.0475 21.0775 28.0775 50.08 147.555 MHz. See Dec 4 listing for further details..

27

W1AW Qualifying Run, 10-35 WPM, 1400Z Dec 27 (9 AM EST Dec 27). See Dec 9 listing for further details.

31-Jan 1

ARRL Straight Key Night, 24-hour period UTC (from 7 PM EST Dec 31 until 7 PM EST Jan 1). This is a friendly meeting on the air using straight keys. Suggested areas of operation on 80, 40 and 20 meters are 60-80 kHz from the lower band edges and 10 kHz from the lower Novice band edges. When participating in Straight Key Night, use SKN instead of RST preceding the three-digit report to clue in passersby. After Straight Key Night, send a list of stations worked and your vote for Best Fist Heard (not necessarily one you've worked) during that period. This is not a contest; quick contest-like exchanges are discouraged. Vote also for the Most Interesting QSO. Mail your report by Jan 10, 1991, to ARRL HQ.

JANUARY 1991

2

West Coast Qualifying Run, 10-35 WPM, 0500Z Jan 3 (9 PM PST Jan 2). See Dec 4 listing for further details.

5-6

ARRL RTTY Roundup, see this issue, p 102.

Hunting Lions in the Air Contest, CW, sponsored by Lions Clubs International from 1200Z Jan 5 until 1200Z Jan 6 (phone: 1200Z Jan 12 until 1200Z Jan 13). Open to all amateurs worldwide. 80-10 meters (excluding WARC bands). Categories are single-op and multiop, single transmitter. Multiop must be club or association of ham radio operators. Exchange signal report and serial number. Lion, Lioness and Leo club members also send their club name and Lion district. Work stations once per band. QSOs with stations on the same continent count one point; QSOs with stations on other continents count three points. Bonus points: 10 points for QSOs with Leo, Lioness and Leo Club from different countries (five points for same country); 20 points (five points if in Brazil) for QSOs with Rio de Janeiro Arpoador Lions Club members. 20 points (five points if in US) for QSO with Melvin Jones Memorial Radio Club of US. 25 points for QSO with Arpoador Official Stations PY1LCA or ZY1LCA. (This doesn't apply to the Rio de Janeiro Arpoador Lions Club or the Melvin Jones Memorial Radio Club). No multipliers. Mail logs by Feb 15, 1990, to the Contest Committee of Rio de Janeiro Arpoador Lions Club, PO Box 2155, Rio de Janeiro 20011, RJ, Brazil.

9

W1AW Qualifying Run, 35-10 WPM, 0300Z Jan 10 (10 PM EST, Jan 9). See Dec 9 listing for further details.

12

Midwinter Contest 1991, CW, sponsored by the DYLC, 0700Z to 1900Z Jan 12 (Phone from 0700Z to 1900Z Jan 13). YLs call CQ-contest or CQ-Midwinter Contest, OMs call CQ YL. OMs work YLs only, YLs work YLs and OMs. No crossband contacts. Exchange RS(T), serial number, country. OMs start serial number with 001, YLs with 2001. All log entries must include the date, time and band. YLs count as five points, OMs count as three. Each DXCC country worked counts as a multiplier (not per band). Multiply QSO points by the multipliers for score total. SWLs may also participate by logging only the YL stations heard. Send logs to Midwinter Contest, PO Box 262, 3770 Barneveld, Netherlands.

12-13

Hunting Lions in the Air Contest, phone, see Jan 5-6 listing for further details.

North American QSO Party, CW, sponsored by the *National Contest Journal*, 1800Z Jan 12 to 0600Z Jan 13 (phone 1800Z Jan 19 to 0600Z Jan 20). Single operator and multioperator two transmitter. Output power must be limited to 150 W. Single ops may have only one signal at a time and may not use spotting nets or helpers. No crossmode operation. Work stations once per band. Exchange name and QTH. Multipliers are states (incl KH6), NB-VE1, NS-VE1, PEI-VE1 or VY2, PQ-VE2, ON-VE3, MB-VE4, SK-VE5, AB-VE6, BC-VE7, NWT-VE8, YUK-VY1, NF-VO1, LAB-VO2 and other North American countries. Non-North American countries do not count as multipliers, but may be worked for QSO credit. Final score is QSOs × multipliers per band. Suggested frequencies: 1.815, 3.535, 7.035, 14.035, 21.035 and 28.035 (phone frequencies are 1.865, 3.850, 7.225, 14.250, 21.300, 28.450 and 28.600). Team competition: Each team has a maximum of 5 members as a single-entry unit. Groups having more than five members may submit more than one team entry. To qualify, the name and call sign of each operator (and station operated, if a guest op) must be registered with KZ2S by telegraphic or written means before the start of the contest. Awards. Send logs to John Golomb, KZ2S, 107 Bailey Corner Rd, Wall, NJ 07719.

13

Midwinter Contest, phone, see Jan 12 listing for further details.

19-20

Michigan QRP Club CW Contest, sponsored by the Michigan QRP Club, 1200Z Jan 19 until 2400Z, Jan 20. Four entry categories: A—250 milliwatts or less output; B—1 W to 250 milliwatts; C—5 W to 1 W; D—more than 5 W. Exchange signal report, QTH (state/province/country) and MI QRP number (power output if nonmember). CW only. Work stations once per band. 160-10 meters, excluding WARC bands. Suggested frequencies: 1.810 3.560 7.040 14.060 21.060 28.060 50.060. Novices: 3.710 7.110 21.110 and 28.110. Count five points per member QSO and one point per nonmember QSO. Multiply QSO points by the number of states/provinces/countries worked per band. Multiply total by 1.25 if using 100% battery power or × 1.5 for using 100% natural power. Awards. Mail logs to L. T. Switzer, N8CQA, 654 Georgia, Marysville, MI 48040.

North American QSO Party, phone, see Jan 12-13 listing for further details.

19-21

ARRL January VHF Sweepstakes, see this issue, p 101.

24

W1AW Qualifying Run, 10-35 WPM, 2400Z Jan 24 (7 PM EST, Jan 24). See Dec 9 listing for further details.

26-FEB 3

ARRL Novice Roundup

26-27

UBA Contest, CW, sponsored by the Union of Belgium Amateurs, 1300Z Jan 26 until 1300Z Jan 27 (CW is 1300Z Feb 23 until 1300Z Feb 24). Categories: A—Single-operator single-band; B—Single-operator multiband; C—Multioperator single transmitter all bands; D—QRP 10 watts input as class B; E— SWL as class B. Suggested frequencies: 80, 40, 20, 15, 10 meters, according to IARU Region 1 band plan. Exchange RS(T) and serial number (starting with 001). Belgium stations must also give province abbreviation. QSOs with ON, DA1 and DA2 count 10 points, QSO with other European Community members stations count three points, QSOs with other stations count as one point. European community is in multiplier list. All Belgium provinces (AN, BT, HT, LB, LG, LU, NR, OV, WV); each of the prefixes: ON4-ON9, DA1, DA2; and European communities (CT, CU, DL, EA, EA6, EI, F, G, GD, GI, GJ, GM, GU, GW, I, IS, LX, OZ, OY, PA, SV, SV5, SV9, SY, TK, ZB2) count as multipliers. Total the QSO points times the multipliers for the final score. All logs must show the date, time (UTC), station worked and exchange. Declaration also required. Mail logs within 30 days of contest end to UBA HF Contest Committee, Glaicia Jan, ON6JG, Oude Gendarmeriestraat 62, B-3100 Heist Op Den Berg, Belgium.

Contest Announcements: Items for this column can be sent on a 5¼- or 3½-inch MS-DOS floppy diskette in ASCII format to ARRL HQ, via modem (ARRL HQ BBS, 203-665-0090, 2400-8-N-1), or in written form. 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 Jan 1 to make the Mar issue. Please include name of contest, dates, times (Z) and complete rules. Send to Contest Corral, 225 Main St, Newington, CT 06111.

Silent Keys

Administered by Nancy A. Slipski

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

KA1AVG, Ivan S. Coggeshall, Middletown, RI
W1CDE, Paul P. Blum, Stamford, CT
K1COG, John L. Ham, Falmouth, MA
N1DNT, Robert C. Miller, Hudson, NH
KA1FP, Harit Majmudar, Worcester, MA
W1GKF, Stanley H. Rosenberg, Beverly, MA
KA1LDV, Paul B. Monroe, Auburndale, MA
KA1LVO, John F. Hagele, Stamford, CT
KA1LYH, Philip H. Smith, Bangor, ME
W1MFY, Frederick E. Hollowell, Myrtle Beach, SC
WA1YSF, Barry R. Loos, South Windsor, CT
N2DHX, Arlene Ciccone, Kenilworth, NJ
W2DIA, Edward H. Weiler, Garden City, NY
W2GMU, Carl Perko, Tucson, AZ
KA2JNV, Edwin J. Smolarek, Spring Valley, NY
K2KOG, Robert I. Mayhew, Glens Falls, NY
W2LFX, George G. Scott, Vincentown, NJ
W2MRW, Francis M. Comins, Romulus, NY
W2MYJ, John W. Kittner, Morristown, NJ
K2RWC, Alex Baroshewitz, Freehold, NJ
WB2TQM, Nicholas Tarasuk, Cranford, NJ
K2XU, Howard La Munion, Utica, NY
K2ZKN, Edmund T. Ford, Wappingers Falls, NY
W2ZSN, Paul W. Ussery, Middletown, NJ
N3CVH, Anthony Lazzara, Easton, PA
N3GH, K. Richard Varell, Seaford, DE
W3SUA, A. R. Goode, Ocala, FL
W3VQ, Preston R. Schuler, Allentown, PA
W4BPD, Gus M. Browning, Cordova, SC
K4CHU, Dr John M. C. Covington, Roanoke Rapids, NC
W4DK, Eugene H. Fritschel, Fort Lauderdale, FL
W4FNW, Edwin C. Hand, Andalusia, AL
KF4GU, Jack L. Sturm, Orange Park, FL
W4HKK, Clarke A. Simms, Scroggins, TX
K4HPM, R. F. Wilkinson, Melbourne Beach, FL
*WA4HSE, Melvin C. Hill, Clinton, TN
W4JRR, Cecil I. McDowell, South Boston, VA
KA4MEF, Edward E. Hyrne, Palm Coast, FL
KA4OXF, Avery B. Stephens, Fuquay Varina, NC
K4OX, Glenn G. Boundy, Miami, FL
W4QED, H. Ellis Saxton, Boca Raton, FL
*W4RVE, Ward S. Atherton, Fort Pierce, FL
N4UDI, Wayne Workman, Lexington, NC
N4UMV, George Lovelace, Lakeland, FL
WA4VWC, Jarrell Penn, Knoxville, TN
W5ATH, James E. Palmer, Fort Worth, TX
W5BU, Dan C. Taulman, Fort Worth, TX
*W5FFP, Lemuel A. Decker, Houston, TX
KA5FHZ, Francis V. Chtopecki, Lake Charles, LA
W5GAA, Frank H. Bouldin, Fort Worth, TX
WD5HLZ, Reo T. DePew, Albuquerque, NM
AC5I, Rex L. Parker, Scott, AR
W5IHK, C. Ray Jones, Athens, TX
N5KEI, L. W. Fletcher, New Braunfels, TX
WB5QAF, A. D. Treloar, Ethel, LA
NK5Q, Leslie C. Miller, San Antonio, TX
W5TKU, Allen C. Smiley, Anthony, TX
W5ULO, Thomas W. Benbow, Arlington, TX
W5ZFQ, Geo B. Smith, Seguin, TX
W6AFQ, Clay Fisher, Santa Rosa, CA
NY6A, J. F. Walker, Corte Madera, CA
W6AWP, J. Lee Smith, San Pedro, CA
W6CBF, Clyde H. Sunderland, Walnut Creek, CA
W6CMK, Emil J. Ponso, Lynwood, CA
W6EFO, Henry E. Hess, Sacramento, CA
NB6E, Louis S. Isola, San Luis Obispo, CA
WD6FRP, Muriel B. Hunter, Berkeley, CA
KE6IT, Ronald A. Baker, Jr, Novato, CA
WB6JCW, Charles B. Tator, Yucaipa, CA
N6LOK, M. E. Kelley, Fresno, CA
K6MAU, John G. Waayers, Grass Valley, CA
WB6OXP, Gill Lackey, Wilmington, CA
W6QQC, Ted B. Edwards, Ridgecrest, CA
KJ6TP, John A. Grissom, Hemet, CA
KA7HLP, Hilder T. Thompson, Moyie Springs, ID
W7HLT, William O. Walls, Portland, OR
W7HUM, Robert E. Perry, Longbranch, WA
W7JHK, Lind J. Simonsen, Tacoma, WA
W7NRU, Dale C. Bell, Reno, NV
*WA7SVU, James E. Howells, Eugene, OR
KB8AAU, Larry R. Yocks, Martins Ferry, OH
W8AEC, William U. Weller, Martinsburg, WV
*W8AQA, Robert B. Cooper, Grand Rapids, MI
N8ARL, J. T. Gilkerson, Royal Oaks, MI
N8AYB, Nelson E. Calkins, Sheboygan, MI
W8CEU, Peter Susko, Cape Coral, FL
WD8DQK, Merle A. Smith, Langlois, OR
*K8EBF, Ray A. Rosenberry, Elyria, OH
N8EOA, Virginia S. Schietecatte, Fowlerville, MI
WB8GXT, Dennis Kauble, Clyde, OH
N8JMY, Everett P. Kaylor, Holland, MI
WA8LKH, Robert C. Palmer, Jackson, MI
WA8LWF, Vinton O. Moore, Elm Grove, WV
W8MZX, Richard H. Cook, Royal Oak, MI
W8NGW, Walter E. Musgrave, Cleveland, OH
K8OPL, Charles D. Bilby, Toledo, OH
K8PJE, Robert Lagucki, St Clairsville, OH
KA8RID, Jack W. Gray, Mount Vernon, OH
W8SLW, Chester P. Rempinski, Detroit, MI
WD9BEG, Ricky D. Russell, Grand Tower, IL
W9DNN, Bruce W. Jackson, Berkeley, CA
KA9HLB, Claude D. Hennon, Lawrenceville, IL
WA9IJA, William S. Miller, Inverness, FL
WA9IYE, Lucy E. Martin, Indianapolis, IN
WB9JJW, Walter F. Stone, West Lafayette, IN
W9KFO, Kenneth E. Johnson, Eaton, IN
W9ZZM, William H. Warren, Rhinelander, WI
WØCQF, John R. Dye, St Louis, MO
NWØG, William B. Berntsen, Edina, MN
WAØIKG, Thomas L. Chism, Elm Creek, NE
KØKMO, Eugene W. Fischer, St Louis, MO
WØNSA, C. A. Messineo, Theodosia, MO
WØOCH, Clarence O. Roark, Kansas City, KS
KØPEG, Marie J. Ballard, Galena, MO
WBØPYO, Donald P. Barnes, Littleton, CO

*Life Member, ARRL

Note: All Silent Key reports sent to HQ must include the name, address and call sign of the *reporter* as well as the name, address and call sign 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 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 p 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 or for 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.

75, 50 and 25 Years Ago

December 1915

☐ Something new under the sun: "After considering the matter for several months, it has finally been decided to issue regularly some kind of a bulletin to League members.... After much hard work, the President and Secretary out of their own pockets have produced *QST* Nr 1. It constitutes the first bulletin of general information on relay matters, and they hope to follow it each month with a new one.... Of course, the success of this plan hinges upon whether the membership ... will subscribe to *QST*. If they do, we are right, and we have a fine future promised us. If they do not, then the President and the Secretary will have lost their money and wasted a lot of hard work."

☐ *QST* is new, but its founders, and the Amateur Radio they seek to serve, are already up and coming. War rages in Europe; an exchange of correspondence, in which League president Hiram Percy Maxim offers the services of the League and its members for national defense, begins on page 3 of *QST* Nr 1. Cofounder Tuska, as an Associate Member of the Institute of Radio Engineers, offers *QST*'s first technical article, "Pictured Electro-Magnetic Waves." The issue's four photos figure the wireless telegraph stations of W. H. Carroll, St Louis, Missouri ("One of the best equipped Stations in the League"); J. Lippert (8BE); and Roy G. Burr, Norwalk, Ohio. Three and one half pages detail the "Latest List of Additions to American Radio Relay League List of Stations"; *QST* subscription and ARRL membership blanks beckon; general information, a book review, notices and humor round off the editorial corners; and ten advertisers gamble with Maxim and Tuska that this new Amateur Radio magazine—24 pages, not including Covers 1 through IV—will go somewhere.

December 1940

☐ Twenty-five years later, *QST* pauses to reflect that the Maxim-Tuska gamble *did* pay off, and then some: Celebrating *QST*'s silver anniversary, "It Seems to Us—" finds Editor K. B. Warner in top form; "A Quarter of a Century With *QST*" covers exactly that; Clarence D. Tuska, now of RCA's Patent Department, reveals "*QST*'s Diary, Volume I"; a reprint of The Old Man's January 1917 "Rotten QRM" re-unveils the fabulous Wouff Hong, Rettysnitch and Ugerumf through snatches of on-air blithering ("We assume from this msg. that Glucky is being asked to wait a minute while Blifsky seeks a wouff hong with which to wallop a monkey the next time the latter faces toward the motor"); and two men behind *QST*'s scenes, Harry R. Hick (ace draftsman of *QST*'s schematics, he also designed, among other things, the square *QST* letters and drew the kitties that long pounced in "Strays") and Fred Davis (*QST*'s printer; of Rumford Press, New Hampshire) pause before the footlights before disappearing backstage.

☐ Seeking stronger mobile signals in the 2- to 4-Mc. range, W. C. Hilgedick and Millet G. Morgan, W6QQJ, discuss recent top-loaded-antenna developments in "Raising the Efficiency of Short Vertical Radiators."

☐ Frank D. Lewis, W1LKV, describes "A Microwave Superhet" developed by M.I.T. for its 700-Mc. blind-landing system.

☐ "No neutralization required," eh? By Goodman, W1JPE, successfully completes "A Double Beam-Power U.H.F. Transmitter" for 28, 56 and 112 Mc. only after disregarding that all-too-familiar saw in applying RCA's 815.

☐ Although the 6L6 beam tube is more popular as a crystal tube than its suitability for the job might suggest, Hq. staffer Don Mix, W1TS, declares that much can be done to get the most out of "The 6L6 As a Crystal Oscillator."

☐ Dana Bacon, W1BZR, of the National Company, dissects and describes the crystal filter used in National's new NC-200 receiver in "Improving Crystal Filter Performance."

☐ "How's DX?" includes what's intended to be the final pre-World-War-II DX Century Club listing: "Effective with the appearance of this *QST*, Headquarters is discontinuing the checking of claims for either added credits or new DX CC awards until further notice. One fine day we shall hope to be able to announce ourselves open for new DX CC evidence again, but there is little present excuse for repeating the same listings month after month."

December 1965

☐ "An Anniversary Look at *QST*" celebrates the magazine's fiftieth year with reprints from the November and December 1916, April 1917 and December 1940 issues.

☐ Henry D. Olson, W6GXN, discusses phase-locked-loop detection in "Weak-Signal V.h.f. Reception."

☐ John A. (K2AOP) Clark's "A Semiconductor Converter for 432 Mc." promises "low-noise U.H.F. reception the easy way." Its noise figure, however, is unquantified.

☐ H. C. Gabrielson, W6HEK, reports contacts made (176 claimed) and calls heard (two or more times, 247) through OSCAR 3.

☐ 350 logs tell the tale of last September's V.H.F. QSO Party: less activity than in the September 1964 bash, but spiced by phenomenal 144-Mc. conditions in the east.—*David Newkirk, WJ1Z*

VHF/UHF Century Club Awards

The ARRL VUCC numbered certificate is awarded to amateurs who submit written confirmations for contacts with the minimum number of Maidenhead grid-squares located (indicated in *italics*) for each band listing. Numbers listed after calls refer to endorsements. The totals shown are current as of October 5, 1990. An SASE will bring you the rules and application forms.

Compiled by Lisa Kustosik, KA1UFZ

50 MHz
100

1 K8WKZ 625
2 *KB4CRT* *325*
3 W1QXX 325
4 N4MM 475
5 WB8WXZ 200
6 WB7OHF 325
7 WB1FVS
8 WD4FAB 275
9 WA3DMF 400
10 WA6BYA 575
11 W4OO 425
12 KA1DHO 250
13 W3WFM 450
14 N3COG 300
15 N2DXP 300
16 K1TOL 600
17 WA1OUB 550
18 W3EP/9 325
19 N5DDB 300
20 W1WHL 250
21 *WB4SLM* *200*
22 N2CEI 176
23 W8MVE 125
24 NØLL 525
25 KI3L
26 WB4NMA 125
27 KØTLM 450
28 K8TGC 300
29 W1JR 325
30 KC8PS
31 WB4OOJ 225
32 KC7QY
33 KA2BTD
34 WA4UAS
35 N8EDL
36 W5JME 400
37 *WA6CRA/4* *175*
38 N9CEX
39 KØUS
40 WB8BKC 550
41 NZ5W 150
42 KAØJGH 450
43 N9ANO
44 WBØZKG 250
45 KØYAH 175
46 KA9MGR 375
47 KY9P 250
48 AK4T 150
49 N2BMN
50 KD9QU 150
51 AA2Z/3
52 WD5ICC 300
53 WA1AYS
54 KB2XJ
55 N2WK 300
56 WB2EBS
57 *K2YOF*
58 WBØPKN 350
59 WB2NPE
60 K5WE
61 KX9N
62 N9DCA
63 WA8LLY 325
64 WB8KAY 325
65 K9HEK 200
66 W5FF 675
67 WB4NJG 175
68 DELETED
69 KD5RO 125
70 W3ZZ 350
71 W2SZ/1 125
72 KE4PE
73 WØJRP 425
74 N2BJ 225
75 WB8YZN
76 W3OTC 325
77 WDØCKF
78 K5IS 150
79 W9VNE
80 WAØDYU 300
81 K6EID 350
92 KA5LVP
83 K8GQB 250
84 K8IXU
85 KD6PY
86 KS5M
87 KAØNVT
88 W2CUK 125
89 WB8KRY 175
90 WB6KLL 150
91 KA3B 150
92 KCØOG
93 KA9JYZ
94 W2HRW 350
95 N9FDS 150
96 W9NO
97 KA2LIM
98 KCØQR
99 K2OS
100 N5DDT
101 KF5DB
102 K4LHB
103 K5UR 400
104 WD8CTX 175
105 K2OVS 250
106 KD7IY
107 W5NZS
108 NB9L
109 WA1WIF 125
110 WD6BCN 150
111 NC9F 200
112 VE3FGU
113 W9UD
114 NN9K 300
115 KI3L/5 200
116 N3BBI 300
117 K4RWP 250
118 N7BUP 175
119 K9LCR *225*
120 WD9FFC 175
121 K4CKS 450
122 N4VA
123 WA9FYB 175
124 AC3T 250
125 K2GK
126 KB3QM
127 WB2MKN 175
128 W6RXQ
129 KA9DZM 200
130 KA9LDS 300
131 KU8Y
132 W7US 200
133 WB8TGY 300
134 W7HAH 400
135 AA4FL *150*
136 KS4S 250
137 W4HJW
138 WA4JNE
139 WDØBQM
140 NA4I 275
141 WBØTEM 125
142 AIØO 125
143 KA2GOJ 300
144 WB9MSV 200
145 KD9IV 250
146 KA5EBL
147 WA3CKA
148 W5OZI 525
149 N2AHN 275
150 KF5AL 300
151 W8QXO 200
152 WB9UQE
153 W8QOI
154 KI6O 300
155 AB9W *175*
156 W9UB
157 KB4DZX 125
158 W1GXT 225
159 W5DXN
160 N5HVJ 200
161 K9RRS
162 W9XT
163 KA9SPD
164 K1ISW
165 KA4CRT
166 K6EJO 150
167 W5RCI 250
168 N4MW 325
169 WA6IJZ
170 W3BWU 150
171 WA2PDI *175*
172 AA4FQ 150
173 W7ABX 250
174 K1RSA 175
175 WØKEA 425
176 NW5E 175
177 AA5C 150
178 KF6ZB
179 K1TMM
180 WB8YFE *400*
181 N2AVR
182 K3YTL
183 K6CH 225
184 WB5ROR 200
185 K4DZP
186 DELETED
187 WBØVZW 125
188 KC9NV
189 N7DB 300
190 AA4FS
191 N4AVV
192 K3QM
193 WA9FIH 125
194 N9CC
195 WB4NIX
196 N5HYV 125
197 WA5S 200
198 K1GPJ 425
199 K7ICW
200 W7JXU
201 KI3W 150
202 N4LTA 225
203 WAØNQK
204 WA4IAX
205 WDØFOY 125
206 WB4WXE
207 WØVD 125
208 K2DNR/7 175
209 KN6B 325
210 WBØCGH
211 WA7TUX
212 WØRTZ
213 W5HUQ 150
214 KA9SOW 175
215 WA1TRE 325
216 N5HHS/5 (EM10) 300
217 N5HHS (EL29) 150
218 AFØT
219 N5JHV
220 KBØHH 125
221 W7KYT 175
222 KB9QC *150*
223 KMØA 425
224 WØRT
225 NØFFO 300
226 WA5DJJ
227 WB3LJK
228 K5HYE 175
229 N2CG
230 WB5MTU 150
231 WB8PAT 150
232 NØCMW
233 W7LQV 150
234 WØFY 225
235 WB5RUS 175
236 N2GBY 200
237 WA2HYC
238 N1ABY
239 VE3EVW 150
240 KB4OLM 200
241 VE3LNX 300
242 WB4AYE/6 150
243 N9KS
244 W7KNT
245 W7IDZ 275
246 WA6UZR
247 W5AL 350
248 WD5JDI
249 KA2TVA 150
250 KF4FL 200
251 KD4LT
252 KB4TZX
253 KA1ZX 225
254 KK6C 300
255 K3AKR
256 KØIFL 225
257 VE4CW 225
258 K7CW *125*
259 AF2K
260 KVØR
261 WA4CAK 125
262 KB4CSE 275
263 WBØWAQ/8 300
264 WAØOZP 150
265 NØGPD 125
266 N2AAZ
267 N6EIO
268 WA1TBV
269 KD2YB 125
270 WBØHYV 200
271 W4CYC 300
272 KU2A 200
273 KB4XK 200
274 WA4NJP
275 WD8OXK 150
276 N8CCC 225
277 AA4LB 125
278 KA8FKY
279 KQØZ 125
280 KB6QK 200
281 WB5AFY
282 WØGN 200
283 KA1MVB *400*
284 N4HB 175
285 NØCW 125
286 W7FIV 225
287 KX4R 225
288 WA5UFH 200
289 KA3ETI
290 KA6EYQ
291 AG9S 225
292 W1EXC
293 KBØZQ 125
294 N5CTE 200
295 KA5DWI
296 KØFKJ
297 N5EPA 300
298 KDØSU
299 KB8ZW *125*
300 N6CW 400
301 KC7IJ 350
302 WA3YON
303 KA9LLF 150
304 KB8BSW 200
305 W2CNS 350
306 K7NN 175
307 KE9I 175
308 N5DGQ 200
309 N7GXS 150
310 K7VAY
311 NKØP
312 WB5NAA
313 KB5QA
314 N5JWD
315 KB8JI
316 WBØCQO 250
317 WA5OLT 200
318 AB5T
319 K1FJM/4
320 KAØKUY 175
321 KH6CP/1
322 KC4IS 150
323 W1GRW 125
324 WB8CCL 350
325 WA9ABB
326 WW4T 150
327 WD5BJT
328 K6RZ
329 K6BEM 175
330 JO1HQQ *300*
331 W7IDZ 175
332 WD4AFY 150
333 WØPVL 200
334 K8CHO 150
335 NC9L
336 N5ISA
337 WBØKEK 150
338 WA6DAW
339 N5JYX 175
340 WAØTKJ 150
341 NJØX 125
342 WQ5S 325
343 WB4TWX
344 KB3PD
345 WA1NQV 150
346 WA8R *125*
347 WA7OEU 300
348 G4IJE
349 KA7MCX 400
350 G3CCH 150
351 W3TFA
352 W8WG
353 WA7KHO
354 WBØHUO 125
355 N1ETT 250
356 NØAKC
357 W4USW
358 KH6IAA
359 KD9OT 200
360 KXØO 125
361 WA5JCI 375
362 AA5AM 275
363 WD5K 300
364 KA9QLP
365 KA9RQC 200
366 AJ9C
367 WA9PWP 150
368 JN1BPM
369 NW7O
370 WA3FYJ
371 K3ZO 250
372 K2MP
373 CX8BE
374 WA2FUZ 200
375 KC8IM
376 VE5LY 225
377 WB5IGF
378 WAØGOZ 175
379 KB5IUA
380 KD8FO
381 W8TN
382 KØDAS 125
383 NØHJZ 175
384 W4LMJ
385 K2QE
388 KC7MJ *150*
387 N6VI 150
388 N4EQT 125
389 K1CLN
390 W8CM 275
391 W2IDZ
392 N9QX
393 KB7FUV 175
394 W4FSO/4
395 K4RZB
396 K6LMN
397 KØCS 300
398 NW7O/DM25 125
399 NW7O/DM18
400 KC4B
401 K9SM
402 WAØFQK
403 KDØHE 200
404 WAØBOK
405 WB4JEM 150
406 N4TWX
407 KI6BU
408 KA5WRG
409 W3EP/1 200
410 KL7IKV 200
411 WØZZQ 250
412 N8HNS 150
413 NØIGZ 125
414 K7MA
415 NØFPE 175
416 VE1QX 200
417 WA6BIL
418 VE1JH
419 WDØG 150
420 K3HZO
421 GØJHC
422 WA7DCW
423 KE8FD 125
424 NØFQW
425 WBØQQS
426 N5JBZ 175
427 KL7WE
428 N6DHZ
429 TI2KD
430 N6RMJ 125
431 VE4AGT
432 KAØCRI
433 KE7CX *250*
434 G1IOV
435 AL7JM
436 WA8MLV 125
437 NS4W
438 WA2TEO 150
439 WAØBWE
440 KØOST 150
441 G4UXC
442 ZL2CD
443 K9ES
444 WB9CAS
445 WØDFK 200
446 WA4PGM
447 KA8TBW
448 N4GBK
449 KZ3X 125
450 WD4O
451 KK4NO
452 AA5IB
453 WA6VGS
454 WB2RFV
455 GM8MBP
456 GJ4ICD 300
457 GM1ZCD
458 G4MKF
459 N2DKP
460 N8IQX
461 KAØJJK
462 VE3JJX
463 WD9ERO
464 NØKSC 175
465 WA7HCE
466 WA4CQX
467 W1DU
468 KM4ID 125
469 N4KWX
470 WN6W 150
471 KG6VE 125
472 KA9UVY
473 WA9LWJ 125
474 WB7REL
475 NQ8A 125
476 N7NQO
477 WQ8P
478 KD4LP

144 MHz
100

1 K9MRI 325
2 WB9MSV 225
3 KD8SI 325
4 N9KC 125
5 NØLL 250
6 WB4NMA 125
7 WA4NJP 200
8 K2LWR 175
9 KFØM 225
10 W4GJO 200
11 N9AQ 200
12 SM4GVF
13 WA6MGZ 200
14 KB5MR 125
15 DELETED
16 K5WE 150
17 KCØQR 125
18 WA3HMK 225
19 K7CW
20 W5SUS 125
21 W3EP/9
22 K8WKZ
23 N4AR 150
24 NR5O
24A K5YY 375
25 WD4DGF 150
26 K4CAW 150
27 WB8BKC 175
28 K3MD
29 WB8KAY 150
30 KA9LDS 200
31 W1JR 150
32 WA1OUB 175
33 NN9K 200
34 N9BD 125
35 K2TXB
36 WBØYWW
37 K3RX 125
38 WB8ART 200
39 WDØFOY
40 WBØTEM 225
41 NØAJU
42 K2OS
43 WAØTKJ 325
44 W5RCI 200
45 WBØDGF 125
46 WA2FXB
47 N8BJN 125
48 KØTLM 200
49 KØUS
50 SM3AKW
51 NOØY
52 WB4NXY 125
53 W3ZZ 150
54 NI8O 150
55 KAØABA 125
56 KXØO 125
57 W9HAD
58 AA5V
59 WBØZKG
60 N8CKH 150
61 W8LSC
62 W5FYZ 200
63 KCØOG
64 K5UR 350
65 W5FF 175
66 WØRT
67 NØEKT
68 WBØYZN
69 KD9QU 125
70 WB9OJR 150
71 N5BHO
72 WB2NPE
73 WB9CAS
74 K8TL
75 WB4NJG
76 AA4FS 150
77 VE1UT
78 KU8Y 125
79 WB4GFO
80 K4CKS 200
81 KB7O
82 K2GK
83 KB9QC
84 WB9UQE
85 W2GZ/1
86 WB3LJK
87 G6JNS
88 G4UXC 150
89 K8RZB
90 AF9Y 300
91 G6DZH 125
92 G4WAD 125
93 G8HKM
94 W9UD
95 N4AVV 125
96 DL8LAU 300
97 W9YCV 125
98 W7HAH 250
99 K9VGE
100 G4XEK
101 W2RS 125
102 KE2N
103 W8NJR
104 N8DEJ
105 WBØSWD
106 WA3FYJ
107 KD4LT
108 W3CWG 200
109 KB4FQ 125
110 N2WK 150
111 W5NZS
112 LA9FY
113 WA4VCC 200
114 GØCHE 125
115 KR9U
116 G6XVV 150
117 N2AHN 125
118 YO2IS
119 WA5DBY
120 KMØA 275
121 W9JGV 150
122 WA9JFM 150
123 W7ID 200
124 WØIZ 175
125 WØJRP 150
126 KB4CSE 200
127 K3JFL
128 KU9L
129 W8QXO 125
130 WB4TWX 150
131 W4CPZ 125
132 W4ZD 375
133 WØEMS
134 K4JQU 125

135 WA8MIL
136 WA8NPX 125
137 N5HYV
138 KD9JQ
139 NC9F 125
140 K8UC
141 W2GU 175
142 HB9RUZ
143 NB9F 150
144 WØFY 175
145 AA4FQ 200
146 AB5T
147 KB3QM
148 KB4WM 150
149 W7IUV 125
150 W9UB
151 NØBTN
152 WD4EWX
153 K3QM
154 N5HVJ
155 KI4CI
156 KBØZQ
157 W3WVG
158 VE1ALQ
159 NW5E
160 N4MW 150
161 KB3PD
162 DELETED
163 WD4AHZ 175
164 W3ZR
165 W5HUQ
166 W2DRZ
167 WAØNOK
168 KA9SPD
169 WØVD 150
170 YU4WEU 150
171 KJ4GK
172 K6PVS
173 K3NXH
174 N4EJW
175 Y22SA
176 NY4T 175
177 WB4OOJ
178 KAØGGI
179 NE4C 125
180 KØIFL 225
181 KBØHH
182 DL8AAV
183 WØRTZ
184 N5WS 200
185 K4RWP
186 KB4CRT 125
187 K5IS
188 AA2Z
189 W3WFM
190 YU3OV
191 NØFQW 150
192 WA4SBC
193 DELETED
194 WB5ROR 175
195 W5AL 200
196 KD7IY
197 K7CW
198 N5HHS
199 WA8EOU 150
200 K4HJE 125
201 NI4Z
202 KD9IV
203 KI3W 200
204 GI1JUS
205 N2BJ
206 N6CW
207 K6CH
208 N4MM
209 DK2LM
210 WC4G
211 WB4TBF
212 KQØZ
213 KD5RO
214 KB8JI 125
215 GM4ILS 125
216 N5CTE 150
217 W5UUM 125
218 WA5PUP
219 W7RV
220 AA7A 125
221 N8GWG
222 N4HB
223 WBØHUO
224 WB5NAA
225 N4VC 125
226 N8CGY
227 AA4TJ
228 WA8EQP
229 NU5F 125
230 WA1VRH 150
231 G6IJM 150
232 DL4OL
233 KX4R 125
234 WD9IIC
235 W4FF
236 WB4MJE 150
237 KA5DWI
238 W2HRW
239 KB5RF 175
240 W5ASH
241 YU7CV 200
242 WB8CCL 150
243 WD4FAB
244 K9MK 150
245 KAØJGH
246 KE9I
247 WA4MJD
248 W1AJR
249 KC4IS
250 WB8CPW 125
251 WA2SLY
252 WBØHYV
253 KD8JQ
254 WB8PAT
255 W4EMB
256 KAØKUY 125
257 WW4T
258 KA2WKA
259 WB8YFE
260 WB4SLM
261 WD5ICC
262 KF5PE 125
263 N4FWE
264 W1AIM
265 N5JYX 125
266 VE3PCW
267 KE8FD 125
268 N1BUG
269 K7ICW
270 KB8ZW 125
271 NØFFO
272 KØJJA
273 WA4VLQ
274 WBØWAO/8 125
275 G3JMB
276 WA8MZQ 175
277 K1FJM/4
278 KA5EBL
279 VE5LY
280 WØRAP
281 WA4GBE
282 KI8G
283 WD4AFY 125
284 KB5QA
285 KA5ULI
286 VE3LNX
287 NØCIH
288 WDØG
289 G4RRA 250
290 AA5AM
291 K3ZO
292 KB4PIW
293 KC4YO
294 W2CNS 125
295 K3HZO
296 WA5NFC 125
297 KD8FO
298 KB4XK
299 GWØETM
300 WA5UAJ
301 W5SFW 125
302 W5UGO 175
303 W8RQQ 125
304 KAØYMZ
305 W8CM 125
306 W4FSO/4
307 K1TR
308 KØDAS 125
309 KG5VE 125
310 NS4W
311 WQØP 125
312 W5DFU
313 N8DJB
314 N5KWB
315 KA9MGR
316 G1LSB
317 K8FF
318 NØJRN
319 WB8JKR
320 WAØJYJ
321 NF7X
322 WB2OYC
323 K0BI
324 WAØBWE
325 K5MAT
326 WB2ZSY
327 KA9RZZ
328 W5MJD
329 G3NAQ 150
330 W5JME
331 NA4I
332 K1KA
333 K2OVS
334 WA4OFS
335 GW6TEO
336 WA2TEO 125
337 SM7GWU 250
338 WD4MBE
339 WØDFK 150
340 WQ5S
341 WA9UBI
342 AA5DS
343 AA5IB
344 G4VXE 125
345 N2JS
346 WA5JCI
347 WB4RUA
348 W3EP/1
349 K7TM
350 WR8B
351 WØKEA 125
352 K9DZE
353 WA9O/M
354 WA9LWJ
355 KZ3X

220 MHz
50

1 W1JR 80
2 WØSD
3 WBØTEM 120
4 WB8BKC 110
5 VE3EMS
6 WD4DGF
7 N9HH
8 W2SZ/1
9 W9UD
10 KC4EG
11 WB3LJK
12 W5RCI 80
13 WB2NPE
14 K5UR 110
15 WA4PCS
16 N2WK 60
17 KFØM
18 WB8ART
19 WS4F
20 KØTLM
21 W2DRZ
22 K2GK
23 K3HZO
24 WB8KAY
25 VE3LNX
26 W4GJO
27 WB9MSV 60
28 KØIFL 70
29 KCØQR
30 K4LHB
31 WB9OJR
32 KB8ZW 60
33 WB8PAT
34 KB8JI
35 WAØTKJ 70
36 KA9MGR 60
37 WB9CAS
38 W3ZZ 60
39 W2GU
40 WB4SLM
41 N3AHI
42 NN9K 60
43 NC9F
44 KB3QM
45 WA9JFM 70
46 WBØWAO/8 60
47 WØFY
48 WA4NJP
49 KMØA
50 K5UGM
51 KØDAS
52 W5NZS
53 NØCIH
54 N4MW
55 N8DJB
56 KD5RO
57 N2BJ
58 NW3C
59 KB4XK
60 WA2TEO
61 WA4VCC

432 MHz
50

1 W1JR 170
2 K8WW 180
3 WB3ESS
4 WB8BKC 140
5 W4GJO 130
6 W2VC 70
7 WA9JFM 90
8 KB5MR 100
9 WB4NXY 90
10 K4CAW 90
11 W2SZ/1 70
12 KD8SI 90
13 WBØTEM
14 VE3CRU 70
15 W9UD
16 WB9MSV 100
17 WB5AFY 150
18 W5RCI 170
19 KØTLM 100
20 SM3AKW
21 K5YY 130
22 WB8ART 100
23 K1FO 250
24 W3ZZ 70
25 WØRAP 200
26 KFØM 80
27 K8TL 70
28 WBØDRL
29 NI8O 120
30 KC4EG
31 KCØQR 70
32 VE3BFM
33 W8LSC 60
34 KR9G 60
35 AF9R
36 WB8KAY 70
37 NZ5W
38 NC9F 90
39 WB2NPE
40 W1XX/2
41 W5NZS
42 K2GK
43 K5UR 150
44 WØRT
45 G6JNS
46 N9KC
47 G6DZH 70
48 G6HKM
49 KE5EP 70
50 K3YTL
51 WA5DBY
52 KB3QM
53 WB3LJK
64 WB9SNR
55 N5BHO
56 N8DJB 90
57 WØRRY 150
58 N4AVV
59 KØUS
60 KØJJA
61 AA4FS 60
62 VE3LNX 60
63 N4WM 80
64 KCØOG
65 KAØABA
66 K8UC
67 KB8ZW 80
68 NØEKT
69 WB9UOE
70 K3QM
71 WØFY 70
72 WA8MIL
73 G4NBS 70
74 K5WE
75 WB9OJR 70
76 WBØDGF
77 W5DFU 80
78 KMØA 70
79 K9VGE
80 K3HZO 60
81 N2AHN 70
82 WØJRP 70
83 W8YIO 110
84 W2GU 80
85 WS4F
86 W2DRZ
87 W5ASH 60
88 WAØNOK 70
89 W5HUQ 80
90 WØVD 70
91 K9DZS
92 WB9CAS
93 KD5RO
94 W5HN 60
95 W9HAD
96 KA9SPD
97 N8BJN
98 DF8ZW
99 NØLL 80
100 WA5TKU
101 KI4CI
102 W3WFM
103 WØYPT
104 KA9LDS 70
105 KØIFL
106 G3XDY 80
107 NØFFO
108 N2WK
109 KBØZQ
110 K4CKS 100
111 W7HAH 90
112 N4VC
113 WAØTKJ 130
114 WB2DNE
115 WB8K 70
116 KL7WE 80
117 WA4OFS
118 G1EHJ
119 WA4PCS
120 N5HVJ
121 WB5ROR
122 WD4FAB
123 WB8PAT
124 WD4AHZ
125 WA4VCC 60
126 WB4OOJ
127 KDØGT
128 KØRZ
129 G4FRE 110
130 KB3PD
131 KC4IS
132 K2OS
133 G6DER 100
134 KD9IV
135 KB9QC
136 KØSMI
137 AA2Z
138 JA4BLC
139 KB4CSE 60
140 KX4R 60
141 WB4SLM
142 KC5SH 70
143 KB4WM 60
144 GW8TIX/P 70
145 WB5NAA
146 JHØYSI
147 N5JYX 80
148 WA4BGE
149 WA4NJP 60
150 W5AL 60
151 KB5QA
152 N2BJ
153 KA5ULI
154 G4XOL 100
155 WØKJY
156 WA3FYJ
157 N4EQT
158 W5UGO 110
159 W7RV
160 N5CTE
161 W4FSO/4
162 W2CNS
163 W7ID
164 G1LSB 100
165 WQØP 60
166 N9CXO
167 NS4W
168 WA5NFC
169 W4ZPG
170 KB8JI
171 WB8TGY
172 KBØHH
173 G4NPH
174 WD9EGE
175 WAØBWE
176 KØDAS
177 KT8W
178 K7ICW
179 WD4MBK 80
180 WA8EUU
181 AA5IB
182 WW4T
183 WD4AFY
184 W5UUM
185 W4EMB
186 WA1HYN

902 MHz
25

1 AA2Z
2 VE3LNX 35
3 WB8BKC 35
4 W1JR
5 WB2NPE
6 VE3CRU
7 N3CX
8 KD5RO 35
9 N2WK
10 WB5LUA

1296 MHz
25

1 WB8BKC 70
2 K8WW 50
3 N6CA 40
4 WB5LUA 120
5 W8YIO 45
6 W1JR 35
7 W2VC 35
8 W2SZ/1
9 W5HN 30
10 WBØDRL
11 WA5TKU 30
12 WØRAP 70
13 VE3BFM
14 WA8TXT
15 VE3LNX 35
16 WB2NPE
17 KD5RO 60
18 K3YTL
19 G4PRJ 35
20 WB5AFY 50
21 WAØTKJ 60
22 KE5EP 35
23 WA5DBY
24 KØNG
25 WB9SNR
26 WB4NXY 30
27 NOØY 45
28 W7CNK
29 W5RCI 45
30 W5DFU 40
31 W5NZS
32 NI8O 45
33 KØSMI
34 G4NBS 50
35 K3HZO 40
36 N8DJB 30
37 K2TXB
38 W2DRZ
39 W5ASH
40 WA5VJB
41 KDØGT 30
42 W4GJO 30
43 N5WS 30
44 KCØQR
45 KØRZ 30
46 WD5AGO 55
47 NØEKT
48 KØTLM 35
49 WA1OUB 35
50 G3XDY 55
51 WA1JOF
52 KD8SI
53 W3KWH
54 K5UR 40
55 AA2Z
56 KF5PE 30
57 W2GU
58 WBØHU
59 N2WK 30
60 KØFQA
61 KD5RO/2 55
62 G6DER 70
63 KØIFL
64 N2BJ
65 KB3QM
66 WØYPT
67 G4RGK
68 WB9MSV
69 G6HKM
70 WA9JFM 30
71 WB4SLM
72 WØKJY
73 KB8ZW
74 W2CNS
75 N4MW
76 GM8MBP
77 W3ZZ
78 WA4VHF 30
79 KD7YZ
80 NØLL
81 WA8EUU

2.3 GHz
10

1 WB5LUA 30
2 WA5DBY
3 WA3AXV
4 WA3JUF
5 WA5VJB
6 W5HN
7 W2SZ/1
8 WB5AFY 15
9 KD5RO 20
10 W7CNK
11 W5UC
12 W8YIO 20
13 W5DFU
14 K7AUO
15 WB2NPE
16 W4HHK
17 N3CX
18 WB8BKC 15
19 WB8TGY/8
20 KØRZ
21 WA5TKU
22 G3XDY 15
23 KDØGT
24 KB8BSW
25 VE3LNX 15
26 W1RIL
27 KØKE
28 W5ASH
29 KXØO
30 KD5RO 25
31 G6DER 35
32 N2WK
33 W1JR
34 WAØTKJ
35 W5RCI

3.4 GHz
5

1 W2SZ/1
2 WA5DBY
3 WB5LUA 10
4 W5UC
5 KD5RO 10
6 WA5VJB 10
7 WB7UNU
8 WA3RMX
9 KØRZ
10 W7CNK
11 WB5AFY 10
12 K7AUO
13 WB5LUA/5
14 KDØGT
15 WØKJY
16 KØKE
17 KXØO
18 G6DER 10
19 KD5RO
20 W5UGO
21 N6CA

5.7 GHz
5

1 W2SZ/1
2 K5PJR 35
3 WA5ICW 30
4 WD5AGO
5 W5UGO 25
6 WB7UNU
7 WA3RMX
8 K7AUO
9 WB5LUA 10
10 KØRZ

10 GHz
5

1 W2SZ/1
2 K2DNR/7 (DM41)
3 KCØW
4 K2DNR/7 (DM42) 10
5 WA7BBM
6 WB7UNU
7 WA3RMX
8 N6CA 10
9 WA6EXV 10
10 KB7CI/7 10
11 WB2ELB
12 KS2Z
13 W7UDM
14 K7AUO
15 WA6QYR
16 DELETED
17 K6UQH
18 KØRZ
19 W6RXQ
20 N6XQ
21 WBØHLC/6
22 W6OYJ
23 WB2ONA
24 W2TTM
25 W2VC
26 W6CPL
27 K2GQI 10
28 K6HLH
29 WB5LUA
30 W6OYJ
31 WA5BNH
32 G3JMB/P 10
33 W6HDO
34 W6HCC 10
35 G8LSD 10
36 NW7O
37 WA7JUO
38 KG2K
39 W6ENZ
40 K6KLY
41 AA5C
42 N5QGH
43 WA5VJB
44 VK7IK/W5
45 WA5DBY
46 W6HCC/DM14le 15
47 NW7O/DM26eh

24 GHz
5

1 W2SZ/1
2 WA3RMX
3 WB7UNU
4 N6XQ/6
5 W6CPL

300 GHz
5

1 KY7B

Results, 1990 ARRL June VHF QSO Party

This was my first VHF contest, but it won't be my last! It was enjoyable, yet not as hectic as HF contesting.—*K1NCD*

By Billy Lunt, KR1R and Warren C. Stankiewicz, NF1J
Contest Manager Assistant Contest Manager

"We ought to keep in mind the goals and purposes (of) VHF/UHF contests. There are three major purposes: (1) to increase VHF and UHF activity, especially in underused bands; (2) to provide a framework for competition and recognition; and (3) to have fun." Nicely put by the editors of VHF-UHF Contesting!, a regular column in the ARRL's contest magazine, *National Contest Journal*. To best meet these objectives, a survey was conducted among the VHF contesters. Input on proposed rules changes was sought.

It's quite an act to fairly balance what are sometimes conflicting objectives. That's why the rules haven't been static, but have tried to keep pace with the fluid interests of VHFers. Dozens of rules changes have resulted in the past decade alone. The Contest Advisory Committee is reviewing suggestions that came from the survey. This could make the VHF contest program even more enjoyable for you—crafting the rules for the maximum enjoyment of the participants is the goal.

The weekend of June 9-11 saw much VHF contesting fun being practiced, as attested to by N2HXJ: "Good weather this June made operating QRP portable great fun!" Likewise, KM1H was "amazed at what QRP can do from a good hilltop." Pete, KT2B, an old hand at QRP portable work "heard a lot of new QRP portable stations this year." He added, "it's encouraging to see the upswing in activity." It can't get any better for WB8TGY: "The highlights were working VP9, C6A, and CO2 on 6 meters and 13 QSOs and six grids on 220 with only 2½ watts."

Six-meter DX is usually a component of the June contest. The "highlight of the contest was working C6AFR," according to WA3HMK. Seconding that is WB4U: "My biggest thrill was working C6AFR on the first call through a pileup." Further echoed by N4JQQ: "It was a thrill to work C6AFR and I was glad to see that most ops stayed above 50.125 (for domestic QSOs)."

Conditions on 6 were about what could be expected. W3EP/1 noted "the scatter on 6 was above average and E_S was evident for hours, but never solid or strong." VE3DVF experienced a "few double-skip openings to the West Coast." WA7KHO asked, "With meteors, E_S, tropo and aurora, what more could a person want?"

Scores were right up there in the ionosphere. Breaking the one-mil multioperator barrier for the first time was the Mt Greylock Expeditionary Force, W2SZ/1, at 1.245 million points. This fantastic score topped other superlative efforts by K3YTL at 672k, K1TR/3 at 669k and N6CA at 657k.

In the single-operator category, K2LNS

Plaque Winners

Single Operator

Position	Winner	Score	Donor
1st	WA2FGK (K2LNS,op)	240,384	John Kanode, N4MM
2nd	K5CM (N5CG,op)	196,112	Bald Knob VHF Contest Group
3rd	N2CEI	127,397	ARRL
4th	K2SMN	117,936	Terry Netzley, W8NJR
5th	W1RIL	117,468	Delaware Valley VHF Society
6th	WZ8D	116,844	ARRL
7th	K1RZ	112,572	Mt Greylock Expeditionary Force, W2SZ/1
8th	KA2DRO	108,096	Paul Monroe, KA1LDV Memorial—W1TKZ
9th	VE3ASO	107,864	Kenwood USA Corporation
10th	W9IP/2	104,500	Kenwood Employees Radio Club, WD6DJY

Multioperator

Position	Winner	Score	Donor
1st	W2SZ/1	1,245,371	MacTrack Software
2nd	K3YTL	672,336	ARRL
3rd	K1TR/3	669,900	Angle Linear, N6CA
4th	N6CA	657,540	Don Wilke, WW8M
5th	W3CCX	432,196	Mt Airy VHF Radio Club
6th	AA9D	358,295	Jon K Jones MD, NOØY
7th	N2WK	322,065	Mark Wilson, AA2Z
8th	N2WM	232,366	ARRL
9th	KF6AJ	227,397	Rochester VHF Group
10th	WBØDRL	222,430	W1XX (+WB1AVA,K1GX,K1JX,KB9NM) Contest Team

QRP Portable—Single Operator

Position	Winner	Score	Donor
1st	WB2DNE/3	29,492	Jay, K2OVS, and Dick, K2RIW
2nd	WB2ELB	24,354	Peter Putman, KT2B
3rd	N1DJB	23,436	Contest Committee—LIMARC
4th	N6UII (DM04)	21,801	West Coast VHFer
5th	NOØY	10,728	ARRL

DX Single Operator

Position	Winner	Score	Donor
1st	GØMOS (WB4SLM,op)	4,046	W3EP, K9AKS, W9IP

DX Multioperator

Position	Winner	Score	Donor
1st	C6AFR	57,112	Robert Carpenter, W3OTC

Here's a look at K3IVO/8, set up at Bald Knob, West Virginia.

guided the WA2FGK station home first at 240k points. K5CM, operated by N5CG, was not far behind with 196k. Congratulations to the single-operator entrants in the top-ten box, which took over 100k points to make. Each earns a handsome plaque.

WB2DNE/3 found a nice hill in eastern Pennsylvania on which to work QRP portable and came away the national winner at 29k points. WB2ELB, N1DJB and N6UII deserve special mention for their strong showings.

VHF contesting continues to be a fun activity that populates our precious spectrum. Next up is the VHF Sweepstakes, January 19-21, 1991. How about making it a club project to get your club aggregate score listed? Certificates go to winners in each club. Step up to the mike and volunteer to organize your club entry. See page 101 for details. The September 1990 VHF contest results will be in January 1991 *QST*. Happy contesting!—*W1XX*

SOAPBOX

I tried out my home-brew 220 transceiver. I finally figured out how to put 432 through 3456 on a single mast (KH6CP/1). These were the best conditions I've seen in a while. My 6-meter score was almost equal to January's total score! (WA1LBK). Indoor antennas don't work too well on VHF, but I had fun anyhow (W9KDR/1). The conditions were good on 6 meters, but flat on the higher bands (W1AQ). The activity seemed to be down a bit, particularly on the higher bands. 6-meter E_S helped, although this was not as good an opening compared to past years (W1AIM). This was my first time on 6 meters and my first time in this contest. The E_S on 6-meters was a real treat. 2 and 432 would have been more exciting if everybody had listened for us "up north" (WE1U). I heard good, courteous operating on 50 MHz (W1EXZ). I love radio, but when lightning hit the water tower 40 feet away from me, I considered stamp collecting. I had a good time despite that (N1DJB). I thought the contest went well (W3HHN). I caught the flu, started late and had extensive porcupine damage to the antennas, coax and masts. Slide Mountain is a great, but challenging location (WB2DST). This was my first VHF contest. Working for a cellular company allows me access to great sites and I'm sure that helped my score (WM2C). 2 meters was deader than a doornail (KG2H). This is always a nice contest, even though there was no real propagation, especially on 2 and 432 (K2KM). Conditions were poor on 2, although 6 had some skip. It was a disappointing contest (WA2SLY). For a mere 4½ hours' operating time, this wasn't a shabby effort (WG2I). The conditions were good, but I couldn't fit in the operating time (AK2F). Contesters are never happy. We were hoping 6 meters would open and when it did, we complained that the activity on the higher bands had dropped off (N2WM). Activity was definitely down and has been for more than a year now. 6-meters being open was the real event of this contest (K2SMN). Band conditions were flat and I experienced problems with my computerized logging (W2CNS). I solemnly swear to computer log, and nothing but computer log. This was my first time over the 100k barrier and it was amazing to finally run with the big boys (KA2RDO). 6 meters was interesting, but there was no DX except for the C6s. My Drake TR-6 blew up during the E_S opening and it took me an hour to fix it (WA2BPE). 10 watts on VHF is a real killer. You have to rely on CW and a lot of persistence! I was happy to work eight stations on 1296 while running only 2½ watts. Many attempts took several minutes to allow for QSB peaking (WB2ELB). This was my first VHF contest and it was more fun than I expected. Next time I'll leave the amp behind and operate QRP. I enjoyed the weekend backpacking, but wished the lightning hadn't chased me away from the mountaintop Saturday evening (N1GZZ/2). 6 meters was popping—you never knew where the next grid would come from (K2LNS). Having more power and a better antenna system helped me, but 2 meters was no better than January (N3HBZ). It was too much

Inside the operation of the Central Iowa Technical Society, WØRPK. Shown (l-r) are KØIQR, KØVM, WØRPK, NØJAS and WAØJFS.

Division Leaders

Single Operator

Division	*Call*	*Score*
Atlantic	WA2FGK (K2LNS,op)	240,384
Canada	VE3ASO	107,864
Central	W9UD	42,313
Dakota	WAØBWE	50,570
Delta	KC4YO	85,312
Great Lakes	WZ8D	116,844
Hudson	N2CEI	127,397
Midwest	NØLL	61,854
New England	W1RIL	117,468
Northwestern	NU7Z	27,639
Pacific	W6RXQ	30,300
Rocky Mountain	W2CRS	33,110
Roanoke	K2UOP/4	83,268
Southeastern	WD4MGB	55,926
Southwestern	W6CPL	60,720
West Gulf	K5CM (N5CG,op)	196,112

Multioperator

Division	*Call*	*Score*
Atlantic	K3YTL	694,590
Canada	VE3BQN	32,034
Central	AA9D	366,715
Dakota	*WBØGGM	110,714
Delta	W4BFB	122,337
Great Lakes	WW8M	197,559
Hudson	N2WM	232,366
Midwest	WBØDRL	222,430
New England	*W2SZ/1	1,245,371
Northwestern	K7CW	22,869
Pacific	N6EGN	25,915
Rocky Mountain	WØKEA	31,309
Roanoke	K3LNZ/8	176,076
Southeastern	KM4LK	38,280
Southwestern	N6CA	657,540
West Gulf	WQ5S	55,500

*new Division record

Multioperator QSO Leaders By Band

50 MHz		144 MHz		220 MHz		432 MHz		902 MHz		1296 MHz	
K1TR/3	527	W2SZ/1	656	N6CA	420	W2SZ/1	297	W2SZ/1	51	W2SZ/1	89
W2SZ/1	485	K1TR/3	569	W2SZ/1	171	N6CA	255	K3YTL	34	K3YTL	60
C6AFR	444	K3YTL	506	K1TR/3	125	K3YTL	179	W3CCX	28	N6CA	53
K3YTL	391	N6CA	477	K3YTL	102	K1TR/3	163	K1TR/3	27	K1TR/3	47
WB0DRL	367	N2WM	364	W3CCX	92	N2WK	134	W1XX	20	W3CCX	43
W3CCX	351	N2WK	334	N2WK	90	AA9D	125	N2WM	16	N2GHR	43
W0UC/9	335	W1XX	277	N2WM	68	W3CCX	107	KF6AJ	13	W1XX	39
N6CA	331	K2XR	256	W1XX	64	W1XX	101	N2GHR	13	K2XR	33
W0RPK	323	KF6AJ	243	KF6AJ	62	KF6AJ	98	N6CA	12	WW8M	30
KF6AJ	299	AA9D	240	AA9D	56	WW8M	96	N2WK	12	N2WM	29
AB2I	296	W3KWH	233			N2WM	91	W3KWH	11	N2WK	28
WB0GGM	293	W3CCX	228			K3LNZ/8	88	WW8M	10	KF6AJ	28
N2WK	285	K3LNZ/8	218			K2XR	80	K3LNZ/8	9	AB2I	28
VE3BQN	281	N4HB	212			N2GHR	80	AA9D	6	AA9D	27
AA9D	278	NM8X	208			N4HB	75	NM8X	6	N4HB	26

Multioperator Multiplier Leaders By Band

50 MHz		144 MHz		220 MHz		432 MHz		902 MHz		1296 MHz	
WB0DRL	158	AA9D	85	W3CCX	39	AA9D	60	W3CCX	19	W2SZ/1	29
W0UC/9	150	W4BFB	73	AA9D	37	WW8M	48	W2SZ/1	18	K3YTL	23
K1TR/3	148	K3YTL	66	W2SZ/1	36	W2SZ/1	45	K3YTL	16	AA9D	23
W3CCX	135	N4EQT	65	K1TR/3	35	K3YTL	42	K1TR/3	13	N6CA	22
AA9D	133	NM8X	64	K3YTL	32	W3CCX	41	W1XX	12	K1TR/3	21
K3YTL	132	WB0DRL	60	N2WK	29	K1TR/3	39	W3KWH	11	W3CCX	21
W2SZ/1	125	W3CCX	57	N2WM	29	WB0DRL	37	N2WK	10	W3KWH	18
W0RPK	125	W3KWH	56	N6CA	27	K3LNZ/8	36	N2WM	10	K2XR	18
WB0GGM	117	K1TR/3	55	KF6AJ	27	W4BFB	33	K3LNZ/8	8	N2WK	17
N2WK	115	K3LNZ/8	55	W3KWH	27	N6CA	32	N2GHR	8	W1XX	17
KF6AJ	114	N8FWL	53	WW8M	26	N2WM	32	N6CA	7	N2GHR	17
VE3BQN	114	W2SZ/1	52	K3LNZ/8	24	KF6AJ	30	WW8M	7	WW8M	16
N4EQT	111	W0UC/9	52	AB2I	24	W3KWH	30	AA9D	6	N4HB	16
W3KWH	109	N4RFV	48	WB0DRL	23	W1XX	30	KF6AJ	6	N2WM	15
AB2I	106	NS4W	47	W1XX	23	K2XR	29	NM8X	5	AB2I	15

work hauling antennas and equipment to the top of the fire tower (100 feet), but I was able to work everyone I heard. I was awakened in the middle of the night by 50-mi/hr winds howling through the tower structure (N3FTI). I tried a new location this year, only to be eaten alive by gypsy moth caterpillars. I managed to work Ø-land off the bottom of the 6-meter Yagi after it fell over. The gypsy moths drove me crazy! (N3EXA). The opening on Saturday was heaven-sent! I worked many good grids, but no double-hop (KA3AFY). I couldn't believe I worked FN43 with only 25 watts! I almost reached my goal of 10 grids. I can hardly wait for the next one! (KA3VGD). It was another enjoyable contest! (WA3USG). Conditions were only mediocre, with 6-meter E_S limited here. There were only a little more than 100 grids available to the serious 6-meter operator. There were lots of mountaintoppers, but activity was definitely down (W3ZZ). Hearing all those grids on 6 meters made my mouth water (WA3FAE). 6 meters held a lot of surprises (W3MSN). I had to stay home and run single-op instead of mountaintopping. Somehow, it just wasn't the same (K4AEK). It was different operating in EM74, as opposed to FN13. (KA2KQM/4). Band conditions were poor Saturday evening and Sunday (KJ4SO). The band was flat here for the entire contest (NK4Q). Murphy stayed home this year and the weather was good. I had great fun (WA4DOU). I enjoyed the opening (WB4JEM). My 2-meter rig blew up, but 6 meters made up for it (WA4JNE). I enjoyed the substantial CW operation during the contest. At times, I had a pileup on 6-meter CW! We had little E_S from west of the Mississippi (WB2PMP/4). This wasn't too bad an effort for low power and a dipole cut for another band (WB5MAC). I had the most 6-meter QSOs since 1980. I thought this one was a blast, even though conditions were never much above normal (KK4NO). A storm came up after midnight, with winds estimated at 40-50 mi/h and enough marble-sized hail to cover the grass on the mountaintop (WB4PCS). If not for the good 6-meter E_S, it would have been a slow contest (WD4GXN). The 1296 receiver went dead on me, but look out for next time! Operating mountain QRP is fun! (KM4MP) This was only half the score I had in January (N4BG). Conditions were poor—there was

QRP Portable operator Dennis, N3HKX, worked 129 stations on 2 meters with this simple set up.

no E_S, Ms, Au or ducting! (K5YY). 6 meters saved the contest Sunday, but there was too much QRM on 2 meters (KG5UE). The night before the contest is not a good time to learn that your buried coax for 144 and 432 had been cut by the local cable company. I'm glad 6 was open (WN2E). This was only a half-hearted effort, as I spent most of my time hunting new grids on 6 meters. I found five, bringing me to 671 (W5FF). Conditions were good the first two hours and the last 2½ hours. This was my best score in a VHF contest (KY5N). I enjoyed being the recipient of 6- and 2-meter pileups (WB5VYE). This was my best score and there were no band openings! (W5UGO) Conditions were the worst I've seen in 12 years (W5NZS). This was my first QRP portable effort. Maybe next time the heat index won't be over 104° (WD5AGO). I wonder what it would have been like if the band had held up during the entire weekend? (W5OZI). Our operating on a public beach was bound to attract attention, but most people just wanted to know if we were with the Army (KE5CO). Band conditions were poor for the second year in the row. I had time to watch the prairie dogs, pheasants and meadowlarks (W5AL). Thank heaven for the 6-meter opening to Texas and Colorado Sunday morning. I especially enjoyed the duct to Oregon. My overall score was lower than last year, despite my having worked 10% more grids (WB6PFJ). I had more fun baby-sitting the first day (N6RPM). This is my first VHF contest! (WB6HYH). I worked more local stations than I've ever worked in a VHF contest (KH6HME). This was my first time on 6 meters since 1957 (WB6WCW). The excellent weather for which southern California is usually famous abandoned us this year. A storm put our microwave stations inside a black hole all weekend. Multiple equipment failures, blown trailer tires and illness added to the mound of evidence that Murphy was definitely here! (N6CA). It was nice to QSO old friends and to find new hams out mountaintopping (K6GSS). We operated from the top of Loma Prieta, el 3791 feet, and nearly got blown off the top of the mountain both nights. When it was slow, we got to know the local bugs well! We had a great time and look forward to doing it again next year (WA2YWP). Rain, rain, rain! This never happens in southern California in June! Perhaps we'll have better luck in September (W6OYJ). I wish there'd been more life on CW. (WB9MII). There were some nice 6-meter openings. Next year will be better! (N7FJM). Last year I wondered if things could get worse and now I can say "Yes" (WA7JTM). We had weird openings on 6 to the Pacific Northwest, but there were no good openings to any eastern parts of the US (WA6IJZ). Conditions were poor Saturday, but a weak aurora in the evening helped (W7IDZ). We got snow both days and froze. A good aurora Saturday got us K1LL/Ø on 2 meters (K7CW). 6 was dead until the

John, KC4UIK, enjoys the sun as he operates QRP portable from grid FM18 on South Mountain, Maryland.

last four hours of the contest (W7LQN). It was better than last year! (W7ABX). Game 3 of the NBA finals was a distraction here in Oregon (N7DB). Where else but on 6 meters can a QRP station with tiny antennas create a pileup? (WA7TUX). Conditions for tropo were wiped out by tropical storm Boris, but the daytime meteor shower was spectacular (WA6PZL). We have the worst VHF conditions in the country and still have fun (WM7A). Our thanks go to W7YOZ for providing encouragement and the extra gear to make our first expedition a great experience. Everything worked and we had a lot of fun (N7MWV). At least I worked some new grid squares (N8CCC). One word describes the band conditions: Yuck! (WB8JAY). There wasn't as much activity as in past years, but the weather was excellent (W8OUD). I thought band conditions were slightly better this year (W3MMM). The band was wide open on the 7th and 13th (W8HBG). Either there was a shortage of contest operators or the stormy weather that surrounded us Saturday and most of Sunday morning affected us more than we anticipated (N8FWL). I've never seen conditions as *flat as they were on UHF (K8MO). It was like a* winter contest in Siberia! (N8JTB). I finished off my 6-meter WAS! (WB9QIU). I lost interest in this one (N8FEH). The bands were not in great shape during the contest and the fishing at the lake wasn't great, either (N8FUJ). Some visitors at my location thought I was trying to locate wild animals with radio collars (K8OSF). Some stations we've worked in past contests were not to be found this year (WW8M). Activity was sparse—perhaps the weather was to blame (W9JGV). Conditions were poor on all bands, given the short period I had to operate (WB8YFE). I picked up 17 new grids on 6 meters (WA9LZM). I found that 25 watts, a small antenna, poor location and a broken rotator make for rough going (N9JR). It seems like the better prepared I am, the worse the conditions are (KDØSU). We were lucky—we finished packing up and reached the paved highway just ahead of a big thunderstorm (WØIA). I was glad to work Bermuda and the UN on 6 meters (KØDAS). The local activity gets thinner every contest (KBØBT). I wish 2 and 432 would have had better openings (NØFQW). This may have been my first VHF/UHF contest, but it won't be *my last!* (WAØX). *I camped out on a small "hill,"* which is hard to do—North Dakota doesn't have any hills (KE9QT). I worked California for the first time in 10 years on VHF. 6 meters being open gave low-power stations some good opportunities (VE2FUT). Southern stations should understand the "north" concept (VE3KDH). There didn't seem to be any enhanced propagation on 144 or 432 MHz

Dick, WA2AAU, operates one of the microwave stations on Mt Greylock at W2SZ/1.

(VE3DVF). It got so cold Saturday night that I had no problem sending dits at 60 WPM (VE3BFM). This was my first real attempt at a VHF contest. I had a lot of fun and am looking forward to September (VE6TA). There's more to these bands than FM and repeaters (VE6KC). Beautiful beaches, nice weather, a rare grid square (FL16), good 6-meter conditions and a great group made for a fun contest (C6AFR). It sure is different operating *with no kilowatt and single Yagis (GØMOS). The* contest started at 1800 and the storm hit at 1810. We couldn't hear the radios during the hail. The great 6-meter openings Sunday made it all worth it (VE3WHY). I was pleased to have a 50 MHz opening to JA and DU3, but I was disappointed by the continued ignorance of grid squares by the JA stations (VS6BG).

Single Operator QSO Leaders By Band

50 MHz		144 MHz		220 MHz		432 MHz		902 MHz		1296 MHz	
WD4MGB	440	WA3HMK	389	N6UII	145	K1FO	100	N2CEI	25	WA4VHF	48
K5CM	410	N3KZ	323	(DM04)		WA2FGK	89	WA2FGK	24	W1RIL	45
(N5CG,op)		(N3HBZ,op)		AA6TT	74	(K2LNS,op)		(K2LNS,op)		WA2FGK	39
WB4JEM	364	WB2QOQ	272	W6CPL	71	WB3ESS	85	W1RIL	21	(K2LNS,op)	
WA2FGK	290	N3FUJ	223	N2BJ	56	WB2VPH	74	K9MK/5	20	K2SMN	38
(K2LNS,op)		WA4VWV	223	N2CEI	55	N2BJ	73	N1DPM	18	N1DPM	31
WA1OUB	278	KM1H	216	WA2FGK	52	K4QIF	70	K2SMN	16	N5WS	28
K2RTH	277	K5MA/1	204	(K2LNS,op)		K1RZ	69	N5WS	14	AA6TT	26
WN2E	245	NA1S	199	K6MEP	44	K9MK/5	66	WA1MBA	14	K4QIF	25
W9IP/2	243	W3EP/1	192	WB2VPH	43	W2CNS	65	N2BJ	13	K1RZ	24
NY1E	238	VE3KDH	176	WZ8D	43	KB1I	64	K2UOP/4	10	K9MK/5	23
KC4YO	234	K1RZ	174	W1RIL	42	WZ8D	64	VE3ASO	9	K2UOP/4	21
W4OO	228	K9MK/5	174	N1DPM	42	KA2RDO	62	WB1FKF	9	N2BJ	19
KA2RDO	227	K3ZO	170	K2SMN	42	K2SMN	60	KT2B	7	W2CNS	18
KAØJGH	224	N2BJ	168	WA8NJR	37	W2HRW	60	W6CPL	5	W3ZZ	18
WB2PMP/4	220	WA1VRH	161	K1RZ	36	WA8NJR	58	KB8ZW	4	W6CPL	17
W3WFM	218			WA8TJL	35						

Single Operator Multiplier Leaders By Band

50 MHz		144 MHz		220 MHz		432 MHz		902 MHz		1296 MHz	
K5CM	171	WA4VWV	55	WZ8D	29	WZ8D	35	WA2FGK	13	WA4VHF	20
(N5CG,op)		WA3HMK	55	WA2FGK	26	WA2FGK	31	(K2LNS,op)		WA2FGK	19
WA1OUB	134	KA3RWP	51	(K2LNS,op)		(K2LNS,op)		N2CEI	12	(K2LNS,op)	
W9IP/2	127	KE8FD	50	K5CM	23	K2SMN	29	N1DPM	10	K4QIF	16
WA2FGK	124	WG8Q	49	(N5CG,op)		W5UGO	29	K2SMN	9	W1RIL	15
(K2LNS,op)		KC4YO	47	K2SMN	23	K1FO	29	W1RIL	9	K1RZ	15
KA2RDO	114	WZ8D	46	WA8TJL	23	N5WS	28	K9MK/5	9	K2SMN	14
N5JHV	105	K5CM	45	K5SW	22	K5CM	27	K2UOP/4	8	K2UOP/4	14
WZ8D	104	(N5CG,op)		VE3KDH	22	(N5CG,op)		N5WS	8	N5WS	14
WD4MGB	103	K1RZ	44	KA2RDO	21	K1RZ	27	VE3ASO	7	N1DPM	13
WB4JEM	99	VE3KDH	44	W2CNS	20	W2CNS	26	N2BJ	7	W2CNS	13
WD5K	99	N5WS	42	KB8ZW	20	WA8NJR	26	WA1MBA	6	W3ZZ	11
N2CEI	98	KFØAU	42	N2CEI	19	WA8TJL	26	KT2B	5	N2BJ	10
W2CNS	96	WA8NJR	41	K1RZ	19	NØFQW	26	W6CPL	4	N2CEI	10
VE3ASO	93	WA8TJL	41	W9IP/2	19	KA2RDO	25	KB8ZW	4	K9MK/5	10
NØLL	93	NI3B	41	N1DPM	19	VE3ASO	25	WB1FKF	4	WB5TCO	10
KAØJGH	92			VE3ASO	18	K9MK/5	25				

Scores

Scores are listed by ARRL/CRRL Sections. Within each Section, single-operator scores are listed first and then multioperator scores. From left to right, each line lists: call sign, score, QSOs, multipliers and bands worked (A = 50 MHz, B = 144 MHz, C = 220 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2.3 GHz, G = 3.4 GHz, H = 5.7 GHz, I = 10 GHz, J = 24 GHz, K = 48 GHz, L = Light). An asterisk before the call sign denotes a QRP-Portable station. Among single-operator stations, single-band winners are noted with band letter(s) in **boldface** print indicating the band won.

1

Connecticut

W3EP/1	55,341	405	129	**ABD**
WA1VRH	26,790	282	95	AB
*KH6CP/1	5,348	95	46	ABCD9EF
K1FO	5,800	100	29	D
NA1S	5,572	199	28	B
W1WHL	4,550	91	50	A
N1ABY	2,278	67	34	A
KB1I	2,176	64	17	D
K1BY	560	40	14	B
K1WVX	462	42	11	B
*K1NCD	28	7	4	B
KF6AJ (+WA2TEO)	227,397	745	229	ABCD9EF
W1XX (+K1s GX,JX,WB1AVA,NJ2L)	208,426	751	197	ABCD9EF

Eastern Massachusetts

W1CWU	22,048	258	73	**ABD**
WA1LBK	18,408	200	78	ABCD
W1GXT	17,152	210	64	ABCDE
N1BWT	16,353	195	69	ABCD
WB1FKF	14,514	140	59	ABCD9EFG
KX1C	10,620	190	45	ABCD
K5MA/1	5,508	204	27	**B**
AA1O	4,248	101	36	ABD
WC1B	2,850	75	38	AB
NZ1D	2,730	77	35	ABC
W1ZNY	1,110	74	15	B
K1VZI	1,003	50	17	ABCDE

Maine

NY1E	20,706	238	87	**A**
KA1ZX	5,208	93	56	A
WB1APD	1,519	49	31	AB
W1PLX	406	29	14	**B**
W9KDR/1	18	6	3	B
K1JW (+KA1s IOD,VUB)	612	53	9	BD

New Hampshire

WA1OUB	49,704	303	152	**ABE**
AC1J	22,910	238	79	**ABCD**
*KA1LMR	7,395	133	51	ABCD
KA1CDZ	7,296	128	48	ABCDE
KM1H	4,968	216	23	**B**
WA1T	4,185	91	45	ABD
WB1HBB	1,554	111	14	B
KA1FB	525	35	15	B
N1FDX (+WB1FLD)	854	61	14	B

Rhode Island

WA1GYL	2,700	98	25	**ABD**
*KA1FVG	1,065	71	15	**B**
W1AQ (K1s AGA,CH,DS,JM,KM1X,N1s GOP,GYU,NO1U,NZ1P,WA1AHK, WA1VPC,ops)	65,268	421	126	ABCDE
WA1HYN (+WA1RLV,WB1GMA)	23,485	229	77	ABCD

Vermont

W1AIM	11,534	126	79	**ABCD**
WE1U	2,924	61	43	ABD
W1EXZ	713	31	23	A
W1TKZ (AF1R,KC1SI,N1CPE,NT1M, WA2TIF,ops)	72,086	460	133	ABCD

Western Massachusetts

W1RIL	117,468	487	156	**ABCD9EFG**
N1DPM	91,260	388	156	ABCD9E
*N1DJB	23,436	233	84	ABCD
K1FWF	16,492	217	76	AB
K1ISW	16,038	179	66	ABCDE
WA1MBA	12,816	151	48	BD9EFG
KA1BVM	2,312	136	17	B
N1EJG	1,418	59	24	A
K1JG	465	30	15	BD
*KR1R	450	50	9	B
WA3EEC	448	26	16	ABCD
WA1ZUH	252	21	12	B
WA1LWC	120	12	5	C
WA1WRM	84	12	7	AB
W2SZ/1 (K1s DH,NKR KA1s DZV,FZY, JFW,PRT,RE,UTM,UTU,VGN, KC1EB, KJ1K,N1FGY,WA1s UGE VPX,ZYV,ZMS, WB1HIH,K2TR KA2s FWN,LIV,NKO, UWD,KB2s EBE,HQ,IAL,N2s 8NY,DCM, GXH,HUC,HPA,JNT,W2s ARQ,JVF, WA2s AAU,SCA,SPL,WB2s JSJ,KLD, KMY,WF2B,WM2Y,WO2V,WS2B,WT2F, KD3NC,WA3INC,AK4L,N8AFM, WA8USA, ops)	1,245,371	1992	359	ABCD9EFGHIJ

2

Eastern New York

N2BJ	71,592	435	114	**ABCD9E**
WA2FUZ	19,400	162	97	ABCDE
W3HNN	9,545	119	55	A
*WB2DST	4,758	81	41	ABCDE
KB2FTX	3,750	75	50	AB
WA2ALV	2,025	56	27	ABCD
WM2C	1,496	88	17	B
KD2IX	494	38	13	B
KG2H	480	32	15	B
KA2MCU (FN32)	65	9	5	ABCD
KA2MCU (FN22)	4	2	2	AB
AB2I (+AB2J,KC2JS,W2AWX,WA2IID, WB2CWA,WN2Y)	150,282	612	198	ABCDE
N2HWV (+WA2s KPF,ZNU,WD2U)	930	62	15	AB

NYC-Long Island

K2KM	6,486	115	47	**ABD**
WA2EIO	5,548	101	38	**BDE**
WA2SLY	5,520	138	40	**AB**
N2KFC	2,472	103	24	B
WG2I	630	45	14	B
WV2C	403	31	13	B
N2GHR (K2VL,N2BFJ,WA2VNU, WB2YZV,ops)	152,352	580	184	ABCD9E

Northern New Jersey

N2CEI	127,397	474	191	**ABCD9EFG**
K4BNC	18,190	182	85	ABD
WB2OOO	10,608	272	39	**B**
WA2JDT	10,500	133	70	ABCD
AK2F	8,883	175	47	ABCD
N2CKH	4,992	104	48	A
*KE2SO	795	53	15	B
N2WM (+K2BJG,N2s AAZ,HMM,WM, NV2D,WA2VPK,WB2RFB,WE2Z)	232,368	793	223	ABCD9E
K2XR (K2s JWE,OWR,KA2ING,WA2VUN, WB2RFV,ops)	170,996	671	197	ABCDE

Southern New Jersey

K2SMN	117,936	414	189	**ABCD9E**
W2HRW	62,898	404	114	**ABD**
W2EIF	17,318	171	78	ABCDE
WA2AXJ	5,768	103	56	A
K2BWR (+K2ZRJ)	42,182	229	131	ABCDE

Western New York

KA2RDD	108,096	468	192	**ABCD**
W9IP/2	104,500	409	209	ABCDE
W2CNS	103,037	418	187	ABCDE
WA2BPE	38,886	246	136	ABD
*WB2ELB	24,354	173	99	ABCDE
KU2A	10,419	106	69	ABCD9
WB2VPH	7,068	255	19	BCD
*N2HXJ (FN13)	3,043	127	17	BCD
KE2GD	2,886	163	13	BCD
W2WGL	2,852	61	34	BD
K2OEQ	2,220	68	30	ABD
*KE2DI (FN22)	1,798	48	31	ABCD
W2RHQ	880	44	20	AB
*KE2DI (FN12)	781	49	11	ABCD
AI2S	696	29	24	A
NS9E	567	58	7	BD
KB2SE	532	60	7	BD
WF2V	288	26	9	BD
KE2HU (FN13)	175	25	7	B
N1GZZ/2	154	14	11	B
KE2HU (FN03)	6	3	2	B
NS9E (FN12)	1	1	1	B
N2WK (+KA2s AAP,HSK,KB2EMU, KD2KQ,KM2P,N2DKP,NQ2O,W2s AV, HG,HPF,WA2s LAQ,MOP,WB2QCJ, KD5RO)	322,065	902	255	ABCD9EFGHI
WA2AAZ (KB2ITN,KE2RP,N2s CMA,COJ, HLT,HVN,IJM,WA2SOK,WB2JSB,ops)	23,000	227	100	ABD
WT2L (+ops)	3,780	216	12	BCD

3

Delaware

K4CHE	39,345	278	129	**ABCD**
KB3LE	3,420	94	30	BD
AC3T (KA3B,op)	2,850	114	25	**B**

Eastern Pennsylvania

WA2FGK (K2LNS,op)	240,384	630	256	**ABCD9EF**
*W52DNE/3	29,492	225	101	ABDE
KZ3X	24,072	215	102	ABD
WA3HMK	21,395	389	55	**B**
N3KZ (N3HBZ,op)	12,920	323	40	B
*N3FTI	9,381	165	53	ABD
N3FUJ	8,773	253	31	BC
WB3ESS	3,910	85	23	D
*KT2B	3,720	72	30	BD9E
*N3EXA	2,627	80	37	AC
*N3HIK	2,580	129	20	B
KA3AFY	2,442	66	37	A
WA3LFY	1,170	65	18	B
WB3DNI (FN00)	280	10	10	ABCD9EFGHI
KA3VGD	270	30	9	B
WB3DNI (FN01)	132	6	6	9EFGHI
WB3DNI (FM19)	112	7	7	ABCD9EF
WB3DNI (FN10)	33	3	3	EFG
W3IIT (FN20)	32	5	4	AG
K3YTL (WA1MKE,NA2T,K3MKZ,KA3s EEO,UXW,N3DAP,WA3s JWP,JWV, NV5,YON,WB3s FAA,FYT,IWZ,ops)	672,336	1337	336	ABCD9EFGHIJ
K1TR/3 (+K1s BE,EA,KA1GD,N1AFQ, NR1E,WA1PBU,K3II,KM3T,K5ZD)	669,900	1492	330	ABCD9EFGHIJ
W2EA (+W2ORA)	25,149	279	83	ABD
W3HZU (KA3TAH,KB3CU,N3s GKP,GPF, NO3C,W3HMS,W3SST, WA3USG,ops)	20,046	225	78	ABD
K3UZY (+N3AHF)	5,796	138	42	B
NZ3W (+K3s IJ,NYX,N3s GRD,HHG)	2,697	87	31	AB

Maryland-DC

K1RZ	112,572	483	177	**ABCDE**
W3ZZ	69,204	349	146	ABCDE
K3ZO	41,650	350	119	AB
K4JST	31,490	263	94	ABCD
W3WFM	19,402	218	89	**A**
K3AKR	19,256	197	83	ABCD
W3IFM	10,934	154	71	A
WA3FAE	6,118	158	38	ABCD
WA4VHF	2,880	48	20	E
K3YDX	1,957	103	19	B
W3MSN	1,008	41	21	ABD
W3LMC	440	40	11	B
*KC4IUK/3 (FM19)	65	13	5	B
*KL7GLK	16	2	2	GJ
WI2T (+KA3QPG)	378	27	14	AB

Western Pennsylvania

KA3RWP	40,576	282	128	**ABD**
NI3B	5,330	130	41	B
W3CCX (WA1YHO,N2SB,WB2YEH, WC2K,K3ESJ,N3s CX,EVV,WA3s AXV, FFC,JUF,NUF,YUE,WB3JYO,WB8SJ,ops)	432,196	975	334	ABCD9EFGHIJL
W3KWH (N2CJJ,AI3V,K3TP,KA3KSD, N3EQP,NW3C,WA3TTS,WB3EML,NI8O, WD8BHO,ops)	222,111	628	261	ABCD9EFGHI
KA3NHF (+N3DLJ)	4,150	83	50	A

4

Alabama

WB8RDY	13,464	187	72	**AB**
W4CYC	8,215	155	53	**A**
KB4KKG	532	28	19	A
WA4VUG	63	9	7	B
KM4LK (+KB4OOW,N4SMX,WA4CQG)	38,280	314	116	ABD

Georgia

K4AEK	2,325	75	31	**AB**
KA2KQM/4	2,244	60	33	**BD**
KB4BKV	836	40	19	BD
AK4T	130	13	10	A
WS4F (+AA4GA)	36,252	269	106	ABCD9EF
N4ORP (+WW4T)	10,656	110	72	ABCDE

Kentucky

AA4FQ	4,160	71	52	**ABD**
N4FFO	1,700	50	34	AB
N4EQT (+KJ4VH,N4OKX,KA6SSB, N8CRB,W8ULC,WF8Z)	118,899	484	217	ABCD
N9AQ/4 (+K9VGE,N9EMC,WA9KRT)	28,676	213	107	ABCDE

North Carolina

N4DT	32,274	225	99	**ABCD9EFI**
KJ4SO	10,295	111	71	ABDE
N2CJP	8,107	108	67	ABCD
*KI4JU	2,464	64	28	ABD
NK4Q	1,425	57	25	B
KS4S	408	24	17	A
W3IIT (FM14)	16	4	4	B
WA4DOU (+WB4WTC)	22,236	190	109	ABD
W4AQL (N4RMM,WA4KXY,WD4DWN, K0DI,ops)	20,998	231	83	ABCDE
W4DW (AB4OZ,K4SAN,KB4VYP, KC4s GFR,NJB,OCB,N4PNO,WA4LHE, NO0T,ops)	5,700	93	60	ABD

Northern Florida

WB4JEM	40,808	375	108	**ABD**
WA4JNE	20,880	236	87	ABD
WB2PMP/4	18,940	220	77	A
K4RZB	6,370	130	49	A
W4CSS	5,824	112	52	A
WA4OFS	5,047	89	49	**ABDE**
WB5MAC	900	36	25	A

South Carolina

KK4NO	32,085	219	115	**ABCDEF**
N4MWQ	425	25	17	A

Southern Florida

WD4MGB	55,926	470	117	**ABD**
K2RTH/4	29,997	303	99	AB
K1FJM/4	26,460	257	98	ABD
K4KCF	19,465	218	85	ABD
W4OO	18,924	228	83	A
K4SC	16,281	201	81	AB
WB4BKC	14,440	177	76	ABC
W8HXT	3,321	81	41	A
WD4AHZ	1,704	56	24	**BD**
W4MLA	1,189	41	29	A
N4ILE	300	22	12	ABC

Tennessee

KC4YO	85,312	431	172	ABCD
WB4JGG	23,896	214	103	ABD
W4BFB (WA3DQS,AA4ZZ,K4s FSI,JQU, TP,KA4WYC,KC4s FJX,FSC,GCK,KJU, KK4s FC,L,N4s LFX,ROL,UMI,WIK,XCW, WB4s PCS,QCS,TLX,WO4G,ops)	122,337	467	207	ABCDE
N4RFV (+AB4SQ,KA4OAK,KB4VRE, KC4MFB,KK4CA,N4WTH,W4TZG)	51,088	354	124	ABCDE
WB4KNF (+W2GU,N4VC)	44,336	268	136	ABCDE
NS4W (KC4BWG,N4VDW,ops)	22,656	188	96	ABD

Virginia

K2UOP/4	83,268	370	162	**ABCD9E**
WB4DBR	41,520	263	120	ABCD9EI
W4DO	20,655	168	85	ABCDE
WD4GXN	17,751	183	97	AB
KB4OLM	17,425	188	85	ABCD
K4QIF	10,575	105	47	**BDE**
*KM4MP	5,586	141	58	BE
WB4U	5,408	104	52	A
WA4OVW	5,253	98	51	ABD
KI5CK/4	4,424	79	56	A
N4JQQ	4,185	93	45	A
K4FTO	1,175	43	25	ABD
WA4SBC	1,152	32	24	BCD
WB4NTV	1,044	33	29	ABD
N4BG	840	28	21	BD
W4KMS	520	26	20	AB
WA4MMP	208	13	13	ABD
KC4IUK	4	2	2	B
N4HB (+AB4SF,N4s PAT,URM,W4s APQ, DR,WU4G)	133,518	548	187	ABCDE
W4IY (K4HWG,KA4s CKI,RRU,WB4s NFS, RDV,K8RI,ops)	82,852	390	154	ABCD9EI
KB4NT (+KA4VHR,KB4NT,KI4CY, KJ4Y,N4HYO,NB4J,WA4s LPR,QOT, WB8MQN)	1,020	129	75	ABD

5

Arkansas

WB5IGF	50,400	307	140	**ABCDE**
K5YY	4,400	110	40	**B**
W4RDI	266	19	14	B
K5UR (EM26)	63	9	7	B
K5UR (EM34)	42	7	6	B
K5UR (EM25)	24	6	4	B
K5UR (EM35)	12	4	3	B
K5UR (EM33)	9	3	3	B
K5UR (EM45)	1	1	1	B
K5UR (EM44)	1	1	1	B

Louisiana

KG5VE	11,880	165	72	**AB**
N5KWB	4,128	88	43	**BC**
WA5DRK	2,720	80	34	A
K5UR (EM42)	20	5	4	B
K5UR (EM43)	20	5	4	B

Mississippi

W5RCI	27,730	176	118	ABCDE
WN2E	20,580	245	84	A
N5JYX	11,205	109	83	ABCD
WD5CCA	2,698	71	38	AB
K5UR (EM52)	42	7	6	B
K5UR (EM51)	25	5	5	B
K5UR (EM41)	4	2	2	B

New Mexico

N5JHV	25,168	206	121	**ABD**
KN5S	19,425	183	105	ABD
W5FF	6,860	98	70	AB
N5EPA	4,750	94	50	ABD
KA5EBL	4,717	80	53	ABD
K5MAT	3,649	78	41	ABCD
N5MXU	2,925	75	39	**AB**
W5DXR	1,888	56	32	ABC

North Texas

K9MK/5	97,244	452	161	ABD9E
N5WS	71,810	325	154	ABD9E
N5BHZ	33,300	248	113	ABDE
AA5IB	21,600	184	96	ABD
WD5K	20,592	208	99	**A**
KY5N	17,290	190	91	AB
N5UD	16,530	190	87	A
AA5C	3,128	63	34	ABD9E
WQ5S (+AA5AM,N5LRM)	55,500	287	148	ABCDE
WB5VYE/5 (EM21) (+WA5ZKO)	5,458	80	44	ABCD9
WB5VYE/5 (EM04) (+WA5ZKO)	4,158	66	42	ABCD9
WB5VYE/5 (EM22) (+WA5ZKO)	2,688	55	32	ABCD9
WB5VYE/5 (EM03) (+WA5ZKO)	1,825	44	25	ABCD9
K5BZH (+WD5DCZ)	1,404	47	26	BD
WB5VYE/5 (EM11) (+WA5ZKO)	945	29	21	ABCD9
WB5VYE/5 (EM02) (+WA5ZKO)	940	31	20	ABCD9
WB5VYE/5 (EM12) (+WA5ZKO)	602	30	14	ABCD9
WB5VYE/5 (EM01) (+WA5ZKO)	252	15	9	ABCD9
WB5VYE/5 (EM13) (+WA5ZKO)	50	5	5	ABD9E

Oklahoma

K5CM (N5CG,op)	196,112	629	272	ABCD
K5SW	31,598	186	122	ABCDE
N5OSK (EM25)	28,951	195	131	ABD
W5UGO	11,968	131	68	BD
*WD5AGO	4,428	72	41	ABDE
W5NZS	3,780	72	40	ABCD
KF5GP	2,448	68	36	AB
KB5FNE	684	36	19	B
N5OSK (EM24)	350	25	14	B

South Texas

W5OZI	9,163	119	77	**A**
W3XO/5	4,980	83	60	A
KA5TJI	1,518	69	22	**B**
WA9YLB/5	960	48	20	B
KC5FP	350	20	15	A
KE5CO (+WB5N)	22,204	210	91	ABDE

West Texas

WBCM	37,536	248	136	**ABD**
W5AL	18,269	145	91	ABCD

6

East Bay

WA6LHD	2,726	94	29	**B**
WB6PFJ (+WB6LRU)	24,486	285	66	ABCD
W6QT (+W6TKT)	1,349	48	19	BDI

Los Angeles

W6CPL	80,720	355	110	ABCD9
AA6TT	48,204	435	78	ABCDI
*N6UII (DM04)	21,801	341	39	BCDE
WA6BIL	4,590	135	34	AB
N6RPM	1,805	85	21	ABDE
W6IFF	850	55	10	BCD
KI7FIS	497	71	7	B
*N6UII (DM14)	98	10	5	BCDE
*N6UII (DM13)	72	8	4	CDE
*N6UII (DM03)	42	6	3	CDE
KI6X (DM04) (+N6TG)	10	5	2	B

nge

FCS 18,183- 179- 67- **ABCD**
IY 11,118- 161- 51- **ABCD**
Ui 6,213- 100- 57- ABCD
F 3,220- 140- 23- **B**
HYH 2,040- 60- 34- A
D 1,173- 51- 23- AB
G (+KI6X)
322- 21- 14- ABD
(DM15) (+N6TG)
18- 6- 3- B

ific

MME 585- 53- 9- **ABCD**

ita Barbara

EP 50,268- 339- 118- **ABCDEI**
AAG 12,512- 174- 68- ABD
6FIT 1,428- 51- 28- AB
WCW 350- 25- 14- A
MN 264- 30- 8- BC
Q/6 91- 13- 7- B
A (WB2WIK,AA6VX,AE6E,K6s AWO,
SY,ZMW,KB6RAA,N6s DBS,DLU,LL,
FD,URH,VI,XCO,W6s OSM,YLZ,WA6s
OR,CGR,ITE,MEM,RAY,RIK,TMJ,
DU,ops)
657,540- 1592- 260- **ABCD9EFGHIJL**

ita Clara Valley

XQ 30,300- 224- 100- **ABCDEFI**
SS 9,072- 133- 63- ABC
V 8,001- 121- 63- ABC
HRK 7,696- 130- 52- ABD
CW 1,452- 44- 33- A
6KXF (CM96)
1,083- 41- 19- BD
6KXF (CM86)
364- 20- 14- BD
2UQT 90- 15- 6- A
6TDU 80- 8- 5- C
5KXF (CM97)
50- 8- 5- BD
2YWP (+N6URL)
20,064- 204- 76- ABCD

n Diego

6MEG 4,216- 91- 34- ABCD
6BNH 3,724- 87- 26- **BCDE**
6DTA 2,664- 63- 36- ABD
DYJ 2,090- 73- 22- BCDI
6AXW 1,752- 57- 24- ABC
Q 1,647- 52- 27- AC
M 884- 68- 13- **B**
G 500- 41- 10- BC
9MII 60- 15- 4- B

n Francisco

A6KLK (CN70)
2,346- 69- 34- **A**
6JYU 720- 31- 15- **BDE**
6LLY 621- 27- 23- A
D6HDY 490- 35- 14- **B**
A6KLK (CM89)
294- 21- 14- A

n Joaquin Valley

4AYE 11,580- 146- 80- **ABCD**
VK 2,210- 64- 26- BCD
6T 350- 25- 7- D
LMN (DM05)
264- 14- 11- BCD9E
LMN (CM96)
210- 11- 10- BCD9E
LMN (CM97)
195- 15- 13- AB
LMN (DM06)
75- 7- 5- BCD9E
LMN (CM95)
65- 5- 5- CD9E
LMN (DM04)
48- 9- 4- BC
6YDI (+AA6AH,WB6s COT,ITM)
24,357- 252- 69- ABCDE
MI (+KB6s LQV,NMI,KC6s
OSE,JAB,JNV,N6s PLE,VYT)
2,904- 84- 24- ABCD
X (DM05) (+N6TG)
15- 5- 3- B

cramento Valley

PYI 13,992- 174- 66- **ABCD**
LMN (CN81)
160- 16- 10- AB
PYF 120- 15- 8- B
LMN (CM98) 36- 6- 6- A
LMN (CM89) 4- 2- 2- B
LMN (CN80) 1- 1- 1- B
EGN (+K6AAW,W6s HBU,JEX,WB6FJE,
KA7DGL)
25,915- 282- 71- ABCD
6RHC (+KB6QNI,N6s BCU)
18,881- 193- 79- ABCD

7

Arizona

N7FJM 3,276- 72- 42- ABD
K1SC 3,116- 76- 41- **AB**
KF7JS 375- 25- 15- A
WA7JTM (+N7AMA,WW7B)
68,474- 400- 146- ABCD
W7GZ (+KB7CI)
12,580- 164- 68- ABDIJ
WA6IJZ/7 (+N6RMJ)
8,500- 117- 68- ABD

Eastern Washington

KA7BZJ 2,208- 60- 32- ABD
N7AUV 1,624- 49- 28- ABD
W7IDZ 1,323- 49- 27- **A**
W7FHI 629- 37- 17- **B**
N7JGO 132- 11- 6- **D**
K7CW (+K7IDX,W7WA,WA7UQV)
22,869- 223- 99- ABD

Idaho

WA7FSI 1,044- 58- 18- **A**
KC7IJ (+KB7FUV)
10,437- 147- 71- AB

Montana

WA7KHO 12,800- 153- 80- **ABD**
W7KNT 8,978- 134- 67- **A**
W7HAH (+WA7PDC)
6,213- 109- 57- AB

Nevada

W7LQV 5,546- 105- 47- **ABD**
K7ICW 3,871- 79- 49- **A**
K7NV 2,170- 62- 35- AB
NR6E/7 832- 32- 26- AB
W7ABX 780- 30- 26- A
NW7O (KB7IRF,W7TVF)
14,842- 167- 82- ABDEI

Oregon

KE7CX 24,479- 216- 91- **ABCD9E**
WA3RMX 11,018- 134- 54- ABCD9EFGHIJK
K7HSJ 2,484- 67- 36- ABCD
WD4ECK/7 1,674- 49- 27- BD
N7DB 1,541- 67- 23- **AB**
W7TYR 660- 32- 12- ABCDE
KI7Z (CN94) 441- 35- 9- BD
KI7Z (CN95) 440- 40- 8- BD
KI7Z (CN85) 296- 28- 8- 6D
KD7LA (+W7JXU)
11,968- 156- 64- ABCDE

Utah

NJ7A 2,775- 68- 37- **ABD**
KB0ES 2,346- 69- 34- **AB**
WA7TUX 2,278- 62- 34- ABD
WA4GPM 150- 15- 10- AB
*WA7PIB 70- 10- 7- B
WA6PZL/7 (+N6s ENU,HBI)
4,018- 75- 49- ABD
WB7REL (+N7LPP)
693- 33- 21- AB
WB7VLJ (DN21) (+WA7PXD)
322- 21- 14- ABD
WB7VLJ (DN30) (+WA7PXD)
180- 15- 12- AB

Western Washington

NU7Z 27,639- 256- 83- ABCDE
WM7A 17,236- 252- 62- ABD
W7YOZ 16,758- 173- 63- **ABCD9EFIJ**
N3EG 10,920- 162- 60- ABCD
W7FI 10,224- 142- 72- AB
KD9GT/7 5,480- 111- 45- *ABCDE*
W7ZSL 2,088- 61- 29- ABCD
K7ND 884- 34- 13- **D**
*W7HDD 742- 28- 14- BCDEF
KB7IOG 464- 58- 8- B
KA7HLB 462- 33- 14- AB
W1PRT 80- 16- 5- B
WB7PEK (+KA7ICT)
16,320- 188- 68- ABCDE
N7MWV (+N7MWU)
768- 47- 12- BCDE

Wyoming

KD9GS (+W9s KJY,SII)
7,592- 118- 52- ABDE

8

Michigan

K8MD 24,510- 191- 96- **ABCD9E**
WB8TGY 19,671- 191- 83- ABCDEF
WG6Q 7,840- 160- 49- **B**
KU8U 7,535- 108- 55- ABD
N8JTB 5,940- 121- 45- ABD
N8CGY 3,738- 89- 42- AB
WB9QIU 2,480- 62- 40- A
KK7B 1,680- 33- 21- **ABD9EFGH**
N8FEH 1,595- 55- 29- B
N8FUU 720- 35- 18- BD
*K8OSF (EN57)
176- 8- 8- ABD9EFGH
*K8OSF (EN58)
114- 6- 6- B9EFGH
K8OSF (EN67) 40- 8- 5- *BE*
WW8M (+KC8Z,N8s ERM,KSR,NE8I)
185,164- 550- 238- ABCD9EF
NM8X (+AC8W,N8s COA,FGB,LMT,
NR8S,WA8YAN,VE3CKU)
132,719- 509- 211- ABCD9E
N8HNS (N4SC,KB8s AFS,CJX,KN8JDN,N8s
CUF,IMF,IMO,IRT,JGM,JTV,LUG,NY8D,
WA8TON,WB8VCJ,ops)
26,750- 224- 107- ABC

Ohio

WZ8D 116,844- 439- 214- **ABCD**
WA8NJR 84,943- 386- 173- ABCDE
WA8TJL 60,473- 288- 163- ABCDE
KB8ZW 56,610- 272- 153- **ABCD9E**
KE8FD 31,000- 202- 125- ABCD
K8DIO 23,460- 178- 102- ABCD
WB8TDG 15,308- 144- 86- ABCD
N8CCC 8,450- 114- 65- ABCD
WB8JAY 7,318- 103- 59- ABD
*W8FK 4,050- 75- 54- A
N8NI 3,485- 79- 41- ABD
WD8DCX 2,592- 65- 32- ABD
W8OUD 2,079- 63- 33- B
W3MMM 1,566- 54- 29- B
K8KR 1,518- 66- 23- B
K8MR 1,300- 52- 25- B
W8HBG 936- 55- 14- BD
K3ZAP 935- 41- 17- ABCD
N8AXA 540- 26- 18- ABCD
W8XT 100- 17- 4- ABCD

West Virginia

WD8ISK 20,832- 155- 93- **ABCD9E**
W8TN 8,510- 93- 62- ABD
WB8BEL 4,004- 77- 52- **A**
K3LNZ/8 (K3s DUA,ICH,WA3s
EDQ,NZL,OYW,W4PSJ,ops)
176,076- 811- 219- ABCD9E
N8FWL (+WF1G,KA8OTX,KB8s ECQ,
GDU,ICR,N8s JPX KUR,KWI,WB8CNN,
WU8Q) 46,596- 299- 132- ABCD
K3VO/8 (N3DCI,NS3V,NT3Z,W3s EKT,
IP,WA3s KZR,TIO,WB3EVS,WB6VGI,
WB8WRI,ops)
42,372- 238- 132- ABCD9E

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Illinois

W9UD 42,313- 250- 131- ABCDE
WA8FTA 18,768- 204- 92- **A**
NC9F 11,523- 123- 69- ABCDE
N9BJG 5,760- 85- 64- ABD
W9JGV 4,040- 101- 40- **B**
WB9GKA 3,525- 66- 47- ABD
N9HET 3,072- 96- 32- B
WB9MXX 276- 23- 12- AB
WA9WXC 216- 23- 9- BC
AA9D (+AF8Z,K8s AKS,PW,RO,KA9CKI,
N9s EDT,KC,NN9K,W9WI,WA9NRB,
WB9SNR,WC9M)
358,295- 741- 353- ABCD9EFGJL
KB9CEQ (+N9s IQV,JF)
28,328- 282- 104- AB

Indiana

A4VWV 21,608- 256- 74- BCDE
WD9IJS 14,091- 159- 77- ABD
WB8YFE 4,788- 76- 57- ABD
WF9M 4,320- 108- 40- B
KC4KK/9 4,212- 81- 52- AB
W9MBL 540- 27- 20- A
W9CSF (N6SYJ,K9s DZE,URA,KA9PGC,
NA9N,NT9T,NY9B,WB9YHH,WD9BDW,
WD9EIX,ops)
48,735- 306- 135- ABCDE
K9MRI (+K9TVZ)
28,138- 217- 108- ABCD9
W9YB (KA9CCR,KC8RG,ops)
15,023- 154- 83- ABCD

Wisconsin

KA9HKL 15,925- 161- 91- **ABD**
WF9X 15,568- 173- 86- ABD
WA9LWJ 11,826- 152- 73- ABD
WA9LZM 6,100- 100- 61- AB
WA9HCZ 2,528- 79- 32- **B**
N9CO 2,460- 82- 30- B
WA1UJU/9 2,010- 67- 30- B
N9GNQ 1,475- 58- 25- BC
N9JR 1,288- 52- 23- BCD
WB5TCO 330- 11- 10- **E**
W9UC/9 (+WB9GNF,K9FVF,GJX,N9s,
AKC,BSH)
165,130- 590- 245- ABCDE

0

Colorado

W2CRS 33,110- 248- 110- **ABCDE**
N0KV 27,573- 233- 91- **ABCDE**
K7VNU/0 6,900- 112- 60- ABCD
KD0SU 3,196- 83- 34- ABD
KA0JJK 2,156- 59- 28- ABCDE
*KB0CY 1,525- 61- 25- AB
K9BOL 80- 16- 5- B
W0KEA (+N0s BRI,OVL)
31,309- 222- 131- ABCD
W0IA (W1XE,KA5WET,AI6Z,KA0DXM,
KF0GN,KR0U,WA0NHD,ops)
13,692- 148- 84- ABCDEF

Iowa

K0DAS 21,218- 176- 103- ABCDE
KD0BT 7,102- 126- 59- ABD
N0CIH 4,770- 75- 45- ABCDE
KF0AU 4,662- 111- 42- **B**
W0RAP 216- 9- 8- **E**
W0RPK (+WS1MJ,K8s IQR,VM,N8S,
JAS,JEG,PK,WA6s JFS,OEV,RSW,
WQ6V) 99,781- 480- 193- ABCDE

Kansas

N0LL 61,854- 309- 169- ABCDE
WQ0P 44,770- 287- 121- **ABCDE**
N0IGZ 14,694- 158- 93- AB
*NC0Y 10,728- 116- 72- **ABD9EF**
WD0G 3,168- 72- 44- AB
W0RT 1,012- 35- 22- BD
K0YMQ 612- 34- 18- B
WV0Q (EM29) 52- 11- 4- BD
WV0Q (EM28) 24- 4- 4- BD
WV0Q (EM19) 24- 4- 4- BD
K0CS (DM98) 9- 3- 3- A
K0CS (EM08) 1- 1- 1- A
K0CS (EM18) 1- 1- 1- A
WB0DRL (+WB5VZL,KB8HH,KX9O,
W0MXY)
222,430- 638- 290- ABCD9EF
WQ0P (EM28) (+KA0KAN)
96- 6- 6- C
WQ0P (EM18) (+KA0KAN)
40- 5- 4- C
WQ0P (EM19) (+KA0KAN)
40- 5- 4- C
WQ0P (EM29) (+KA0KAN)
18- 3- 3- C

Minnesota

WA0BWE 50,570- 316- 130- **ABCD9E**
*WA2HFI/0 4,418- 94- 47- AB
W0AUS 1,984- 56- 31- ABDE
*AA8AJ 224- 32- 7- B
WB0GGM (+WA2PHW,KA8JWC,KB0s CV,
ZQ,N0HJZ,W0OHU)
110,714- 475- 197- ABCDE
KC0P (+KA0UZZ,N0BJG,W0VB)
25,194- 233- 102- ABCD

Missouri

N0FQW 39,260- 268- 130- **ABD**
W0JRP 19,584- 171- 102- ABCD
WA0X 4,836- 77- 52- ABD
W3HDH/0 3,654- 87- 42- A
K5UR (EM28) 30- 6- 5- B
K5UR (EM27) 20- 5- 4- B
K5UR (EM29) 4- 2- 2- B

North Dakota

NT0V 25,553- 243- 101- **ABD**
*KV0R 4,641- 91- 51- A
*KE9QT 462- 33- 14- **B***

Nebraska

KA0JGH 20,608- 224- 92- **A**
KD0HE 15,416- 148- 94- **ABD**
K0US 13,940- 164- 85- AB
WB0RMO 13,193- 150- 79- ABD
W0BJ 3,240- 61- 48- ABDE

South Dakota

W0ETT 11,926- 127- 89- **ABD**

VE

Maritime- Newfoundland

VE1AHM 348- 24- 12- **BD**
VE1MUF (VE1s WL,XH,ops)
1,056- 46- 24- ABD

Quebec

VE2FUT 12,705- 143- 77- **ABCD**
VE2DUB 6,380- 103- 55- ABD
VE2UMS (VE2s BAP,BBW,DRW,MFJ,ops)
460- 46- 10- B

Ontario

VE3ASO 107,864- 411- 194- **ABCD9EFI**
VE3KDH 30,420- 257- 90- **BCD**
VE3FGU 28,060- 244- 115- AB
VE3EYR 12,705- 141- 77- ABCD
VE3WCB 9,108- 138- 66- ABE
VE3SMA 8,352- 117- 58- ABDI
VE3DVF 8,142- 110- 69- ABD
VE3PFC 6,784- 100- 64- ABI
VE3PRF 4,998- 86- 51- ABDI
VE3KKL 4,324- 73- 46- ABCD
VE3OEU 3,515- 80- 37- BD
*VE3BFM 2,370- 62- 30- ABCD
VE3FVW 666- 31- 18- BD
VE3SST 64- 8- 8- AB
VE3BQN (+VE3RBS)
32,034- 281- 114- A
VE3SAU (VE3s FHU,OJN,ops)
12,400- 145- 80- ABD

Manitoba

VE4AQ 390- 21- 13- **BD**

Alberta

VE6BOJ 10,414- 207- 41- **ABD**
VE6TA 4,559- 85- 47- ABD
VE6AFO 1,450- 47- 25- ABD
VE6NOV (VE6s CA,EY,KC,PY,VQ,ops)
23,714- 256- 71- ABCDE
VE6JW (VE6JY,K2JFV,WA2TMC,ops)
13,080- 189- 60- ABDE
VE6CYT (+VE6GYJ)
2,480- 124- 20- AB

British Columbia

VE7XF 15,194- 199- 71- **ABD**
VE7ASI 407- 30- 11- **BCD**
VE7PRC (VE7s ASY,ASZ,BEE,DSM,EHQ,
GJB,RJ,ops)
341- 31- 11- AB

Marine Mobile

W1TUM/MM 264- 33- 8- **B**
VE3YRA/MM (VE3s AAY,ORE,SST,WHY)
13,376- 152- 88- AB

DX

Bahamas

KB4CRT/C6A 3,276- 91- 38- **A**
C6AFR (AA4s R,SC,K4MQG,KB4CSE,WA4s
UNZ,VCC,ops)
57,112- 477- 118- ABD

England

G0MOS (WB4SLM,op)
4,046- 93- 34- **ABDE**

Belgium

ON8WN 1- 1- 1- **A**

Bermuda

KX5U/VP9 1- 1- 1- **A**

Hong Kong

VS6BG (KB7G,op)
1,127- 47- 23- **ABD**

Mexico

XE1GRR 360- 24- 15- **A**
XE2/W6UZL (+KI6ZH,K9VV)
12,608- 154- 66- ABCDEI

Indonesia

YC2OK 492- 41- 12- **B**

Checklogs

K6UQA, WB3DNI (FM09), WD4SBV,
XE2HWB

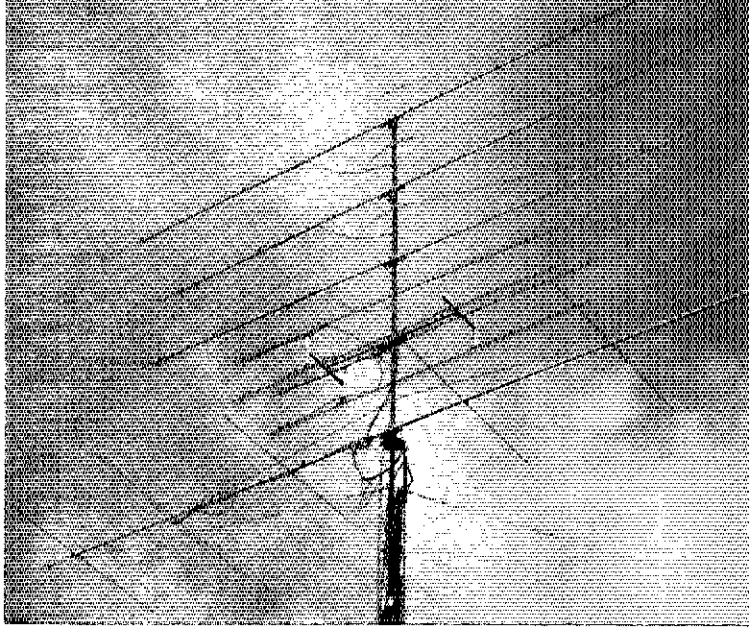
Disqualified

N8FMD DQ

Results, 1990 ARRL UHF Contest

I operated just for the fun of it!—*WB2YZV*

By Billy Lunt, KR1R
Contest Manager
and
Warren C. Stankiewicz, NF1J
Assistant Contest Manager



Jerry, WD5BKV, used this antenna farm to lead the West Gulf division from his station in Oklahoma.

The UHF Contest, a fun 24-hour activity conducted the first weekend in August, is for bands 220 MHz and up. The essence of this activity is encapsulated in this comment from first-time entrant John Conover, W1QLT, of Acton, Massachusetts:

"I had little idea how much fun it could be to put up a 2-element quad-loop beam on a pole and feed two watts from an ICOM IC-3AT hand-held transceiver atop Mt Wachusett and run S9 signals from one end of Massachusetts to the other with ease. All stations worked gave me strong signal reports in return. Had there been more stations from New England and New York state, they would have been worked easily. But there weren't many representatives from these areas on the air. I'm sure there are many amateurs, including Novices, who have 220-MHz capability. Perhaps what's needed is a serious PR effort, beyond the *QST* contest announcement, that spurs folks to seriously explore the UHF bands for communications and experimental possibilities. Commercial interests, now edging in on this part of the spectrum, would love to shove us aside."

Nice scene: 2000-foot Mt Wachusett; 83° Fahrenheit; scattered cumulus clouds at 5000 feet; 3-knot wind from the southwest; W1QLT operating 220 FM from his car; and 100 feet away, Ken Schofield, W1RIL, of Paxton, Massachusetts, is setting up his 10-GHz dish for a long-distance contact. It can't get any better. Working the UHF contest portable can have serious side effects: Lots of fresh air and sunshine; the thrill of working long distances with little signal or antenna; populating the bands. Catch the fever!

Scores were outstanding, as always. WA2FGK (K2LNS, op) topped the single ops with 94k points, while W2SZ/1 put in their usual fine multioperator performance at 354k. The winners include W1QLT, who discovered what a joy it is operating this contest. Check the boxes and the line scores for all who did their part to make this UHF contest fun for all.—*W1XX*

SOAPBOX

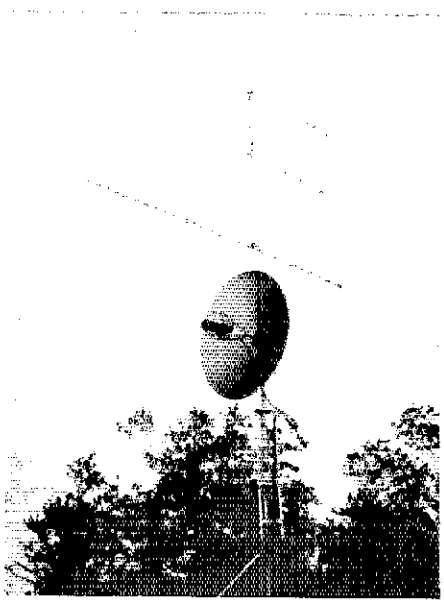
My best DX on 3456 SSB was 55 miles, with a combined output of 12 mW! (WA3YON). I only got to operate 7-8 hours of the contest. Activity seemed good when I was on. Working the Pack-Rat rover, N3ADG, on 432 to 2304 was a good reason to get on while they were at Camelback Mountain (N2SB). I was only able to operate the contest for a few hours, but had a good time. I had a thrill working W2SZ on 3456 (N3CX). I need more bands, more power, more aluminum and more Alka-Seltzer! (KA2RDO). Our greatest thrill was working N3AOG on 3456, with them running QRP at 5 mW (KD5RO). This was a fun contest. We didn't spend much time preparing for it; just four guys out for the afternoon to have fun. The weather was perfect. I thought the activity was sparse for the time we operated. Our "big" moment was the QSO with KD5RO on 3456 while we were running 8 mW into the dish (N3AOG).

Single Operator Top Five

Call	*Score*
WA2FGK (K2LNS, op)	94,668
WA3YON	53,502
WA2TEO	51,957
WW8M	49,662
WA3FFC	46,899

Multioperator Top Five

Call	*Score*
W2SZ/1	354,090
KD5RO	129,456
N2CEI	64,050
W4IY	37,011
K3YTL	25,740



Here's a look inside and out of WA3FFC's portable operation from FN01. Scott activated the grid on all bands from 220 to 2304 MHz, finishing third in his Division and fifth overall.

Everyone should try to get one more operator on the UHF bands by next year (NØHJZ). This contest needs more activity! This year's contest also needed better conditions (WBØGGM). Activity was good and the band conditions were fair. I'm always amazed at how many stations are on during a contest and later are seldom, if ever, heard from again! (WW8M). Conditions were average to poor. Heavy rains caused severe path attenuation (WA8TJL). The rain-soaked trees killed the contest for my low antennas (K8MD). Murphy moved in! I blew the preamp twice, had a bad relay, a bad connector, fog, thunderstorms and I lost power for four hours. I still had fun, I think (WB8K). I operated for one hour, as the rest was spoiled by rain (NE8I). I operated just for the fun of it (WB2YZV). This was the first time we were able to work W2SZ on 3 and 5 GHz from FN20 (NX2Q). I worked two new grids on 1296! It was fun again this year, The activity was better than last year, but it was still slow (WQØP). It sounded like no one knew this contest was going on (NØCIH). I wish activity had been better. I worked EN00 for a new one on 432 (WØJRP). There was a nice coastal opening Saturday night (WA1VRH). I wasn't supposed to be in this contest and ended up working harder than I do in most contests. Mr Murphy came to visit with a vengeance! There's always the next one (K1LPS). Pack Monadnock featured plenty of commercial antennas, friendly visitors and good weather (KH6CP/1). This was my first real effort on 10-GHz narrowband and was I happy to have worked into New Jersey, a distance of 180.4 miles. Going out to one of these mountaintop locations enhances one's appreciation of the efforts put in by those who do it regularly (W1RIL). Where were all the locals? I even heard Boise, Idaho, on 432 for the first time, but my 10 W didn't make it over the hill to the north (NJ7A). Overall propagation was down from last year. We worked hard to catch some new grids! (W4IY). It was a typical contest turnout in August in Florida—ugh! I hope fall will bring more amateurs out of the woodwork (WD4FAB).

Scores

Score lines indicate call sign, total score, QSOs, multipliers and bands operated (C = 220 MHz, D = 432 MHz, 9 = 902 MHz, E = 1296 MHz, F = 2.3 GHz, G = 3.4 GHz, H = 5.7 GHz, I = 10 GHz, J = 24 GHz, k = 48 GHz, L = Light) and ARRL/CRRL Section. Call signs of Division leaders and band indicators of band winners are printed in **bold** type.

Atlantic Division

WA2FGK (K2LNS, op) 94,868- 54-24-C- EPA
94-34-D
24-14-9
37-18-E
13-8-F

WA3YON 53,502- 36-19-C- EPA
55-21-D
22-11-9
23-13-E
9-5-F
3-2-G
2-2-I
1-1-J

WA3FFC 46,899- 40-22-C- WPA
63-30-D
15-11-9
26-16-E
2-2-F

N2SB 22,500- 26-16-C- SNJ
44-14-D
12-8-9
18-9-E
6-3-F

K1RZ 19,050- 37-18-C- MDC
46-19-D
22-13-E

N3CX 17,892- 16-7-C- EPA
34-11-D
13-7-9
15-9-E
5-4-F
4-4-G

KA2RDO 9,594- 30-19-C- WNY
48-22-D

WB2YEH 6,300- 11-7-C- SNJ
22-8-D
10-8-9
11-7-E

WA2ONK 4,686- 45-13-D- SNJ
13-9-9

WA4VHF 4,212- 39-18-E- MDC

KD2YE 3,894- 47-19-D- WNY
2-2-F
1-1-G

K4JSI 3,800- 22-13-C- MDC
26-12-D

K3AKR 2,574- 27-15-C- MDC
12-7-D

W3CL 2,160- 19-7-C- EPA
28-8-D

KU2A 1,350- 11-9-C- WNY
10-7-D
2-2-9

WA1MKE (FN11) 1,332- 2-2-C- EPA
3-2-D
1-1-9
2-2-E
1-1-F
2-2-G
2-2-I
1-1-J

WA3JUF 1,125- 3-3-C- EPA
12-8-D
2-2-9
1-1-E
1-1-F

KD2KQ (FN02) 648- 1-1-C- WNY
3-2-D
1-1-9
1-1-E
2-2-F
2-2-G

KD2KQ (FN13) 456- 1-1-C- WNY
2-2-D
1-1-9
1-1-E
1-1-F
1-1-G
1-1-H

KD2KQ (FN12) 270- 1-1-C- WNY
2-1-D
1-1-9
1-1-E
1-1-F
1-1-G

KD2KQ (FN03) 252- 1-1-C- WNY
1-1-D
1-1-9
1-1-E
1-1-F
1-1-G

KD2KQ (FN22) 210- 2-1-D- WNY
1-1-9
1-1-E
1-1-F
1-1-G

KD2KQ (FN23) 195- 1-1-D- WNY
1-1-9
1-1-E
1-1-F
1-1-G

WA1MKE (FN10) 185- 2-1-C- EPA
1-1-D
1-1-9
1-1-E
1-1-F

WA1MKE (FN20) 150- 1-1-C- EPA
1-1-D
1-1-9
1-1-E
1-1-F

KD2KQ (FN24) 120- 2-1-D- WNY
1-1-9
1-1-E
1-1-F

KD2KQ (FN14) 108- 1-1-D- WNY
1-1-9
1-1-E
1-1-F

WA1MKE (FN21) 72- 1-1-C- EPA
1-1-D
1-1-9
1-1-E

KA3MLY 3- 1-1-C- WPA

KD5RO (+K2OS, KD2KQ, N2WK, NQ2O, WD4RDZ) 129,456- 60-26-C- WNY
78-27-D
23-18-9
30-21-E
18-14-F
9-8-G
1-1-H
4-1-I

K3YTL (NA2T, WA3JWP, WB3FAA, ops) 25,740- 40-20-C- EPA
38-16-D
10-8-9
17-9-E
6-4-F

N3AOG (+WA3s JUF, NUF, WB3DNI) 15,867- 10-5-C
29-14-D
7-7-9
15-10-E
6-4-F
4-3-G

Central Division

W8UC/9 3,098- 10-7-C- WI
29-18-D
6-3-E

WB8YFE 162- 9-8-D- IN

Dakota Division

N8HJZ 90- 10-3-D- MN

WØRUE 90- 6-2-D- MN
2-1-E

WØOHU 54- 6-3-D- MN

KBØZO 42- 7-2-D- MN

WBØGGM (+WA2PHW) 1,014- 4-3-C- MN
12-6-D
5-4-9

Delta Division

W2GU 5,247- 10-8-C- TN
25-17-D
9-8-9

Great Lakes Division

WW8M 49,662- 38-27-C- MI
74-39-D
7-5-9
30-18-E

WD8ISK 20,460- 30-17-C- OH
40-21-D
7-5-9
16-10-E
1-1-F
1-1-I

WA8EUU 15,435- 57-34-D- MI
6-5-9
18-10-E

WA8NJR 13,598- 39-17-C- OH
42-19-D
11-8-E

WA8VPD 11,214- 26-17-C- MI
27-14-D
4-3-9
14-8-E

WA8TJL 10,320- 18-14-C- OH
36-21-D
13-8-E

W8VO 9,072- 25-18-C- MI
29-18-D
9-6-E

K8MD 7,884- 15-10-C- MI
38-20-D
4-3-9
6-3-E

WB8K 3,354- 43-26-D- OH

WB8WAO/8 1,125- 8-6-C- MI
9-7-D
4-2-E

N8LMT 741- 13-9-C- MI
6-4-D

NE8I 312- 4-3-C- MI
5-3-D
2-2-9

N8AXA 252- 6-2-C- OH
6-3-D
1-1-E

W8XT 66- 6-1-C- OH
5-1-D

Hudson Division

N2GHR 12,960- 68-18-D- NLI
38-12-E

WB2YZV 9,408- 26-12-C- NLI
38-11-D
1-1-9
18-8-E

K4BNC 1,116- 31-12-D- NNJ

NB2V 864- 32-9-D- NLI

WA2BAH 60- 3-2-C- ENY
2-2-D

KA2MCU 54- 4-2-C- ENY
2-1-D

N2CEI (NK1P, N2EOC, ops) 64,050- 78-20-C- NNJ
67-17-D
28-12-9
25-11-E
10-6-F
4-4-G

NX2Q (+K2ESL, KA2s AYR, LIV, KB2CRU, N2s AAM, BL, WB2EZG, WF2O) 7,905- 30-14-C
55-17-D

Midwest Division

WQØP 3,948- 25-18-D- KS
11-10-E

NØCIH 1,458- 5-5-C- IA
14-9-D
4-4-E

WØJRP 1,056- 7-6-C- MO
15-10-D

NØLL 360- 2-2-C- KS
8-7-D
1-1-E

KDØHE 300- 10-10-D- NE

K5PTR/Ø 252- 7-6-E- KS

New England Division

WA2TEO 51,957- 52-22-C- CT
85-26-D
28-11-9
31-10-E

K1TR 14,760- 47-18-C- NH
73-23-D

WB1FKF 14,592- 18-9-C- EMA
30-9-D
10-6-9
15-7-E
4-3-F
3-3-G
1-1-I

K1FO 8,256- 88-32-D- CT

WA1HYN 5,772- 33-13-C- RI
41-13-D

KB1KM 4,104- 15-9-C- EMA
24-10-D
9-5-E

WA1MBA 4,032- 14-6-D- WMA
6-4-9
11-7-E
3-3-F
1-1-G

NM1K 4,029- 36-9-C- CT
25-5-D
9-3-E

N1BWT 3,240- 19-9-C- VT
27-10-D
2-1-I

AJ1E 1,890- 27-9-D- EMA
9-5-E

AC1J 1,824- 18-8-C- NH
20-8-D

WA1VRH 1,530- 34-15-D- CT

K1VZF 1,188- 7-3-C- EMA
16-6-D
5-3-E

K1LPS 1,170- 9-6-C- VT
7-6-D
1-1-E
2-2-I

KH6CP/1 1,116- 7-4-C- NH
8-4-D
2-2-F
2-2-G

K1RT 972- 36-9-D- CT

AA1O 324- 18-6-D- EMA

W1QLT 72- 6-4-C- WMA

W2SZ/1 (KA1s FZY, JFW, NRR, PRT, UTU, KC1EB, N1FGY, NC1J, WA1ZMS, WB1HIH, KA2s LIV, UWD, WRG, ZPX, KB2s EBE, HQ, IAL, N2s BNY, DCM, GXH, HPA, JVF, WA2s AAU, SCA, WB2s JSJ, KMY, WHD, WM2Y, WO2V, WS2B, KD3NC, WA3INC, WA8USA, ops) 354,090- 102-27-C- WMA
142-33-D
43-18-9
50-19-E
33-14-F
28-12-G
14-9-H
13-7-I
8-6-J

W1RIL (+KA1OTP) 198- 1-1-9- WMA
5-2-I

Northwestern Division

WA3RMX 2,880- 6-3-C- OR
6-3-D
2-1-E
3-2-F
2-1-G
2-1-H
3-2-I
1-1-J
1-1-K

WB7UNU 840- 2-1-E- OR
2-1-F
2-1-G
2-1-H
1-1-I
1-1-J
1-1-K

W7YTR 570- 2-2-C- OR
5-4-D
2-2-E
2-2-I

N7EPE 336- 2-1-E- OR
2-1-F
2-1-G
2-1-H

W7VOK 18- 1-1-C- OR
2-1-D

K7DAF 3- 1-1-D- OR

K7HSJ (+K7YLO, N7LVP) 165- 4-2-C- OR
5-2-D
1-1-E

Pacific Division

AJ6T 150- 10-5-D- SCV

KF6CU 36- 4-3-D- EB

Rocky Mountain Division

NJ7A 3- 1-1-D- UT

Roanoke Division

WA4ZIA 7,770- 38-25-D- NC
13-10-E
1-1-F
1-1-I

W4DO 2,310- 6-6-C- VA
17-11-D
6-5-9

WB4CTW 1,260- 28-15-D- VA

WA4OVW 900- 25-12-D- VA

K4FTO 162- 9-6-D- VA

W4IY (K4HWG, WB4RDV, K9RI, ops) 37,011- 27-19-C- VA
82-34-D
7-6-9
19-13-E
2-1-I

K2UOP/8 (+W3IY) 16,992- 37-18-C- WV
37-15-D
10-8-9
12-9-E

Southeastern Division

WS4F 5,568- 10-5-C- GA
22-14-D
10-8-E
3-2-F

W4VHH 1,845- 11-6-D- GA
7-5-E
3-3-F
1-1-G

WD4MBK 567- 1-1-C- GA
4-3-D
2-2-E
2-2-F
1-1-G

WD4FAB 420- 12-6-D- NFL
4-1-E

Southwestern Division

W6CPL 12,510- 56-6-C- LAX
21-8-D
3-2-9
10-5-E
2-2-F
3-3-G
3-3-I
1-1-L

KB6MEG 1,908- 39-6-C- SDG
14-6-D

K8LMN 1,152- 13-5-C- LAX
1-1-D
1-1-9
2-2-E
1-1-G
1-1-I
1-1-L

West Gulf Division

WD5BKV 21,594- 23-17-C- OK
43-23-D
28-19-E

AA5C 8,142- 24-8-D- NTX
6-2-9
15-6-E
5-2-F
5-2-G
1-1-H
2-2-I

K5SW 6,549- 12-10-C- OK
27-17-D
10-10-E

WA5VJB 4,374- 4-3-C- NTX
19-7-D
6-2-9
7-2-E
2-1-F
2-1-G
4-2-I

KM9K/5 2,535- 31-9-D- NTX
8-2-9
9-2-E

N5OSK 1,275- 25-17-D- OK

W5ETG 1,080- 8-3-D- NTX
4-2-9
6-2-E
3-2-F

AA5AM 720- 7-4-C- NTX
17-6-D

W5UGO 540- 15-12-D- OK

W5GVE 45- 5-3-D- STX

N5QGH (+WB5LUA) 20,007- 13-8-C- NTX
42-15-D
6-2-9
20-7-E
8-2-F
5-2-G
1-1-H
2-2-I

Canada

VE3SRL (VE3s BFM, SST, ops) 4,950- 17-12-C- ON
19-16-D
3-3-9
2-2-E
1-1-F

DX

YB2OK 1,298- 36-12-D- YB

Rules, 1991 ARRL International DX Contest

1) **Eligibility:** Amateurs worldwide.

2) **Object:** W/VE amateurs work as many amateur stations in as many DXCC countries of the world as possible on 1.8 to 30 MHz, excluding the 10, 18 and 24-MHz bands. Foreign amateurs work as many W/VE stations in as many states and provinces as possible.

3) **Dates:**

(A) **CW**—Third full weekend in February (Feb 16-17, 1991).

(B) **Phone**—First full weekend in March (Mar 2-3, 1991).

4) **Contest Period:** 48 hours each mode (separate contests). Starts 0000 UTC Saturday; ends 2400 UTC Sunday.

5) **Categories:**

(A) **Single Operator**—One person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc) is not permitted. Single-operator stations are allowed only one transmitted signal at any given time. (Note: This does not permit multiple single-band entries from the same station).

(1) *All-band.*

(2) *Single band (one only).* Single-band entrants who make contacts on other bands should submit logs for checking purposes.

(B) **QRP**—Single operator, all-band only. QRP is defined as 5-W output or less.

(C) **Single Operator Assisted**—One person performs all operating, monitoring and logging functions. The use of spotting nets and assistance through other alerting systems not physically located at the station (operating arrangements involving assistance through DX-alerting nets, etc) are allowed. There are no restrictions on the number of band changes or the length of time spent on a band.

(D) **Multioperator**—More than one person operates, checks for duplicates, keeps the log, etc.

(1) *Single Transmitter.* One transmitted signal at any given time. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multioperator, single transmitter stations must keep a single, chronological log for the entire contest period. Violation of the 10-minute rule or improper logging will result in an entrant's reclassification to the unlimited multi-multi class (see below).

(2) *Two-transmitter.* A maximum of two transmitted signals at any given time, on different bands. Once either station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Both transmitters may work any and all stations; the second transmitter is not limited to working new multipliers only. *Each of the two transmitters must keep a separate, chronological log for the entire contest period.* Violation of the 10-minute rule by either or both transmitters or improper logging will result in an entrant's reclassification to the unlimited multi-multi class (see below).

(3) *Unlimited.* A maximum of one transmitted signal per band at any given time. Unlimited multi-multi stations must keep a separate, chronological log for each band for the entire contest period.

6) **Contest Exchange:**

(A) W/VE stations (including 48 contiguous United States and does not include Canadian islands of St Paul and Sable) send signal report and state or province.

(B) DX stations send signal report and power (three-digit number indicating approximate transmitter output power).

7) **Scoring:**

(A) *QSO Points*—W/VE stations count three points per DX QSO. DX stations count three points per W/VE QSO.

(B) *Multiplier*—W/VE stations: Sum of DXCC countries (except US and Canada) worked per band. DX stations: Sum of US states (except KH6/KL7) and District of Columbia (DC), VE1-8, VO, VY1 (Yukon is separate from VE8) worked per band. Maximum of 59 per band.

(C) *Final Score*—QSO points × multiplier = final score.

8) **Miscellaneous:**

(A) Call signs and exchange information must be received and logged by each station for a complete QSO.

(B) All operators must observe the limitations of their operator licenses and station licenses at all times.

(C) Your call sign must indicate your DXCC station location (KH6XYZ/W1 in Maine, FG0AAA/FS on St Martin, etc).

(D) One operator may not use more than one call sign from any given location during the contest period.

(E) The same station may be worked only once per band—no crossmode or repeater contacts.

(F) Aeronautical and maritime mobile stations outside the US and Canada may not be worked for QSO or multiplier credits by W/VE stations.

(G) All transmitters and receivers must be located within a 500-meter-diameter circle, excluding directly connected antennas. This prohibits the use of remote receiving installations. Exception: Multioperator and Single Operator Assisted stations may use spotting nets for multiplier hunting only.

(H) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

9) **Reporting:**

(A) Use ARRL International DX Contest forms, a reasonable facsimile or submit entry on diskette.

(1) Official entry forms are available from ARRL HQ for an SASE with two units of First-Class postage.

(2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM-compatible, MS-DOS formatted, 3½- or 5¼-inch (40- or 80-track). The log information must be in an ASCII file, following the ARRL Suggested Standard File Format and contain all log exchange information (band, date, time in UTC, call sign of station worked, exchange sent, exchange received, multipliers [marked the first time worked] and QSO points). One entry per diskette. An official summary sheet or reasonable facsimile with a signed contest participation disclaimer is required with all entries.

(B) Logs must indicate times in UTC, bands, call signs, complete exchange sent, complete exchange received and QSO points. Multipliers should be clearly marked in the log the first time worked. Entries with more than 500 QSOs total must include crosscheck sheets (dupe sheets).

(C) All operators of multioperator stations must be listed.

(D) Entries must be postmarked within 30 days after the last contest weekend (April 3, 1991). Logs not postmarked by the deadline will be classified as checklogs; no extensions, no exceptions. All stations are requested to send their entries in as early as possible and enclose each entry (CW and phone) in a separate envelope. Entries received after mid-July will not make *QST* listings.

10) **Awards:** Plaques will be awarded in the following categories for the CW and phone contests.

(A) Top W/VE scorer in each entry category—single operator all-band high-power, single operator all-band low-power, single operator-single band (1.8-28 MHz), QRP, single-operator assisted, multioperator-single transmitter, multioperator-two transmitter, multioperator-multitransmitter.

(B) Top scorer in the single operator all-band category worldwide and on each continent. In addition, worldwide leaders in the single operator-single band, QRP, single-operator assisted, multioperator-single transmitter, multioperator two-transmitter and multioperator unlimited categories will receive plaques.

(C) Additional special plaques will be awarded as sponsored. See January 1990 *QST* for current list.

(D) Certificates will be awarded to top single operator all-band entries from each country and ARRL/CRRL Section; top single-band entries in each US call sign area and each country; top single-operator assisted entries in each country, US call sign area and in Canada, top multioperator entries (single, two- and multi-transmitter) in each country, US call sign area and in Canada. Additional single-band and multioperator certificates will be awarded if significant effort or competition is displayed. DX entrants making more than 500 QSOs on either mode will receive certificates.

11) **Club Competition:** ARRL-affiliated clubs compete for gavels on three levels: unlimited, medium and local clubs. Details will be listed in January 1991 *QST*.

(continued on page 102)

Rules, 44th January VHF Sweepstakes

1) **Object:** To work as many amateur stations in as many different 2° × 1° grid squares as possible using authorized frequencies above 50 MHz. Foreign stations work W/VE amateurs only.

2) **Contest Period:** Begins 1900 UTC Saturday, January 19 and ends at 0400 UTC Monday, January 21.

3) **Categories:**

(A) *Single Operator, Single-Band:* One person performs all operating and logging functions. All QSOs for score listings in *QST* must be made on one band. Single-band entries may, however, submit QSOs made on other bands for credit in ARRL-affiliated club competition.

(B) *Single Operator, All-Band:* One person performs all operating and logging functions.

(C) *Single Operator, QRP Portable:* Run 10-W output or less using a portable power source from a portable location. The intent of this rule is to encourage operation from "remote" locations, not to have home or fixed stations run low power.

(D) *Multioperator:* Those obtaining any form of assistance, such as the use of relief operators, loggers or spotting nets. All equipment (including antennas) must be located within a 300-meter-diameter circle.

4) **Exchange:** Grid-square locator (see Jan 1983 *QST*, p 49). Example: W1AW in Newington, Connecticut, would send "FN31." Exchange of signal report is optional.

5) **Scoring:**

(A) *QSO points:* Count one point for each complete two-way 50- or 144-MHz QSO. Count two points for each 220- or 432-MHz QSO. Count four points for each 902- or 1296-MHz QSO. Count eight points for each 2.3-GHz-or-higher QSO.

(B) *Multiplier:* The total number of different grid squares worked per band during the contest. Each different 2° × 1° grid square counts as one multiplier on each band it is worked.

(C) *Final score:* Multiply the total number of QSO points from all bands operated by the total number of multipliers for final score (see scoring example).

Scoring Example

Band (MHz)	QSOs	QSO Points	Grid Squares
50	25 (× 1)	25	10
144	40 (× 1)	40	20
220	10 (× 2)	20	5
432	15 (× 2)	30	10
902	36 (× 4)	144	9
1296	5 (× 4)	20	3
2304	1 (× 8)	8	1
5760	1 (× 8)	8	1
Totals	133	295	59

Final Score = (QSO Points) × (Total no. of grid squares) 17,405 = 295 × 59

6) **Use of FM:**

(A) Retransmitting either or both stations, or use of repeater frequencies, is not permitted. This prohibits use of all repeater frequencies. Contest entrants may not transmit on repeaters or repeater frequencies on 2 meters for the purpose of soliciting contacts.

(B) Use of the national simplex frequency, 146.52 MHz, or immediate adjacent guard frequencies is prohibited. Contest entrants may not transmit on 146.52 for the purpose of making or soliciting QSOs. The intent of this rule is to protect the national simplex frequency from contest monopolization. There are no restrictions on the use of 223.50 MHz.

(C) Only recognized simplex frequencies may be used, such as 144.90 to 145.00; 146.49, .55 and .58, and 147.42, .45, .48, .51, .54 and .57 MHz on the 2-meter band. Local-option simplex channels and frequencies adjacent to the above that do not violate the intent of (A) or (B) above or the spirit and intent of the band plans as recommended in the *ARRL Repeater Directory* may be used for contest purposes.

7) **Miscellaneous:**

(A) *Stations may be worked for credit only once per band from any given grid square, regardless of mode.* This does not prohibit working a station from more than one grid square with the same call sign. Such a roving station, however, must submit a separate entry for each grid square from which operation takes place. In this situation, the entrant may opt to waive rule 7 (C) and use a single different call sign from each different grid square. Crossband QSOs do not count. Aeronautical mobile contacts do not count.

(B) Partial QSOs do not count. Both calls, the full exchange and acknowledgment must be sent and received.

(C) A transmitter used to contact one or more stations may not be used subsequently under any other call during the contest period (with the exception of family stations where more than one call is assigned to one location by the FCC/DOC); one operator may not give out contest QSOs using more than one call sign from any one location. The intent of this rule is to accommodate family members who must share a rig, not to manufacture artificial contacts.

(D) Only one signal per band (6, 2, 1¼ meters, etc) at any given time is permitted, regardless of mode.

(E) While no minimum distance is specified for contacts, equipment should be capable of real communications (ie, able to communicate over at least 1 km).

(F) Multioperator stations may not include QSOs with their own operators except on frequencies higher than 2.3 GHz. Even then, a complete, different station (transmitter, receiver and antenna) must exist for each QSO made under these conditions.

(G) A station located precisely on a dividing line between grid squares must select only one as the location for exchange purposes. A different grid-square multiplier cannot be given out without moving the complete station (including antennas) at least 100 meters.

(H) Above 300 GHz, contacts are permitted for contest credit only between licensed amateurs using coherent radiation on transmission (eg, laser) and employing at least one stage of electronic detection on receive.

(I) Marine Mobile (and Maritime) entries will be listed separately as "Marine Mobile" in the listings and compete separately for awards.

(J) Participants are reminded that the segment 50.100-50.125 MHz should be used for intercontinental QSOs only, using 50.125 MHz as a calling frequency, then QSY after contact is established.

8) **Reporting:**

(A) Entries must be postmarked no later than 30 days after the end of the contest (February 21, 1991). No late entries can be accepted. Use ARRL January VHF Sweepstakes forms, a reasonable facsimile or submit entry on diskette.

(1) Official entry forms are available from HQ for an SASE with two units of First-Class postage.

(2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM-compatible, MS-DOS format, 3½- or 5¼-inch (40- or 80-track). The log information must be in an ASCII file, following the ARRL Suggested Standard File Format, and contain all log exchange information (band, date, time in UTC, call sign of station worked, exchange sent, exchange received, multipliers [marked the first time worked] and QSO points). One entry per diskette. An official summary sheet or reasonable facsimile with a signed contest disclaimer is required with all entries.

(B) Logs must indicate band, date, time in UTC, call signs and complete exchanges (sent and received), multipliers and QSO points. Multipliers should be marked clearly in the log the first time they are worked. Entries with more than 200 QSOs total must include crosscheck sheets (dupe sheets).

9) **Awards:**

(A) Single operator.

(1) Top single operator in each ARRL/CRRL Section.

(2) Top single operator on each band (50, 144, 220, 432, 902, 1296 and 2304-and-up categories) in each ARRL/CRRL Section where significant effort or competition is evident. (Note: Because the highest score per band will be the award winner for that band, an entrant may win a certificate with additional single-band achievement stickers.) For example, if WBØTEM has the highest single-operator all-band score in the Iowa Section and his 50- and 220-MHz scores are higher than any other Iowa single op's, he will earn a certificate for being the single-operator Section leader and endorsement stickers for 50 and 220 MHz.

(B) Top single-operator QRP portable in each ARRL/CRRL Section where significant effort or competition is evident.

(C) Top multioperator score in each ARRL/CRRL Section where significant effort or competition is evident. Multioperator entries are not eligible for single-band awards.

10) **Club Competition:**

ARRL-affiliated clubs compete for gavels on three levels: unlimited, medium and local. Details are in January *QST*.

11) **Condition of Entry:**

(A) Each entrant agrees to be bound by the provisions and the intent of this announcement, the regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualifications:** For excess duplicate contacts and call sign or exchange errors. See January *QST* for complete details. QST

3rd ARRL RTTY Roundup Announcement

Packet, RTTY, AMTOR, ASCII

1) **Object:** Contact and exchange QSO information with as many stations as possible on digital modes. Any station may work any other station.

2) **Contest Period:** First full weekend of January. Begins 1800 UTC Saturday, January 5, and ends 2400 UTC Sunday January 6, 1991. Operate no more than 24 hours. Two rest periods (for a combined total of six hours) must be taken in two single blocks of time, clearly marked in the log.

3) **Modes:** Baudot RTTY, ASCII, AMTOR and packet (attended operation only!)

4) **Bands:** All amateur bands 3.5 to 30 MHz (excluding 10, 18 and 24 MHz).

5) **Entry categories:**

(A) *Single Operator, multiband*—One person performs all operating and logging functions. Use of spotting nets (operating arrangements involving assistance through DX-alerting nets, etc) is not permitted. Single-operator stations are allowed only one transmitted signal at any given time.

1) less than 150 W output
2) 150 W output or more

(B) *Multioperator, single transmitter only*—More than one person operates, checks for duplicates, keeps the log, etc. Once the station has begun operation on a given band, it must remain on that band for at least 10 minutes; listening time counts as operating time. Multioperator stations are allowed only one transmitted signal at any given time.

6) **Exchange:**

United States: Signal report and State.
Canada: Signal report and Province
DX: Signal report and serial number, starting with 001. *Note:* Both stations must receive and acknowledge the complete exchange for the contact to count.

7) **Scoring:**

(A) *QSO Points:* Count one point for each completed QSO (anyone can work anyone). A station may be worked once per band for QSO credit (but not for additional multipliers).

(B) *Multiplier:* Count only once (not once per band), each US state (except KH6 and KL7), each VE province (plus VE8 and VY1) and each DXCC country. KH6 and KL7 count only as separate DXCC countries. The US and Canada do not count as DXCC countries.

8) **Miscellaneous:**

(A) Crossband and crossmode contacts are not permitted. Packet radio contacts made through digipeaters or gateways are not permitted.

(B) The use of non-Amateur Radio means of communication (eg, telephone) for the purpose of soliciting a contact (or contacts) during the contest period is inconsistent with the spirit and intent of this announcement.

9) **Reporting:**

(A) Entries must be postmarked no later than 30 days after the end of the contest (Feb 6, 1991). Any entry making more than 200 total QSOs must submit duplicate check sheets (an alphabetical listing of stations worked). No late entries can be accepted. Use ARRL RTTY Roundup forms, a reasonable facsimile or submit entry on diskette.

(1) Official entry forms are available from ARRL HQ for an SASE with two units of First-Class postage.

(2) You may submit your contest entry on diskette in lieu of paper logs. The floppy diskette must be IBM-compatible, MS-DOS formatted, 3½- or 5¼-inch (40- or 80-track). The log information must be in an ASCII file, following the ARRL Suggested Standard File Format, and contain all log exchange information (band, mode, date, on and off times, time in UTC, call sign of station worked, exchange sent, exchange received, multipliers [marked the first time worked] and QSO points). One entry per diskette. An official summary sheet or reasonable facsimile with a signed contest participation disclaimer is required with all entries.

10) **Awards:** Distinctive certificates will be awarded to: Top high-power and low-power Single-operator and Multioperator scorers in each ARRL/CRRL Section; Top high-power and low-power Single-operator and Multi-operator scorers in each DXCC country (other than W/VE); each Novice and Technician entrant; each entrant making at least 50 QSOs.

11) **Conditions of Entry:** Each entrant agrees to be bound by the provisions and the intent of this announcement, the regulations of his/her licensing authority and the decisions of the ARRL Awards Committee.

12) **Disqualifications:** For excess duplicate contacts and call sign or exchange errors. See January *QST* for complete details.

Recommended HF Digital Operating Frequencies (kHz)

North and South America	Europe/Africa
3590 RTTY DX 3605-3645	3580-3620
7040 RTTY DX 7080-7100	7035-7045
14,070-14,099.5	14,070-14,099
21,070-21,100	21,080-21,120
28,070-28,150	28,050-28,150

Recommended Novice Digital Operating Frequencies (kHz)

10 meters: 28100-28150*

Suggested simplex packet radio frequencies:
28102.3
28104.3

*Authorized power output 200-watts maximum for Novices/Techs only in the 10-meter Novice subband.

Starting/Ending Time Conversion

UTC	*EST*	*CST*	*MST*	*PST*
Starts 1800 Sat, Jan 5, 1991	1 PM	12 PM	11 AM	10 AM
Ends 2400 Sun, Jan 6, 1991	7 PM	6 PM	5 PM	4 PM

Canadian Multipliers

Prefix	*Province*
VO1/VO2	NFLD/LAB
VE1	NB
VE1	NS
VE1/VY2	PEI
VE2	PQ
VE3	ON
VE4	MB
VE5	SK
VE6	AB
VE7	BC
VE8	NWT
VY1	YUKON

DX Contest Rules

(continued from page 100)

12) **Condition of Entry:**

(A) Each entrant agrees to be bound by the provisions and the intent of this announcement, by regulations of his or her licensing authority and the decisions of the ARRL Awards Committee.

(B) **Disqualification:** An entry may be disqualified if the overall score is reduced by more than 2%. Score reduction does not include correction of arithmetic errors. Reductions may be made of unconfirmed QSOs or multipliers, duplicate QSOs or other scoring discrepancies. An entry will be disqualified if more than 2% duplicate QSOs are claimed for credit. For each duplicate or miscopied call sign removed from the log by ARRL, three additional QSOs will be deleted as a penalty. The penalty will not be considered as part of the 2% disqualification criterion. If a participant is disqualified, that operator will be barred from entering the contest on that mode the following year. The call signs of all disqualified participants will be listed in the *QST* contest results.

Section News

Administered by Steven Ewald, WA4CMS

The ARRL Field Organization Forum

ATLANTIC DIVISION

EASTERN PENNSYLVANIA: SM, Robert M. Stanhope, KB3YS—ASM: N3ECL @ WB3AFL, WA3PZO @ WB3JOE. ACC: KC3QB. BM KD3OA @ NR3U. OOC: W3IS. PIC: W3ZXV. SGL WA3IAO. SEC WB3FPL. STM: KD3AO @ WB3JOE. TC: W3FAF. "You win with people!" I've planned this month's column for some time. As this was the end of 1990 & the holiday season, I felt it appropriate to use this space to thank those who have helped the ARRL. No question about it, EPA has undergone a complete rebuild these past 4 yrs & many of the people who made it happen have left the service. I decided to recognize them for their hard work. Little did I know at the time that one of the hardest workers in the Section, Tom Teel, KB3UD, would become a Silent Key; he'll be deeply missed for a long time to come. I became SEC during the rebuilding process & many people helped me in the ARES program. Former DECs Bob Rhoads, Tom Teel, Hayes Eckard, Ron Small, Geoffrey Dent, Carl Zimmerman, Vince Bardsley & Ron Paull (1st "DEC of the Yr") started the ball rolling. Their leadership & recruiting ability were the foundation we needed. Then they strengthened the local program with their EC appointments. We appreciate the work of former ECs Rich Eckenrode (1st "EC of the Yr"), Vic Tenaglia, (later 2nd "DEC of the Yr"), Mike McLaughlin, Scott Rhoads, Wilson Hein, Thomas Sable, Barry Richmond, Eric Olena, Kevin Kloda, Diana Smith, Jo Ann Rovito, Marcia Paull & Cecil Mundorff. Some of these men & women still serve EPA in different capacities. Two NMs, Bud Trench (EPA) & Mary Anne Lynskey (PTTN), retired & Andy Haig (3RN) became a Silent Key. There's a lot more to these jobs than pinning on an ARRL callsign badge. The solid efforts of all volunteers are appreciated. EPA is a premier Section in the ARRL because of its people—they're all winners. Welcome to the new ECs in the Section: Marty Peritsky, K3PBU, Susquehanna Co; Robert Chimel, WA3LWR, Lackawanna Co; & Rich Arland, K7YHA, Luzerne Co. John Scull, KG3C, is a new ORS. Chris Tobias, KD3OA, is the new BM; he hopes to reshape the program & help promote local club activities. His ideas sound exciting. Carter, KD3AO, is relaying the column to ARRL HQ this month, as I'm really in FL watching the cute antennas walk along the beach. I hope you have a merry holiday season. 73 'til next yr, Bob, KB3YS @ WB3AFL. Tfc: N3DRM 311, W3IVS 235, KD3AO 188, N3CD 159, W3JKX 134, N3EFW 96, W3IPX 80, W3KOD & W3DP 78, W3ADE 69, W3KAG & N3FLE 59, WA3EHD 55, KU3R 51, KA3VTC 48, KA3MVM 45, W3NNL 41, N3CSE 34, N3AT 33, WB8KPE 28, WA3PZO 20, WA3CKA 16, W3CL 14, WA3JKB 13, K3ARR 12, W3FAF 11, WE3E, W3VA & K3TX 10, WB3EVL 8, W3BNR 4 & KG3C 4. Nets (QNI/QTC): EPA 391/152, EPAEPTN 455/232, PTTN 234/106, D6ARES 104/15, MARCNET 87/1, MARCTN 115/29, SEPATN 91/7, PFN 150/173. SCARES 60/3. PBBSs: K3RLI 329, WA3TSW 195, WB3JOE 162, N3ET 17, WB3AFL 4.

MARYLAND-DC: SM, Ken Cohen, NI3F (@ WA3ZNW)—ASM/PKT: KJ3E. ASM/ACC: WA3YLO. OOC: NB3P. SEC: WA1QAA. TC: W3VVN. STM: N3EGF. SGL: KW3X. PIO/BM: WA3SCW. It's a boy! Our new ASM weighed in at 5 lb 8 oz & is busy studying for his Novice ticket. G3ZCZ suggested calling him "SAREX," but we named him Zachary. K3RXK has relinquished his position as NM of the MEPN & will be replaced by WD3W (ex-N3GPR)—Tony will be a tough act to follow, George. Congrats to the winners of the new MD-DC QSO Party. Hats off to all who participated & kudos to the Antietam ARC for sponsoring this event. The BRATS will provide emergency comms for the MD H S Band competition. Your SM will speak to the Goddard ARC & would love to meet your club, too! Attention NTS folks: Please don't deliver routine tfc by landline after 2130 local time (or early mornings on wknds, for that matter!); people often have to get up early for work & don't always appreciate the "public service" of being roused out of bed for a msg that can wait! We want to make friends for ham radio & can better do so by avoiding late deliveries. 73 es 88 'til next month!

Net	Day	Time	Freq
MEPN	Dy	2300Z	3920 kHz
MDD	Dy	0000Z	3643 kHz
MDD	Dy	0300Z	3643 kHz
MSN	Dy	0030Z	3717 kHz
MPTN	Dy	24 hrs	via FGGM

MSN/KC3Y 30/54/295 PON/W3DFW 25/7/180 MDD/K3GHH 58/168/402 (Top Brass, K3GHH/108, KC3Y/156, W3QQ/104) MEPN/WD3W 31/148/713 MPTN/KJ3E 30/565/541. Tfc: W3IWI 703 (BPL), N4QQ 609 (BPL), N2GTE 574 (BPL), K3GHH 272, KA3T 244, NR3Q 185, KC3Y 154, KN1K 152, KD9M 148, WD3W 134, K3RXK 118, KJ3E 116, WB3BJM 98, WA3YLO 78, K3ORW 76, NB3P 60, N3EGF 58, W3FZV 55, K3USO 54, N3IJJ 53, K3NNI 36, W3YVQ 33, WA3SCW 24, W3DQI 23, WA3GYW 20, N3DE 19, N3GIY 16, K2EB 13, WB3V 10, WA1QAA 5, KA3WWI 1, W3ZNW 0. PSHR: KC3Y 92, WA3YLO 82, NR3Q 72, W3YVQ 72, K3RXK 70, WB3BJM 68, K3GHH 68, K3ORW 65.

SOUTHERN NEW JERSEY: SM, Richard Baier, WA2HEB—SEC: W2HOB. STM: WB2UVB. ACC: K2IXE. TC: N2BQT. PIO, SGL, BM: Vacant. OOC: WA2HEB. ATCs K2JF, KA2RJA & WB2MNF. I received a nice report from Amateur Radio Experimenters Assn (AREA) President WA2RJP, informing me his group helped augment comms for the Dover Twp PD when their station was put off the air because of lightning; those involved in this fine public service activity were WA2RJP N2HQV, KA2HLL, WA2EMU, KB2CNE, KB2CNY & N2HYG. Even though I'm writing this article in Oct, you'll be reading this in early Dec, so I'll throw out my annual 2 cents for sending holiday greetings via Amateur Radio. This yr, with many of our loved ones in the military overseas, this takes on added meaning. We have outlets to the MARS network. If you're interested, please contact our STM, WB2UVB, at 15 E Camden Ave, Moorestown, NJ 08057. Until next month, 73. Tfc: WB2UVB 337, KB2CDB 120, WB2ZJF 62, N2FET 57, N2JXG 46, KA2CQX 45, K4FFM 31, W2AZ 24, WA2EMY 23, W2FFE 18, KC2PB 17, WA4JRP 16, WB2SYJ 16, K2OG 11, N2HQL 10, KA2YKN 9, KB2GUH 9, N2EPH 7, WA2JSG 7, N2FHJ 6, KB2HJJ 6, N2GJJ 3, KB2IOJ 3, N2HQX 2, WA2FAB 1.

WESTERN NEW YORK: SM, William W. Thompson, W2MTA—Sep BPL to N2JAW. Good to meet the gang at the Schoharie Co club in Middleburgh on the 13th; we learned about the mysteries of the electrical codes. Clinton Co ET Net begins ops on 147.15 at 7 PM M-F next month as an NTS local net. WN2F. OO report: N2FHT. Club officers: ARATS K2LRL W2VCI NC2A; Drumlins, N2CMA N2KQH WA2SOK N2IJM; JCRAC N2JOA KA2OTS WB2ACO WB2HBU; RAWNY; KA2NYS KA2IWJ KA2IWK KA2GVY; Rome K2YAI N2JAW KA2JXA W2SYL. Sorry to report the deactivation of the Central NY Pkt node station at the KC3BQ PBBS; thanks to Rob for his pioneering efforts in pkt. The active PBBSs in W NY for the channeling of standard format msg tfc ("T" category) are KD2AJ Plattsburg (129xx), NA2B Massena (136xx), KC2AZ Elmira (148xx & 149xx), WB2WXQ Rochester (140xx-147xx), WF2A Vestal/Binghamton (130xx-135xx & 137xx- 139xx). (Home PBBS for STM N2EIA is WB2WXQ, for SM W2MTA is WF2A.) Local tfc nets are encouraged to check the above PBBSs for msg tfc on a dy basis (you know—LT, RT & KT). Out-of-Section tfc should be routed to WA2UMX in E NY if not picked up by local net folks for forwarding through the NTS via the local net. Simple, huh? Get ready...here comes the Christmas rush. Seasons greetings!

Net Name	QNI-QSP-QND	Net Name	QNI-QSP-QND
NYSEMO	114-010-05	Earlybird	191-000-20
NYSR	027-005-05	Blue Line	
NYS/M*	283-171-30	NYS/E*	399-214-30
WDN/M*	312-073-30	WDN/E*	429-141-30
NY Phone*	120-081-30	JCRACN	298-027-25
NYPON*	351-216-30	OARCN	063-003-04
NYSPT&EN	465-065-30	TIGARDS	030-005-05
Empire SS	390-139-30	VHF THIN	030-000-04
LCARES	054-000-05	BRVSN	239-002-30
OCTEN/E*	862-167-30	OCTEN/L*	294-123-30)
Q Net	404-000-30	CNYTN*	321-062-30
STAR*	403-040-30	ORTN	036-000-04
WDN/L*	380-078-30	NYS/L*	270-183-30

*NTS Net

PSHR: N2EIA, N2EVG, WA2FJJ, W2FR, KA2GJV, NN2H, KC2HJ, N2IKR, KB2IWN, N2JAW, N2JRS, KB2JRT, W2MTA, WB2OEV, WB2QIX, KA2QOO, WA2UKX, KA2UTI, KD2WP, K2YAI, KA2ZNZ. NA2B reports PBBS activity of KT = 1, T = 285. Tfc (Sep): N2JAW 522, W2MTA 286, K2YAI 241, WA2FJJ 211, W2FR 158, N2EIA 141, KA2GJV 139, KA2ZNZ 128, KC2HJ 127, KB2JRT 114, NN2H 109, WB2OEV 108, WB2QIX 106, KA2QOO 100, AF2K 99, KB2D 96, WB2OWO 84, WA2UKX 74, N2EVG 68, KB2IWN 57, KD2WP 43, WB2IJH 40, W2UYE 34, N2DLN 33, KB2JOP 30, N2IKR 25, N2JRS 25, W2PPS 24, KB2EOQ 22, KA2UTI 19, KA2DBD 18, KA2SJG 15, N2KWV 12, NJ3V 9, WB3CUF 5. (Aug) KB2EOQ 42.

WESTERN PENNSYLVANIA: SM, Bernie Fuller, N3EFN (@ K3ASI)— ASM: KA3OEM (@ NM3G). SEC: WA3UFN (@ W3YA). STM: WA2QXA (@ KA3NVP). BM: KC3ET (@ KA3NVP). TC: K3LR. OOC: KX3V. ACC: AK3J. Part 97.1(a) of the FCC Rules establishes one of the purposes of the Amateur Radio service as: "Recognition & enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communication." To further this purpose, the ARRL has entered into Agreements of Understanding with several public-service organizations. Unfortunately, many of us, in our desire to please, tend to overcommit our resources for providing emergency comms. It's contingent upon each of us in a position to coordinate resource commitment to plan the efficient use of the resources at our disposal. Every agency we support should be made aware, at some time in the planning phase, of the total commitment of the amateur resource during actual emergencies; only in that way will they be aware of our limitations. Ask yourself these questions: (1) How many operators do I have available? (2) How many agencies am I committed to support? (3) What is the total equipment requirement? What is available? (4) With the manpower & equipment resources, can I support these agencies? (5) Can I honor my commitments under 24-hr-per-day sustained operations? (6) Have I established priorities for support, in conjuction with the local EMA officer? We have limited resources, so commit your support accordingly. For further info on this subject, contact WA3UFN, WPA SEC. Congratulations to the new officers & dirs of the Two Rivers ARC: pres KA3PPH, vp NQ3U, treas AG3H, secy KA3TRN, activities N3GPJ & WA3K, KA3KDU, KA3NMB. Spreading the word about Amateur Radio is a function often lost in the list of club priorities—each club should have a PIO & an active public awareness program. If your club is fielding a briefing team, share your success with the Section so we can all benefit from your experience. Kudos to Steel City ARC & Triple-A ARA for renewing their commitments to Amateur Radio & their community as Special Service Clubs. KA3RRF for his outstanding article in the Nittany ARC newsletter on "Ethics in Ham Radio."

Net	QNI	QTC	Sess	kHz	Time/Day	NM
WPACW	158	92	30	3585	7 P Dy	WA3UNX
WPAPTN	295	141	30	3983	6 P Dy	WA3HLN
KFN	----Suspended----					
PFN	150	173	30	3958	5 P Dy	WA3THT
WPA2MTN	302	42	30	146.88	8 P Dy	KA3BGC
NWPA2MTN	619	37	27	145.13	9 P Dy	WA3ZSC

Tfc: N3EMD 452, W3EGK 284, N3FM 193, N3AES 146, W3OKN 95, WA3UNX 94, WA2QXA 93, WA3DBW 61, W3NGO 43, NO3M 29, WA3QNT 28, W3KUN 15, N3FQQ 14, KA3VBY 7, K3LTV 1.

CENTRAL DIVISION

ILLINOIS: SM, Sharon Harlan, WB9SFT—SEC: W9QBH. BM: K9EUI. ACC: KI9G. STM: K9CNP. SGL: K9IDQ. TC: N9RF. OOC: W9TT. PIC: N9EWA. DEC: WD9EBQ. Amateur Radio was heavily involved in the aftermath of the tornado that swept through Wheatland Plains, Plainfield, Joliet & Crest Hill at 3:30 PM Tues, Aug 28. This terrible storm was one of the worst to hit IL in a long time, causing more than $170 million damage, taking 27 lives, damaging 950 houses & apts, completely destroying 350 of these homes & Plainfield H S & St Mary Catholic Church. Amateurs from BARS, FRRL, WCRA & surrounding areas answered a call from Will Co ESDA Tues afternoon, Aug 28, to set up radio links at Jane Addams Middle Sch in Bolingbrook as a possible shelter site for people who had lost their homes. A link was established with Will Co ESDA using the 146.82 rptr in Joliet, while other shelters were coordinated on the Bolingbrook Amateur Rptr System on 147.33, linked to the rptr on 224.54. The other shelters included Troy Craughwell School in Joliet, Troy JHS in Shorland & Grand Prairie School in Joliet, each manned by radio amateurs staying in touch on simplex with an NCS. On Wed, Aug 29, a request was passed on to link the BARS 220 rptr to the Argonne machine on 145.19 in Plainfield, where a Salvation Army disaster relief net had been set up. The link stayed in use for 1½ days to allow Salvation Army mobile units & portables to operate on 220 & 2 mtrs. Much of the area was initially without electricity, water, gas or phones, so the Salvation Army canteens were busy supplying hot food & drinks to inhabitants & volunteers & distributing clothing & canned goods to the victims. On Thurs eve, members of WCRA with their W9CCU truck offered assistance & to improve 2-mtr hand-held coverage, they changed freq from Argonne to the AFAR rptr on 147.21. Meanwhile, an H&W net had been established on the Bolingbrook Rptr System 147.33 MHz. This net ran from Wed, Aug 29, until Sat, Sep 1. At the end of the net, 95 individuals & families being sought had been listed along with 35 who had been found. This info was faxed to both Joliet newspapers & to Will Co cable TV. Congratulations to those Amateur Radio operators who gave their time to go to the affected areas to provide comms, sweat & support to our neighbors who needed us. It you helped in any way, your assistance was appreciated. One thing is sure: trained Amateur Radio operators with their hand-held transceivers, mobile transceivers & multiple rptr systems proved their worth again.

Net	Freq	Time
ISN	3905	1800 Dy
ILN	3690	1830 & 2200 Dy
ITN	3705	1900 Dy
CTN	147.69/09	2100 Dy
ILARES	3905	1630 1st, 3rd Sun
IEN	3940	0900 Sun
ILPN	3855	1645 M-F; 0830 Sun
NCPN	3915	0700 M-Sat
NCPN	7270	1215 M-Sat

Tfc: K9CNP 163, W9HOT 146, W9HLX 125, NS9F 98, WD9HQW 65, KA9JNE 54, WD9EBQ 53, WA9RUM 6, WD9CIR 20, K9WMP 7, W9LNQ 4.

INDIANA: SM, Peggy Coulter, W9JUJ—SEC: WA4VWV. STM: KJ9J. OOC: N9INN. SGL: WA9VQO. BM: W9OCL. PIC: N9IPA. I regret to report the Silent Keys: Sep 3, Thomas R. Hale Sr, WD9BKK, Evansville; Sep 6, Chester M. Martin, W9TWN, Indianapolis; Sep 8, Ward L. Studor, WA9CCX, Indianapolis; Sep 14, Ronald Sieffert, W9IY, New Castle; Sep 18, Richard B. Orban, WB9UFO, Indianapolis; Sep 25, Max L. Kalp, KD9HB, Rushville; Oct 1, James A. Lovell, W9DAG, Greenfield. We extend our sympathy to their families & friends; they will be sadly missed. I've accepted the resignation of Mike Head, WB9ZQE, as SEC, effective Oct 8. He's retired after many yrs. He isn't leaving completely, & will be seen & heard at many places, but wants to slow down. I want to thank him for the fine things he's done for IN amateurs. Let him know of your appreciation with a card. I'm appointing Steve D. Smith, WA4WVW, to SEC. He's been working with Mike & is well-qualified, having filled that position in other states. I know you'll work with him as you did with Mike. As we sit by our fires & keep warm, we should be thinking of good things to come. Put your thinking caps on & think of someone to nominate for the 1991 Young Amateur of the Yr & Worker of the Yr awards, presented by the Indianapolis Hamfest Assn & the ARRL IN Section. You have until May 31, 1991, to nominate a candidate. That time will come fast & you don't want someone worthy of the award to miss out. There's also the 1991 IN Amateur of the Yr award, presented by the IN RC Council. When spring comes, we get too busy & forget these important things. OOC N9INN has received 6 reports out of 39 OOs—not a good percentage. Maybe we can do better. Received reports from ATC WA6OIZ. EC K9LMJ. W9OCL received OBS reports from K9BSW, N9BAC & N9BS; would like to see more. Report from N9IPA—any PIO needing help or info should contact him. Send him a report on your activities; these reports are important. I want to extend a Merry Christmas & a prosperous, healthy New Year to one & all. NMs: QIN, NR9K. ICN: KE9GM. WN, WA9OHX. Sep net reports:

Net	Freq	Time	Dy	UTC	QNI	QTC	QTR	Sess
ITN	3910	1330	2130	2300	2851	401	1783	90
QIN	3656	1430	0000	0300	351	205	1015	60
IWN	3910	1310			1721		310	30
IWN VHF Bloomington					726		450	30
IWN VHF Kokomo					881		150	30

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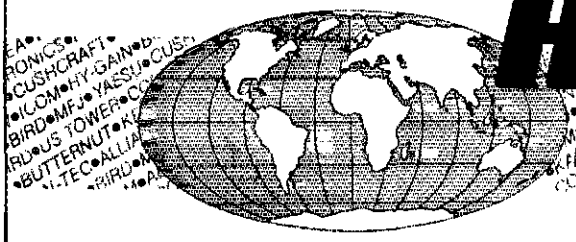

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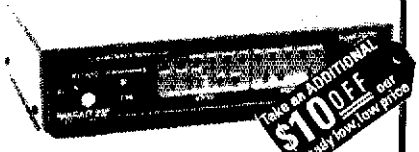

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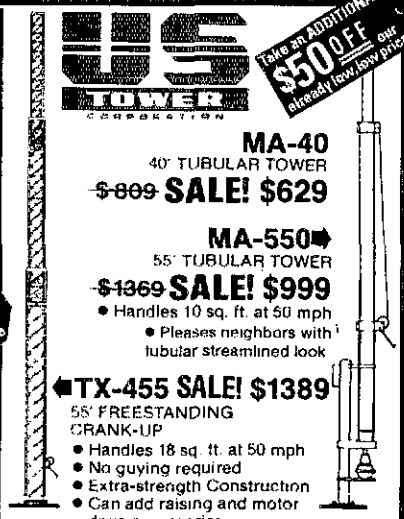

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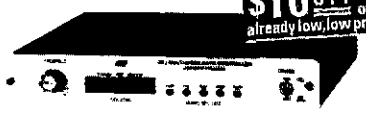

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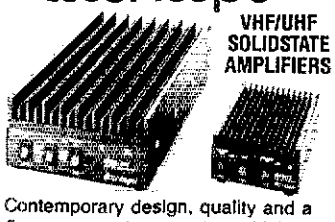

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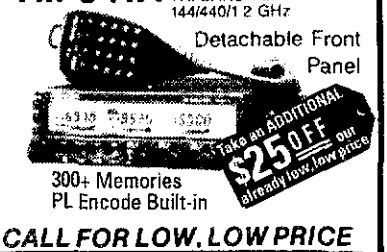

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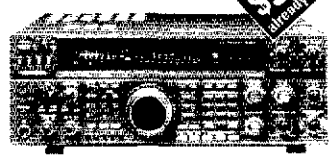

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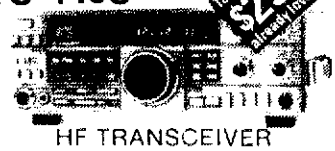

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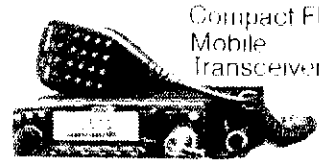

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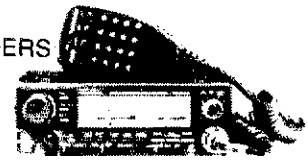

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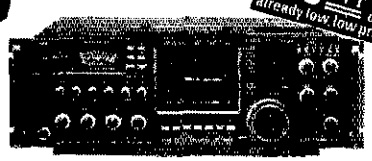

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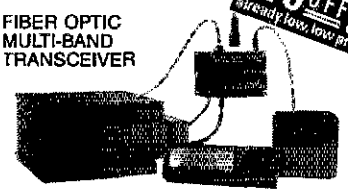

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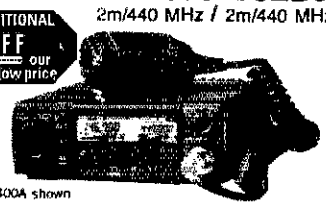

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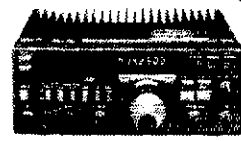

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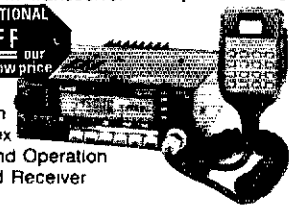

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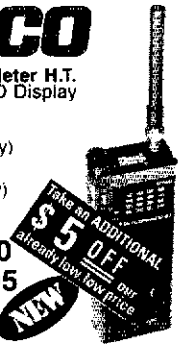

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IWN VHF Northeast	660		600	30
Hoosier VHF Nets (13 nets)	1478	104	2137	58

D9RN Sep tfc 208 in 60 sess, IN 100% by KA9CC, K9CGS, N9DWU, WB3HWU WA9OHX, W9UEM & K9ZLS. 9RN Sep tfc 321 in 60 sess, IN 100% by W9FC, N9HZ, KJ9J, W9JUJ, NR9K, WA9QCF & WB9UYU. Pkt BBS reports: KD9HW 3854, N5AAA 3053, KA9LQM 2181, WA9IVB 1624, KK9G 1661, N9BAC 1238 & KD9LP 796. Tfc: NR9K 481, W9UMH 266, WA9OHX 236, W9JUJ 175, WB7QWG 152, KA9LQM 132, KJ9J 101, W9UEM 96, WA9QCF 86, KE9GM 55, K9SBW 52, W9PPO 28, K9ZLS 28, W9ZGC 22, N9GBR 17, W9EDE 14, N9BS 14, WD9CIV 8, KD9ER 7, WB9IHR 7, W9EHY 6, K9DIY 6, W9RTH 5, NZ9S 3, W9KMY 3, KA9ZOD 3, K9OUP 2, W9XD 2.

WISCONSIN: SM, Richard R. Regent, K9GDF—Welcome to new ACC, KE9XQ, in LaCrosse. Special thanks to KA9FOZ, for 6 yrs of work as past ACC. KC9CJ, our STM & family has moved to Port Edwards. KA9DDN, with a little research, cut telephone costs for the Ozaukee RC rptr by 40%. Police Chief Meloy suddenly had problems with his police radios & couldn't communicate with his staff at an important event. The Ozaukee RC ARES (now with 46 members) saved the day & impressed the chief with their reliable Amateur Radio comms. Congratulations to new officers of WI Nets Assn: chmn K9KSA; secy N9IAI; treas KY9P. New W/K ARC officers: pres NX9H; secy/treas KB9DRK. Green Bay Mike & Key Club reports new local telephone BBS has ham section, telephone 337-9374. Rock River RC foxhunt had 1st-place winners WD9ADB, KA9JDE & his son Cory. W9NGP, NM of WIN/L on 3662 MHz at 10 PM, could use more liaisons. Watertown ARC Christmas party will be at Donny's Dec 2. Exams: Dec 1, Red Cross bldg in Racine, NW9P; Blue Top Supper Club in Stevens Point, N9JW; Dec 5, E HS in Milwaukee, W9JK; Dec 13 & 15, St Joseph Hosp in Marshfield, WA9K; Dec 15, St Nicholas Church in Milwaukee, WI9M. The WI Valley RA moved their 444.1 MHz antenna to the 105-ft level on Rib Mtn's big tower. Central WI Radio Amateurs, interested in applying for Special Service Club, has new officers: pres KA9LAQ; vp KA9TTU; secy/treas KB9CRV. CWRA has 9 husband & wife member couples who are licensed amateurs—can your club top that? Season's greetings.

DAKOTA DIVISION

MINNESOTA: SM, George Frederickson, KCØT—Last month, I mentioned that I was moving my station from the basement to a 1st-floor location. I'm almost in business, except for the digital TNC situation. I've concluded that I'm snake bit, as I'm not getting any cooperation from the TNCs. I've reworked cabling, plugs, etc & one unit's been sent to the factory for a checkup. Everything works great on all modes except AMTOR, which is what I really need. By the time you read this, I hope things are back to normal! Band conditions are picking up—a pleasure most of the time. Now, we need to see an increase in the population on our nets & we'll be in great shape. I wish more individual stations would generate tfc; we can't live forever on HANDI-HAM tfc. Our lone BPL this month again was Judy, WBØWNL, with 895 points, although Geb, WØGRW, came close with 453 for the month. Regretfully, Jerry, WDØGUF, reports that Lewis Maidels, KAØLRM, of Ely, became a Silent Key Oct 1. We're sorry to hear that, but thanks, Jerry, for the report. Have a good month, gang, & thanks for the great help & support in making things go. Until next time & in spite of Gramm-Rudman, GL & 73. Jim Swisher, KFØFI, STM.

Net	*Freq.*	*Time*	*QNI/QTC/Sess*	*NM*
MSN/1	3685	6:30P	256/ 40/ 30	KDØNH
MSN/2	3685	10:00P	213/ 68/ 30	KØQBE
MSSN	3710	6:00P	322/ 26/ 30	KAØSBY
MSPN/N	3860	12:05P	285/ 95/ 30	KCØT
PAW(PICO)	3925	9:00A	2616/206/113	WDØBAC

Tfc: WBØWNJ 895, WØGRW 453, WAØTFC 286, KFØFI 199, NIØA 132, NØFOO 73, KAØARP 66, KDØNH 57, W9DM 46, KØQBE 35, WDØGUF 32, KAØVQN 30, KCØT 30, KØWPK 28, KØPIZ 28, KAØSBY 26, NØFKU 27, NØJP 6, KN9U 6, KØOGI 5. Total tfc 2,440.

NORTH DAKOTA: SM, Bill Kurtti, WCØM—The Dakota Div Convention in Fargo was a success again with more than 400 attending. 21 hams, including me, were initiated into the Order of the Wouff Hong at the convention. The Peace Garden Hamfest Committee met at Devils Lake & the Grand Forks Clubs are the ND hosts this yr. Congratulations to NØIWE & XYL on the addition to their family. Congratulations on upgrades: Amateur Extra Class WØSRH, Gen KBØGKS & NØLYE. Anyone wishing to upgrade who's within driving distance of Dickinson can take tests after the monthly mtg; contact Bill Bosch, WDØEMY, for details. Grand Forks hams were out again helping provide comms for the 25th Annual Potato Bowl. Bismarck-area hams got together for their picnic, with a good time had by all. A pkt node is planned in Grand Forks to provide better local 2-mtr pkt coverage into the city.

Net	*Freq*	*Time*	*Sess/QNI/QTC*	*NM*
Goose River	1895	9 AM Sun CT	5/62/0	NTØV
DATA	3937 kHz	6:30 Dy CST	30/602/26	NØJR
Wx Nets	3937 kHz	9 AM 12:30 PM CT Sat Nov-Mar winter only		WØGFE
North 40	146.64	8 PM, MT Sn	5/53/0	NØELA
MON-DAK	146.73	8 PM, MT	4/33/0	NØELA
Dickinson-ARES			5/32/0	NØELA
Superlink	All Superlink rptrs	7 PM CT		NØKMG &KAØZKE

SOUTH DAKOTA: SM, R. L. Cory, WØYMB—ASMs: NØABE & WAØFPR. STM: KDØYL. SEC: KAØFPR. PIO: NØHCR. The Reliance rptr has been changed to 94. WA6MUK needs an SD RTTY contact to finish WAS; if you can help, call him collect at 818-797-1077. KØCX has been reelected pres of Black Hills ARC, NØJQ elected vp, KAØFTA treas & KAØSEZ secy. Pierre ARC is working on a plan to link SD rptrs; more info on this as it becomes available. They also plan a Goblin Patrol for Halloween. After receiving a copy of PRB-1, the Milbank City Council has given KAØUEQ permission to put up his 56-ft tower. LARK of Watertown is making application to hold the 1991 ARRL Convention. KAØUEH has become pres of LARK, as WUØL has moved away. 1991 will be the 50th anniversary of Mt Rushmore; there should be a special-event station with help of all the clubs. Pierre ARC is planning an operation from the State Capitol Bldg. Total tfc reported for Sep was 325.

DELTA DIVISION

ARKANSAS: SM, Bob Harmon, W5SEP—New appointments: ASM: Bob Hancock, KB5IDB. SEC: Mike Echols, WN5X.

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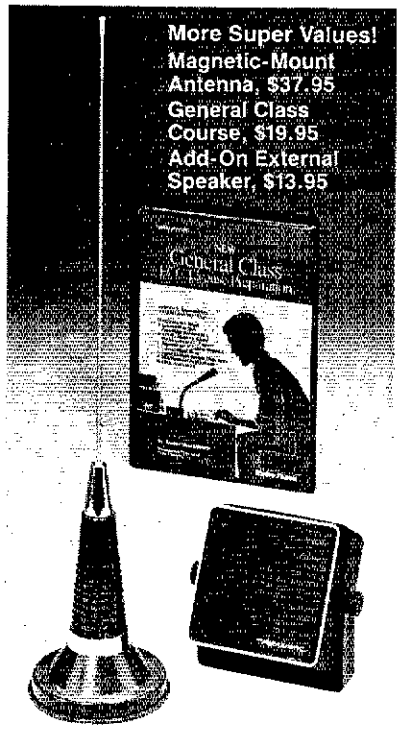

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OOC: Ray Parker, K5LJC. Sep 15, 1990, saw a successful earthquake drill held in AR in preparation of the predicted earthquake for the NE part of the state. Bob Hancock posts the following report: Authorities predict an earthquake measuring 7.2 on the Richter scale will hit NE AR in early Dec. For months, hams from all over AR prepared for an emergency comms drill sponsored by the Central AR Radio Emergency Net. The purpose was to simulate, as closely as possible, what would happen in the event of a major earthquake in AR. On Sep 15, hams from across the state turned out to show their stuff. The exercise included simulated chemical spills, bridge collapses, dam breakage, severe WX, power & comms outages caused by the 7.2 earthquake. Each station received specifics on the extent of the damage in their area. There were tasks assigned, such as sending a msg to a volunteer worker's family saying that they were safe. Individuals & clubs from 16 cities & towns throughout AR coordinated with the Office of Emergency Services & the Red Cross for the drill. Comms were on 7235 kHz & pkt. The Civil Air Patrol participated flying at 6000 ft carrying a 2-mtr rptr. Signals were heard throughout the state. The drill was a good learning experience & participants now have a better idea of what to expect in the event of a real emergency. Thanks to all who participated & helped make the drill a success. Special thanks to Fred Short, KB5MTC, who wrote the script for the drill & Mike Echols, WN5X, both of whom spent long hours organizing, planning & putting things together. Sep 15 was proclaimed Amateur Radio Public Awareness Day by the Governor of AR & the Mayor of N Little Rock. On another note, it's with great sadness that I announce I will not be candidate for reelection as SM. My business concerns require that I be out of the state several days each yr. I've enjoyed my term & would like to say thanks to all who helped make my job enjoyable.

LOUISIANA: SM, John "Wondy" Wondergem, K5KR—ASM: KB5CX. ACC: K5KR. SGL: KD5SL. STM: WB4FDT. SEC: KG5PV. Pkt: WB5ASD. TC: KE5FZ. The Jefferson ARC in Metairie holds their annual New Orleans Hamfest Dec 1-2 at the Bonnabel H S. They will have interesting forums & plenty of room for swap tables, dealers & exhibits. The Radio Amateur Service Club of Baton Rouge recently renewed as an ARRL Affiliated Club. The 1990 Annual Club Report Form is overdue from several LA Affiliated Clubs. Ask your club secy if your club is up to date. A Sat or Sun ham radio exhibit in a local shopping mall is a popular method of showing everyone Amateur Radio & the public service benefits we do. It's also an introduction to many who become interested & obtain their amateur license. Reports indicate that the shopping mall mgrs are interested & helpful in having an Amateur Radio exhibit. The LA tfc nets are continuing to do a great job. Bill, WB5YDD, DRN-5 NM reports the Sep DRN-5 at 784 msg in 60 sess, with LA represented 100% by K5WOD, WA5WBZ, N5CNK, KF5VW, WB5EIN, WA5TQA & N5LRZ.

MISSISSIPPI: SM, Butch Magee, KF5DE—ASM: WD5GHW. SEC: N5DVR, SGL: KA5WRX. TC: W5VZF. STM: KB5W. BM: W5EPW. OOC: WA5TMC. If you made it to the MS ARRL Convention in Biloxi, you know what a great time everyone had & if you made it to the mtgs & the League Forum, you know how much business we covered for our section. Good news we received (& a healthy indicator) has been in the Section nets & the MS NTS tfc nets. The total number of check-ins & amount of tfc moved is impressive. Thanks to the movers & handlers & the record-setting numbers. Special thanks to Bill Fryer, N5DVR & Larry Clark, WB5AKR, the SEC & ASEC, for the terrific job they've done rebuilding ARES in MS. Thank you, from all of us. 73, Butch Magee, KF5DE, SM.

Net	*NM*	*Sess*	*QNI*	*QTC*	*Bulletins*
MSPN	W5HTV	30	1780	56	11
GCSBN	WD5JXT	30	1304	18	
Mag SN	N5HBB	30	844	9	Emer Pwr = 11
MTN	KB5W	30	192	31	
JCEN	KB5KYD	4	44	0	
DRN5	WB5YDD	60	NA	784	NA

Stations heard: KB5W, NS5M, W5DEJ, W5JDF, KT5Z, N5KKI, W5YRX, WB4LAL, W4MRD, KA4RZZ. (MS represented 100% by KT5Z, W5HKW, KB5W, NS5M, N5KKI, WB5GFM and/or KB5W). New net reporting this month is the Jackson Co Emergency Net; Winston Dunn, KB5KYD is the NM. JCEN meets once per wk on the 146.08/88 rptr in Gautier.

TENNESSEE: SM, Harry Simpson, W4MI—E ASM & PIC: W4TYU. W ASM & ACC: K4CXY. STM: WB4LAL. SEC: K4UVH. OOC: K4LSP. TC: W4HHK. The TN Phone Net is on 3980 kHz with early sess at 6:40 AM Eastern, regular sess at 7:45 AM Eastern M-F, at 9 AM Central Sat, Sun & holidays. Eve sess M-Sat at 6:30 PM Central. CW Net sess on 3635 kHz at 7 PM Central, M-F. There are 2 things that make this SM job rather difficult: (1) The deadline for my mailing to ARRL HQ is the 7th of ea month, which, with postal holidays, etc, doesn't leave much time for you to get info on your previous month's operation & (2) The 7th of the month deadline is for publication in the issue dated 2 months later, so it isn't a showcase for current events! As an example, this column is being prepared on Oct 7 & will be printed in the Dec of *QST*. It doesn't make too much difference, because an average of only 12 members (out of TN's 2500) take the time to send in a report each month. Please remember, you don't just have to report tfc—you can report anything you feel would be of interest to the amateur fraternity. It's already too late for you to get something in during 1990—how about getting a head start & sending in an item for 1991? I suppose the best thing I can do now is to thank you for your cooperation in past yrs & wish you a happy holiday season. DRN5 mgr WB5YDD reports 784 msgs handled in 60 sess with TN represented 88% of the time by K4WWQ, KN4HL & welcome newcomer K4ZUY. Tfc: WA4FMR 131, WB4LAL 86, K4ZUY 66, K4WOP 45, W4DDK 39, W4TYV 34, KA5KDB 33, W4MI 28, K4WWQ 25, WA4HKU 23, WA4GZZ 17, KN4HL 12, W4PSN 8.

GREAT LAKES DIVISION

KENTUCKY: SM, John Themes, WM4T—Asst. SM: KC4WN. SEC: WB4NHO. STM: K4AVX. (Sep) The Louisville Hamfest was the ARRL State Convention this yr & was well-attended. At the ARRL Forum, it was announced that Tom, WD4RWU, Doug, KC4FRA, have been appointed as ASMs. DES in Frankfort has called upon us to test our emergency communication abilities with a simulated earthquake drill next month complete with jump teams. The coverage area will be in SW KY near the New Madrid fault. Results to be reported next month.

MKPN	1230 97	30	WD4RWU
KTN	724 53	30	KC4FRA

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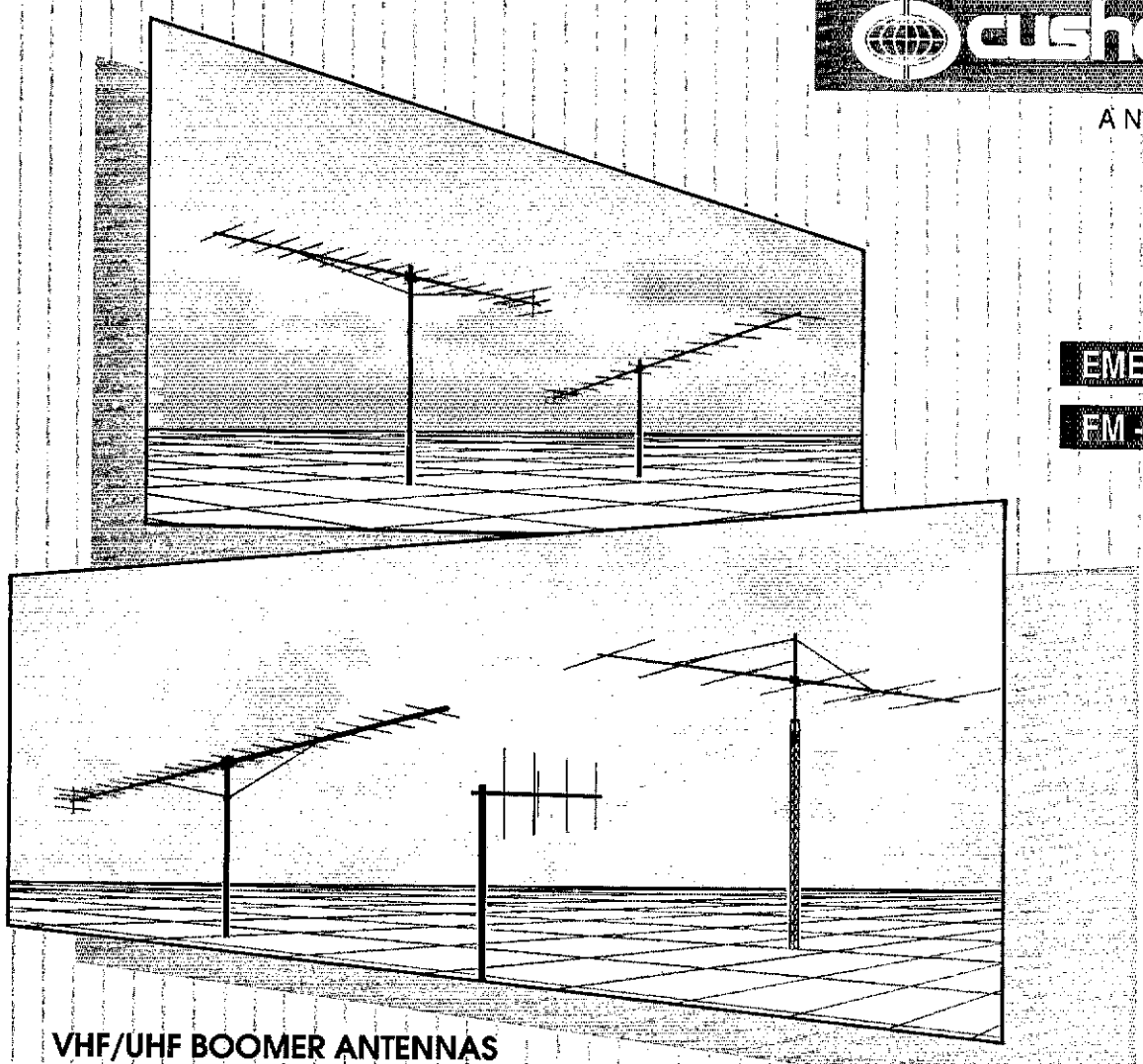
ANTENNAS

EME - CW - SSB

FM - PACKET



VHF/UHF BOOMER ANTENNAS

Antennas so efficient, powerful and successful that they defy comparison! They have established new VHF/UHF distance records. Boomers' computer based design has become the standard of comparison.

All Cushcraft Boomers are built with stainless steel hardware, ultraviolet stabilized element insulators, coaxial balun and heavy wall boom material with stainless steel locking pins. They are consistent winners in every antenna gain measuring contest and they are the choice of VHF and UHF antennas for hams around the world. **Built to perform and built to last. The best your money can buy.**

SIDEBAND CW BOOMERS

The antennas VHF/UHF operators choose for EME Meteor scatter and contesting. They all have baldnced T-Match feed systems and trigon reflectors for precise patterns and maximum performance.

4218XL	144-145 MHz	18 Element	28' BOOMER
32-19	144-146 MHz	19 Element	22' BOOMER
215WB	144-148 MHz	15 Element	15' BOOMER
220B	220-223 MHz	17 Element	19' BOOMER
424B	424-435 MHz	24 Element	17' BOOMER

6 METER BOOMER

Our 617-6B has more gain than any antenna in its class! Serious operators appreciate the design durability of this long boom 6 meter antenna. The excellent gain and front to back ratio are combined with a new clean pattern to focus your signal where you want it. The 617-6B is designed to survive the toughest conditions.

617-6B	50-51 MHz	6 Element	34' BOOMER

FM BOOMERS

Our FM Boomers feature the latest wideband technology to give the high performance required for FM and Packet or sideband and CW. There are three high performance models for two meters and two models for the new 220 MHz novice phone band. All are designed for quick, easy assembly and horizontal or vertical mounting.

124WB	144-148 MHz	4 Element	4' BOOMER
215WB	144-148 MHz	15 Element	15' BOOMER
230WB	144-148 MHz	2x15 Element	BOOMER
224WB	220-225 MHz	4 Element	3' BOOMER
225WB	220-225 MHz	15 Element	10' BOOMER

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KYN (Both)	303	100	60	K4AVX/KZ8Q
TSTMN	343	23	30	KZ8Q
KNTN	172	46	40	KB4UJA
CARN	665	40	30	KN4IV

SARs (Sep): K4VHF 92, KB4UJA 84, K4AVX 55, WD4RWU 44, W4OGP 38, KC4WN 33, W4TPB 17, N4PEK 10, WB4ZDU 10, WA4HLW 5.

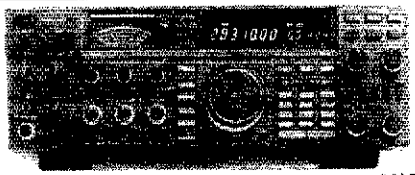
MICHIGAN: SM, George E. Race, WB8BGY (@ WA8URE)—STM: WB8R (@ NT8R). SEC: K8CQF (@ N8JAT). SGL: N8CNY. TC: W8YZ. OOC: WA2AJQ. BM: N8IWS (@ WA8OOH). PIC: WR8R. (@ KC8TU). ACC: W8POX. Silent Key, with deep regret, is Mort Neff, N8AY. The following was prepared by our STM Larry, WB8R: "MI is proud to be the home of the oldest spot-freq tfc net in existence. QMN (the MI CW tfc net) has operated on 3663 kHz since 1935. QMN is Amateur Radio history embodied & is the standard by which other nets are judged. It's where the modern concept of tfc nets originated & is firmly tied to all facets of public service in MI. QMN operators on the 8RN handle all msgs coming into & going out of the state during the evening cycle of NTS. But all is not well with QMN. It's *in serious danger of becoming* extinct, not because CW is a thing of the past, but because not enough operators have an interest in CW tfc handling. We desperately need more operators. We're looking for CW enthusiasts of every experience level who'd like to contribute in a way that blends their favorite mode with public service. We're looking for operators who'd like to broaden their horizons by becoming proficient multimode operators. We're looking for operators willing to accept a challenge to help prevent the premature death of an Amateur Radio institution. CW nets are relatively painless; listen for a few sess to get the hang of what's happening & join in. One of the best things about CW nets is that you can often be in & out of the net in 10 mins. You don't have to participate every day—stop by when your schedule permits. Nor does your operating have to be impeccable or *at lightning speeds.* We have a net with speeds to suit everybody & you're always among friends. We operate a Novice net & a training session of QMN every day to help get operators started. The net schedules are listed at the end of this column. To get specific details of how to operate on a CW net, contact your SM, STM, or QMN or MNN NM. The MI public service effort is unsurpassed nationally & we must not allow MI Amateur Radio history to record the passing of QMN. By becoming a participant, you'll become part of Amateur Radio history & help ensure that QMN continues to lead ham radio & public service into the 21st century." Thanks to Dean, KF8AU, for his leadership as NM of the MNN over the past yrs. New MNN NM is Jeff, KA8NCR; Jeff is an excellent multimode operator. Please give him your support by joining the MNN. The MI Convention was a great success. *Thanks for the fine arrangements by the N MI Chain of Clubs.* Special thanks to Denny, N8JCL, for the effort he put forth to make it happen. 73. Please support the following MI-area nets:

Net	*Freq*	*Time/Day*	*QNI*	*TFC*	*Sess*	*NM*
MiTN	3953	7 PM Dy	607	290	30	WD8EIB
QMN*	3663	6 PM Dy	447	125	60	WB8SYA
SEMTN	145.33	10:15 PM Dy	301	132	29	N8HSC
MNN*	3722	5:30 PM Dy				KF8AU
			No report			
MACS*	3953	11 AM M-Sa	303	41	31	K8OCP
GLETN	3932	9 PM Dy	968	82	30	KE8TJ
UPN*	3921	5 PM Dy	1178	68	35	WA8DHB
NMTN	147.12	7:30 PM Dy	352	45	30	N8JCL
WSSBN	3935	7 PM Dy	496	33	30	K8GOU
VHF Net Activity			689	13	46	N8CRV

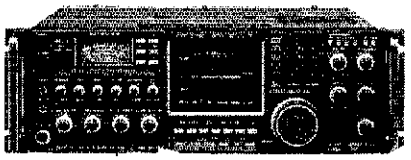
*QMN Early-6:30 PM Dy QMN Late-10 PM Dy MNN Late-8 PM Dy MACS 1 PM Sun UPN 12 PM Sun. Tfc for Aug: WA8OOH/PBBS 1122, KA8CPS 454, WB8I/PBBS 387, KA8BYK 208, WB8SYA 162, N8FPN 139, WB8YDZ 122, WB8R 120, W7LVB 75, NW8M 75, KB8DZX 70, K8GXV 66, N8IIC 63, WD8MJB 62, WB8BGY 53, NY8W 50, K3UWO 45, N6CRV 44, K6HAP 42, W8BEZ 41, K8UPE 39, WA8DHB 39, *K8ZJU 37, W8YIO 36, W8EOI 34, W8IHX 31, K8OCP 27,* N8CNY 26, KA8YVW 24, KI8Q 15, WD8EIB 13, W8RNQ 12, K8GOU 12, WB8WJV 12, WT8J 12, KN8JDN 11, WA8MVH 9, AF8V 5, N8EXS 4, W8URM 3 (NW8M Jul 35, Aug 14).

OHIO: SM, David Kersten, N8AUH @ NO8M (see p 8)—ASM: John Haungs, WA8STX @ KC8TW 513-563-7373. SEC: WD8MPV @ WA8BXN 216-274-8240. STM: KF8J @ W8HHF. ACC: KJ3O/8. BM: W8PH @WB8ICL. TC: KB8MU. SGL: N8CVK. PIC: K8QOE. OOC: WB8ZCE. We have entered the 1990 holiday season & with this comes NTS tfc to (and from) OH. At this time (10/1/90) the Mideast situation is quiet, but servicemen & women are on duty there & elsewhere. Please get involved with a tfc net if you haven't already done so, to help assure prompt holiday greetings to & from these folks, so far from home & others. This business of handling tfc is part of the practice that keeps us sharp for when a disaster strikes so we'll know what to do & do it well! The Section nets are listed below & local nets are active in many areas—join in. If you're an active NTS tfc handler, have you a field organization appointment (Official Relay Station)? If not, contact SM or STM. If you relay bulletins from the ARRL, are you an Official Bulletin Station? If not, contact SM or BM. A field position assures you regular receipt of *OSJ* & League mailings, too! The Toledo Mobile Radio Assn is now on top of the world: Their new rptr site is the top of the Owens-Illinois bldg, 29 floors plus. Dayton ARA has new officers: W8ILC, pres; WA8KZR, vp; WT8W, secy; N8CZD, treas—congrats! With the approach of the end of the yr, be sure your club notifies HQ & KJ3O (Annual Report), especially changes in officers & addresses, etc. We need to know of plans for your club hamfest so we can try to avoid conflicts & give sectionwide publicity in the *OH Section Journal.* If you're a club officer, make sure we know of your plans: Write KJ3O or SM. Keep K3RC/8 advised of VE dates, too. The N OH SKYWARN steering committee continues to prepare for NEXRAD, as work goes on to assure reliable comms to & from 31 OH & 2 PA cos for Cleveland NWS: Watch *OSJ* for updates. If N8AUH is not on your club newsletter mailing list, please add me so *I can be advised on what's happening in all areas of OH. There* will be only 1 change in Section leadership at this time: Thanks to WA8STX for the fine job as SM the past 2 yrs & his acceptance as ASM to help with SW OH & KY liaison: Thanks, John! Good show.

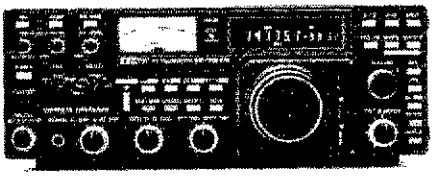
Net	*QNI*	*QTC*	*Sess*	*Time/Local)*	*Freq*	*Mgr*
8N(E)	188	105	30	1845 Dy	3.577	WD8C
8N(L)	227	104	30	2200 Dy	3.577	KD8HB
8NR	172	85	30	1800 Dy	3.605	W8EK



HF Equipment	Regular	SALE
IC-765 Xcvr/ps/keyer/auto tuner.....	3149.00	2699



IC-781 Xcvr/Rcvr/ps/tuner/scope	6149	5199



IC-751A 9-band xcvr/.1-30 MHz rcvr	1699.00	1399
PS-35 Internal power supply.....	219.00	199[95]
FL-63A 250 Hz CW filter (1st IF).....	59.00	
FL-52A 500 Hz CW filter (2nd IF)....	115.00	109[95]
FL-53A 250 Hz CW filter (2nd IF)....	115.00	109[95]
FL-70 2.8 kHz wide SSB filter.....	59.00	

IC-735 HF xcvr/SW rcvr/mic.....	1149.00	969[95]
PS-55 External power supply	219.00	199[95]
AT-150 Automatic antenna tuner	445.00	389[95]
FL-32A 500 Hz CW filter.....	69.00	
EX-243 Electronic keyer unit.....	64.50	
UT-30 Tone encoder	18.50	
IC-725 HF xcvr/SW rcvr..... *(Special)*	949.00	799[95]
AH-3 Automatic ant tuner .. *(Special)*	489.00	379[95]
IC-726 10-band xcvr/6m/ 5-30MHz rx	1299.00	1089

Accessories	Regular	SALE
IC-2KL HF solid state amp w/ps.....	1999.00	1699
IC-4KL HF 1KW out s/s amp w/ps.....	6995.00	5995
EX-627 HF auto. ant. selector *(Special)*	315.00	269[95]
PS-15 20A external power supply	175.00	159[95]
PS-30 Systems p/s w/cord, 6-pin plug	349.00	319[95]
SP-3 External speaker	65.00	
SP-7 Small external speaker	51.99	
CR-64 High stab. ref. xtal; 751A, etc ...	79.00	
SM-6 Desk microphone.....	47.95	
SM-8 Desk mic - two cables, scan	89.00	
AT-100 100W 8-band auto. ant. tuner...	445.00	389[95]
AT-500 500W 9-band auto. ant. tuner ...	589.00	519[95]
AH-2 8-band tuner w/mount & whip ,,,	758.00	689[95]
AH-2A Ant tuner system, only .. *(Special)*	559.00	469[95]
GC-5 World clock..... *(Closeout)*	91.95	69[95]

Accessories for IC-765, 781, 725 • CALL for Prices

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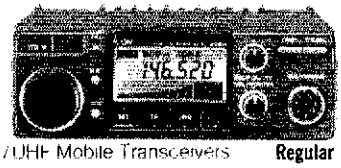
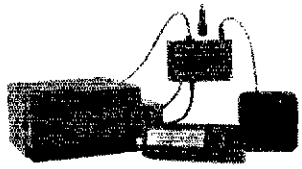
VHF/UHF Base Transceivers	Regular	SALE
IC-275A 25w 2m FM/SSB/CW w/ps...	1299.00	1129
IC-275H 100w 2m FM/SSB/CW.....	1399.00	1199
IC-475A 25w 440 FM/SSB/CW w/ps	1399.00	1199
IC-475H 100w 440 FM/SSB/CW *(Spec)*	1599.00	1269
IC-575A 25w 6/10m xcvr/ps *(Special)*	1399.00	1099
IC-575H 25w 100w 6/10m xcvr.....	1699.00	1469



VHF/UHF Mobile Transceivers	Regular	Sale
IC-229A 25w 2m FM/TTP mic.....	449.00	389[95]
IC-229H 50w 2m FM/TTP mic.....	479.00	419[95]
IC-448A 25w 440 FM/TTP ... *(Closeout)*	599.00	499[95]

Dual-band FM Transceivers	Regular	Sale
IC-3220A 25w 2m/440 FM/TTP mic...	659.00	569[95]
IC-3220H 45w 2m/35w 440 FM/TTP	699.00	599[95]
IC-2400A 2m/440 FM/TTP ... *(Special)*	899.00	699[95]
IC-2500A 35w 440/1.2GHz FM.....	999.00	869[95]



Multi-band FM Transceiver	Regular	Sale
IC-901 2m/440 Fiber opt. xcvr *(Special)*	1199.00	929[95]
UX-R91A Broadband receiver unit...	389.00	349[95]
UX-19A 10w 10m unit.....	299.00	269[95]
UX-59A 10w 6m unit.....	349.00	319[95]
UX-S92A 2m SSB/CW module.....	599.00	529[95]
UX-39A 25w 220MHz unit *(Special)*	349.00	279[95]
UX-129A 10w 1.2GHz unit	549.00	499[95]

VHF/UHF Mobile Transceivers	Regular	Sale
IC-970A 25w 2m/430 MHz transceiver	2895.00	2499
IC-970H 45w 2m/430 MHz transceiver	3149.00	2699
UX-R96 50-905 Mhz receive unit....	389.00	349[95]

Mobile Antenna	Regular	Sale
AH-32 2m/440 Dual Band mobile ant	39.00	
AHB-32 Trunk-lip mount.....	35.00	
Larsen PO-K Roof mount.....	23.00	
Larsen PO-TLM Trunk-lip mount.....	24.70	
Larsen PO-MM Magnetic mount	28.75	

Repeaters	Regular	Sale
RP-1510 2m 25w repeater.....	1849.00	1649
RP-2210 220MHz 25w repeater	1649.00	1399
RP-4020 440MHz 25w repeater	2299.00	1999
RP-1220 1.2GHz 10w repeater.....	2599.00	2249

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Hand-helds	Regular	SALE
IC-02AT/High Power	409.00	349[95]
IC-04AT 440 *(Closeout)*	449.00	329[95]
IC-2SA 2m ... *(Special)*	419.00	299[95]
IC-2SAT 2m/TP *(Spec)*	439.00	359[95]
IC-3SAT 220 HT/TTP	449.00	369[95]
IC-4SAT 440 HT/TTP	449.00	369[95]
IC-2GAT 2m HT/TTP	429.00	379[95]
IC-4GAT 440MHz. TTP	449.00	369[95]
Special . .		
IC-32AT 2m/440 HT	629.00	549[95]
IC-24AT 2m/440 HT	629.00	549[95]

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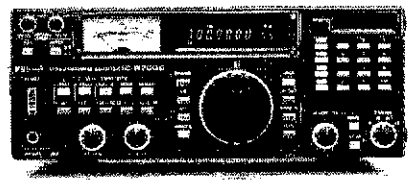
IC-12GAT 1w 1.2GHz HT/batt/cgr/TTP	529.00	469[95]

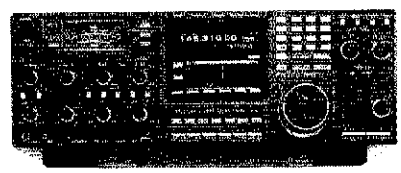
Aircraft band handhelds	Regular	SALE
A-2 5W PEP synth. aircraft HT.....	525.00	479[95]
A-20 Synth. aircraft HT w/VOR.....	625.00	549[95]

For HT Accessories • CALL for Prices

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	



R-7000 25MHz-2GHz receiver.....	1199.00	1029
RC-12 Infrared remote controller....	70.99	
EX-310 Voice synthesizer	59.00	
TV-R7000 ATV unit.....	139.00	129[95]



R-9000 100KHz-2GHz all-mode rcvr ...	5459.00	4699

Due to the size of the ICOM product line, some accessory items are not listed. If you have a question, please call. Prices subject to change without notice.

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1-800-621-5802

8NR(Aug)	187	56	31			
OSSBN	1798	843	90	1030,1615, 1845	3.9725	N8IBS
OSSN	197	64	30	0645 M-F	3.577	WB8FSV
OSSN	---	---	---	0800 S-Su	3.577	WB8FSV
OSN	266	69	30	1810 Dy	3.708	WD8KBW
OH Section ARES Net				1700 Sun	3.675	WD8MPV

Tfc: W8NO 334, W8BO 317, N8JDH 299, KD8KU 265, W8PMJ 245, KD8HB 239, K8JDI 226, WD8KFN 186, N8IIP 172, WA8STX 171, KC8CV 169, W8JLW 148, W8EK 140, KF8J 131, WA8SSI 130, K8DHD 123, W8QZK 119, WB8DPZ 115, W8SKP 112, WD8IKC 103, W8BDC 97. N8FWA 97, WD8RAO 96, WB8JGW 96, WD8RIB 93, K8ALV 86, KA1S 83, WA8HED 81, W8LDU 80, KA8HBN 71, WD8KBW 67, K8IOW 58, KC8NM 54, W8RG 52, K8LQM 50, KA8YIT 44, NS8C 44, KA8SON 41, KA8GJV 41, N8GOB 41, WB8FSV 41, KC8UR 31, N8JRV 27, N8HJB 26, KF8HT 25, WV8B 25, N8INP 24, W8PBX 24, WB8WTS 24, K8ES 23, KB8ESU 22, KE8WA 22, N8EFB 21, NY8V 20, K8WOQ 19, K8WZX 18, WD8JYE 18, KB8DUX 16, N8AJU 15, K8CKY 15, N2NS 15, WB8HHZ 14, KB8IFD 13, N8FPH 12, KD8XL 12, NW8E 11, NF8B 11, KB8FYB 10, N8JHP 9, KB8HJJ 8, WB8KWC 7, KC8JV 7, W8GDQ 7, K8QIP 6, N8CW 5, N8LCI 5, KB8GUM 3, WB8NHV 2, K8BAX 2. W8XT 1. (Aug) W8EK 68, N8EFB 25, N8AJU 12. KA8OQF 3. (Jul) WD8KFN 107.

HUDSON DIVISION

EASTERN NEW YORK: SM, Paul S. Vydareny, WB2VUK—STM/ASM: K2ZM. SEC: WA2ZYM. ACC: KV2A. SGL: KB2HQ. BM: WB2IXR. OOC: N2DVQ. PIC: KB2TM. ATC: WA2VGM. ASM/Pkt: N2FTR. ASM/Newsletter: WB2NHC. Club news: Albany ARA held the annual Auction mtg in Nov & heard from WB2EZG. Comms Club of NR learned about European antenna systems & operators from KB2QN. Overlook Mtn ARC had a program including a video on Ham Radio in the Soviet Union. PEARL is having a training sess for the Indian Point drill. Saratoga RACES welcomes new members KB2ABQ WB2LFU W2ZFE N2KAE KE7NL KA2WCC AG2X KB2KLA KA2FCB WT2F N2BLU. The growth of Public Data Networks by WB2ZMK was the program for WARA. WECA discussed upcoming drills & heard from Marathon recruiter WA2DHF. N2FTR suggested the formation of a central collection point for newsletter eds. It's difficult for eds to get enough input to fill an issue; Andrew has offered to collect items from those who wish to submit them & to make them available to other eds via pkt. Please send any info, copies of newsletters in ASCII format, comments, suggestions, etc, to N2FTR @ WA2RKN. I urge you to get involved in your local net in preparation for the upcoming holiday season & its resultant tfc. Also, please send monthly reports to STM K2ZM by the 6th of the month. Net reports for Sep (Check-ins/Tfc Passed): AESN 36/2 CDN 557/43 ESS 390/139 NYP 120/81 NYPON 351/216 NYSE 399/214 NYSL 270/183 NYSM 283/171 SDN 411/113. Sep PSHR: WE2G WB2VUK KB2EPU WB1BTJ K2ZVI N5MEA N2JBA. Sep tfc: WB2VUK 189, WB2IIV 145, KB2EPU 89, K2LYE 68, WA2YBM 50, K2ZVI 49, WE2G 47, WB1BTJ 46, WF2M 44, N5MEA 40, N2FTR 35, WA2GYY 17, N2JBA 14, N2KBC 10, WB2NHC 10, N2JQY 4.

NEW YORK CITY-LONG ISLAND: SM, Walter M. Wenzel, KA2RGI—ASM: WB2IBO. ASM: N2GQR. ASM/ACC: KA2LCC. SEC: W2HPM. STM: WI2G. OOC: NB2T. PIC: KA2JMA. TC: W2QUV. BM: W2JUP. Appointments: Effective Oct 1, we have a new STM, Ann Fanelli, WI2G. Ann agreed to take over, as Bob, K2MT, had to step down because of family commitments. Join me & the Section to welcome Ann aboard. Many of us are already working with Ann & know she'll do a good job.Ann asked me to relay to you that she's excited about the appointment & looks forward to assisting those who haven't yet gotten active in msg handling with NTS nets. My thanks go to Bob who has, over the yrs, helped restructure the local NTS network. There are positions still open for you to assist in the local ARRL Field Organization. All it takes is a little effort & time, & the rewards are everlasting. Coming up April 14 is the Suff Co RC Hamfair. Attn hamfest coordinators: To assist with scheduling, please notify me & ARRL HQ of the dates you're planning for your hamfest so everyone can receive proper notification & limit the possibility of date conflicts. This yr, we had problems because of multiple events occurring on the same or sequential dates. Your cooperation in this will help make your event better. VE sess: LIMARC (ARRL) 2nd Sat each month at 9:30 AM, Salten Hall, NY Inst of Tech, Old Westbury. Contact Al Jones, W2ZDB, at 516-676-5790; Suff Co VE Team (ARRL) 2nd Sat each month at 9:30 AM, Suff Co Community College, Islip Arts Bldg, Selden, NY, contact George Sintchek, WA2VNV, at 516-751-0894; Grumman ARC (W5YI) 2nd Tues each month at 5 PM, Grumman Rec Ctr, Plant 113, 800 S Oyster Bay Rd, Hicksville, NY, contact Howard Liebman, W2QUV, at 516-354-6861; Great S Bay ARC (ARRL) 4th Sun each month at 12 Noon, Babylon Town Hall Office Annex, 281 Phelps Ln, N Babylon, NY, contact Walter Wenzel, KA2RGI, 516-957-5726. If your group plans a VE sess, please let me know so it can be added to this listing, even if you don't hold a regular listing, please let me know it at least two months in advance so it can make the column. The following tfc nets in & around the section handle NLI:

Net	*Freq*	*Time*	*Day*	*NM*
BAVHF	145.350/R	2000	Dy	K2TWZ
NCVHF	146.745/R	1930	M-F	N2IMP
NCVHF	146.805/R	1930	Sat-Sun	N2IMP
SCVHF	145.210/R	2000	Dy	KA2JMA
NYP	3.925 MHz	1300	Dy	W2MTA
NYPON	3.913 MHz	1700	Dy	KA2UBD
NYS/M	3.677 MHz	1000	Dy	N2EIA
NYS/E	3.677 MHz	1900	Dy	N5MEA
NYS/L	3.677 MHz	2200	Dy	W2YGW
NLT	28.450 MHz	2100	Wed	N2IMP
ESS*	3.590 MHz	1800	Dy	W2WSS

*Independent Net, recognized by NTS, local times.

Pkt Node Stations

AI2Q-4 Freeport	145.01 Nassau, W Suff
W2HPM-4 Farmingville	144.97 Central Stuff
NR2L-4 Water Mill	145.09 E Suff
WB2IBO-4 Massapequa	145.03 Backup for AI2Q-4

Tfc (Sep): WI2G 810, KA2VZX 325, N2AKZ 317, N2HLZ 108, W2GKZ 80, K2JLD 68, N2KYE 44, NB2D 42, K2TWZ 41, KA2JMA 38, WB2ZIE 37, N2KHU 30, WA2UKM 26.

NORTHERN NEW JERSEY: SM, Richard S. Moseson, NW2L (@ KD6TH)—ASMs: Recruitment KA2F, Vol Counsel N2IGO, SE KY2S, SW KC2ZA, NW NW2S. ACC: WA2QYX. BM: K2ULR. OO/AAC: KA2BZS. PIC: WE2R. SEC: WB2HBZ.

Ameritron Linear loafs at full legal limit . . .

massive power supply capable of 2500 watts for half hour!

What makes the Ameritron AL-1200 stand out from other legal limit amplifiers?

The answer: a super heavy duty power supply that loafs at full legal power - it can deliver power for more than 2500 watts PEP two tone output for a half hour!

The heart of the AL-1200 power supply is a highly efficent Peter Dahl tape wound hypersil® transformer weighing 32 pounds. — it's equivalent to a 45 pound transformer using standard E-I laminations.

High current computer grade capacitors

You get genuine high current, full height *computer grade* capacitors with screw-on terminals — not short stubby, light duty soldered in "capacitors" that can't dissipate the heat generated by high current.

Why some filter capacitors explode

The failure of *carbon* equalizing resistors — used in most linear amplifiers — is the primary cause of filter capacitor failures.

When a *carbon* resistor gets hot its resistance drops, causing more current to flow, causing the resistor to get hotter.

This destructive cycle repeats until the *carbon* resistor opens and causes excessive voltage on the capacitor — the capacitor can explode.

Carbon equalizing resistors *can't* fail in the AL-1200. Why can't they fail? Because no-compromise *wire wound* SEVEN WATT 50 K ohm equalizing resistors — not the 2 watt 100K resistors others use — safely protect each filter capacitor. Plus, the lower value gives you better voltage regulation.

A direct short won't blow these rectifiers

The AL-1200 rectifier *board uses diodes rated for* a massive surge current of *200 amps* — you can accidentally short the high voltage supply and the diodes won't blow!

Will the amplifier you're considering withstand a direct power supply short?

Eimac® 3CX1200A7: the durability of glass and the power of ceramic

The AL-1200 uses one of Eimac® 's

AL-1200
$2045
Suggested Retail

toughest ceramic transmitting tubes — the high gain 3CX1200A7. It has the durability of glass tubes and the power dissipation of ceramic tubes.

3CX1200A7: 12 times tougher than the 3CX800A7

A 3CX1200A7 *has a 50 watt control* grid dissipation — that's more than 12 times tougher than the delicate 4 watts grid dissipation of a 3CX800A7.

If you accidentally drive a 3CX1200A7 with your 100 watt exciter when your amplifier is off, you won't fry your control grid. But don't make that mistake if you have a pair of 3CX800A7s — unless you're ready to buy another pair.

Full legal power at half the price

A *single* 3CX1200A7 in the AL-1200 delivers the *same legal limit* as a *pair* of 3CX800A7s that cost nearly twice as much. What do you get for paying twice as much? Twice as many parts to fail.

Plus more . . .

The UPS shippable AL-1200 also gives you . . . *all mode, all band coverage* including WARC and MARS, Pi-network tuned input, Step-Start Inrush Protection™, multi-voltage primary, Pi-L output tank with silver-plated components, separate filament transformer eliminates poor regulation and surges, adjustable ALC, SSB/CW switch for best linearity and efficiency, operate/standby switch, transmit indicator LED, 12 VDC auxiliary output, 35% safety factor for tuning capacitors and bandswitch virtually eliminates failures, shielded RF compartment, quiet die cast blower has 4 speeds, two illuminated meters show continuous grid current, peak RF watts out, drive power/ALC, plate voltage and plate current, ball bearing vernier reduction drives on plate and load controls, optional QSK board, one year limited warranty and more.

Call your dealer for your best price

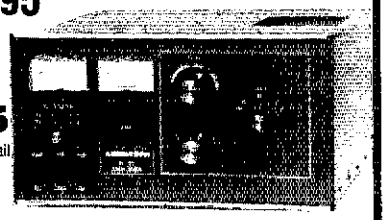
Even at $2045 list it's a bargain. For your best price, call your favorite dealer and order today!

Pair of 3-500Z tubes give you full legal output for . . . $1995

Want a pair of tough 3-500Z workhorses?

The AL-82 is the **same** amplifier as the AL-1200 except it uses a pair of 3-500Z tubes. It has the same super heavy duty power supply to give you full legal output. Some amplifiers With a pair of 3-500Zs can't deliver full legal output because they use a lighter duty power supply.

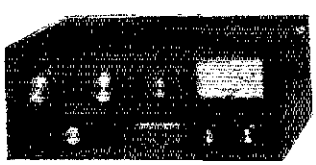
AL-82
$1995
Suggested Retail



That's why the AL-82 costs a little more -- and why it's well worth it. Call for your best price today!

Legal limit antenna tuner

ATR-15
$399
Suggested Retail



Ameritron — the high power specialist — brings you the ATR-15 antenna tuner that's designed for legal limit amplifiers. It handles full legal power with ease.

Heavy duty silver plated bandswitch virtually eliminates switch failure. High power transmitting capacitors. 1.8-30 MHz. Peak reading SWR/wattmeter. 6 position antenna switch. Selectable 1:1 or 4:1 balun. 5¼ x 13¼ x 13½ inches. Meter *lamps uses 12 VDC.*

Ameritron's most powerful amplifier

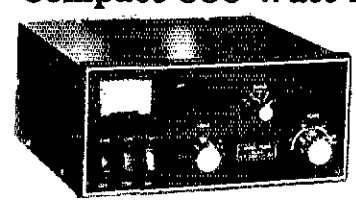
AL-1500
$2625
Suggested Retail

Ameritron super power amplifier uses the herculean 8877 ceramic tube.

It's so powerful that a mere 65 watts drive gives you full legal output — 1500 watts — and it's just loafing because the power supply is capable of 2500 watts PEP.

Compact 600 Watt Linear

AL-84
$549
Suggested Retail



600 watts for only $549! 5x10x11 inch powerhouse gives 600 watts PEP, 400 watts CW output. Four 6MJ6/6LQ6 tubes. Low SWR input for solid state exciters.

AMERITRON®

. . . the high power specialist

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Sales: (601) 323-8211 • **FAX:** (601) 323-6551
Free Catalog or Nearest Dealer: **800-647-1800**

STM: WB2FTX. TC: WG2W. Holiday greetings to all. Use the NTS to send free holiday msgs. If you're not sure how, just check into one of the nets listed below & ask the NCS to help you out. NNJ nets welcome newcomers to tfc handling. You may also send NTS msgs by pkt. Don't forget our servicemen & women in the Persian Gulf. Check into any net & ask if there's a MARS liaison. That person will fill you in on the special info needed for MARS tfc. Nominations are open for ARRL Instructor of the Yr Awards (volunteer & professional); send nominations to NW2L by Jan 31. Make sure your best instructors are recognized for their skill & effort. Congrats to winners of the 1990 NJ QSO Party. NNJ single-op winner is WA2ASM; multiop W2FCL placed 2nd overall. Next yr's party is Aug 17-18. Club news: BEMARC reports extensive emergency comm activity during Aug storm that spawned tornadoes on & near Staten I. BARA member WA2PNI reports talking with astronaut Jay Apt, N5QWL, at the Johnson Space Ctr ARC, K5RRR (how else?) via satellite! New Providence ARC providing comms for "Overlook Hustle" race in Summit & reports 7 stations took part in their "Hidden Receiver Hunt" (details last month). K2QKV & K2GLS were 1st to find the "fox." NPARC also nominating W2YFM for QCWA "Elmer" Award. NJDXA honoring WA2DIG on his 90th birthday. TCRA has new officers: pres W2OBJ, vp W2OPE, secy WB2RMH, treas KE2KX; congrats to all. Frank Warren, KB4CYC, is NM of OBTTN, eff Oct 1. Tnx to WR2E for hard work running 2 nets at once. Tfc handlers met for lunch Oct 6 in Hightstown; Tfc Confab Dec 1. Sep net stats (QNI = # check-ins/QTC = # msgs passed):

Net	NM	Freq	Time	Sess	QNI	QTC
NJM	WB2ZJF	3695	1000	30	237	144
NJPN	W2CC	3950	1800	35	410	149
NJSN	WR2E	3735	1830	30	139	26
NJN/E	KA2INE	3695	1900	30	205	64
NJN/L	WA2OPY	3695	2200	30	98	38
OBTTN	WR2E	147.120	2000	30	169	106
NJTTN	N2DXP	223.860	2100	30	146	37
NJVN/E	WB2FTX	146.895	1930	30	482	90
NJVN/L	KA2KJF	146.490	2230	30	206	61

Sep tfc (Call sign/Total msgs/PSHR): W2QNL 508 (BPL)/111 W2RRX/182/102 N2XJ/171/98 WB2FTX /120/65 K2VX/109/74 WA2EPI/108/85 W2RQ/106/-K2PBP-T/105/62 KA2INE/92/74. KB4CYC- T/81/74 WA2PAC/78/78 KE2JX/68/62. W2MTO/63/89 N2DXP/50/60 W2DMM/42/94 KA2KJF/40/- W2PTZ/28/- N2GJ/27/- WA2CLP/22/43 W2CC/22/- KA2QOU/20/60 KA2DST-T/14/49 W2XD/12/- N2KBD/9/- WB2GJE/6/-. 73 de NW2L.

MIDWEST DIVISION

IOWA SECTION: SM, Wade Walstrom, WØEJ—ASM: KØCNM. SEC: KDØBG. STM: WØCON. ACC: NUØP. OOC, WAØQMU. BM: KØIIR. TC: KØDAS. SGL: WRØG. PIC: WEØM. Merry Christmas & Happy New Year to all! New officers of the Denison Rptr Assn: pres NØDQS, vp KØCNM, secy KAØHFR, treas WAØGUD. The SE IA Hamfest at W Liberty is history for this yr & marks the end of the summer & the hamfest season in IA. There was a fine turnout & fine WX & it was good to talk to you. The Cedar Valley ARC helped with comms for the Soap Box Derby & operated a special-event station at the Usher's Ferry Pioneer Village in Cedar Rapids. KDØZV was severely injured by a fall from an 80-ft tower; We all wish Rich a speedy recovery. We all need to be careful while working on towers! The Mt Pleasant ARC operated a special-event station at New London Day. The Ft Madison ARC is "adopting a highway" & held their 9th annual Radio Rodeo. The Cyclone ARC hosts a VE sess Dec 8 at 9:30 AM; contact KCØRX at 515-292-4504. WAØDFF has earned WAC-CW & WPX-CW. New call signs: AAØCB & NØMMA. Newsletters: Quad Cities ATVC, Cedar Valley ARC, Des Moines RAA, EIDXA, Mt Pleasant ARC, Ft Madison ARC, Scoland ARA, SW Iowa ARA, Collins ARC, IO-IL ARC, Ft Dodge ARC & Central IA RAS. Tfc: KØIPT 212, WØSS 186, KAØADF 90, KØCNM 70, KØGP 56, KAØVBA 40, AEØR 9.

KANSAS: SM, Robert M. Summers, KØBXF—SEC: KØBIX. STM: WØOYH. ACC/OOC: KØBXF. TC: KAØHEP. BM: open. PIO: WBØWSG. SGL: NØIZE. We still need a volunteer to accept the position of BM. 1990 SET will be over by the time you read this. If you didn't get a chance to participate with your zone ARES, it's not too late to let your EC know that you're willing to accept an active postition in emergency situations. If in the Leavenworth area, try the new rptr on 145.33 (-). KS NE RC emergency comms van is nearing completion & should be ready for show & tell by the time you read this. QST, let me hear from you. Net activity for Aug '90:

Net	QNI	QTC	NM	Freq	Dy	Time (Z)
KSBN	1366	115	WØRC	3920	Dy	0030
KPN	394	24	WØFRC	3920	MWF	0645
KPN				3920	Sat-Sun	0800
KMWN	1074	667	WBØYWZ	3920	Dy	0700
KWN	770	653		3920	Dy	0001
CSTN	1941	117	WØDE	7253	M-F	1830
				3920	Sun	1430
QKS	242	52	WBØZNY	3610	Dy	0100
				3610	Dy	0400
QKS-SS	31	8	WØMYM	3735	T Th S	0130

Tfc (Aug): WØFE 292, NZØM 268, KØBXF 231, WØFIR 230, NØKOJ 152, WDØY 84, NBØZ 83, WØOYH 67, WBØZNY 57, WTØE 19, WØPB 16, WØMYM 16, WAØYXK 14, WOØE 12, KXØI 8, WØEBL 7, KBØEEY 7, WØKL 5, WZØB 4, WØCHJ 3.

MISSOURI: SM, Bill McGrannahan, KØORB—A Sep overflowing with activity! The MS-150 saw hams from all over the state doing their part for public service. The leaders were WRØR & KØUAA for KC; NØEIR for St Lou, & WBØZCZ for Columbia. There were 2 picnics: the MO Section & the Ozark ARS. Rev Gregg Hibbard, WØENW, is on the Exec Committee of MVOAD & represents MO Section to that group. NDØN & WBØWLU travelled to the SEMA mtg at Jeff City. Heart of Amer ARC was guest of KMBC-TV for their club mtg. Scout Expo '90 drew more than 50,000 people to KC. The Southside ARC & the HARC manned booths for Public Awareness Day. WØCLR & NØKNQ headed the Southside booth & Mike, KØUAA, was in charge of the HARC. Operation Preplan '90 involved several emergency response agencies in a simulated crash at KCI; Platte Co ARES took an active part. Members at the site were WØXK, WØOCT, WAØOKD, NØEA & KAØNGZ. W5USI was at the EOC & WAØUUC was NCS. SW MO ARC helped with a 100 bike ride. Mo. Valley ARC worked the Pony Express Marathon. Your SM & SEC met with Richard Stump of SEMA. Later, SEC Jim Schroeder, KFØBM, attended a SEMA earthquake drill at Jeff City. The KS ARRL hamfest in Wichita gets

better every yr! We worked the ARRL booth with Paul, WØFIR. There's a good picture in *PhD News* of Vice Director Chuck Miller, WAØKUH, with KC's Mayor Berkley. We attended the wedding of STM John Seals, WRØR, & Beth Taylor, NØMAX. Officiating was the Rev Robert Seals, WØFLO! St Peters Swapfest ended the month. Aug + Sep Nets: MOSSB, NM WBØWLU, sess 61, QNI 1385, QTC 178; MEOW WDØELL 61/1108/62; Hambutcher KØDSQ 43/922/49; CCARES KAØSXY 9/136/35; SUL2MTR KBØEVY 8/144/11; SWMOSKY KDØUD 8/252/9; ROLBB WØDLG 54/268/5; KCBAARC NØWA 8/174/2; PREVERE WBØEJJ 9/692/2; QCWA 35 9/182/5; CARL KCØMV 7/99/0; JAKARES 8/97/0; HARC KAØSXY 9/259/11; CMEN WBØTEG 8/157/1; JEFF WØORI 9/152/0; PHD 8/243/14. SEPT ONLY: PALARES KEØAH 4/35/0; MON AIØO 62/160/86; STLARES KØWEX 4/240/4; AUDARES 4/34/0; BRCLUB WØLNO 15/278/0; FRINITE 4/70/0. Tfc: NQØG 233, WAØYJX 211, KØORB 97, WØBMA 34, KØPCK 30, KFØBM 22, WBØCJB 17, WBØTEG 9, (Aug) NDØN 118, WØOUD 48. Happy Holidays de KØORB!

NEBRASKA: SM, Vern J. Wirka, WBØGQM—Holiday Greetings to everyone! Douglas Co EC, Jim Peterson, KFØFO, is working with our SEC, Michael Ruhrdanz, NØFER & other ECs in obtaining ID vests that can be worn by ARES members when providing comms. Peterson reports that the need for a means of ID became obvious during a recent disaster drill in Dodge Co when other participants were not able to easily recognize the amateurs providing comms. The Ak-Sar-Ben ARC of Omaha has appointed Doug Halbert, KØBOY, to head a pkt committee. The Ak-Sar-Ben ARC & Lincoln ARC pkt committees are working to establish a high-speed pkt backbone link for the PBBS ltc, to reduce the load on the 145.01 MHz. Terry Breitenfeld, N7EXB, of Blair, is the head of a group working on a linking system for some voice FM rptrs in NE & IA; the group is trying to get equipment, antenna sites & bldg control-circuit systems. The Beatrice ARC now has a net that meets Tues eves at 1930 local on the 146.19-79 MHz rptr, according to Dave Knisely, KAØCZC. The 146.25-85 MHz Lincoln Rptr Club system now includes quick access to the NE State Patrol for emergencies outside Lincoln, but within Lancaster Co; to access the State Patrol, dial 1-2-3-*; for emergencies inside the city of Lincoln, dial 9-1-1-*; the # drops the phone patch, according to Bruce Colgrove, WDØDMS. Tfc: KEØXQ 44, WBØGQM 28, WAØBOK 20, WDØEWH 8, WCØO 7, KØBOY-PBBS 179, NFØN-PBBS 31.

NEW ENGLAND DIVISION

CONNECTICUT: SM, Caesar Rondina, N1DCS—ASM: KB1H. STM: K1EIC. SEC: N4GAA. ASEC: N1FIQ. TC: W1HAD. OOC: KY1F. ACC: NK1J. BM: N1API. PIC: WA1CMF. SGL: K1AH. Let me start off by wishing everyone a safe & healthy holiday season; best wishes to all. CT had 96.7% rep in 1RN Cycle 3. Thanks to SCARA & Milford ARC, for providing comms for the Orange Biathlon headed by N1FIQ. Thanks to the area clubs that assisted at the Durham Fair again this yr—SHARC, Meriden ARC, MARS/CARES, lots of ltc generated & it proved informational to the public. Thanks to SCARA for their help in providing comms for C-Med & the NHFD for the New Haven Road Race. Thanks to ESCARA for their booth at the Woodstock Fair; great job. As a reminder, all the tidbits mentioned here in my column are taken from articles I read in the club newsletters sent to me. If you want things your group or club does posted, drop me your newsletter or a note; my address is on p 8 of *QST*. I'll be happy to read & report on your club's activities. Make a note that Jay, N4GAA, our SEC, has a new phone number, 203-937-9477. There's an answering machine on it when he's not home. Our pkt network is looking for someone in the Meriden-Wallingford area to join our network to fill a void & act as a backup. Requirements are simple. This system will be a 2- or 3-port system. Any interested parties, please contact me. 73, Caesar.

Net	*Sess*	*Stations*	*Tfc*	*NM*	*Liaison*
CPN	32	334	210	KY1F	1RN
CN	63	309	205	KA1JAN	1RN
NVTN	31	237	107	K1HEJ	CPN
RTN	30	303	67	WA1FCA	CN
WESCONN	36	419	325	KA1GWE	CPN

PBBS Reports

PBBS	Received	Fwd	Total
CSTN N1DCS-4	592	405	997

Tfc: W1WP 2830, K1EIC 1043, KY1T 833, KA1JAN 507, KA1GWE 502, NM1K 501, KA1VED 278, W1EFW 194, KA1VEC 155, N1GKJ 150, KY1F 147, W1NJM 75, N1API 68, NX1Q 66, W1YOL 44, KA1SHO 30, KA1TBM 25, WA1K 23, W1CUH 19, N1BOW 17, W1GPS 9, NY1V 4, W1QV 2.

EASTERN MASSACHUSETTS: SM/SEC, Barry Porter, KB1PA—STM: WA1TBY. ACC: N1GTB. BM: KA1NOI. SGL: K3HI. TC: KA1IU. PIO: K1HLZ. OO/AA: KA1SNA. EMass Hotline: 617-437-0111. I thank the people involved in Amateur Radio Public Awareness Day; it does make a difference in public perception. Fall is the time to get outside work done before winter sets in & a time to get involved with your local ham club. It's also a time to review Amateur Radio's participation in local emergency communication plans. Contact your local CD director & ask if you can help. Remember that the Section Staff & I are available to speak to your club if you're looking for speakers. If you live on the N Shore & are looking for fine active clubs, check out the N Shore Rptr Assn & the Cape Ann Radio Assn. Both have active community participation programs & numerous other projects. On the Cape, the Brewster & Falmouth Clubs are exemplary examples of ham radio clubs. In Boston, The Red Cross Club keeps getting bigger. The hams that compose these (& all other clubs) make me proud to be a ham. Ham radio has generated a lot of positive energy in E MA. For those involved, thank you; keep up the good work & good things will continue to happen to the hobby. Have you done anything to enhance ham radio's reputation this month? Please express your opinion on Amateur Radio issues to your Section or Div staff; we appreciate your input.

Net	*NM*	*Freq*	*Time(EDT)*	*Day*	*Sess*	*QTC*	*QNI*
EMRI	KA1GEP	3658	1900/2200	Dy	59	196	306
EMRPN	W1TC	3915	1730	Dy	29	102	174
EMRISS	N1CVE	3715	2100	Dy	28	42	28
EM2MN	N1DUB	53/23	2000	Dy	28	178	374
HHTN	N1FLO	94/64	2230	Dy	30	118	369
CITN	KB1AF	745/045	1930	Dy	30	69	536
NEEPN	WA1FNM	3945	0830	Sun	5	9	52

Tfc totals: WA1TBY 313, KB1AF 275, KA1GEP 184, NS1N 182, N1FLO 150, W1TC 148, N1GZQ 122, WA1FNM 110, K1ABO 89, W1CE 81 (Aug), W1CE 79, K1GGS 72, WF1M 52, KA1PEP 44, N1AJJ 42, KA1CEY 39, KA1EDY 34, K1UXB 29, KA1RSY 27, KC1TI 26, KA1VAX 26, K1BZD 25, NZ1D 23, K1SEC 22, KA1AMR 5, N1EGN 5, N1FWV 1.

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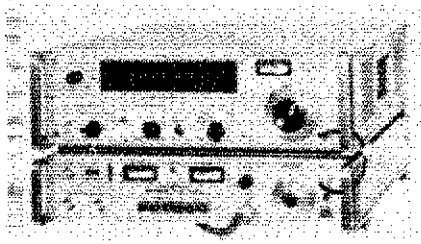
- 500 MHz TO 15 GHz FREQUENCY RANGE
- SENSITIVITY IS -20 dBm TO 10 GHz, -7 dBm TO 15 GHz
- AUTOMATIC GAIN CONTROL
- MEASURE FM DEVIATION, DEVIATION RATE AND AM MODULATION

This is a compact, all solid-state instrument that performs the functions of a transfer oscillator and a transfer oscillator synchronizer. Measures frequency drift over long periods, carrier frequency of pulsed signals and accurate CW frequency measurements.



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A 275 MHz dual trace oscilloscope for under $1,000.00. For a limited time you can buy this beautiful Hewlett Packard oscilloscope for what you would expect to pay for a 100 MHz scope! Take full advantage of this offer -
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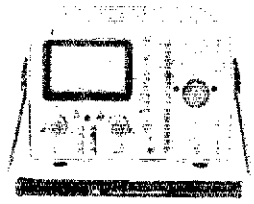

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- 10 mV TO 5 V/DIV VERTICAL SENSITIVITY
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- TIME BASE 10 nS TO 0.5 S/DIV
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INTEL UPP103 UNIVERSAL PROM PROGRAMMER $79.00

The Intel UPP103 is a peripheral device used in the programming of Intel's family of electronically programmable read-only memories (PROMs). It is designed to be used with intel's Intellec Microcomputer development systems, but may be used as a stand-alone processor with proper storage configuration to interface the UPP correctly.

INTEL ICE86A IN-CIRCUIT EMULATOR $249.00

The Intel ICE86A Emulator is a diagnostic tool that is used for testing and debugging the hardware and software of user-designed 8086 microprocessor based systems. This unit contains all the necessary equipment in a handy carrying case to do the job. Just plug it into your existing hardware and go to work!

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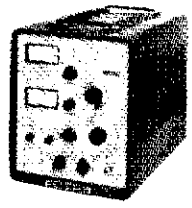

2590A shown with 5245L Counter and 5253B Plug-in (sold separately).

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- Measures Ratio and Multiple Ratio
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- All Solid State Design

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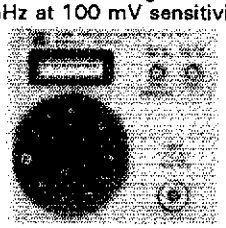
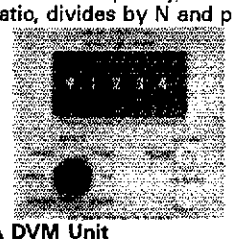
5251A Frequency Converter $ 50.00
Increases counter range to 100 MHz at 50 mV sensitivity.
5252A Prescaler $ 50.00
Increases counter range to 350 MHz at 50 mV sensitivity.
5253B Frequency Converter $ 70.00
Increases counter range to 512 MHz at 50 mV sensitivity.
5254A Frequency Converter $ 100.00
Increases counter range from 300 MHz to 3000 MHz at 50 mV sensitivity
5255A Frequency Converter $ 400.00
Increases counter range from 3 GHz to 12.4 GHz at 100 mV sensitivity.



5261A Video Amplifier $ 50.00
Increases basic counter sensitivity to 1 mV at basic frequency.
5262A Time Interval Unit $ 50.00
For measuring pulse length, spacing, and delays.
5264A Preset Unit $ 75.00
Measures N x frequency, N X period, N X ratio, ratio, divides by N and preset counts.



5265A DVM Unit $ 100.00
Converts counter to a digital DC voltmeter with 10, 100, and 1000 V ranges.
5267A Time Interval Unit $ 100.00
Measures 1 μsec to 10^8 sec with 0.1 μsec resolution at 0.3 V sensitivity.

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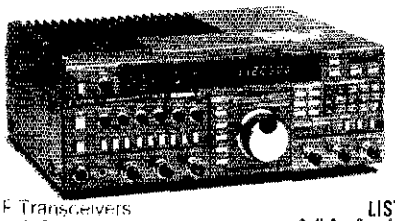
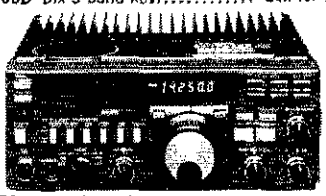
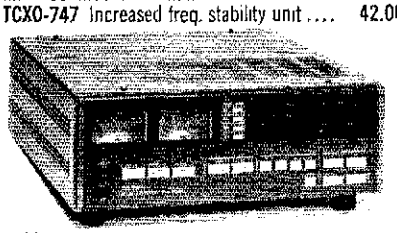


HF Transceivers	LIST
FT-767GX 160-10m xcvr	Call for Special
2M/767 2m module	239.00
6M/767 6m module	196.00
430/767 430-440 module	296.00
440/767 440-450 module	296.00
SP-767 Speaker w/audio filters	99.00
SP-767P Speaker/phone patch	136.00
FAS-1-4R Remote antenna selector	120.00
FIF-232C Interface	95.00
FTS-8 Encoder/decoder	55.00
FT-1000D Dlx 9-band xcvr	Call for Special



FT-757GX MkII 9-band xcvr w/mic	$1089.00
FP-757HD Heavy duty supply with fan	309.00
FP-700 Power supply	244.00
FC-757AT Automatic ant. tuner w/memory	429.00
FAS-1-4R Remote antenna selector	120.00
SP-767 Speaker w/audio filters	99.00
SP-767P Speaker/patch	136.00
FRB-757 External relay box	14.00
MMB-20 Mobile mount	26.00

FT-747GX HF transceiver	Call for Special
FP-757HD Heavy duty supply with fan	309.00
FP-700 Power supply	244.00
SP-767 Speaker w/audio filters	99.00
MD-1B8 Desk microphone	115.00
FM-747 FM unit	47.00
MMB-38 Mobile bracket	14.00
TCXO-747 Increased freq. stability unit	42.00



FL-7000 Solid-state HF linear amplifier $2279.00

Misc. Accessories	LIST
MD-1B8 Desk microphone	$ 115.00
MH-1B8 Mobile microphone	29.00
YS-60 1.8-60 MHz 2KW wattmeter	Call for Special
YS-500 140-520 MHz 200w wattmeter	99.00
YH-55 Lo-Z headphones	28.00
YH-77 Lightweight headphones	26.00

VHF/UHF Base	LIST
FT-736R 25W 2m/430	Call for Special
FEX-736-50 6-meter module	294.00
FEX-736-220 220MHz module	322.00
FEX-736-1.2 1.2GHz module	589.00
TV-736 1.2GHz ATV converter	163.00
Keyer-B Electronic keyer unit	19.00
FTS-8 Encoder/decoder	55.00
FVS-1 Voice systhesizer	37.00

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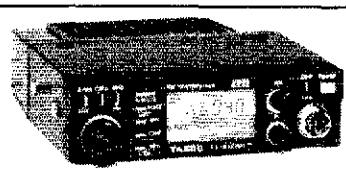

VHF/UHF Mobiles	LIST
FT-212RH/C8 45w 2m FM w/autodial mic	$405.00
FT-712RHT/C8 35w 440 FM w/autodial mic	497.00
FT-290R MKII 25w 2m FM/SSB xcvr	610.00
FT-690R MKII 10w 6m FM/SSB xcvr	752.00
FT-790R MKII 25w 430-450 FM/SSB xcvr	681.00
FBA-8 Holder for C-cell Nicads	32.00
NC-26B Wall Charger for FBA-8	10.00
CSC-19 Soft case	16.00
MH-10F8 Speaker/Microphone	30.00
MH-10E8 Hand Microphone	24.00
FTS-7 Encoder/decoder	40.00
FT-4700RHT/C8 50/40W 2m/440 FM/TTP	799.00
AD-2 50w 2m/440 duplexer	48.00

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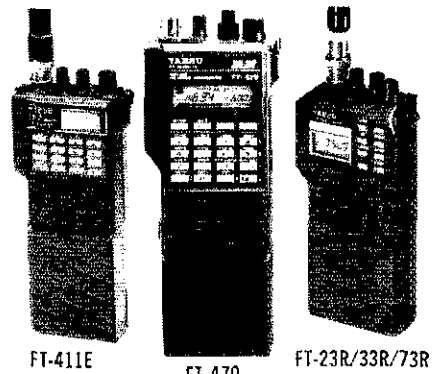
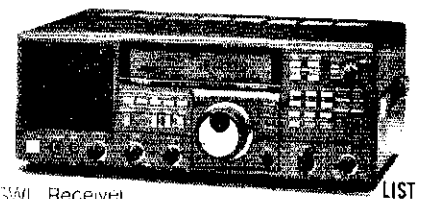


FT-411E FT-470 FT-23R/33R/73R

VHF/UHF Handhelds	LIST
FT-411E 2.5W 2m FM HT	Call for Special
FT-811 440MHz FM HT	410.00
FT-470 2m/440 FM HT	Call for Special
FT-23R-12 2m 5W HT	325.00
FT-23R-17 2m 2.5w HT	306.00
FT-33R 5w 220MHz HT	328.00
FT-73R 2w 440MHz HT	Call for Special
FT-73R/TTP 2w 440MHz HT w/TTP	Call for Closeout



SWL Receiver	LIST
FRG-8800 150 KHz-29 999 MHz Shortwave	$ 784.00
FRA-7700 Indoor active receive antenna	58.00
FRT-7700 Antenna tuner	77.00
FRV-8800 118-174 MHz VHF converter	107.00
FIF-232C Interface	95.00
DC-8800 DC kit	4.00
FM-W/8800 FM-wide kit	21.00

Antenna Rotors	List
G-500A Heavy duty elevation rotor	$249.00
G-5400B Az/El rotor combo	497.00

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MAINE: SM, Jeff Weinstein, K1JW—Hearty congratulations to Jack, N1DEE, for being selected "Falmouth Citizen of the Yr" for his outstanding work with Falmouth's cable-TV community- access channel. The new N1GRU rptr on 147.12 out of Brunswick, with numerous operating features, including a phone patch, has superb coverage throughout the coastal Casco Bay area. Congrats to K1JB for winning the CW & Phone Int'l DX competition in the ME Section last winter & to KN1M & N1AFC for consistently placing at or near the top in QRP competition. The K1JB/KD2EU VK9 DXpedition to Lord Howe I off the E coast of Australia was eminently successful last winter. Increasing military involvement by US forces in the Middle East has substantially elevated the need for MARS stations. The value of the MARS system in helping to keep up the morale of our troops in hostile, remote locations is incalculable. Please mail me your name & address & the MARS branch that interests you (USAF, Army, Navy) & I'll convey your interest to the appropriate person. ATC KA1IOD is the Section's ATV specialist; if you're interested in finding out more about ATV, contact Mike. The Mid-Coast Swap-or-Sell Net meets Sun at 2015 local time on the Camden 146.82 rptr. The Yarmouth RC educational committee will teach a Gen'l class course beginning in Jan. If you'd like more info about clubs in your area or if you'd like to start a new club, contact me for assistance. New appointments: EC (Statewide NWS Liaison) N1DEE; ORSs W1VEH & KA1VHI. Pkt will most likely achieve the status of handling more NTS ttc than any other mode in 1991. If you're not into pkt yet & would like more info about this exceptionally powerful mode, contact ATCs K1RQG or WA2YVL. The York Area ARES Net meets Mon at 1930 local time on the Saco 146.775 rptr. The Bath-Brunswick Area ARES Net meets Mon at 1930 on the Orr's Island 147.27 rptr. The ARRL NE Div Conv at Boxboro Oct 13-14 was successful & featured, among other things, great seminars, a full manufacturer/dealer display area & a large contingent of ME hams checking it all out! Season's greetings to all!

NEW HAMPSHIRE: SM, Bill Burden, WB1BRE—SEC: N3CLZ. STM: KB4N. This seemed like public service month in NH with all the activity! In each case, we had the opportunity to show the public what Amateur Radio can do. Bill, W1PNR, reports that the White Mountain RC supported the 18th running of the "Up Mt Washington Bicycle Race," supporting the American Cancer Soc. Comms were provided by N1CMD, N1DCT, N1DQA, N1DQM, WE1E, VE2GUQ, KA1IXA, W1LQQ, K1PDY, W1PNR, KA1PQE, KA1PQM, KA1PTW & NV1Y. This is the 2nd Mt Washington event involving Amateur Radio this yr—a busy mtn! The Warbirds Airshow in Manchester is always a big effort for hams & NF1N reports that more than 60 hams provided comms & safety support for the event—they also got to see neat aircraft! This one has become a real test of our ability to work in large crowds with noisy aircraft, while maintaining a professional comms system. There were other such events during this period—Derryfest '90 & the Concord Triathalon— more local support & exposure for our hobby! Welcome to new EC Donald, K2ANV, in Bradford. The new Amoskeag RC has elected pres Al, N1FIK; vp Barry, N1DNU; secy Diane, N1GZW; treas Dick, N1FIL. They meet at St Mary's Bank & more info is available from Al or Barry. NARC held its latest VE sess with 10 of 16 applicants upgrading. The majority were testing for Nov & Tech licenses. GBRA had a tour of the Channel 11 TV station, thanks to Bob, W1HJT. W1JY continues to publish his Technical Notes in the CNHARC newsletter— good reading! NH had 100% rep on 1RN/Cycle 3 & on FRN! Thanks to all who support this effort. Nets: VTNH 275, GSPN 105, GSFM 70. Tfc: W1PEX 1613, W1FYR 565, K1TQY 520, N1CPX 175, KB4N 133, W1ALE 87, KK1E 54, KA1ROH 42, N1ALM 25, WB1EAE 21, WB1GXM 17, WA1YZN 11, N1DCT N1CUG K1IOJ 10, NE1J KA1QWT 8, KI1M KB1XU 7, NU1A 6, KA1HPO 5, KA1KFX K1PDY 4, WA1RLO N1BAC 3 BPL: W1PEX, W1FYR, K1TQY. PSHR: W1PEX, N1CPX, W1ALE.

RHODE ISLAND: SM, William M. Foss, KA1JXH—The RI Technical Talk roundtable group meets Thu at 7 PM on 223.88 for helping amateurs. Nov to Amateur Extra Class, with technical subjects, with Marc, KA1EGY. NCRC had a ham radio demo at the power boat show Sep 22-23; they're awarding a Worked All NCRC Members certificate. The trivia net is Wed at 7:30 PM on 145.17 & 224.56 with Dan, KA1BNO & Lori, KA1OCF. I'd like to wish everyone a Merry Christmas & a Happy New Year.

VERMONT: SM, Mitch Stern, WB2JSJ (@ N1GMU)—STM: KT1Q. SEC: NB1K (@ W1FYR). SGL: KA1TIF. OOC: WB1BWV. PIC: N1DMP (@ N1GMU). Upgrades: N1HHX N1IAG KA1VOD to Gen, N1HRO to Adv. Thanks to VEs NK1A NJ1Z N1BRT N1FHI K1HKI N1EQO WB1AJG. Exams this month: Dec 15 in Burlington, contact WB2JSJ for details. The radio class in Essex Jct has 30 students nearing graduation, keeping teachers N1DKS, KC1WH & me busy. CVARC's 146.625 rptr in Williamstown sports a new antenna & improved coverage. Welcome to Matt, DL2BAA, who is studying at VTC for a yr. Best wishes to Howard, NW1N & family on their move to IN. Congrats to KC1TE on his recent marriage to Michelle. We regret to report the passing of Jack MacRae, WA2MAP, of Clarendon. Plans are underway for VT amateurs to help celebrate VT's Bicentennial; more details to follow in upcoming reports. Don't forget the 10-Mtr contest Dec 8-9; get those Novs & Techs on the air! Ronni & I would like to take this opportunity to wish everyone all the best for a safe & happy holiday season! Nets: VTNH 30/218/275, Carrier 25/584/45, GMN 25/486/29, VPN 5/74/14, CVFM 5/66/4, TSFMN-Keene 6/88/12, TSFMN-Ascutney 4/73/3. Tfc: WA2SPL 1852, WA1JVV 519, KT1Q 505, N1GMU 422, N1DHT 193, NB1A 66.

WESTERN MASSACHUSETTS: SM, Jean Hurtle, KA1IFC—OOC/TC: KA1SNA. PIO: PIO/ACC: K1BE. STM: KA1EXJ 1990 is coming to an end & many positive things have taken place this yr; I thank the folks who have given their time & effort to make them happen. I'm looking toward 1991, knowing that our section will continue in the same direction. Another Yankee Rowe drill was held Sep 25 & thanks to all the amateurs who participated & made it the usual success. We're seeing changes & more active RACES participation in Area 3. We should also see the same happening in Area 4 in the not-to-distant future. The fall parades, auctions, races, etc, have come & gone, but all were enjoyed & a success. With the holiday season comes Christmas parties for many clubs & a great way to end the yr. It also brings holiday msgs from friends & family via the NTS; if you haven't sent holiday wishes this way, give it a try. There are lots of folks willing to help

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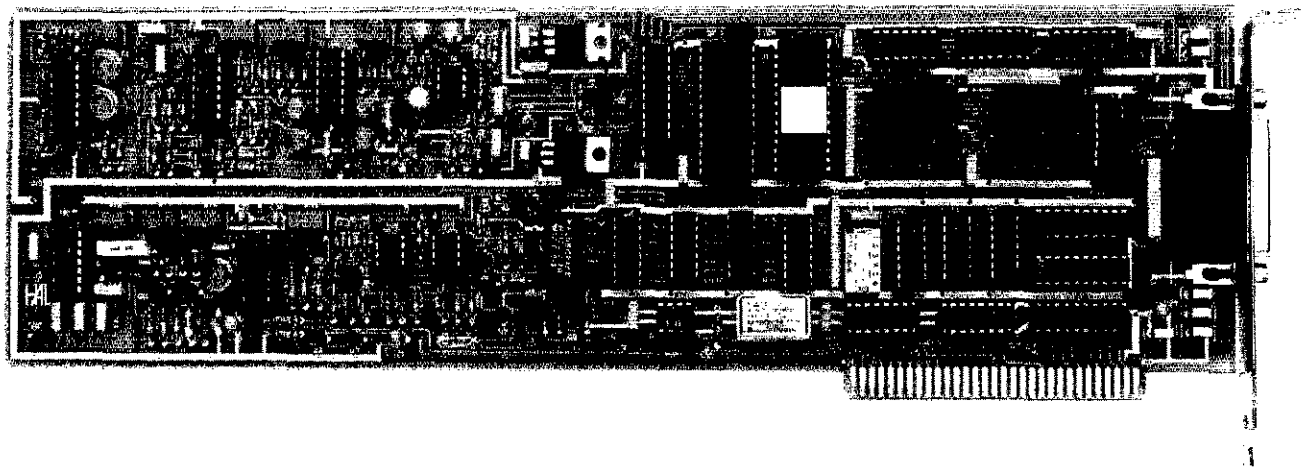


The HAL PCI-3000/PC-AMTOR system is designed to put your PC on the HF bands with outstanding performance at an affordable price. Amtor allows you to get through when other methods fail. If you've ever been DX-ing with someone on Amtor when 20 meters dies out in the evening, you know what we mean. Things may slow down, but you can usually keep up the QSO!

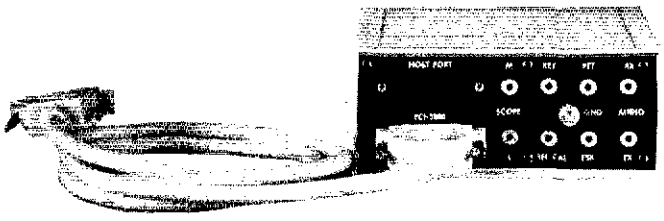
The PCI-3000 doesn't limit you to Amtor. You also get high-performance Baudot and ASCII RTTY, CW, and Search Mode. Search Mode lets you simply tune in the signal—we take it from there. The PCI-3000 automatically finds the correct code, speed, and polarity. No more guessing!

If you want to communicate on HF, do it right with the PCI-3000! Call HAL Communications—your AMTOR source—and put your PC on the air today!

SPT-2 Spectra-Tune:

For ease of tuning your PCI-3000, add the SPT-2 Spectra-Tune. The Spectra-Tune lets you tune in CW and RTTY signals quickly and accurately with a calibrated linear 30-segment bar graph. The bar graph represents a 600 Hz range of the audio spectrum, centered at 2210 Hz for RTTY and AMTOR, and 800 Hz for CW. Calibrated marks indicate the proper frequency for AMTOR, RTTY, and CW tuning.

A cable is included with the SPT-2 for providing power and control from the PCI-3000. The rear panel of the SPT-2 provides convenient "RCA" phono connectors for all radio connections. This avoids having to make radio connections directly to the PCI-3000. Enhance your PCI-3000 system with the SPT-2 Spectra-Tune Today!



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send them along for you. What have you done in 1990 to promote Amateur Radio? The youth of today will be the amateurs of tomorrow, but not without someone encouraging them & instilling their interest in the hobby. I hope everyone has a safe, healthy & happy holiday season! Tfc: KA1IFC 533, KA1EXJ 216, WA1OUZ 187, KA1QFV 62, W1KK 56, W1SJV 42, KA2TDL 32, NM1U 30, NX1K 27, W1ZPB 9.

NORTHWESTERN DIVISION

ALASKA: SM, Harley Steward, KL7IZZ—ASM: KL7HO. OOCs: KL7IKX & AL7BB. STM: AL7LX. TC: AL7CC. SEC: AL7KE. ORS: KL7LA. OO: KL7EB. Rescue at sea: In mid-Sep 1990, Cleone Sylvester, WL7ANR & husband Roger, 10-yr S Pacific sailing veterans, were en route from the Philippines to Juneau & lost their engine 3 times in the Aleutians—Adak, Dutch Harbor, finally about 150 mi out of Sand Point. 3rd time severe storms came up. With the Coast Guard not hearing their calls, they needed help! To the rescue came Gene Mockerman, KL7GID & Hal Stevens, KL7HJD, on 24-hour constant standby. Relaying from Walla Walla, Washington, was Dwight, K7CKK. Landlines were made to the Coast Guard & Sand Point harbormaster. Relays were handled by George, AL7BX, in Dutch Harbor. An alerted Fish & Wildlife patrol boat left its safe harbor to tow. There were 100-knot winds & 30-ft seas before arrival at Sand Point. All were safe, thanks to at least 47 hams in contact during last 2 wks of this night (& day) mare.

IDAHO: SM, Don Clower, KA7T—ASM: K7REX. SEC: N7MAL. STM: W7GHT. OOC: WB7CYO. The ID QSO Party generated a lot of interest. I made 350 QSOs & almost as many QSL cards. I hope there were a lot of ID hams on the air. Thanks to the Eagle Rock ARC for putting on the contest. I'll try to have the results next month. 73, Don.

Net	*Sess*	*ONI*	*QTC*	*NM*
Farm	30	1809	59	K7CDA
NWTN	30	790	10	N7AH
Idaho CD	21	677	6	K7UBC
IMN	30	274	52	WS7U

Tfc: KA7WZM 155, N7MAL 84, W7GHT 42, WS7U 34.

MONTANA: SM, Pete Peters, KF7R—The NW Div Vice Dir, NM7N, visited Butte, Billings, Kalispell, Missoula & Bozeman. Mary Lou will try to visit the N & E part of MT on her next visit. Novices: John Kindelman, Laura Bowker; Techs: N7PBI, KB7HFZ, KB7LNM; Gen: N7NCW; Adv: N7OQW, N7PFR, N7DQU. SK: Jerry Lindner, W7YHD, of Malta, MT. Al Eckes, W7DXQ, of Glendive, has been an ARRL Member for 66 yrs & a ham since 1913; congrats, Al. A new pkt NetROM (FSH) & PBBS (FISH) on 145.010 MHz is operating on Signal Hill near Ft Peck. WIMU, KB7LIM received a prize for being the last licensed ham, K0PP won the preregistration prize. Condolence to N7DLK & WY7M who recently lost their mothers.

Net	*ONI*	*QTC*	*NM*
MTN	1302	71	N7AIK
IMN	274	52	WS7U
MSN	60	0	KF7R

Tfc: WB7WVD 45. PSHR: WB7WVD 72.

OREGON: SM, Randy Stimson, KZ7T—ASM: W7FBP. ASM: AL7IN. STM: W7VSE. SEC: KV7F. PIO: KC7YN. SGL: KA7KSK. ACC: WF7Q. OO: WN7W. STC: N7ENI. The summer's over & the major public service events are done for the yr. The last 2 major events I know of are Cycle Oregon & the Portland Marathon. Cycle Oregon is a bicycle tour from Pendleton to Newport & lasts 7 days & is one of the most grueling events we work; 7 hams worked 7 days with the group & 30 hams worked it as the cyclists came through the area. The 7 hams worked 10-12 hrs a day & then had mtgs. The hams worked in conjunction with 4 Buck Ambulance people & 4 State Patrolmen. There were at least 6 emergencies where hams were instrumental in getting Buck Ambulance there & numerous calls for the State Patrol to help with tfc. The Portland Marathon, with 10,000 runners & walkers, went well because of the mild weather; there were 40 hams that helped. This was the 2nd yr for the Tillamook Hamfair & it was twice as big as last yr. They had commercial exhibits for the 1st time & more flea mkt tables this yr. Please mark the last wknd of Sep 1991 for the next Tillamook Hamfair. We have a new NM for the Beaver Net, Scott Gray, K7WPC; good luck, Scott. I know you'll do a good job. Tfc (P) = packet: W7VSE 396, N7IQK 370P, N7BGW 226, W7DCR 210P, AL7IN 208P, W0RLI 108P, AA7U 82, N7OVK 81, KA7DFN 80P, N7KMJ 80P WB7VMS 72P, W7LNE 55, W7ODG 51, KA7CZG 34P, K7NLM 30, KB7HOA 27, KB7FOK 26, N7DXT 22P, N7ENT 16, KA7DEF 12, KA7AID 11, KA7WFW 11, KA7LOC 6, AL7W 4.

EASTERN WASHINGTON: SM, Tom Plaisance, KC7PH—STM: W7GB. SEC: WA7CBX. OOC: W7LKR. ASM: KC7MM. SGL: KD7AC. ASM & WEN NM: KE7WG. BM: W7EQU. PIC: N7DWD. ACC: WV7Y. Happy holidays to all. Did you know that the EWA Section has most of the hamfests & NMs in the state of WA? New appointments include W7YEM as OBS & Dale Avery, KC7MM, as ASM. Thanks to Pat Dockrey, NQ7M, for his service as ACC & ASM. Thanks also to OBS Dan Landron, K8IIJ, who moved from our section. KC7MM reports testing held at Gonzaga Prep in Spokane every 3 mos; contact W7IIR if interested. 73, KC7PH. Tfc: W7LBK 159, K7GXZ 158. W7GB 85, WA7YEN 83.

WESTERN WASHINGTON: SM, Mary Lewis, W7QGP—STM: KD7ME @ W0LVJ. SEC: NM7N @ VE7VBB BC, Can. SGL: KD7AC. ACC: W7QGP. TC: W7JWJ. BM: N7CAK @ W0LVJ. OCC: N7DVR. The Victoria BC- Clallam Co ARC (Port Angeles-Sequim) picnic was held Aug 26. This P. A. Picnic has been held annually for more than 50 yrs, alternating between Victoria & Port Angeles, sponsored by the Clallam Co ARC. You can help a youngster & lower your taxes by making a tax-deductible contribution to the William H. Bennett, W7PHO, Memorial Scholarship Fund, c/o ARRL. New MBARC rptr on Racehorse Mtn is on the air & operational on 145.23; tone access uses 103.5 Hz. Coverage is from Everett N to lower BC, W to Port Angeles & E to the Mt Baker ski area. They'll share the freq with W7HIL in Bellevue. Amateur Radio may be an Olympic Games event, if an ambitious proposal by a small group of hams becomes a reality. Spurred on by the success of the World RadioSport Championship in Seattle, a plan to form a World RadioSport Federation has been announced by an international group of amateurs. See *ARRL Letter* Sep 21, 1990, and Nov Happenings, *QST*, p 56, for more info. Total hrs for public service 284; Skagit Cty 24; Thurston Cty 54; Island Cty 36; Jefferson Cty 26; Cowlitz-Wahkiakum 109; Clark 35. Cancelled EC Frank NM7R, Nahcotta and new

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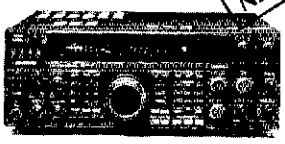

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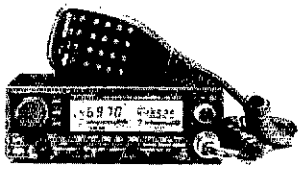

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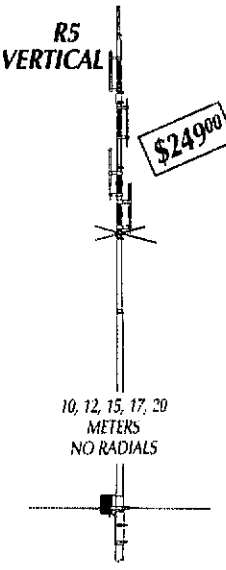

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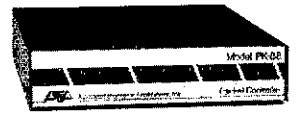

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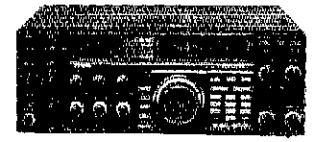

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ECs Thurston Cty, Frank, AA7DO, and Pacific Cty, Brandt, KA6INC. Activity Reports: W7AZU 66, K7CLL 4, KA7CRN 19, W7DK 125, W7EJZ 32, N6EQZ 32, W7IGC 366, W7LG 119, KD7ME 290, W7NWP 22, W1PRT 55, W7SUX 131, K7TTY 24, WB7WOW 123; late Aug N6EQZ 68. PSHR WB7WOW 95, W7EJZ 91.

PACIFIC DIVISION

EAST BAY: SM, Bob Vallio, W6RGG—ASMs: W6ZF, WB3FCV. SEC: W6LKE. STM: K6APW. OOC: K6TI. TC: N6AMG. I had the pleasure of attending the MDARC mtg & presenting them with their Special Service Club certificate; they're active in all the required categories & then some! The program that night was by Myron Reynolds, a retired engineer, who presented a super "nonham" perspective of radio from its earliest days to the present. I attended the LARK mtg this month, presenting a slide show on my 1989 trip to XF4L. I talked so long, there were few questions concerning League matters! SBARA had a pool party hosted by KJ6EP & KC6KJB. Club business was conducted in & out of the water! EBARC's mtg featured a slide show by W7SW on his activities in Antarctica & operating from KC4USV. The Club welcomed new members KC6JXE & KC6KAS. CCCC member upgrades are KB6EJL, N6TIQ & N6VFZ to Gen & N6WFB to Adv as KK6OK. They welcomed new members KC6KIO, N6UHH, K6XQ, W6JAS, KB6DA, KK6LW & KC6JET. HRC welcomed new members Robert Vasser, Dorothy & Howard Granger, Thomas Page, Walter Beam & Dick Gorringe. NBARA members W6RJY, WB6YYY & WA6IEC participated in the Kaiser Hospital Exercise. The VVRC *Newsletter* will soon be edited by WA6CAX. Congrats to N6SPY/T for making PSHR. Sep tfc: WB6DOB 187, W6VOM 116, WB6UZX 32.

NEVADA: SM, Joe Lambert, W8IXD—ASM: Curly Silva, K7HRW. TC: NW7O. STM: KK4M. SEC: K7HRW. I trust everyone had a good time at the Pacificon Convention in San Jose & we're getting ready for the Christmas Party season. LVRAC plans a party at Palace Station Dec 8, open to all. Contact KF7GB for info. We're setting up a mtg with our Pacific Div Dir, Charles McConnell, W6DPD, the morning of Dec 16; contact W8IXD for info. Las Vegas hams supported the Boy Scouts Scout-o-Rama & JOTA program with stations organized by W7BES & AA7AU. I regret to report that Lou, WB6BPU, has become a Silent Key; Lou was always there when needed & pitched in whenever asked. We'll certainly miss him. LVRA has done extensive tower work & other improvements on Low Potosi in preparation for the new season. The CONDOR connection now extends to W AZ, with a rptr on Smith Peak. That's all for now—hope everyone enjoys the holiday season. See you next yr.

PACIFIC: SM, Ron Phillips, AH6HN—Bob, WH2AEN, reports a tropical depression was around Guam most of Aug & part of Sep; rain most of time, with 15-18" in Aug alone. Guam CD has a new emergency van due in Dec that will help improve emergency comms. Maui, Kauai & the Big Island are busy improving pkt capabilities. The Rose system is being set up to help speed up the acquisition & delivery of tfc from NTS. Welcome aboard, Nelson, WH6CIP; Dean, NH6XK; Teodora, WH2AMQ; Julia, WHØAAN; Stepan, WH6CIM; Carla, WH6CIN; Juan, KH2EO; Akiko, WHØAAM; Alex, WH6CIO; Rogerto, KH2EN; Kerry, WH2AMR; Steve, NH6XL; Jim, WH2AMO; & Masahiro, WH2AMP. Good luck to all. Tfc: KH6S 47, WV6K 6.

SACRAMENTO VALLEY: SM, Jettie Hill, W6RFF—STM: WA6WJZ. TC: W6IEW. ACC: KB6COH. SGL: N6IG. SEC: KE6EP. PIC: WA6OWH. BM: WB5FIX. OOC: WY6O. These people put in many hrs on Section business. A list of all appointees for an SASE. Many large scores in the section for the CA QSO Party—congrats. Several clubs had visitors & speakers from the CDF & VIP programs after the fire season. If you'd like to help in the VIP program, contact CA Dept of Forest. WB6RVR resigned as OO because of work-load; thanks for your help, Norm. I've visited & given talks to several clubs & I'm available to visit your club; schedule me into your 1991 programs. The Sacramento Valley Section Net meets at 8 PM on the 1st Sun of the month on 146.085+ WD6AXM/R; the net is open to all ARRL members. W6RFF is NCS. Dec is club Christmas Party time! Wish all members a Merry Christmas & Happy New Year. Send activity reports! Tfc: K9JM 129, WA6WJZ 83, WA6ZUD 80, N6LAM 42, W6CFQ 36, W6RFF 20, WB6SRQ 6.

SAN FRANCISCO: SM, Dick Wilson, K6LRN. Ex-K6OPI is now N6ZFO, after a 25-yr hiatus; welcome back, Bill. AA6RM is putting together an ARES handbook & reminds us ARES net is Wed eves at 2000 local on W6PW/R 145.15(-). KB7IP is assisting Dave 15 San Fran hams worked comms for the Bridge-to-Bridge Race. AA6RM, WT6D, N6XZU from SF with KI6EH & WF6P from Santa Cruz did boat race; contact N6XZU or AA4RM for SF RACES/ARES info. N6UZJ leads Marin RACES-ATV team. N6ECH & XYL were hosts at Sonoma Co Campground at Gualala last summer. Anchor Bay ARC meets 1st Tue at Sundstrom Mall in Gualala; contact pres NX6G for details. Sonoma Club reports a profitable Flea Mart & coverage of Vinemant Triathlon, Stride for Life & Bodega Bay to Breakers. Join & support your local club! Keep abreast of local news, gossip & fast- breaking info. Send station activity reports to me, address on p 8, by the 3rd. Tfc: N6FWG 104.

SAN JOAQUIN VALLEY: SM, Byron Smith, WA6YLB—Having returned from Pacificon, I wished more from the SJV section could attend. It was a well-done convention & much work was expended by the hams in the Santa Clara Valley section, especially by the SCCARA Club. If your club would like me to attend & give a presentation, please contact me. Speaking of winning, N6SIW won the ICOM IC-3SAT from the S Sierra ARS drawing. KC6ESL won an ICOM IC-725 HF rig at the SW Div convention in Aug. KB6EMO upgraded to Adv. Tfc: WD6FRS 23, KC6ESL 11.

ROANOKE DIVISION

NORTH CAROLINA: SM, Reed Whitten, AB4W—ASM: AB4S. SEC: N4MYB. STM: KI4YV. ACC: WC4T. TC: KM4OX. SGL: KE4ML. PIO: WA9NEW. The NTS Christmas tfc rush is coming soon. This is an important exercise of the NTS & there's a need for outlets in all cities & towns throughout NC. Please check into an HF or VHF NTS net, help with the tfc load & get some good experience handling tfc. Many groups set up "Free Radiogram" tables or booths with signs & an equipment display in shopping malls during the holiday season. This is one of the most effective ways for public contact with Amateur Radio. Help with an existing mall operation or set one up yourself. 3 additional planeloads of hostages from Iraq & Kuwait have been "repatriated" at the Raleigh-Durham Int'l Airport since last month. The State Emergency Response Team (SERT) had our "Amateur Radio Arrival Message" forms (which were provided to the hostages & described in last month's Section News), translated into Arabic. ARES members from Durham & Wake cos were present for all 4 planeloads & succeeded in delivering difficult msgs, eg, to unknown unlisted telephone numbers in the US & even 1 msg to Iraq (via 212 area code!). Hurricane Lily threatened the NC coast & caused SERT & ARES activation. Lily veered N, but flooding in the W part of the state (from other storms) resulted in ARES activity in quite a few cos. Congratulations to the Gaston Co ARS for having a clean section of I-85 publicizing their club (& Amateur Radio). Net reports, Jul-Sep:

Net	*QNI*	*QTC*	*TFC*	*QND*	*Ses*	*NM*
NCEN	1340	394	317	1541	91	WB4WII
NCMN	1304	348	265	1143	92	WD4MRD
CN	1786	623	586	3365	183	K4IWW
CSN	780	122	110	2119	92	AA4MP
CNCTN	3266	171	145	1384	92	WA4MNR
PCTN	1538	373	338	1405	92	N4JTG
RARS	1024	47	47	1666	92	K4ABJ
M2MEN	1197	90	78	719	83	KF4MZ
CFEN	1429	79	79	1753	92	W4EHF
PETN	1062	89	82	8497	81	WB4HRR
THEN	945	120	96	841	91	N4UMI
ACARES	162	11	11	212	14	K4ULA
PCECN	230	3	2	342	12	KA4KGZ
Totals	18,808	2,470	2,158	17,339	1,107	

Sep tfc: K4IWW 340, K4NLK 170 (117/Aug), W4EAT 129, N9CGD 126, KC4MWT 55, N4LST 47, WD4MRD 35, N4WFU 33, WD4LOO 33, W4EHF 30, WA4MNR 29, N4YRD 27, N4UE 23, N4SMS 18, AB4W 17, WA2EDN 16, N4SVZ 16, KA4KGZ 12, N4SHE 12, N4VHU 11 22/Aug), N4ZUD 11, N4XUN 9, W8KLF 8, N6LHE 6, KN4BR 6, KN4HF 5, N4SXG 2 [AR].

SOUTH CAROLINA: SM, Ned Moeller, N4FVU—CARC pres N4QWL & AB4HI, a Chapin H S teacher, made it possible for the Lexington Co School Dist 5 elementary students to converse with the Arctic Explorer *Discovery* ship's crew at sea. The Explorer is recovering gold from the *SS Central America* that sank in 1853 off Charleston, SC. Crew member Tommy Thompson is using his robot *Ninmo* to recover the half-billion dollars worth of gold. 2 Cola TV stations gave us coverage. A gift of 2 antenna poles by Aiken Elec Corp are in place at the Aiken EOC. NBC interviewed K4FEF, WD4AJT, KB4HVQ & WA4YUY who provided H&W msg service for the Iraq refugee's arrival in Charleston. On Sep 22, the Spartanburg ARC supported their EOC's chemical-leak exercise. Oct 6, SEC K8AFP called an unannounced ARES/RACES statewide SET exercise. We had excellent response at 0700 hrs on 3993.5 kHz. Aiken EC W5TUN reports a successful joint SET with Richmond Co, GA, Oct 13. Our SC SM election results will be known when you read this. 73 & happy holiday wishes to all! Sep tfc: W4ANK 209, KA4LRM 44, N4FVU 39, W4DRF 38.

VIRGINIA: SM, Ted Dingler, N4KSO—SEC: WB4ZTR. STM: N4GHI. ACC: KA4YUY. OOC: W8IRT. TC: W4UMC. BM: W3ATQ. PIC: WB4QOJ. Thanks to the following for renewing as DECs for their areas: WB4AXY & WB4UHC. Thanks to N4KDE, KJ4UF, W4PVA, N4EFJ, KB4BOZ, KA4NWK WA4PGM, KB4DCE, WA4TCJ, KC4LY & WA1VRL for renewing as ECs in their cos. ARES is functioning well under the leadership of WB4ZTR; if you'd like to help in your area, contact your EC or WB4ZTR. Clubs receive great training & provide a great service by assisting in bike races, walkathons, foot races, etc. These activities give us a chance to showcase our skills to the general public. Mtn Empire ARS provided comms for the Amer Lung Assn Bike Ride in SW VA, 10- & 35-mi rides were covered for 200 riders. BARC & MEARS provided comms for a 100-mi bike race in SW VA/E TN. The comms support helped provide a safe ride for the riders. NCSs for the clubs were WD4EKA & WA4JME. A real drill experience was provided by Bristol when they shut off the power & emerg power had to be used. This gave the clubs a real-life problem. MEARS set up a demo for the Wash Co EMS Council & had a special-event station at the VA Highlands Festival. Amateurs from Winchester, Charlottesville & Fairfax provided comms for the MS Fruit Loop Bike Tour. The tour ranged from the N Shen Valley to Strasburg, VA. Some amateurs doubled as EMTs. This event was an example of what can be done when resources are pooled; the VA section showed what they can do. Keep up the good work, VA. The EC of Prince William City, W4PVA, reports amateurs in that area participated in a HAZMAT drill recently. He reports that Amateur Radio delivered drill info faster than the country comms by nearly a half-hour; as soon as that info gets out, our services will be in great demand. New location for Frostfest will be at the Showplace on the Mechanicsville Tpke; new yr, new location, but I'm sure the same good fest & time as before—Jan 20, 1991, CU there; 73. Tfc: N5DST 536, WB8TAX 816, N4GHI 556, K4DOR 524, N4HOG 472, WD4MIZ 392, K4MTX 290, W4JLS 266, N4EXQ 236, AA4AT 226, N4TRA 207, KB2GII 183, W3ATO 135, WB4FLT 120, WD4MIS 114, WA4DTE 97, N6ANQ 94, KJ4LQ 92, K8EI 91, NW3K 88, KB4QPR 83, WA4TVS 80, K4JM 68, WB4ZTR 60, KC4OJM 59, KI8BR 58, WB4EDB 53, N4NIG 51, N4MGQ 48, K4BGZ 46, KI4RO 36, KJ4EK 34, W4TZC 34, N4TE 33, K4MLD 33, KB4NGO 32, N6GVG 30, WB4ZNB 29, WB4KIT 28, N4JSP 27, KB4CAU 26, N4FZA 24, KB2CEV 21, KC4NH 21, W7UQQ 20, K4YVX 19, WB4UHC 16, W4LQF 14, K4GR 14, N4KSO 12, KN4DV 11, K4MLC 11, N4FNT 10, W8HNT 10, W4HDW 8, KC4JGC 6, N4JEO 5, NM4R 5, KJ4UF 2, W4HU 2, AB4FA 1, KB4WT 1, W4YE 1.

WEST VIRGINIA: SM, Karl B. Thompson, K8KT—SEC: K8QEW. STM: N8FXH. SGL: K8BS. TC: K8LG. ACC: WA8FLP. Rptr Coord WD8GDY. WD8LDY became a resident of VA Sep 12. Our loss is their gain; we'll need lots of help from Central WV hams to pick up the tfc load. Good luck, Dave. NCSs are needed for WVRN at 6:30 each eve. Contact Mike, K8LG, if you can help. Please encourage your local clubs to support the WV State Amateur Radio Council. For info, contact Chuck, K8UQY.

Net	*Freq*	*Time*	*QNI*	*QTC*	*Sess*	*NM*
WVFN	3865	6:00	900	136	30	WD8V
WVN-E	3567	7:00	153	55	30	KZ8Q
WVN-L	3567	10:00	140	38	30	KZ8Q
WVMD	7235	11:45	642	56	30	WD8V
WVRN	3640	6:30	150	24	30	K8LG

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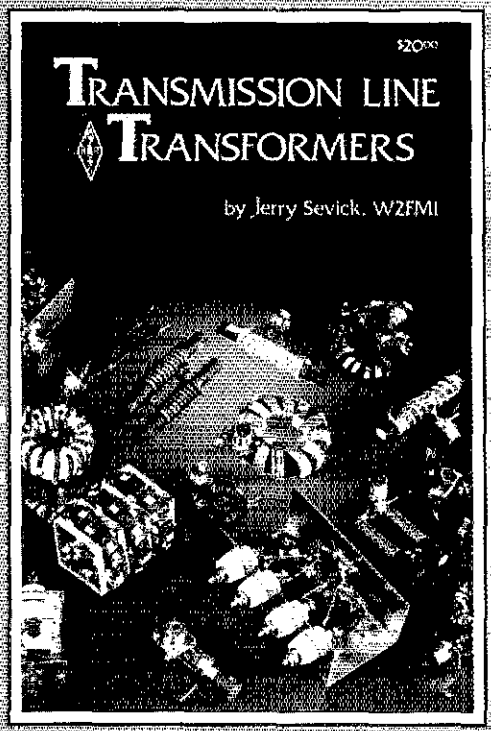
Here are just a few of the topics covered in the fifteen chapters in the new edition: Analysis; The Basic Building Block; The Guanella Analysis; The Ruthroff Analysis; Low and High Frequency Characterizations; Transformer Parameters for Low-and High-Impedance Applications; 3 chapters on Unbalanced-to-Unbalanced Transformer Designs; Baluns; Multimatch Transformers; Material and Power Ratings; Simple Test Equipment; Hints and Kinks; selecting ferrites, winding transformers, constructing low-impedance coaxial cable; Summary Statements; References.



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Tfc: KA8WNO 561, WT8L 279, WD8V 192, K8QEW 57, N8FXH 31, K8KT 29, KA8OGF 25.

ROCKY MOUNTAIN DIVISION

COLORADO: SM, Bill Sheffield, KQ0J—ASM: KA0MQA. SEC: WB4ETT. STM: WTØG. ACC: WBØDUV. PIC: WBØFQB. OOC: KA0CDN/WØIJR. SGL: WDØHNQ/WDØHNP. TC: WØLJF. BM: KAØVKM. We've had a change in the SEC. Bob Ragain, WB4ETT, E Slope DEC for yrs, has moved into the position of SEC. Please don't hesitate to let Bob know if he can be of assistance. The statewide SET was Oct 20 with most districts involved. This SET was planned by WB4ETT to involve statewide participation & was successful; a reminder to get your SET reports in to WB4ETT & ARRL HQ by Jan 1. Ski Country ARC in Glenwood held Nov/Tech classes in Oct & Nov, there will be many upgrades during the VE test scheduled on the W Slope Dec 1 in Grand Junction; contact WCARC, Box 3422, Grand Junction, CO 81502. During hunting season, WØKEA from Vail, KØWOP & I helped WOØG with a VE sess in Steamboat Springs; congrats to the new upgrades. Enjoyed mtg with noted DXer Jim Smith, VK9NS, who attended the Mile Hi DX mtgs in Denver & Boulder. From the section, we'd like to wish everyone a happy holiday season. 73, KQ0J. Nets: Col: QNI 992, QTC 86-105, QNF 776, 30 Sess. CWN: QNI 66, QTC 82, QNF 149, 30 Sess. CWXN: QNI 2457, QTC 1990, QNF 2700, 30 Sess. CAHN QNI 55, QTC 2, 5 Sess. HNN: QNI 2012, QTC 151-623, QNF 1063, 30 Sess. NCTN: QNI 204, QTC 61, QNF 207, 25 Sess. SCTN: QNI 220, QTC 19, 25 Sess. Tfc: NØBQP 1690, KCØVL 1103, WBØYNS 836, WØACH 552, WØLVI 419, KØYFK 396, NØHFZ 386, WTØG 355, WBØVET 264, WØLJF 236, NØGVC 222, WØLKD 102, NØCYR 72.

NEW MEXICO: SM, Joe T. Knight, W5PDY—ASM: K5BIS. SEC: K6YEJ. STM: ND5T. NMs: WA5UNO, K6LL & W5QNR. TC: W8GY. ACC: KA5BEM. SW Net meets dy, 3583 @ 0230 UTC, handled 84 msgs with 87 checkins. NM Roadrunner Net meets dy, 3939 @ 0100 UTC, handled 73 msgs with 1170 checkins. NM Breakfast Club meets daily, 3939 @ 6:30 AM, handled 149 msgs with 961 checkins. Yucca 2-mtr Net, 78/18, handled 16 msgs with 434 checkins. Caravan Club 2-mtr Net, 66/06 handled 12 msgs with 154 checkins. SCAT Net, 66/06 handled 11 msgs with 489 checkins. Info Net 12/72, with 84 checkins. ZIA Sunday Noon Pkt Net with 55 checkins. Albuquerque Hamfest was a success with 600 attendance & thanks to KC5FT & her crew. The N NM Hamfest was nice, tnx to AG5S & his helpers. Socorro Hamfest was Nov 17 at NM Tech; nice to see you there! Very sorry to report the passing of NU5K. Tfc: KF5VF 82.

UTAH: SM, Rich Fisher, NS7K—SEC/STM: Jim Brown. PIO: Lon Stuart. Some of the UT clubs' officers held a mtg to decide how to run the Rocky Mtn Div convention next yr in Salt Lake City. UARC has a new mtg place: Salt Lake Co fairgrounds. The UT ARC net is Sun at 2100 local on 146.62. The Info Net on the Rocky Mtn Div convention meets on 147.18 at 2130 local on Sun. I'd like to know how many clubs there are in UT; would you please send me a mailing address & club name in your area? QTC KF7AG 146, NS7K 67.

WYOMING: SM, Jim Raisler, N7GVV—ASM: Steve Cochrane, WA7H. SEC: Jim Anderson, W7TVK. STM: Dan Ransom, K7MM. PIC: Wilson Sellner, WB7RRZ. University ARC elected pres NQ7Q; vp/secy Roland, KB7HVD; treas Shirley, KB7WN. Jerry, KB7M & Shirley visited W1AW. They presented a slide show at the Sep UARC mtg.

Net	*Freq*	*Time*	*Days*	*QNI/QTC*	*NM*
Cowboy	3923	645 P	M-F	655/4	WB7K
Pony Express	3923	8	Sun	146/0	W7MZW
Area 5 ARES	2 M			80/0	W7ILL
Albany ARES	2 M			23/0	WB7K

Tfc: W7SQT 127.

SOUTHEASTERN DIVISION

ALABAMA: SM, Mildred Cullen, AA4XF—ASM: W4XI. ACC: KA4PKB. OOC: KE8BP. SGL: WO4W. STM: W4PIM. PIC: KB4KCH. SEC: AB4EZ. TC: N4NOK. BM: KA4ZXL. The newly formed ARES/RACES net was activated Oct 4 as severe WX & tornado warnings were issued for NW & Central AL. Thanks to Hubert, KN4HD; Dennis, KC4IVI & Lewis, AA4XE, for taking reports & relaying to the B'Ham NWS. Talladega RAC has been reorganized after 7 yrs of inactivity; new TRAC officers: pres JT Malone, N4ZDY; vp Ben Booth, AG4I; secy/treas Ellen Runyan, KA4MQM. Harold Brown, KK4DD, has a new rptr on 145.490 in Gadsden, providing wide coverage over NE AL. The NDMS drill was postponed because of Operation Desert Shield; local areas conducted the drill as planned. Boyd, KB5GDN & SEC AB4EZ coordinated with H'Ville, B'Ham & Anniston on this simulated earthquake in AR. Our TC, Frank Field, N4MOK, asks that you consider becoming an ATC; no experience necessary, contact him at 203 Wind Ridge, Jacksonville, AL 36265. Nets: ADN: QNI 556, QTC 222. ASN: QNI 311, QTC 94, ATN: QNI 160, QTC 26. ATNM: QNI 2,930, QTC 101. ARES/RACES: QNI 122, QTC 4. BPL: WA4JDH. PSHR: W4PIM WA4JDH W4QAT WB4MMD N4XFX W4CKS WB4IDB KM4JD KA4RZZ W4IBU AA4XF AB4EZ WA4RNP KC4IVI. Tfc: WA4JDH 614, W4PIM 245, W4IBU 194, AA4XF 120, W4CKS 118, KC4IVI 114, KM4JD 102, W4QAT 96, KC4LMD 65, WA4RNP 52, WB4MMD 51, W4XI 14, W4DGH 12, WB4TVY 4. Have a happy holiday season. 73 de Mildred.

GEORGIA: SM, Eddy Kosobucki, K4JNL—ASM & BM: AA4UA. SEC: NC4E. STM: WB4WQL. ACC: KM4IH. OOC: W8BLA. Pkt: W4OO. SGL: WB4UVW. TC: W4ZTL. The YLs of MALARC need help; for the yrs they've been in existence, they've been a tremendous help to hamfests & other projects in the metro Atlanta area. They've been holding together by a string in recent months. There are many YLs in the area who need to get out to see if they can help get them back like they were in recent yrs. They've made many sacrifices with their families, etc, to keep the club going. Let's get that enthusiasm back up & help get the club like it used to be—thanks. We had conflicts with hamfest dates again; now's the time to get your date set & call Bernice Dunn at ARRL HQ to see if you have a conflict next year. She'll send the needed paperwork for an ARRL-scheduled hamfest. PSHR honorees for Sep: WB4DVZ, KC4BHX & KA4HHE; let's get this number back up where it used to be— ARRL HQ gives a beautiful certificate if you qualify. We are hearing about another major earthquake becoming reality; keep your emergency equipment in jam-up shape in case we're called on to help our neighbors. The 1990 SET is history; if you or your organization hasn't sent in the reports to our SEC, NC4E, please do so now—thanks. This is Dec & a family month. I wish a Merry Christmas to you & your family & hope Santa Claus brings you that piece of gear you didn't get last yr. God Bless, Eddy. Tfc: KA4HHE 195, KC4BHX 115, W4AET 99, WB4DVZ 92, WB4WQL 46, WD4DSS 37, N4WFH 25, N4MWR 12.

NORTHERN FLORIDA: SM, Rudy Hubbard, WA4PUP—ASM: N4ADI. ACC: KI4BI. BM: N4GMU. OCC: WB4GHU. SEC: W4MLE. SGL: KC4N. STM: KB9LT. TC: N4SS. PIC: KB4LB. Digital: K4CY. It was my honor & pleasure to issue NTS Service Award Certificates based on K4CY's recommendation to KB4T, W1EOH, KK4CQ, KB4OWD, WD4HIM & N4GMU. These stations maintain PBBSs & I'm sure you appreciate their dedication & service. New appointees this month: N4SAR, EC Escambia Co; WB4WOO, EC Walton Co; N4SGQ, EC Okalaloosa Co; KM4AE, EC Volusia Co; & K4LPT, DEC W Panhandle Dist. WA4DNA, is now NM for NFPN— congratulations to each of you for accepting responsibility. K4LPT reports the Gulf Coast Disaster Medical Team conducted a training exercise Sep 29-30 at Keesler AFB; the purpose was to train EMS personnel, doctors, nurses, EMTs, firemen & Amateur Radio operators. Participating were K4LPT, N4SGQ, N4RNV, NØBKM. WB5GFM & KB5GGO. KB4LB reports he is going to publish Section News Bulletins; anyone interested in helping generate news should contact him, especially the clubs. W4MLE has updated the N FL Section Emergency Comms Plan. All DECs & ECs should have received a copy by the time you read this; if not, contact your DEC. We're still seeking people interested in serving as ATC, PIO, OBS & OO. Every club should consider nominating someone in their group for these positions. Best wishes to all for the best of the Holiday season. Tfc: N4SS 645, KB9LT 316, WA4QXT 277, N4JAQ 197, N4GMU 144, WD4IIO 132, WC4D 121, WA4EYU 107, KC4FL 98, WB4DNT 82, WB4GHU 80, WA4GYR 74, N4GSQ 60, AA4FG 58, N4ADI 56, KB4RTG 38, KC4MDY 38, N4QTS 34, WB2NGZ 31, N4JHI 30, N4OZD 29, N2AOX 29, W4KIX 25, N4YHE 20, WA4PUP 20, W4MLE 20, WA4JNC 16, WA8APQ 12, N4UF 12, WA4STZ 11, W8IM 11, K4UTY 10, NF4O 6.

SOUTHERN FLORIDA: SM, Richard D. Hill, WA4PFK—STM: K4ZK. SEC: Open. Asst SEC: WB4WDK. TC: KI4T. BM: WD4KBW. PIC: N4PBF. AA/OOC: WB4GHU. ACC: K4EUK. SGL: KC4N. Pkt Mgr: K4CY. Manny, W4SS, the SEC for many yrs, has asked to be relieved because of work commitments; Thanks for your help over the yrs—it's much appreciated! Congrats to AL7IN who ran a well-known BBS in Dade Co—he sent a pkt msg stating that he's now ASM in the Oregon section. N4XMD sent a pkt indicating that he handled 9 phone patches to Navy ships in Region 3. K4CY, the All FL Pkt/NTS appointee, sent the following list of PBBSs that reported Sep totals for bulletin, personal mail & NTS formal tfc. PBBSs & their NTS total: W2TKU 333, W4DPH 256, W4DUV 51, WB2WPA 118, KB4VOL 27, K4CY 99, WD4HIM 85, K4GBB 61, K4OZS 55 and W8DUV 51, WB2WPA 118, KB4VOL 27, K4CY 99, WD4HIM 85, K4GBB 61, K4OZS 55 & KA4GDV 0. WB2WPA, a PBBS in Collier Co, sent the following comments: "...busy month for the PBBS! Had been around 1300 msgs most of the summer, but a flood of bulls during Sep. Some notes on activity: (1) New 440 MHz rig on the air at WB2WPA-5 PBBS/ENAP; improved reliability over an old converted commercial rig, (2) Collier Co's new Mobile Comms & Command Post has been approved by the Board of Co Commissioners & will include 4 comm consoles—1 dedicated to RACES/ARES, including HF SSB/Pkt, VHF FM/Pkt, UHF FM/Pkt & ATV capabilities; hope to be online next summer, (3) Collier Co Emergency Net took basic first aid & CPR through the Co EMS Oct 13. About 25 have registered for the class at reduced cost & (4) Plans moving ahead for improvements to WB2WPA/R (147.03+), including remote receiver network & link to Lee Co & possibly Dade in the next 12 months. The rptr is sponsored by CC Emergency Mgmt." The following ECs submitted reports for their respective cos for Sep, as reported by WB4WDK: S Brevard, W4MSQ; Dade W4IYT; Desota, KM4VC; Highlands, WB4WDK; S Brevard, W4MSQ; Dade, W4IYT; Desota, KM4VC; Highlands, WB4WDK; Manatee, N8EHZ; Monroe W3YWK; Palm Beach K4ZRP; Pinellas N4OBT; Polk N4LXG; Sarasota N4LML; Osceola KE8WH; Okeechobee K4INJ; Lee WA4PIL; Hendry/Glades AA4BN. W4MSQ reports that the ARES membership drive is doing well. WB4WDK said Highlands held their annual SET with Emergency Mgmt Hurricane Exercise. N4OBT stated that Pinellas Co had an excellent drill with the N Pinellas Co Red Cross. N4KFU has written excellent guides for CW tfc handling, NCSs, reps, etc, for FL Medium-speed Net. The Broward Amateur Radio Digital Society (BARDS) had AB4LU as speaker at their last mtg; he gave a technical presentation on the 7-layer Open Systems Interconnect Reference Model; it's a protocol stack going from the physical media in the ham world, radio waves, to the applications layer, a BBS. The S Brevard ARC *Spark* announced that Amateur Radio classes sponsored by SBARC will begin immediately after Jan 1. The St Luce Rptr Assn *RepeaterEAR* was full of interesting info: Featured were Skybeacon-2, the Discovery Ctr Ham Radio project & a column on lightning, to name a few. The ARA of SW FL profiled KB4ALZ this month. KC5YD has undergone heart surgery in TX. The Englewood ARS *Newsletter* stated that comms were provided for the Pioneer Days Parade Labor Day wknd & the following participated: WBØGUX, W9BVB, KC4QMY, KB4KBH, KC4HZE, KA4DHC & special thanks to N4ZXT & N4ZCR. Other club newsletters received included Sarasota ARA, IBM ARC Boca Raton, Martin Co ARA & Ft Myers ARC. WB4KKG reported he was recently elected a member of the Radio Club of America. The FL Keys ARC is sponsoring the Worked All Keys (WAKEY) award; to earn this prestigious certificate, work & confirm 5 different keys on HF or 15 different keys on UHF/VHF. Send your cards to the Florida Keys ARC, PO Box 545, Big Pine Key, FL 33043. WD4KBW reports 248 bulletins received & sent by WA4EIC 47, WT4F 26, WD4KBW 14, KB4WBY 161. The ARRL Info Net meets at 7:30 AM Sat on 3940 kHz. Tfc: W3CUL 3082, W3VR 1318, N4KFU 311, WA9VND 310, WA4EIC 291, W4NFK 245, KD4GR 239, K4SCL 234, AA4BN 225, WA4PFK 224, AA4HT 221, K4FQU 218, W4MEE 216, WX4J 215, KB4ECH 178, K4IA 171, WA4NBE 163, K4ZK 145, KA4FZI 144, W4DWN 136, K4EUK 132, WBØHOX 113, AA4CH 108, WB4WYG 95, WT4F 88, KC4ECA 76, WA4RUE 66, KA4NXF 65, KN4CM 63, W3TLV 57, WD4KBW 52, N4WAN 50, KB4MON 39, K4JI 31, KC4VK 27, AB4WQ 21, WB4GCK 20, W4WYR 17, N4ILN 17, W4VQE 17, N4MXD 13, KI4ZW 13, W4MFE 11, NØABC 9, WA8EXA 9, N4YWC 6, K3KT 6, W4NSY 6, W3IJR 6, KA4GDU 5, KBØBDL 5, WA4PIL 5, KB4HAY 4, N4OIA 3, KAØRUL 3, KAØGYF 3, N4RHJ 3. (Aug) KI4ZW 17, KB4HAY 5.

PUERTO RICO: SM, Luis E. Lopez, WP4EPC—This is my 1st report as SM. Thank you all who supported my nomination; let's work together so we can put this great country of ours

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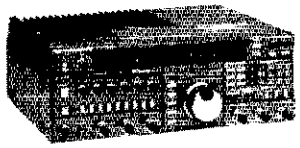

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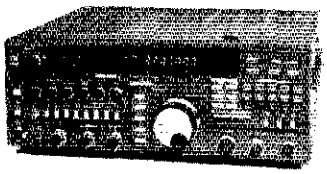
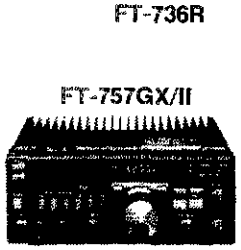


FT-736R



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FT-23R

FT-411

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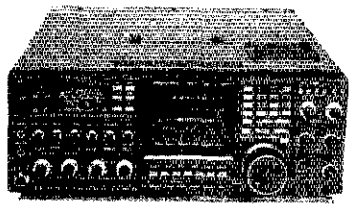
IC-781

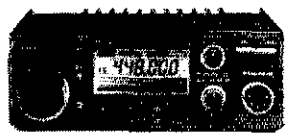


IC-765

IC-735

IC-725

IC-28A/28H



IC-448A IC-228A/H

IC-2SAT
IC-3SAT
IC-4SAT
IC-24AT

IC-2GAT
IC-4GAT

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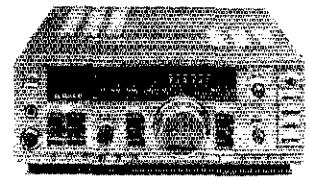
TS-440S TS-140S



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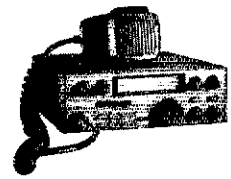

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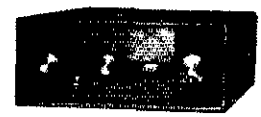

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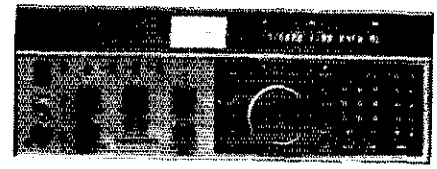

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forward. With many of the new programs now available to radio amateurs, we can enhance the future of this great hobby. Our section is comprised of 6000 hams, 314 of whom are ARRL Members. I hope each of you devoted League Members will encourage at least one of your friends to join the ARRL in 1991. Explain to them the new programs & challenges we've brought forth. As I assume my new duties as your SM, my workload increases—with your cooperation & the fine staff I've chosen, we can put the PR Section forward. I've become a staff member of the Div Dir; your problems, complaints or recommendations now come to my attention, so please write me. Each Member has a responsibility to pass his ideas to the SM so I can bring them up to our Dir. As communicators, we need to improve our efforts a little. Listed below is the staff I've chosen, so please note the categories they're responsible for: SEC: KP4AWI. PIC: KP4DLM. SGL: WP4GPZ. TC: KP4ARY. SM: KP4EW. NM/PR Net: KP4DJ. Tfc: PRN sess 30, OND 175, ONI 121, QTC 116. KP4DJ 40. Congratulations, Willie, KP4DJ, on your 60 yrs membership of the ARRL. 73.

VIRGIN ISLANDS: SM, Ron Hall, KP2N—ASM: KV4JC. SEC: NP2B. NM: VP2VI. St Thomas/St John ARES members furnished comms for the Univ of the VI homecoming parade. Participating were K4VQD, NP2CY, NP2AP, NP2DI & KP2N. NP2E reports that the STT/STJ ARES net is now Sun at 2300Z. Congrats to WP4EPC, Luis Lopez, new SM of PR; I hope to meet with him soon to keep the comms open between our islands. A job well-done for Alberto, WP4CSG, the outgoing SM; Alberto was always there when we needed him & came through for the VI during Hurricane Hugo. St Croix ARC has been requested to furnish comms for a ½ Triathalon. Novice classes are underway with W9UKK & KV4JC as instructors. The SCARC 147.25/85 rptr has been moved to the OTH of KV4II & is working well—ARES STX net is Sun at 2245 on the 147.25 rptr. At 2300Z, the net moves to 146.81 & joins the STT/STJ ARES joint-island net. VP2VI, NM for VINE, reports sess 31, ONI 124. 73 de Paradise de KP2N.

SOUTHWESTERN DIVISION

ARIZONA: SM, Jim Swafford, W7FF—ASM: K7OMR. STM: W7EP. NM's: K6LL, K7POF. Yavapai Co DEC WI6S reports they organized their SET around a simulated earthquake at the mining town of Jerome; it ran Oct 12. Coconino ARC passed a motion to purchase an ARRL library set for presentation to their city/co library; contributions to their "kitty" are welcome—FB. N6RTV & KK6OP sent an FB newsletter from newly organized Yuma ARC, which serves the Yuma/Winterhaven-area hams; officers are: pres NL7TY, vp N6RTV, secy KK6OP, treas N7FTT. Membership is about 50—how about considering ARRL affiliation? By the time you read this, the OCWA/SOWP will have had their annual luncheon in Phoenix Dec 1; WA6WZO, SW Div Dir & I will attend & hopefully Barry, K7UGA. New OCWA officers were elected at Ft Tuthill: pres W9INP, vp W7LGB, secy/treas W7ER. Steve, KD6ZZ, sent in FB report on the OPRC's participation in Amateur Radio Awareness Day Sep 15. Demo stations were set up & operated for 12 hrs at the El Con shopping mall in Tucson. N7JZT set up a portable pkt station & amazed the younger set by communicating with San Diego computers utilizing a handheld radio & tabletop antenna. Tucson's Channel 4 TV station gave coverage & interviewed WA7AHF on their 5:30 PM news show; the Pima Co Emergency Services RACES van was on display & ARRL literature was distributed to the interested public. Congratulations on a job well done. Understand that other clubs around the Section did this event. In Phoenix, it was a joint undertaking of the following clubs: AZ Rptr Assn, AZ ARC, AAA-5 TV, AZ PRA, Central AZ DX Assn, TTT FM Rptr Gp, Scottsdale ARC & BSA Explorer Post No. 599. Thanks for the good work in presenting ham radio to the public. W7YS & NG7S are back from the USSR where they operated as UA9G/US calls & 4L9AG; they made 5000 QSOs from Oblast 141. W9WFV sent in an FB report on the recent activities of the W Valley ARC's RFI Committee actions in investigating problems in the area at the request of the FCC; these folks are doing a tremendous job & certainly deserve the thanks of the ham community for helping to preserve our image in the eyes of the public & the FCC—please give them your support. I've just returned from a 2600-mi auto trip to SE Kansas where I attended my 50th H S reunion. Right now, I'm feeling rather old, so will QRT & get some rest. 73 & CUL, Jim. Tfc: W7EP 153, K7RLL 98, W7OIF 40, K7POF 25, N7ETP 11.

LOS ANGELES: SM, Phineas J. Icenbice, Jr, W6BF—Someone told the Old-Timer, "You have a great signal, you must be one of the Big Guns." The Old-Timer answered "No, about the 3rd level down." The 1st level, many agree, is Frank, W6KPC, using 36 elements with the top 12 elements at 200 ft. The next, many say, is Dale, W6UA, & a few dozen others like Terry, W6MKB; Jerry, W6MDH; Bud, W6VPH; Dr Dave, W6QHS & all those who have great locations & great antennas elevated for low-angle takeoff clear of obstructions (usually up 95 ft or more). The 3rd-level down in signal strength is a common station like mine, but don't sell the mobile stations short. Sy, N4KEL/mobile 6, received a message from a ham in the Pacific NW informing him that he couldn't possibly be mobile. I've seen Sy's rig & it runs 680 W output to a pair of phased verticals top-loaded & mounted on top of a Ford van; Sy knows how to miss the overhanging trees in Wichita (Sy's score is 305 DXCC countries *mobile*). So the Old-Timer thinks Sy & his mobile could be in category 3. Don, AA6GE, has the highest mobile antenna around these parts of W6-land. Don's worked Mongolia (JT) on 75 mtrs from his mobile on the beach. His one-man, self-made mobile antenna has been as high as 146 ft, no wind & not moving, but I understand his rig has been operated mobile at more than 100 ft. One day, a man saw Don erecting his mobile antenna & asked what he was doing. Don told him he was assembling his mobile antenna. "How high?" the curious gambler asked. "110 ft," Don answered. "I'll wager $1 you're trying to pull my leg," said the onlooker. After a few minutes, speedy Don had assembled 60 ft & the disbeliever was so shocked that he put down a dollar on the van & walked away. Many have seen Don's antennas go up over 130 ft at the TRW Swap meet, on the beach or one of Don's favorite mountaintops. Don has a power winch on the front of his van to pull the antenna & van out of difficult positions. According to *Lockheed Bulletin*, a chap was sentenced to the electric chair, but he had a ham lawyer who got the voltage reduced. According to the SGVRC, there was a young student who asked a farmer how long cows should be milked. The farmer asked the co extension agent & he advised them that the long cows should be milked the same way as the short ones. 73 de W6BF. Tfc: N6NYK 94, N6AHT 42, KC6BCC 34, K6IDU 30, N6TFS 26.

ORANGE: SM, Joe H. Brown, W6UBQ—ASMs: Riv Co-Bob, W6LKN, 714-686-3823; Org Co-Ralph, WB6JBI, 714-776-9272; SB Co-Ken, WA6ZEF, 714-983-1272; Inyo Co-Steve, WV6T, 619-872-1199. ASM/PIC for Sec News-Jerry, AD0A, 714-351-8824. Org Co ARC Prez Chris, KJ6ZH, sez "Ham radio is about communicating, so at the next (radio club) mtg, take time to communicate with someone you haven't met yet." Good advice! Many clubs are electing their new officers for 1991. Buena Park ARC newsletter says "If you want to keep the club alive, think about giving something back for all the enjoyment the club has given you. Volunteer to be an officer." More good advice! New officers of the Clairemont Rptr Assn: pres Paul, N6JII; 1vp Bob, N6RH; 2vp Dennis, N6MZH; secy Marsha, N6SNW; treas Julie, KB6YCT. The W ARA, represented by Chip, K7JA, was recognized as a new Special Service Club (SSC) at the SW Div Conv by our Dir Fried, WA6WZO. The W Coast ARC has also been recognized as an SSC. Guest speaker at the Beach Cities Wireless Society was Jerry Man, K9AAH, from the San Diego Field Operations Bureau of FCC. Jerry gave an excellent presentation regarding the nabbing of "big-time" radio interrupters & violent criminals who dip into the comms field. The Coachilla Vy ARC notes the passing of Frank Rankin, N6RLO, who became a Silent Key Jul 13. Congrats to the Autonetics RC for winning the Org Co Council's Trophy for 1990 FD competition. The Bishop ARC received a letter from the local police dept thanking them for their participation in past & future events—great going, gang! The Lee DeForest RC sponsored a booth at the Lake Perris Farmers Fair where many inland-empire clubs helped during the Fair—great PR work! TC John, WA6BFH, needs ATCs to help in local RFI/TVI cases; if you can help, contact John at 714-685-0485. The Corona-Norco RC made good publicity in the Corona Independent through its operation of the Barney Oldfield special-event station. Congrats to Joanne, KC6NIC (XYL of N6ZNT) & Joanie, KC6NXK (XYL of AD0A), for passing their Tech exams. STM WF6O reports SCNV QNI 309 QTC 140 in 30 sess. BPL WF6O, PSHR WF6O W6RE. PBBS Tfc: WF6O-1 232, N6RKY-1 26. Ind Tfc: WF6O 500, K6ZCE 68, N6VEV 58, W6SX 55, AD0A 41, KA6HJK 39, W6RE 31, KA6GND 21, KD6GX 10, K6PGG 8, N6OKS 6, N6HIW 4, WA6WKG 2, KA6JOB 1. The section's RACES/ARES & tfc operations are some of the most dedicated guys & gals in the SW Div—thanks to all of you from W6UBQ. Very 73!

SAN DIEGO: SM, Arthur R. Smith, W6INI—STM: N6GW. TC: N6JZE. SEC: W6INI. DECs: K7DCG NE, AA6JE S, N6NKJ E. SCN/1 NM: KI6ZH. ARES/VIP members were called upon by the CA Dept of Forestry to provide comm support for the Field Info Officers at the "PAINT" fire (near Del Dios Hwy), Sep 10-12. Participating were W6BFQ, WA6EDG, WD6EJJ, WD6GEB, AA6JE, KR6K, KB6KBI, KE6MU, KB6NMK, K6PD, NQ6R, AF4V, W6WYN, KE6YY, WA6ZMQ. Tnx to AA6JE for coordinating the operation. San Diego Ranger Unit CDF-VIP coord Jim Van Meter has been transferred to a new job—training prison inmates in wildland firefighting. Good luck, Jim! Participating in comm for the Univ City Kiwanis were NSARC members N6ACJ, WB6BDY, WA6EOO, KK6GO, WB6LLO, KA6UCD. Upgrades: to Gen N6ZNE; to Tech KC6FSM, KC6NSE. Poway ARS supported the 1990 Poway Days Parade with WB6BOD, K7DCG, KB2EVE, KI6GV, K6JAM, N6JHR, KC6KWV, W1LE, KA6PXD, N6RVM, KB7VE, N6VJX. New lic: KC6MOA. Learn formal msg handling at 2000 dy on Palomar ARC rptr 146.73(-). SDCTN: 29 sess, QNI 292, QTC 79. ARES/CW: 5 sess, QNI 12. Tfc: KI6ZH 343, KT6A 206, WA1ZEN 84.

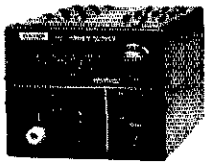
SANTA BARBARA: SM, Thomas I. Geiger, W2KVA—ACC: KB5AH. ASMs: N Vntra, N6MA; S Vntra, W8AKF; SBar, WB6BYU; SLO WB6IIY. BM: N6TNG. STM: N6NLW. OOC: W8AKF. TC: W6KFV. DECs: Vntra, WB6RVA; S SBar, KA6KGF; SLO, W7AZF. We'll start this month's column with a big thank you to Bill Hoover, KB5AH, for submitting last month's Section News while I was in "W2-land." Bill did his usual super job & I'm sure you enjoyed his entertaining style. A late report for Aug is just in from the San Luis Obispo Co ARES: N6FOU was asked by the organizers of the "4th Annual Pismo Beach-Seaventure Triathlon" to provide comms for this Aug 26 event. Because the "Tri" part of triathlon indicates 3 athletic competitions, effort was required to cover all events. NCS KB6KCW, dispatched W6TKF and N6BVL to the beach for the foot race, N6BVK to the pier for the swimmers & KA6SEQ, KG6XQ & N6FOU to the bicycle races. N6FOU acted as relay for SEQ & XQ, who were out of range of the NCS because of the terrain. Triathlon director John Rodgers had nothing but praise for the fine job these 7 did over the 5-hour event. The Ventura Co ARC again upheld the Section's honor in the Sep VHF/UHF contest. Operating from the 8831-ft summit of Mt Pinos (grid square DM04), 6 members activated K6MEP on all bands, from 6 mtrs to light (laser). Operating at K6MEP were: WA6DJS, N6RMJ, N6QOA, NS6X, KC6GLS and W6LYZ. The effort netted 559 QSOs in 99 grid squares for a total score of 72,272 points— an excellent result & all the more impressive when you realize that 6 mtrs didn't "open" until the last ½-hour of the contest. The 474 Terahertz laser comms effort also recorded a probable record by virtue of a 32-mi QSO with WA6EJO. Congratulations to the K6MEP gang, & WA6EJO, on another super VHF/UHF contest effort. Speaking of the VCARC, the club is sponsoring the 1991 W Coast VHF Conference May 3-5. The cont will be at the Holiday Inn on the Beach at Ventura, and promises to be a 1st-class affair. For further info, contact conference chairman John Kitchens, PO Box 178, Somis, CA 93066-0178 or VCARC, PO Box 2103, Oxnard, CA 93033. The Section Field Day results have finally been tallied; sorry for the long delay. It's probably no great surprise that the Conejo Valley ARC took top honors again with a score of 8575 (for the equivalent of a Class 2A entry). Operating QRP/CW made each QSO worth 10 points for 7875, with 700 bonus points. It's hard to beat that kind of performance—congratulations again, CVARC. The Novice Field Day Achievement Award this yr goes to N6RRJ at the Santa Barbara ARC with a fine 396 points for 114 phone & 42 CW QSOs. Well done, SBARC Novices & Techs. Testing successes for Sep: Satellite ARC, Vandenberg (GLAARG) to Gen N6ZKA. VEs N6IR, N6UE, W6PIM, W6ELH & W6GQB. No other VE reports received this month. Congratulations to all who upgraded & thanks to the VEs who contribute so much time & effort to make this program possible. 73 for now. Tfc: W8AKF 7026, W6NOR 97, N6NLW 93, VE3AWE 72.

DAIWA

DEALER LIST

Ack Radio Supply	Atlanta	GA	404-351-6340
Ack Radio Supply	Birmingham	AL	205-322-0588
Allied Appliance & Radio	Englewood	CO	303-761-7305
Amateur & Advanced Comm.	Wilmington	DE	302-478-2757
American Electronics	Greenwood	IN	317-888-7265
A-Tech Electronics	Burbank	CA	818-845-9203
Barry Electronics	New York	NY	212-925-7000
B.C. Communications Inc.	Huntington Sta.	NY	516-549-8833
Burghardt Amateur Center	Watertown	SD	605-886-7314
C-Comm Inc.	Seattle	WA	800-426-6528
CW Electronics	Denver	CO	303-832-1111
Delaware Amateur Supply	New Castle	DE	800-441-7008
Denny's Technical Service	Lemars	IA	712-546-6625
D J Systems	Riveira Beach	FL	407-845-7021
Electronic Equip. Bank	Vienna	VA	800-368-3270
Eli's Amateur Radio	Ft. Lauderdale	FL	305-525-0103
Ham Radio Outlet	Woodbridge	VA	800-444-4799
Ham Radio Outlet	Salem	NH	800-444-0047
Ham Radio Outlet	Atlanta	GA	800-444-7927
Ham Radio Outlet	Phoenix	AZ	800-854-6046
Ham Radio Outlet	San Diego	CA	619-560-4900
Ham Radio Outlet	Anaheim	CA	800-854-6046
Ham Radio Outlet	Van Nuys	CA	818-988-2212
Ham Radio Outlet	Burlingame	CA	415-342-5757
Ham Radio Outlet	Oakland	CA	415-534-5757
Hamtronics Electronics	Trevose	PA	800-426-2820
H.C. Van Valzah Co.	Downers Grove	IL	312-852-0472
Henry Radio	Los Angeles	CA	800-877-7979
HR Electronics	Muskegon	MI	616-722-2246
Jun's Electronics	Culver City	CA	213-390-8003
Kalmus Engineering	Woodinville	WA	206-485-9000
K-40 Electronics	Warren	MI	313-939-3700
K Comm	San Antonio	TX	800-344-3144
Lentini Communication	Newington	CT	203-667-3561
Lett Electronics	Topeka	KS	800-835-0250
Madison Electronics	Houston	TX	713-520-7300
Michigan Radio	E. Detroit	MI	313-771-4711
Mike's Electronics	Ft. Lauderdale	FL	305-491-7110
Milbert Co.	So. St. Paul	MN	612-451-2241
N & G Distributing	Miami	FL	305-592-9685
North Olmstead Amat. Radio	N. Olmstead	OH	216-777-9460
Omar Electronics	Loganville	GA	404-446-3241
Omni Intl. Trading	Seattle	WA	206-628-2923
Portland Radio Supply	Portland	OR	503-233-4904
Quad Electronics	Pensacola	FL	904-438-3319
Radio Place	Sacramento	CA	916-441-7388
RF Enterprises	Merrifield	MN	800-233-2482
Rivendell Electronics	Derry	NH	603-434-5371
Ross Distributing	Preston	ID	208-852-0830
R & L Electronics	Hamilton	OH	513-868-6399
Soundnorth	So. Int. Falls	MN	218-283-9290
Super Sound	San Fernando	CA	818-361-1339
Tel-Comm, Inc.	Littleton	MA	617-486-3400
Texas Towers	Plano	TX	214-422-7306
The Ham Station	Evansville	IN	800-729-4373
Universal Amateur Radio	Reynoldsburg	OH	614-866-4267
Western Radio	San Diego	CA	619-268-4400
Westside Comm. Supply	St. Petersburg	FL	813-345-0739

POWER SUPPLIES



MODEL PS140II

MODEL:		
PS304	24A	18 lbs.
PS120M	9A	11 lbs.

Daiwa power supplies consist of quality IC's, transistors and diodes. Each model contains a over-current limiting protection circuit. This protects the power supply circuitry when shorting positive and negative line or when over current flows through the power supply circuitry.

Input Voltage	117 VAC ± 10%
Output Voltage	13.5 V
Output Current	12A
Volt Fluctuation	Less Than 1%
Ripple Voltage	Less Than 3 mv
Protection Circuit	When 14-2A
Pwr Consumption	350W Max.
Dimensions	128 × 104 × 225 mm
Weight	11 lbs.

Cross Needle SWR/Power Meters for All Bands

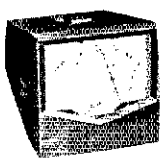
NS-660PA

Model	Freq. Range Int. Sensor	Forward Power	Connectors
NS-660A/PA	1.8-150 MHz	30/300 W/3 kW	SO-239
NS-663BM/BN*	140-525 MHz	30/300 W	SO-239/N type
DP-810	1.8-150 MHz	0-1.5 kW	SO-239
DP-820/N	140-525 MHz	0-150 W	SO-239/N type
DP-830	1.8-525 MHz	0-1.5 kW/0-15 W	SO239/N type
CN-101	1.8-150 MHz	15/150 W/1.5 kW	SO-239
CN-103	140-525 MHz	20/200 W	SO-239/N

All models back lit *Average Power Reading Only

MOBILE/BASE CROSS NEEDLE SWR/POWER METERS

CN-460M



CN-520

Model	Freq. Range Int. Sensor	Forward Power	Connectors
CN-410M*	3.5-150 MHz	15/150 W	SO-239
CN-460M*	140-450 MHz	15/150 W	SO-239
CN-465M*	140-450 MHz	15/75 W	SO-239
CN-520**	1.8-60 MHz	200 W/2 Kw	SO-239

*Back lit with mobile bracket **Optional mobile bracket available

LINEAR AMPLIFIERS

80W

This Model Is Available with Commercial Frequency Band—Special Order

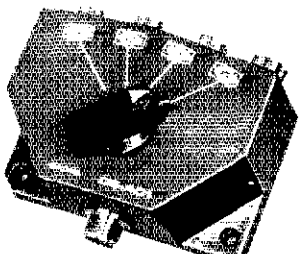
LA2080H

Model	LA2080H	LA2065R	LA2155H	LA2035R
Freq	144-148 MHz	144-148 MHz	144-148 MHz	144-148 MHz
Preamp Gain	15 dB	15 dB	15 dB	15 dB
Input Pwr	1-5W	1-14W	Low - 1.5W High - 25W	1-5W
Output Pwr	1.5Win-30 out 5Win-80out	10W-60out	1.5Win-150out 25Win-150out	1.5 in-30out
Power Consump	13.8VDC/ 12A Max	13.8VDC/ 8A Max	13.8VDC/ 27A Max	13.8VDC/ 5A Max
Dimension	122-45-175mm	122-45-175mm	170-79-250mm	100-35-140mm
Accessory	W/RX	W/RX	W/Rx	W/RX

Coaxial Switches

PAT. No. 59-0003803

CS-201



CS-401

	CS-201 2 Position	CS-201G II 2 Position	CS-401 4 Position	CS-401G 4 Position
Frequency:	500 MHz	1.3 GHz	800 MHz	800 MHz
Connectors:	SO-239	N type	SO-239	N type
Isolation:	+ 60 dB	+ 60 dB	+ 50 dB	+ 50 dB
Power Rating:	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW

Insertion Loss: All models less than 0.2 dB

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Happy Holidays

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WEST GULF DIVISION

NORTH TEXAS: SM, Dan Dansby, W5URI—ASMs: W5GPO, KG5SC, W5IWE, KO5I, WD5IVD, K5MXQ, KF5BL. ACC: KA1CWM. OOC: WA5YKO. STM: W5VMP. SEC: NØAJP. BM: W5QXK. SGL: K5LP. PIC: WW5L. TC: K5SXK. Congratulations to Jared Peel who just received his call KB5NUL; father is K4HIX. Both active in Jr Op net on 147.14 Rptr Sunday from Arl. Bryan, KB5FES, and Greg, KB5GLV were part of 12 man team who placed 1st Advanced & Vertical Rescue at the 12th Annual Wilderness Conference at Garner State Park in Sep. Thanks to WD5F, NØFYI, KB5KNQ, N5QQF, KG5CW, & N5BJO for quick response & assistance during a fire at R.I.M. inc. OSM & Parker Co. was grateful. Tyler ARC will conduct a Satellite Workshop & Tyler JC on Jan 19. Contact W5JYJ for details. Congratulations to AC5Z for becoming a State RACES Officer & reactivating State District 24, a 10 county area for State RACES. Burt, I still want you to be one of my ASMs. I am extremely pleased to see so many KB5s in the news. That shows the new hams are getting active. Keep it up, gang. 5 for BPL this month. (We're growing). KF5BL,45,268,336,35=684: W5TOO,0,361,307,0,=668: NZ2T,185,59,258,45=547: W5YQZ, 37,127,127,40=325: N5PGZ,48,86,69,63=267: Other tfc: AC5Z 57, W9OYL 57, WI5J 46, KC5NG 36, KD5BNU 12. 7290 Net Rpt Sep 3029 QNI 303 Msgs in 45 sess, NTS Liaisons 2 per sess, NM KD5RC. WI5J, hope that foot gets better.

OKLAHOMA: SM, Joe Lynch—This month my column is a sad one because of so many Silent Keys. First, tragically, Warren Tooman, KF5PW, an Oklahoma City police officer, was killed in the line of duty, while responding to a robbery of a fast food restaurant. Amateur Radio operators in Oklahoma City & Warren's home town of Anadarko will miss him very much. Next, although not as tragic, but just as sad, I have to report the following as Silent Keys. Hadley Bower, W5WEH; Gordon Short, W5UCJ; Dave Holder, N5GQY; Fred Wells, N5IND; Ray Bryan, W5IQ (ex-W5UYQ); Don Russell, KB5IBO (ex-K5LMM); Charles Kidson, KA5PRC; and Lehman Wilder, WD5CLB. W5WEH was a long time resident of OKC & active on CW. Carol King, K5CPZ, remembers W5UCJ as a caring person who, with his wife, would take her out to dinner often while Carol was a student at TU. Gordon also handled a lot of Carol's reading for a time in her life. I remember N5GQY as an enthusiastic ham who was active in pkt. N5IND & WD5CLB were active in emergency comms & were regular check-ins to OPEN. W5IQ was a former Dir, a former SCM, active in the formation of Texoma Hamarama, a past pres of the Aeronautical Center ARC and an active member of QCWA chapter 63. He is survived by his wife, K5PBE. KB5IPO was a long-time ham who recently returned to the airways. KA5PRC was active on the Novice bands from OKC. All of these hams will continue to have special places in our hearts. While their keys are silent, the memories they left in our minds are not. Because of the length & nature of this month's column, all regular news has been left out & will appear in next month's column. 73 de Joe, N6CL.

SOUTH TEXAS: SM, Arthur R. Ross, W5KR— SEC: K5DG. STM: WD5GKH, OOC: K5SBU. ACC: WB5YDD. TC: NZ5U. BM: WA5SCY. PIC: WA5UZB. SGL: K5KJN. ASM, all of above plus N5TC. STX Section needs OOs to help in FCC Field Auxiliary. See *QST* page 8 for address of SM to request info. *Scrambled Scribblin's*, Ham 'N Eggs Societe' bulletin, La Grange, announced Fayette Co Emgcy Net meets 7:30 PM each Mon on 146.80 MHz; Washington Co Emgcy Net meets 8 PM each Sunday on 147.26; all hams invited to QNI. B-VARC Bulletin, Brazos Valley ARC, rprts Aug exam sess gave 48 exams to 20 applicants; 5 unlicensed qualified for 1st ticket (3 Tech, 2 Novice); upgrades were N5PJH, KB5FLU, WD5DZC, N5PMD to Advanced; KB5ADD, KB5JSQ to Tech; N5QMY to Gen; grand work by all! Brazosport ARC *News* rprts Brazosport Relay Triathlon had comms help from the club; KA5SYW, NV5L, KA5NBR, KA5KRI, WB5J, WB5I, W5SYN, K5QQI, N5KV, WB8PHO, WD5GKH, KA5VZM, KA5VUL, N5HBI, WA5QJZ & KA5IDC covered all bases; things went well. Brenham ARC PIO KI5JI (ex-KA5EEQ) is proud of new call sign; nice going, David. DRN5 NM WB5YDD rprts 784 msgs in 60 Sep sess; STX represented 100% by W5CTZ, KE5ZV, N5NAV, KG5TL, N5ILI, W5SHN, WB5YDD. NARS News. NW ARC, Houston, rprts FEMA has apvd a Public Info Emgcy Sys (PIES) to be part of the total system; Houston area hams will be listening carefully; also rprts N5PBD upgraded to Adv; KA5DNP rcvd his DXCC (satellite) certificate; congratulations to all. ACC/ASM WB5YDD rprts Sam Houston ARK (SHARK) has been officially renewed as SSC. Houston Amateur Pkt RS sent complete minutes of Sep 5 mtg via pkt to W5KR-1 mailbox; the entire 6K+ came thru in less than 3 hrs. San Antonio ARC bulletin, *The Bexar (bare) Wire*, rprts not less than 50 hams helped in search for missing girl; some had no prior emgcy comms experience; Bexar Co EC WA5QZI will conduct training classes for the volunteers; remember that one cannot wait until the wind reaches 40 knots before beginning preparation for a hurricane. AARC-OVER, Austin ARC newsletter, rprts upgrades: KA5JRA, KB5MST, KA5SFC and 3 unlicensed to Tech; WD5EYR to General; N5NCW, KA5EEQ, KA5PVT, N5QWE, WB5IMB, W8NEG to Advanced; KF5KF to Extra; 4 unlicensed to Novice; one great session! 7290 Net NF5T rprts 3029 msgs in 45 Sep sess; NM KD5RC. Clear Lake ARC's *Amateur Radio Gazette* rprts club supported International Skiing (on water) over a 2-day period in Jul; KH6FHS, N5IMC, N5PNP, WD8KUJ, WB5SAG, KE5DQ, KA5TSS, WA5LOO, K3WIV did yeoman work; all were roundly praised for their work; SPECIAL NOTE - K5CA, an old hand at putting out club bulletins, has just taken over CLARC's *Gazette*, so expect interesting copy. We need good conscientious OOs; drop the SM a card for info.

WEST TEXAS: SM, Milly Wise, W5OVH—Here in WTX the new hams are getting younger—6-yr-old Terry Van Sickle, son of Brenda, N5LEU & Terry, WB5WXI passed his Novice exam at Plano, Texas Sat, Aug 4. He starts 1st grade in Sep—Les (WF5E) has DX Pkt Cluster up & running on his PC. Plans are underway to connect this system to the Packet Clusters in Dallas & Austin—Congratulations to Jim Wilson, KF5EI on obtaining DXCC.—Remember: Hams who want to operate near the White Sands Missile Range, additional coordination appears necessary to overcome conflicts in the 420-450 MHz band. Amateur operations are restricted to 50-W PEP. The Sun City ARC just finished a banner yr because of the capable leadership of Jeanie Hoyle, KA5WAC. The new officers for K5WPH are Pres; Martin, WB5LJO; VP Lonnie, KA5OSX; trea Jim, N5FKW; dirs Gary, KA5KBG & Al, KB5GZZ; secy Larry, WB8LBZ. The W5ES radio class commenced Sep 29 with 25 students. Jack, KB5QV & Lou, K5CU, are the instructors. Wish to thank the clubs in the WTX Section who are advancing the schooling of new hams by lending the time & hrs of work teaching new people to become hams and promote good communication skills to young & old. In the Oct issue of *World Radio News*, I found one of the best explanations of how the word "ham" came to be, taken from a Quarter Century Wireless Bulletin. It's very interesting reading. Look on p 47...73, Milly Wise, W5OVH.

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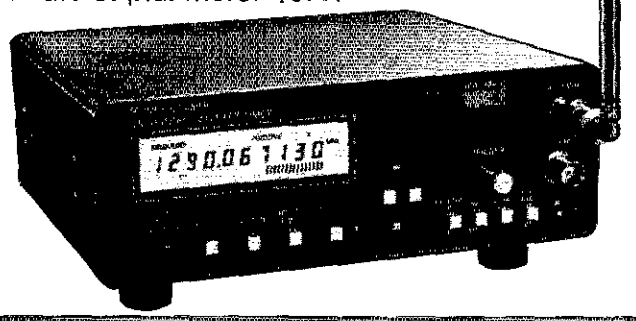

Model	Range Low High	Display 8 Digit LED	Display 10 Digit LCD	Signal Strength Bargraph	Universal Counter	TCXO Option
8030	10Hz 2.4GHz		•	•	•	±.1ppm add $125.
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2600	1MHz 2.4GHz		•	•	•	±.2ppm add $ 80.
2210A	10Hz 2.4GHz	•				±.5ppm add $ 75.
1300H/A	1MHz 1.3GHz	•				±.5ppm add $ 75.

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KENWOOD Newsletter

KENWOOD U.S.A. CORPORATION Vol. 1 Issue No. 5

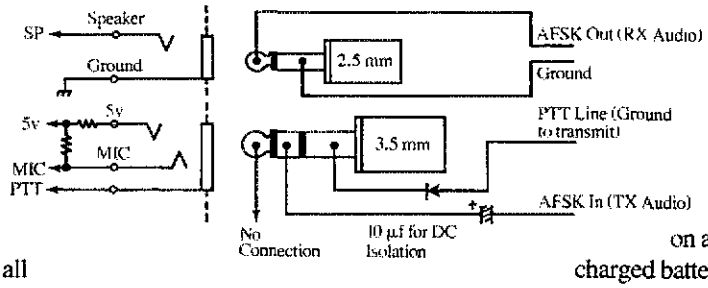
Accurate and timely information for the active Amateur Radio Operator from Kenwood U.S.A.

Interfacing Digital Communications Equipment (Part 3)

Interfacing Handheld Transceivers

Interfacing handheld transceivers to your terminal unit is really easier than it might appear. It has become very common to see portable packet stations. In fact, several articles have appeared in amateur publications with a small HT, laptop computer, and pocket sized TNC contained in a briefcase.

Since all modern Kenwood transceivers utilize the same basic configuration for their microphone and speaker jacks we won't need to spend a lot of time on this configuration.



The accompanying diagram shows the basic wiring method for all Kenwood Handheld transceivers since the TH-21/TR-2600 series was introduced in 1984.

You should also note that the microphone plug is a stereo plug that has three contacts; a tip, a ring, and a sleeve. The tip is used only to supply operating voltage to the HMC-1/HMC-2 VOX headset. Therefore, do not attach anything to the tip of the microphone plug!

The PTT (Push-To-Talk) line requires chassis ground in order to switch the radio into the transmit mode. On Kenwood speaker microphones this is done by shorting the sleeve of the Speaker jack to the sleeve of the microphone jack.

If your terminal unit does not switch to chassis ground you might have a little trouble keying the transceiver. Check the operators manual included with your terminal unit to make sure that it supplies chassis ground on transmit. If it doesn't supply a good chassis ground you might not be able to key the set from the TNC. If this occurs you will need to supply an external chassis ground when you wish to transmit. Several good examples of keying circuits are shown in the *1990 ARRL Handbook* on page 29-5, Figure 6, that you should be able to use if necessary.

It's also a good idea to install a diode between the terminal unit and the PTT terminal of the transceiver. Install the anode of the diode towards the radio and the cathode towards the terminal unit. This will prevent any standing voltage on the terminal unit from adversely affecting the operation of the transceiver's PTT circuit. Any small signal diode should work for this purpose. For example we have used a 1N60, 1N914, etc. with good results in the past at our club station (WD6DJY).

We recommend that you use a good shielded cable, such as RG-174, for all connections since many laptop computers do not provide sufficient RF shielding.

Keep an eye on your battery voltage because the batteries will drain rapidly on a busy channel! Keep several charged batteries with you to extend your operating time, or use a small motorcycle battery and a dc adapter for increased operating times.

Next month our topic will be interfacing linear amplifiers to Kenwood transceivers.

73 Craig (KR6T)

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Coming Next Month

Next Month: Interfacing Linear Amplifiers.

If you have a comment about a column, or have a question about any ham radio subject please let us know. We will select topics for the newsletter that have the widest appeal.

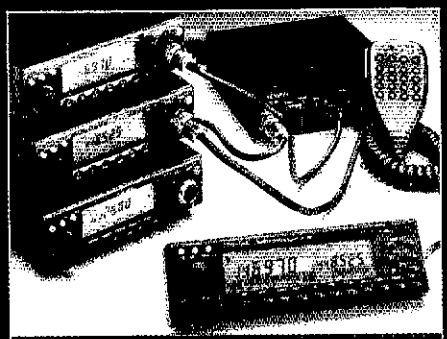
KENWOOD

Mobile Companion!

TM-241A
TM-441A/TM-541A
Compact FM Mobile transceivers

Here are your new mobile companions — at your service whenever you're on the road! Their compact size makes installation a snap, and the remote control options allow you to customize your installation for that "professional" look!

- **Wide band receiver coverage.** The TM-241A receives from 118–173.995 MHz. Transmit range is 144–148 MHz. (Modifiable for MARS and CAP operation, permits required.)
- **TM-441A** covers 438–449.995 MHz, and the **TM-531A** covers 1240–1299.995 MHz.
- **CTCSS encode built-in, selectable from the front panel.**
- **Selectable frequency steps** for quick and easy QSY.
- **TM-241A provides 50 W. TM-441A 35 W, and TM-541A 10 W.** Three power positions, 5, 10, and full. The TM-541A has two power positions, 1 and 10 watts.
- **20 full-function memory** channels store frequency, repeater offset, sub-tone frequencies, and repeater reverse information. **Repeater offset on 2m is automatically selected.** There are **four channels** for "odd split" operation.
- **Tone Alert System with Elapsing Time indicator.**
- **Auto-power off function, and time-out timer.**



RC-20 Remote Control Unit
As supplied, one RC-20 will control two transceivers. **Most often-used front panel functions** are controllable from the RC-20. The RC-20 and IF-20 combine to allow control of up to four radios.

- **Selective calling and pager option.** The DTU-2 option enables the Dual Tone Squelch System (DTSS), allowing selective calling and paging using standard DTMF tones.
- **Digital recording system option.** Used in conjunction with the tone alert system, the DRU-1 allows message storage of up to 32 seconds.
- **Multiple scanning functions.** Band and memory scan, with selectable scan stops and memory channel lock-out.
- **Large LCD display with four-step dimmer control.**
- **Automatic Lock Tuning (ALT) for the TM-541A.** Compensates for drift.

- **Supplied accessories.** Mounting bracket, DC cable, fuses, MC-44DM multi-function DTMF mic.

Optional accessories

- **DRU-1** Digital Recording Unit
- **DTU-2** DTSS unit • **IF-20** Interface unit, used with the RC-20, allows more than two transceivers to be remotely controlled • **MA-700** 2m/70cm dual band antenna with duplexer (mount not supplied) • **MB-201** Extra mounting bracket • **MC-44** Multi-function hand microphone • **MC-55** (8-pin) Mobile mic. with time-out timer • **MC-60A, MC-80, MC-85** Base station mics. • **PG-2N** Extra DC cable • **PG-3B** DC line noise filter • **PG-4G** Extra control cable • **PG-4H** Interface connecting cable • **PG-4J** Extension cable kit • **PS-50/PS-430** DC power supplies • **RC-10** Handset remote controller • **RC-20** Remote control head • **SP-41** Compact mobile speaker • **SP-50B** Mobile speaker • **TSU-6** Programmable CTCSS decoder

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Specifications and features are subject to change without notice or obligation.
Specifications guaranteed for Amateur band use only.

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Affordable DX-ing!

TS-140S/680S

HF transceiver with general coverage receiver.

Compact, easy-to-use, full of operating enhancements, and feature packed. These words describe the new TS-140S HF transceiver. Setting the pace once again, Kenwood introduces new innovations in the world of "look-alike" transceivers!

- **Covers all HF Amateur bands with 100 W output.** General coverage receiver tunes from 50 kHz to 35 MHz. *(Receiver specifications guaranteed from 500 kHz to 30 MHz.)* Modifiable for HF MARS operation. *(Permit required).*
- **All modes built-in.** LSB, USB, CW, FM and AM.
- **Superior receiver dynamic range** Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range.
- **New Feature! Programmable band marker.** Useful for staying within the limits of your ham license. For contesters, program in the suggested frequencies to prevent QRM to non-participants.
- **Famous Kenwood interference reducing circuits.** IF shift, dual noise blankers, RIT, RF attenuator, selectable AGC, and FM squelch.
- **M. CH/VFO CH sub-dial.** 10 kHz step tuning for quick QSY at VFO mode, and UP/DOWN memory channel for easy operation.
- **31 memory channels.** Store frequency, mode and CW wide/narrow selection. Split frequencies may be stored in 10 channels for repeater operation.

- **Selectable full (QSK) or semi break-in CW.**
- **RF power output control.**
- **AMTOR/PACKET compatible!**
- **Built-in VOX circuit.**
- **MC-43S UP/DOWN mic. included.**

Optional Accessories:
- **AT-130** compact antenna tuner
- **AT-250** automatic antenna tuner
- **HS-5/HS-6** headphones
- **IF-232C/IF-10C** computer interface
- **MA-5/VP-1** HF mobile antenna (5 bands) • **MB-430** mobile bracket
- **MC-43S** extra UP/DOWN hand mic.
- **MC-55** (8-pin) goose neck mobile mic.
- **MC-60A/MC-80/MC-85** disk mics.
- **PG-2S** extra DC cable • **PS-430** power supply • **SP-41/SP-50B** mobile speakers • **SP-430** external speaker
- **SW-2100** SWR/power meter
- **TL-922A** 2 kW PEP linear amplifier (not for CW QSK) • **TU-8** CTCSS tone unit • **YG-455C-1** 500 Hz deluxe CW filter, **YK-455C-1** New 500 Hz CW filter.

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TS-680S

All-mode multi-bander

- 6m (50-54 MHz) 10 W output plus all HF Amateur bands (100 W output).
- Extended 6m receiver frequency range 45 MHz to 60 MHz. Specs. guaranteed from 50 to 54 MHz.
- Same functions of the TS-140S except optional VOX (VOX-4 required for VOX operation).
- Preamplifier for 6 and 10 meter band.

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

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DR-590T(NEW)

VHF/UHF Twin Band Mobile

144-147. 995Mhz(RX137—173. 995Mhz)
440-449. 995Mhz(RX410—469. 995Mhz)
45W Hi, 10W Mid., 5W Low on VHF
35W Hi, 8W Mid., 5W Low on UHF
Cross Band Repeater Function Simultaneous Receiving and Scanning on both Band
Front Control Panel is detachable. Remote Control will be available (Option)
MARS and CAP Modifiable (permit required)

DR-570T

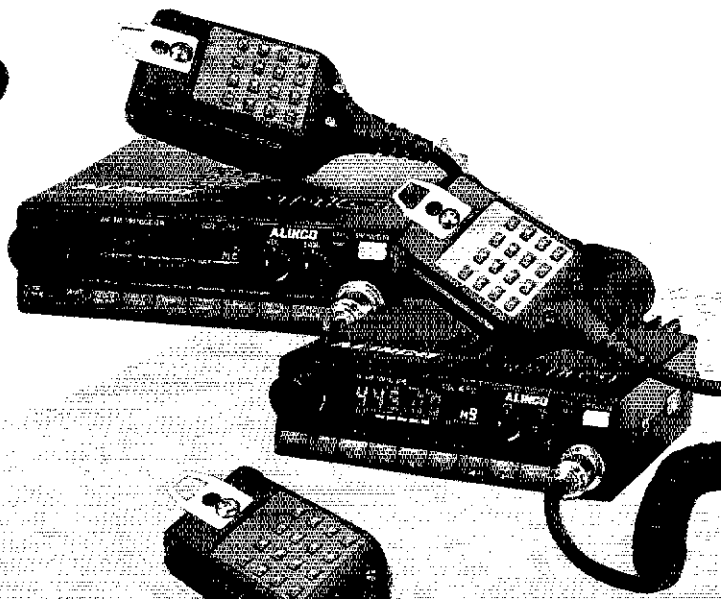
Set your sights for dual!

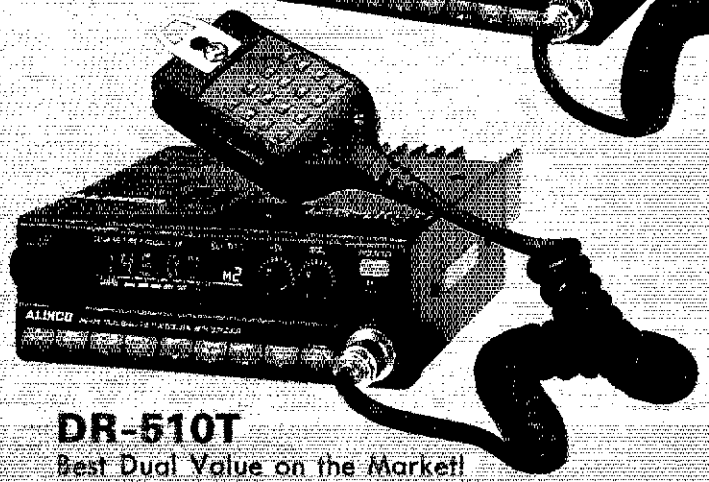
The Alinco DR-570T "Twin Bander" has dual LCD readout, volume, squelch and tuning controls. Double barrelled power with 45W on 2M and 35W on 70 cm, plus simultaneous receive on both bands or intermix with four modes of scan. The DR-570T will win the "battle" with its illuminated front function panel and LCD readout, readable in any lighting conditions. Don't let the "Tiny" DR-570T fool you! It's fast, and leaves the competition in the dust with many standard features you expect. Cross band repeat with the flick of a switch. Full duplex, 20 memory channels, call channels, 16-key DTMF Microphone, and subtones are just a few "Reach" for the DR-570T today!

DR-110T & DR-410T

Tiny 2M Power From Alinco!

DR-110T, this 2M Alinco, enters the nineties a proven winne with the "reputation" of best value. The DR-110T packs powerful 45W on 2M and sports all the features you expect i todays transceivers. Tuning is a snap with the multi-functione easy-to-see keyboard, 14 memory channels, subtones, scan multi-colored LCD readout, reverse, are a few of the many fea tures of the DR-110T. The mobile of the future-today! DR-410 available for 70 cm.





DR-510T

Best Dual Value on the Market!

The Alinco DR-510T has most of the outstanding features of it's sister the DR-570T, including 1 memory channels, cross band duplex and cross band repea The multi color LCD display, and simple tune control pan makes simplicity the key word. The DR-510T with 45/35 watt is the best, featurepacked dual bander on the Amateur marke today. See the DR-510T along with the other Alinco "Magnif cent" ones at your favorite dealer today!

DR-112T(NEW)

Full Featured 2M Power Pack.

The DR-112T is a "True FM" full-power (45 watts) transceiver. The pack lit LCD display is ideal for bright or dim lit conditions. And, as with mos Alinco products, the control panel is engineered to be "User friendly" and still offer a full range of features.

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ALINCO ELECTRONICS INC.

DJ-560T (NEW)

Full Featured Twin Band Handy

We packed almost all of the features you would find in a full sized mobile Twin Bander into this compact HT. The DJ-560T has key board entry, CTCSS encode built in, several scanning modes, 40 memories, fully programmable, Autodialer, Dual Display (2 Meter & 70 Cm). The DJ-560T is sitting on top of the mountain.

DJ-100T & DJ-120T & DJ-200T

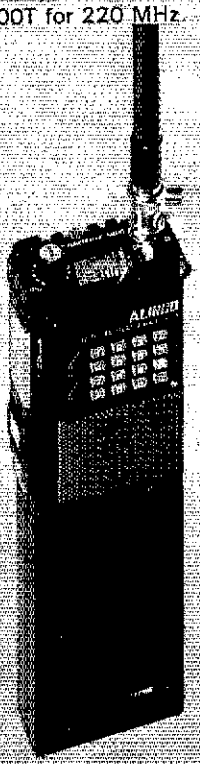
Best 2M Micro Value

The Alinco DJ-100T/DJ-120T is "Magnificent" for its tiny size, but stands up to the competition with power and capability. 10 memory channels store offsets and subtones. Has LCD readout with call channels and reverse at your fingertips. 500 mah battery with direct DC to DC is standard. 3W on standard battery, 6W on optional battery leaves the competition in the dust! DJ-200T for 220 MHz.

DJ-500T

Power-Packed Dual Handi

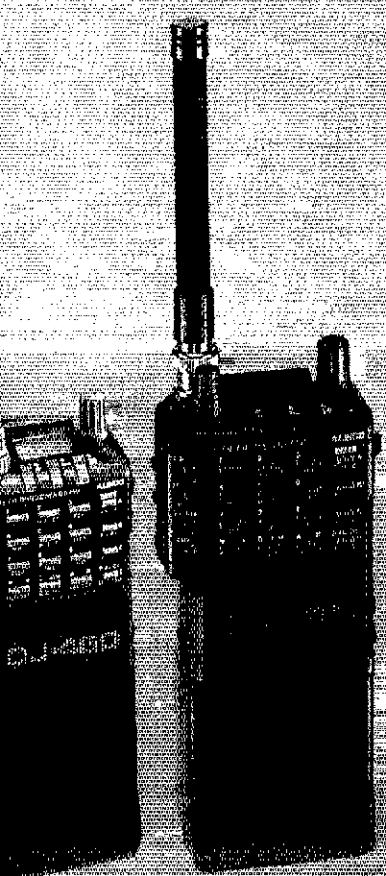
20 Memory channels, subtones, built-in DC to DC, 700 mah nicad battery, LCD readout with 6W on 2M and 5W on 70cm (with optional battery) call channels, DTMF Touchtone, and direct keyboard entry, are just the few winning features of the Alinco DJ-500T Dual Band Handheld. Easy to use, and Value Priced at your Alinco Dealer.



DJ-160T & DJ-460T

2M H/T is here! And wow!

"Bells & Whistles" is a tame word to use for the new DJ-160T, newest "Magnificent" one from Alinco. Keyboard entry is just one of four ways to enter a frequency in the extended receiver (137-173.995 Mhz) of the DJ-160T. You can store duplex "simplex" pairs in any of 20 Memories, or Call Channel, with offsets, and any of 38 encoding subtones. Choose one of 3 scan "modes", "Band", "Program" or "Memory" and one of five step ranges in VFO. Priority mode can be used in VFO, Memory or Call. "Dual Watch" allows the DJ-160T to scan 3 seconds alternately on CALL, VFO or one MEMORY. "Pager" is for group or single person alert. Other features include "Auto Battery Save", Auto "Power Off", and 2-Memory Autodialer. Get 3-watts on standard 700 mah battery, or increased power from built-in DC to DC, or optional 12V battery. The Alinco DJ-160T, now the "Top Gun" with the competition today! DJ-460T for 70 cm.



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Tech Talk from ICOM

DX'ing WITH THE BEST!

DX'ing and contesting are two all-time favorite interests among radio amateurs worldwide. So, naturally new and better ways to "work the rare ones" or increase contest scores is big news. The latest and greatest development in this area, PacketCluster™ is the topic of this month's Tech Talk from ICOM.

Simply explained, PacketCluster™ is a new application of packet radio's unlimited assets. A large group of HF operators with similar interests (like pursuing new countries and zones and exchanging QSLs) "cluster together" via packet for mutual rewards. As a result, each operator reaps the benefits of multiple eyes and ears constantly scanning the bands for needed contacts. Everyone likes a mini-celebration after making a good DX contact, so they relate their "DX DE K7XX: 28025.0 ZA1XXX," and keep the action rolling. PacketCluster™ software stores and categorizes information for easy access. If you wish to review DX activity on a particular band, check beam headings, gray lines, or QSL addresses for DX stations, a couple of keystrokes list the details right on your terminal.

You can even use PacketCluster™ for silent monitoring and the system will beep when an announced preprogrammed prefix DX'pedition or band is reported active!

Your present computer, TNC and ICOM VHF FM transceiver used for packet radio will work fine for PacketCluster.™ If desired, new and advanced software that combine packet, HF rig controlling and station logging can be added to computerize your whole setup!

PacketCluster™ with a deluxe ICOM HF transceiver, like the IC-781 or IC-765, is truly a DX'ers dream, especially when several bands are "open" simultaneously. Using PacketCluster™ relayed information and an IC-781 or IC-765 with Band Stacking Registers, independently programmable and fully tunable memories plus sharp I.F. filters, you can easily double or triple your DX'ing success. By pressing a single button, you can shift between 20 meter SSB pileups and 15 or 10 meter CW QSO's in a flash. You can also load numerous DX-active SSB/CW frequencies in adjacent memories and shift between each with one click of the memory knob. As you contact each station, simply dial another PacketCluster™ listed DX spot, press "WRITE", and that memory is immediately updated for continued DX'ing. Your IC-781 or IC-765's dual VFOs remain undisturbed, holding additional DX'ing frequencies. The DX spotting assistance of PacketCluster is equalled only by the multi-rig operating flexibilities of ICOM's IC-781 or IC-765!

The ultimate way to enjoy PacketCluster™ is with ICOM's totally deluxe and CRT-equipped IC-781. The upper portion of its screen shows operating frequencies, modes, time, etc.. And the multiple functions in the lower portion include a display of your packet computer's video output! Everything is visible on a central monitoring screen right in front of you and accessible via your adjacent computer's keyboard! Combine ICOM rig-controlling software and your really headed for the DX Honor Roll!

The finishing touch to this space-age station is ICOM's new IC-4KL 1000 watt-output linear amplifier or field-proven IC-2KL 500 watt-output linear amplifier. These hearty amplifiers require no warmup or tuning, and they automatically follow band changes on their mated ICOM HF transceiver. Add ICOM's EX-627 Automatic Antenna Selector and you are free to work DX in top style! PacketCluster™ and ICOM's deluxe transceivers are truly a match!

For additional information on ICOM HF/VHF/UHF equipment and accessories? Call our toll-free literature hotline at 1-800-999-9877. Information will be mailed to you immediately.

Need more guidance on packet? This popular topic was highlighted in a recent 8-page ICOM RADIO NEWS newsletter. For a free copy, send your name and address to ICOM America.

*PacketCluster™ is a software package providing DX and contest multiplier announcement and logging capabilities using VHF packet radio. It is the trademark of Pavillion Software, P.O. Box 803, Hudson, MA 01749.

What topics would you like to see discussed in ICOM's TECH TALK Series?
Send your request to:
ICOM America, Inc.
2380 116th Avenue N.E.
Bellevue, WA 98004

The IC-781 Is Just Too Much Transceiver To Squeeze On One Page

It is almost impossible to fit the prestigous IC-781 on a single page. Its futuristic design and superior features defy boundaries.

Never before has a transceiver captivated radio enthusiasts so intensely. The IC-781 inspires countless hours and loyal attention to your hobby... whether it is DX'ing, contesting, exploring new interests or simply enjoying legendary performance.

From the Multi-Function 5-Inch CRT and Spectrum Scope to Twin Passband Tuning, Dual Watch, ICOM's exclusive DDS System and continuous coverage of all amateur bands, the IC-781 is a total communications package designed to exceed your every expectation. The IC-781...Today's Standard of Excellence. See it at an ICOM Dealer near you.

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For a brochure on this or any other ICOM product, call our Toll-Free Literature Request Hotline 1-800-999-9877.

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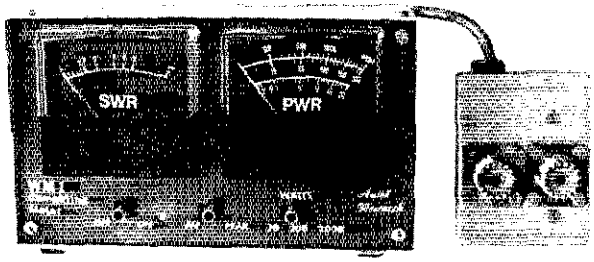
COMPUTING SWR & WATTMETER



NEW! Model WM1
$119.00 (+$4) (Includes AC Supply)

- **AUTOMATICALLY COMPUTES SWR.** No adjustments needed!
- **READS SWR DIRECTLY.** Even when you're talking on SSB!
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- **REMOTE RF HEAD.** A must! Up to four feet from meter. Coax can't pull meter off table.
- **AVERAGE & PEP READING.** Allows compliance with latest FCC rules.
- **THREE RANGE SCALES.** 2000, 200, 20 watts. Usable to less than 1 watt.
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1.5-30 MHz 5% F.S. Accuracy. Uses 8-18 VDC or 115 VAC. 5¼"x3½"x2¾". Attractive light/dark grey styling.

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For SSB/CW/AM
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115 VAC supply built-in. Filter by-passed when off. | **Auxiliary Notch rejects 80 to 11,000 Hz! Covers signals other notches can't touch.** | **Four main filter modes for any QRM situation.** | **Continuously variable main selectivity (to an incredible 20 Hz!)** | **Continuously variable main frequency. (250 to 2500 Hz)**

AUTEK pioneered the ACTIVE AUDIO FILTER back in 1972. Today, we're still the engineering leader. Our new QF-1A is the latest example. It's INFINITELY VARIABLE. You vary selectivity 100:1 and frequency over the entire usable audio range. This lets you reject whistles with dual notches (to 70 dB), or reject SSB hiss and splatter with a fully adjustable lowpass plus aux. notch. Imagine what the NARROWEST CW FILTER MADE will due to QRM! HP rejects low frequencies. Skirts exceed 80 dB. 1 watt speaker amp.

Built-in 115 VAC supply 6½x5x2½. Two-tone grey styling. Even latest rigs include only a fraction of the QF-1A selectivity. Yet it hooks up in minutes to ANY rig--Yaesu, Kenwood, Drake, Swan, Atlas, Tempo, Heath, Collins, Ten-Tec, etc. Just plug it into your phone jack and connect spkr. or phones to the output. Join the thousands of owners who now hear stations they couldn't copy without a QF-1A! It really works! If it can't pull him out, nothing can.

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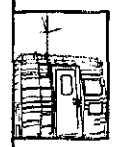
Presenting the family of Spider™ Multi-Band Antennas

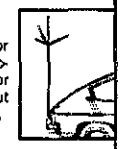
Four amateur bands (10, 15, 20, and 40 meters) at your command without having to change resonators or retune — just band switch your rig. Also available are the 75, 12, 17 and 30 meter bands. Needs no antenna tuner. Custom made with highest quality workmanship and materials.

Wherever you roam, on Land or Sea . . . or even at Home



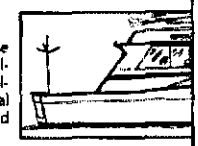
On Land

Suitable for use on any motor vehicle from a compact automobile to a motor home or trailer. Work four bands without stopping to change resonators.



Or Sea

The Spider™ Maritimer is for use on or near the ocean. Highly polished stainless steel and nickel-chrome plated brass. Commercial marine frequencies (8, 12, 16 and 22 MHz) are also available.



At Home

If you live in an apartment, condominium or restricted area, the Spider™ may well be the answer to your antenna problems.

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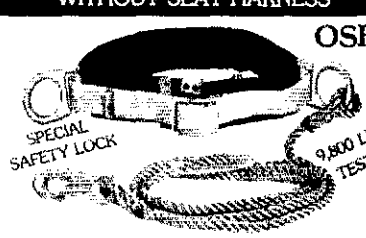

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AN IC-32AT IS MORE THAN JUST A PRETTY FACE.

Kent Gilpin, KA4LHI, knows his ICOM IC-32AT is not just an ordinary transceiver, it's one Tough Radio.

As an amateur radio operator and an investigator, Gilpin carrys his trusty IC-32AT dual bander with him everywhere. Such was the case one sunny day.

On August 4th, 1990, Gilpin was mowing the lawn with his riding lawn mower when his IC-32AT slipped from his belt falling to the ground. Hearing a strange noise from under the lawn mower, he immediately stopped. "It sounded like the lawn mower was chewing up a piece of metal," said Gilpin. When he checked to see what had happened he was devastated to see his new IC-32AT laying in the grass. The LCD display was destroyed along with the left face of the transceiver.

Doubtful that any radio would work after being mowed over, Gilpin turned on the radio to see if miracles do happen. He was astonished! "Even though the face of the radio was mangled, my ICOM IC-32AT still receives memory channels and it even transmits! It's one tough ICOM!"

DO YOU HAVE A TOUGH RADIO STORY? If so, we'd like to hear from you. Send your best ICOM "Tough Radio" story to:

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ICOM

One Tough Radio

NOTHING COMPARES TO AN ICOM HF...

...EXCEPT ANOTHER ICOM HF!

	IC-781	IC-765	IC-751A	IC-735	IC-725/IC-726
AC Power Supply	Built-in	Built-in	Optional PS-35 (fits internally)	Optional PS-55	Optional PS-55
Automatic Antenna Tuner	Built-in	Built-in	Optional AT-500 (Home) AH-2 (Mobile)	Optional AT-150 (Home) AH-2 (Mobile)	Optional AT-150 (Home) AH-3 (Mobile)
IF Shift or PassBand Tuning	Twin PBT plus IF Shift!	IF Shift	PBT	PBT	No
Wide SSB Filter	2.8 KHz with Optional FL-103	No	2.8 KHz with Optional FL-70	No	No
Narrow SSB Filter	2.4 KHz Built-in	2.3 KHz Built-in	2.3 KHz Built-in	2.3 KHz Built-in	2.3 KHz Built-in
Narrow/500 Hz CW Filter	Built-in	Built-in	Built-in	Optional FL-32A	Optional FL-100
Narrow/250 Hz CW Filter	Built-in	Optional FL-53A and/or FL-101	Optional FL-53A	Optional FL-63	Optional FL-101
Tunable Notch Filter	Yes	Yes	Yes	Yes	No
Semi or Full CW Break-in and speed	Both. Full QSK to 60 WPM	Both. Full QSK to 60 WPM	Both. Full QSK to 40 WPM	Both. Full QSK to 40 WPM	Semi QSK
RF or IF Speech Compression	RF Level	RF Level	RF Level	IF Level	No
Voice Synthesizer Frequency Readout	Optional UT-36	Optional UT-36	Optional Ex-310	No	No
RTTY: AFSK or FSK and shifts	Both. FSK shifts: 170, 425, 850 Hz	Both. FSK shifts: 170, 850 Hz	Both. FSK shifts: 170, 850 Hz	AFSK	AFSK
KHz per dial revolution	2.5 and 5.0 KHz	2.5 and 5.0 KHz	5 KHz	5 KHz	5 KHz

How does your HF transceiver compare? You may find a visit to your local amateur dealer is just what you need. Selecting your new HF is a cinch. First select ICOM, the manufacturer with the finest quality, service and customer support. Then use the chart above to compare all ICOM HF models and select the model with features matching your interests.

All ICOM HF transceivers feature independently programmable and fully tunable memories, dual VFOs, general coverage reception, 100 watts output (the IC-781 is 150 watts), and top quality, field-proven reliability. All ICOM HF transceivers have a full one-year factory warranty backed by four North American service centers.

For additional information on all ICOM equipment, simply call our toll-free literature request hotline at 1-800-999-9877.

Are you receiving ICOM's RADIO NEWS? This eight-page newsletter is loaded with great information on new rigs, special tips on mobiling, satellites, packeting, contesting and much more. For a free copy, send your name and address to ICOM.

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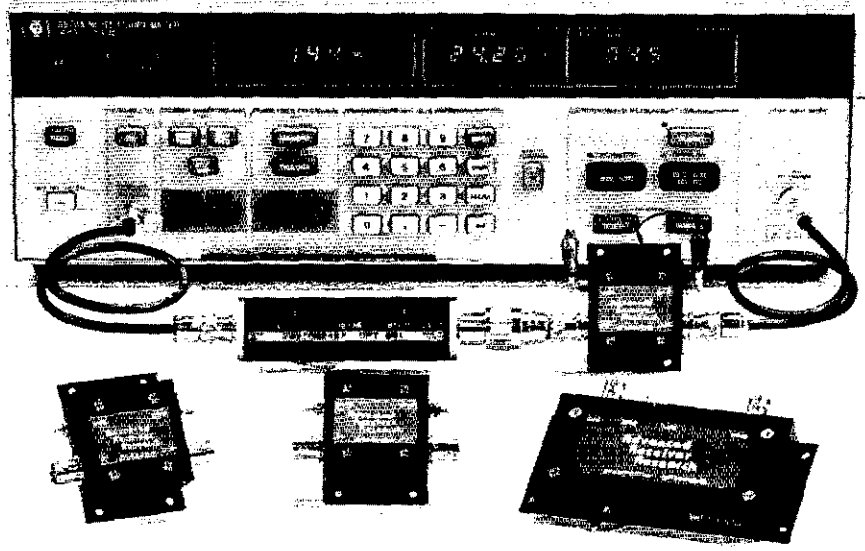
High Performance vhf/uhf preamps



Receive Only	Freq. Range (MHz)	N.F. (dB)	Gain (dB)	1 dB Comp. (dBm)	Device Type	Price
P28VD	28-30	<1.1	15	0	DGFET	$29.95
P50VD	50-54	<1.3	15	0	DGFET	$29.95
P50VDG	50-54	<0.5	24	+12	GaAsFET	$79.95
P144VD	144-148	<1.5	15	0	DGFET	$29.95
P144VDA	144-148	<1.0	15	0	DGFET	$37.95
P144VDG	144-148	<0.5	24	+12	GaAsFET	$79.95
P220VD	220-225	<1.8	15	0	DGFET	$29.95
P220VDA	220-225	<1.2	15	0	DGFET	$37.95
P220VDG	220-225	<0.5	20	+12	GaAsFET	$79.95
P432VD	420-450	<1.8	15	−20	Bipolar	$32.95
P432VDA	420-450	<1.1	17	−20	Bipolar	$49.95
P432VDG	420-450	<0.5	16	+12	GaAsFET	$79.95
Inline (rf switched)						
SP28VD	28-30	<1.2	15	0	DGFET	$59.95
SP50VD	50-54	<1.4	15	0	DGFET	$59.95
SP50VDG	50-54	<0.55	24	+12	GaAsFET	$109.95
SP144VD	144-148	<1.6	15	0	DGFET	$59.95
SP144VDA	144-148	<1.1	15	0	DGFET	$67.95
SP144VDG	144-148	<0.55	24	+12	GaAsFET	$109.95
SP220VD	220-225	<1.9	15	0	DGFET	$59.95
SP220VDA	220-225	<1.3	15	0	DGFET	$67.95
SP220VDG	220-225	<0.55	20	+12	GaAsFET	$109.95
SP432VD	420-450	<1.9	15	−20	Bipolar	$62.95
SP432VDA	420-450	<1.2	17	−20	Bipolar	$79.95
SP432VDG	420-450	<0.55	16	+12	GaAsFET	$109.95

Every preamplifier is precision aligned on ARR's Hewlett Packard HP8970A/HP346A state-of-the-art noise figure meter. RX only preamplifiers are for receive applications only. Inline preamplifiers are rf switched (for use with transceivers) and handle 25 watts transmitter power. Mount inline preamplifiers between transceiver and power amplifier for high power applications. Other amateur, commercial and special preamplifiers available in the 1-1000 MHz range. Please include $2 shipping in U.S. and Canada. Connecticut residents add 7-½% sales tax. C.O.D. orders add $2. Air mail to foreign countries add 10%. Order your ARR Rx only or inline preamplifier today and start hearing like never before!

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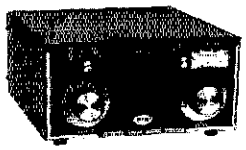
ANTENNA TUNERS

1500W.



MODEL VS1500A ANTENNA COUPLER

The Barker & Williamson VS1500A antenna coupler is designed to match virtually any receiver, transmitter or transceiver in the 160 to 10 meter range (1.8 to 30 MHz) with up to 1500 watts RF power to almost any antenna, including dipoles, inverted vees, verticals, mobile whips, beams, random wires and others, fed by coax cable, balanced lines or a single wire. A 1:4 balun is built-in for connection to balanced lines.

FEATURES INCLUDE:

- Series parallel capacitor connection for greater harmonic attenuation.
- In-circuit wattmeter for continuous monitoring.
- Vernier tuning for easy adjustment.

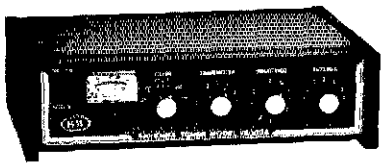
Front panel switching allows rapid selection of antennas, or to an external dummy load, or permits bypassing the tuner.

Dimension (Approx.): 11" wide x 13" deep x 6" high

Weight: 6 ½ lbs.

Price: **$499.00** SHIPPING & HANDLING $4.00

FOB Factory. Fully warranted for one year.



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EB63	140W	$ 88.65	
EB27A	300W	$139.20	
EB104	600W	$446.15	
AR305	300W	$383.52	

NEW!! 1K WATT 2–50 MHz Amplifier

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FR–1 (Wired/tested)	$149.95	

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Model 99 Heat Sink(5.5x12x1.6)	$ 22.00	
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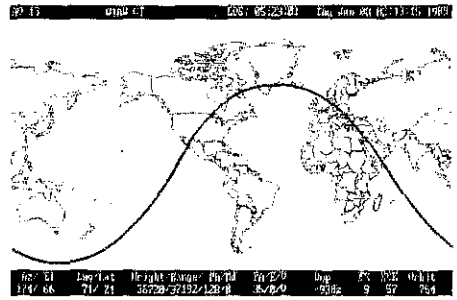

Line representation of QuikTrak 4.0 World Map

QuikTrak 4.0

Whether you want to identify the next time Oscar 13 will provide communications between two cities or if you just want to know the next time you can visually sight the Soviet space station MIR, QuikTrak will let you plug in the latest Keplerian elements for up to 100 satellites using a new full screen editor. QuikTrak also supports autotracking. *Hardware requirements*, IBM PC, AT, PS/2, or clone with a minimum 512K memory. CGA or EGA graphics required. Numeric coprocessor not required but recommended.

InstantTrack 1.0

For those concerned with greater speed and capability, InstantTrack offers all of QuikTrak's features plus instant visibility for your "favorite" satellites before you issue the first keystroke. More than 200 satellites and 1754 cities are on the menu and will be in full-color high-resolution EGA or VGA modes. *Hardware requirements:* IBM PC, AT, PS2 or clone with at least 512K memory. EGA or VGA graphics required. Numeric coprocessor not required but recommended. Mouse not required but can be used on the map screens.

These are only a few of the features of QuikTrak and InstantTrack. The figures below reflect suggested donations to defray production expenses and benefit AMSAT's non-profit, educational activities.

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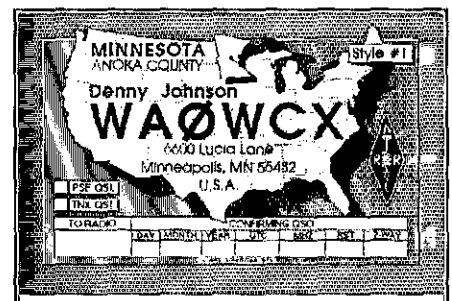

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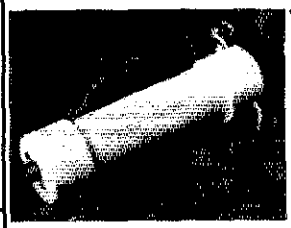

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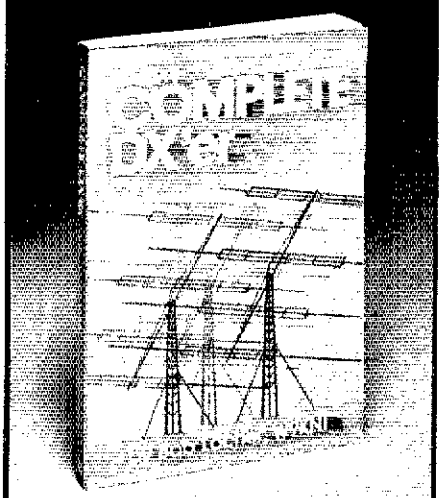
DX!



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Now that we have your undivided attention, here's the book you've been waiting for! W9KNI has done it again by updating the pre-eminent book on DXing. Covers basic listening and equipment, pile-up techniques, hunting, antenna and tower notes, more hunting techniques, advanced listening, QSLing, special language techniques, DX-pedition operating and more! Join with Bob in the joy of the chase and capture of that new one. This book is what DXing is all about — fun! Price is $12*.

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All the DX info you need in one spot! DXCC listing with bearings, ranges, sunrise/sunset by day for each country (gray line), postal info, extensive logging system and log printing power (1 day, between two dates, countries), print DXCC/WAZ Oblast need list by band/mode, high-speed on-screen color displays with appropriate monitor, ITU callsign allocations, 3rd party and reciprocal lists, UTC clock, 52-page manual, help screens for all functions. Requires IBM-PC/XT/AT or true compatible, 640K memory, DOS 3.0 or greater, hard disk recommended, supports 132 column printer, Epson 80 column compatible or HP LaserJet II. Available on 5¼ or 3½ format, not copy protected. $60*.

*See the ARRL Bookshelf page elsewhere in this issue for ordering information.

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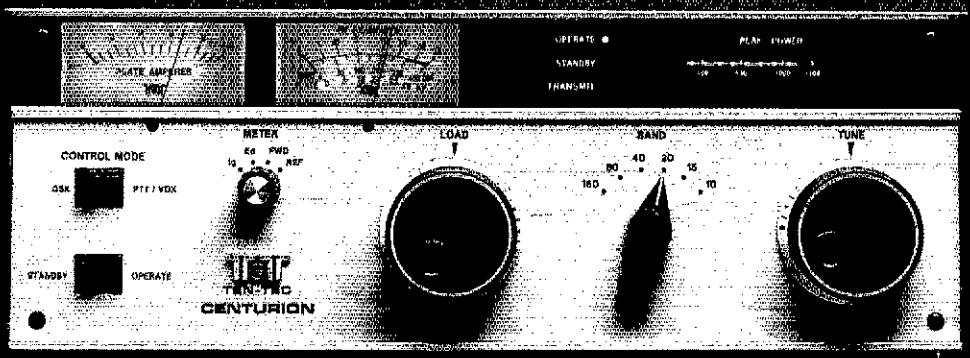
THE DXCC COMPANION

How to Work Your First Hundred Countries

By Jim Kearman, KR1S

Just bitten by the DX bug? Then the **DXCC Companion** is just the book for you! It's filled with practical, easy to understand information for the beginning DXer. Follow the advice given by KR1S and you'll have your first hundred countries confirmed in no time. You'll learn about equipment, antennas, propagation and the rights and wrongs of QSLing. Available at your dealer or from ARRL Order #3398-for $6 (add $2.50 for postage and handling, $3.50 for UPS)



Now, A Choice of Three Great Amplifiers– One is Ideal for Your Operating Interests!

NEW!

Centurion ... The Classic Kilowatt!

The Model 422 Centurion uses the classic pair of Eimac® 3-500Z tubes. The RF deck and power supply are combined into a single, attractively styled, desk top cabinet. The power output is rated at 1300 watts on ssb, 1000 watts cw and 650 watts using "key-down" modes. Drive required for full power ssb operation is 100 watts. The duty cycle is 50%.

Semi-break-in cw is achieved using a fast acting, non-vacuum, relay and the excellent QSK electronics used in the Hercules II. This system is also suitable for the fast switching digital modes. (For the "heavy duty" QSK cw operator, an accessory board is available incorporating a Jennings vacuum relay.) VOX ssb operation is silky smooth and virtually noiseless. This versatile control system assures compatibility with all exciters with amplifier control provisions.

A tube-axial fan is used for forced air cooling. Air flow is routed through the power supply as well as the upper and lower sections of the RF compartment. Air inlets and outlets are in the sides and top of the cabinet to optimize low pressure, low noise, air movement.

A dedicated meter for plate current, a multi-meter for plate voltage, grid current and forward or reflected power. A full time 10 element LED bargraph instantly displays peak power output.

The Centurion operates on all bands from 1.8 to 21.5 MHz. 21.5 to 29.7 MHz is enabled with the installation of an expansion board, supplied no-charge upon proof of licensed authority.

A tough, easy to handle, amplifier that doesn't really mind a little abuse. The Centurion is a great value.

SPECIFICATIONS

Band Coverage: 1.8-2.0, 3.2-4.7, 6.5-10.3, 13.4-19.6, 17.6-21.5 MHz. 21.5-29.7 MHz after authorized modification.
Input Power: 2000 watts, maximum.
Power Output: 1300 watts ssb, 1000 watts cw. RTTY and SSTV 650 watts, 50% duty cycle.
Drive Power: 100 watts for full rated output.
Efficiency: 50-65%, depending on frequency and load impedance.
Input/Output Impedances: 50 Ohms, unbalanced. SWR ◄2:1.
Distortion: -35 dB from 1 kw rf output level.
Harmonics: -50 dB typical.
CW Break-In: QSK capable. Relay switching.
Tube Compliment: Two Eimac® 3-500Z.
Power Amplifier Circuit: Class AB2, grounded grid.
Plate Voltage: 3100 volts, no load. 2600 volts, full load.
Cooling: Forced air with full chassis air flow.
Metering: Dedicated plate current meter. Selectable multi-meter for plate voltage, grid current, forward or reflected power. Ten element LED bargraph display for peak power indication.
Front Panel Status Indicators: Standby, operate, transmit.
Primary Power: 220-250 Vac @ 15 A. 110-125 Vac @ 30 A, 50/60 Hz. For full power operation, 220-250 Vac is strongly recommended.
Circuit Protection: Primary line fuses. Plate transformer primary interlock and high voltage shorting bar.
Front Panel Controls: Power on/off, standby/operate, control mode select (QSK - PTT/VOX), plate TUNE and LOAD, band switch, meter switch.
Tune and Load Controls: 6:1 vernier drives with calibrated dial skirts.
Construction: Aluminum chassis, front and rear panels, interior partitions and top and bottom covers.
Size: HWS 8.25" x 15.25" x 18.5". (20.3 x 38.7 x 46.9 cm).
Weight: 47 lbs (21.3 kg).

Hercules II Solid State, No Tuning!

High tech simplicity, base or mobile. A compact, lightweight HF amplifier that offers a unique combination of virtues that can only be achieved using modern, solid state technology. Instant on, 12 - 14 Vdc operation, general coverage from 160 through 10 meters, no-tune operation and compact size. Add to that, lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The Hercules II is attractively styled to match our HF base station transceivers and will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A ten element LED bargraph instantaneously displays peak power output. Band selection is either with the front panel switch or remotely via a rear panel connector. A front panel speaker is built in.

The internal heat sinks are air cooled by a temperature controlled tube axial fan. Whisper quiet in ssb operation, yet enough air capacity for cool operation in the key-down modes. The Hercules II is compact, good looking and generates a signal that is within one S-unit of the mighty Titan.

MODEL 9420 115/230 VAC POWER SUPPLY

Housed in a separate utility enclosure and remotely controlled through the 6 foot power cable. 100 amperes at 13.7 Vdc is provided. 80 amperes for the amplifier and 20 amps for the exciter. An alternate power supply can be a heavy duty, deep cycle, lead acid battery and an automatic 10 amp charger. This low cost alternative power source will support the Hercules II during sustained amateur service.

The Mighty Titan ... Simply Unbeatable!

The Titan has it all! Maximum legal power with ease, all full power bands 160 through 15 meters (10 and 12 meters after authorized modification), lightning fast QSK for break-in cw and the digital modes and a two speed blower for quiet operation. This awesome performance from a desk top amplifier is made possible by the remote power supply and a pair of Eimac® 3CX800A7 ceramic triodes. The heart of the power supply is our own four core, tape wound Hypersil® transformer. This 41 lb behemoth is conservatively rated at 2.5 kVa CCS (9.2 kVa IVS) and is nearly noiseless, even at 1500 watts output!

Other features include a front panel, peak reading wattmeter using an instantaneous ten element LED bargraph display. PTT/VOX or QSK control line select switch, built-in SWR meter and an "over-drive" warning LED. 3:1 vernier TUNE and LOAD controls in combination with an outstanding RF deck design, make the Titan a real "pussy cat" to load and operate.

The Titan is styled to match our transceivers but it interfaces beautifully, no matter what exciter you are using. If you are ready to choose your dream amplifier, the Titan has it all! Check it out.

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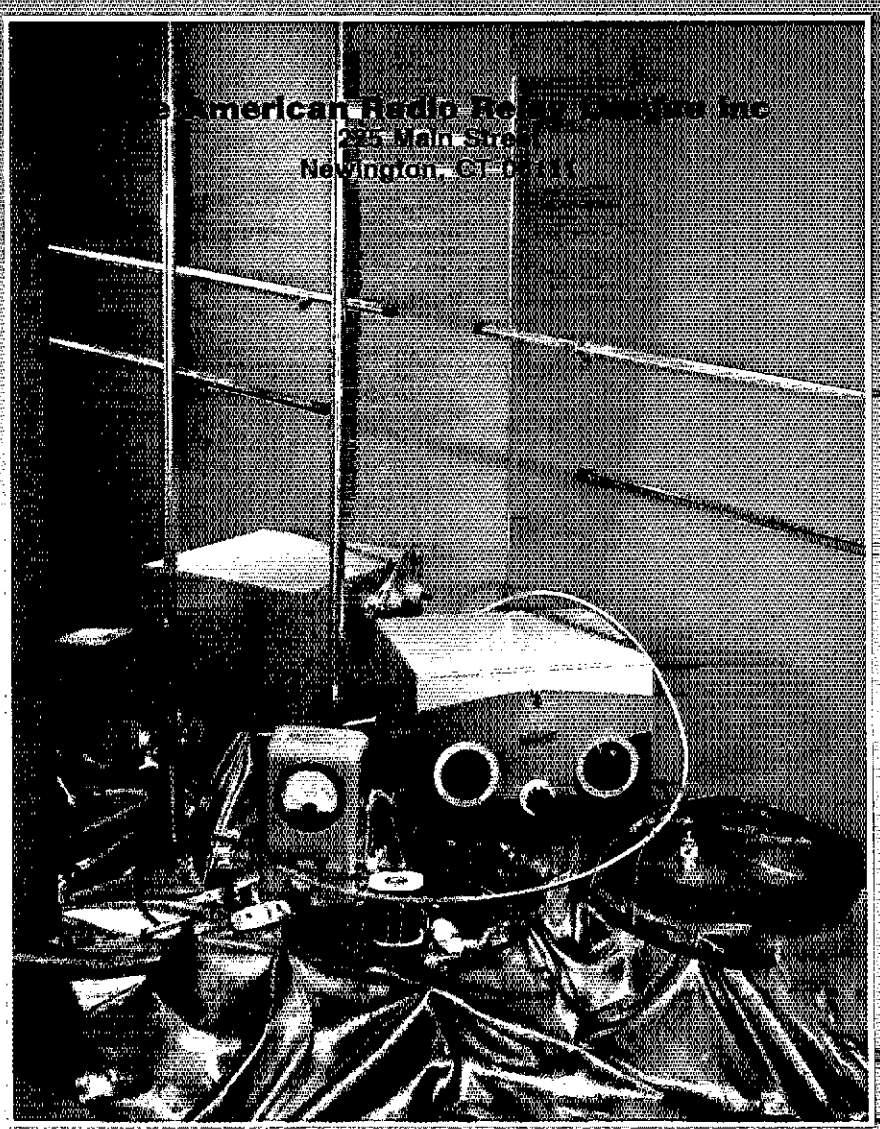
REFLECTIONS—Transmission Lines and Antennas

by W. Walter Maxwell, W2DU

A Book that puts "King SWR" in perspective

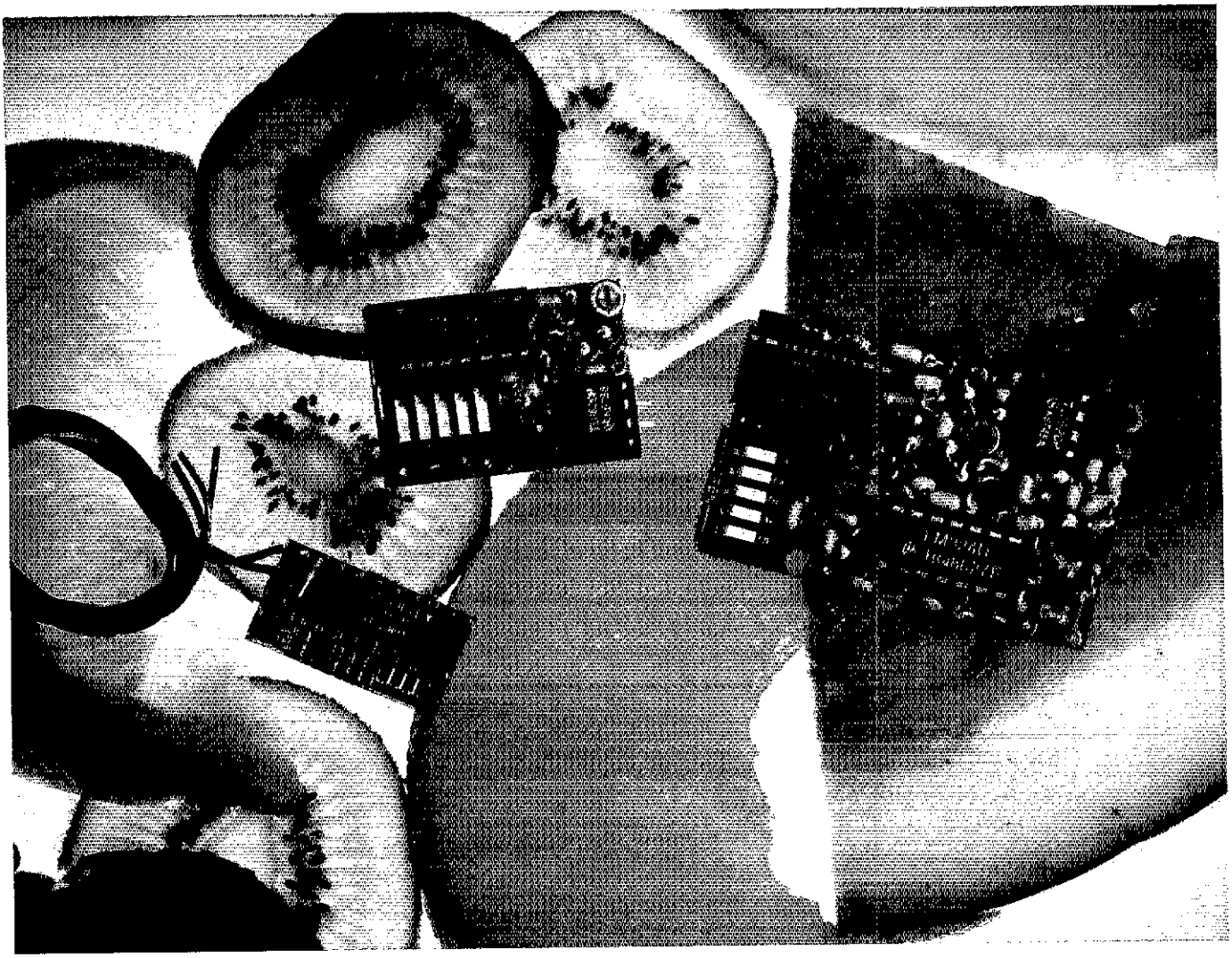
Reflections is written to clear the air of the half-truths and outright myths we hear these days about transmission lines, standing waves, antenna matching, reflected power and antenna tuners. The first seven chapters are based on "Another Look at Reflections"—one of the most popular series ever published in QST. The remaining seventeen chapters contain new and previously unpublished material which concludes the series. Besides giving "King SWR" a serious cross-examination, the book has a wealth of information on matching networks, antennas, and use of the Smith Chart. Software, described in Chapter 15, is available separately.

In order to improve knowledge of reflection mechanics and transmission-line propagation, Maxwell explains: Why reflected power by itself is an unimportant factor in determining how efficiently power is being delivered to the antenna. The effect of line attenuation to discover why it is the key factor which tells us when and how much to be concerned with reflected power. Why all power fed into the line, minus the amount lost in line attenuation, is absorbed in the load regardless of the mismatch at the antenna terminals. Why reflection loss (mismatch loss) is canceled at the input of the line by reflection gain. Why a low SWR reading by itself is no more a guarantee that power is being radiated efficiently than a high SWR reading guarantees it is being wasted. Why SWR is not the culprit in transmitter-loading problems—why the real culprit is the change in line-input impedance resulting from the SWR and why we have complete control over the impedance without necessarily being concerned with the SWR. The importance of thinking in terms of resistive and reactive components of impedance instead of SWR alone, and why SWR by itself is ambiguous, especially from the viewpoint of the selection and adjustment of the coupling and matching circuitry of an external line-matching network.



Reflections—Transmission Lines and Antennas was written by Walt Maxwell, W2DU, a noted antenna designer for RCA Laboratories. From 1960 until retirement in 1980, Walt was in charge of the Astro-Electronics Division Space Center Antenna Laboratory and Test Range.

This book is available in hardcover, Over 384 pages, $20 at your dealer or from ARRL. Order no. 2995. A companion 5-1/4 inch diskette is available for use on IBM® PCs and compatibles for $10 Order no. 3118. Add $2.50 ($3.50 for UPS) for shipping and handling.



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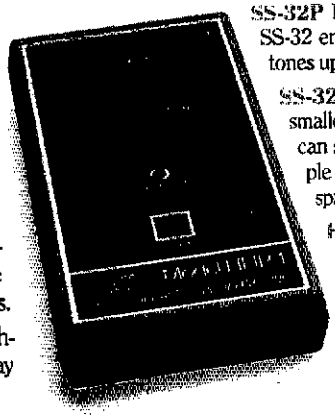

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Besides the computer programs mentioned above, we have four sets of tapes that give practice from 5 to 22 Words Per Minute. On sets 1, 2, and 3 (at speeds up to 18 WPM) the individual characters are recorded at a rate of 18 WPM, but the spacing between the letters is increased to slow the overall average code speed. This makes it easier to learn the code at higher speeds. At speeds greater than 18 WPM and in set 4, standard code timing is used.

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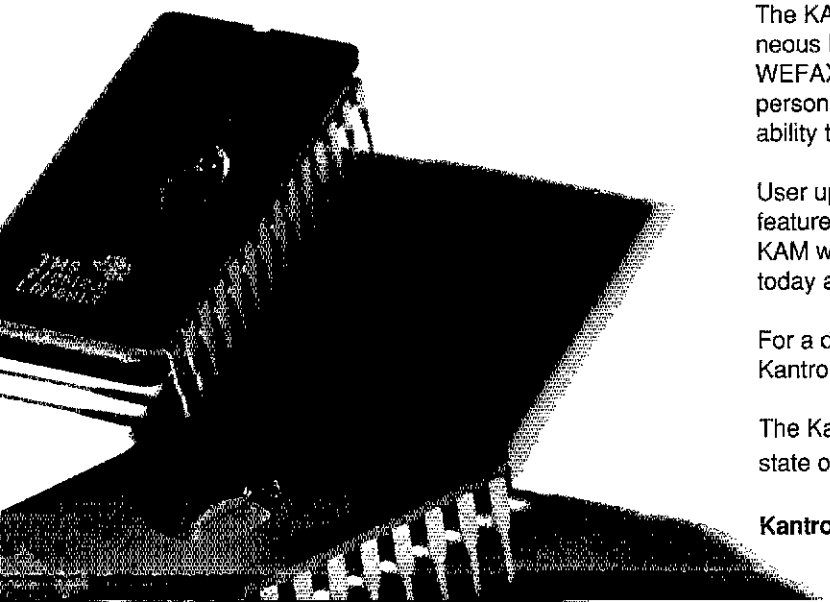
Designed with flexibility and programmability from its first appearance in 1985 through 4 major firmware upgrades to date, the Kantronics All Mode (KAM) represents the TNC which has evolved to meet the current state of the user's art.



The KAM is the only dual port unit capable of simultaneous HF and VHF packet, RTTY/ASCII, AMTOR, CW, WEFAX (weather facsimile) Kiss mode for TCP/IP, a personal packet bulletin board system (PBBS) and the ability to be both a KA-NODE and Gateway.

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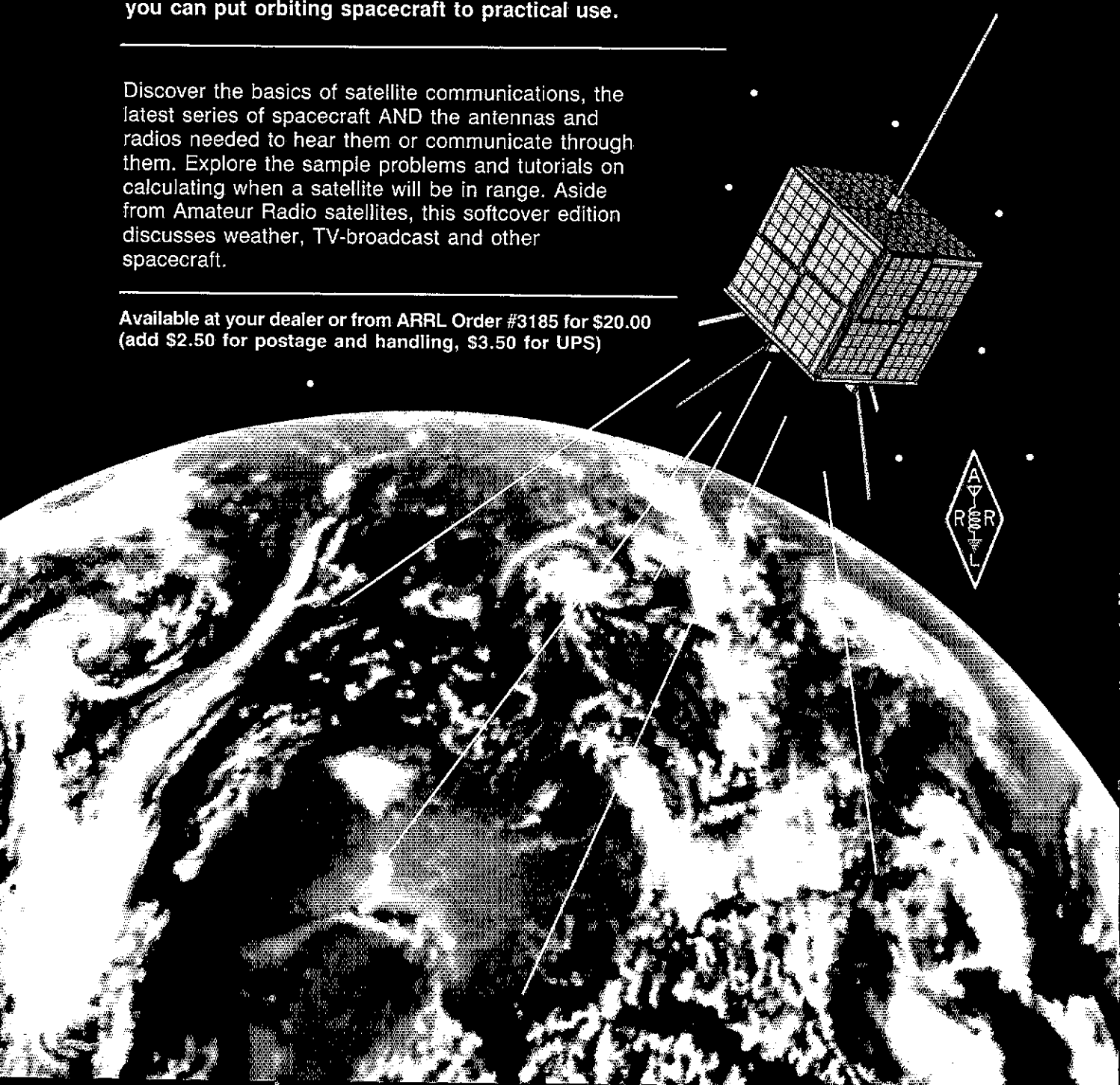
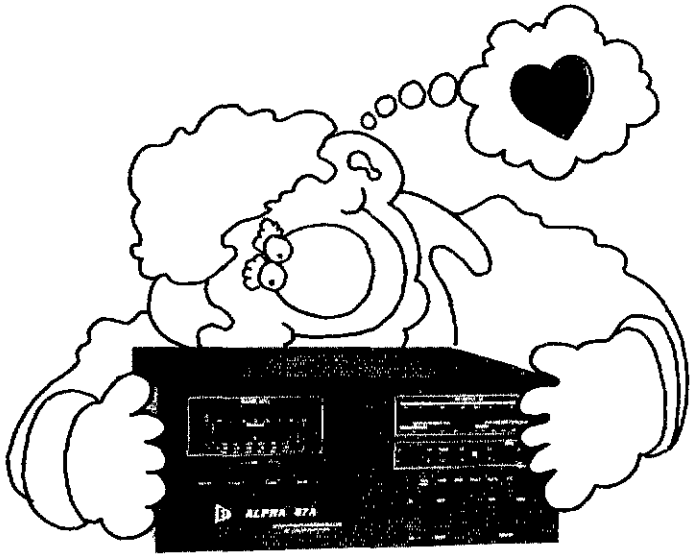
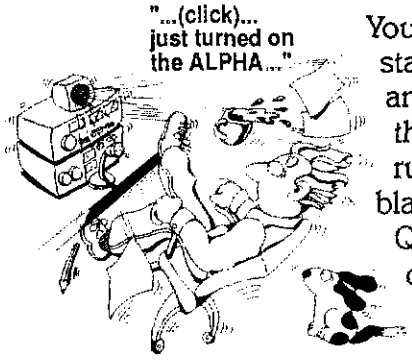


You'll love your new ALPHA 87A...



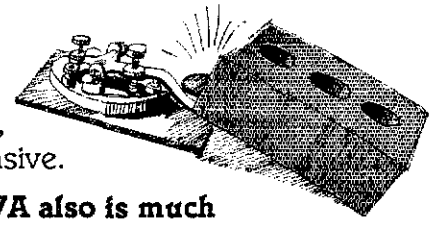
because it's so POWERFUL!



Your world-class station needs an amplifier with the power and ruggedness to blast through QRM for days on end and keep its cool...one you can take for granted. For almost two decades those qualities have made ETO's **ALPHA 77Dx** and **ALPHA 78** the world-wide standards for brute power and operator friendliness.

We've emphasized the **87A**'s microprocessor-controlled automatic bandswitching and other unique features. The remarkable thing is, you don't have to sacrifice one iota of power or ruggedness to get all that convenience.

The new ALPHA 87A delivers the same "brick-on-the-key" power as the famed 77Dx, yet the **87A** is smaller, lighter, and less expensive.



The ALPHA 87A also is much easier to use and more versatile than the ALPHA 78. It lets you QSY all over the HF bands--completely "hands-off" --without compromising power or efficiency.

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Contact Ray Heaton or Alysa Drew for a detailed ALPHA 87A brochure.

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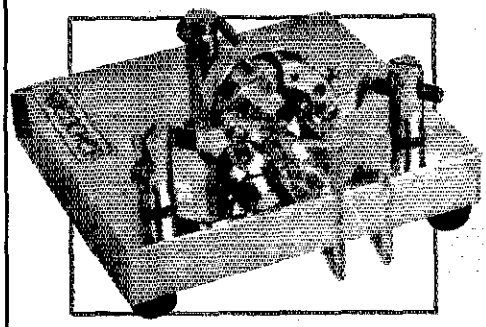

Discerning CW operators world wide have long recognized the **Bencher Iambic Paddle** as the finest paddle available. You can't find a smoother, more responsive paddle for flawless keying, certain to make your CW operating a real pleasure.

- Stainless Steel Adjustable Spring for Different Fists
- Non-Skid Feet
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The Bencher Iambic Paddle, the Finest Available

BY-1	Black Base	69.95
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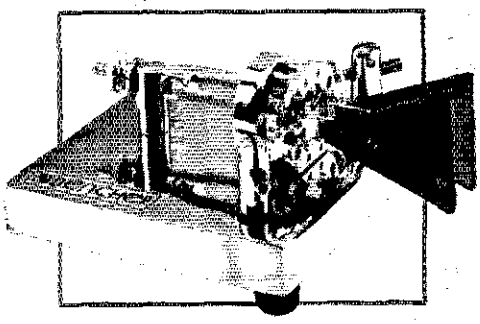


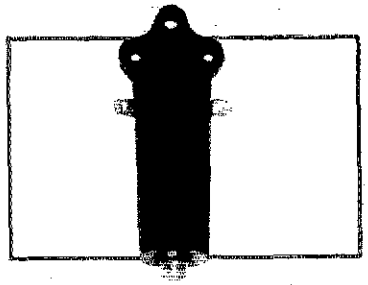
The Bencher Single Lever, Non-Iambic Paddle—For the amateur who prefers the more traditional approach to electronic keying.

ST-1	Black Base	69.95
ST-2	Chrome Base	84.95
ST-3	Gold Plated	250.00

CW is the language of amateur radio—and no one speaks it better than Bencher!

The **Bencher Balun** converts the unbalanced coax to a balanced feed, the antenna is properly driven and your power is radiated by the antenna — not the feed line.

- Finest non-rust materials
- Rugged Cycolac® case
- DC grounded for lighting protection
- Built-in Center insulator
- Amphenol coax connector
- Rated 5KW, works with antenna tuners



The Bencher Engineered 1:1 Balun 3.5-30 mHz

ZA-1A Balun	$34.95
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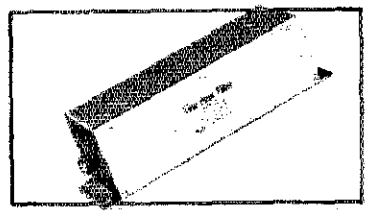
YA-1 **Low Pass Filter** $49.95

Working Range:	1.8 to 29.7 MHz
Impedance:	50 ohms
Power Rating:	1.5kw continuous, 5kw peak
Attenuation:	≥80db@54MHz



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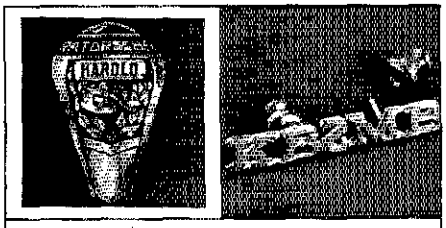

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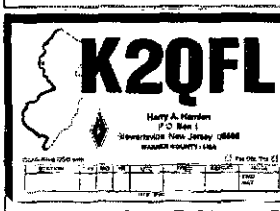

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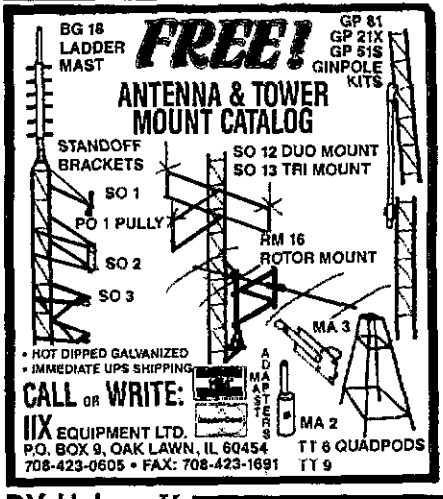

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The fourth volume in the Doug DeMaw notebook series, **The Design Notebook** is related to the **QRP Notebook**, but has even more equipment designs. Sound interesting? We think this book will be as big a hit among builders and experimenters as W1FB's previous works. There are 194 pages of text. The cover price is $10, order number 3207. Available from your dealer or order directly from ARRL. Add $2.50 ($3.50 for UPS) postage and handling.

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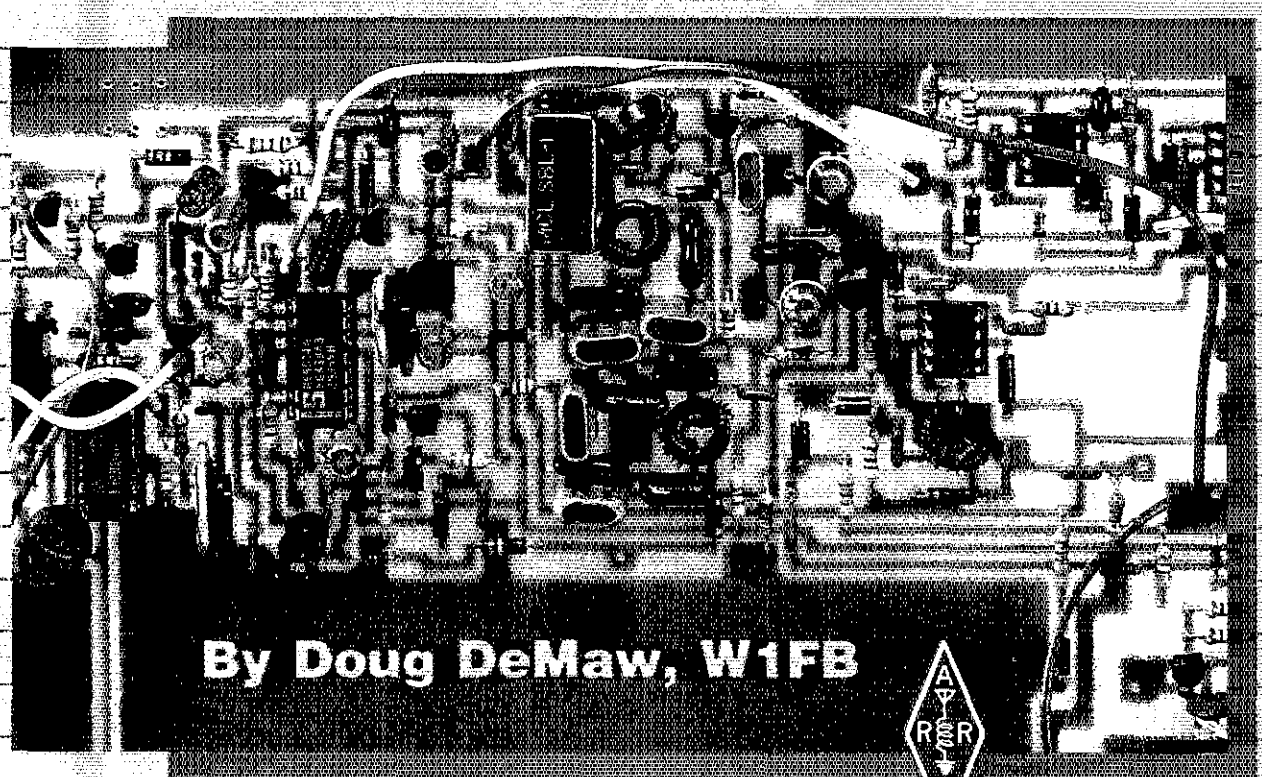

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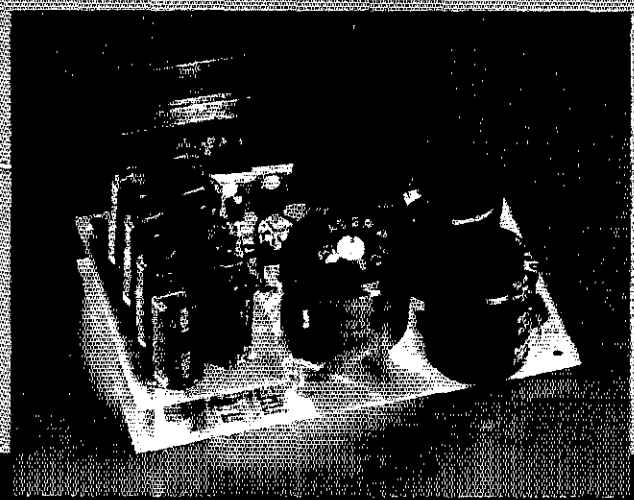

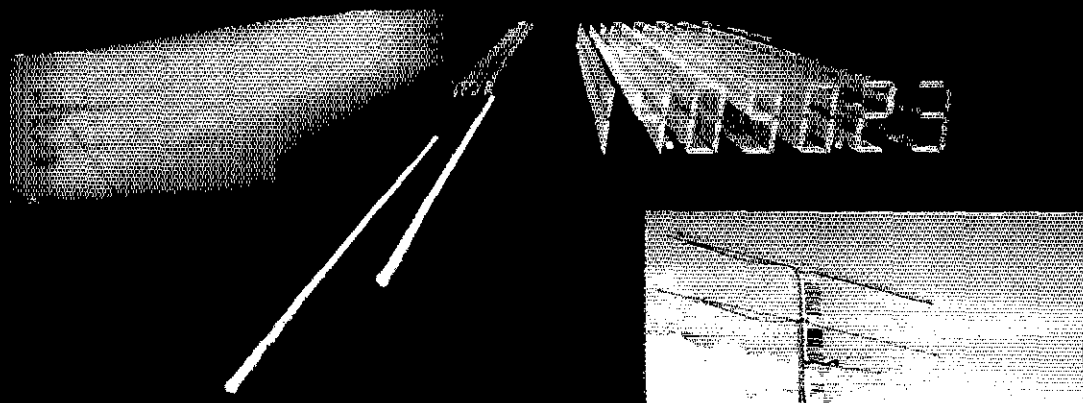

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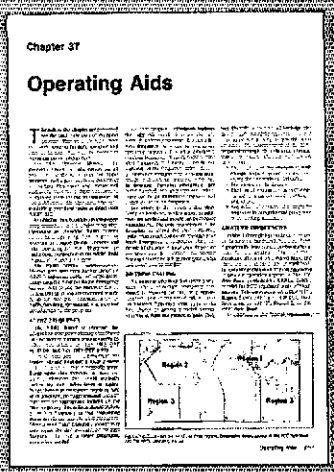

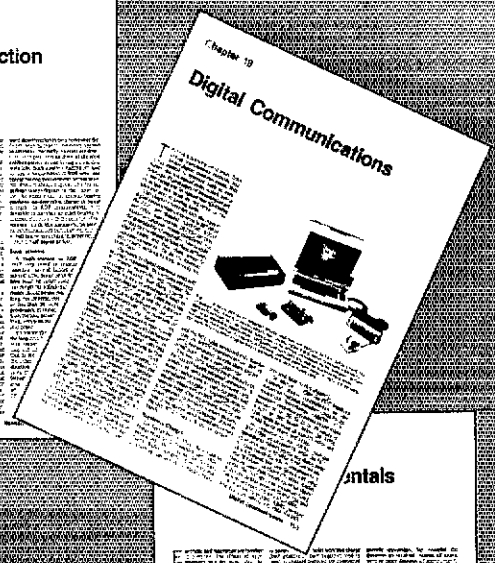

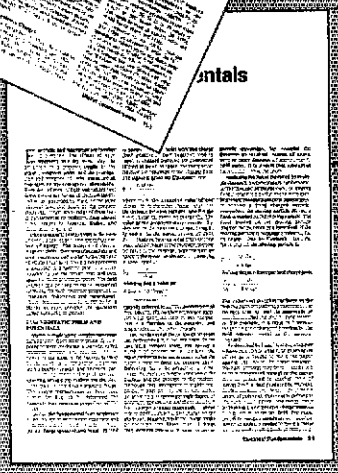

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You'll also find many popular construction projects that can be built in a weekend, such as power supplies, keyers, measuring devices, QRP transmitters and VHF/UHF preamps. For the more ambitious builder, there are projects like high-power HF and VHF amplifiers. Don't forget the **Handbook** as a source of component data. There is an entire chapter devoted to everything from tube and transistor specifications to aluminum tubing sizes. The 39 chapters feature over 2100 tables, figures and charts, and an expanded index rounds out the book.

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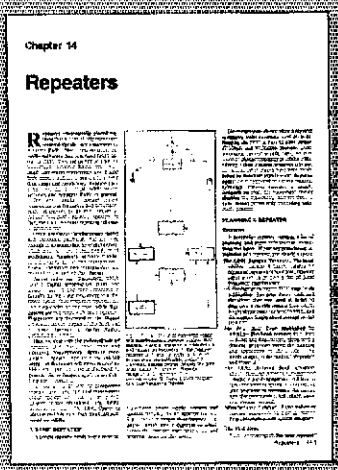

The ARRL Handbook for Radio Amateurs, 1991 Edition, is available in hard cover at your favorite dealer or directly from ARRL for $25. Order number 1689. Please add shipping and handling charges of $3.50 for surface mail, $4.50 in the US for UPS.

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Just a few of the projects in the *1991 Handbook*

(1) Flyback transformer for the Switched Mode Power Supply shown in (2). (3) 70-cm and 2-m J-Pole Satellite Antenna. (4) EIA Pin Connector Assignments. (5) Mobile RDF Setup. (6) Updated Frequency Counter. (7) 2-Mbit/s Microwave Data Link.

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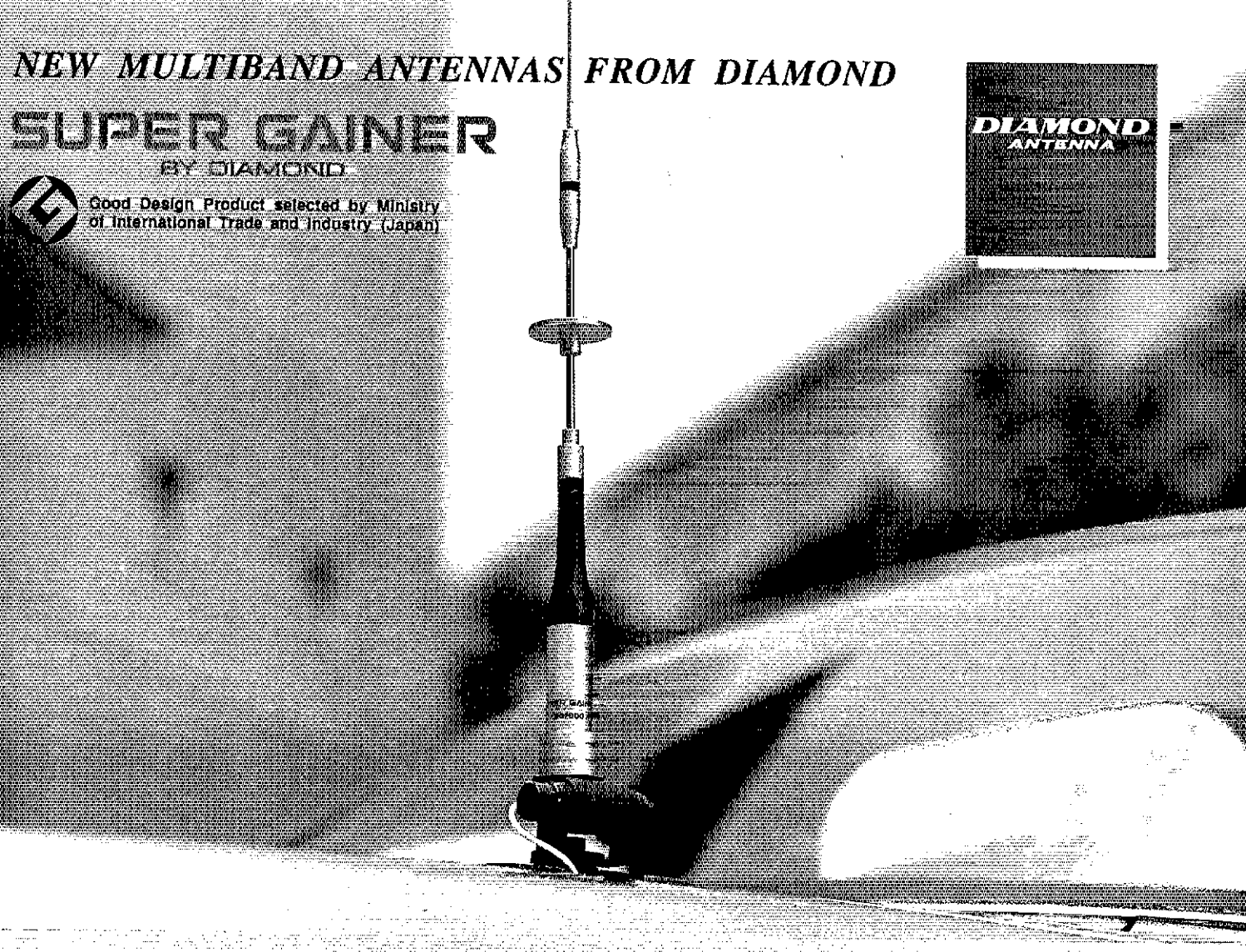

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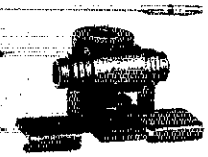

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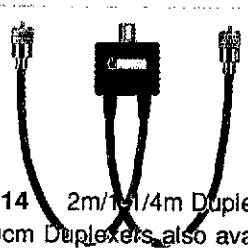

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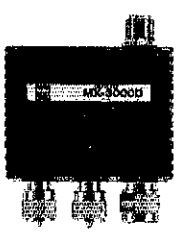

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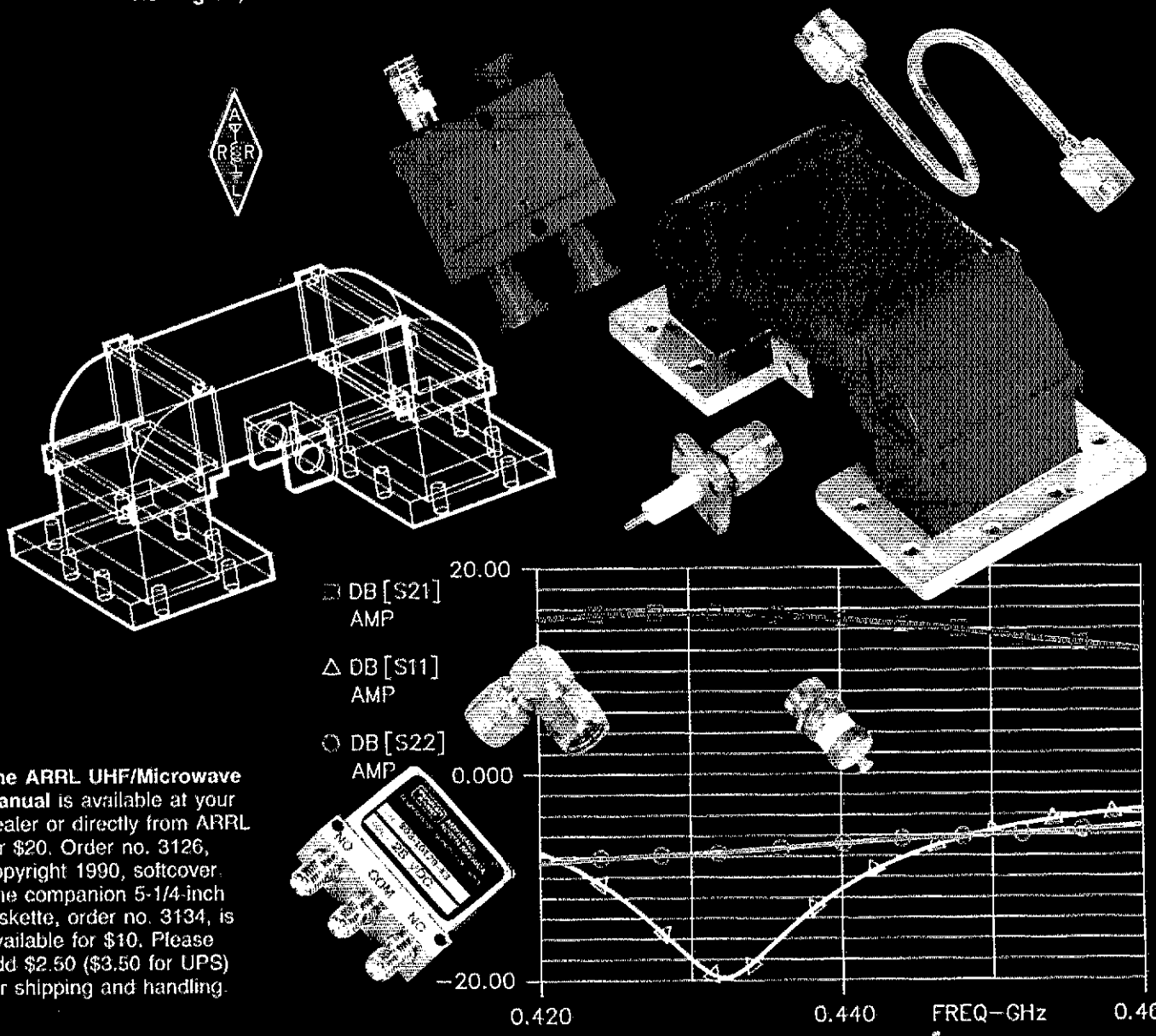

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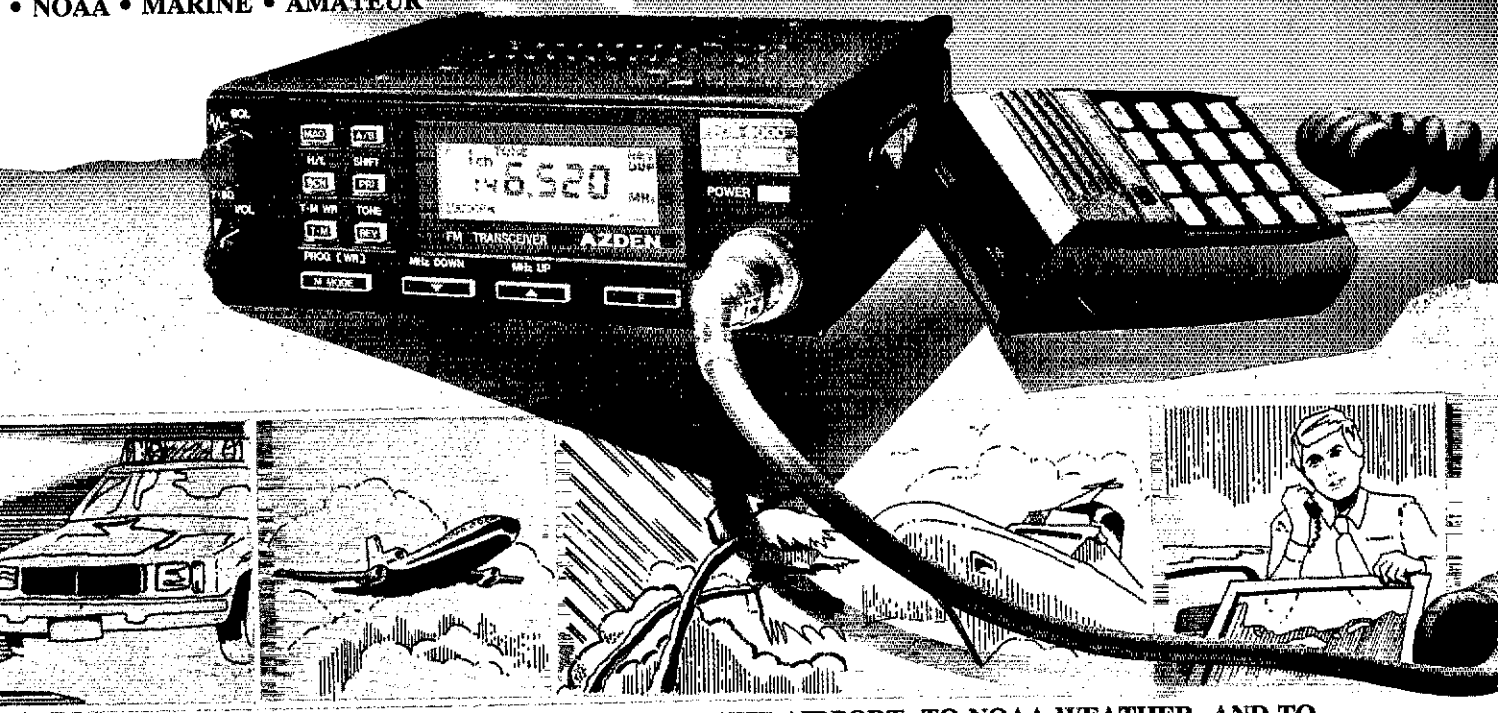

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PROFESSIONAL CW operators, retired or active, commercial, military, gov.'t, police, etc. invited to join Society Of Wireless Pioneers-W6WOW, 146 Coleen Street, Livermore, CA 94550.

JOIN The Old Old Timers Club, an international non-profit organization. If you operated a radio station, commercial, amateur or Armed Forces 40 or more years ago, and have an Amateur license at present you are eligible. Join the real pioneers of ham radio. Write O.O.T.C., 1409 Cooper Drive, Irving, TX 75061.

QCWA Quarter Century Wireless Association is an international nonprofit organization founded in 1947. You are eligible for membership if licensed 25 or more years ago, and presently licensed. It is not necessary to have been licensed for entire 25 years. Members receive QCWA publications and participate in QCWA activities. Come grow with us! Write QCWA Inc., 1409 Cooper Drive, Irving, TX 75061.

LITTLE BIG HORN NETS. Sundays: 21.352-2130Z and 14.057-2200Z. WA2DAC/Nm.

CITRUS COUNTY FLORIDA HAMFEST January 26, 1991. National Guard Armory, Seven Rivers Drive, off US 19 in Crystal River, FL. Set-up 3PM Friday and 7AM Saturday. Public at 9AM. Admission $4 (SASE) until Dec. 20, 1990, $5 thereafter. Indoor tables $8, outdoor flearnarket $5. Vendors must purchase admission. Ed Gaudet, 904-748-2371 or Phil Crawford, 904-489-6179 or SHARC Hamfest, 9 S. Davis, Beverly Hills, FL 32665.

CALL 1-800-423-2604

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5325 NORTH I-35 AUSTIN, TEXAS 78723

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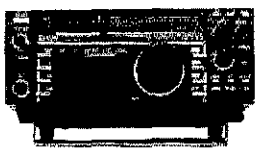
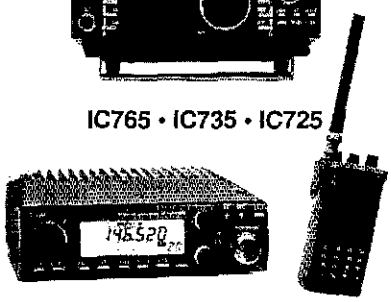


IC765 • IC735 • IC725



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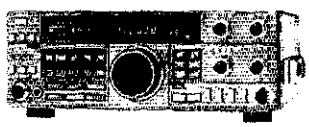

• TS950SD •
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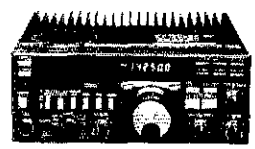
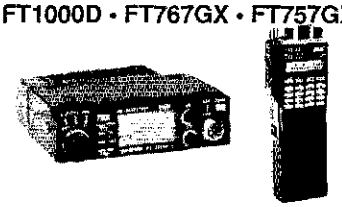
TH27A — TM731A — New! TM941A — TS440S w/AT — *Battery Promo! Call Now!* — TH225A



FT1000D • FT767GX • FT757GX/II



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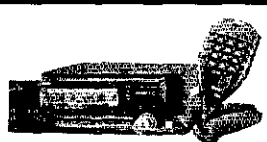

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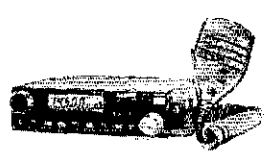

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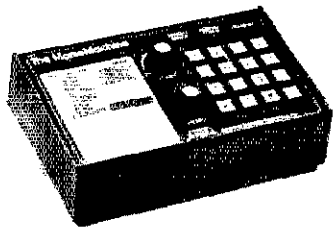


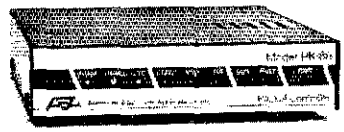
The Morse Machine MM-3 Keyer

The Morse Machine has all the features you need in a memory keyer, including 2 to 99 WPM speed selection and over 8,000 characters of soft-partitioned memory. Twenty memories store your messages...as short or as long as you like. Memory can be expanded to 36,000 characters. All memory is backed up by an internal lithium battery.

Comprehensive Morse training facilities *are built-in.* **A *Proficiency Trainer*** *for* random code group practice. **A Random Word Generator** which generates four-letter words and **A QSO Simulator** which allows you to call stations, answer a CQ or listen to realistic on-the-air QSO's.

The MM-3 also features automatic serial number insertion and incrementing in any memory message. Use the front panel knob to adjust your sending speed or enter a precise speed with the keypad, toggling between the two at any *time. Exchanges can be expedited by* having parts of your message sent at a higher speed. You can even add remote switches for four of the memories to send your response or call CQ. The MM-3 can also be programmed for automatic beacon use. The RS-232 compatible serial I/O port provides computer control of the MM-3 and monitoring of the Morse training features.

Packet

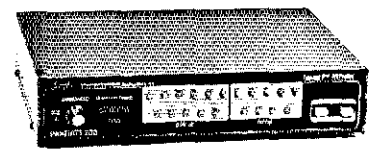


PK-88 Packet Radio TNC

Unique operating features with a proven hardware and software design make AEA's PK-88 your best choice in packet radio--now with MailDrop, an 8KByte efficient personal Mailbox. The PK-88 also allows multiple single frequency QSO's, digipeating and networking. It's a superb value, packed with all the most needed packet radio features such as direct interface capability with NET/ROM and TCP/IP. In addition to all the features of a "standard" TNC, the PK-88 offers features not found in any other *TNC:*

- WHYNOT command - Shows reasons why some received packets are not displayed.
- "Packet Dump Suppression" - Prevents dumping unsent packets on the radio channel when the link fails.
- CUSTOM Command - Allows limited PK-88 customization for non-standard applications.
- Enhanced MBX command- Permits display of the data in I- and UI-frames, without packet *headers and without packet headers* or retried frames.
- Enhanced MPROTO command - Suppresses display of non- ASCII packets from Level Three switches and network nodes.

Multi-Mode



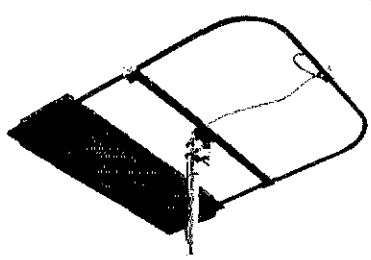
PK-232MBX Multi-Mode Data Controller

With over 40,000 units sold worldwide, the PK-232MBX is the world's leading multi-mode data controller. Combining all amateur data communication modes in one comprehensive unit, the PK-232MBX offers Morse Code, Baudot, ASCII, AMTOR/SITOR 476 and 625, HF and VHF Packet, WEFAX receive and transmit, TDM, as well as commercial standard NAVTEX automated marine information services.

All software is on ROM.

- 20 front panel status and mode LED indicators
- RS-232 compatible
- Exclusive SIAM™ Signal Identification and Acquisition Mode
- TDM Time Division Multiplex *decoding*
- PakMail™ mailbox with selective control of third-party traffic
- FAX printing - supports most printers
- Two radio ports
- Host mode for efficient program control of the PK-232MBX
- KISS mode for TCP/IP networking protocol compatibility
- 32K RAM lithium battery-backed
- Many features for the digital SWL

Antennas



IsoLoop™ 14-30 MHz Compact HF Antenna

AEA brings you the breakthrough in compact HF antenna design with its high-performance, low-profile IsoLoop HF antenna. Designed specifically for hams with limited space or antenna restrictions, the 32"-square IsoLoop covers all frequencies from 14 to 30 MHz, at up to 150 watts continuous.

No ground radials are needed and its balanced, shielded feed-loop isolates the antenna from the feedline. This ensures that your signal is radiated by the antenna, not the feedline, which helps eliminate TVI and stray RF in the shack.

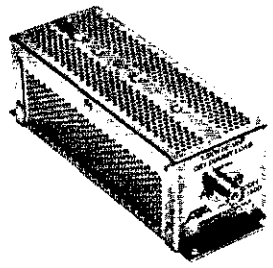
The inherent hi-Q of the IsoLoop makes it like a very sharp tunable filter that radiates. The narrow bandwidth suppresses harmonics from your transmitter, and also attenuates out-of-band signals that could overload your receiver.

The omni-directional IsoLoop makes an excellent attic or balcony antenna, and because it weighs only 12 pounds is also perfect for portable use.

Advanced Electronic Applications, Inc. 2006-196th St. SW/P.O. Box 2160 Lynnwood, WA 98036 206-775-7373

Better Experience

Dummy Load

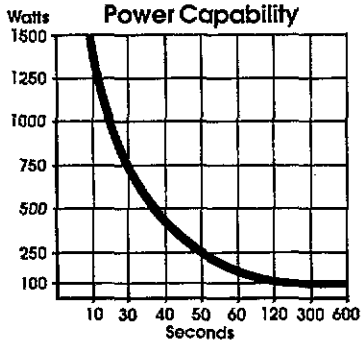


DL-1500

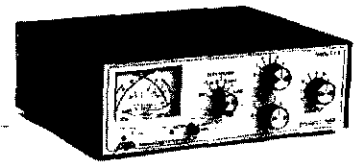
DC-650 MHz Up to 1500 Watts

AEA's dry dummy load simulates a perfect 50 ohm antenna up to 650 MHz *so you can test your transmitter without* radiating a signal on the air.

- DC-650 MHz
- Simulates matched 50 ohm transmission line to test your transmitter
- Handles short-term RF power up to 1500 watts
- VSWR of less than 1.3:1 at 650 MHz
- Compact and lightweight
- Air cooled dry load



Econo Tuner



ET-1 Antenna Tuner

300 Watts of All-Band Tuning

Meet your match with AEA's new ET-1 Econo-Tuner™. A quality, economical antenna tuner for under $150, the ET-1 Econo-Tuner is designed to match virtually any receiver, transmitter or transceiver from 1.8 to 30 MHz with up to 300 watts of RF power.

Compatible with almost ANY antenna including verticals, dipoles, inverted vees, beams and mobile whips that are fed by coax cable, balanced lines or a single wire. For easy connection to balanced lines, a 4:1 balun is built-in.

A front panel switch control allows you to switch between two coax-fed antennas (direct or through the tuner). You can also switch to a balanced line or wire antenna. The BYPASS position allows you to switch to a dummy load (such as AEA's *DL-1500* dry dummy load) or a direct connected coax antenna. In the BYPASS position, COAX 1 OUT or COAX 2 OUT can be selected so that *the tuner is bypassed, but not the meter* circuit.

The ET-1 features a precision dual-movement meter to simultaneously *monitor power and SWR.*

Unique engineering designs have made AEA one of the leading innovators in the amateur radio industry. That same *quality and superior technical support* make the ET-1 your best deal for an antenna tuner.

Antennas

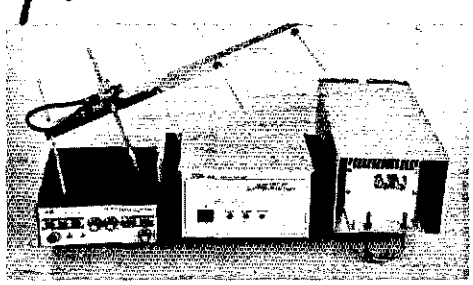
IsoPole™ Omni-Directional VHF and UHF Base Station Antennas

An outstanding mechanical and electrical design make the IsoPole the best *choice for an economical* omni-directional VHF or UHF base station antenna. All IsoPole antennas yield the maximum gain attainable for their respective lengths and a zero degree angle of radiation which puts the most signal on the horizon. Exceptional decoupling results in simple tuning and a significant reduction *in TVI potential. Decoupling* cones offer great efficiency over obsolete radials which radiate in the horizontal *plane. The IsoPoles also* have a broader frequency coverage than any comparable antennas. Typical SWR is 1.4 to 1 or better across the entire band!

All mounting hardware is stainless steel. The decoupling cones and radiating elements are made of corrosion-resistant aluminum alloys. Aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast, not supplied).

IsoPoles are ideal for packet radio. The decoupling cones stop computer hash picked up by the outer shield of the coaxial cable from being passed to the receiver.

Amateur TV



AEA's New ATV System

Add a new dimension to your amateur radio communications with AEA's Amateur Television (ATV) system. If you hold at least a technician-class license, you can transmit and receive live or taped audio and video Fast-Scan TV (FSTV) information that rivals broadcast quality. Now you can share more than conversation over the air with *this new mode of "personal com*munications."

It's Easy and Inexpensive. If you have a video camera or camcorder and a standard TV set, you may already *own the most expensive components of* an ATV system. AEA's ATV system includes a transceiver and antenna. Simply connect the camera, TV and the *antenna to the transceiver, and you're* on the air LIVE with one watt P.E.P.! If you want to broadcast with more power, AEA also offers a 50 watt mast-mounted linear amplifier and GaAsFET preamp with power supply. Your TV set will monitor your transmitted and received pictures.

Amplifier Now Available.

INDIANA: South Bend Swap & Shop, Sunday December 30 at the Century Center downtown, on US 33, Oneway north between Society Bank Building and the river. Four lane highways to door from all directions. Tables: $5/5 ft. round; $15/8x2.5 rectangular; $20/8 ft. wall locations. Talk-in 52-52 & area Repeaters. Sponsored by Repeater Valley Hamfest Committee. Contact: Wayne Werts, K9IXU, 1689 Riverside Drive, South Bend, IN 46616, telephone 219-233-5307.

HAMS For Christian Missionaries and Blessings for obediance serve many needs of missionaries and churches. Net skeds are M-F @ 0:200 UTC, 14.320 MHz 8:00 PM CST/7:00 PM PST/SN 28.400 19:00 UTC; 21.330 21:00 UTC. Teach all nation Sat. 21.365 21:00 UTC. Contact HCM, 3120 Ryan Drive, Escondido, CA 92025, 619-480-4477.

QSL CARDS/RUBBER STAMPS/ENGRAVING

ENGRAVING: Callsign/Name Badges by W8LQV. SASE for price sheet. Box 4133, Overland Park, KS 66204.

CADILLAC of QSLs—Completely different! Samples $1. (refundable). Mac's Shack, P.O. Box 43175, Seven Points, TX 75143.

CUSTOM Designed Embroidered Patches, Club Pins, Medals and Ribbons. Highest quality, fastest delivery, lowest prices anywhere. Free info. NDI, Box 693944M, Miami, FL 33269, 305-653-9434.

QSL Samples—25 cents. Samcards, 48 Monte Carlo Drive, Pittsburgh, PA 15239.

QSL's—Quality for less is back! See our display ad in this issue of *QST*. Harry A. Hamlen, P.O. Box 1, Stewartsville, NJ 08886.

QSLs & RUBBER Stamps. Top quality QSL samples and stamp information $1 (refundable with order). Ebbert Graphics D-3, Box 70, Westerville, OH 43081.

QUALITY QSLs. Samples $.50. Olde Press, WB9MPP, Box 1252, Kankakee, IL 60901.

QSL SAMPLES send $1 (refundable with order) Box 1262, Point Roberts, WA 98281.

DON'T Buy QSL Cards until you see my free samples. Also I specialize in custom cards and QSL business cards. Write or call for Free Samples and custom card ordering information. Little Print Shop, Box 1160, Pflugerville, TX 78660, 512-990-1192.

FREE Logbook with first order. QSL samples cost 3 stamps. Gazebo Press, 4148 Mimosa Lane, La Plata, MD 20646.

RAISED Printed QSLs. Very unique. You can feel the type! Our new laser technology produces exotic callsign type effects. Super high quality. Standard designs or use your own artwork/computer graphics to create a really personal QSL. We now offer state outlines in 3-D. $1 for samples & information. Dennis, WA5QMM, Network QSLs, P.O.B. 13200, Alexandria, LA 71315-3200, 318-443-7261, FAX: 318-445-9940.

QSLS QUALITY And Fast Service For 30 Years. Include call for free decal. Samples 50 cents. Ray, K7HLR, Box 331, Clearfield, UT 84015.

BROWNIES QSL Cards since 1939. Catalog & Samples $1 (refundable with order). 3035 Lehigh Street, Allentown, PA 18103.

QSL CARDS, rubber stamps, envelopes, ARRL member card. Send 45 cents postage or SASE for samples. Seventeen designs. Paragon Stamp, P.O. Box 544, Goleta, CA 93116.

RUSPRINT QSLs. New full color satellite! ARRL, cartoon, patriotic, mike & key, telegraph keys, economy. Historic. State outlines. Order quantities start at 100. Plastic card holders. Display 20 cards. Three-$4.50. Four & up $1.30 each. More information? Business SASE with 45 cents postage. Rusprint, Rt. 1, Box 363*QST*, Spring Hill, KS 66083.

QSL CARDS—Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSLs, Dept B, 310 Commercial, Emporia, KS 66801.

QSLS—1) Famous K0AAB custom with background collection. 2) Railroad employees and railfan's specials. 3) Front report styles. 4) Multiple callsigns. 5) Ham business cards. State your sample wants. 45 cent self-addressed business size envelope required for free samples and catalog. Mahre & Sons Print Shop, 2095 Prosperity Avenue, Maplewood, MN 55109-3621.

GAIL'S QSL'S. $7/100, stamp for samples. Rt. 1, Box 98, Mt. Grove, MO 65711.

PHOTOS, Postcards-Become QSLs. Clear stick on labels. New! "Kall Kards." Stamp brings details. K-K-L, Box 412, Troy, NY 12181-0412.

QSL SALE! 100 cards $8, 200/$11, 300/$14, 500/$20, 1000/$33. Free shipping! Guaranteed correct! Many new designs! Phone or write today for samples or ordering. Shell Printing, KD9KW, Box 50, Rockton, IL 61072, 815-629-2193.

QSL CARDS, 4 designs, fast quality service. SASE for samples. WordWise Services, 107 Giles Court, Newark, DE 19702.

NORTHWEST IMAGERY—Guaranteed quality, variety, personalized service, and low prices. For samples please send $1 (refundable with order) to Tom, WO7Y, 11969 Tioga Street, Boise, ID 83709.

QUALITY QSLs At A Quality Price. For samples send $1 (refundable with order) to S & S Printing, P.O. Box 843, Cabot, AR 72023.

QSL'S High Quality, 45 cent stamps or cash for brochure and samples. Don, K3LQQ, 84 Chapel Drive, Zephyrhills, FL 33544.

COLOR PICTURE QSL. Franklin Printing, 2775 Maple, Zanesville, OH 43701, 614-452-5375.

LAKESIDE QSLS—sixteen full picture color designs. Samples $1 (refundable). P.O. Box 43043, Seven Points, TX 75143.

ANTIQUE-VINTAGE-CLASSIC

WANTED: Old microphones for my mic. museum. Also mic-related items. Write Bob Paquette, 107 E National Avenue, Milw., WI 53204.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specify Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. Q, Berwyn, IL 60402.

WANTED: Radio, magazines, horn speakers, pre 1930. W6THU, 1545 Raymond, Glendale, CA 91201, 818-242-8961.

WE MAY HAVE the tubes you need. (Thousands in stock). Send SASE for our list. Fala Electronics, P.O. Box 1378-1, Milwaukee, WI 53201.

BUY, Sell, Collect and Restore early tube equipment? Early receivers, tubes and telegraph gear? Join the Antique Wireless Association which sponsors old-time "meets", flea markets, museum and journal with technical articles and free want ads. Membership and annual dues only $10. Write for information and Museum hours: Bruce Kelley, W2ICE, Route 3, Holcomb, NY 14469.

MICROPHONES and related memorabilia used in radio/TV broadcasting prior to 1960 wanted. Cash paid: trade terms available. Write: James Steele, WKBK, Box 2525, Kingsland, GA 31548-2525, 912-729-6106.

WANTED: WWII Military Radios and Accessories. Need ATD Tuning Units, DY43 Dynamotor, BC 222/223 Manuals, ART-13 Connectors, ARR/41/MT-1518 Mount, ATB, GRC 106 Receiver, Hallicrafters HT20. Charlie, 501 Mystic Valley Pkwy., Medford, MA 02155.

WANTED: Pre-1930 *QSTs*. Richard Titus, NV2C, 231-9 Lucas Lane, Voorhees, NJ 08043, 609-772-0316.

COLLECTOR Looking For Pre-1942 Communications Receivers, Commercial, Amateur, Government, Kit, Homemade, etc. Anything considered. Wayne, N0TE, Rt. 1, Box 114, Burlington, KS 66839, 316-364-5353.

MANUALS for most ham-gear made 1935/1970, plus Kenwood. No quotes. Our current catalog "K", at $1, required to order. Over 2,000 models. HI-Manuals, Box K-802, Council Bluffs, IA 51502.

WANTED For Museum, Pre-1980 Microcomputers, and DT100, WYSE Y75 or WY60 Terminal; and Rohn 25 or 45 Tower. David Larsen, KK4WW, Blacksburg Group, 703-763-3311/231-6478.

MUSEUM SEEKING radio/television broadcasting equipment, literature, microphones, transcriptions. Radio, TV's. Van Dyke, Squires Avenue, E. Quogue, NY 11942, 516-728-9835.

WWII SUITCASE RADIOS WANTED! American (SSR-1, etc.), British (A Mark II, III, Mark II, A Mark III, etc.), and German. Bill Mills, 15 Hawthorn Avenue, Needham, MA 02192, 617-449-3536.

ANTIQUE RADIO CLASSIFIED. Free sample copy! Antique radio's largest-circulation monthly magazine. Old radios, TVs, ham equip., 40s & 50s radios, telegraph, books & more. Ads & articles. Free 20-word ad monthly. Subscribe today. Six-month trial: $13. Yearly rates: $24 ($36 by 1st class). Foreign: write. ARC, P.O. Box 802-B6, Carlisle, MA 01741.

E.F. JOHNSON Transmitters, Literature and Accessories wanted for my station. Wanted: Johnson kilowatt and/or Viking 500 for my station. Will pay cash and pickup. All inquiries are cheerfully answered. Phone 518-638-8199 or write Len Crispino, P.O. Box 702, Hudson Falls, NY 12839.

TELEGRAPH & WIRELESS Bugs, Keys, Paddles Wanted For Private Collection. Donations appreciated. SX-115A/HT-32B/Linear, Vintage Station Wanted. John Hensley, WJ5J, 5054 Holloway, Baton Rouge, LA 70808, 504-928-2559.

WANTED: Hallicrafter Skyriders with entire front panel silver color, Skyrider Commercial, S-30, S-33, S-35, Hallicrafter TV's and consumer electronics, other very old or unusual Hallicrafters items including advertising signs, memorabilia, parts, etc. Also want RCA ACR-111, AVR-11. Chuck Dachis, "The Hallicrafter Collector", 4500 Russell Drive, Austin, TX 78745.

PRE-1968 QSL of W6YTG, Charles May, sought by son. David May, KB1TC, 301-836-7961.

WANTED: QSTs for Dec. 1915, Dec. 1916, Dec. 1919, June 1920, Oct. 1921, all of 1922. Have some 1916, 1917, 1919 for trade. Bob, W4JNN, 703-560-7161 or P.O. Box 166, Annandale, VA 22003.

WANTED By Collector: Old Radios, Parts, Microphones, Advertising Signs, and TVs. Jerry Finamore, 87 Stonewood Place, Catasauqua, PA 18032, 215-264-8412.

WANTED: US Amateur Callbooks, 1920 thru 1936, plus 1939, 1940, 1941, 1945, 1955. Bob, W4JNN, 703-560-7161 or P.O. Box 166, Annandale, VA 22003.

GONSET G-76 Transceiver Wanted For My Station. Len Crispino, WB2MJH, P.O. Box 702, Hudson Falls, NY 12839, phone 518-638-8199.

EARLY TRANSMITTER WANTED. Examples: Gross, Stancor, Collins, Thordarson, Harvey, Temco, National, Utah, Hallicrafters, Hammarlund, Guthman, Rel. Bob Mattson, KC2LK, 10 Janewood, Highland, NY 12528, 914-691-6247.

SELL: rare complete 74 years *QST* collection from issue one. Minimum offer $3,000. K6IR, 16904 George Washington Drive, Rockville, MD 20853-1128, 301-774-7709.

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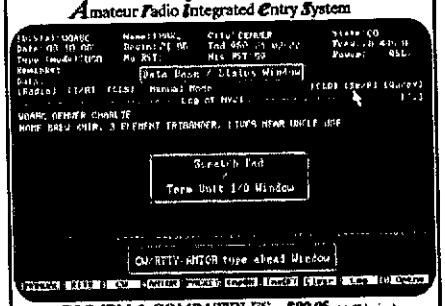

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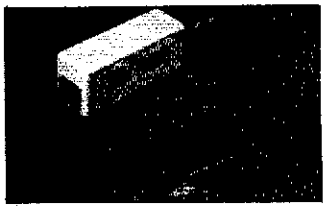

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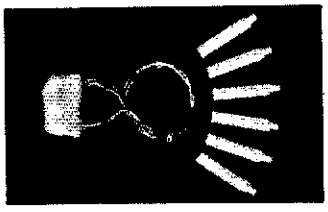

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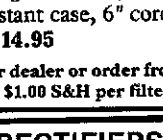

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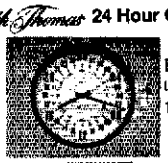

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SWISSLOG: The most popular logging program in Europe is now available in the United States. It features on line DXCC, WAZ, ITU and WPX checking. Beam heading, all zones, local time and distance to QSO partner. Print Logs, QSL cards and labels. Contest duping, fast input and report mask. Grid square support. Graphic full color MUF map presentation shows grayline and path. DXCC statistics, conversion from K1EA, DXLOG and DBase. Much more. IBM PC, 640K, hard disk. $75. Frank, KD2LL, 10 Robbins Avenue, Amityville, NY 11701, 516-598-0011.

ICOM, KENWOOD, YAESU, Drake, Collins & Heath Owners: 8/10 Pole Crystal Filters. Are you plagued with interference during QSO's? Do you need improved selectivity to hear weak signals in QRM? Yes to either, purchase our steep skirted SSB or CW Filters! Monthly separate ICOM, Kenwood & Yaesu Newsletters. Indexes and back issues available. High tech service dept. Authorized Kenwood service center. Our 11th year. Send 45 cent SASE for free 20 page catalog to: International Radio & Computer Inc./Fox Tango, 751 South Macedo Blvd., Port St. Lucie, FL 34983, 1-407-879-6868.

KENWOOD R-2000, $465; Gould Biomation Logic Analyzer, type K-100-D, $750. Cleaning shack, SASE for list. Dick Kelly, W6BKY, Box 593, Ventura, CA 93002.

WANTED: Tracor 599 or 599J VLF Receiver 527 freq. difference meter, Tracor 304B or 304D complete or for parts. Bill Smitherman, KD4AF, Rt. 4, Box 79, East Bend, NC 27018.

HAM WALLET. First name and call sign tooled with 1/2" letters in genuine leather. $29.95. Dick Millager, KA7SPS, 9155 SW Yearling Place, Beaverton, OH 97005.

COLLINS KWM-380 with all options. Excellent condition $1995. ETO Alpha 78 Amplifier $1995. Chris, KD5DD, 6911 Kingsbury, Amarillo, TX 79109, 806-359-3865.

CALL LETTER ID TAGS, (Authentic Dog Tags), stainless steel, customized; name, call letters, QTH, etc. Up to five seventeen space lines. $4.29 postpaid, neck chain included. Buy five tags and get one free. JPW Enterprises, P.O. Box 353, Logan, UT 84321.

WA1TWX CW6805 keyboard from 12/88 *QST*. Now includes nonvolatile memory and beacon operation. Special including TI keyboard: Kit $75, Assembled $85. For information write: SCS, Box 680, New Hartford, CT 06057-0680.

DC POWER SUPPLIES. 12VDC from 4.5 amps to 60 amps. Applications: 2 meter linear amplifiers, test bench, car tape/stereo. Free brochure and price list. Sunco Electronics, 16150 NW 40th Court, Miami, FL 33054.

HAM PROGRAMS for Commodore, IBM-PC, Apple, TI99/4A. Send legal size SASE: EPO Software, 7605 NE 147th Avenue, Vancouver, WA 98682.

HAM RADIO KITS & ASSEMBLIES for various *QST* & 73 construction articles. We also offer books and electronic components. For catalog, send legal size SASE w/45 cents postage or $1 to A & A Engineering, 2521 W. LaPalma #K, Anaheim, CA 92801.

MODIFICATION INSTRUCTIONS, update your ham equipment to its full capability. Models: IC-02AT, IC-04AT, IC-2AT, IC-U2AT, IC-24AT, IC-32AT, TM-701A, TM-721A, TM-731A, TS-790A, ALR22HT, TH-25A, TH-45A, TH-75A. Each $5. HamMods, P.O. Box 101, Hudsonville, MI 49426.

QUALITY SERVICE: ICOM , Kenwood, Yaesu, Ten-Tec, Azden & Atlas repaired at reasonable cost. Optimized alignment available. In our sophisticated lab. Fast turnaround. Ship equipment with letter detailing problems & preferred method of payment to: International Radio & Computer Inc./Fox Tango, 751 S. Macedo Blvd., Port St. Lucie, FL 34983, 1-407-879-6868.

NEW COMMODORE C64 QSO Log Search program that's fun and useful. User friendly, AM/PM clock runs during program. Developed by a Ham for Hams. Only $10.75 includes 1st class postage. Money back guarantee. Mail to Bob Wagoner, KC8HQB, P.O. Box 4593, Orange, CA 92669-4593.

1991 CALLBOOKS. "Flying Horse." North American $23.95. International $23.95. S&H $4 per order. Immediate delivery. Discount on ARRL, other books. Extra charge COD, Visa. Burk Electronics, 35 North Kensington, La Grange, IL 60525, 708-482-9310.

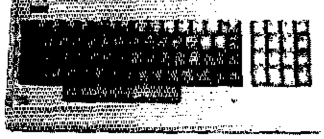
HAMMARLUND HQ-180, Dentron Tuner, Homebrew Linear; Heath HW-100 Transceiver, Appache, SB610, Oscilloscope; Gonset GSB-100 Xmit, GSB-101 Linear; Hallicrafters SX-101, SX110 Receivers, HT-37; TI-99A Expansion, Drives; 20' Tower; RCA WA-44C, Knight KG-686 AF/RF; Generators; HP Scope. WB2JDC, 516-599-5745.

COMPLETE STATION W/Antenna Farm. Plus 3/2 home on 2.33 acres, detached 24x24 shop. Enjoy Flordia sunshine! Home is South of Tampa. $85,900. Kay L. Pye, WD4HHN, Dickman Realty, 813-645-3211, 645-1492.

WANTED: Galaxy/Wrl equipment, accessories, manuals, etc. Harry Ober, WB6CGZ, P.O.B. 174, Palmdale, CA 93590, 805-273-9073.

WILSON 6 Channel 2 Mtr. Handi-Talki, Touch-Tone Pad, Charger, Rubber Duckie, A-1, $150. Hickok Model 270 Function Generator, Square, Triangle, and Sine Wave Output. Like new, $100. B&K 467 Color Picture Tube Checker/Rejuvenator, adapters for most popular tubes, like new. B&K 747B Dynamic Tube Tester, like new, each unit cost over $500 new, will sell individually for $275 or $500 for both. K7GFL, 702-658-7428.

ALL PURPOSE TERMINALS



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RCA's APT is a high quality, self-contained computer, a smart terminal, loaded with many features. Originally selling for about $300, this terminal is a super value for anyone needing a computer to access bulletin boards, word process, operate a TNC on PACKET RADIO or simply free up a larger PC.

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- Keyboard selectable 40 or 80 column display.
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- All terminal parameters are fully adjustable allowing emulation of many terminal systems.
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Our APT's are very clean units removed from service. Instruction manual, wall cube power supply and TV/APT selector switch included. Optional 6' Centronics printer cable- $7.75. Optional DB-25 male/male Gender Changer- $7.95. Add $5 for UPS.

SPECIAL: Purchase our RCA APT today, along with a PK-232MBX Controller and we will pay the shipping anywhere in the cont. U.S., an $8 value (DX orders $8 credit).

AEA'S AT-300 Antenna Tuner

Limited Time Offer - $145

- 300 Watts continuous power handling capability will handle most any rig.
- 3.5 - 30 MHz (Don't overlook this superior tuner just because it does not cover 160 Meters! After all, when was your last 160 Meter contact logged?)
- Low Pass Filter's two coil design provides greater harmonic reduction, more power transfer and a wider range of impedance matches than most tuners on the market.
- Peak reading cross-needle meter shows forward power, reflected power and SWR.
- All steel, quality cabinet is 12.8" W x 15" D x 5.8" H. Weight is 8.14 pounds.
- Large cabinet provides more internal space for higher "Q" and greater efficiency.
- High and low power switch for versatile operation.
- 6 position "Antenna Selector" switches between 2 coax fed inputs, both tuned and bypassed, a dummy load position and balanced or wire antenna.
- Back lite meter is switchable from front. 12 volts must be supplied externally to jack on back.
- Still want to more facts? Then dig out your April 1990 CQ and read Lew McCoy's review!

With all of these features, the AT-300's regular *Ham Net* price of $219 is a bargain. So, at Bob's new low price of $145 (66% off), this may be the best deal in Ham Radio, ever!

U.S.: Please add $4.50 per tuner for UPS. We pay all shipping on 4 or more AT-300s.

Catalog included with your order (or sent upon completion) [$3 elsewhere US or $5 DX]. 200 pages, over 10,000 electronic PARTS. Please add adequate shipping, 50¢ per lb, to 70 lbs (1st - 5lbs add $3 min). We accept visa, MC, American [illegible], checks, Cash On Delivery (UPS) add $3.

NEW COLLINS PARTS

We purchase Collins replacement parts from many of the same vendors used by Collins, made to original specs. You have the choice. Keep it original for optimum operation and resale.

Manuals: (Brand New, Fresh and Crisp!) [illegible]

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Front Feet Extensions: Aluminum, tapered, black anodized feet tilt rig up. [illegible]

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Crystals, operating frequencies: [illegible]

Crystals, BFO, Calibrator: [illegible]

KWM-2A Plug in Relays [illegible]

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TR Relay for KWM-2/A, 32S- & 30L-1: Authentic [illegible] Relay. [illegible]

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Plastic Trim Rings: [illegible]

Mechanical Filters: [illegible]

Oak Switches for Collins: [illegible]

[illegible]

Potentiometers: [illegible]

30L-1: Power Switch -$19; Plate Choke [illegible] -$10; [illegible] Filter Caps -6/$40

Power Transformers: [illegible]

KWM-380 to HF-380 Conversion Kit: [illegible] $525

MM-280 Mobile Mike -$35. AC-2830 Headset -$35. AC-2802 Rack Mount -$165. AC-2828 Footswitch -$45. AC-3802 Speech Processor -$[illegible]. 140 Hz CW Filter -$199. 260 Hz CW Filter or 1.7 KHz RTTY/SSB Filter -$[illegible]. 6 KHz AM Filter -$[illegible]. Complete Knob Set -$[illegible]

COLLINS EQUIPMENT ON HAND. [illegible] KWM-2, KWM-380 (converted to HF) 30L-1 [illegible]

Other COLLINS Parts On Hand: IF Transformers, Front Panels, Escutcheons, Knobs, Transformers

3-500Z (EIMAC) $145 (PENTA)	$110
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4CX1000A (PENTA)	$499
572B (CETRON) $ 75 (PENTA)	$ 68
811A (PENTA) $15 (HORIZ. USE)	$ 22
6146B (PENTA) $15 (MATCHED)	$ 38
4CX250B (PENTA)	$ 95
4CX300A (PENTA)	$145
6JB6A, 6KV6A, 6KM6	$15.50
6LQ6, 6KD6, 6JB6C	$16.50
6LB6, 6MJ6, 12JB6	$17.50

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DX Handy	10 Meter Handheld Transceiver	$159
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IsoLoop	14 - 30 MHz omni-directional Antenna	$315
MM-3	Memory Keyer (Morse Machine)	$179
AVT	Amiga Video Slow-Scan	$279
ET-1	300 watt all band tuner	$125
DL-1500	500MHz, 1500w Dummy Load	$109
HPF-1	75/300Ω High Pass Filter for TV/VCR	$ 12
144 MHz IsoPole	Antenna for 2 Meters, omni-directional	$ 53
220 MHz IsoPole	Antenna for 220, omni-directional	$ 55
440 MHz IsoPole	Antenna for 416-465 MHz, omni-dir	$ 85
AT-3000	3000 watt antenna tuner	$369

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Dean LeMon, KRØV sure is! Dean got active in Amateur Radio when he was 16 years old and earned his Extra Class license in less than four years! "It's a fascinating hobby and a great way to meet all kinds of new people from all over the world."

Dean has cerebral palsy and got started in Amateur Radio with help from the Courage HANDI-HAM System. The HANDI-HAM System is an international organization of able-bodied and disabled hams who help people with physical disabilities expand their world through Amateur Radio. The System matches students with one-to-one helpers, provides instruction material and support, and loans radio equipment.

Isn't it time you got radioACTIVE with the Courage HANDI-HAM System?

Call or write the Courage HANDI-HAM System WØZSW at Courage Center, 3915 Golden Valley Road, Golden Valley, Minnesota 55422, phone (612) 588-0811.

WANT: Ten-Tec Paragon. W9LL, 178 Eighth, 60016, 708-824-0783.

HAMMARLUND HQ-140X Recvr. WØIVI.

WANTED: Ham Equipment And Other Property. The Radio Club Of Junior High School 22 NYC Inc. is a non-profit organization, granted 501(C)(3) status by the IRS, incorporated with the goal of using the theme of Ham Radio to further and enhance the education of young people nationwide. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. As 1990 draws to a close please look over whatever unwanted equipment you have, and call us. We will pick up or arrange shipping. You will receive the tax deduction, but most important, the privilege of knowing that your gift really made a difference in the education and upbringing of a youngster. Write us at: RC Of JHS 22, P.O. Box 1052, New York, NY 10002. Round the clock Hotlines: Voice 516-674-4072, FAX 516-674-9600.

COLLINS DL1, early, mint, manual, $80, will pay shipping. KM3Z, 412-463-7390 evenings.

HEATHKIT SB-104A with speaker and power supply, excellent condition, $400. Autek QF-1A Filter, $50. Prices include shipping. Bob, KAØAFG, 712-336-1342.

STAINLESS Steel U-Bolts, Turnbuckles, Eyebolts, Screw Eyes, Bolts, Screws. Small quantities. Free catalog. Elwick, Dept. 800, 230 Woods Lane, Somerdale, NJ 08083.

HAVE YOUR HEATH amateur radio equipment reconditioned, aligned, and calibrated. Send for quote. RTO Electronics, 4166 Maple Street, Berrien Springs, MI 49103.

ESTATE SALE: W3IUD, Kenwood TS830S, MC60 Mike, AT230 Tuner, HS6 Earphones, Trimm Earphones, Heathkit SA2060 Tuner, Hallicrafters SX-115, Bearcat 210XL Scanner, RS Programmable Scanner FM Rcvr PRO-2003, RS DX300 Rcvr, Hustler G7-144 Vert, Minimus 3.5 & 5 Speakers, SP17 Speaker, Automatic Radio FSA 7222A Speaker, B&W 376 Coax Switch, B&W 594. Molloy, 215-544-0340.

WANTED: National 200 (NCX-200) Transceiver (any condition) or source for B-52002 Function Switch, Gonset G-77A Transmitter, Hammarlund HX-50 Transmitter. Bob, KB2KHP, 2656 Oneida Street, Utica, NY 13501, 315-797-6814 after 7PM.

12 VOLT 62 AMP Switching Power Supplies. Reconditioned, fully tested. Very solid! $97. Alan, KFØAT, 303-373-1214, 7:30-9:00 PM MST.

KENWOOD TS-130/SE 500 Hz Filter MC50 Mike, original boxes. Prefer pickup $475. W4PDT, 904-276-3625.

HAM TURNED SWL Send SASE for complete list of equipment For Sale to: R.E. Sapp, KAØCTH/9, RR 2, Box 82A, Maroa, IL 61756.

432 MHz VHF Engineering BLE 10/80 Watt Amplifier. $110 plus shipping. WB8YFE, 219-485-9133.

MMT 432/28 S Satellite Transverter, mint, $180. Jerry, W6IWR, 602-584-5716.

OFFERED PEANUTS For Your Trade-In? Contact me for reasonable quote or for "For Sale" list. Radio Recyclers, 3221 W. Lincoln Avenue, Milwaukee, WI 53215, 414-383-9001.

DRAKE TR4C, absolute mint condition, AC4 P/S, MS4, $525. New finals included. Terry Berman, AB4UM, 703-435-1117 after 6PM.

ELECTRONIC Tubes, send $1 for inventory. Askew, 808 Horseshoe Trail, Albuquerque, NM 87123, 505-293-0948.

AMIGA, MACINTOSH, ATARI XL/XE/ST Amateur Radio public domain software for $4 disk. SASE for catalog. Specify computer! WA4EFH Hamsoft, Box 1646, Orange Park, FL 32067-1646.

COMMODORE 64, disc drive 1541, printer MPS803, sender loadstar programs, radar rat game used about four hours, no trade offers. KD7FE, 5085 Highland Drive, Post Falls, ID 83854.

VESELE BOZICNE praznike in srecno novo leto 1991 vosci vsem Slovenskim Radio Amaterjem sirom sveta. Jozef Zele, W8FAZ.

QRP BP-80DX Transceiver Kit. Superhet, Digital Readout, More! Info: Lectrokit, 401 W. Bogart, Sandusky, OH 44870.

NI-CAD BATTERIES, surplus battery packs, 20 cells 7.0 amp-hr or 1.25 amp-hr. Custom battery packs, 6, 7.2, 9.6, or 12 Vdc, 7 amp-hr or 1.25 amp-hr, cubes or fanny pack. SASE for more info. N7NGK, 10276 S. Ashley Hills Circle, Sandy, UT 84092.

WANTED: Squires-Sanders; AN/URR58, SS-1R, SS-IBS, SS-1V, SS-1S, BSSG-1. Marion Arthur Ambrose Jr., Contel Page Inc., APO New York, NY 09794-0007.

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, P.O. Box 1462, Loveland, CO 80539.

WANTED: Dentron DTR-2000L with burned final, DTR-1200L, Clipperton-V, Clipperton-L, Heathkit SB-200, SB220 Linear. WB7DEJ, 504-641-2779.

TRANSCEIVER, Novice, General. 200 Watts Maximum SSB, CW. 80 Meters HW-12 ready for air. Including Microphone, Antenna, Instruction, Shipping, $95. W2IXU, 609-698-8442.

EXAM HELP. Programmed instruction $10, computer theory and code tests $15. SASE Pueblo Sunshine Software, WØNIT, 920 West Adams, Pueblo, CO 81004, 719-544-1654.

WANTED: any modifications for Kenwood TS-670 "Quad-bander" Transceiver. Rege Dvorsky, WA3LKT, 2265 Marginella Drive, Reston, VA 22091.

COMMODORE 64 Ham Programs—8 disk sides-over 200 Ham programs-$16.95. 25 cent stamp gets unusual software catalog of utilities, games and British disks. Home-Spun Software, Box 1064-Q, Estero, FL 33928.

COLOR Camera—Panasonic PK450, 6:1 zoom, auto-focus, stereo sound, mfg. service manual, $200. Carl Faix, 609-428-7672.

FOR SALE: Yaesu FT707 Radio, with matching FC-707 Antenna Coupler, FV-707 DM Digital VFO and Power Supply with excellent Speaker built in one compact unit. Original compact rack made for units by Yaesu. All mods, microphone, instruction manual and schematics like new $1250 & shipping or best offer. WB5RNC, P.O. Box 5566, Corpus Christi, TX 78465, call days 512-883-8511, nights after 6:00 PM 512-991-5722.

IC-2KL Wanted. Bryan Lundgren, 714 Michigan Avenue, South Haven, MI 49090, 616-637-1278 after 6PM.

VHF HF MODIFICATIONS—Kenwood, ICOM, Alinco, Yaesu, Scanners. Work performed by Certified First Class Engineer. Mail $2 (deductable from order) for models, prices, modification list. Chick's Radio Communications, 1340 Lander Road, Mayfield Heights, OH 44124-1606.

MODEM: Incomm 1200bps, external. New w/warranty. Hays compatible. RS-232 cable included. $55, shipping included. KA4AIY, 703-521-0787.

WANTED: ICOM 202 2M High Power Amp. K1GAO, 203-265-7388.

COLLECTOR Wants KW-1, 30K, 75A, any old Amateur Transmitters by Collins, National, Rel, Harvey Radio Labs, Gross, Utah; old catalogs, manuals, etc. Parker, W1YG, 87 Cove Road, Lyme, CT 06371, 203-434-7783.

WANTED: ICOM IC-202/IC-202S. SMA transfer and SPDT relays good to 10.5 GHz (latching types preferred). Zack Lau, KH6CP/1, c/o ARRL Lab, 225 Main Street, Newington, CT 06111, phone 203-666-1541.

DRAKE SSR-1 Receiver Wanted. Also, FS-4 Synthesizer, TR-4 Transceive Adapter. Will pick up, pay cash in California. Collins, 60 Shannon Court, Novato, CA 94949, call 415-883-3915.

WANTED: Manuals (including schematics) for Lafayette Signal Generator TE-20. Meyer Minchen, AG5G, 4635 SW Fwy., Houston, TX 77027, 713-622-6161.

CYRILLIC Hard Copy Of Soviet Maritime RTTY Traffic. For IBM PC-compatibles and multimodes: AEA PK-232, Universal M-7000, Kantronics KAM. Works with variety of printers including most Epson and IBM 9-pin and 24-pin printers. Each version $29.95, but please send business-size SASE for system requirements (specify demodulator type) and sample output to Stewart Morgan, P.O. Box 37595, Raleigh, NC 27627-7595. Include separate SASE for each multimode.

COAXIAL RELAYS, AMPHENOL, 28 VDC 320-10931-3 Type "N" High Isolation to 2 GHz $90 each. 316-10082-3 Type "BNC" $25 each all new surplus, other available. W3ZD, 215-675-4539.

KRAFT R/C Receiver (26.690 MHz) and 4 Sport Series Servos, guaranteed in excellent working condition. All for $50. Milltary URM25E RF Signal Generator, covers 10 KHz to 50 MHz. A-1 condition $100. K7GFL, 702-658-7428.

QRP STATION Kit, new, 80 meters, $20 plus $3 postage. John Uscinowski, RR #1, Box 379, Greenwich, NY 12834.

MISCELLANEOUS Laser Diodes, Circuits. SASE any callbook, K6LMN, 213-474-2447.

ROSS' $$$$ New December (Only) Specials: JSC RG-213 500 Ft. $150, Kenwood TM-631A $629.90, TR-8400 $349.99, TM-701A $452.90, TH-41AT $209.90, TM-241A $394.90, TS-940S/WAT $2055., TS-440S/WAT $1199.90, TH-75A $434.90, TH-315A $339.99, TH-31BT $229.90, ICOM IC-765 $2609.90, IC-781 $5099.90, IC-24AT $529.90, IC-735 $919.90, IC-2SA $289.90, IC-2SAT $317.50, IC-471H $939.90, Yaesu FT-411E $329.90, G-5400B $445.90, FT-1000D $3619.90, FT-470 $394.90, FV-101DM $229.90, FT-33R $259.90, YR-901 $499.99, Tokyo Hy-Power HC-200 $109.90, HL-102V $239.99, HL-160V $299.90, HL-82V $139.90, MFJ-1278T $299.90. Send SASE for used and open box list. All LTO (limited time offer). Looking for something not listed?? Call or write. Over 9039 ham-related items in stock for immediate shipment. Mention ad. Prices cash, FOB Preston. Hours Tuesday-Friday 9:00 to 6:00 PM. Monday 9:00 to 2:00 PM. Closed Saturday & Sunday. Ross Distributing Company, 78 South State, Preston, ID 83263, 208-852-0830.

TEN-TEC, new boxed latest 1990 production models USA made, 562 Omni V, 585 Paragon Transceivers, 425 Titan, 422 Centurion, 420 Hercules Linear Amplifiers, 238, 253, 254 Antenna Tuners, 239, 240 Dry Dummy Loads, Mobile HF Antennas, Keyers, Cabinets, Filters and Accessaries. Visa/MC or check. For best mail-order deal, write/phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763-0100.

WANT New Tektronix CRT for 422 Scope. Part #154-0466-00. John Gibson, 1075 Sterling Avenue, Berkeley, CA 94708.

ANTENNA TUNER for end-fed randomwire. Compact, commercially built, 1500 watts, 3.5-30 MHz continuous. Ideal for apartment, portable, WARC bands, $79. Ray, N4RU, 305-475-4895.

QRP .. QRP .. W6SKQ/KH6 20M CW only December 3 to 14, will monitor 14.060.

CRYSTALS: Winter is here. 160M, 80M, 40M DX. Build something QRP, etc. Inexpensive FT-243 crystals for nets or partners. 160M $5.95, five or more $3.95 each. 80M $3.95, five $2.95. 40M fundamentals and multipliers from 40M to 20M, 15M, 10M $3.95, five $2.50. 30M fundamentals $3.95, five $2.95. Airmail 35 cents per crystal. Four stamps or $1 for listings-circuits package. 1700-60,000 kilocycles. "Crystals Since 1933." C-W Crystals, Marshfield, MO 65706.

WANTED: Collins Mechanical Filter F455Y-60 (526-9340-00). Bill, KD6HG, P.O. Box 1456, Lyons, CO 80540, 303-823-6438.

MACINTOSH Ham Software—DX Helper™ shows bearing, distance gray line, Great Circle, MUF, call sign identifier, CW code practice, more! Satellite Pro™ shows graphics, view from space, az, el, alt, more! Write or call for info. MacTrak Software, P.O. Box 1590, Port Orchard, WA 98366, 206-871-1700.

MFJ TUNERS

Here is the finest 3 KW Tuner money can buy with roller inductor, dummy load, new peak reading meter, antenna switch, balun plus more ... $349.95

The MFJ-989C is not for everyone.

However, if you do make the investment you get the finest 3 KW PEP tuner money can buy -- one that will give you a lifetime of use, one that takes the fear out of high power operation and one that lets you get your SWR down to absolute minimum.

The MFJ-989C is a compact 3 KW PEP roller inductor tuner with a new **peak** reading Cross-needle SWR/Wattmeter. The roller inductor lets you get your SWR down to absolute minimum.

With three continuously variable components - two massive 6 KV capacitors and a high inductance roller inductor - you get precise control over SWR and the widest matching range possible. It covers 1.8 to 30 MHz.

MFJ-989C **$349.95**

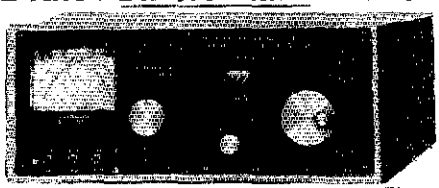
You get a **new** lighted **peak** and average reading Cross-needle SWR/Wattmeter with a **new** more accurate directional coupler.

You get a giant two core balun wound with teflon wire for balanced lines and a 6-position antenna switch with extra-heavy switch contacts.

The compact 10¾ x 4½ x 15 inch cabinet fits right into your station.

You get a 50 ohm 300 watt dummy load for tuning your exciter, a tilt stand for easy operation and a 3 digits turns counter plus a spinner knob for precise inductance control. Add $10 s/h.

2-Knob Differential-T™ Tuner



MFJ-986 **$289.95**

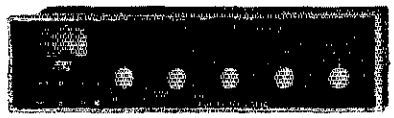
The new MFJ-986 Differential-T™ 2-knob tuner uses a differential capacitor to make tuning foolproof and easier than ever. It ends constant re-tuning with broadband coverage and gives you minimum SWR at only **one** best setting. Covers 1.8-30 MHz.

The roller-inductor lets you get your SWR down to absolute minimum. 3-digit turns counter lets you quickly return to your favorite frequency.

You get MFJ's new **peak** and average reading Cross-needle SWR/Wattmeter with a **new** directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

A **new** current balun for balanced lines reduces feedline radiation and forces equal currents into antenna halves that are not perfectly balanced for a more concentrated, stronger signal. Add $10 s/h.

MFJ'S Fastest Selling Tuner



MFJ-941D **$109.95**

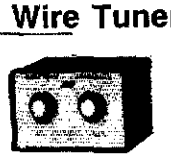
The MFJ-941D is MFJ's fastest selling 300 watt PEP antenna tuner. Why? Because it has more features than tuners costing much more and it matches everything continuously from 1.8-30 MHz.

It **matches** dipoles, vees, verticals, mobile whips, random wires, balanced lines and coax antennas.

SWR/Wattmeter reads forward/refelcted power in 30 and 300 watt ranges. Antenna switch selects 2 coax lines (direct or through tuner), random wire, balanced line or tuner bypass. Efficient airwound inductor gives lower losses and more watts out. 4:1 balun. 1000 volt capacitors. 10 x 3 x 7 inches.

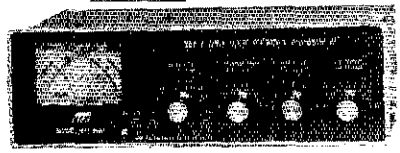
MFJ's Random Wire Tuner

MFJ-16010 **$39.95**



You can operate all bands anywhere with any transceiver when you let the MFJ-16010 turn any random wire into a transmitting antenna. Great for apartment, motel, camping operation. Install a wire anywhere! Covers 1.8-30 MHz. 200 watts PEP. Ultra small 2x3x4 in.

MFJ's Deluxe 300 Watt Tuner



MFJ-949D **$149.95**

The MFJ-949D gives you lower SWR and more power out than **any** tuner that uses two tapped coils. **Why?** Because you get two **continuously** variable capacitors that give you infinitely more positions than the limited number on two switched coils.

This gives you the **precise** control you ned to get your SWR down to a minimum. After all, isn't that why you need a tuner. It covers **1.8-30 MHz.**

You get MFJ's **new** lighted 2-color **peak** and average reading Cross-needle SWR/Wattmeter, **dummy load,** antenna switch and 4:1 balun - all in a compact 10 x 3 x 7 inch cabinet that is appropriately **smaller** than your radio. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

With MFJ's ***deluxe*** 300 watt PEP tuner you get an MFJ tuner that has earned its reputation for being able to match just about anything - one that is highly perfected and has years of **proven** reliability.

MFJ's Mobile Tuner

MFJ-945C **$89.95**

Don't leave home without this **mobile** tuner! Have an uninterrupted trip as the MFJ-945C extends your antenna bandwidth so you don't have to stop, go outside and adjust your mobile whip.

You can operate anywhere in a band and get low SWR. You'll get maximum power out of your solid state or tube rig and it'll run cooler and last longer.

Small 8 x 2 x 6 inches uses little room. SWR/Wattmeter and convenient placement of controls makes tuning fast and easy while in motion. 300 watts PEP output. Efficient airwound inductor. 1000 volt capacitors. Mobile mount, MFJ-20, $3.00.

144/220 MHz VHF Tuner

MFJ-921 **$69.95**

MFJ's new VHF tuner covers both 2 Meters and the 220 MHz bands **plus** you get a built-in **VHF SWR/Wattmeter.** Measures 8 x 2½ x 3 in. 2-knob tuning convenient for mobile or base.

MFJ ENTERPRISES, INC
P.O. Box 494, Miss. State, MS 39762
(601) 323-5869; **FAX:** (601) 323-6551

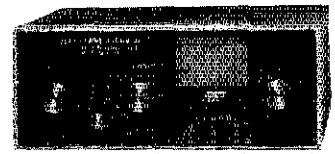
MFJ's Artificial RF Ground

MFJ-931 **$79.95**

You can create an artificial RF ground and eliminate RF "bites", feedback, TVI and RFI when you let the MFJ-931 resonate a random length of wire and turn it into a tuned counterpoise.

Also, the MFJ-931 lets you electrically place a far away RF ground directly at your rig -- no matter how far away it is -- by tuning out the reactance of your ground connection wire. 7½ x 3 x 7½ in.

MFJ's Barefoot/1.5 KW Tuner



MFJ-962C **$229.95**

For a **few** extra dollars, the MFJ-962C lets you use your barefoot rig **now** and have the capacity to **add** a 1.5 KW PEP amplifier **later.** It covers 1.8-30 MHz.

You get two husky continuously variable capacitors for maximum power and minimum SWR. And lots of inductance gives you a wide matching range.

***You** get MFJ's **new peak** and average reading* Cross-needle SWR/Wattmeter with a **new** directional coupler for more accurate readings over a wider frequency range. It reads forward/reflected power in 200/50 and 2000/500 watt ranges. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Plus . . . 6-position antenna switch and teflon wound balun with ceramic feedthru insulators for balanced lines. 10¾ x 4½ x 14-7/87 in. $10 s/h.

MFJ's smallest Versa Tuner

MFJ-901B **$59.95**

The MFJ-901B is our smallest -- 5x2x6 inches -- (and most affordable) 200 watt PEP tuner -- when both your space **and** your budget is limited. Good for matching solid state rigs to linears.

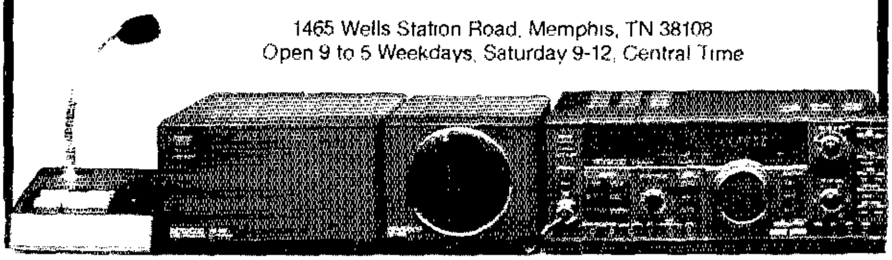
It matches whips, dipoles, vees, random wires, verticals, beams, balanced and coax lines from 1.8-30 MHz. Efficient airwound inductor. 4:1 balun.

FOR YOUR NEAREST DEALER OR TO ORDER

800-647-1800

• 1 year ***unconditional*** guarantee • 30 day ***money back*** guarantee (less s/h) on orders from MFJ • **Free** catalog
• Add $5.00 each s/h (except as noted) • **Call now!**

MFJ . . . making quality affordable



SELL OR TRADE. ATV Station Equipment; Plus. SASE for detailed listing. Ben, KA4LBE, 1324 Sunset Park, Seymour, TN 37865.

PALOMAR Tuner Tuner Model PT-340 $60. Includes shipping. KB4YQ, 6141 Knotts Creek Lane, Suffolk, VA 23435, 1-804-484-5215.

WANTED: R5000 or R71A Shortwave Receiver. Must be in excellent condition. Reg Farrant, WA8WLI, call 803-831-9011 evenings or 803-222-2860 days.

YAESU FT-757GX Mk. II, one year old, mint condition, never mobile, $795 postpaid UPS. KI4SU, 216 Harrogate Place, Longwood, FL 32779, 407-682-5431.

KENWOOD TS-530S Transceiver, excellent, has new amateur bands, digital readout, $565. W1KVP, 203-245-2937 evenings.

SHACK CLEANING SPECIALS. Spectronics digital display for the KWM2-A, 75S3, $150; Heath monitoring scope model HO-5404, $145; Kenwood MC-43 mike, $35; Murch tuner, mint, $125. Call Charlie, KD4AJ at 404-396-0276.

SELL: ICOM 720A with 2 mics, excellent condition, $475. WA6IRN, 208-733-5306.

SERVICE MANUAL COPIES: TEK, H-P, Heathkit, etc. SASE for long list. J. Glass, WB6ZTI, 14316 Cerecita Drive, East Whittier, CA 90604-1740.

ROLLER-INDUCTOR—28uH @ 2KW, new-sale price $46 + $4.50 S/H. Limited offer so hurry! Kilo-Tec, P.O. Box 10, Oakview, CA 93022, tel. 805-646-9645. SASE for catalog.

KENWOOD AT-250 Automatic Antenna Tuner $200. W2EVJ, 62 Lester Avenue, Westwood, NJ 07675, 201-666-9012.

PHASE V License Upgrade Software—$15 + $2.50 S/H per module. Novice through Extra. Material is current. Many features and simplified math formulas! Fast service. Full support. A great Christmas gift. Available in DOS, CPM, C-128. Want to pass your next exam? Order PHASE V. Calene Ware Products, 3102 Wilma, Wichita, KS 67211, 316-685-0747. Credit card or check. (A Ham Family Enterprise, WC0S/WS0X.)

WANTED: Uniden Portable Rcvr. CR2021. Kenwood TS830S, mint, $585. MC50, $45. Both $595. Swan 500CX, SS16, 117XC, TV2, $225. George, WA6HCX, 805-682-3094.

WANTED: Ten-Tec External VFO Model 243. Karl Knisley, KB8GUM, 887 CR 165, Ashley, OH 43003, 614-747-3026.

ICOM IC4SAT $345, UT-50 Tone Squelch Unit $35, BP-85 Battery Pack $75, Mirage D1010RN 100W 440 MHz Heavy Duty Amp $385, most items never used. WA3UIM, 215-353-8443.

AMPLIFIER 3.5-30 MHz, up to 150 watts PEP with only 1-5 watts drive. Handbook design. Great for mobile or home QTH. Add some power to your QRP or Novice rig. Requires 12 VDC. Like new. Only $139.95. Stan, K7NIX, Box 4301, Tumwater, WA 98501.

WANTED: excellent Drake 2C and 2CQ. AD4U, 302 Rucker Drive, St. Matthews, SC 29135, 803-874-1934.

QUADS 10-15 Meter $99.95. Lightning Bolt Antennas, RD 2, Rt. 19, Volant, PA 16156, 412-530-7396.

YAESU FT-901DM all mode HF xcvr, $500; Kenwood TR-7800 25w 2mtr mobile, $150; Lunar 150w 2mtr amplifier, $135; Kenwood TR-8400 10w 70cm mobile, $225; Mirage 100w 70cm amplifier, $135; Drake TR-7 with AUX-7 board, $600; Dentron Super Tuner Plus, $80; all mint condition with manuals, ship UPS freight collect. Heath SB-200 linear amp w/10 meter band, $300 to licensed amateur, pick up only. Call or write: Bob, W5SUR, 220 Stonewall Jackson Drive, Conroe, TX 77302, 409-321-1902 evenings.

WANTED: Alpha 7X for parts, Sigma XR-3000D, Tektronix 7A26, 7B53, 7L5, etc., also lightning damaged equipment. WD5JFR, 4161 Oak Road, Tulsa, OK 74105, 918-742-1845.

VIDICONS B/W $10, Lenses $10-$40, Tek Waveform Monitor $125 + shipping. K2JSO, RD #7, Box 1012, Middletown, NY 10940, 914-386-2882.

RELOCATING. Will sell Spanish-style two-bedroom plus multipurpose room in beautiful Albuquerque, NM. 1865' heated plus two-car garage. Included 45' Rohn 25 with insulated guys and extensive ground system. 88K firm. Full particulars with photo to serious prospects. Call Pat Walton, W5RES at 505-897-0452 or callbook address.

YAESU FT-747GX with FP-700PS. Like new. With warranty cards. Used 1 hour. $700. Also, Astron RS-12A, $60. Ten-Tec 3110 10 meter whip-new in the box. $20. WB4IBY, 919-726-2865 (w).

YAESU: 440-450 MHz module for FT726 (new), FT790R 430 MHz all mode portable, FV707DM external VFO (new), FTV107 Transverter (no modules) new. Ten-Tec model 243 Omni remote VFO (new). KB5CQY, 918-455-4003.

ASTRO 200, HF Transceiver, plus 20-ampere power supply, $500. KE6AP, 805-327-0073.

SSB ELECTRONIC USA VHF/UHF/SHF equipment 50 MHz-10 GHz. Transverters, Converters, Mast-Mounted GaAs-Fet Pre-Amplifiers, EME/OSCAR Equipment. Call-write 40p catalog. 717-868-5643 M-F after 6:30 PM, weekends anytime. Gerry, K3MKZ, 124 Cherrywood Drive, Mountaintop, PA 18707.

BATTERY Pack Rebuilding: Send your pack / 48 hr. service. ICOM BP2/BP3/BP22 $19.95, BP5 $25.95, BP7/BP8 $32.95, BP70 $29.95, Kenwood PB21 $15.95, PB21H $21.95, PB25/26 $24.95, Yaesu FNB9 $19.95, FNB10 $23.95, FNB11 $27.95, FNB4/4A $36.95. U-Do-It Inserts: ICOM BP2 $17.50, BP3 $16.95, BP5 $22.95, BP7/8 $27.50, BP22 $17.95, BP70 $25.95, Kenwood PB21 $12.95, PB21H $18.95, PB24/25/26 $19.95, Tempo S1/2/4/15 $22.95, Yaesu FNB9 $16.95, FNB10 $18.95, FNB4/4A $32.95, Azden $19.95. New Packs w/Case: ICOM BP8B (8.4 v/800 base chg only) $34.95, Yaesu FNB2 $19.95, FNB12 $44.50, Santec 142/1200 $22.95. Free catalog. $3 shipping/order. PA + 6%. Visa-M/C + $2. Cunard, RD 6, Box 104, Bedford, PA 15522, 814-623-7000.

BEST OF MFJ

MFJ, Bencher and Curtis team up to bring you America's most popular keyer in a compact package for smooth easy CW

MFJ-422B **$134.95**

The best of all CW world's -- a deluxe MFJ Keyer using a Curtis 8044ABM chip in a compact package that fits right on the Bencher iambic paddle!

This MFJ Keyer is small in size but big in features. you get iambic keying, adjustable weight and tone and front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of automatic or semi-automatic/ tune modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Use 9 volt battery or 110 VAC with MFJ-1305, $12.95.

The keyer mounts on a Bencher paddle to form a small (4-1/8 x 2-5/8 x 5½ inches) attractive combination that is a pleasure to look at and use.

The Bencher paddle has adjustable gold plated silver contacts, lucite paddles, chrome plated brass and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only $79.95 to mount on **your** Bencher paddle.

Deluxe 300 W Tuner

MFJ-949D **$149.95**

MFJ-949D is the world's most popular 300 watt PEP tuner. It covers 1.8-30 MHz, gives you a new peak and average reading Cross-Needle SWR/Wattmeter, built-in dummy load, 6 position antenna switch and 4:1 balun -- in a compact 10 x 3 x 7 inch cabinet. Meter lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Antenna Bridge

MFJ-204B **$79.95**

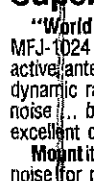
Now you can quickly optimize your antenna for peak performance with this portable, totally self-contained antenna bridge.

No other equipment needed -- take it to your antenna site. Determine if your antenna is too long or too short, measure its resonate frequency and antenna resistance to 500 ohms. It's the easiest, most convenient way to determine antenna performance. Built in resistance bridge, null meter, tunable oscillator-driver (1.8-30 MHz). Use 9 V battery or 110 VAC with AC adapter, $12.95.

Super Active Antenna

"World Radio TV Handbook" says MFJ-1024 is a "first rate easy-to-operate active antenna ... quiet ... excellent dynamic range ... good gain ... very low noise ... broad frequency coverage ... excellent choice."

Mount it outdoors away from electrical noise for maximum signal, minimum noise. Covers 50 KHz to 30 MHz.

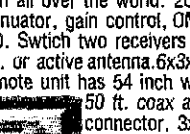


Receives strong, clear signals from all over the world. 20 dB attenuator, gain control, ON LED. Swtich two receivers and aux. or active antenna.6x3x5 in. Remote unit has 54 inch whip, 50 ft. coax and connector, 3x2x4 in. Use 12 VDC or 110 VAC with MFJ-1312, $12.95.

MFJ-1024 **$129.95**

VHF SWR/Wattmeter

MFJ-812B **$29.95**



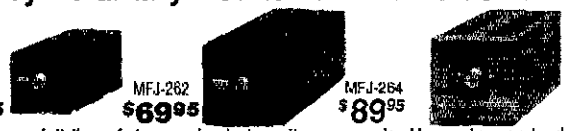
Covers 2 Meters and 220 MHz. 30 or 300 Watt scales. Also reads relative field strength 1-170 MHz and SWR above 14 MHz. 4½x2¼x3 in.

MFJ Coax Antenna Switches

$34.95 MFJ-1701 $21.95 MFJ-1702B $59.95 MFJ-1704

Select any of several antennas from your operating desk with these MFJ Coax Switches. They feature mounting holes and automatic grounding of unused terminals. They come with MFJ's one year **unconditional** guarantee. **MFJ-1701,** $34.95. Six position antenna switch. SO-239 connectors. 50-75 ohm loads. 2 KW PEP, 1 KW CW. Black alum. cabinet. 10x3x1½ inches. **MFJ-1702B,** $21.95. 2 positions plus new Center Ground. 2.5 KW PEP, 1 KW CW. Insertion loss below .2 dB. 50 dB isolation at 450 MHz. 50 ohm. 3x2x2 in. **MFJ-1704,** $59.95. 4 position cavity switch with lightening/surge protection device. Center ground. 2.5 KW PEP, 1 KW CW. Low SWR. Isolation better than 50 dB at 500 MHz. Negligible loss. 50 ohm. 6¼x4¼x1¼ in.

"Dry" Dummy Loads for HF/VHF/UHF



MFJ-260B **$28.95** MFJ-262 **$69.95** MFJ-264 **$89.95**

MFJ has a full line of dummy loads to suit your needs. Use a dummy load for tuning to reduce needless (and illegal) QRM and save your finals. **MFJ-260B,** $28.95. VHF/HF. Air cooled, non-inductive 50 ohm resistor. SO-239 connector. Handles 300 Watts. Run full load for 30 seconds, derating curve to 5 minutes. SWR less than 1.3:1 to 30 MHz, 1.5:1 to 150 MHz. 2½x2½x7 in. **MFJ-262,** $69.95. HF.1 KW. SWR less than 1.5:1 to 30 MHz. 3x3x13 in. **MFJ-264,** $109.95. Versatile UHF/VHF/HF 1.5 KW load. Low SWR to 650 MHz, usable to 750 MHz. Run 100 watts for 10 minutes, 1500 watts for 10 seconds. SWR is 1.1:1 to 30 MHz, below 1.3:1 to 650 MHz. 3x3x7 inches.

MFJ Ham License Upgrade Theory Tutor

MFJ *Theory Tutor practically guarantees you'll pass* the theory part of any FCC ham license exam. Versatile MFJ software is the best computer tutor ever tailor-made for ham radio. You can study the entire FCC question pool, selected areas and take (or print) sample tests. Auto. saves each study session (ex. sample tests), gives you all FCC test graphics (ex. mono.), explanations of hard questions, pop-up calculator, weighted scoring analysis, color change option and more. **Order** MFJ-1610 **Novice;** MFJ-1611 **Tech.;** MFJ-1612 **Gen.;** MFJ-1613 **Adv.;** MFJ-1614 **Ex.** for **IBM compatible.** For **Macintosh:** MFJ-1630-N; MFJ-1631-T; MFJ-1632-G; MFJ-1633-A; MFJ-1634-E, **$29.95** per license class.

MFJ Speaker Mics

MFJ-284 or MFJ-286 **$24.95**

MFJ's compact Speaker/Mics let you carry your HT on your belt and never have to remove it to monitor calls or talk.

You get a wide range speaker and first-rate electret mic element for superb audio on both transmit and receive.

Earphone jack, handy lapel/pocket clip, PTT, lightweight retractable cord. Gray. One year **unconditional** guarantee.

MFJ-284 fits ICOM, Yaesu, Santec. MFJ-286 fits Kenwood.

MFJ-1278 Multi-Mode Data Controller

MFJ-1278 **$279.95**

Use computer to transmit/ receive in **all 9** digital modes: Packet, AMTOR, ASCII, CW, RTTY, FAX, SSTV, Contest Memory Keyer and Navtex receive. Easy-Mail™ Personal Mailbox, Built-in printer port, 20 LED tuning indicator, AC power supply, Host/KISS, 32K RAM, Multi-gray level FAX/SSTV modem, CW key paddle jack and tons more. Options include 2400 baud modem (MFJ-2400, $79.95) and software starter packs with computer cables, $24.95 each, for IBM compatible, Commodore 64/128, Macintosh and VIC-20.

12/24 Hour LCD Clocks

$19.95 MFJ-108B **$9.95** MFJ-107B

Huge 5/8 inch bold LCD digits let you see the time from anywhere in your shack. Choose from the dual clock that has separate UTC/local time display or the single 24 hour ham clock.

Mounted in a brushed aluminum frame. Easy to set. The world's most popular ham clocks for accurate logs. MFJ-108B 4½x1x2;MFJ-107B 2¼x1x2 in.

Cross-Needle SWR/Wattmeter

MFJ-815B **$69.95**

MFJ Cross-Needle SWR/ Wattmeter has a new **peak** reading function! It shows you SWR, forward and reflected power in 2000/500 and 200/50 watt ranges. Covers 1.8-30 MHz.

Mechanical zero adjusts for movement. SO-239 connectors. Lamp uses 12 VDC or 110 VAC with MFJ-1312, $12.95.

Deluxe Code Practice Oscillator

MFJ-557 **$24.95**

MFJ-557 *Deluxe Code Practice Oscillator* has a Morse key and oscillator unit mounted together on a heavy steel base so it stays put on your table. Portable because it runs on a 9-volt battery (not included) or an AC adapter ($12.95) that plugs into a jack on the side.

Earphone jack for private practice. Tone and Volume controls for a wide range of sound. Speaker. Key has adjustable contacts and can be hooked to your transmitter. Sturdy. 8½x2¼x3¾ in.

MFJ Multiple DC Outlet

MFJ-1112 **$29.95**

New MFJ DC Power Outlet saves you space **and** money. Hook it to your 12 VDC power supply and get 6 DC outlets for connecting your accessories. RF bypassing keeps RF out of power supply from DC line outlet. 13½x2¾x2½ in.

Nearest Dealer/Orders: 800-647-1800

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• One year **unconditional** guarantee • 30 day **money back** guarantee (less s/h) on orders from MFJ • Add $5.00 each s/h • **FREE** catalog

MFJ . . . making quality affordable

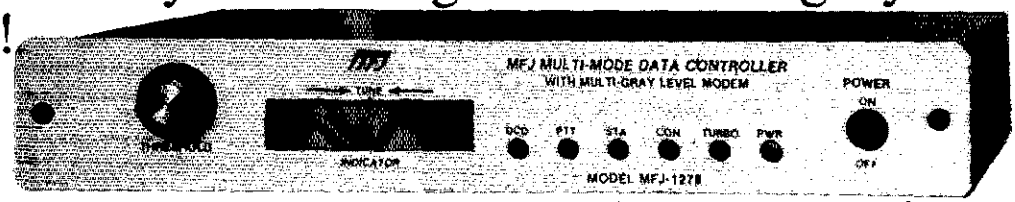
MFJ gives you *all 9* digital modes

and *keeps on* bringing you state-of-the-art advances

. . . while others offer you *some* digital modes using 3 year old technology!

MFJ-1278

$279.95



No 3 year old technology at MFJ!

Using the latest advances, MFJ brings you 9 exciting digital modes and *keeps on* bringing you state-of-the-art advances like new ASA™.

You get tons of features other multi-modes just don't have.

Only MFJ gives you *all 9* modes

Count 'em -- you get 9 fun modes -- Packet, AMTOR, RTTY, ASCII, CW, FAX, SSTV, Navtex and Contest Memory Keyer.

You can't get *all 9 modes in any* other multi-mode at *any* price. Nobody gives *you modes MFJ-1278 doesn't have.*

The best modem you can get

Tests in ***Packet Radio Magazine*** prove the modem used in the MFJ-1278 copies HF packet more accurately than all other modems tested.

MFJ-1278 is the *only* multi-mode with a ***true*** DCD circuit. This dramatically reduces sensitivity to noise and dramatically increases completed QSOs.

Exclusive Built in Printer Port

Only the MFJ-1278 has a dedicated printer port that lets you plug in your Epson or IBM compatible printer.

You don't need to buy a silly $40 cable just to plug in your printer.

20 LED Precision Tuning Indicator

MFJ's unequaled tuning indicator makes it really easy to work HF packet. Unlike others, you use it the same for all modes -- not different for each mode. Just tune your radio to center a single LED and *you're precisely tuned in to within 10 Hz* -- and it shows you which way to tune!

New Easy Mail™ Personal Mailbox

You get MFJ's new Easy Mail™ Personal *Mailbox with soft-partitioned memory so you* and your ham buddies can leave messages for each other 24 hours a day.

Multi-Gray Level FAX/SSTV Modem

You'll see tomorrow's news today when you copy outstanding FAX news photos with crisp clear details. MFJ-1278 is the *only* multi-mode *with a built-in multi-gray level modem. It lets* you transmit and/or receive multi-gray level pictures with an appropriate terminal program.

NEW! **MFJ's new Automatic Signal Analysis™ gives you *exclusive* HF packet idenification!** **MFJ's** new ASA automatically identifies HF packet, RTTY, ASCII and AMTOR signals. A quick "OK" command selects the mode!

One FREE Upgrade!

When you buy your MFJ-1278 *today*, you don't have to miss new modes and features that come out *tommorow*. **Why?** Because your 1278 comes with a coupon good for one ***free*** eprom upgrade exchange that'll add new features.

Plus More . . .

Plus you get . . . 32K RAM, ***free*** AC power supply, Host mode that lets MFJ-1278 serve as *a kiss interface or dumb modem, fast throughput* anti-collision technology, independent transmit level for each radio port, random code generator, lithium battery backup, RS-232 *and* TTL serial ports, socketed ICs, tune up command, peripheral I/O port, automatic serial numbering, programmable message memories, dual radio ports (*each* HF or VHF), CW paddle jack, audio amplifier and speaker jack so you can monitor CW sidetone, transmit and receive audio and packet connect bell, ***new*** fully intergrated instruction manual with *Fast Start*™ booklet and more. 9½ x 9½ x 1½ inches.

No Matter What™ Guarantee

You get MFJ's one year No Matter What™ *Guarantee.*

That means we will repair or replace your MFJ multi-mode (at our option) *no matter what* happens to it for a year.

Others give you a *limited* warranty. What if *they* say, "Sorry, your *limited* warranty doesn't cover *that!*"

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Don't settle for 3 year old technology.

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New MFJ-1278T *Turbo* with *fast* 2400 baud modem

MFJ-1278T

$359.95

The new MFJ-1278T *Turbo* gives you *fast* 2400 baud packet -- *twice* the baud rate of any other multi-mode. By communicating faster you'll reduce chances for error, lessen congestion and more efficiently utilize our ham frequencies. You'll also get 1200/300 baud for compatibility with older TNCs.

The 2400 baud modem is also available separately. Order MFJ-2400, $69.95, for any MFJ and most other TNCs.

Software Pack gets you on the air *instantly!*

MFJ software packs with interface cable get you on the air instantly if you use an IBM compatible, Commodore or Macintosh computer. Here are some of the programs available:

MFJ-1289, $59.95. Menu driven. Super IBM compatible program. See ad below for details.

MFJ-1282B, $39.95. New with multi-gray receive for Commodore 64/128. Menu driven.

MFJ-1287, $24.95. Macintosh starter pack.

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MFJ-1274 **$159.95**

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MFJ-1270B super clone of TAPR's TNC-2 gives you more features than *any* other packet controller -- for $139.95

You can double your fun by operating VHF and HF because you get ***high performance*** switchable VHF/HF modems.

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In MFJ's new **WeFAX** mode you can print full-fledged weather maps to screen or printer and save to disk using most computers.

A new KISS interface lets you run TCP/IP and MSYS. NET ROM compatible.

You also get 32K RAM and a free 110 VAC power supply (or use 12 VDC).

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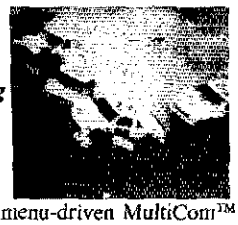
New 2400 baud ***Turbo*** models available: **MFJ-1270BT**, $209.95; **MFJ-1274T**, $229.95.

New MFJ MultiCom™ . . . exciting new 1278 software



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New menu-driven MultiCom™ brings out the full power of your MFJ-1278 *with multi-gray modem.* No set-up required — just load and use. You get incredible high resolution WeFAX maps and AP news photos right off HF. You also get color packet pictures and multi-gray SSTV.

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Custom QSL created with paint program can be transmitted by FAX, SSTV or Packet. On-line help. RS-232 cable. Tons more. Call for ***free*** MFJ catalog for full information: ***800-647-1800.***

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. . . lets you instantly point, shoot and transmit a video picture -- all in one smooth sequence

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ICOM IC2GAT $295, Kenwood TH-31BT-new with many accessories, new B+K 1851 Frequency Counter $469, Autek Research Memory Keyer $45, new Cushcraft A50-3 and 224 WB. WA3UIM, 215-353-8443.

JENNINGS RC21 High-Performance Coaxial Relay/Switch, new, $1295. Jennings RC5 Coaxial Relay, used/tested $125ea. ICOM AT-500 Antenna Tuner, like-new $425. KLM 2M-16LBX Antenna, new-box $125 Alan, K6GA, 714-964-3912.

HAMTRONICS Receiving Converter Model CA432, 432-434 in, 28-30 out, $45. MFJ Antenna Bridge Model MFJ204B, $40. Both mint. KC2I, 201-939-2237.

MINT YAESU FT-747GX, FM, unused mobile bracket, $585 FOB. K1LEC, 802-886-8121.

ANTENNA TUNER—Dentron Model MT-2000A 3KW Tuner with manual, excellent condition, $150 plus shipping. WB5PUB, 512-837-7770.

IBM PC keyboard program and interface circuit. Menu makes program extremely easy to use. Sends perfect code on any compatible with serial port. 5.25 or 3.5 disk $25. Interface kit, $25. SASE for info. Electrosoft, P.O. Box 1462, Loveland, CO 80539.

HAM RADIO REPAIR: Radios repaired at reasonable rates with quality workmanship. Rich, KA1CXM, 364 Clearview Avenue, Harwinton, CT 06791, 203-485-9910.

EIMAC 3CX800A7, new, warranty, $295. Eimac 3CX1200A7, new, $425. Drake R-4B Receiver, $165. T-4XB Transmitter, $150. AC-4 P/S, $75. MN-2000, $250. MN-2700, $350. Alan, K6GA, 714-964-3912.

ANTENNA PARTS CATALOG, Lowest Prices: Dipole/Quad/Ground Radial Wire, Insulators, Center Feeds, Open Wire Feed Line. RG-213 Mil Spec $.37/ft. Revolutionary Hybrid Product: 168 strand copper "Flex-Weave"™, #14, strong, flexible, non-stretch, won't rust/kink like copper weld, $34 first 275' (minimum), $.12/ft. thereafter, includes shipping! Catalog: $2. Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

DX RADIO Adventures To Polynesia. Be rare DX, contest and experience the beautiful and exotic South Sea Islands of Fiji, Tonga and Samoa. Contact DX Adventures, P.O. Box 75670, Honolulu, HI 96836 or call 1-808-261-2000.

SALE: Kenwood TS-530S, Heath SB-201, Ten-Tec Tuner, Heath Ultra Pro Keyboard Keyer-$800. W3DVH, 717-323-6334 pick up.

ROPE—Space Age-Kevlar-black, braided Dacron covered-no stretch-high abraison resistance 500 lb. test. 200 foot spools only. $12.95 + $2.75 HPI. Checks cleared before shipping. VA residents add 4.5% tax. Rope-Rope-Rope, Box 6601, Portsmouth, VA 23703. Inquires, SASE.

WANTED: Kenwood TR-7600, TR-7625 or other 2mtr FM transceiver which allows for external control of the operating frequency. Lenard Persin, 3914 Dekalb Drive, Orlando, FL 32809, 407-855-1237.

WANTED: MFJ-1212 TRS80 III Xcvr program and interface and instruction book. Ted Rape, K8BAX, 206 Northcrest, Mason, OH 45040, 513-398-4721.

COLLINS New Parts & Tubes-meter for 75S3 $45, 30L1 $45, KWM2 on/off switch $15, WARC & 10 meter crystals $6 each. Tubes-see ad Oct 90 QST page 188. WE2T, 716-334-1103.

WEEKLY HAM TRADER. Mailed First Class every Friday. Subscriptions $13 for six months (26 issues) or $25 for full year (52 issues). Ad rates 20 cents per word non-commercial, 40 cents commercial. Prepaid ads and subscriptions to: Weekly Ham Trader, P.O. Box 1159, Arnold, MO 63010.

AEA PK-64/HFM-64 RTTY/ASCII terminal unit, $150; Commodore 64 computer, 1541 drive, 1702 monitor, MPS802 printer, $400; all mint with manuals, ship UPS freight collect. Call or write: Bob, W5SUR, 220 Stonewall Jackson Drive, Conroe, TX 77302, 409-321-1902 evenings.

SELL NCX3 and AC supply, $95. Gonset 101 Linear needs one 572B, $95. 3600 Volt CT transformer 600 mills, $75. Atlas 210X and AC console, $350. Working Hammarlund HQ170, $75. Halficratters HT37, $40. TS830S excellent condition, $695. W5PO, 3200 Michael Way #2, Las Vegas, NV 89108, 702-645-8145.

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HAM RADIO Business For Sale—Antennas and accessories. Low cash required. Send letter with qualifications or call. ASI, Route 2, Box 478, Hillsboro, OR 97123, 503-628-3687.

SLEP SPECIALS, Military USM-207 Frequency Counter, Late Model Solid State, Eight Digit Readout, 0-500 MHz, High Stability Crystal Oven Oscillator, Lab Quality, $185. Military TS-510A Signal Generator, 10 MHz to 420 MHz Calibrated Output, Mil/Version HP608D, $195. Military URM-127 Solid State Portable Audio Signal Generator, 20 Hz to 200 KHz in four bands, Metered Output, 0-10VRMS, $85. HP616A Microwave Signal Generator, 1.8 GHz thru 4.1 GHz, $195. Tektronix 575 Curve Tracer Oscilloscope, $225. HP606A Signal Generator, 50 KHz thru 65 MHz, Calibrated Output, Ideal For Amateur Repair, $245. All lab tested. Have quantity. Visa/MC/check. Add shipping. Write/phone Bill Slep, 704-524-7519, Slep Electronics Company, Highway 441, Otto, NC 28763-0100.

ICOM R7000 VHF/UHF Receiver, $800. B&K 1260 Rack Mount Video Pattern/Sync Generator, $1150. Bruce, KA3NGT, 814-938-7237.

FOR SALE: 70 Ft. Free Standing 4-Section Crank-Up Universal Tower with Hy-Gain Heavy Duty Rotor #300 and 1HP Crank-Up Motor. All stainless steel cable with indoor outdoor control, $2200 or best offer. Includes base & all attachments. Also Telrex 4-Band Array 10-15-20-40 Mtr. ST4BM3 at $2300 or best offer. A lifetime antenna with a DXers dream-offered at less than 1/2 new price. Sandy, WB5RNC, P.O. Box 5566, Corpus Christi, TX 78465, days 407-852-1982, 512-991-5722, eves 305-454-7962.

COMPUTER LOGGING SERVICE—You work the contest, I provide computerized log. Complete scoring, summary, dupes and reports using latest K1EA program. $1 for full info, samples, logs, etc. Bill Albrant, K7JYE, 101 Acorn Circle, Brea, CA 92621.

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KENWOOD TS-830S $650, AT-230 $185, TS-520S $395, AT-200 $135, DG-5 Display $175, SP-520 $75, VFO 520/S $165, Yaesu FT102 $590, FV102DM $375, Heath 2KW SB-220 $590. John Korona, WA2V, 1117 Dewitt Terrace, Linden, NJ 07036, call daytime 201-486-0039.

WANTED: 2 Type AM National Velvet Vernier Dials. W9RKE, 18106 Ireland Road, South Bend, IN 46614.

GROUND RADIAL WIRE For Verticals Or Slopers; Improves performance, new #16 bare solid copper; Lowest cost: $38 for 1000 foot spool, includes shipping! Davis RF, P.O. Box 230-Q, Carlisle, MA 01741, 508-369-1738.

1991 CALLBOOKS: Until 12/25: North American, $25; International, $25. Both, $49. Any four or more: $23.50/ea. Postpaid USA. California residents add sales tax. Duane Heise, AA6EE, 16832 Whirlwind, Ramona, CA 92065, 619-789-3674 evenings.

TS-130S KENWOOD Compact Transceiver, excellent condition, 80-10M with 18/24 MHz bands. Call Tom after 5PM, 607-754-7767.

WANTED: Heathkit SB-401 Transmitter. Peter Rapelje, 48 Circle Drive, Glen Cove, NY 11542, 516-676-0694.

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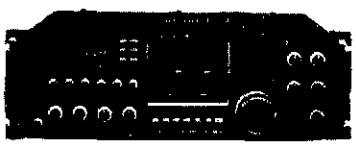

HF Equipment	List	Jun's
IC-781 Super Deluxe HF Rig	$5995.00	Call $
IC-765 New, Loaded with Features	3149.00	Call $
IC-735 Gen. Cvg. Xcvr	1099.00	Call $
IC-751A Gen. Cvg. Xcvr	1699.00	Call $
IC-725 New Ultra-Compact Xcvr	949.00	Call $
IC-726 HF/50 MHz All Mode	1299.00	Call $
Receivers		
IC-R9000 100 kHz to 1999.8 MHz	5459.00	Call $
IC-R7000 25-1300 + MHz Rcvr	1199.00	Call $
IC-R71A 100 kHz - 30 MHz Rcvr	999.00	Call $
VHF		
IC-228A/H New 25/45w Mobiles	509./539.	Call $
IC-275A/H 50/100w All Mode Base	1299./1399.	Call $
IC-28A/H 25/45w, FM Mobiles	469./499.	Call $
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IC-2SAT Micro Sized HT	439.00	Call $
IC-901 New Remote Mount Mobile	1199.00	Call $
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TS-680S HF Plus 6m Xcvr	1149.95	Call $
TL-922A HF Amp	1982.95	Call $
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R-2000 150 kHz - 30 MHz	799.95	Call $
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VHF		
TS-711A All Mode Base 25w	*1059.95*	*Call $*
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TH-225A New 2m HT	399.95	Call $
TH-26AT Compact 2m HT	369.95	Call $
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TM-621 2m/220, FM, Mobile	729.95	Call $
TM-701A 25w, 2m/440 Mobile	599.95	Call $
TH-75A 2m/70cm HT	TBA	Call $
UHF		
TS-811A All Mode Base 25w	1265.95	Call $
TR-851A 25w SSB/FM	771.95	Call $
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TH-46AT Compact 440 FM, HT	399.95	Call $
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YAESU FT-1000D

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DJ-160T

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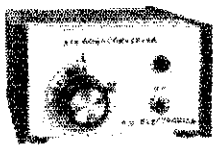

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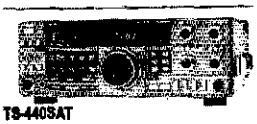

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FT-747GX - Economical HF Xcvr - 100W.
FT-736R - VHF / UHF All Mode Base Xcvr.
FT-470R - 2M/70CM Deluxe Dual Band HT.
FT-411R - 2M Full-Featured Handie Talkie.
Please Call For Your Special Low Prices!

ALINCO

VHF / UHF MOBILES AND HANDIES

DR-570T - 2M/70CM - Dual Band Mobile.
DR-510T - 2M/70CM - Dual Band Mobile.
DR-110T - 2M - 45W - VHF Mobile.
DJ-500T - 2M/70CM - Dual Band Talkie.
DJ-160T - 2M - Tiny - Full Featured Talkie.
DJ-100T - 2M - Tiny VHF Handie Talkie.
ELH-230G / ELH-230D - 30W HT Amplifier.

AMERITRON
HF LINEAR AMPLIFIERS

AL-1500 - 1500W AL1200 - 1500W
AL82 - 1500W AL80A - 1000W
AL84 - 600W **CALL FOR PRICE!**

FREE SHIPPING ON RADIOS!

ICOM

IC-781A
General Coverage - HF Xcvr - Full Dual RX - With Built in Band Scope. Top Performer. **Call For Price!**

IC-765A
Digital - General Coverage - 100W - HF Xcvr. Great Performer. **Call!**

IC-735A
General Coverage HF Xcvr - 100W. Good Performer. **Call For Price!**

MORE ICOM RADIOS - IN STOCK

IC-725 - Economical HF Xcvr.
IC-726 - Economical HF W/ Xcvr.
IC-970 - VHF / UHF All Mode Base.
IC-2400 - VHF / UHF Mobile Xcvr.
IC-228A - 2M - 25W Mobile Xcvr.
IC-228H - 2M - 45W Mobile Xcvr.
IC-32AT - VHF / UHF - 2M Talkie.
IC-24AT - VHF / UHF - 2M Tiny HT.
IC-2GAT - 2M - 7W Super Talkie.
IC-2SAT - 2M - Tiny Handie Talkie.

MFJ IN STOCK

New Product - 948 Tuner $ 119
901B / 941 D Tuners ..... 59 / 99
945C / 949D Tuners ..... 89 / 139
986 / 989C Tuners ..... 259 / 299
1278 / 1270B TNC's .... 249 / 129
202 / 204 Nx Bridges ..... 59 / 79
250 / 260 / 262 Loads 49 / 29 / 69
407 / 401 Keyers ..... 69 / 49
422 MFJ / Bencher Combo 129

ASTRON
12 VDC POWER SUPPLIES

MODEL	AMPS	ICS	PRICE
RS4A	3	4	$ 49
RS7A	5	7	59
RS12A	9	12	79
RS20A	16	20	99
RS20M	16	20	119
RS35A	27	35	159
RS35M	27	35	179

Models With "M" Suffix Have Meters.

OTHER ACCESSORIES

AEA PK232MBX - AllMode TNC.
KANTRONICS KAM - All Mode
NYE MBV-A - 3KW Antenna Tuner.
RF CONCEPTS - Amplifiers.
MIRAGE - VHF / UHF Amplifiers.
OTHERS TOO. - PLEASE CALL!

HEATH

HW2P - 2M Tiny Handie Talkie.
HW-24T - 2M/70CM Handie Talkie.
Call For Price All Heath Models!

TEN - TEC

Paragon - General Coverage Xcvr.
Omni V - Ham Bands Only Xcvr.
Titan - 1500W HF Linear Amplifier.
Call For Prices On All TEN - TEC Equipment! Most Items In Stock.

BUTTERNUT ANTENNAS

HF5B Butterfly - Compact Triband Beam. 6FT Boom Length - 12.5 FT *Element Length.* $ 259.95
HF6VX - 6 Band Vertical Antenna. Handles Full Legal Power $ 159.95
HF2V - 80/40M Vertical Antenna. Handles Full Legal Power $ 149.95
RMKII - Roof Mount Kit $ 59.95
STRII - Radial Kit 59.95
TBR160 - 160M Coil 59.95
30MRK - 30M Kit 39.95
Free Shipping On Butternuts!

COAX AND CONNECTORS

RG213/U - 95% Shield - Non Contaminating Jacket. $ .39 / FT.

RG8X - 95% Shield - Mini-Size Coax. Uses UG176 Adapt. $ .25 / FT.

9086 International - Equivalent to Belden 9913 - 100% Shield - Solid Center Conductor $ .45 / FT.

Connectors:
Amphenol PL259 - Silver - $ 1.50.
Amphenol UG218 - N Male 3.50.
Amphenol N Male For 9913 4.95.

ANDREW HELIAX®

LDF4-50 - 1/2 Copper (/Ft) $ 2.19
LDF5-50 - 7/8 Copper (/Ft) .. 5.49
Connectors: 1/2" - 29.00, 7/8" - 69.00

ROTOR CABLE

Standard 8 Conductor Rotor Cable. (2 #18Ga. & 6 # 22Ga.) $ .25 / FT.

Heavy Duty 8 Cond. Rotor Cable. (2 # 16Ga. & 6 # 18Ga.) $ .45 / FT.

ROTATORS

Telex CD45II - 8.5 SQ. FT.
Telex HAM4 - 15 SQ. FT.
Telex TAILTWISTER - 20 SQ. FT.
Telex HDR300 - 25 SQ. FT.
Yaesu G500A Elevation Rotor.
Please Call For Prices On Rotors!

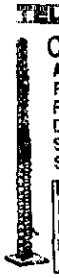
cushcraft

A3S - 3 Element Triband Beam.
A4S - 4 Element Triband Beam.
A743 / A744 - 30/40 Kit For Above.
R5 - 20-10M, No Ground Vertical.
AP8 - 80-10M Vertical Antenna.
D40 - 40M Rotatable Dipole.
40-2CD - 2 Element, 40M Beam.
A50-5 - 5 Element, 6M Beam.
215WB - 15 Element, 2M Beam.
230WB - 30 Element, 2M Beam.
4218XL - 18 Element, 2M Beam.
3219 - 19 Element, 2M Beam.
ARX2B - 2M Vertical antenna.
Call For Prices On All Cushcraft!

PHILLYSTRAN GUY CABLE

HPTG1200I - 1200 Lb. Rating. $ .32
HPTG2100I - 2100 Lb. Rating. $ .36
HPTG4000I - 4000 Lb. Rating. $ .59
HPTG6700I - 6700 Lb. Rating. $ .79
Phillystran Guy Cable Is Non-Conducting - No More Insulators. Also, The New Phillystran No Longer Uses Potting Heads, But Uses Regular Cable Clamps. Please Call Us For Details!

TELEX hy-gain



CRANKUP SALE

All Models Shipped Factory Direct - Prepaid.
Features: All Steel - Hot Dipped Galvanized - Self-Supporting - With Rotor Shelf and Wench.

Model	Height	Load
HG37SS	37 FT.	9 S.F.
HG52SS	52 FT.	9 S.F.
HG54HD	54 FT.	18 S.F.
HG70HD	70 FT.	16 S.F.

Accessories For Hygain Towers *Are Also Available For Immediate* Delivery. CALL FOR PRICE!

TELEX HYGAIN ANTENNAS

New DX88 HF Vertical Antenna.
7-2 Discoverer - 2 El., 40M Beam.
7-3 Discoverer - 3rd El. add-on Kit.
Explorer 14 - 3 Element Tribander.
QK710 - 30/40M Add-on Kit.
V2S - V3S - V4S - VHF/UHF Vert.
TH5MK2S - 5 El., Triband Beam.
TH7DXS - 7 El., Triband Beam.
205BAS - 5 El., 20M Beam.
155BAS - 5 El., 15M Beam.
105BAS - 5 El., 10M Beam.
204BAS - 4 El., 20M Beam.
64BS - 4 El., 6M Beam Antenna.
18AVT/WBS - 80-10M Vertical.
18HTS - 80-10M Hytower Vertical.
Call For Prices On All Hygain.

ROHN
GUYED TOWER PACKAGES

HEIGHT	25G	45G	55G
50	849	1229	1549
60	939	1389	1939
70	999	1719	2159
80	1199	1869	2369
90	1289	2039	2579
100	1369	2199	2989
110	1449	2459	3209
120	1669	2619	3429

These Towers Are Shipped Complete With The Following: All Guy Hardware, Base Section, Rotor *Plate; According To ROHN Specifications.* 70 MPH Design. Towers Are Shipped Freight Collect From Plano, TX. **IN STOCK NOW!**

FOLDOVER TOWERS

Model	Height	Load Cap.
FK2548	48 Ft.	15.4S.F.
FK2558	58 Ft.	13.3 S.F.
FK2568	68 Ft.	11.7 S.F.
FK4544	44 Ft.	34.8 S.F.
FK4554	54 Ft.	29.1 S.F.
FK4564	64 Ft.	26.4 S.F.

GGK25GII - Double Guy Kit $ 299.
GGK45GII - Double Guy Kit $ 319.

The Above Specifications Are At 70 MPH, With The Above Double Guy Kit Properly Installed. ROHN Foldover Towers Are Drop Shipped Freight Paid; Cost 10% Higher West Of The Rockies.

STACKED SECTIONS

20G - Light Duty 12 Inch $ 54.50
25G - Medium Duty 12 In 65.50
45G - Heavy Duty 18 Inch 153.50
55G - Extra Heavy 18 Inch 197.50
Please Call For Pricing On All Rohn Accessories. Most Are In Stock For Immediate Delivery!

US TOWER

All Steel Crank Up Towers And Poles. Hot Dip Galvanized To Withstand Rust. Totally Self Supporting - No Guy Wires! Coax Arms, Thrustbearings, Masts, Motor Drives, Optional Bases, And More Are Also In Stock For Quick Delivery. Call For Special Pricing.

Model	Min Ht.	Max Ht.	Load	Price
MA40	21 Ft.	40 Ft.	10 Sq.'	629
MA50	22 Ft.	50 Ft.	10 Sq.'	999
TX438	22 Ft.	38 Ft.	18 Sq.'	919
TX455	22 Ft.	55 Ft.	18 Sq.'	1385
TX472	22 Ft.	72 Ft.	18 Sq.'	2279
HDX555	22 Ft.	55 Ft.	30 Sq.'	2079
HDX572	22 Ft.	72 Ft.	30 Sq.'	3559

Shipping On US Tower Models is Collect From Visalia-California. Calif. Residents Please Add 6% State Tax.

ROHN SELF SUPPORTING BX TOWERS

Model	Height	Load	Weight	Price
HBX40	40 Ft.	10 Sq.'	228	$ 449
HBX48	48Ft.	10 Sq.'	303	589
HBX56	56 Ft.	10 Sq.'	385	699
HDBX40	40 Ft.	18 Sq.'	281	569
HDBX48	48 Ft.	18 Sq.'	363	689

All ROHN BX Series Towers Are Shipped Freight Prepaid In The Contenental United States. These *Towers Come With The Base Stubbs At No* Additional Charge As Well As The Rotor And Top Plates. The Above Antenna Load Ratings Are At 70 MPH. Please Note That ROHN Does Not Reccomend Using This Tower With Antennas That Have A Boom Length Exceeding 10 Foot.

GUY WIRE AND 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 (7X7) Aircraft Cable (2700 Lb. Rating)	.15 / Ft
3/16 CCM - Cable Clamp For 3/16 or 5/32	.45
1/4 CCM - Cable Clamp For 1/4	.55
1/4 TH - Thimble For All Guywire Listed	.45
3/8 EE - 3/8 X 6 Eye And Eye Turnbuckle	6.95
3/8 EJ - 3/8 X 6 Eye And Jaw Turnbuckle	7.95
1/2 X 9 EE - 1/2 X 9 Eye And Eye Trnbkl.	9.95
1/2 X 9 EJ - 1/2 X 9 Eye And Jaw Trnbkl.	10.95
1/2 X 12 EE - 1/2 X 12 Eye And Eye Trnbkl.	12.95
1/2 X 12 EJ - 1/2 X 12 Eye And Jaw Trnbkl.	13.95
5/8 X 12 EJ - 5/8 X 12 Eye And Jaw Trnbkl.	16.95
3/16 Preformed Guy Grips (Replaces CCM)	2.49
1/4 Preformed Guy Grips (Replaces CCM)	2.99
GAS604 - 6 In. X 4 Ft. Earth Screw Anchor	19.95
500D - Guy Insulator (Up To 3/16)	1.99
502 - Guy Insulator (Up To 1/4)	3.49
Ground Rod - 5/8 X 8 Ft. Copper Clad	12.95
Coax Seal - Waterproofs Coax Connectors	2.50

GALVANIZED STEEL MASTS

Wall	5'	8'	10'	12'	15'	20'
.12	29	39	49	59	69	89
.18	49	75	89	109	129	149
.25	69	109	129	159	189	249

These Galvanized Steel Mast Measure 2 Inch, Out*side Diameter And Are Available In 3 Different Wall* Thicknesses. They Are All Galvanized, High Carbon Steel. Mast Measuring 8 Feet Or Less Can Be Shipped By Ups. Mast That Are Longer Than 8 Feet Must Be Shipped By Collect Freight.

HUSTLER ANTENNAS

6BTV - 6 Band Vrt...149 5BTV - 5 Band Vert...129
G7-144B - 2M Vert...129 G6-144B - 2M Vert...89
Hustler HF Mobile Resonators Are Also In Stock.
Please Call For Pricing On Other Hustler Items.

PLEASE ADD ESTIMATED SHIPPING ON TOWER AND ANTENNA RELATED PRODUCTS.

ORDER TOLL FREE 1 - (800) 272 - 3467

LOCAL AND TECHNICAL INFORMATION PHONE# 1 - (214) 422 - 7306

FAX ORDER AND INFORMATION PHONE# 1 - (214) 881 - 0276

HOURS: 9AM - 5PM
SAT. 9AM - 1PM

TEXAS TOWERS

C.O.D.
MC / VISA

Div. of Texas RF Distributors, Inc., 1108 Summit Ave. Suite # 4, Plano, TX 75074

Index to Volume LXXIV—1990

How to Use This Index

Items are listed according to the monthly column in which they appeared and/or under any category (or categories) that generally describes them. The name of the author(s) appears in parentheses, followed by a colon, then the page number and issue. Examples: "The 160-Meter Antenna Dilemma" appears under Feature Articles—Technical and under Antennas and Transmission Lines. "Earthquake!" appears under Feature Articles—General Interest and under Public Service. Some items have additional subject-description information in parentheses after the title.

FEATURE ARTICLES

General Interest

Technical

Note: Beginning with the Dec issue, the 50 and 25 Years Ago column became 75, 50 and 25 Years Ago.

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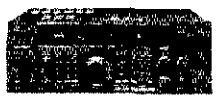
RADIO CENTER USA

KENWOOD



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TRANSMIT THE ULTIMATE SIGNAL

- *Digital Signal Processing*
- Dual Frequency Receive
- Digital AF Filter • 100 Memories

CALL FOR DETAILS AND ORDER TODAY!

YAESU

Special Holiday Savings

FT-767GX

HF/VHF/UHF BASE STATION

- 160-10 Meter Standard
- Optional Plug-ins for 6M, 2M, 70cm
- Receive 100 kHz to 29.99 MHz
- AM, FM, SSB, CW, AFSK

CALL FOR ALL DETAILS!

ICOM

IC-2SAT

COMPACT, LIGHTWEIGHT 2 METER HT

- Covers 140-150 MHz
- Simple Operation
- 48 Memory Channels
- VFO and Memory Scan
- Up to 5 Watts Output

CALL FOR ALL THE DETAILS!

ALINCO

DR-590

NEW!

2 METER/440 MOBILE

- 45 W/2 Meter 35 W/UHF
- Cross Band Repeater Function
- Receiving and Scanning on Both Bands
- Detachable Front Control Panel

CALL FOR DETAILS!

KENWOOD

SALE

TM-231A

COMPACT 2 METER FM

- 50 Watts, 20 Memories
- Multiple Scanning Modes
- Selectable, Built-in CTCSS Tone

DON'T DELAY—CALL TODAY!

YAESU

FT-736R

Special Holiday Savings

WORK SATELLITES, MOONBOUNCE, TROPOSPHERE, AURORA . . .

- SSB, CW, FM
- 2 Meters and 60 cm With Optional Slots for 50, 220 MHz and 1.2 GHz
- 25 Watts on 144,220, 440 MHz

CALL FOR ALL DETAILS!

Kantronics

DataEngine

- High Speed Packet
- Internal 1200 Baud Modem
- Off The Shelf 9600 Baud Packet With The DVR 2-2
- Internal 9600 Baud, G3RUH Type Modem Available

CALL TODAY!

ALINCO

DR-570T

VHF/UHF TWIN BANDER

- 45W on 2M/35W on 70cm
- Receive on both Bands at Same Time
- Extended Receiver Range
- More Features for the Money Than Anyone Else

ALL ALINCO SALE PRICED!

KENWOOD

NEW!

TH-27A

2 METER SUPER COMPACT HT

- Receive 118-165 MHz
- Up to 5 Watts Output
- CTCSS Encode/ Decode Built-in
- Multi-Function Scanning
- TH-47A, 70 cm Model

CALL TODAY!

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Special Holiday Savings

FT-470

2 METER/70CM PERFECTED

- Simultaneous Receive On Both Bands
- Built-in PL Encode/Decode
- 10 Memories Each Band
- 2.3 Watts With 5W Optional

CALL FOR ALL THE DETAILS!

HUSTLER

G-10 10 METER COLINEAR VERTICAL

Fiberglass Construction

½ Wave Gain Antenna

SPECIAL SALE

$39.95

(BELOW DEALER COST)

LIMITED SUPPLY—CALL TODAY

ALINCO

DJ-160T

DELUX 2 METER HANDHELD

- Receive 137-173.995 MHz
- 20 Memories
- 3 Watts Standard
- 3 Scan Modes
- Store Duplex/ Simplex Pairs, *Call Channel*, 38 Encoding Subtones

CALL TODAY!

MFJ SALE MFJ

LARGEST STOCK OF ALL YOUR MFJ FAVORITE ACCESSORIES CALL TODAY FOR BEST PRICE

MFJ-1278

Multi-Mode Data Controller

CALL FOR EXTRA SAVINGS

YAESU

Special Holiday Savings

FT-411

MAXIMUM 2 METER HT PERFORMANCE

- Dual VFO's
- 40 Memories
- *Extended Receive*
- Built-in PL Encode/Decode
- Auto. Repeater Shift

CALL FOR ALL THE DETAILS!

CAROL CABLE

(Columbia Cable)

4080 Rotor Cable	22¢/foot
4090 H.D. Rotor Cable	34¢
1108 RG8, Mini	21¢
1198 RG8, Super Flex	30¢
1180 9913 Type	41¢
1176 RG213, Mil Spec	36¢

10% DISCOUNT ON FULL ROLLS

ASTRON

• RS7A	$49	• RS35M	$159
• RS12A	$70	• VS35M	$174
• RS20A	$89	• RS50A	$199
• RS20M	$109	• RS 50M	$219
• VS20M	$124	• RM50M	$259
• RS35A	$139	• VS50M	$232

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WANTED: QUALITY USED GEAR, CASH OR TRADE

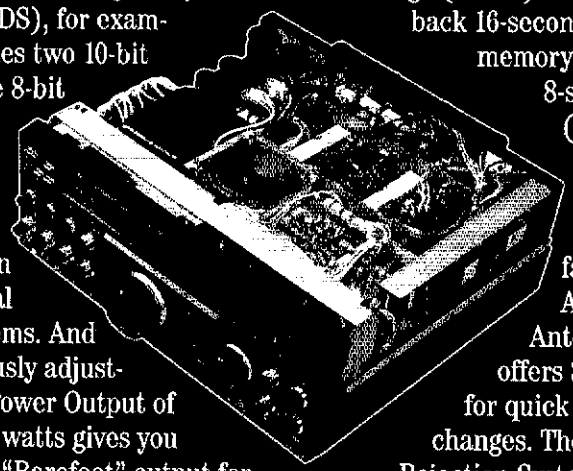
AEA • ALINCO • ASTRON • ALPHA-DELTA • AMERITRON • ANTENNA SPEC • B & W • BENCHER • BUTTERNUT •

CUSHCRAFT • DIAMOND • DRSI • HEIL • HUSTLER • HYGAI

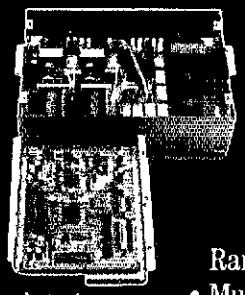
The Best of the Best

To be a star in international competition, you have to play your cards right. Stack the deck in your favor with Yaesu's FT-1000. It has all the features world-class winners demand.

Our Direct Digital Synthesis (DDS), for example, utilizes two 10-bit and three 8-bit DDS for fast lock-up and lower noise than traditional PLL systems. And continuously adjustable RF Power Output of up to 200 watts gives you excellent "Barefoot" output for pileups, plus generous drive for your linear. While the Stereo Dual Receive gives you two tuning knobs for easy spotting and simultaneous reception of two different frequencies—for cross-band dual receive or diversity reception using two antennas, add the optional BPF-1 module.



The FT-1000 also has the optional Digital Voice Storage (DVS-2) to let you play back 16-seconds of receive memory and two 8-second (or four 4-second) messages in transmit. A fast-action Automatic Antenna Tuner offers 39 memories for quick band changes. The QRM Rejection Systems include cascaded filter selections, IF width control, IF shift, IF notch filter, all-mode squelch, dual-mode noise blanker and CW audio peaking filter. Additional features include:



Auto-Antenna Circuitry

- 100 Memories.
- High Dynamic Range—108dB.
- Multimode Selection on Packet/RTTY.
- CW Spot.
- Independent mode and filter selection on SSB/CW.
- Mode/Frequency/Filter Information Stored Independently in each VFO.
- Built-in Electronic Keyer Module.
- Twin Frequency Displays.
- Standard (FT-1000) and Deluxe (FT-1000D) Versions.

Be a Star Performer. For more information on the FT-1000 and other Yaesu amateur radio products call the Yaesu Dealer nearest you.

One Year Limited Warranty

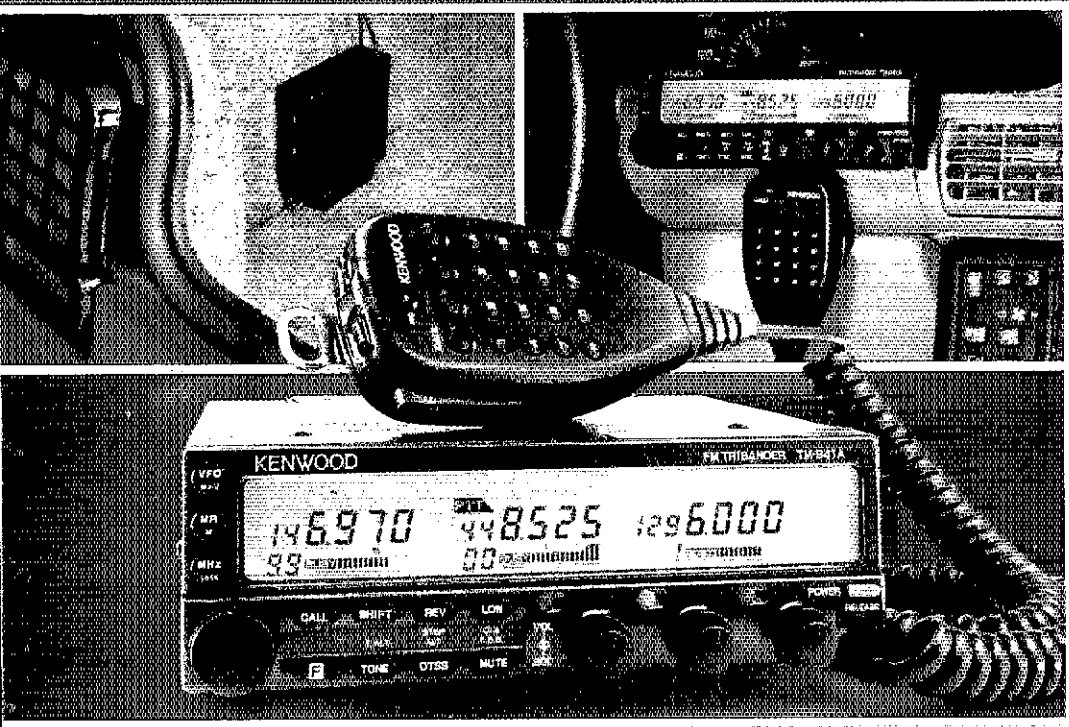
YAESU

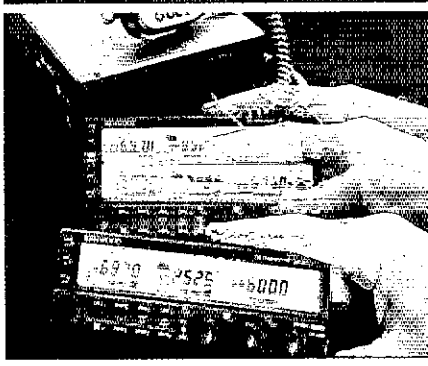
Performance without compromise.℠

STAR PERFORMER

KENWOOD

Triple Play!





TM-941A

TRI-BAND FM Transceiver

Kenwood brings you yet another breakthrough—the TM-941A *TRI-BAND* FM TRANSCEIVER. Now you can operate on *three* bands—144, 450, or 1200 MHz—with one radio! This rig even gives you full duplex, cross-band, triple-band repeat!

- **High power output.** 50 W on 144 MHz, 35 W on 450 MHz, and 10 W on 1200 MHz. (Selectable low power: 5 and 10 W, 1 W on 1200 MHz.)
- **Wide band receiver coverage.** 118-174, 438-450 (400-475 after modification), 1240-1300 (1210-1330 after modification) MHz. TX on Amateur bands only. Modifiable for MARS/CAP. Permits required.
- **CTCSS encode built-in.** 38 sub-tones selectable from the front panel.
- **Cross-band repeat function.** Selectable single or dual input! Off-set function on output, allows simplex to repeater repeat!
- **Simultaneous tri-band receive.** Individual volume and squelch controls help you "sort out" the signals.
- **Detachable front panel.** Use the optional PG-4K or PG-4L to mount the front panel remotely.
- **Selective calling option (DTU-2).** Selectively call a single station, or call a group with DTMF tones.
- **303 memory channels.** Store everything you need for efficient operation. All channels allow you to store "odd split" repeaters.
- **Versatile scanning functions.** Band scan, memory scan and programmed scan with carrier or time operated stop.
- **NEW! Auto memory scan.** Automatically memorizes a busy frequency while scanning the band!
- **Automatic repeater offset on 2 m.** Plus or minus 600 kHz for 144 MHz, ± 5 MHz on 450 MHz, and ± 12 or 20 MHz for 1200 MHz. (Manual offset for 450 and 1200 MHz.)
- **Fixed detect output.** For packet operators!
- **Multi-function DTMF mic supplied.**
- **Auto power off and time-out timer.**
- **4-step dimmer control.** Selectable 4-step dimmer control.
- **Three separate antenna and speaker connectors.** For maximum performance.

Optional Accessories:

- **DTU-2** Digital paging (DTMF) unit
- **PG-4K, PG-4L** Front panel cable kits • **MC-45** Multi function mic.
- **MB-11** Extra mounting bracket
- **SP-41, SP-50B** External mobile speakers • **PG-3B** DC line noise filter
- **PS-430** Power supply • **PG-2N** DC power cable • **TSU-7** CTCSS decode unit.

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

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