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Phone Contest ... page 13**

**1989 Rules ... page 44**



THE RADIO AMATEUR'S JOURNAL

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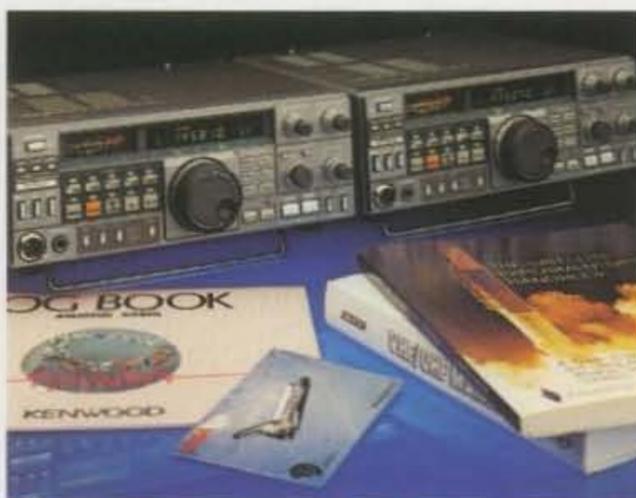
The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).

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- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones

- MC-48B 16-key DTMF, MC-43S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters:
  - SW-200A 1.8-150 MHz
  - SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2U DC power cable

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

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- **PG-2S** extra DC cable • **PS-430** power supply
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- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.



- **Large, easy-to-read multi-function LCD display with night light.**
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- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, DC cable, dust caps.



#### Optional Accessories:

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



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**The Radio  
 Amateur's Journal**



**ON THE COVER:** Our mystery operator logs some contest time  
 in the CQ World-Wide DX Phone Contest. Photo by Larry Mulvehill, WB2ZPI.

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# Zero Bias

## AN EDITORIAL

I've been doing my very unscientific median-age study lately by listening to what amateurs have to say at hamfests and by reading the letters I receive. I hear the word *tradition* bandied about as if there are these great words carved in stone that are universal truths for all times. Quite often I think that people should substitute the word *nostalgia* for tradition, as this would come closer to what they're really trying to say.

Amateurs tend to think of certain things as traditions. Traditions are those things which are handed down pretty much exactly the same from one generation to another. They are handed down orally and by example. So if we talk about tradition, we should be able to define the lineage. Do amateurs follow the tradition of 1906 or 1919? How about 1928 or 1937? What about 1941 or 1952? After all, amateur radio hasn't been around for that long in historic terms, so we should be able to trace some of these traditions back to the first amateur.

If we had a group of archaeologists studying a tribe of indians who engaged in fishing, they would probably see a traditional way of making fish hooks over any 80- to 90-year span. The indians would have gathered around to teach and pass on to their young how to make fish hooks in pretty much the same manner. Each generation didn't have to reinvent the fish hook. The technology lent itself to an oral tradition; it was stable. What we experience as amateur radio today in 1989 barely resembles what was going on 20 or 30 years ago, let alone 80 years ago.

I guess we should consider ourselves fortunate to be part of a continuing technological explosion. In purely historical terms, we haven't been around long enough to really develop tradition, as everything continues to change. For some, the changes are happening too quickly and too often. For the impatient and the dreamers it isn't happening fast enough. To say about amateur radio "We've always done it that way" has never been true. To make it true you would have to add the qualifier "We've done it that way since . . ." and that date continues to change. About the only thing that has remained sort of constant and is true to the definition of the word *tradition* is the ARRL's *Wouff Hong* Ceremony and their *Readysnitch*. What do you say? You don't know what they are or what they mean? Shame on you. They are truly direct links to the past that are passed on through an oral tradition.

So if tradition is not actually what we mean when we defend something or wax misty-eyed over a revelation from H.P. Maxim himself, just what is it that we do mean? We most often mean nostalgia. *Webster's Dictionary* defines nostalgia as "a wistful or excessively sentimental sometimes abnormal yearning for re-

turn to or return of some real or romanticized period or irrecoverable condition or setting in the past." We tend to talk about things as being not as good as they were in the good old days. Bring back the amateurs, the tests, the operators, the DX, and even the music from the good old days. You will note one great omission, though: there is no great movement to bring back the equipment of those days, too.

Nostalgia too has the unfortunate attribute of being time sensitive. The good old days continually shift, depending on just when the individual received his or her license. So even if you took nostalgia at 10-year intervals, you'd still have a mixed bag of good old days. Still, there aren't too many amateurs who would opt for 10-year-old gear over some of the newer goodies.

The technology has changed the hobby and not the other way around. It has all moved very quickly and appears to some to be accelerating. The proverbial "twinkling of an eye" is actually about 20 years. Well, somehow some of us got the idea that amateur radio was the one immutable thing that was supposed to stay the same forever and ever, and even though everything else in life was changing at a hectic rate, you could always find that stable point in amateur radio.

Well, if that was the idea or plan, nobody wrote it down as law. If that was the intent, people could stop inventing things or coming up with technology that could knock your socks off. In reality we're all playing "catch up" not only with amateur radio, but with everything else we experience. Almost all of us use things now with little or no knowledge of how they work. We have to go along accepting the fact that they do work and spend our "learning" time figuring out how to use them, not build or repair them. We may in some ways be the "masters of our fate," but certainly we are not the masters of our technology. The intrinsic joy, however, is in the fact that it does work and we no longer have to reinvent the fish hook.

When you look through the contest scores in this issue and think about the phenomenal achievements, think about trying to duplicate that effort with 20-year-old gear and technology. Let your mind wander back just five years and try to fit the concept of packet radio into your amateur radio activities of the day. In those days a *node* was something to be surgically removed and quickly. Just 20 or so years ago did you ever think that anyone would really have his own computer in his own home? Today most amateurs have several computers and think nothing of it.

Now if we take someone into our midst and get him licensed in 1989, this year will become his benchmark and his "good old days" and the way things should be. Ten years from now he'll be upset over some change occurring,

and he'll hunger for these, the wonder days of amateur radio discovery. For in truth, the first several years in the hobby are the years of discovery wherein everything is new and still fun. There's no time for the politics, the petty squabbles, or anything that interrupts the flow of having a good time. It's the time for innocent dreams, the kind we all had, that took us out of the everyday world of school or job and gave us unlimited opportunity to span the world with our signal. The Walter Mitty in all of us came out in those dreams.

You may not believe this, but there are quite a number of us who still have those dreams and act on them. We still enjoy amateur radio for what it is and accept and relish the fact that it is fluid and ever changing. All that does is open more things to do and enjoy. However, there are some (and we know who you are) who would rather get caught up in being very serious, obdurate, and steadfast in the belief that amateur radio history should begin and henceforth emanate from the day you (just you) received your license.

The new licensee of 1989 will use the 1989 criteria for an amateur radio license as the new tradition, which to some will be nowhere near as good as the 1939 or even 1959 tradition. With any luck, he'll be telling the new amateurs of 2009 how hard he had it way back when—back in 1989 when hams were hams, and you strung your own long-wire antennas, and a contact was really a contact. That crude digitized equipment really left a lot to be desired, and you needed tremendous expertise to pull out a rare one in those days.

Maybe it's too hard for us to accept that things couldn't possibly be as good as we'd like to remember. Maybe it's too hard to accept that it's okay not to understand everything and be able to build your own station. Maybe things were great and you do have wonderful memories, but that doesn't shut out the possibility of collecting new memories even if they are different.

Whatever amateurs were like "then" as compared to "now," you could never get a consensus as to a universal starting point for "then." For 80 or 90 years we've had a new tradition, if you will, almost every year, and sometimes more than one. The A model of a piece of amateur gear becomes a "classic" the minute a B model appears. We've had constant change in everything except attitude. Actually, our collective attitude has been characterized by the phrase "I've got mine," which still leaves out "as of \_\_\_\_\_."

Maybe in 2009 there will only be one class of amateur license, one exam or application, and maybe it will be super hard or super easy to obtain. Whatever it is, those who are around to see it will certainly complain and long for the good old days of 1989. 73, Alan, K2EEK

# The Morse Machine™

## The Ultimate Keyer from AEA



The Morse Machine has all the features you've been asking for in a high performance keyer like 2-99 WPM speed selection and over 8,000 characters of memory that can be stored in 20 memories. The 20 memories are soft partitioned so that your stored messages may be as short or long as you like. Memory can be expanded to hold up to 36,000 characters. Of course, all memory is backed up by an internal lithium battery so that once a message is loaded, it will stay there until you write over it.

Whether you're an expert or a novice, The Morse Machine has three ways to help you improve your code:

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The Morse Machine is a full featured keyer for the serious contester, with automatic serial

number insertion and incrementing in any memory message. You can 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 speeded up by having parts of your message sent at a higher speed. You can also add remote switches for 4 of the memories so that you can instantly send your responses or call CQ.

A computer can be interfaced to The Morse Machine through its RS-232 compatible I/O. Any front panel function may be programmed by the computer. This makes loading memories as simple as typing them in from your keyboard. The Morse Machine can display your random code, or Dr. QSO practice sessions on the computer screen.

The Morse Machine can be programmed to be an automatic beacon. This can be used to automatically repeat a Morse (or RS-232 ASCII) message at a programmed interval of 1 to 999 seconds.

See your AEA dealer today for a demonstration of The Morse Machine or contact:

**Advanced Electronic Applications, Inc.**

P.O. Box C-2160 Lynnwood, WA 98036  
206-775-7373

# Announcing

•**WARC-FEST 89** - To observe the 10th anniversary of the WARC band allocation and to promote the expanded use of these frequencies, WARC-FEST 89 will take place on Sept. 10 from 1800-2400Z on WARC bands 24.890-24.990, 18.068-18.168, and 10.1-10.15 MHz. Amateurs worldwide are eligible. Categories: single op either CW only or mixed mode. Exchange: op's first name, QTH (ARRL section, Canadian province, DXCC country), and antenna type. Conditions: 1 hour time period minimum per band; stations may be contacted once per band-mode; existing restrictions on WARC band use must be observed. For official forms, write to Texas DX Society, P.O. Box 540291, Houston, TX 77254-0291.

•**The following Special Events take place in September:**

**W1FHP**, from Agricultural Fair, Bethlehem, CT; The Hen House Gang; daylight hours Sept. 9-10 on 40 and 20 meter SSB, some 40 meter Novice, and in 10 meter Novice and General. QSL with first-class stamp or envelope to Callbook or Hen House Gang, Hard Hill Rd., N. Bethlehem, CT 06751.

**K2BR**, from Miss America Pageant, Atlantic City, NJ; Southern Counties ARA; Sept. 11-16, phone 25 kHz inside lower General class band edge, CW 65 kHz inside lower General band edge, Novice 28.100, 28.500 MHz. QSL with number 10 SASE to SCARA, P.O. Box 121, Linwood, NJ 08221.

**NT3A/3**, from Sunfest, Ocean City, MD; Sept. 23-n-24; phone 3.9035, 7.2335, 14.313, 21.413, 28.313 MHz, and CW 3.713, 7.113, 14.035, 21.135, 28.135; nighttime operation after 0100Z on 75 and 40 meters will be on the 3905 CC WAS Net. For special QSL send QSL and SASE (or 2 IRCs) to Sunfest, P.O. Box 120, Simpsonville, MD 21150-0120.

**W3BN**, from Pagoda Skyline Festival, Reading, PA; Reading Radio Club; Sept. 24 from 1400-2000Z; SSB only on 80, 40, 20, 15, and 10 meters. Send QSL and SASE (for certificate) to Reading Radio Club, P.O. Box 13777, Reading, PA 19612-3777. (Find 10 other RRC members calling "CO Pagoda" from home stations to qualify for a special club certificate.)

**3-land**, from Prince Georges County Fair, Prince Georges County, MD; Prince Georges ARES; 1600Z Sept. 9 to 0000Z Sept. 10; SSB 3950, 7275, 14340, 18150, 21435, 24950, 28350, 50130 kHz. For QSL certificate send your QSL to PG-ARES, PG-OEP, 7911 Anchor St., Landover, MD 20785.

**K4SEX**, from Powers Crossroads Arts & Crafts Festival, Newnan, GA; Bill Gremillion Memorial Radio Club; Sept. 2-4, 1400-2000Z; 14.325, 21.325, 28.325. For QSL, send QSL and SASE to BGMRC, P.O. Box 2327, Newnan, GA 30264.

**4-land**, Bear Bryant Special Event Station from University of Alabama, Tuscaloosa, AL; West Alabama ARS and University of Alabama ARC; 1300-2300Z Sept. 30; all HF bands in the bottom 25 kHz of the General portion of each band. For certificate send SASE and your QSL to P.O. Box 1741, Tuscaloosa, AL 35403 or Callbook address of WD4DAT.

**W4KYT**, from the ghost town of Paradise, AZ; Co-chise ARA; Sept. 2-4 (no specific times); 3.885, 7.285, 14.288, 21.288, 28.385, plus 6 meter band, phone and CW on all bands. Special certificate for business-size SASE to P.O. Box 1855, Sierra Vista, AZ 85636.

**7-land**, from Great Montana Cattle Drive, Billings, MT; Yellowstone Radio Club identifying themselves as "The Great Montana Cattle Drive"; Sept. 4-9, 1400-2400Z each day; 7265, 14265, 21365 kHz USB. For certificate send QSL and 9 x 12 SASE to Verlon Cox, K7AEZ, 1124 Parkhill Drive, Billings, MT 59102.

**WK8N**, from "Tecumseh" production, Chillicothe, OH; evening and weekend hours during Aug. and Sept.; SSB lower 25 kHz of 40, 20, and 15 general and 10 meter Novice phone bands. For QSL send QSL and SASE to Ron Cade, WK8N, 747 Jefferson Ave., Chillicothe, OH 45601.

**W8TQE**, from Michigan International Speedway, Adrian, MI; Adrian ARC; Sept. 15-17 (no times given); SSB 20 kHz up from bottom of General portion and Novice bands. QSL via W8TQE, P.O. Box 26, Adrian, MI 49286.

**W8OLS**, from Little Brown Jug Harness Race, Delaware, OH; Delaware ARA; 1300Z Sept. 17 to 0100Z Sept. 18 and 2300Z Sept. 20 to 0300Z Sept. 22; 7.260 and 28.405. For QSL send SASE and QSL to DELARA, 398 North Old State Rd., Delaware, OH 43015.

**W8ZHO**, from WW II submarine *USS Silversides*, Muskegon, MI; Muskegon Area ARC; 1300Z Sept. 16 to 1900Z Sept. 17; 28.475, 21.320, 14.255, 7.255, 3.855. For certificate send QSL and 9 x 12 SASE to KB8APS, 3160 Walker Rd., Muskegon, MI 49444.

**WB9TXD**, from Septemberfest, Schaumburg, IL; Schaumburg ARC; 1500-2100Z Sept. 3; 7.289, 14.289, 21.289, 28.389. For certificate send QSL to SARC, P.O. Box 68251, Schaumburg, IL 60168-0251.

**KE0DX**, from Mellette House, Watertown, SD; Lake Area Radio Klub; 1400-2300Z Sept. 30; phone 3.890, 7.265, 14.265, 21.340, 28.340 MHz; CW 40 kHz up from bottom of each band 80 through 10 meters. QSL with SASE to Lake Area Radio Klub, P.O. Box 642, Watertown, SD 57201-0642.

**NR0R and N0ZZ**, from Kansas City and St. Louis; Kansas City QRP Assn. and St. Louis QRP Society; Sept. 9-10 from 10 AM to 6 PM Central Time; CW 3.560, 7.040, 14.060, 21.060, 28.060, phone 3.985, 7.285, 14.285, 21.385, 28.885. Work both stations and receive a special certificate; use QRP (5W on CW, 10W on phone) to work both stations and receive a bonus QRP endorsement. For certificate send large SASE and QSL for each contact stating log information and power used to Mark Campbell, NR0R, 6205 E. 140th Place, Grandview, MO 64030-3843.

**8-land**, from Chiropractic Founders Day, Palmer College, Davenport, IA; Palmer College Chiropractic ARC and Davenport RAC; 1300-0100Z Sept. 17; 10 kHz up from bottom of General portion of each band. For certificate send QSL and business-size SASE to Dr. Wayne H. Zemelka, KB0C10, 1000 Brady St., Davenport, IA 52803.

•**The following hamfests, etc., are slated for Sept.:**

Sept. 2-3, **Alamogordo ARC Hamfest**, Otero County Fairgrounds, Alamogordo, NM. Contact AARC Hamfest Committee, Box 276, Alamogordo, NM 88311.

Sept. 2-3, **Shelby Hamfest**, Cleveland County Fairgrounds, Shelby, NC. Contact Shelby ARC, P.O. Box 2206, Shelby, NC 28150.

Sept. 9, **Uniontown ARC Gabfest**, club grounds, Uniontown, PA. Contact UARC Gabfest, c/o John T. Cermak, WB3DOD, P.O. Box 433, Republic, PA 15475 (412-246-2870).

Sept. 9, **Saratoga County RACES Hamfest**, Saratoga

(Continued on page 8)

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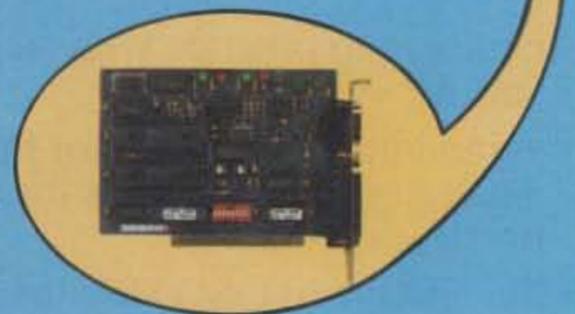
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We don't play games by using old rating methods to make you pay for input power you don't get at the antenna. What you do get is 1000 watt output of peak

envelope power on SSB and 850 watts on CW. Even 500 watt output on RTTY.

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## World's Most Powerful 10 Meter Amateur Mobile Antenna\*

Lockheed Corp. Test Shows  
Wilson 1000 Antenna Has  
58% More Gain Than The  
K40 Antenna.

In tests conducted by Lockheed Corporation, one of the world's largest Aerospace Companies, at their Rye Canyon Laboratory and Antenna Test Range, the Wilson 1000 was found to have 58% more power gain than the K40 Electronics Company, K40 Antenna. This means that the Wilson 1000 gives you 58% more gain on both transmit and receive. Now you can instantly increase your operating range by using a Wilson 1000.

Guaranteed To Transmit and Receive  
Farther Than Any Other 10-Meter  
Mobile Antenna or Your Money Back\*\*  
New Design

The Wilson 1000 higher gain performance is a result of new design developments that bring you the most effective 10-meter base loaded antenna available.

### Why Wilson 1000 Performs Better

Many 10 meter antennas lose more than 50% of the power put into them. The power is wasted as heat (dielectric) loss in the plastic coil form and is not radiated as signal.

We have designed a new coil form which suspends the coil in air and still retains the rigidity needed for support. This new design eliminates 95% of the dielectric losses. We feel that this new design is so unique that we have filed a patent application on it.

In addition, we use 10 Ga. silver plated wire to reduce resistive losses to a minimum.

In order to handle the high power common for amateur use, we used the more efficient direct coupling method of matching, rather than the lossy capacitor coupling. The Wilson 1000 will handle 2000 watts of power.

### The Best You Can Buy

So far you have read about why the Wilson 1000 performs better, but it is also one of the most rugged antennas you can buy. It is made from high impact thermoplastics with ultraviolet protection. The threaded body mount and coil threads are stainless steel; the whip is tapered 17-7 ph. stainless steel. All of these reasons are why it is the best 10 meter mobile antenna on the market today, and we guarantee to you that it will outperform any antenna or your money back!

\*Inductively base loaded antennas

\*\*Call for details.

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A Division of Lockheed Corporation  
Burbank, California 91520

Aug. 21, 1987

Wilson Antenna Company Inc.  
3 Sunset Way Unit A-10  
Green Valley Commerce Center  
Henderson, Nevada 89015

Subject: Comparative Gain Testing of Citizen's Band Antennas  
Ref: Rye Canyon Antenna Lab File #870529

We have completed relative gain measurements of your model 1000 antenna using the K-40 antenna as the reference. The test was conducted with the antennas mounted on a 16' ground plane with a separation of greater than 300' between the transmit and test antennas. The antennas were tuned by the standard VSWR method. The results of the test are tabulated below:

FREQUENCY (MHZ)	RELATIVE GAIN (dB)	RELATIVE POWER GAIN (%)
26.965	1.30	35
27.015	1.30	35
27.065	1.45	40
27.115	1.60	45
27.165	1.50	41
27.215	1.60	45
27.265	1.75	50
27.315	1.95	57
27.365	2.00	58
27.405	2.00	58

A complete description of this test is contained in file #870529. Excerpts of this report are enclosed.

Lois M. Leake, Antenna Engineer  
Electromagnetics Laboratory

Approved:  
W. C. Weikel, Group Engineer  
Antenna/ATS Support Laboratory

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HENDERSON, NV 89015

## Announcing (from page 6)

County Fairgrounds, Ballston Spa, NY. Contact David Atwell, N2FEP, 911 East High St. Lot 11, Ballston Spa, NY 12020 (SASE).

Sept. 9-10, **Mobile Hamfest**, Texas Street Recreation Center, Mobile, AL. Contact Larry Early, P.O. Box 8404, Mobile, AL 36689 (205-342-7601 after 6 PM).

Sept. 9-10, **Melbourne Hamfest**, Melbourne Auditorium, Melbourne, FL. Contact Hamfest, 708 Dartmouth Ave., Melbourne, FL 32901.

Sept. 10, **Bolingbrook ARS Ham/Computerfest**, Inwood recreation Center, Joliet, IL. Contact Hamfest, BARS, P.O. Box 1429, Bolingbrook, IL 60439-7429 (SASE), or call 312-985-0527 evenings or weekends.

Sept. 10, **Butler County ARA Hamfest**, Butler County Farm Show Grounds, Butler, PA. Contact Chairman, P.O. Box 1787, Butler, PA 16003-1787.

Sept. 10, **Findlay Hamfest**, Hancock County Fairgrounds, Findlay, OH. Contact Findlay Radio Club, Box 587, Findlay, OH 45839.

Sept. 10, **Grand Rapids ARA Electronic Fleamarket and Computer Show**, West Catholic High School, Grand Rapids, MI. Contact Don Hazelswart, KA8BCI, 616-363-0649.

Sept. 16, **SCRA Ham Radio Fleamarket & Auction**, Sonoma County Fairgrounds, east of Santa Rosa, CA. Contact Sonoma County Radio Amateurs, Box 116, Santa Rosa, CA 95402.

Sept. 17, **Candlewood ARA Fleamarket**, Elks Lodge, Danbury, CT. Contact CARA, P.O. Box 143, Bethel, CT 06801, or call George, KC2QF, 914-533-6653.

Sept. 17, **LIMARC Hamfest**, NY Institute of Technology, Old Westbury, Long Island, NY. Contact Neil Hartman, WE2V, 516-462-5549.

Sept. 17, **Indian Foothills ARC Hamfest**, Marshall Senior Citizens Bldg., Marshall, MO. Contact WB0WMM, Callbook address.

Sept. 17, **Contoocook Valley Radio Club Fleamarket**, Davisville, NH. Contact Warren Stiles, WA1RLO, 603-648-2604.

Sept. 17, **20/9 ARC Hamfest**, Mahoning County Joint Vocational School, Canfield, OH. Contact Paul Resch, 216-793-8352.

Sept. 17, **South Jersey Radio Assn. Hamfest**, Pennsauken High School, Pennsauken, NJ. Contact Ed Ramm, AB2Y, 4500 Westfield Ave., Pennsauken, NJ 08110 (609-663-5539).

Sept. 23, **Ventura County Hamfest**, Oxnard Community Center, Oxnard, CA. Contact Dick, WA6JOX, 805-485-4462.

Sept. 23-24, **York Hamfest & Computer Show**, York Fairgrounds, York, PA. Contact York Hamfest, P.O. Box WW, Dover, PA 17315 (SASE). (VE exams Saturday.)

Sept. 23-24, **Radio Expo 89**, Lake County Illinois Fairgrounds, Grayslake, IL. Contact Mike Brost, WA9FTS, P.O. Box 1532, Evanston, IL 60204.

Sept. 23-24, **Walla Walla Valley ARC**, Community Bldg., Milton-Freewater, OR. Contact Jack Babbitt, WA5ZAY, P.O. Box 321, Walla Walla, WA 99362 (509-525-7003).

Sept. 24, **Adrian ARC Hamfest/Computer Show**, Lenawee Fairgrounds, Adrian, MI. Contact Adrian ARC, P.O. Box 26, Adrian, MI 49221.

Sept. 24, **BARCFEST 89**, Boulder County Fairgrounds, Longmont, CO. Contact Barbara McClune, N0BWS, 5338 Spotted Horse Trail, Boulder, CO 80301.

Sept. 24, **Natchaug ARC Fleamarket**, French Club, Williamantic, CT. Contact Pat Rogowski, N1GBP, 90 Becker Circle, Windsor, CT (203-522-8028 evenings).

Sept. 24, **Fall Foliage Hamfest and Fleamarket**, National Guard Armory, Berlin, VT. Contact Todd Bigelow, P.O. Box 524, Williamstown, VT 05679 (802-433-5567).

Sept. 24, **MIT Fleamarket**, Albany & Main St., Cambridge, MA. Call 617-253-3776.

Sept. 23, **Champaign-Logan ARC Hamboree 89**, Logan County Fairgrounds, Bellefontaine, OH. Contact Steven Kidder, N8ETD, Box 265, Russells Point, OH 43348.

Sept. 30, **Elmira International Hamfest**, Chemung County Fairgrounds, Elmira, NY. Contact Elmira ARA, 727 West Third St., Elmira, NY 14905.

Sept. 30, **Northern New Mexico ARC Hamfest**, US Army Reserve Center, Santa Fe, NM. Contact Tom Hardek, K9IKI/5, P.O. Box 233, Los Alamos, NM 87544 (SASE).

Sept. 30 & Oct. 1, **Kansas ARRL State Convention**, Best Western Wichita Red Coach Inn, Wichita, KS. Contact Wichita ARC, 707 North Main St., Wichita, KS 67203.

Sept. 30 & Oct. 1, **Greater Louisville Hamfest**, Commonwealth Convention Center, Louisville, KY. Contact Greater Louisville Hamfest Assn., P.O. Box 34444, Louisville, KY 40232.

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393S	TH5MK2S Thunderbird, 5 elements	766.00	236S	153BAS 3 element 15 meter	190.00
395S	Explorer 14 Broad Band	606.50	226S	203BAS 3 element 20 meter	309.00
221S-1	TH3JRS Thunderbird, 750W PEP	383.00	375S	105BAS Long John 5 element 10 meter	264.00
390S	TH2MKS Thunderbird, 2 elements	360.00	376S	155BAS Long John 5 element 15 meter	398.50
396S	30/40 Meter Kit for Exp. 14	154.00	377S	205BAS Long John 5 element 20 meter	678.50
			394S	204BAS 4 element 20 meter	513.00
			371S	Discoverer 7-1 Rotary dipole 30/40 meter	280.00
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F & M Electronics—Greensboro, NC

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The Ham Station—Evansville, IN  
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Quement Electronics—San Jose, CA  
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Satellite City—Minneapolis, MN  
Soundnorth—S. Int'l Falls, MN  
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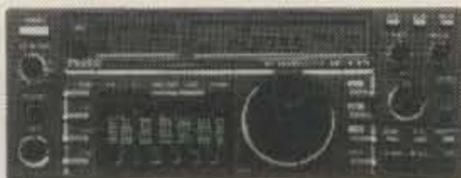
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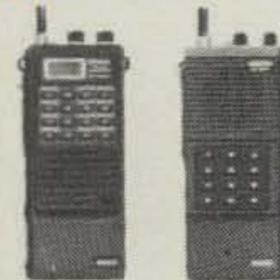
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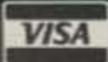
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# Results of the 1988 CQ World-Wide DX SSB Contest

BY BOB COX\*, K3EST/6, AND LARRY BROCKMAN\*, N6AR/4

“Incredible! Best conditions on the high bands ever.” “Fifteen was open the whole contest. Never heard anything like these great conditions.” “There are no meters like ten meters.” Those are a sampling of remarks from operators from around the world commenting on the outstanding conditions in the 1988 CQ WW SSB Contest. “I thought I had died and gone to heaven.” “Is there a propagation category above above average?” Twenty meters was like forty, fifteen was like twenty, and ten was a dream. Action from 28.300 to 28.850! You easily could miss a multiplier on a band that required over 500 kHz of tuning.

The conditions were outstanding, but so were the operators from around the world. Rising to the occasion, single operators and multi teams saw old records fall like leaves from a tree. State-of-the-art computer-assisted stations competed next to modest setups, and they both worked 3W8DX! Special DXpeditions fanned out around the globe to enhance their chances of making QSO's and make the contest more interesting for all the participants. Just how good was 10? Several stations worked SO1A, HG5A, AT0Z, D44BC, 9V1XI, BY4SZ, and 4S7EA in the first 20 minutes of the contest.

## Single Operator All Band

The competition for single operator all band pitted four top competitors operating from CT9BZ, 9Y4TT, PJ2FR, and P40A. When the final bell rang, CT9BZ operated by Martti, OH2BH (the newest member of the CQ Contest Hall of Fame) had won. He set a new World and African record for the single operator category. 9Y4TT, operated by NQ4I, also broke the old world record in finishing second. Rick set a new South American record. PJ2FR operated by Rich, N6KT, and P40A operated by Bill, N1GL, finished third and fourth, respectively. Look at the Band-by-Band Breakdown box for these fellows. It is quite impressive. Way out in the Pacific, where everyone's beam is pointed in the opposite direction most of the time, YJ0RY managed to not only finish sixth in the world, but set a new Oceania record as well.

In the USA, Stu, KC1F, using a station on the edge of technology, combined with top operating skills, broke the old USA record by nearly two million points. It seems that improvements in technology and conditions, and most important, the increased skills of operators throughout the world, allow operators like Stu to push the record higher and higher. The same can be said about the second-place finish of K3TUP operated by K3LR. The station on Lake Eire



FK0AW: from left, FK8FI, FK1SU, FK8FK, FK0BG, FK0AW.

sure demonstrates what is possible from points west of the east coast. Newcomer to the East, N6BV/1, finished third, while Randy, K5ZD/3, finished fourth (Randy had the smallest number of unique QSO's of anyone we checked; uniques can be a measure of copying errors).

In Europe the winner was Ville, OH0MM, operated by OH2MM. What an outstanding job for so far north in Europe. Ville set a new European record. He was followed by another MM, HA0MM. Everyone seems to like to work these stations. We had several comments about how easy it was to QSO these fellows on all bands.

In the QRP category ZY5EG, operated by PY5CC, was number one in the world. With most of the operators of PY5EG at ZX0F, PY5CC was able to put super-station PY5EG to good use. Finishing second in the world was KR2Q, Doug, who lead all comers in the U.S. in this category.

## Single Operator Single Band

Generally speaking, the high bands were above average for the entire contest. Although only one low-band record fell over the weekend, the country totals from many stations indicated that the low bands were open for most of the usual openings. With so much activity devoted to 10 and 15, the amount of activity on the low bands suffered. Single band operators sometimes are concerned that if they choose to operate 28 MHz, for example, they cannot



New single op record holder CT9BZ. L to R: CT3AR, CT3BZ, and CT3YD.

make any QSO's on any other band. It is perfectly OK to QSY to any other band to run or work stations even if you are a single band entry. You just choose the band to submit as your single band entry and count the other QSO's as a checklog. That way you can work new band countries for yourself or hand them out during times when your single band is dead.

Two operations separated by 7,000 miles went head to head on 28 MHz. VP2ET piloted by K5RX edged out KD7P/NH2. As a result of their efforts the world record on 28 MHz was broken by VP2ET and a new Oceania record was set by KD7P/NH2. Two other continental records were set: LT8WW and YU3ZV both are

\*1816 Poplar Lane, Davis, CA 95616

\*\*12041 Walker Pond Rd., Winter Garden, FL 32787



Wow! HB0CZS: back (L to R) DK8MZ, DJ0IP, DL4OBD, DF9YY, DK1FW; front DL5MAE, DF7RX, DF9XV, DF3QL, DB2QK, DK3RG, DK6QX, DL4NAC, DL2NBU, DL6RAI, DL8OH, and DK2OY.



Top multi-single in Europe IR4LCK. L to R: IR4LCK, I4RYC, IK4EWK, IK4CZF, I4ZSQ, I4EAT, I4YRW, I4IKW, IK4CTR, I4IND, I4TJE, and I4VEQ.

new record holders. In the USA, W0ZV set a new record by edging out new West Virginian Dave, K3ZJ/8. Bill, W0ZV, remarked that it was a surprise to be called by His Majesty, JY1!

Moving 7 MHz down frequency, the clear winner on 21 MHz was ZP5Y. He set a new World and South American record. VO1SA did a classy bit of operating to finish second. Setting a new continental record for Europe was YT3AA, Tine. As a matter of fact, the top three European finishers were from Yugoslavia: YT3AA, 4N2E, and YT6AA. Meanwhile in the states, Carl, K3RV/4, edged out John, K2VV, for a new USA record. Carl will be on this year from EL, where he now lives.

You would think with conditions so good on 10 and 15 that 20 would suffer. Well, it was different than in recent years. Closing for part of the day, it became an afternoon to breakfast band. This was sufficient for Sigg, TF3CW, to set a new European record as he won for the world. The top six box on 20 illustrates how diverse were the QTH's of the winners. Finishing

second was YX5A and third was VE2ZP. In the USA, KV4P broke through the pileups often enough to take first-place honors. Second place goes to N4CC/9.

The competition on 7 MHz was fierce, and when the dust settled T11W emerged as the winner over SP5RBR, who broke the old European 7 MHz record. Handing out a nice prefix was FM4A, who finished third. In the states K5RR was the run-away winner over second-place winner W9DUB. On 3.7 MHz it was again clear that the winners in the top six box could come from anywhere. IK5BAF took away the trophy by finishing first over UF6VZ. In doing so IK5BAF set a new European record. In the states perennial strong signal W6RJ beat out W7IVX for the top slot. Top band seemed to suffer most probably because everyone was on 20 or 15. The World top score was YU3MM, who had a signal heard over most of the world. In the USA the guy to beat is Rick, K5UR, who just keeps taking top band honors.

### Multi-Single

This category generates a great deal of interest in the CQ WW test. Anyone who has operated it knows it is fun. This year a group of Finnish operators traveled down to EA8AGD and not only had a lot of fun, but set the new World's record in the process. With an outstanding score of over 17 meg points they beat out second-place finisher PJ1W. Again look at the Band-by-Band Breakdown chart to notice the different strategies used by the two teams. The QSO's/band will tip you off. A special expedition to ZX0F finished third in a category where competition is very high. In most cases contestants in the multi-op categories who travel overseas do not walk into a ready-made station. They usually choose a hotel in a good location and then the week before the contest, haul everything to the QTH and set up everything field-day style. C30DSA took everything by truck from Finland to Andorra, to a location high in the mountains where they erected tow-



Putting YS in everyone's log was YS0YS. Clockwise from bottom: YS1GF, YS1OR, YS1ZD, YS4GV, YS1OD (YS1FAF head out of picture).

ers, antennas, etc. When enthusiasm is rampant, contesters will move mountains of equipment to get that great good time. Just take a look at the picture of HB0CZS. The number one score in Europe was IR4LCK. The happy crew appears in the picture after setting a new European record. The crew from HG5A (a beacon here on the West coast) took second place in Europe. Here in the states N2RM set a new USA record in beating the boys from Tom Sawyer's home town, K4VX0.

### Multi-Multi

Realizing the high probability of great conditions in the contest, the multi-multi stations from around the world were set to go all out. Assembling antennas to be stacked and phased, tuning the antennas for maximum forward gain without worrying about front-to-back ratios, carrying out the logistics of getting 15 to 20 operators to agree on how each band should be run, appointing a band captain who headed a band crew, knowing that the competition is trying to anticipate all their moves, overcoming local custom and licensing problems—these were only a few of the problems overcome by the new World record holders at P40V. Facing similar setup problems (each station set everything up for the weekend) was second-place finisher PJ1B. Located only 120 miles from P40V, the two stations initiated the highest level of competition seen in years. Each of these multi-multi crews is similar to a soccer or football team—all players have to pull together to win. Located farther north and having just as much fun during the contest was KP2A. The new USA record holder is W3LPL (since the WW SSB they have won all four major contests: two CQ and two ARRL, the first to do so). Frank's crew was in heaven with conditions so good. Not too far back was the effort of N5AU from down Texas way. In Europe, UP8A not only finished fourth in the world, but set a new European record along the way. The beautiful location of HB0CZS must inspire the best from central Europe, as they finished second. Special mention should be made of the rugged competition from zone 1. Accumulating high scores is hard enough, but to do so from KL7 is fantastic, so our congratulations to KL7Y, who edged out KL7RA.

### Comments

Last year we mentioned a growing interest in creating a single operator unlimited cate-

# 1988 CQ WORLDWIDE DX CONTEST

## WINNERS

The operators at right (by 80/40M operating positions) and below (by high band positions) pushed P40V to an all-time SSB record of nearly 20,000 QSOs and 50 million points.



After winning the world and smashing the old SSB record by 7 million points, this group decided to return to Aruba for the CW contest. They anchored the CW crew (below) to nearly 39 million points—eclipsing the old CW record by over 50%!

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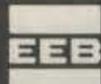
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CR-30	9'10"	27 @ 90 MPH	39"	1,322	39	239.95*
CR-45	14'9"	23 @ 90 MPH	39"	881	55	319.95*
CK-46	Thrust Bearing For CR-18, CR-30, and CR-45 Maximum Acceptable Mast Diameter 2 1/2"					47.95*

\*U.P.S. Not Included  
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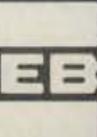
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Top QRP in USA, number 2 in the world KR2Q with Samantha.

gory. Well, in response to your letters we did it. This category is a cross between single operator and multi-single. Although only one operator is allowed to use the station's equipment, he can make use of spotting nets and packet radio. So even though he is receiving spotting help from others (clearly multi-single), he is working and receiving contacts by himself (clearly a single operator). When the committee met in Dayton this year, it was decided to call the category single operator unlimited in the hopes of not restricting the growth of creative ideas. The new category does not have a 10-minute rule, so an operator can freely move anywhere at anytime. We hope that this new category will create interest for a growing segment of the contest population.

Each year we receive logs where there is no information in the received column. The operator has only written down the call and nothing else. These types of logs are in violation of rule XI.2: all sent and received exchanges must be logged. If a station fails to follow this rule then the delinquent QSO's will be removed from the log.

The Committee also decided to eliminate the two-year rule, which prevents the winner to receive a trophy if he repeats as winner the next year. Now if you win, you win the trophy. We are looking for potential trophy donors for the 1989 contest. If you are interested in contributing to the contest please contact K1AR.

The burden of log checking by your Committee is awesome. Each year we receive computer printout logs of top scores with no disk included. We then have to type the entrant's score into the computer. It seems silly for us to repeat what you have already done—i.e., type your log into the computer. If you submit your



Three guys just having a great time in the CQ WW. 8P9X operated by L to R: K4FJ, K3KG, and K3ZR.

## SSB TROPHY WINNERS AND DONORS

### SINGLE OPERATOR, ALL BAND WORLD

CT9BZ (Opr. Martti Laine, OH2BH)  
Donor: Dave Rosen, K2GM  
WA2RAU Memorial

### World QRP

ZY5EG (Opr. Peter Z. Sprengel, PY5CC)  
Donor: Milliwatt Books, W0RSP

### USA

Stuart Santelmann, KC1F  
Donor: Potomac Valley Radio Club

### Caribbean/Central America

Julio E. Henriquez, HI3JH  
Donor: Alex M. Kasevich, VP2MM

### Europe

OH0MM (Opr. Vilho Hillesmaa, OH2MM)  
Donor: Potomac Valley Radio Club  
W4BVV Memorial

### Africa

J52US (Opr. David E. Heil, K8MN)  
Donor: Gordon Marshall, W6RR

### Asia

Shigeki Fujii, JR6PGB  
Donor: Japan CQ Magazine

### Japan

Hideo Takahashi, JF1SEK  
Donor: Japan CQ Magazine

### Oceania

YJ0RY (Opr. Pekka Kolehmainen, OH1RY)  
Donor: Northern California DX Club

### South America

9Y4TT (Opr. Ralph Dougherty, NQ4I)  
Donor: CQ Magazine

### SINGLE OPERATOR, SINGLE BAND

#### World—28 MHz

VP2ET (Opr. James Eppright, K5RX)  
Donor: Joel Chalmers, KG6DX

#### World—21 MHz

ZP5Y (Opr. Luis N. Kemper P., ZP5JCY)  
Donor: Lee Wical, KH6BZF

#### World—14 MHz

TF3CW (Opr. Sigurdur R. Jakobsson, TF3CW)  
Donor: K2HLB Memorial  
(New Jersey DX Association)

#### World—7 MHz

T11W (Opr. Carlos W. Wiesz Menk, T12KD)  
Donor: K7ZZZ Memorial (Fred Laun, K3ZO)

#### World—3.5 MHz

Marco Luporini, IK5BAF  
Donor: Fred Capossela, K6SSS

#### USA—28 MHz

William Tippett II, W0ZV  
Donor: Donald Thomas, N6DT

#### USA—21 MHz

Carl Kratzer, K3RV/4  
Donor: West Jersey DX Group

#### USA—14 MHz

Brantley Furness, KV4P  
Donor: Southern California DX Club

### USA—7 MHz

Richard Fenwick Sr., K5RR  
Donor: Stanley Cohen, WD8QDQ

### USA—3.7 MHz

Robert Ferraro, W6RJ  
Donor: Arnold Tamchin, W2HCW

### Canada (21 MHz)

J. Richaer Burke, VO1SA  
Donor: Gene Krehbiel, VE7KB

### Caribbean/Central America (28 MHz)

Leonce Richer, FM5DN  
Donor: Pedro Piza, Jr., NP4A  
KP4ES Memorial

### Europe—28 MHz, Zone 14

Joao Rafael Faustino Almeida, CT1BOP  
Donor: A. G. Anderson, GM3BCL

### Japan—21 MHz

JH7YJF (Opr. Fumika Kawahara, JR7QKR)  
Donor: DX Family Foundation

### MULTI-OPERATOR, SINGLE TRANSMITTER

#### World

E48AGD (Ops. OH8PF, OH6LK, OH6EI, OH1EH, OH1EB, OH1CN)  
Donor: Southern California DX Club  
(W6AM Memorial)

#### USA

N2RM (Ops. N2RM, N2ME, M2MR, WM2H)  
Donor: Carolina DX Association

#### Europe

IR4LCK (Ops. I4EAT, I4IKW, I4IND, I4LCK, L4LEC, I4RYC, I4TJE, I4VEQ, I4VOS, I4YRW, I4ZSQ, IK4CTR, IK4CZF, IK4EWK)  
Donor: Bob Cox, K3EST/6

#### Canada

VE6OU/3 (Ops. VE6OU, VE3BVD, VE3OZB)  
Donor: Calgary Amateur Radio Assn.

### MULTI-OPERATOR, MULTI-TRANSMITTER

#### World

P40V (Ops. AI6V, AI7B, K7RA, K7SS, KE7V, KQ2M, N6BT, N6IG, N6TU, N7NG, NB6G, NV7Z, VE7SZ, W4ETO, W6OAT, W7WA, W8LRL, WA6AUE, WA6DGX, WA7NIN, WJ7X)  
Donor: Radio Club Venezuela

#### USA

W3LPL (Ops. F6IIR, K1DQV, KC8C, KF3P, N3GB, N8II, NW5E, W3EKT, W3EMH, W4PRO, WB2EKK, WB3JRU, WD4AXM, WD8HBB)  
Donor: DX Incorporated Club

#### Europe

UP8A (Ops. UP2BAW, UP2NO, UP2NOG, UP2NTA, UP2PAJ, UA3132071)  
Donor: OH-DX-Ring, OH2AM

### CONTEST DXPEDITIONS

#### World Single Operator

VK9YG (Opr. Steven E. Telenius Lowe, G4JVG)  
Donor: Stuart Meyer, W2GHK

#### World Multi-Operator

3W8DX (Ops. HA5MY, HA5PP, HA5WA)  
Donor: The German CDXG & SDXG  
(DJ3NG & DJ4EI Memorial)

3D2XX (Ops. VK8XX, W6SZN, K3NA, KN3T)  
Donor: CQ Magazine

## BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

Number groups indicate: QSO's/Zones/Countries on each band.

### WORLD TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
CT9BZ	124/10/37	175/22/64	608/24/83	2358/37/107	926/30/97	2695/34/109
9Y4TT	57/8/18	272/12/34	648/28/74	2051/36/97	1703/35/108	2419/32/105
PJ2FR	57/8/13	235/16/40	406/20/62	1380/35/90	1610/32/94	2933/34/102
P40A	39/11/14	231/18/54	221/27/67	934/32/97	1690/30/94	2830/30/99
HC5J	34/6/8	183/11/24	401/28/59	1185/29/84	1593/35/105	2671/30/102
YJ8RY	7/4/6	172/18/38	465/28/55	986/32/85	1425/32/91	3068/30/95
3D2VV	4/4/4	57/19/21	300/31/61	1070/33/79	1288/34/91	2055/31/81
DH0MM	125/8/36	294/19/59	459/26/77	1362/30/99	865/32/99	1528/34/103
KC1F	16/7/10	225/18/58	102/18/58	968/36/125	723/33/102	1527/34/117
HA0MM	53/4/22	445/14/52	293/27/81	848/36/102	439/34/89	2385/39/117

### USA TOP SINGLE OPERATOR, ALL BAND

Station	160	80	40	20	15	10
KC1F	16/7/10	225/18/58	102/18/58	968/36/125	723/33/102	1527/34/117
K3TUP	20/7/13	118/15/50	104/20/61	628/39/122	1040/37/117	1306/36/122
N6BV/1	0/0/0	116/13/47	102/15/52	411/32/106	1021/34/116	1134/31/111
K5ZD/3	12/6/8	101/17/54	153/21/63	620/38/109	694/33/110	902/36/120
W9RE	16/6/8	83/16/47	107/25/63	615/35/105	597/33/96	1237/30/112
K300	15/6/9	133/12/47	84/18/49	472/34/101	984/34/118	915/34/111
K4ISV	29/9/16	83/21/50	92/23/58	635/36/100	877/36/100	704/37/108
N2LT	12/7/9	110/13/48	96/21/52	541/30/91	420/33/87	1366/34/113
WX4G	17/7/11	95/16/51	119/22/59	530/32/83	520/30/79	1228/36/119
K1CC	32/13/21	166/14/52	101/20/54	520/34/103	419/30/94	1103/32/103

### WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

E8AGD	64/9/36	164/15/64	387/24/74	2478/37/121	1565/36/124	3545/36/128
PJ1W	19/5/15	359/20/62	165/22/72	2722/39/124	296/34/106	4342/36/117
ZX0F	17/11/16	126/16/36	263/25/83	2658/36/132	1347/38/139	2622/38/143
8P9X	71/5/11	162/16/47	667/29/93	1978/37/112	2148/38/131	2575/37/131
IR4LCK	48/8/48	163/21/74	500/38/121	1496/38/152	1594/39/138	2381/40/145
HG5A	147/8/40	532/14/57	336/28/79	1076/39/128	1810/39/125	2334/36/114

### USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

N2RM	27/11/24	242/17/63	82/23/73	614/37/126	1120/37/126	1293/36/131
K4VX/8	25/12/22	68/20/62	187/28/77	575/39/135	924/35/129	1205/36/124
W5WMMU	15/8/12	108/20/64	147/30/84	769/39/135	695/36/125	1198/34/124
K8CC	17/11/15	78/18/64	161/26/83	596/39/128	962/36/129	1084/37/130
N3RS	7/6/5	128/18/59	156/22/66	462/39/121	908/38/132	1026/34/138
N2MG	11/6/9	131/14/54	91/20/68	1084/38/146	581/35/123	784/30/107

### WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

P40V	338/17/43	1504/26/97	2063/32/125	4884/38/164	4867/38/159	4409/38/158
PJ1B	628/17/48	1133/24/89	1918/31/118	4880/39/165	4703/39/148	4254/37/159
KP2A	521/15/53	800/21/89	1843/29/107	4780/38/166	4878/38/154	3848/36/140
UP8A	738/12/52	933/20/65	1220/34/113	3255/39/142	3165/39/136	3051/39/133
H80CZS	541/10/54	1318/15/69	1480/28/105	3368/38/143	2711/37/131	2319/37/119
W3LPL	141/16/52	415/22/75	330/28/93	1571/39/159	1710/38/146	2310/37/156

### USA MULTI-OPERATOR MULTI-TRANSMITTER

W3LPL	141/16/52	415/22/75	330/28/93	1571/39/159	1710/38/146	2310/37/156
N5AU	79/15/35	175/24/68	442/31/101	1271/39/158	2102/39/161	1912/37/162
K2TR	86/15/35	211/15/65	235/24/84	1865/39/156	1954/39/148	1712/37/153
WM5G	46/15/26	211/23/59	305/28/84	991/38/143	1932/38/152	1557/37/144
NB1H	30/10/16	200/14/59	245/25/87	1241/39/137	1828/39/142	1407/36/143
N4RJ	184/16/43	179/20/67	306/30/95	1086/39/132	1466/37/147	1140/37/146



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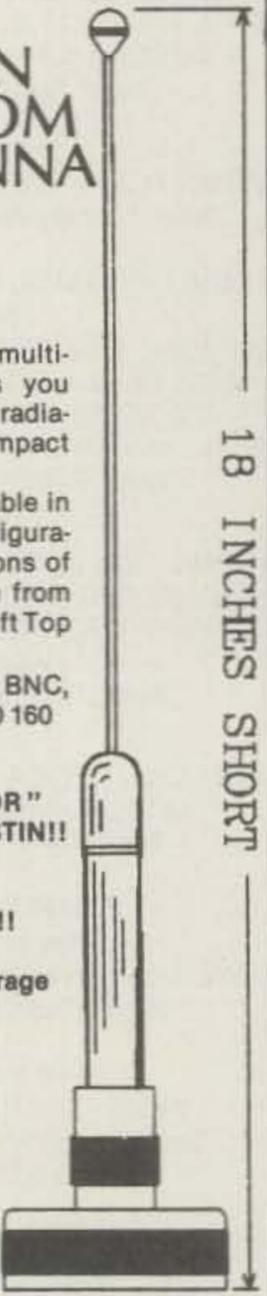
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*Tim, K3LR, pushed K3TUP into number 2 in the USA.*

log as a computer printout, please send us a copy on a floppy disk. We use IBM-compatible systems and can convert most inputs to IBM. We prefer an ASCII file of your log. To encourage the top scorers to submit disks of their logs, which we can read, we will decrease the penalty for duplicate or broken QSO's as follows: less than 1% to 2, less than 3% to 5. If you submit a regular log it will be treated as per the rules. If you use a dupe-checking service ask the checker to send a floppy in with your log. For those of you who sent in disks last year, thank you! Because of all your efforts we hope to continue to certify the winners as worthy.

Thanks to all the members of the contest committee for all their hard work: K2SS, N2AA, KR2Q, K2VV, N3ED, K1DG, K1AR, W2RQ, K5NA/2, W9RE, WA8YVR, W7EJ, KE7V, K7RA, K6NA, AD6C, and N6AW.

It is with a great deal of respect and fondness that the contest committee says to Frank, W1WY, thank you. Thank you for taking over and nurturing the contest in its infancy. Thank you for providing the standards of excellence that now guide us, and thank you for remaining as our advisor over the years and in the present.

Congratulations to all the winners! We look forward to seeing you in the 1989 contest!

73, Bob, K3EST/6, and Larry, N6AR/4

## TOP SCORES

WORLD Single Operator All Band		USA Single Operator All Band		EUROPE Single Operator All Band	
CT9BZ	12,743,190	KC1F	6,429,808	OH0MM	6,544,684
9Y4TT	12,340,132	K3TUP	6,004,683	HA0MM	6,203,318
PJ2FR	10,692,318	N6BV/1	4,510,586	ZB2X	6,058,080
P40A	10,103,709	K5ZD/3	4,434,765	GW4BLE	5,235,428
HC5J	9,358,202	W9RE	4,416,000	UP3BA	4,435,218
YJ0RY	8,970,328	K3OO	4,303,803	OH6JW	4,250,536
3D2VV	6,687,564	K4ISV	4,083,156	OH3UU	4,093,600
OH0MM	6,544,684	N2LT	4,003,796	OH1AF	3,966,270
KC1F	6,429,808	WX4G	3,902,200	DJ4PT	3,629,934
HA0MM	6,203,318	K1CC	3,877,140	OY9JD	3,463,306
<b>28 MHz</b>					
VP2ET	2,423,880	W0ZV	1,139,040	YU3ZV	1,541,603
KD7P/NH2	2,309,304	K3ZJ/8	1,026,684	G3FXB	1,494,048
LT8WW	1,930,500	K7RI	973,947	G3LNS	1,264,848
P40DX	1,775,172	K51L	955,632	IU4K	1,220,610
FM5DN	1,637,272	KX4S	955,344	I1ZEU	1,179,420
CE6EZ	1,630,044	K7QQ	727,360	EA6VQ	1,097,136
<b>21 MHz</b>					
ZP5Y	2,525,791	K3RV/4	1,270,478	YT3AA	1,423,275
VO1SA	1,650,176	K2VV	1,172,760	4N2E	1,303,808
YT3AA	1,423,275	KU2M	856,042	YT6AA	1,203,238
P40TL	1,399,827	K1UO	801,652	OH5BM	1,141,296
4N2E	1,303,808	W2HFP	683,388	LZ1YE	1,011,810
K3RV/4	1,270,478	NG2X	647,190	G4CNY	990,344
<b>14 MHz</b>					
TF3CW	1,791,840	KV4P	528,080	TF3CW	1,791,840
YX5A	1,274,880	N4CC/9	459,550	CT1BOP	1,175,230
VE2ZP	1,254,282	W6QHS	378,005	UR2RE	787,064
CT1BOP	1,175,230	N4MO	358,668	IK6CWO	695,540
AZ4M	1,060,332	W8TWA	326,838	IK1HJS	607,370
A92BE	967,750	WA1DXD	308,183	IK8ETA	576,380
<b>7 MHz</b>					
TI1W	534,797	K5RR	177,280	SP3RBR	505,440
SP3RBR	505,440	W9DUB	66,040	IO3MAU	428,250
FM4A	467,148	W9CH	50,796	OH2HE	219,510
IO3MAU	428,250	WA2IFS	50,300	YT7A	198,882
8R1RPN	353,956	N8RA/1	45,135	I5FCK	194,228
JA5OVU	290,895	K3UA	40,660	YU4VO	168,942
<b>3.7 MHz</b>					
IK5BAF	270,704	W6RJ	83,136	IK5BAF	270,704
UF6VZ	204,134	W7IVX	65,250	4N1A	116,309
TE1L	198,336	W0CD/8	62,205	I4AVG	110,424
4N1A	116,309	K4HJJ	48,327	RB5DX	76,964
I4AVG	110,424	WB2ULI	40,290	YT3AW	65,892
JA1XAF	89,268	KQ3V	38,808	DK5WN	56,854
<b>1.8 MHz</b>					
YU3MM	29,169	K5UR	16,368	YU3MM	29,169
OK3CWO	23,460	KG4W	10,505	OK3CWO	23,460
VE1ZZ	23,188	W2FCR	5,580	IV3PRK	22,445
IV3PRK	22,445	WB3GCG/4	5,332	SP5INQ	17,670
VE3PN	22,008	KD9SV	4,218	LZ1KOZ	14,040
VE3DO	20,091	KJ9I	2,700	OZ7JZ	9,216
<b>Multi-Operator Single Transmitter</b>					
EA8AGD	17,172,672	N2RM	6,923,136	IR4LCK	13,157,568
PJ1W	15,259,408	K4VX/0	6,227,259	HG5A	10,691,254
ZX0F	14,721,311	W5WMU	6,056,298	LZ9A	10,490,675
8P9X	13,989,181	K8CC	6,020,844	C30DSA	10,165,779
IR4LCK	13,157,568	N3RS	5,242,974	Y34K	9,959,275
HG5A	10,691,254	N2MG	5,003,050	OK7MM	9,507,142
<b>Multi-Operator Multi-Transmitter</b>					
P40V	49,294,652	W3LPL	16,092,951	UP8A	23,092,600
PJ1B	46,091,192	N5AU	14,896,951	HB0CZS	18,270,570
KP2A	37,042,774	K2TR	14,229,270	YT2R	12,960,410
UP8A	23,092,600	WM5G	11,302,107	YU1EXY	12,373,616
HB0CZS	18,270,570	NB1H	10,750,824	OZ9EDR	10,157,720
W3LPL	16,092,951	N4RJ	9,655,415	DF0DX	7,517,400

## DX QRM

Biggest thrill: operating CQWW from Rotuma... 3D2XX. Real antennas next time... 8P6BBS. 10 meters was great; good score on 10 meters for US... DA1WA. Fuimos derrotados por MURPHY... EA1DQB. Killing the electronic safety system of the local chair-lift with our RF-power, let us meet a lot of new, interesting people... HB0CZS. We joined in WW for the 1st time... JA0ZRY. I'm very sorry. We couldn't win in the contest... JA2YKA. Good condx in 28 MHz between USA and JA... JA6YCU. Vry tks FB condx... JA9YAA. Condx for this contest made building this Multi-Multi worthwhile... KL7RA. Very bad conditions in 16, 8 and 2 meters... L8H. First time, gud condx, we worked only first 23 hours in the contest... PI4AJ. Congratulations to P40V operators on a fine win... PJ1B. Can conditions like this get better in heaven?... VE7ZZZ. Hard to get multipliers over JA pileups... AH0B. Two antenna rotors burnt!! Propagation wide open... CE5BYU. Tremendous 28 MHz European pileups... FK0AW. Propagation on 10 meters was fantastic... JA1ZEQ. 16 new countries... KL7CQ. 3W8DX called us on 10 meters... PJ1W. Decisions, decisions, decisions which band to operate... VE5GF. First time in CQWW. Didn't break any records but lots of new countries and lots of fun. Thanks!... XE1THR. Of course we were working on antennas at 2359... ZF2JR. Sun and 86 degrees are serious distractions... 8P9X. Tks fr nice contest!... RW4LYL. Operated only 13 Hours... UZ3DXS.

Tnx for nice contest!... UQ0A. Tnx nice contest... UQ1GXJ. My first single op all band phone CQWW DX!... UP3BO. Fb condx on 10 and many lost multipliers... UP1BWW. I worked 39 zones for WAZ!... RB5HT. Tnx for nice contest—73!... UP1BZO. Glad to notice WIK again on 10 meters. Our first 4 meg score!... UT4UXW. Beautiful DX-peditions: YJ0RY, J3/W8KKF... UB4TWA. Thanks so much to all for nice contest QSO... UL8LYA. Fantastic propagation on 10 meters!!!... UL8CWW. Cheerio!... UI9BWE. Winds 20 m/s; 40 M loop was seriously damaged!... UR1RWL. This was our first CQWW SSB contest using our RL1P call from the RL8PYL contest team. Propagation fantastic on all bands, but lower activity on low bands than usual. We will have even bigger antennas next year!... RL1P. This was my first big contest—it was very hard and exciting... DL8OBE. Congratulations! This is the best contest in the world... EA2AN. Good conditions... DL2JO. 10 M fine DX band, 20 M too much EU QRM... DL5UF. I had a lot of fun... DL8NBJ. Good participation of all countries... CR7BWW. Sorry for me my wife had a severe headache just now when conditions were quite fair... SM6IY. I was first SM stn for many US stn on 28—tnx fine contest... SM0JOQ. Always nice to work the whole world... PA3EBX. Good condx, plenty W and UA, fine test... PA0KDM. The 2nd day of the contest the amplifier broke... EA7DHP. It was a very nice contest. The propagation was better than last years. Many thanks... PA3CJP. Fantastic conditions... LX1EA.

Delighted to work 3W8DX for an all-time new one... G3XTT. Sorry, I had no more time. Fantastic conditions on 10, 59+ signals by HS0A, YJ0RY, BY1PK, ZB2X, no good RX with 3W8DX... DJ6TK. To all of you Merry X-mas and specially a very healthy, happy and prosperous New Year 1989 in peace!... DJ2UU. In this year I worked non-high power... DL3YCJ. Rotator seized after 1 hour, XYL's temper seized after 24 hours, my throat seized after 44 hours... GM4VJV. Super contest again. I can now beat the million point barrier, but tell me, how do I beat sleep?... GW4RHW. I built a 100 ft. tower as an elevated 1/4 wave vertical on 80 and 80 was very poor, but 10 is back. A real good fine time... F6AOJ. I do this contest only for testing my computer log program. It's ok for CW... F5IN. My 10th CQWW DX contest and always very happy, 3 new countries this weekend... FE6FNA. Bad propagation for my location... CU2AF. Missed great 10 long path opening into Europe at midnight by being on 40... WR6R/KH6. Aloha to all the great operators on 15... KH6IMB. I found out after the test started that JA's can't work SSB on 160M... KH2D. Didn't hear zone 33 or 34 on any band... KG6DX. Will be on low bands next year... FO5IW. Extra good condx but again no Africans... AX3SM. The new quad came through despite gale force winds... VK1RJ. Enjoyed working the test but I had too little power... KH8/SM7PKK. K1EA's program does dupe at 180 an hour!... ZL3GQ. Unpredictable propagation path on 10M... YE2ZE (Op. YB2CTW).

The bands were too good! Always open... YB0ARA. Thrilled to QSO so many W Novice/Technician stations... CN8FC (Op. WA4UAZ). Pwr supply gave up thereby missing six valuable hrs at end of test... 5Z4BP. I doubt whether the 10M band was ever before so populated... A25/ZS6P. Only licensed three months... TL8JL. Like every year: problems with the antenna and with the people next door... EC9JI. Nearly set off an international incident when my test exchanges overloaded a newly installed sound system at the French cultural center next door

during a performance by African musicians . . . J52US. Very sad that 3000 QSOs not made! . . . A92BE. Had to keep moving the antenna off the railing or a shipping crane would rip it off . . . VS6WO (Op. NA9D). First test with 9V call—big fun to be called . . . 9V1XI (Op. JR1MOD). No one can hear a rare DX station who is operating barefoot with a ground plane . . . YK1AO. Six hrs of pwr failure, blackout in Tel Aviv, the neighbors screaming at me—after all, great fun—tnx agn CQ! . . . 4X0T (Op. 4X6TT). Radio gods turned 15M on and off, mostly off, all weekend . . . T28RK (Op. K8JRK). One CQ was more than enough for a huge pileup every time . . . KB6VIR/5N3. Weird propagation . . . AT0Z.

My first test. Generated a huge pileup but nobody answered, then figured out I had stumbled onto 3W8DX's listening frequency! . . . AL7JA. 50W and some wire netted 1,300 Q's on 10M . . . VO1MP/VP9. First contest since '61 when I was KG1FD . . . VP2VM. Toughest part was scoring the North American boundaries . . . CH2PJ. (It's easy . . . everyone in zones 1-8 plus Greenland are in N.A.—ed.) How good was 10M? Made 269 Q's with a TS-830S and a 25 ft wire lying on the floor of my 11th story ferro-concrete apartment! . . . VE1BHA/3. Forty fone. What a racket! . . . T11W. DXing from Grenada was a real thrill for 6 days . . . WD8MQJ/J3. After 5 yrs as J87CD, I'm heading home to GW0AWT for '89 . . . J87CD. Great to be in test again. Last serious effort was DU1GJM back about 16 yrs ago . . . W9NSZ/KP2. Scorpions and sand flies in the tent . . . I think we're having fun now! . . . W1FM/KP2.

## USA QRM

After spending two weeks getting station ready, everything blew up in two hours! . . . N3FDL. 10 meter ant SWR went from 1.4:1 to 3.5:1 with 20 hrs to go—finished with tuner . . . W9NNE. 10 meters was out of this world . . . W0RXL. Licensed 6/88, I thoroughly enjoyed myself, my first contest effort . . . N2IHO. 10 meters! . . . K7EFB. First contest, great fun! . . . N7JXN. All QSOs were logged real-time by K7RI into a computer—no handwritten log was maintained . . . K7RI. I guess it is not too bad a score for a pregnant YL running barefoot! . . . KB2FDO. Best in years! Let the records roll! . . . W0WP. Best openings in my 30 years in ham radio! . . . KC7DB. Best personal effort, and last from this QTH. Next year: better location, better antennas . . . W9XT. Most frustrating experience: stations that take 5-10 Q's before they identify! . . . WA2IKL. Biggest thrill—hearing zone 40 on 10 meter phone. Biggest disappointment not working him . . . KD0NB. Conditions during this contest will be talked about and remembered for years! . . . W7TJ. Fantastic to hear 10 M so active. Sorry I had to quit for wife's birthday. Wait till next year! . . . KF7NL. FH5 (Mayotte) answering my CQ . . . WB9HRO. Finding 3W8DX calling CQ and working him. I operated for fun not score! . . . W7TVF.

DJ8RR opr. wanted to know what the noise was in the shack: told him my 1 and 4 year old daughters were having a war! . . . N2KA. First contest! Almost cried when I told T28RK and BY4AA that they were dupes . . . N8JEC. Good condx but not much activity from DX on 80 m . . . KE9U. Good opening (early) to Europe Saturday night (160 m) . . . KD9SV. Had neighbor back over my fence with his camper breaking my mast guys for inverted vee . . . N7CTY. My first big contest from the Northeast: loved the European exposure . . . WE6G/1. Hams work too close to band edges and splatter outside the American ham band . . . WJ8C. I decided to call CQ VK/ZL. Not only did I work both countries, but was answered by a P29 . . . KD0ZR. I was amazed at what could be done with only 100W! . . . WD9AFL. To quote K5ZD, "There is no meters like 10 meters" . . . K3LR (Opr. K3TUP). IK4BAF was 50 over at 0423 the first night. Wow! . . . KC8JH. My first JA run . . . It won't be the last . . . watch out East Coast! . . . W7KKR. New 2 el 80 M Yagi . . . K0RF. Nodded off to sleep with my voice keyer in the repeat mode. Awoke with a start to find somebody trying to take my frequency . . . K9SD. Best 10M antenna was 4el at 15 feet into Europe! . . . K3OO. Operated a modified multi-single: 3 family members fighting each other to use a single transceiver . . . KR7L. Russia, Japan and China came in like next door! . . . NY0R. When JY1 called, I was speechless! Thanks your Majesty! . . . W0ZV. Where do you point the beam when the whole world is coming in at once? . . . KF0Z.

Great QSO's with 3D2XX and YJ0RY: my first contest, I'm a Novice . . . KA1RPQ. Been a ham 15 years and this was my first test, but not my last . . . WA4IOB. Best condx ever heard in CQ test . . . N6AR/4. Best condx to eastern Europe in years . . . KV4P. Best propagation in years . . . W4WKQ. Caught flu day before test . . . AB4HQ. CQWW is better than christmas . . . N4JVS. Enjoyed chat with a ZS husband and wife team! . . . K4RV. First big contest to enter . . . N4QYK. First contest attempt; linear expired at 2200Z . . . KJ4ME. First contest when 10 was open . . . AA4SQ. First contest—great way to get started on DXCC . . . KI4QH. First try and had fun . . . KQ4G. First try at contesting . . .

W4UEB. First YB on phone . . . W4YN. Getting long of tooth but still enjoy CQWW albeit with tribander . . . N4MO. Great fun for first DX test—will definitely do it again next year . . . KC4IAG. Great to be back . . . K4JYO. Having A92BE stop his middle east pile up to see who was calling from east coast . . . KU4V. How about a Novice category next year? . . . WB4OMM. I found it hard to go to 15 and 20 with 10 so good . . . WX4G. I won contest for DL as DL4GX in 1959 . . . W4HVU. It was great working the 3W8 for a new country and zone . . . K4GFH. I'm getting too old for this!! . . . K4ISV. Lost amp and computer after 4 Q's . . . W4WJJ. Missed 1 meg by 6 Q's . . . WA4CTC. Murphy struck—pulled a muscle in my back—sitting so long . . . NQ4K. My first contest, had a blast . . . KB4YJG. My first contest—lots of fun . . . KB4SSS.

My first entry in CQWW—had fun . . . K4JHT. Ran out of computer memory space Sunday morning!! . . . K4YYL. Rumors that verticals work without radials in Florida are groundless . . . K1TN/4. 10M was utterly fantastic on Sunday . . . KJ4VG. This was my first contest. Tks for the opportunity . . . KB4ZOD. Thrilled with all the new countries I worked . . . N4NPX. Using K1EA program makes submitting log a snap . . . W4MAN. What a blast on 10M . . . WA4YLD. Wish DXpeditions would ID more often . . . WS4N. Wish I was 40 agn . . . K4SB. A thrill to catch HS0A as last QSO and double mult . . . WM5K. Age is 12. This was my first contest . . . N5MRL. Breaking huge pileup for J52US . . . W5HRF. Could never work zone 6 . . . WB5CRG. First test and enjoyed it . . . KA5ZBT. First time all band—lots more work than single . . . WF5E. First time to enter a contest . . . KE5GO. First time to work Europe . . . KB5GEO. Got laryngitis after 12 hrs . . . KE5BK. Great condx, BY 3W8VS and many others made for great test . . . WB5UDX. Had a good time for my first test . . . KG5NE. K1EA's program is a real pro . . . KD5GD. Superb 10M condx this time . . . WA5IYX. 10 was wall to wall from 28.3 to 28.8 incredible . . . WE5I. Three new ones . . . WA5SOG. Tried to find zone 1 but found it too late . . . N5IQO. 20 was outstanding . . . W5FO. Was 10 hot or what? . . . WB5BIR. Activity was down on 3.7 dramatically . . . W6RJ. Amp blew up 15 min into test . . . K16ZH. As I always say, DX is but contests are . . . W6US. Best propagation and K1EA computer program made this the best ever . . . K9AGL/6. Big thrill 14 new countries for a Novice op . . . KB6PJU. Breaking 3W8DX pileup and not knowing who it was . . . N6RQE. Calling CQ from CA with a KG6 callsign is the pits too many @ pointers . . . KG6AO. Can't wait till next year . . . N6SKF. Cndx great. What fun . . . W6PU.

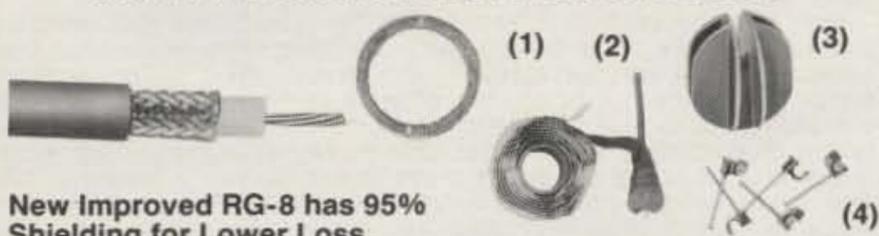
Doubled my previous best score . . . WB6MBF. First contest . . . W6HYK. First SSB test since getting Novice license . . . KB6DWD. Great fun on 10 . . . KG6XT. Had to QRT so XYL could operate . . . AA4Q. Have not heard 10 so open in 25 yrs . . . K6JG. Lots of fun—better every year . . . W6FSJ. My CQ was answered by VR6HJ a YL . . . N6OM. My OMS final zapped him. My MLA2500 rescued him . . . KA6HSM. One of the best yrs yet . . . KB6GV. Operated portable from a pickup camper . . . N6EE. QTH is a condo on busy street . . . N6IBP. Sure great to have 10 open again . . . K6EID. 10 busy all the way up to at least 28.9 . . . N6JM. Tuned across C30DSA with no takers . . . K6ICS. Vy poor 160 condx . . . K6MO. What could be more fun than diving into 700kHz of DX on 10M . . . K6ZH. Woodpecker pinned the meter on 40 . . . WC6H (NU6S). Worked 52 countries with 5 W . . . K6SIK. Worked whole test from my mobile . . . WY6U. You can give me solar flux 165 and A-index 3 anytime . . . W6HXW. I propose a father-son contest (my son is KC1F) . . . N1AU. Worked 3W8DX with 30 seconds left in the test . . . KT1O. K1EA logging program was fantastic . . . AK1A. Running JA's on 10 meters and scoring over 1 mega points in our first ever DX test, what a thrill!! . . . KB1RI. Decided to try packet, EU runs suffered but sure helped the mults . . . K1ZM. Love those spots . . . K1RX. Sportsmanship truly prevailed world wide in the test. We had a blast . . . K1NG. Over 180 QSOs per hour into EU Saturday morning . . . N2RM. Great condx great ops great fun even for us CW types . . . W2GD. Hard work for just the 3 of us with such phenomenal condx . . . N3RS. 10 meters was WOW!! . . . K3PA.

Worked every multiplier called . . . K3ANS. Two computer crashes . . . KD3IY. Just got out of the hospital from a heart transplant and had to jump in for some Q's . . . WA3IJZ. It took 2 degreed engineers 6 hours to get the TS940 hooked up to the amp . . . W4NIM. Worked HS0A on the first call while everyone was piled up on 3W8DX . . . KK4OK. Pkt network was up for the first time. Has great potential for increasing scores . . . N3BB/5. Really enjoyed running 100 watts against all the KW's . . . K9MK/5. Headphone took up smoking as a hobby . . . WB5E. Being called twice on 10 meters by JY1 . . . WB6OKK. Nice to have 10M long path open to VK/ZL again . . . WA6IET. Worked the contest without paper . . . NF6S. Best condx I've heard in 29 years . . . AJ6V. Most countries heard in a test on 10M in 60 years . . . W6BIP. First test in over 10 yrs, the gang did well . . . KO7N. Sure nice to have 15/10 meters open to the world for a change . . . N7RO. Zone 23 activity great on 15 meters . . . K7ZM. A pure pleasure operating 10 meters again . . . KC7V. The

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RG-59	278-1327	.20

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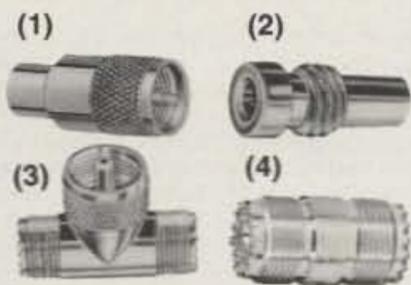
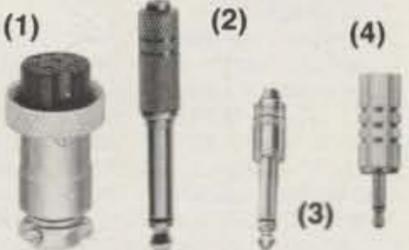


Fig.	Description	Cat. No.	Price
1	PL-259	278-205	2/2.79
2	Reducer for RG-8M, RG-59	278-204	2/.99
	RG-58 Reducer	278-206	2/.99
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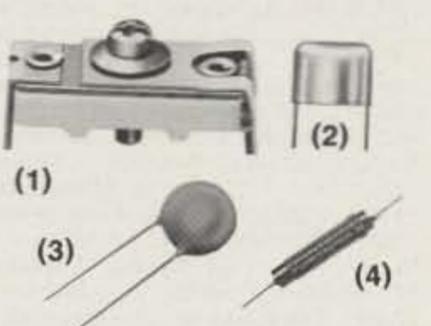
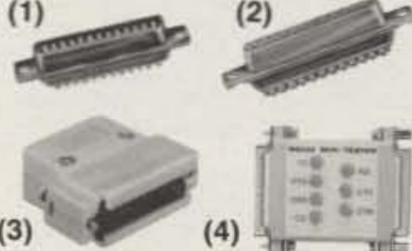


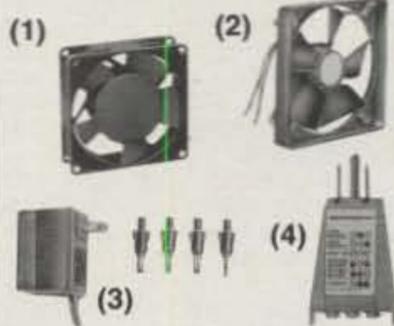
Fig.	Description	Cat. No.	Price
1	95-420 pF Trimmer	272-1336	1.69
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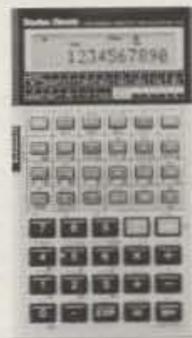


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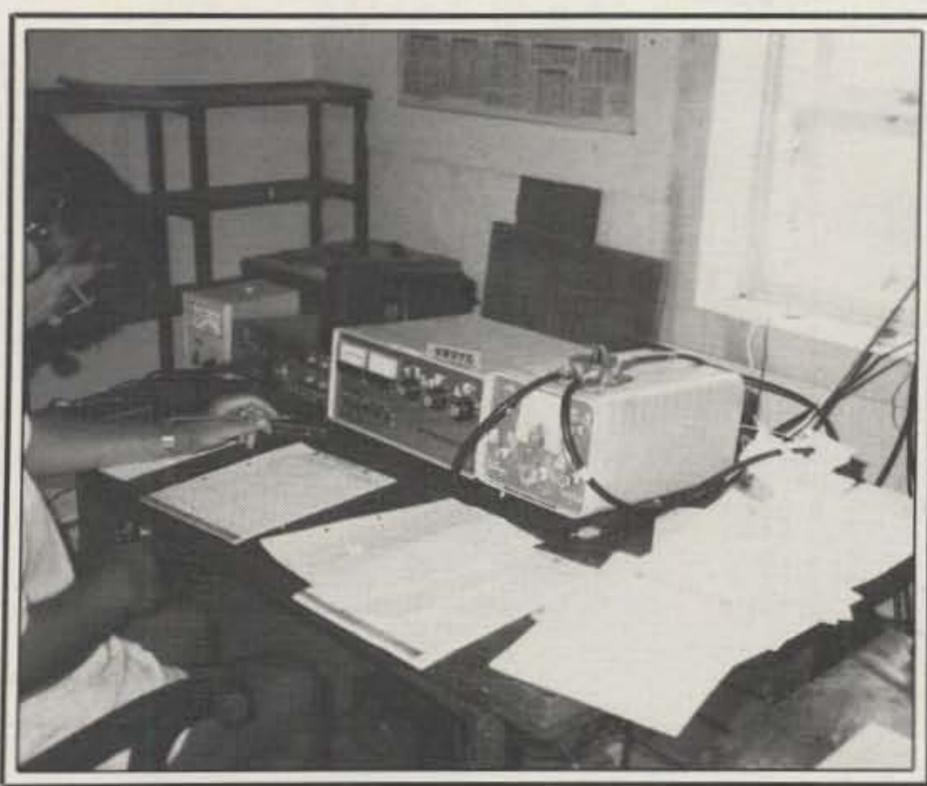
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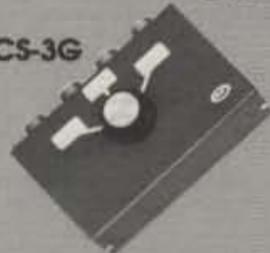
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W8BI & AB8K, KA8OKC, N8BJD, N9AG, W8FN, W8ILC, W8OK, WD8EOL. WM5G & AASDX, K5KJ, K5SXO, KC5DX, KD5GD, KM5R, K09Y, KR0Y, KW5P, N5IWA, N5LAU, N5MAB, NA5U, NJ5N, W65J, W05K, WQ5W. YT2R: YU2DQ, YU2HO, YU2LJ, YU2MM, YU2OG, YU2OH, YU2MP, YU2MY, YU2NJ, YU2NI, YU2FI. YU1EXY: YU1AQ, YU1EW, YU1FW, YU1IT, YU1LA, YU1MSK, YU1PKB, YU1PQI, YU1RL, YU1WK, YU1WR, YU1ZB, YU1SCL, YU3IW, YU6ZEA, YU7AA, YU7AC, VEL, SLAVKO, VLADA. YZ1U: YU1FY, YU1JW, YU1QD, YU1UN, YU1UY, YU1XA, YU1YS, YU6ZI, DJURO, K9SUP, K16MS, OH1ZAA, RODJO. ZF2ML/8: K3IPK, WB2P.

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**WORLD TOP 10 QRP  
(5 W Input)  
All Band**

1. ZY5EG	1,685,682	6. LZ2QV	419,881
2. KR2Q	986,391	7. VP9AD	406,224
3. TI2DU	633,472	8. FD1BEG	399,420
4. WR4K	575,200	9. AA2U	366,338
5. YU2TY	533,544	10. WB5N	294,030

**TEAM CONTESTING**

1. Team USA: (9Y4TT by NQ4I, PJ2FR by N6KT, P40A by N1GL, HC5J by N6TJ, WC6H by NU6S) ..... 44,580,597
2. Team Finlandia: (CT3BZ by OH2BH, ZB2X by OH2KI, YJ0RY by OH1RY, 3D2VV by OH2BAZ, OH0MM by OH2MM) ..... 41,003,746
3. Team CDXC: (VK9YG by G4JVG, GW4BLE, G3XTT, G3OZF, G4OBK) ..... 14,956,371

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, Zones, and Countries. Certificate winners are listed in boldface.

**PHONE RESULTS  
SINGLE OPERATOR  
NORTH AMERICA**

**United States**

KC1F	A	6,429,808	3552	146	470
N6BV/1	**	4,510,586	2804	125	432
K1CC	**	3,877,140	2341	143	427
K1RU	**	3,838,800	2376	135	425
W1WEF	**	3,299,460	2212	132	376
K1VR	**	2,830,806	1887	130	392
K1YR	**	1,707,575	1517	116	293
K3FN/1	**	1,311,590	1008	115	342
K1CLN	**	1,234,320	1187	97	273
W1GIH	**	1,118,460	949	113	307
K1VDF	**	1,071,259	1233	72	229
KG1D	**	758,898	832	88	229
WE6G/1	**	606,818	742	75	213
W1BR	**	574,800	672	82	218
W1KRS	**	562,684	673	84	208
KA1HGY	**	550,560	774	68	180
W1CB	**	503,829	666	75	68
KA1DWX	**	500,532	556	89	229
K1JUL	**	404,586	583	65	182
W1AX	**	290,232	433	58	174
NC1B	**	280,704	386	77	181
W1SD	**	226,672	324	74	174
K1IR	**	203,163	297	67	174
K1SF	**	203,112	421	53	115
W1RM	**	180,310	444	40	106
N4XR/1	**	145,555	247	69	146
AD1Z	**	130,131	266	54	117
W1IHN	**	123,602	191	75	166
N1RC	**	94,707	225	45	108
N1FIO	**	92,184	234	37	101
KB1WR	**	90,903	210	50	107
K1KNO	**	81,842	187	39	112
A13E/1	**	80,040	191	40	105
K2MN/1	**	79,937	203	43	100
K1VKO	**	68,252	161	52	99
K1TWF	**	65,105	165	45	100
KA1IDC	**	64,638	163	40	93
AB1U	**	57,456	181	41	71
NR1P	**	51,120	150	45	75
KA1RE	**	47,304	152	36	72
NO1E	**	20,554	92	26	60
W1PJL	**	13,176	83	15	39
W1FV	**	8,996	63	13	39
W1LUG	**	8,384	81	27	37
K1SA	**	5,220	49	9	27
W3WDX/1	**	1,540	20	11	17
KS1L	<b>28</b>	<b>955,632</b>	<b>1883</b>	<b>36</b>	<b>136</b>
W1BIH	**	294,640	704	37	145
WA1FCN	**	227,625	615	30	95
WB2DND	**	1,813,040	489	29	99
K1EFI	**	151,487	395	32	101
KQ1V	**	137,808	367	31	101
WA1GRX	**	114,425	346	27	88
N1DRB	**	95,760	297	27	85
KA1RLI	**	58,560	224	25	71
KA1PWG	**	24,500	122	22	48
KA1OED	**	22,116	152	17	40
KA1RPO	**	17,052	108	18	40
N1DZJ	**	16,473	103	16	41
KA1RWX	**	16,016	111	16	36
N1FSY	**	4,138	36	19	28
KA1QOL	**	2,352	42	8	16
KA1PES	**	903	15	8	13
KB1KA	**	6	1	1	1
K1UD	<b>21</b>	<b>801,652</b>	<b>1651</b>	<b>38</b>	<b>126</b>

KB1WH	**	466,803	1208	35	118
N1ELN	**	215,619	609	30	93
W2IQL/1	**	140,774	413	29	89
K1LXJ	**	55,272	210	23	71
WA1DXD	<b>14</b>	<b>308,183</b>	<b>814</b>	<b>37</b>	<b>102</b>
W1RR	**	271,467	677	34	105
NU8V/1	**	12,155	80	18	47
NR1R	**	10,997	130	29	67
W3LPR/1	**	5,136	40	15	33
N8RA/1	<b>7</b>	<b>45,135</b>	<b>186</b>	<b>19</b>	<b>66</b>
N1ACH	<b>1.8</b>	<b>2,418</b>	<b>46</b>	<b>11</b>	<b>20</b>
N2LT	<b>A</b>	<b>4,003,796</b>	<b>2545</b>	<b>138</b>	<b>400</b>
NY2L	**	3,065,026	1986	132	397
K2DM	**	2,984,514	2077	128	370
KM2P	**	2,200,590	1616	128	362
NM2Y	**	1,664,476	1432	112	306
AB2E	**	1,383,162	1171	111	307
K2FL	**	877,734	844	102	261
KB2SE	**	804,700	864	98	227
KF2O	**	655,452	751	77	229
WA2UDT	**	644,265	724	88	221
KD2YP	**	612,556	644	98	236
K2QAR	**	572,508	718	76	203
WA2IKL	**	557,845	678	87	218
KS2M	**	524,181	579	95	232
WF2W	**	500,640	631	75	205
K2OIL	**	496,888	649	66	200
N2AIF	**	430,070	518	85	205
K2YGM	**	331,433	429	81	190
WB2K	**	331,344	395	87	225
K2BK	**	326,647	462	75	182
NQ2O	**	293,232	361	88	210
NA2Q	**	291,662	416	75	176
W2KHQ	**	252,072	404	57	159
N2WK	**	218,722	344	74	164
W2PHW	**	193,640	299	72	163
N2KA	**	167,796	253	74	163
KF2U	**	167,772	353	42	122
KT2D	**	165,996	291	64	148
KD2BW	**	142,290	301	55	131
W2TZ	**	137,020	311	41	114
W2FUI	**	131,364	257	51	127
W2PHT	**	130,822	293	43	106
WB2TPS	**	126,608	241	56	137
W2FGY	**	113,730	241	48	122
KR2J	**	113,509	220	58	129
W2SDO	**	111,888	232	52	116
K2PH	**	93,024	240	36	100
WA2VQW	**	84,672	212	49	95
W2GKZ	**	56,017	144	39	100
KC2X	**	51,681	284	66	155
AG2S	**	50,292	139	39	92
KE2DF	**	41,478	172	25	68
WA2VZQ	**	39,600	172	19	61
NA2M	**	18,407	89	30	49
N2FS	**	16,422	83	23	46
K2LS	**	8,700	56	31	44
KB2EMB	**	3,200	36	16	24
WD2AHD	**	1,960	43	15	27
K2YY	<b>28</b>	<b>412,380</b>	<b>941</b>	<b>36</b>	<b>122</b>
NA2G	**	302,872	782	30	101
K2MFY	**	247,080	597	31	111
KB2EMU	**	206,016	637	30	81
KC2KU	**	193,408	520	29	99
WB2QYH	**	142,090	377	31	99
KB2WN	**	95,824	445	25	88
W2KZE	**	80,746	275	23	71
N2UN	**	79,040	287	24	71
K2OLG	**	60,776	153	29	113
KA2YVU	**	57,873	224	28	73
N2BCF	**	51,436	236	21	56
W2QKJ	**	27,365	148	17	48
W2BN	**	22,632	100	24	58
KB2FDO	**	21,904	106	29	45
WE2T	**	16,892	138	9	32
WB2BZR	**	13,944	91	15	41

N2IHQ	**	11,172	92	17	32
WA2VYA	**	5,043	46	17	24
KA2ZKI	**	36	3	2	2
K2VV	<b>21</b>	<b>1,172,760</b>	<b>2224</b>	<b>38</b>	<b>142</b>
KU2M	**	856,042	1733	39	128
W2HFP	**	683,388	1445	39	125
NG2X	**	647,190	1381	38	124
K2WK	**	530,660	1143	35	122
WA2EKW	**	392,368	1005	36	101
KB2HZ	**	336,294	732	34	123
WA2QNW	**	223,872	588	33	95
W2HG	**	172,104	423	33	109
KB2BF	**	140,965	420	31	90
K2AW	**	122,400	314	29	97
KE2CG	**	104,994	320	30	84
WA2CYQ	**	94,939	303	30	79
WB2TKD	**	44,620	173	27	65
AC2P	**	4,972	42	16	28
WA2KFE	<b>14</b>	<b>79,679</b>	<b>280</b>	<b>32</b>	<b>77</b>
KE2DJ	**	23,925	116	18	57
WA2IFS	<b>7</b>	<b>50,300</b>	<b>180</b>	<b>25</b>	<b>75</b>
KC7KU/2	**	37,064	157	18	64
WB2ULI	<b>3.7</b>	<b>40,290</b>	<b>168</b>	<b>21</b>	<b>64</b>
WA2ADG	**	17,095	104	15	50
W2FCR	<b>1.8</b>	<b>5,580</b>	<b>49</b>	<b>13</b>	<b>32</b>
K3TUP	<b>A</b>	<b>6,004,683</b>	<b>3216</b>	<b>154</b>	<b>485</b>
K5ZD/3	**	4,434,765	2482	151	464
K300	**	4,303,803	2603	138	435
AA1K/3	**	3,440,556	2114	141	426
W3BGN	**	3,173,475	2128	129	379
N3AD	**	3,123,252	2278	127	351
KQ3F	**	1,711,830	1380	119	311
WA8MAZ	**	1,634,625	1595	104	271
ND3A	**	1,619,560	1474	110	270
KZ3H	**	1,142,505	865	119	346
K3ZA	**	1,061,720	983	98	282
NM3U	**	1,028,800	958	111	289
AD3V	**	968,890	903	100	277
W3UM	**	934,914	783	112	305
N13P	**	865,602	896	93	249
K3YGU	**	751,542	751	88	266
K3FNW	**	461,006	547	88	210



Country	Code	Frequency	Power	Bandwidth	Modulation	Channel Spacing	Notes
<b>Cape Verde Islands</b>							
D44BC	28	1,010,437	2090	37	126		
<b>Central African Republic</b>							
TL8JL	21	14,210	98	18	31		
<b>Ceuta &amp; Melilla</b>							
EAGGS	A	3,520	32	15	29		
EASCHT	28	26,406	164	16	35		
/EA9	21	9,715	51	24	30		
EAGNN	21	8,610	73	11	43		
EASEU	1.8	14,320	122	5	35		
<b>Comoros</b>							
KY0T	A	224,992	480	61	97		
/D68	21	549,510	1424	35	95		
<b>Guinea-Bissau</b>							
J52US	A	5,372,340	3932	122	338		(Opr K8MN)
<b>Kenya</b>							
SZ4SS	A	16,500	102	17	38		
SZ5OU	21	549,510	1424	35	95		
SZ4BP	14	218,322	632	34	83		
<b>Lesotho</b>							
7P8DP	A	1,483,648	1851	86	182		
<b>Madeira Islands</b>							
CT98Z	A	12,743,190	6886	157	497		(Opr OH28H)
<b>Mayotte</b>							
FH5EF	A	1,532,850	1595	104	226		
<b>Morocco</b>							
CN8FC	28	591,408	1780	29	82		(Opr WA4UAZ)
<b>Nigeria</b>							
KB6VIR	A	880,938	1355	67	151		
/5N3	28	526,976	1381	33	95		
G3GJQ	28	526,976	1381	33	95		
/5N28	28	526,976	1381	33	95		
<b>Republic of South Africa</b>							
ZS5E	28	308,802	932	33	78		
ZS4WD	28	114,227	384	32	91		
ZS6AQS	21	49,895	203	29	56		
ZS6BCR	21	299,376	711	35	58		
<b>Seychelles</b>							
S79D	A	37,752	131	43	61		
<b>Tanzania</b>							
5H1HK	A	4,703,976	3364	129	345		
<b>Western Sahara</b>							
SD1A	28	623,970	1555	29	106		
<b>Zaire</b>							
9Q5NW	A	5,113,166	3638	126	352		(Opr N4NW)
<b>ASIA</b>							
<b>Bahrain</b>							
A92BE	14	967,750	2196	38	137		
<b>Hong Kong</b>							
VS6WO	A	177,120	925	43	65		(Opr NA9D)
<b>India</b>							
AT8V	28	450,606	1199	36	86		(Opr VU2CVP)
AT8Z	21	157,437	498	33	123		(Opr VU2ZAP)
<b>Israel</b>							
4X8T	28	557,018	1310	36	118		(Opr 4X6TT)
4X4VE	21	10,136	69	19	37		
<b>Japan</b>							
JF1SEK	A	2,364,411	2259	111	246		
JH1N8N	28	1,106,891	1031	106	267		
JL1MWI	21	408,744	851	56	112		
JA1BUI	21	287,576	518	76	130		
JA8BMS/1	21	278,296	556	555	117		
JJ1NNJ	21	272,283	439	81	142		
JA1ALX	21	206,976	325	84	147		
JA1BNW	21	206,275	330	70	153		
JA1PUK	21	164,349	324	64	116		
JE1AER	21	153,450	289	67	119		
JH1QDB	21	91,455	175	72	123		
JH1URT	21	57,120	238	43	41		
JA1WYQ	21	52,593	127	43	98		
JA1IT	21	40,710	127	39	76		
JR1YOL	21	37,422	158	23	40		
JH1EVD	21	31,950	157	29	42		
JA7ARW/1	21	30,576	114	38	66		
JA1ASO	21	28,224	100	38	60		
JH1HGF	21	23,852	98	39	50		
JH1PXY	21	4,512	36	21	26		
JO1MCC	21	2,088	26	15	14		
JH1AJT	28	1,421,070	2409	38	163		
JH5GHH	21	871,474	2031	37	109		
/1	21	801,738	1864	36	111		
JR1UV	21	195,490	603	31	82		
JA1OZC	21	171,080	562	32	72		
JN1IZR	21	170,568	638	29	63		
JH1UUT	21	167,422	607	28	69		
JQ1ABC	21	151,620	455	32	82		
JH1IED	21	145,845	478	31	74		
JH1XUZ	21	128,154	486	29	64		
JK1AFI	21	76,377	329	26	57		
J11JVG	21	67,896	361	29	63		
JA1BUN	21	47,925	130	34	101		
JO1CRA	21	46,092	234	22	47		
JA1RCT	21	43,289	208	26	47		
JA1EMQ	21	22,188	174	16	24		
JA1GYQ	21	17,110	100	20	39		
JA1FO	21	14,001	125	16	23		
JH1AIX	21	11,616	86	20	28		
JF1CZQ	21	10,736	82	16	27		
JG1GZN	21	6,623	71	15	22		
JA1XCI	21	5,499	53	17	22		
JN1WXW	21	1,480	24	5	15		
JA1AAT	21	1,071	21	8	9		
JA1AAV	21	525	25	4	3		
JA1AGZ	21	36	3	3	3		
JE1TTO	21	110,768	340	32	80		
JA1SKE	21	77,836	246	34	82		
JF1LLT	21	73,914	270	28	69		
JG1RKB	21	26,696	103	31	63		
JA1DCO	21	7,602	67	19	23		
JE1UFF	21	5,920	52	18	22		
JH1RMH	21	3,036	47	11	11		
JL1KUH	21	2,106	27	13	13		
JH1COV	21	615	15	7	5		
JJ1LAR	21	595	13	7	10		
JH1AOU	21	38,097	163	27	56		
JA1V8W	14	12,636	59	32	49		
JA1GO	7	64,236	248	30	71		
JA1YAD	3.7	89,268	372	28	58		
JA1XAF	3.7	89,268	372	28	58		
JJ2EMF	A	625,089	750	109	194		
JA2DLM	21	352,176	466	104	172		
JA2UOT	21	201,426	402	69	108		
JF2PTA	21	49,422	154	50	68		
JA2BEY	21	1,624	20	14	15		
JH2BCN	28	260,029	757	33	88		
JH2UVL	21	152,181	464	30	81		
JH2HFD	21	125,244	308	36	111		
JF2GYH	21	81,986	308	30	64		
JA2ATE	21	54,509	223	26	65		
JA2WZ	21	48,699	265	23	40		
JH2KGZ	21	46,330	204	27	55		
JF2KUU	21	22,984	159	20	32		
JA2DN	21	21,924	132	22	36		
JR2IGV	21	20,185	129	20	35		
JG2TSL	21	10,472	106	15	19		
JA2HFB	21	9,024	68	20	28		
JA2DHL	21	2,250	28	12	18		
JH2XTV	21	1,342	21	10	12		
JA2BNN	21	165,700	573	29	71		
JK2DCR	21	78,312	270	31	73		
JR2MLV	21	55,620	229	29	61		
JA2DSF	21	43,907	188	28	55		
JA2QOC	21	42,160	175	27	58		
JF2PXB	21	7,181	65	18	25		
JM2BHI	21	880	18	9	11		
JA2THS	14	264,996	621	39	114		
JA2FSM	21	858	13	10	13		
JA2BAY	7	195,624	651	31	83		
JF2LTH	21	150	8	4	6		
JA2IVK	3.7	2,610	37	16	13		
JE2LPC	21	310	13	6	4		
JJ3AUD	A	436,840	596	92	176		
JE3VXD	21	355,250	615	72	131		
JR3WXA	21	323,127	545	76	131		
JH3GRE	21	167,757	304	77	122		
JJ3BFC	21	67,500	173	55	95		
JO3BBQ	21	32,584	123	42	61		
JJ3QXW	21	15,276	84	30	37		
JA3XOG	28	393,053	985	36	101		
JA3EQC	21	337,525	1010	33	82		
JR3RWB	21	246,016	679	34	94		
JA3CXN	21	100,130	371	30	65		
JR3BOT	21	81,679	450	19	43		
JR3KQJ	21	36,708	304	18	29		
JG3NKP	21	28,288	144	23	45		
JA3BBG	21	25,767	148	23	40		
JG3HCV	21	19,722	123	20	37		
JA3PAU	21	7,791	54	20	29		
JR3NZZ	21	435,880	1152	37	89		
JR3RIY	21	315,776	853	32	96		
JA3SSW	21	151,008	401	34	98		
JR3CVJ	21	17,710	93	24	46		
JJ6NFX/3	21	15,450	110	22	28		
JR3JBA	21	5,625	48	19	26		
JR3KAH	21	1,239	21	9	12		
JA3V0V	14	32,585	138	33	62		
JA4ESR	A	2,067,495	1751	134	275		
JE4CIL	21	466,884	654	104	158		
JA4NMT	21	271,614	488	71	132		
JA4DUD	21	223,682	409	78	116		
JA4AQA	21	40,940	142	48	67		
JR4THU	21	31,191	103	46	65		
JF4XTS	21	19,530	107	28	34		
JR4JRP	21	3,828	34	19	25		
JG4AKL	28	2,040	25	15	19		

# uniden®

## \$12,000,000 Scanner Sale

Uniden Corporation of America has purchased the consumer products line of Regency Electronics Inc. for \$12,000,000. To celebrate this purchase, we're having our largest scanner sale in history! Use the coupon in this ad for big savings. Hurry...offer ends September 30, 1989.

### ★★★ MONEY SAVING COUPON ★★★

Get special savings on the scanners listed in this coupon. This coupon must be included with your prepaid order. Credit cards, personal checks and quantity discounts are excluded from this offer. Offer valid only on prepaid orders mailed directly to Communications Electronics Inc., P.O. Box 1045 - Dept. UN16, Ann Arbor, Michigan 48106-1045 U.S.A. Coupon expires September 30, 1989. Coupon may not be used in conjunction with any other offer from CEI. Coupon may be photocopied. Add \$11.00 for shipping in the continental U.S.A.

Regency TS2-T .....\$259.95  
 Regency INF5-T .....\$79.95  
 Regency R2060-T1 .....\$114.95  
 Regency UC102-T .....\$109.95  
 Regency RH606B-T.....\$419.95  
 Regency RH256B-T.....\$294.95  
 Bearcat 200XLT-T .....\$249.95  
 Bearcat 100XLT-T .....\$184.95  
 Bearcat 800XLT-T .....\$249.95  
 Uniden HR2510-T .....\$229.95  
 Uniden PR500D-T1 .....\$32.95

### ★★★ VALUABLE COUPON ★★★

#### Bearcat® 760XLT-T

List price \$499.95/CE price \$244.95/SPECIAL 12-Band, 100 Channel • Crystalline • AC/DC Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz. The Bearcat 760XLT has 100 programmable channels organized as five channel banks for easy use, and 12 bands of coverage including the 800 MHz band. The Bearcat 760XLT mounts neatly under the dash and connects directly to fuse block or battery. The unit also has an AC adaptor, flip down stand and telescopic antenna for desk top use. 6-5/16" W x 1 1/4" H x 7 1/2" D. Model BC 590XLT-T is a similar version without the 800 MHz band for only \$194.95. Order your scanner from CEI today.

#### NEW! Regency® Products

R4030-T Regency 200 ch. handheld scanner ....\$254.95  
 R4020-T Regency 100 ch. handheld scanner ....\$189.95  
 R4010-T Regency 10 channel handheld scanner...\$114.95  
 R1600-T Regency 100 channel mobile scanner...\$244.95  
 P200-T Regency 40 channel CB Mobile .....\$38.95  
 P210-T Regency 40 channel CB Mobile .....\$56.95  
 P220-T Regency 40 channel CB Mobile .....\$79.95  
 P300-T Regency 40 channel SSB CB Mobile.....\$137.95  
 P400-T Regency 40 channel SSB CB Base.....\$174.95  
 PR100-T Regency visor mount radar detector...\$54.95  
 PR110-T Regency "Passport" size radar detector...\$114.95  
 PR120-T Regency "micro" size radar detector...\$144.95  
 MP5100XL-T Regency 40 Ch. marine transceiver...\$139.95  
 MP5510XL-T Regency 60 Ch. marine transceiver...\$159.95  
 MP6000XL-T Regency 60 Ch. marine transceiver...\$209.95  
 MP2000XL-T Regency handheld marine trans...\$189.95

#### Regency® RH256B-T

List price \$799.95/CE price \$299.95/SPECIAL 16 Channel • 25 Watt Transceiver • Priority The Regency RH256B is a sixteen-channel VHF land mobile transceiver designed to cover any frequency between 150 to 162 MHz. Since this radio is synthesized, no expensive crystals are needed to store up to 16 frequencies without battery backup. All radios come with CTCSS tone and scanning capabilities. A monitor and night/day switch is also standard. This transceiver even has a priority function. The RH256 makes an ideal radio for any police or fire department volunteer because of its low cost and high performance. A 60 Watt VHF 150-162 MHz version called the RH606B-T is available for \$429.95. A UHF 15 watt, 16 channel version of this radio called the RU156B-T is also available and covers 450-482 MHz. but the cost is \$454.95.

### ★★★ Uniden CB Radios ★★★

The Uniden line of Citizens Band Radio transceivers is styled to compliment other mobile audio equipment. Uniden CB radios are so reliable that they have a two year limited warranty. From the feature packed PRO 810E to the 310E handheld, there is no better Citizens Band radio on the market today.

PRO310E-T Uniden 40 Ch. Portable/Mobile CB...\$83.95  
 PRO330E-T Uniden 40 Ch. Remote mount CB...\$104.95  
 PRO500D-T Uniden 40 Channel CB Mobile .....\$38.95  
 KARATE-T Uniden 40 channel rescue radio .....\$53.95  
 GRANT-T Uniden 40 channel SSB CB mobile .....\$166.95  
 MADISON-T Uniden 40 channel SSB CB Base .....\$244.95  
 PC122-T Uniden 40 channel SSB CB mobile.....\$119.95  
 PRO510XL-T Uniden 40 channel CB Mobile.....\$38.95  
 PRO520XL-T Uniden 40 channel CB Mobile.....\$56.95  
 PRO530XL-T Uniden 40 channel CB Mobile.....\$79.95  
 PRO540E-T Uniden 40 channel CB Mobile.....\$97.95  
 PRO640E-T Uniden 40 channel SSB CB Mobile...\$137.95  
 PRO710E-T Uniden 40 channel CB Base .....\$119.95  
 PRO810E-T Uniden 40 channel SSB CB Base...\$174.95

### ★★★ Uniden Radar Detectors★★★

Buy the finest Uniden radar detectors from CEI today. TALKER-T Uniden talking radar detector.....\$184.95  
 RD7-T Uniden visor mount radar detector .....\$99.95  
 RD9-T Uniden "Passport" size radar detector...\$114.95  
 RD9XL-T Uniden "micro" size radar detector...\$144.95  
 RD25-T Uniden visor mount radar detector...\$54.95  
 RD500-T Uniden visor mount radar detector...\$74.95

#### Bearcat® 200XLT-T

List price \$509.95/CE price \$254.95/SPECIAL 12-Band, 200 Channel • 800 MHz. Handheld Search • Limit • Hold • Priority • Lockout Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz. The Bearcat 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 10 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz band and 100 channels, order the BC 100XLT-T for only \$189.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adapter and earphone. Order your scanner now.

#### Bearcat® 800XLT-T

List price \$549.95/CE price \$259.95/SPECIAL 12-Band, 40 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC Bands: 29-54, 118-174, 406-512, 806-912 MHz. The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9 1/4" x 4 1/2" x 12 1/2". If you do not need the 800 MHz band, a similar model called the BC 210XLT-T is available for \$178.95.

#### Bearcat® 145XL-T

List price \$189.95/CE price \$94.95/SPECIAL 10-Band, 16 Channel • No-crystal scanner Priority control • Weather search • AC/DC Bands: 29-54, 136-174, 406-512 MHz. The Bearcat 145XL is a 16 channel, programmable scanner covering ten frequency bands. The unit features a built-in delay function that adds a three second delay on all channels to prevent missed transmissions. A mobile version called the BC560XLT-T featuring priority, weather search, channel lockout and more is available for \$94.95. CEI's package price includes mobile mounting bracket and mobile power cord.

#### President® HR2510-T

List price \$499.95/CE price \$239.95/SPECIAL 10 Meter Mobile Transceiver • Digital VFO Full Band Coverage • All-Mode Operation Backlit liquid crystal display • Auto Squelch RIT • Preprogrammed 10 KHz. Channels Frequency Coverage: 28.0000 MHz to 29.6999 MHz. The President HR2510 Mobile 10 Meter Transceiver made by Uniden, has everything you need for amateur radio communications. Up to 25 Watt PEP USB/LSB and 25 Watt CW mode. Noise Blanker. PA mode. Digital VFO. Built-in S/RF/MOD/SWR meter. Channel switch on the microphone, and much more! The HR2510 lets you operate AM, FM, USB, LSB or CW. The digitally synthesized frequency control gives you maximum stability and you may choose either pre-programmed 10 KHz. channel steps, or use the built-in VFO for steps down to 100 Hz. There's also RIT (Receiver Incremental Tuning) to give you perfectly tuned signals. With receive scanning, you can scan 50 channels in any one of four band segments to find out where the action is. Order your HR2510 from CEI today.

#### NEW! President® HR2600-T

List price \$599.95/CE price \$299.95/SPECIAL 10 Meter Mobile Transceiver • New Features Delivery for this new product is scheduled for June, 1989. The new President HR2600 Mobile 10 Meter Transceiver is similar to the Uniden HR2510 but now has repeater offsets (100 KHz.) and CTCSS encode.



BC760XLT  
800 MHz.  
mobile scanner  
SPECIAL!

### ★★★ Facsimile Machines & Phones ★★★

FAX3300-T Pactel Fax machine with phone ....\$1,099.95  
 XE750-T Uniden Cordless Phone with speaker...\$99.95  
 XE550-T Uniden Cordless Phone.....\$79.95  
 XE300-T Uniden Cordless Phone.....\$69.95

### ★★★ Extended Service Contract ★★★

If you purchase a scanner, CB, radar detector or cordless phone from any store in the U.S. or Canada within the last 30 days, you can get up to three years of extended service contract from Warrantech. This service extension plan begins after the manufacturer's warranty expires. Warrantech will perform all necessary labor and will not charge for return shipping. Extended service contracts are not refundable and apply only to the original purchaser. A two year extended contract on a mobile or base scanner is \$29.99 and three years is \$39.99. For handheld scanners, 2 years is \$59.99 and 3 years is \$79.99. For radar detectors, two years is \$29.99. For CB radios, 2 years is \$39.99. For cordless phones, 3 years is \$34.99. Order your extended service contract today.

### OTHER RADIOS AND ACCESSORIES

BC55XLT-T Bearcat 10 channel scanner .....\$114.95  
 BC70XLT-T Bearcat 20 channel scanner.....\$159.95  
 BC175XLT-T Bearcat 16 channel scanner .....\$156.95  
 R2060-T Regency 60 channel scanner.....\$249.95  
 TS2-T Regency 75 channel scanner.....\$269.95  
 UC102-T Regency VHF 2 ch. 1 Watt transceiver...\$114.95  
 BP55-T Regency 16 amp reg. power supply...\$179.95  
 BP205-T Ni-Cad batt. pack for BC200/BC100XLT...\$49.95  
 BB-T 1.2 V AA Ni-Cad batteries (set of eight)...\$17.95  
 FBE-T Frequency Directory for Eastern U.S.A. ....\$14.95  
 FBW-T Frequency Directory for Western U.S.A. ....\$14.95  
 RFD1-T Great Lakes Frequency Directory .....\$14.95  
 RFD2-T New England Frequency Directory .....\$14.95  
 RFD3-T Mid Atlantic Frequency Directory .....\$14.95  
 RFD4-T Southeast Frequency Directory .....\$14.95  
 RFD5-T N.W. & Northern Plains Frequency Dir. ....\$14.95  
 ASD-T Airplane Scanner Directory .....\$14.95  
 SRF-T Survival Radio Frequency Directory .....\$14.95  
 TSG-T "Top Secret" Registry of U.S. Govt. Freq. ....\$14.95  
 TTC-T Tune in on telephone calls.....\$14.95  
 CBH-T Big CB Handbook/AM/FM/Freeband.....\$14.95  
 TIC-T Techniques for Intercepting Communications...\$14.95  
 RRF-T Railroad frequency directory .....\$14.95  
 EEC-T Embassy & Espionage, Elect. Eavesdropping...\$14.95  
 CIE-T Convert Intelligence, Elect. Eavesdropping...\$14.95  
 MFF-T Midwest Federal Frequency directory .....\$14.95  
 A60-T Magnet mount mobile scanner antenna...\$35.95  
 A70-T Base station scanner antenna .....\$35.95  
 A1300-T 25 MHz.-1.3 GHz Discone antenna.....\$109.95  
 USAMM-T Mag mount VHF ant. w/ 12' cable .....\$39.95  
 USAK-T 3/4" hole mount VHF ant. w/ 17' cable .....\$35.95  
 Add \$4.00 shipping for all accessories ordered at the same time. Add \$11.00 shipping per radio and \$4.00 per antenna.

### BUY WITH CONFIDENCE

To get the fastest delivery from CEI of any scanner, send or phone your order directly to our Scanner Distribution Center, Michigan residents please add 4% sales tax or supply your tax I.D. number. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability, acceptance and verification. All sales on accessories are final. Prices, terms and specifications are subject to change without notice. All prices are in U.S. dollars. Out of stock items will be placed on backorder automatically unless CEI is instructed differently. A \$5.00 additional handling fee will be charged for all orders with a merchandise total under \$50.00. Shipments are F.O.B. CEI warehouse in Ann Arbor, Michigan. No COD's. Most items listed have a manufacturer's warranty. Free copies of warranties on these products are available by writing to CEI. Non-certified checks require bank clearance. Not responsible for typographical errors.

Mail orders to: Communications Electronics, Box 1045, Ann Arbor, Michigan 48106 U.S.A. Add \$11.00 per scanner for U.P.S. ground shipping and handling in the continental U.S.A. For Canada, Puerto Rico, Hawaii, Alaska, or APO/FPO delivery, shipping charges are three times continental U.S. rates. If you have a Discover, Visa, American Express or Master Card, you may call and place a credit card order. 5% surcharge for billing to American Express. Order toll-free in the U.S. Dial 800-USA-SCAN. In Canada, dial 800-221-3475. FAX anytime, dial 313-971-6000. If you are outside the U.S. or in Michigan dial 313-973-8888. Order today. Scanner Distribution Center™ and CEI logos are trademarks of Communications Electronics Inc. Sale dates 3/8/89 - 9/30/89 AD #030889-T Copyright © 1989 Communications Electronics Inc.

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1-800-USA-SCAN

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ELECTRONICS INC.

Consumer Products Division  
P.O. Box 1045 □ Ann Arbor, Michigan 48106-1045 U.S.A.  
For orders call 313-973-8888 or FAX 313-971-6000

OK2RU	**	530,240	901	90	230	G3LNS	**	1,264,848	2895	37	119
OK2ABU	**	523,766	1013	60	191	G40JH	**	500,820	1839	32	70
OK1EP	**	381,381	565	78	195	GB75USA	**	94,815	662	14	35
OK1HD	**	354,830	712	68	191	G60Q	**	52,059	318	20	47
OK1KZ	**	320,664	814	63	185	G4CNY	21	990,344	2390	38	120
OK2BBI	**	285,387	536	68	183	GK8B	7	160,272	789	27	81
OK3IAG	**	266,409	543	77	220	<b>Faroe Islands</b>					
OK1BB	**	243,320	633	59	220	OY9JD	A	3,463,306	3504	123	350
OK2QX	**	233,020	515	62	182	OY1A	14	2,775	66	9	28
OK3YCA	**	222,939	498	65	142	<b>Federal Republic of Germany</b>					
OK2PGT	**	184,022	567	52	150	DJ4PT	A	3,629,934	2947	133	353
OK2HI	**	171,186	586	51	155	DJ9ZB	**	2,323,150	1962	129	350
OK3YK	**	136,971	514	45	126	DF1SD	**	1,393,308	1477	98	280
OK1MNV	**	130,713	462	39	148	DL5UF	**	1,121,876	1736	103	309
OK2KBB	**	120,435	342	51	134	DL3LU	**	864,006	943	109	309
OK3CTX	**	88,464	357	44	108	DF1IK/P	**	802,016	1053	85	268
OK1DXW	**	83,330	311	39	91	DJ5FT	**	769,370	1003	100	279
OK2BHQ	**	64,855	258	36	83	DF7NJ	**	736,137	1178	88	223
OK1DWC	**	63,664	220	53	130	DL3NBL	**	555,960	877	90	238
OK3UG	**	54,383	203	44	75	DL6DK	**	504,845	702	77	258
OK1MIZ	**	45,310	304	30	85	DK5WL	**	465,750	880	61	146
OK2PCL	**	42,486	154	36	61	DF2UQ	**	366,000	790	43	201
OK1KGR	**	38,170	328	23	87	DK5WQ	**	358,792	653	73	222
OK1AXB	**	36,162	231	33	90	DL8SCG	**	333,201	605	71	182
OK3CAJ	**	17,710	179	22	48	DK5DS	**	325,240	600	68	167
OK1MSP	**	15,921	73	19	42	DJ5AV	**	295,308	629	64	170
OK2MAJ	**	13,915	39	11	23	DL6LAG	**	277,780	924	50	120
OK2BLD	**	13,601	130	20	47	DJ4ZR	**	244,530	363	87	199
OK1GP	**	12,200	115	14	26	DL8NBJ	**	238,750	509	67	183
OK1S	**	9,856	118	12	49	DKBAX	**	222,562	327	96	161
OK2EC	**	5,525	49	22	43	DL80BE	**	213,840	471	62	154
OK3CMZ	**	3,510	34	18	27	DL9NCR	**	203,280	449	68	163
OK2BPK	**	2,622	42	11	12	DL5YCO	**	201,566	515	65	129
OK6DX	28	762,600	1779	38	117	DJ2UJ	**	161,035	379	62	153
OK3CFA	**	557,277	1367	38	109	DJ7IK	**	156,959	382	63	146
OK3CQR	**	520,968	1390	37	110	DL1EK	**	147,737	461	48	109
OK2PAY	**	406,288	1126	34	100	DL1XAS	**	138,750	380	49	136
OK1TN	**	349,953	822	39	118	DL2JO	**	135,447	431	47	104
OK1ADS	**	342,601	1086	32	87	DL9DBR	**	131,047	287	61	132
OK1MG	**	173,055	462	35	104	DL2RBK	**	124,950	360	49	98
OK1VAM	**	156,078	495	33	84	DJ9MH	**	118,560	287	62	128
OK3CLD	**	152,656	562	30	82	DJ8MW	**	103,621	293	49	82
OK2SPJ	**	91,008	374	25	71	DL3DAF	**	91,290	236	55	115
OK1DFJ	**	68,640	350	22	58	DL3RDE	**	88,773	364	36	91
OK2XA	**	33,790	211	21	41	DJ6GK	**	86,994	205	59	120
OK1FFU	**	18,778	165	17	24	DL3YCY	**	74,745	252	45	106
OK1DXL	**	12,328	112	19	27	DF3IS	**	71,791	289	33	68
OK2BGO	**	11,794	116	16	22	DK1DX	**	64,414	268	32	75
OK1MPP	**	11,289	57	26	45	DL8AAM	**	59,777	302	34	79
OK1AMS	**	9,812	78	18	26	DK9SG	**	37,488	180	32	56
OK1JFP	**	5,022	54	12	19	DL7ZR	**	31,008	121	42	72
OK2BSQ	**	2,375	37	11	14	DJ1ND	**	26,606	105	38	68
OK2SWD	**	666	13	9	10	DJ9RY	**	23,634	127	27	51
OK1AJN	21	302,457	1059	31	92	DL1GGQ	**	22,080	167	21	39
OK2ZZ	**	271,878	1010	28	85	DL3IV	**	20,805	155	30	65
OK1JCH	**	104,841	514	25	74	DA1KM	**	17,459	148	22	57
OK1AGN	**	66,597	368	21	58	DF5WV	**	12,654	75	28	46
OK3KAG	**	62,894	416	19	59	DL8NU	28	970,788	2323	37	110
OK3EO	**	39,591	237	23	60	DK1QH	**	576,436	1786	34	85
OK1DRR	**	32,930	198	23	51	DL6LAU	**	522,512	1403	34	102
OK3WX	**	19,604	187	15	37	DL2DBH	**	411,075	1091	35	100
OK1DHJ	**	12,366	137	14	40	DK1II	**	271,955	904	30	79
OK1JDJ	**	7,480	89	16	28	DL4OK	**	218,890	745	30	76
OK1DWB	**	5,376	64	11	21	DJ1XP	**	159,951	451	32	99
OK3CMW	**	28,224	288	14	59	DJ1ZU	**	157,194	659	26	56
/p	14	28,224	288	14	59	DLBNCG	**	140,262	535	29	68
OK3CXS	**	27,206	316	12	49	DK8FS	**	127,776	379	35	97
OK3DU	**	24,455	130	24	49	DJ7OQ	**	99,858	212	26	71
OK2BOP	**	23,973	217	15	45	DJ4PI	**	44,352	150	35	77
OK1AJY	**	13,440	185	11	37	DF8AN	**	25,536	123	24	60
OK2BAT	**	9,890	138	12	34	DL3ME	**	20,805	152	21	36
OK1FTC	**	2,736	152	6	12	DH1SAJ	**	16,794	120	14	40
OK2TBC	**	1,508	32	10	19	DL9RDG	**	11,395	75	24	29
OK1JFF	3.7	23,274	429	6	48	DJ8OT	**	7,590	59	17	29
OK1FGC	**	20,592	360	10	38	DJ6TK	**	2,660	35	15	23
OK3YCL	**	15,925	312	7	42	DL8PC	21	801,468	1883	39	125
OK1AYE	**	15,312	265	9	39	DL1SBR	**	374,528	1133	35	98
OK3CVI	**	8,405	207	6	35	DL8LR	**	81,720	422	23	67
OK1MKU	**	3,834	102	5	31	DL1SBF	**	27,136	198	17	47
OK3CMK	**	3,072	96	5	27	DA1WR	14	154,224	543	33	93
OK3KNS	**	2,856	82	5	29	DJ8BX/P	**	19,050	236	15	35
OK2BWJ	**	1,944	77	4	23	DK5WN	3.7	56,854	669	11	51
OK3CWO	1.8	23,460	372	10	50	DL8QS	**	3,120	62	8	31
OK1DWJ	**	5,324	122	7	37	<b>Denmark</b>					
						<b>Finland</b>					
OZ4MD	A	1,047,330	1068	118	287	OH6JW	A	4,250,536	3407	123	364
OZ6PI	**	64,780	245	40	118	OH3UU	**	4,093,600	3335	123	353
OZ1IZB	**	11,826	75	21	33	OH1AF	**	3,966,270	3648	121	341
OZ5EV	28	304,414	818	32	105	(Opr OH1NOA)					
OZ1LRT	**	49,875	192	29	66	OH2PM	**	2,788,668	2413	126	387
OZ9HN	**	13,572	120	18	21	OH6YF	**	2,369,500	2596	95	255
OZ5XT	**	1,692	40	9	9	OH6NEV	**	885,292	1497	70	207
OZ1LTB	21	201,262	780	29	74	OH1BV	**	803,241	1226	82	197
OZ2ACL	**	52,614	283	23	56	OH1HD	**	354,830	716	68	191
OZ7HT	14	376,740	1351	35	103	OH3VV	**	336,480	647	68	172
OZ5PZ	**	28,860	283	16	49	OH2LU	**	329,784	556	87	186
OZ7JZ	1.8	9,216	183	8	40	OH1BZ	**	250,790	309	108	202
						<b>England</b>					
G3SNN	A	2,891,184	2426	122	342	OH6CD	**	137,821	326	35	248
G40BK	**	2,639,249	2584	111	310	OH6VR	**	127,350	238	73	152
G3XTT	**	1,773,708	1663	114	360	OH6SU	**	126,911	325	60	119
G3QZF	**	1,636,728	1755	100	276	OH7NW	**	72,670	295	44	125
G4ZXC	**	134,706	450	45	112	OH2LP	**	71,808	173	62	124
G4NXG/M	**	50,830	156	43	87	OH3AD	**	64,225	241	23	54
G0IAT	**	15,615	117	11	34	OH2VZ	**	43,632	182	37	64
G3FXB	28	1,494,048	3338	37	121	OH2BLU	**	34,500	112	32	83

<b>SINGLE OP ZONE WINNERS</b>											
Zone	Call	Score			Zone	Call	Score				
1	AL7KB	307,134			21	A92BE	967,750				
2	VE2XY	604,950			22	AT0V	450,606				
3	K6NA	3,642,240			23	JT1T	563,420				
4	VB3XN	5,373,693			24	VS6WO	177,120				
5	KC1F	6,429,808			25	JF1SEK	2,364,411				
6	XE1OH	3,135,915			26	No entry					
7	DJ6QT/TG9	4,377,500			27	KG6DX	5,389,958				
8	HI3JH	4,874,383			28	YB0ARA	3,018,032				
9	9Y4TT	12,340,132			29	VK9YG	3,671,258				
10	HC5J	9,358,202			30	VK2AYK	406,326				
11	ZP5Y	2,535,791			31	WR6R/KH6	5,016,000				
12	CE3BFZ	2,628,067			32	YJ0RY	8,970,328				
13	LT8WW	1,930,500			33	CT9BZ	12,743,190				
14	ZB2X	6,058,080			34	No entry					
15	OH0MM	6,544,684			35	D44BC	1,010,437				
16	RU1DZ	3,348,450			36	9Q5NW	5,113,166				
17	UA9MR	1,000,215			37	5H1HK	4,703,976				
18	UA0ABK	1,860,352			38	7P8DP	1,483,648				
19	UA0KBO	414,428			39	FH5EF	1,532,850				
20	LZ2AB	1,072,501			40	TF3CW	1,791,840				
<b>German Democratic Republic</b>											
OH6DK	**	28,575	130	39	88	FE6FNA	21	35,244	253	19	47
OH2BYS	**	21,204	84	42	72	TH0X	14	422,838	1718	36	103
OH2DW	**	21,112	92	18	34	F6EZV	7	88,445	478	22	73
OH1NZO	**	15,714	87	34	63						
OH7SM	**	14,528	127	24	40						
OH1PY	**	6,566	50	20	29						
OH2XK</											

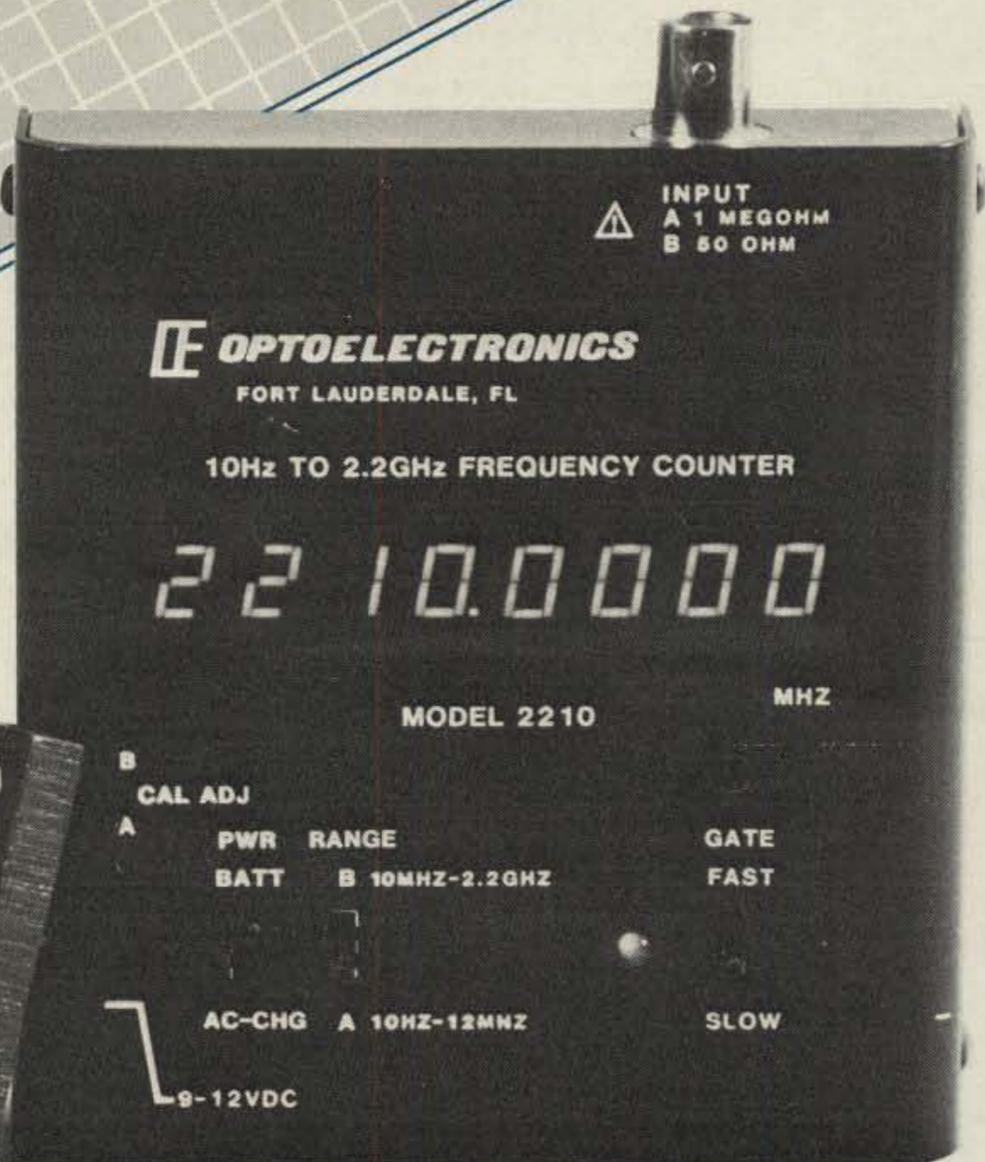
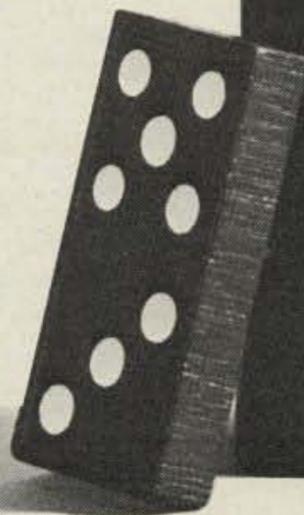
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The Frequency Counter  
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Model 2210 Hand Held  
Frequency Counter  
does it all:

- Frequency from 10 Hz to over 2.2 GHz
- Covers audio through microwave
- Sensitive and accurate



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### SENSITIVITY

1 KHz	< 5 mv	850 MHz	< 3 mv
100 MHz	< 3 mv	1.3 GHz	< 7 mv
450 MHz	< 3 mv	2.2 GHz	< 30 mv

PRICE \_\_\_\_\_ \$219.00

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Fort Lauderdale, Florida 33334

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FAX (305) 771-2052

E18AU	"	13,328	152	14	35	LA9HW	"	36,210	323	15	56	Y03NL	A	537,570	941	77	253	EA7CD	"	35,100	202	22	56	YT2IJ	"	601,916	930	83	249						
E19FN	21	157,950	773	30	87	LA1XDA	"	28,208	192	20	62	Y09CZ	"	80,266	452	38	101	EA7FUN	"	30,750	203	22	53	YU4EGL	"	12,810	277	15	27						
<b>Italy</b>						LA4LN	1.8	3,162	109	4	27	Y08AI	"	49,125	195	46	86	EA5ETP	"	26,280	215	18	42	YU7KM	"	6,592	70	20	44						
IV3YYK	A	1,833,315	1693	114	337	LA6LDA	"	2,730	79	5	30	Y07ARY	"	31,151	206	37	58	EA3DBO	"	24,327	161	21	30	YU1POI	"	684	12	8	11						
IK6CNM	"	297,990	605	66	165	<b>Poland</b>						Y09DIA	"	26,350	161	31	54	EA4EP	"	23,155	177	17	38	YU3ZV	28	1,541,603	3219	39	134						
IK0FEC	"	98,271	289	51	128	SP5DYD/a	A	510,831	1034	68	201	Y06ADW	"	17,168	130	22	52	EA1YY	"	21,050	165	17	33	YU3C	"	1,020,600	2176	39	129						
IK0LLK	"	45,576	231	21	87	SP3IOE	"	372,601	756	64	175	Y06DDF	"	13,176	88	23	31	EA3DZZ	"	20,735	208	17	38	<b>(Opr YT3RM)</b>											
IK2LCY	"	22,140	112	31	51	SP9HWN	"	179,396	508	45	127	Y09FL	"	12,079	118	29	55	EA3ERT	"	20,540	151	20	45	YU3MA	"	639,009	1549	37	110						
IU4K	28	1,220,610	2833	38	136	SP9CTW	"	158,720	294	77	179	Y09AHX	"	4,692	78	11	40	EA3CZM	"	19,860	153	18	42	YU7GW	"	450,364	1179	37	111						
<b>(Opr I4ABF)</b>						SP8HPW	"	101,994	349	50	128	Y03ZR	"	3,417	48	20	31	EA1DAX	"	10,880	142	13	27	YU3EF	"	345,150	1010	32	86						
I1ZEU	"	1,179,420	2570	38	127	SP5ABB	"	88,750	401	39	103	Y05AVN/3	"	1,554	20	17	20	EC5CLE	"	10,010	116	12	23	YU7FT	"	125,100	473	29	71						
IU4BU	"	811,690	2018	38	119	SP4BPH/A	"	87,750	361	34	101	Y03DCO	"	1,271	16	15	16	EA2CR	"	8,428	108	13	30	YU7AE	"	23,045	193	18	37						
I8KPV	"	641,414	1712	35	107	SP7FOI	"	87,552	417	36	116	Y04AAC	"	609	25	7	14	EA5EEP	"	7,560	113	9	26	YU7SF	"	21,528	215	11	28						
I3KVV	"	498,075	1282	38	107	SP9AXA	"	86,583	341	35	98	Y07LDL	28	82,200	486	23	52	EA3FIR	"	7,334	83	16	22	IU4XA	"	14,016	106	17	31						
I4RHP	"	421,587	1067	36	103	SP9AGS	"	70,556	447	23	101	Y02LBN	"	22,119	129	22	51	EA7GMK	"	4,074	73	14	28	YT3AA	21	1,423,275	3020	39	136						
I8BYG	"	390,642	1187	37	98	SP3HC	"	54,171	225	40	77	Y02CMI	"	900	25	6	6	EA1BKT	"	1,825	64	7	18	4N2E	"	1,303,808	2900	39	137						
IK0DWN	"	193,040	566	29	98	SP5LM	"	52,375	204	44	81	Y03RX	"	154	6	5	6	EA5GAY	"	1,210	22	12	10	<b>(Opr YU2RA)</b>											
IN3XUG	"	140,250	549	27	83	SP9MAX	"	46,640	202	40	70	Y06BZL	21	98,580	413	31	93	EA5DCL	"	118,311	566	30	83	YT6AA	"	1,203,238	2718	39	140						
IK0LKO	"	133,182	533	26	72	SP9RPT	"	26,624	186	27	77	Y03AIL	"	40,092	268	24	54	EC1CSO	"	53,280	402	25	65	YT3L	"	983,296	2074	39	145						
IV3BMV	"	120,852	433	32	76	SP9EOG	"	21,390	177	20	73	Y06VZ	14	88,736	609	23	71	EA3ESZ	"	49,200	234	23	77	<b>(Opr YU3EA)</b>											
IK4FNF	"	6,262	72	14	17	SP9GDB	"	20,746	156	24	58	Y06CRP	"	15,240	160	14	46	EA4EHQ	"	37,280	203	23	57	YU3PV	"	852,150	2133	37	103						
I1KN	21	663,696	1419	39	137	SP9BLF	"	16,188	129	19	52	Y03AMC	"	3,485	41	14	27	EC3CQJ	"	34,558	300	16	58	YU3BO	"	850,698	1948	39	128						
I4FYF	"	380,904	1224	32	86	SP9RG	"	14,535	102	30	55	Y06DBA	"	1,769	57	6	23	EA7PS	"	31,317	190	18	55	YU1NR	"	366,223	1101	33	110						
I1RJP	"	210,936	656	35	101	SP6BGF	"	13,838	220	21	67	Y06ADW	"	1,300	58	5	15	EA3EXW	"	17,780	135	20	50	YU2WJ	"	31,262	152	26	51						
W9LT/IB	"	203,443	834	32	99	SP7GAQ	"	9,976	60	32	54	Y03JF	7	67,150	501	24	61	EC7DNG	"	11,041	96	17	44	YT7KW	"	19,860	161	17	41						
IK6CWO	14	695,540	1915	37	119	SP9MRM/a	"	7,840	92	21	35	Y08GX	"	10,395	184	11	34	EC1CPE	"	9,072	73	19	44	YU2CAH	14	73,696	509	25	69						
IK1HJS	"	607,370	1695	38	149	SP9DGO	"	7,750	70	19	31	Y05QAW	"	9,000	200	6	34	EC7DNF	"	6,708	61	15	37	<b>(Opr YT2BU)</b>											
IK0ETA	"	576,380	1462	38	141	SP3CDR	"	6,916	65	19	33	Y09IAB	3.7	5,226	124	6	33	EA1CNO	"	6,030	69	12	33	YU7YZ	"	16,302	121	13	44						
IO3MAU	7	428,250	1420	36	114	SP5SAQ	"	5,063	57	16	45	Y02LCL	"	3,060	91	9	25	EC7DMQ	"	4,961	65	14	27	YT7A	7	198,882	954	28	99						
ISFCK	"	194,228	764	27	91	SP2ZAP	28	491,176	952	38	141	Y02LEL	"	2,548	81	9	23	EA4CPW	"	168	7	4	4	<b>(Opr YU7GO)</b>											
IBSNY	"	125,297	855	26	81	SP5DDJ	"	384,272	994	36	110	Y06AJI	1.8	5,772	159	4	33	EA3AAY	14	152,576	698	32	96	YU4VD	"	168,942	1054	28	83						
IK4HLV	"	85,540	669	23	68	SP6LTF	"	299,382	876	33	90	Y08BOI	"	288	22	3	13	EA7AL	"	92,225	383	31	88	YT2B	"	121,686	845	23	79						
IK8HJC	"	63,935	437	23	72	SP6CZ/6	"	199,629	614	33	90	<b>Scotland</b>						EA1BIM	"	82,915	361	30	85	<b>Sweden</b>											
IK3FHO	"	38,700	408	17	58	SP4EEZ	"	131,572	476	35	94	GM4VJV	A	848,922	1550	85	217	EA1DFH	"	57,456	312	31	81	SM2EKM	A	1,155,099	1551	95	224	<b>UNION OF SOVIET SOCIALIST REPUBLICS</b>					
IK5BAF	3.7	270,704	1238	27	85	SP8SIP	"	117,132	340	35	94	GM3BCL	"	813,100	1307	68	167	EA5EYP	"	31,266	216	33	59	SM5A0E	"	1,127,997	1464	86	225	<b>Byelorussia</b>					
I4AVG	"	110,424	835	18	68	SP1JRG	"	103,615	328	31	84	GM4WEW	"	317,958	707	54	143	EA3FXM	"	10,296	114	13	39	SM3BIZ	"	933,258	1198	88	239	UC2AAX	A	215,450	611	53	142
IV3PRK	1.8	22,445	325	11	56	SP6UJ	"	71,100	347	24	51	GM0DBW	"	156,558	601	48	146	<b>Sicily</b>						RC2AU	"	51,175	261	35	80						
<b>Jan Mayen</b>						SP9PT	"	58,616	167	35	99	GM4CUX	"	20,280	114	28	50	IT9GSF	A	2,333,224	2165	123	329	SM5PPS	"	29,546	172	28	51	UC2AAD	28	114,000	399	34	86
JX1UG	A	6,364	126	10	33	SP6DVP	"	53,108	288	27	44	GM8HJV	28	113,288	593	22	46	SM4AWF	"	22,774	141	26	33	UC2AIU	"	48,962	240	25	69						
<b>Luxembourg</b>						SP9LLF	"	48,459	207	25	62	GM4CHX	"	51,525	315	21	54	SK3AH	"	19,635	165	20	31	UC2WAZ	"	11,649	111	12	28						
LX1EA	28	412,930	1358	34	85	SP9AHB	"	44,635	139	36	77	GM3CFS	"	26,340	212	16	44	SM7FHJ	"	16,046	80	31	40	UC2W0	"	11,114	164	9	19						
LX2AA	14	2,828	64	7	21	SP8BJH	"	29,850	136	27	48	GM8AXY	21	15,957	77	27	54	SM0HBV	"	1,617	25	13	20	UC2OM	"	2,808	40	11	28						
<b>Monaco</b>						SP9ZD	"	29,315	164	27	38	<b>Spain</b>						SM7ABL	"	1,275	25	9	8	UC2AB	"	1,218	60	3	4						
3A8F	A	52,773	196	50	97	SP6FPH	"	27,510	130	28	42	EA3CUO	A	2,316,384	2471	102	281	SM8AJU	28	988,974	2131	38	129	SM5JWC	"	74,336	300	26	66	UC2OE	21	458,028	1401	35	112
<b>Netherlands</b>						SP3LPR	"	25,144	163	20	36	EA2QU	"	1,024,114	1186	90	241	SM6BJI	"	621,777	1478	39	110	UC200B	"	33,957	287	16	47						
PABAGA	A	1,578,582	2131	102	267	SP6HTO	"	21,376	115	24	40	EA2CM	"	693,546	1109	78	216	SM2KWO	"	350,520	1212	32	88	UC2WL	"	11,448	212	18	36						
PA2SWL	"	354,832	789	70	198	SP6HRK	"	19,320	86	23	66	ED1DX	"	625,787	1075	69	212	SM7KIL	"	238,830	909	29	66	RC2CC	14	49,560	270	25	59						
PA3CJP	"	247,380	561	59	158	SP8GEY	"	18,536	135	22	34	EA1AW	"	374,452	609	77	170	SM7WT	"	211,196	510	38	110	UC2WJ	"	425	15	10	15						
PA0COR	"	239,932	505	56	153	SP9IGY	"	16,054	145	15	31	EC3CPT	"	370,014	1183	50	116	SM7T7	14	28,900	264	17	51	UC2AFA	3.7	38,445	606	10	45						
PA0KDM	"	173,044	138	22	62	SP7NJX	"	15,714	103	23	31	EA1CON	"	258,984	609	54	144	SM8BVO	"	27,268	200	18	50	<b>Estonia</b>											
PA3EMN	"	170,368	476	52	124	SP2BIK	"	14,637	123	15	26	EA5FCO	"	215,715	502	55	164	SM5BDA	"	65,669	263	29	68	UR20D	A										

UA6YJA	**	16,400	179	28	64
UW4NH	**	12,312	58	31	45
UA4CM	**	11,508	76	23	36
UA3LDZ	**	10,648	123	28	63
RA3VR	**	3,948	34	19	23
UA30BX	**	1,160	18	12	17
UA3RNI	**	690	219	26	12
UA6LO	28	690,219	204	37	126
UA1AUU	**	70,143	258	27	76
UA3XAL	**	44,820	225	28	62
UA4PKN	**	35,035	233	20	57
UV3HD	**	33,834	277	18	40
UA3CMS	**	30,567	256	24	45
RW3ZA	**	28,512	219	22	44
UA3XBB	**	24,426	169	20	49
UA1CK	**	19,812	94	26	52
UV3QA	**	18,348	144	17	49
RV6AF	**	13,364	233	18	34
RA6ACY	**	5,888	67	14	32
UA3TAM	**	5,220	113	7	29
UA6XHT	**	3,219	111	6	23
UA4ACP	**	1,924	123	8	18
UV6AGF	**	779	21	8	11
RA6ASB	**	576	64	5	6
UA6YHF	**	540	45	2	2
UA4PK	21	627,843	1731	39	118
RA4QC	**	230,280	793	33	87
RA3QOC	**	103,750	585	28	78
UW3EQ	**	92,875	390	30	95
RA6LW	**	66,870	357	27	63
UA4CKK	**	63,700	333	29	62
RA3AOD	**	62,677	339	24	65
RA3DNC	**	58,098	437	17	52
RA1AW	**	51,459	358	19	51
UW6NU	**	28,728	222	22	52
U1BA	**	23,045	271	14	41
UA6YAV	**	21,798	186	19	44
RA3DJA	**	19,363	203	17	50
UA3EAT	**	11,438	116	14	29
RA3ZB	**	10,974	178	17	45
RA1AL	14	270,474	1041	33	89
UA4FZ	**	127,540	394	36	104
UA3TG	**	104,236	370	29	74
UW3TY	**	92,011	411	26	75
UV1AQ	**	78,213	445	26	67
UA3PP	**	67,745	510	22	63
UA3ST	**	31,152	134	24	64
UA1QBV	**	28,872	236	18	54
RA3QA	**	712	11	11	11
UA1AUU	7	1,428	41	7	21
UA3XAW	3.7	13,867	230	9	40
UA3EAX	1.8	4,110	109	7	23
UA4CCC	**	2,072	74	6	22
<b>Kaliningrad</b>					
RA2FB	A	70,533	261	45	108
<b>Latvia</b>					
UQ2GD	A	3,313,956	3031	121	350
UQ2GA	28	230,056	671	31	97
UQ2GIZ	**	96,615	400	26	69
UQ2GN	**	68,931	429	19	62
UQ2GCP	**	40,256	325	19	49
UQ2CR	21	14,749	172	14	35
UQ2PP	**	8,722	116	15	26
UQ2GCA	**	8,544	96	7	41
UQ2GIP	14	41,952	294	21	55
UQ2GLQ	**	945	18	11	16
UQ2GGE	3.7	14,750	267	9	41
UQ2GNL	**	9,495	186	9	36
<b>Lithuania</b>					
UP3BA	A	4,435,218	3882	119	335
UP2CY	**	1,889,735	2298	84	251
UP3BH	**	1,293,486	1540	94	292
UP2BR	**	761,400	845	89	287
UP2DM	**	590,548	1066	62	200
UP3BU	**	443,874	1204	46	128
UP3BO	**	266,954	583	70	184
UP3BP	**	253,305	504	69	126
UP2PAQ	**	155,550	523	45	138
UP2BIC	**	145,275	508	52	143
UP2BGG	**	44,408	273	26	65
UP2BKP	**	33,120	160	28	62
UP3BY	**	25,149	176	27	74
UP2BLF	**	23,000	181	21	47
UP2PBM	**	2,052	38	14	22
UP2OU	28	541,976	1347	36	112
UP1BWW	**	318,351	980	31	90
(Opr UP2BLJ)					
UP2BZ	**	60,075	286	28	61
UP2BON	**	10,850	73	29	78
UP2BIS	21	171,414	718	29	78
UP2ND	**	34,293	243	23	46
UP2PCK	**	5,084	97	10	21
UP2BN	14	49,200	387	21	54
UP2BHA	7	8,096	146	10	36
UP2SA	3.7	26,904	359	10	47
UP2BHM	**	7,828	101	7	31
RP2BKB	1.8	1,472	64	4	19
<b>Moldavia</b>					
UQ5ONQ	A	342,930	941	55	155
RO40A	21	281,917	934	38	113
RO40W	**	3,922	61	10	27
UQ5GR	3.7	8,517	145	10	41
UQ5OLW	**	5,580	141	6	30

<b>Ukraine</b>					
UB4MM	A	1,014,738	1543	91	227
UT4UX	**	981,120	1301	102	262
RB5IU	**	407,272	914	65	210
UT5RY	**	396,047	866	57	154
RB5IQ	**	274,480	522	71	164
RB5VT	**	271,582	579	69	182
UY5TE	**	261,072	758	57	105
RB5SA	**	237,896	720	59	168
UB5JJR	**	234,600	538	63	167
UB5III	**	218,925	519	73	152
UB4JDM	**	170,628	460	42	145
UB5MQF	**	166,740	513	52	139
UT4UM	**	153,698	611	36	98
UB5HEX	**	114,321	284	47	112
RB5AE	**	102,226	251	37	121
UB5CGN	**	94,248	292	58	110
UB5TCJ	**	69,237	235	47	100
UB5MLP	**	66,300	180	62	108
RB4MS	**	62,464	331	30	92
UB5WCV	**	59,150	329	31	99
RB5HT	**	37,260	98	55	83
UB5KN	**	30,250	101	43	67
UB5EPV	**	28,667	185	30	79
UB5FHU	**	25,254	140	43	26
RB5TK	**	19,412	116	23	40
UB5TDX	**	14,553	113	16	33
UT5HP	**	6,486	39	33	36
UB5WBJ	**	4,482	75	12	41
RB5MLL	**	2,736	49	11	36
UB5ZAB	28	292,820	1050	33	88
RT5UO	**	108,100	490	28	69
RB4IUM	**	60,390	265	26	69
UB5TEX	**	60,277	318	25	54
RB5CCO	**	47,974	260	25	58
UB5CJP	**	43,859	317	15	46
UB5QDQ	**	29,696	249	14	39
UB5CCP	**	22,000	91	41	69
UB5QW	**	6,708	70	13	30
UB5EAZ	21	226,984	789	37	99
RB5IA	**	163,748	604	35	99
RB5TU	**	126,222	601	30	79
UB5ILW	**	73,332	311	28	80
UB5VEF	**	56,794	399	19	54
UB5TN	**	24,219	179	20	49
RB5ICY	**	24,156	223	17	44
UB5EDM	**	4,823	37	21	32
UB5AJP	**	315	21	5	10
UY5ZM	14	314,531	1213	33	98
UT4UO	**	244,350	971	33	102
RB5LQ	**	181,026	693	36	100
UB5JZ	**	144,785	698	29	86
RB5EE	**	18,200	136	16	36
RB4IWM	7	39,360	279	22	58
RB5DX	3.7	76,964	1022	15	56
UB5IFN	**	40,256	394	15	59
RB5WA	**	25,440	373	9	51
RB4MAM	**	20,910	346	8	43
UB5IKB	**	16,016	230	10	46
UB5IUA	**	10,890	150	12	43
UB5ZHQ	1.8	6,644	154	7	37
RB5IGN	**	3,792	41	8	16
RB5EKI	**	1344	49	7	17
UB5EQG	**	350	28	3	11
RB5IOV	**	121	8	3	8
<b>OCEANIA</b>					
<b>American Samoa</b>					
KH8	A	165,528	560	57	75
<b>Australia</b>					
VK2AYK	A	406,326	611	92	149
VK2KL	**	398,846	676	79	138
AX3SM	**	203,312	385	66	128
VK2PU	**	25,134	143	25	34
VK3DNC	**	17,802	81	36	50
VK1RJ	28	238,290	1051	25	53
VK4NJQ	**	156,420	520	34	65
VK2PS	**	5,336	42	15	31
VK2XT	21	19,170	97	25	46
VK2APK	14	170,109	483	34	89
<b>Brunei</b>					
V85RM	A	21,624	279	33	35
V85NR	14	3,292	228	20	29
<b>Cocos-Keeling Island</b>					
VK9YG	A	3,671,258	2999	128	303
<b>Eastern Malaysia</b>					
9M6HF	A	267,358	840	49	64
<b>Fiji Islands</b>					
3D2VV	A	6,687,564	4901	152	337
(Opr OH2BAZ)					
<b>French Polynesia</b>					
F05IW	A	1,787,465	2144	107	182
<b>Guam</b>					
KG6DX	A	5,389,958	4232	137	300

<b>KD7P</b>						
/NH2	28	2,309,304	4885	38	123	
KH2D	1.8	0	1	1	1	
<b>Hawaii</b>						
<b>WR6R</b>						
/KH6	A	5,016,000	4112	144	274	
KH6GMP	**	5,200	45	23	29	
<b>K6SS</b>						
/KH6	28	1,578,698	3704	36	110	
KH6VP	**	134,688	490	29	63	
AH6IM	**	38,040	229	24	36	
KH6IMB	21	61,974	332	26	40	
KH6FKG	14	437,115	1316	34	81	
KH6CC	1.8	17,115	273	9	12	
<b>Indonesia</b>						
YB8ARA	A	3,018,032	2459	133	291	
YB3ASQ	**	2,533,476	2354	122	252	
YB5QZ	**	897,672	942	105	226	
YC8RFF	**	207,726	673	80	252	
YC5DDQ	**	66,054	216	29	80	
YC2BKJ	**	22,962	95	32	98	
YE2ZE	28	494,505	1275	34	66	
(Opr YB2CTW)						
YC8VFB	**	37,985	190	28	43	
YC2UKM	21	314,571	776	40	101	
YC8ROC	**	240,514	776	34	61	
YC8VCN	**	145,403	524	32	65	
YC1JNJ	**	40,275	192	29	72	
YC5PG	**	38,845	158	24	46	
YC8RWA	**	24,140	124	27	44	
YC5OH	**	14,975	113	15	38	
YC2JWB	**	13,671	80	25	43	
YC2UIJ	**	12,760	57	25	38	
<b>Mariana Islands</b>						
<b>KH8</b>						
/JH8USD	A	2,862,720	3351	94	194	
<b>KH8</b>						
/JR8NBB	28	158	52	1	1	
KH8	/JAGZ	21	6,060	102	8	12
<b>Marshall Islands</b>						
KX6DC	3.7	71,852	366	29	43	
(Opr NZ8B)						
<b>New Zealand</b>						
ZL1IM	A	92,070	340	47	52	
ZL3GQ	28	227,856	556	37	104	
ZL1AIZ	**	10,680	68	21	39	
<b>Papua New Guinea</b>						
P29HS	A	2,640	29	23	25	
<b>Philippines</b>						
K4YT/4I	A	3,706,000	2961	144	292	
4F1JZ	**	522,166	834	92	170	
DU1KWT	28	248,559	974	30	57	
DU3AAL	**	204,164	818	30	59	
KB6SHL	/DU7	21	15,631	186	13	16
<b>Tuvalu</b>						
T28RK	21	431,562	1487	33	69	
(Opr KB8JRK)						
<b>Vanuatu</b>						
YJ8RY	A	8,970,328	6			



Kevin, 9M2ZZ, arrived just in time for the CQ WW.



Steve, WB4OMM, shows the direction that contest logging is going. A computer and logging software and contesting paper chores become bearable.



PA2SWL always does well in the CQ WW.

K6MA	148,356	335	52	104
AJ6V	119,320	229	62	128
W6BIP	117,648	277	36	116
N6JV	106,096	255	46	106
WB2CHO/6	51,254	185	37	61
KA6ING	41,900	145	30	70
WA6HRK	26,410	112	42	53
K6SSS	703	13	8	11
K07N	4,079,140	2554	155	425
NK7U	2,474,640	1902	142	349
N7RO	1,585,512	1173	143	345
NX7K	1,359,396	1310	103	266
WT7D	1,321,433	1180	118	271
K7ZM	1,085,707	1263	100	201
KZ7T	569,220	549	106	252
WA7G	515,888	593	90	214
WG7F	422,852	692	96	148
N07F	370,293	652	82	147
WA7ECU	343,440	451	93	172
KC7V	337,221	493	94	173
K8CC	6,020,844	2898	167	549
WB8K	4,354,614	2523	153	441
N8CXX	3,756,452	2100	160	454
W8CAR	288,903	431	73	164
KS9K	4,739,848	3000	126	410
WB9IH/9	3,685,000	2138	153	472
KD9ST	1,624,928	1429	121	291
K9QXY	1,129,992	1001	111	283
W9JZ	1,000,960	920	112	279
W9AW	907,135	774	117	302
NX9T	579,384	675	90	222
W9YH	358,785	507	81	174
KD9MF	189,145	322	82	127
W9NAA	77,840	196	47	93
WD9FEN	72,960	249	37	77
WB0LEY/9	23,120	126	19	49
K4VX/B	6,227,259	2984	170	549
N0XA	3,512,300	2293	150	400
KR0U	3,228,720	2062	154	414
K0CS	1,948,914	1616	135	324
KZ0C	1,614,419	1236	130	337
WD0FPY	929,568	930	109	259
KD00Z	578,632	709	90	212
K0GAS	346,436	494	86	171
KE0A	34,218	190	31	71

St. Barthelemy Island			
FJ5AB	1,100,331	1890	173 76
St. Lucia			
J6LAH	4,692,058	4113	118 343
St. Maarten			
PJBJ	8,590,043	6210	137 402

AFRICA			
Canary Islands			
EA8AGD	17,172,672	8203	157 547
The Gambia			
C53FV	270,336	692	43 89
Tanzania			
5H3GW	459,146	781	71 131

ASIA			
Cyprus			
5B4ES	2,457,000	2641	79 243
W6KG/5B4	1,292,720	1550	67 219
Hong Kong			
VS600	4,142,385	4127	149 336
India			
VU2IIT	267,904	553	77 147
Israel			
4X3Q	2,882,982	2875	95 271
Japan			
JE2YRD	4,986,850	3133	151 399
JA3YBF	4,838,778	3392	147 352
JABYBY	3,317,780	2411	141 339
JA7YAA	3,168,726	2447	122 329
JABYAK	1,668,702	1463	122 280
JA3YDS	1,624,124	1631	115 231
JAGYBR	1,226,692	1493	101 191
JE3ZFS	1,198,314	1192	119 232
JA7YFJ	1,110,774	1228	104 214
JH1YHS	727,517	860	100 201
JAGYAI	551,552	702	94 184
JASAV	428,064	722	78 130
JA1ZEQ	325,784	567	83 128
JASVAP	299,744	468	77 155
JA3YQD	281,430	548	74 103
JAGYAV	239,199	434	86 127
JA2YEF	198,605	444	57 100

Mongolia			
JT1KAA	74,646	476	39 60
Peoples Republic of China			
BY1PK	2,413,672	3315	97 195
BY4SZ	1,287,900	1822	106 212
BY4AA	947,681	2115	94 165
Thailand			
HS8A	5,320,172	4028	141 383
Vietnam			
3W8DX	5,972,651	5539	135 344

U.S.S.R			
Asiatic Russia			
UZ9JWR	5,448,573	3687	139 376
UZ8CWA	4,775,814	3480	156 375
UZ9CWW	4,341,190	2688	143 416
UZ9CXE	1,625,130	1738	94 257
UZ8QWT	1,553,706	1602	116 297
UZ9JWJ	1,278,600	1527	78 222
UZ9CYP	1,099,176	1188	92 246
RZ9OWA	870,336	1101	95 233
UZ8WWP	720,194	1050	91 202
UA9UWM	706,153	1154	97 184
UZ9MWJ	298,450	869	68 167
UZ8SXF	242,027	573	50 123
UZ9XWH	226,080	490	47 133
UZ8OWA	187,299	419	74 115
UZ9CXX	120,285	297	54 108
UZ9FWQ	111,381	315	39 98
UZ9XWV	93,019	219	51 116
RA9CVC	84,724	352	31 87
UZ9YXI	6,938	50	25 44
Georgia			
UF7FWM	126,440	369	39 106

Kazakhstan			
RL1P	10,551,325	5612	175 544
UL8LYA	6,880,783	4184	145 436
UL8LWA	2,034,070	1879	111 279
UL8GWW	901,589	1178	113 198
UL8CWW	881,232	1250	78 186
UL8GWC	22,400	147	27 53

Tadzhikistan			
UZ90WM	2,009,700	2121	82 233

Turkmenistan			
UH9HWB	866,987	1163	76 193
UH9AW	54,000	192	32 76

Uzbekistan			
UI98WE	1,226,625	1275	106 269
UI98WF	308,763	527	63 140

EUROPE			
Andorra			
C30DSA	10,165,779	6312	151 512
C30DFQ	2,819,054	2958	140 287
Austria			
OE5XRL	1,274,548	1446	102 230
OE3GEA/3	321,745	852	59 170
Azores			
CU2ARA	3,870,162	3616	109 313
Balearic Islands			
EA6WH	4,818	55	20 40
Belgium			
ON6NL	4,465,240	3457	133 421
ON4AMI	2,739,628	3094	98 248
ON6AH	2,604,504	2663	114 312
ON5GO	2,268,224	2277	107 320
ON7UN	2,147,635	2819	91 210
ON6BR	524,210	849	79 231
ON6OR	254,716	708	44 110

Bulgaria			
LZ9A	10,490,675	5081	193 652
LZ5Z	4,337,316	3584	148 428
LZ1KXA	2,806,320	2486	118 410
LZ1A	2,764,309	2792	127 352
LZ1KVZ	1,589,035	2074	111 304
LZ1KAZ	13,356	124	25 59

Czechoslovakia			
OK7MM	9,507,142	5242	168 545
OK5W	7,960,596	4516	153 526
OK2RAB	1,389,052	1817	100 273
OK1ORA/p	697,392	1163	95 239
OK2KLI	487,542	1109	67 200
OK1KQJ	396,606	619	86 180
OK10FM	326,551	675	71 180
OK2KOD	308,250	654	65 160
OK2KHD	233,772	637	62 169
OK1KSZ	219,240	691	71 118
OK3KGX	123,820	531	40 113
OK2KYC	89,304	427	36 86
OK1KNR	54,484	306	34 72
OK2KVI	45,600	203	35 60
OK2KUB	40,290	187	39 119
OK3KSK	33,040	153	25 51
OK2OAY/p	14,278	136	14 24
OK3KYH	11,895	161	16 45
OK5MVT/p	10,360	120	19 55
OK2KDS	8,056	90	13 25
OK1KCF	6,384	58	20 37
OK2KMR	6,125	85	9 26
OK2KPS	5,085	75	13 32
OK1KQY	2,080	36	7 19
OK1OPT	1,616	15	8 14
OK2KFK	589	27	5 14

Denmark			
OZ3FYN	3,164	50	11 17

England			
G3NAS	4,406,754	3495	130 376
G875CO	3,553,440	3680	116 324
G4PKP	2,412,000	2616	108 292
G3CSR	12,599	120	17 26

Federal Republic of Germany			
DJ4AX	5,286,368	3514	148 436
DJ8RR	4,298,014	3208	128 395
DL3NCI	3,702,594	2552	138 459
DLBJK	3,333,399	3052	122 369
DK6WL	3,136,002	2492	131 407
DL8WU	2,860,925	2999	99 262
DF0RR	2,603,140	2470	120 340
DL0TD	2,436,980	2469	107 305
DL0WH	2,424,652	2314	108 350
DF0AT	2,321,520	2353	106 302
DL0UM	2,204,160	2292	100 310
DF0BV	2,142,112	1649	129 382
DJ10J	2,121,930	1766	125 397
DF2RG	1,984,335	1653	124 379
DK0IN	1,854,090	2249	105 273
DL0ER	852,110	1314	71 188
DK0RD	361,368	793	64 175
DF0XZ	87,508	187	54 113

Finland			
OH5NO	8,013,480	4954	158 487
OH7AB	6,437,927	3811	162 491
OH8TA	919,336	1518	78 170

France			
F68EE	7,442,730	4602	149 466
F6IFR	3,410,637	3052	117 336
FF6KPO	798,694	1529	66 155
FF2LY	463,256	707	87 229

T07TSE	436,320	1698	30 78
F6ENV	28,500	147	32 44

German Democratic Republic			
Y43K	9,959,275	6141	157 498
Y22YD	2,944,920	3080	108 332
Y49CF	189,873	503	58 161
Y72CM	22,140	144	33 57

Hungary			
HG5A	10,691,254	6235	164 543
HG6N	8,802,574	5299	154 528
HG9R	8,167,094	5391	156 506
HG1S	7,835,450	6157	141 469
HG8Q	5,240,544	4022	148 484
HA5KCC	4,167,112	3539	122 364
HA4KYN	1,375,144	1939	93 239
HA8KCK	1,373,814	1792	96 255
HA3KGC	1,118,096	1829	78 190
HAGKVB	782,536	1534	64 168
HA1KZU	460,136	949	63 163
HAGKNX	413,709	869	64 175
HA2KMR	388,920	889	57 153
HG0D	100,147	322	43 94
HA7KNT	4,900	69	11 17

Italy			
IR4LCK	13,157,568	6182	184 678
I2EOW	4,936,530	3501	144 446
IV3JWR	2,027,340	1887	109 311
IK8ERL	1,629,054	1694	117 324

Liechtenstein			
HB0/DF1JC	3,563,200	2931	119 425

Luxembourg			
LX9BV	5,931,600	4608	143 457

Netherlands			
PA0KHS	2,316,861	2859	101 280
PI4VNW	1,652,826	2348	88 234

Norway			
LA2AB	4,374,510	3701	133 385
LA1H	1,872,276	1967	115 319

Poland			
SP5KVV	2,283,477	2342	105 30



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- IC-48A 25w 440-450 FM, TTP mic.... 509.00 449<sup>95</sup>
- HM-14 Extra TTP microphone..... 59.00
- UT-28 Digital code squelch..... 39.50
- UT-29 Tone squelch decoder..... 46.00
- HM-16 Speaker/microphone..... 34.00

- IC-228A 25w 2m FM/TTP mic (Special) 509.00 429<sup>95</sup>
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# CQ REVIEWS:

## The MFJ-986 Differential-T Tuner and MFJ-264 HF/UHF Dry Dummy Load

BY JOHN J. SCHULTZ\*, W4FA/SV0DX

**T**he new MFJ-986 tuner with its differential tuning capacitor feature presents a refreshingly innovative idea that simplifies and lowers the cost of the classic T-network tuner design. Following is a bit of background on the T-network tuner.

### The Basic T-Network

The basic T-network tuner using two variable capacitor arms is shown in fig. 1. It's the same fig. 1, by the way, that was used in my first article for CQ on the subject of such tuners ("Using a T Network," CQ, May 1968). By proper dimensioning of the capacitive and inductive arms of the T-network, any complex impedance at the output terminal theoretically could be matched. After my article appeared, W8NWU corresponded with me about a series of T-networks he used and named "Teeter Totter Tuners." I eventually wrote an article about them ("The W8NWU Teeter Totter Tuners," CQ, February 1969). Referring to fig. 1, here is a quote from the latter article:

"When the output impedance is greater than the input impedance, the value of the capacitor in the output leg will decrease to match the higher impedance at the output while the value of the capacitor in the input leg must increase in order to keep the combination of the two capacitors and the coil in resonance. When the output impedance is lower than the input impedance, the opposite setting of the relative capacitor values is necessary. This seesaw action of the capacitor values resulted in the Teeter Totter name."

Of course, at the time neither W8NWU nor myself caught on to the idea that the two separate variable capacitors shown in fig. 1 could be replaced by a single differential capacitor, although the action of a differential capacitor was described in the above quote! A differential capacitor has two stator sections and one rotor section. The stator sections are arranged



The front panel controls are grouped very logically for ease of operation. A turns counter permits quick resetability of the variable inductor.

so that as the rotor is moved, the capacitance of one section decreases and the capacitance of the other section increases. Moving the rotor in the opposite direction produces the opposite effect. Specially built variable capacitors of this type have been around for many years, or you can achieve the same effect by coupling and rotating two separate variable capacitors in tandem with one of the capacitors turned the "wrong" way around.

### The MFJ-986 Tuner

This tuner has so many interesting features for its price class that it is a bit difficult to know where to start in describing it. Overall, it is a tuner that covers all bands from 1.8 through 30 MHz and will handle 1.5 KW of transmitter output power into any reasonable SWR. It includes internal SWR/power metering, antenna selection switching, and a built-in balun for a balanced line output. It is housed in a two-piece aluminum enclosure that measures about 4½" x 10¾" x 15" deep. Therefore, it should be able to fit into almost any operating position as long as the depth can be accommodated.

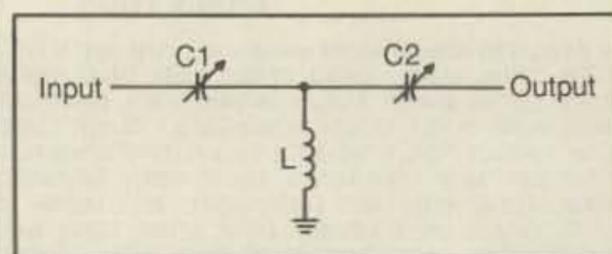


Fig. 1—Basic T-network tuner. This diagram appeared with W4FA's first article on T-network tuners in the May 1968 issue of CQ.

Fig. 2 is an outline diagram of the functional sections of the tuner. The input signal is routed past a directional coupler, on to the variable T-network, and then on to the antenna selector switching for either coaxial-line or balanced-line outputs. The simplified diagram unfortunately doesn't illustrate all of the versatile features built into the tuner, but I'll try to cover some of them.

The antenna switching, for instance, not only provides for the selection of two coaxial-line outputs, a dummy-load output, and an independent balanced-line

\*c/o CQ magazine

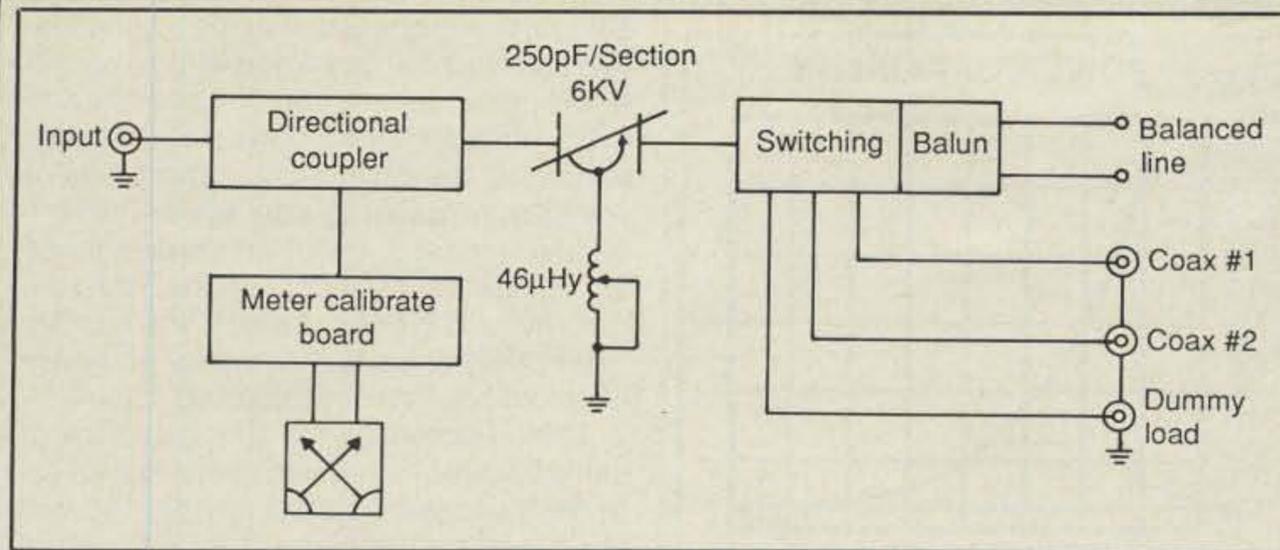


Fig. 2— Functional diagram of the MFJ-986 tuner. Various details and refinements are not shown, as explained in the text.



The rear of the tuner contains the various in/out coaxial line connectors and two hefty feedthrough insulators for connection of a balanced line.

output, but either of the coaxial-line outputs can be switched so as to bypass the T-network (the SWR/power metering remains active). Various compensating capacitors are used so as to cancel various stray capacitance and inductive effects, so the roller inductor and differential capacitor act almost like ideal components to maximize the matching range of the network.

The directional coupler circuitry is unique in that it uses two toroid sampling transformers arranged so stray effects cancel out and a flat frequency response is obtained without the use of the usual trim-type compensating capacitors. The metering circuitry provides for two power ranges (0–200 watts or 0–2000 watts) for forward power and can be switched to read either average or peak power. The meter itself is of the cross-needle type, so the SWR value is constantly displayed along with the output power reading and reflected power reading.

### A Look Outside and Inside

The front-panel arrangement of the tuner is very functional. The various controls can be seen quite readily in the front-panel photograph. The turns counter for the variable inductor is at the upper right side of the panel and displays the relative number of turns active on the roller inductor for logging or preset purposes.

Another photograph shows the rear panel of the unit. Of course, the usual input/output connectors are obvious, but what is really worthy of note is the quality of the connectors and their mounting. The SO-239 coaxial connectors are held in place by screw hardware (not pop rivets), and the balanced-line output utilizes true high-voltage, ceramic-type feedthrough insulators.

Still, the most interesting photograph is that of the interior of the tuner. The view is dominated, of course, by the huge roller inductor (almost 9½ inches long) and the differential capacitor. To the rear of the capacitor you can see the large balun

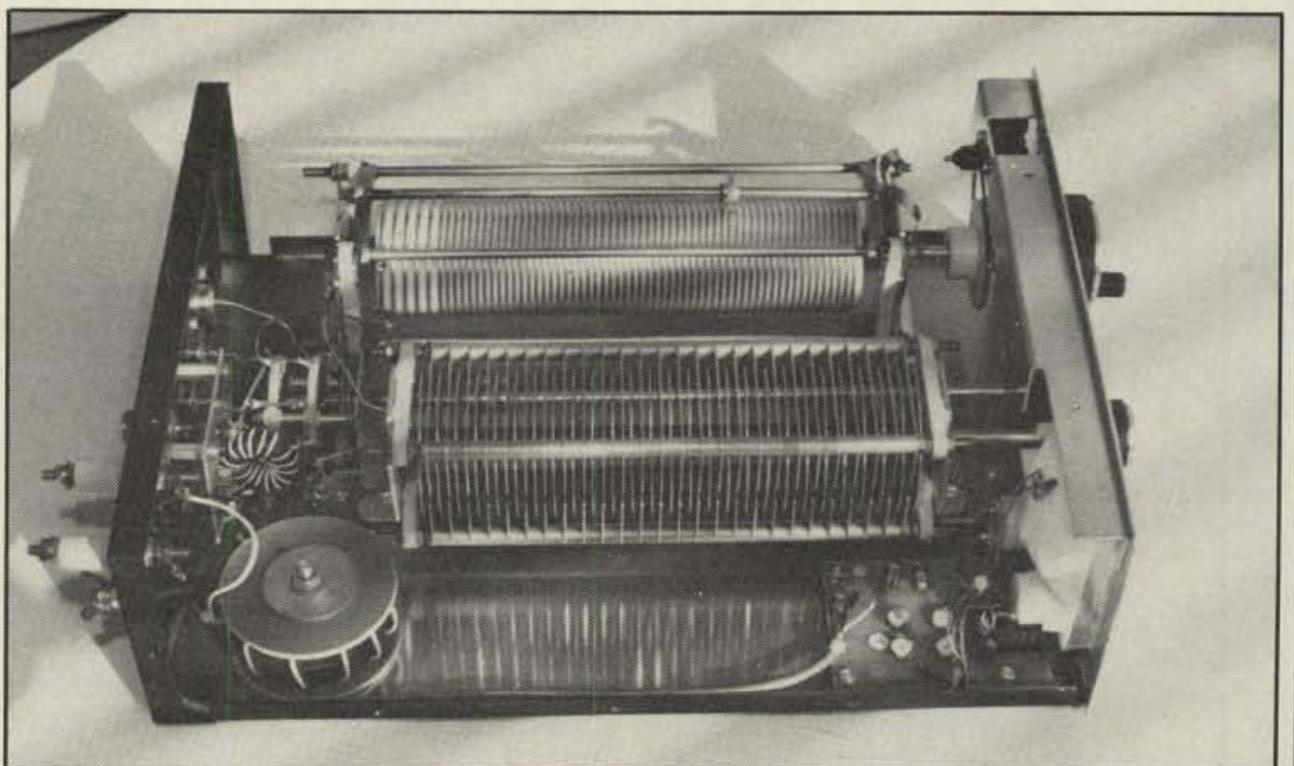
which consists of two hefty, stacked 2¾ inch diameter ferrite cores. The directional coupler and the two-section, ceramic antenna selector switch are between the balun and the rear of the roller inductor. A PC board for the meter circuitry is located toward the front of the variable capacitor just below the back of the meter. The metering circuitry does not require any external power, but an external 12 volt source is needed if you wish to have the meter illuminated. The unit is very neatly wired with very good quality materials (e.g., silver-plated wire for all RF paths).

### Test and Operation

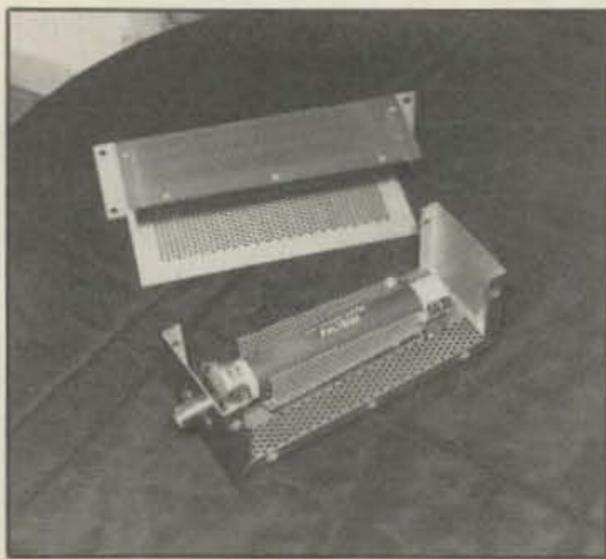
I tried the tuner using 1.5 KW output from a Ten-Tec Titan linear into various moderate SWR loads and at the 300 watt output level into any SWR load I could simulate. I defined a moderate SWR as being 1:5 or less. I can't really see any

sense in trying to force 1.5 KW of RF into extreme SWR loads because of the voltage strain it puts on components all along the line. Under such circumstances the load SWR should be corrected first. On the other hand, I can see where you might want to use a KW level tuner to couple a few hundred watts of power into a temporary, random-length antenna which might present extremely wide load impedance variations on various bands.

Under actual test conditions the tuner handled any SWR situation, as just described, with ease. The only time an arc-over took place was when I tried to force a few hundred watts of RF on 160 meters into the equivalent of a 10 meter dipole. Having only two instead of three tuning controls greatly simplifies operation of the tuner. The automatic vernier action of the roller inductor is excellent, and setting of the variable capacitor was always acceptable even with sharply resonant loads. There is a definite back and forth

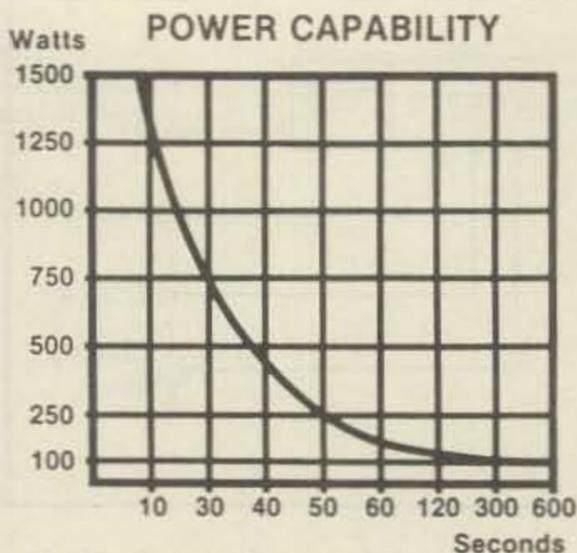


Looking inside the MFJ-986 tuner, the generous dimensioning and the quality of the components can be seen. Note that the variable capacitor has both an upper and a lower stator section.



The extremely wide frequency range of the MFJ-264 dummy load is largely due to a specially formed and tapered internal shield around the dummy-load resistor.

interaction between the two controls. It is quite possible to get the SWR of an unknown load down to 1:1.5, for instance, by an initial adjustment of the roller inductor, adjustment of the capacitor, and then readjustment of the inductor. However, to get the SWR down to an absolute 1:1 might require going through the procedure three to four more times. If you are dealing with a known load and if you log the setting of the roller inductor, only a quick one-time adjustment of the tuner is necessary. The manual that comes with



Impedance: 50 ohms.  
 VSWR: Less than 1.3:1 at less than 650 MHz.  
 Power Dissipation: 1500 watts for less than 10 seconds, 100 watts for 10 minutes.  
 Voltage Gradient: 10 KV/inch  
 Operating Temperature: Up to 350°C.  
 Frequency Range: 1-650 MHz; usable to 750 MHz.

Do not exceed the power load values given, as resistor can be permanently damaged.

Table 1- Specifications of the MFJ-264 dummy load.

the tuner provides very adequate practical information on how to adjust the unit.

In the course of testing the tuner I did check the metering circuitry against commercial-quality power/SWR units. I was quite impressed with the accuracy of the metering in the MFJ-986. The SWR readings of the MFJ-986 below the 1:2 SWR range were always within a 0.1 range of the comparison readings I had available (e.g., the tuner's meter might read 1:1.5 while a comparison meter might read 1:1.6). On the power-scale readings I could find no more than a  $\pm 5$  watt difference between the tuner's reading using its 200 watt range and my comparison meters. Using the 2000 watt range on the tuner's meter, I found that it would track my comparison readings exactly at 250 and 500 watts output, be 100 watts low (e.g., 700 watts) at 800 watts output, and then be 50 watts low, or less, from the 1.0 to 1.5 KW output level. Overall, the metering in the MFJ-986 is excellent both with regard to accuracy and the readability of the meter.

### The MFJ-264 Dummy Load

The MFJ-264 dummy load makes a perfect companion to the MFJ-986 tuner, although of course it can be used alone. It is also the perfect type of dummy load for someone who wants just one compact, general-purpose dummy load that will handle any power level on any band up to and including the UHF range. Let me temper that utopian-sounding description a bit, however, by stating that although the

description is correct, there is a qualification involved. Except when using relatively low power levels, you do have to carefully observe the power/time curve printed on the case of the dummy load or you can permanently damage it. The limitations imposed are of no consequence for most station applications, but the dummy load is not suitable if you happen to be designing a KW amplifier and want to spend hours testing its output level.

Table 1 presents the specifications of the MFJ-264. As you can see, it has an extremely broad frequency range, 1 to 650 MHz, and can handle up to 1500 watts within of course the time constraint imposed by the power capability graph as shown. Besides having to observe the time limit shown by the graph, you also have to allow for a cool-down period which is normally 10 to 20 times the load usage period. Again, I would emphasize that the time constraint is of no real consequence for most station operations.

The MFJ-264 is extremely well constructed. As you can see from the photograph, the unit is housed in a two-piece anodized aluminum enclosure. Regular screw-type hardware is used everywhere rather than inexpensive pop-rivet construction.

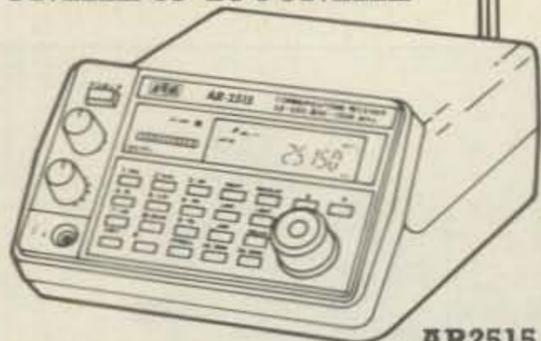
The heart of the unit is a 6 inch long carbon-deposit resistor. These resistors are extremely rugged. They can get hot enough to glow red and still survive after cooling down, although you are hardly supposed to use them in such a manner. If the resistor can be designated the heart of the unit, the internal shield immediately around the resistor must be labeled as the "secret" of the unit. Some designer must have spent quite a few hours shaping the size and taper of the shield such that all of the capacitive and inductive effects would balance out and allow the dummy load to be used well into the UHF range. Interestingly enough, there are no discrete component compensating capacitors or inductors used as is the case with some dummy-load designs. The resistor is held in place by a clip at one end and a worm clamp at the other end, so if one should burn it out, it can easily be replaced.

I checked the MFJ-264 at the 1 KW level up to 30 MHz and at the 100 watt level up to 460 MHz. It was completely within specifications. Putting a KW into it for 30 seconds at 30 MHz produced only a light warming sensation as I touched the enclosure. I was and remain very impressed with the quality and performance of the unit. Used properly it is a useful station accessory that will last the lifetime of a station.

The MFJ-986 tuner has a amateur net price of \$269.95, and the MFJ-264 dry dummy load is priced at \$109.95. Both are manufactured by MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762.

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**Here are some tips for tuning up the most used (and neglected) pieces of equipment in your station.**

# Be Kind To Your Voice

## A Phone Contest Primer

BY BRIAN BATTLES\*, WA1YUA

**W**hen phone contest time rolls around, many amateurs complain about the toll it takes on their voices. If you're going to do a lot of this kind of operating, you'll be using your voice for a very demanding application that requires special care and preparation.

In my career as a radio commercial producer, voice-over talent, full-time professional radio announcer, and amateur radio operator, and in my collaboration with seminar trainers, I've picked up some useful folk wisdom plus information from leading speech pathologists. Here I've combined scientific and medical facts with everyday practical ideas to offer the following tips and procedures on the care and maintenance of the human voice apparatus.

Fig. 1 is a simplified sketch of the anatomy of the human throat, including the larynx, or "voice box," the trachea, or "windpipe," and the esophagus.

The larynx contains two small flaps of thin membrane called the vocal folds or vocal cords. Normally these folds rest along the sides of the larynx (fig. 2). When speaking, they are stretched across the airway, and air passing between them causes them to buzz at a particular audio frequency (fig. 3). The resulting sound is conducted throughout the throat, chest cavity, and sinuses, modified by the placement and movement of the lips, tongue, and associated muscles, and then sent out through the air. The sound waves emitted are what others hear as your voice.

Since the vocal cords are so small (only an inch or so in length), they are somewhat delicate and easily affected by abuse. Prolonged periods of talking, shouting, and singing can irritate the vocal cords, and they may become sore, inflamed, and strained. Following are some proven techniques for reducing unnecessary stress on this sensitive part of your body.

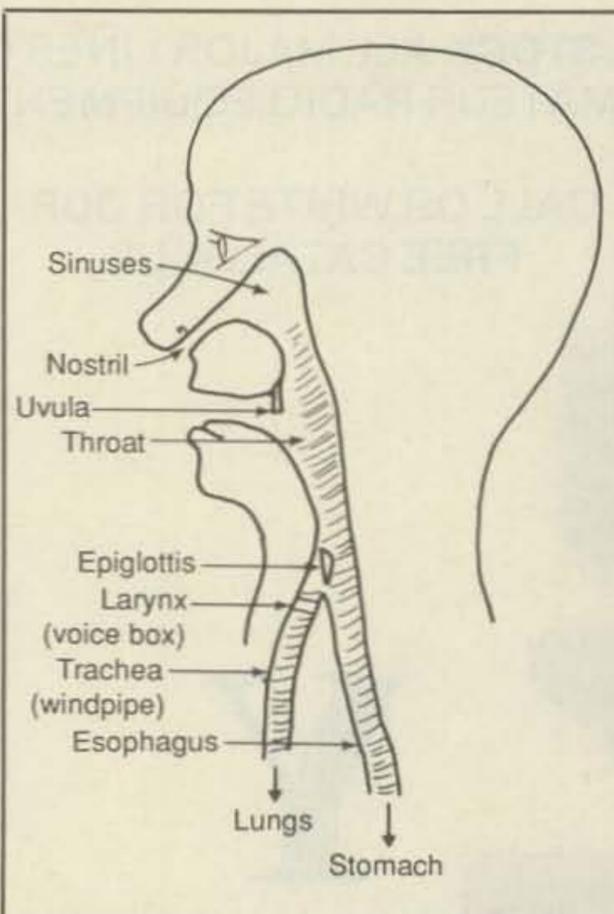


Fig. 1—The basic anatomy of the human throat.

**Drink water.** This is not to moisten your larynx, as liquids don't coat your vocal cords. Referring to fig. 1, you can see that the epiglottis acts as a natural valve between the main throat area and the trachea. The epiglottis is open only during respiration. It closes each time you swallow. Otherwise, food and liquids could enter the trachea, pass between the vocal cords, and get into the lungs, causing severe distress. Even the slightest amount of foreign matter that gets past the epiglottis causes choking, coughing, and gagging. Remember the last time you "swallowed down the wrong pipe"?

Consequently, nothing you drink is able to "coat" your larynx; rather, liquids indirectly provide moisture via the internal blood supply to the vocal organs. This is very important. One of the biggest causes of problems with your voice is dehydration—that is, loss of water. Drink-

ing plenty of water hydrates the tissues that make up the larynx.

Don't just gulp a pint of water once an hour; sip regularly at every free moment to maintain a consistent, adequate flow through your bloodstream. The only drawback is that you'll require a few more trips to the bathroom as the day wears on. Hot tea, honey, throat sprays, cough drops, and the like may help soothe soreness in the upper throat and the mouth, but remember that they do not directly bathe the larynx itself.

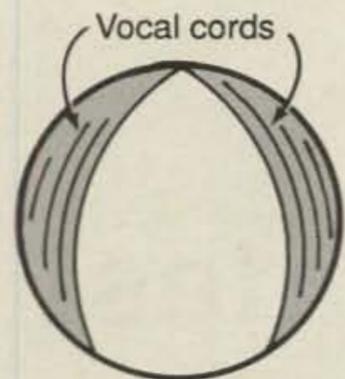
**Don't smoke, drink alcohol or caffeine, or take antihistamines.** These substances act as vasoconstrictors, which means they stimulate the blood vessels to close off some of the blood supply. This actually creates a drying effect in the mucous membranes.

**Clear your throat carefully.** An explosive cough makes the vocal cords slam together abruptly and can raise havoc with their delicate structure. If you must clear your throat, hum first, then gradually allow the humming to build smoothly to a rumble (say "mmmmmmMMMMHHMMMM" rather than an abrupt "AHEM!") This gently tightens the vocal cords and avoids the shock of the cords suddenly becoming taut and slapping shut against each other. Make this a habit!

**Relax.** Slacken your throat, shoulders, chest, neck, and jaw muscles as much as possible. If you tense up, you put more pressure on the organs that produce and modulate your voice. Speaking with a tightened chest, for example, decreases the effectiveness of the naturally resonant chest cavity, causing a greater percentage of sound to be projected via your sinuses. This gives your voice a thin, tinny, and strained timbre, and limits the richness of sound. Posture contributes to this as well. Sit upright to avoid compressing your diaphragm and thorax.

**Speak softly and low.** Go down to a slightly lower, quieter register and let the gain of your electronic equipment pick up the slack. Dropping your pitch to a comfortable zone, say about a half-octave lower than usual, lets your vocal cords work in a

\*105 West Rd., Colchester, CT 06415



VOCAL CORDS AT REST  
LARYNX (TOP VIEW)

Fig. 2- The larynx showing the vocal cords at rest.

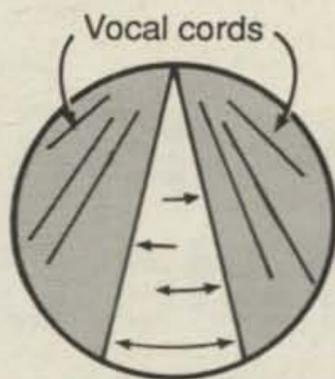
more relaxed state. Keeping your voice volume down a bit saves your energy and allows you to breathe in a more natural cadence. If the microphone isn't picking you up as well, move a bit closer.

**Exercise your voice.** As with any system, your voice needs proper and regular exercise. Build your comfortable range by singing in the shower, the car, whenever you can. Try to hit a few high notes, but don't strain for those extremes. Get as low as you can, too. (Can you imitate Lurch, the butler from the old *Addams Family* TV series?) A hint: When diving for those low notes, don't go for volume; just a mild rumble will get you used to letting those vocal cords flap loosely.

Never overdo voice exercises. Unless you're working with a professional voice trainer, just try this stuff for a couple of minutes a day to maintain flexibility, not to artificially extend your range a few octaves. If you want to sing *Rigoletto*, get a personal coach.

**Pace yourself.** Get into a comfortable rhythm with an even rate of speech, rest, speech, rest, etc. Don't go on nonstop for 20 minutes and then take a 10-minute break. If possible, go 1 minute on, 15 seconds off, 1 minute on, 15 seconds off, etc. This gives your body a chance to cycle through the working/resting periods more completely. A sporadic approach is tiring and puts greater demands on your muscles. If contesting tends to disrupt your sleep schedule, plan a series of brief sleep periods instead of pushing yourself for an extra two hours until the band closes, then crashing for ten hours. Many short rests are better preventive maintenance than fewer long rests. Short sleep periods also keep you oriented on what you're doing and allow you to check the bands more frequently.

**Breathe deeply.** Short, shallow, tight breaths limit your ability to take in necessary oxygen and to exhaust excess carbon dioxide. Let your respiration operate at equilibrium. Too little oxygen causes sluggishness, fatigue, and loss of efficiency. Too little carbon dioxide creates an imbalance as well, disrupting the



VOCAL CORDS  
SPEAKING  
LARYNX (TOP VIEW)

Fig. 3- A top view of the larynx depicting the vocal cords during speech.

body's pH balance and producing dizziness, anxiety, and muscle tension. This is commonly taught in meditation, progressive relaxation, and stress reduction therapy. Why do you think hypnotists always have their subjects breathe deeply? Your respiratory system knows what works best. Let it regulate itself naturally, and you'll find that it consistently adjusts for peak performance.

**Develop calm nerves.** Microphones don't bite. If you get cold feet whenever you initiate a QSO, imagine cracking open the microphone on a radio station pumping out 50,000 watts in the commercial FM band! When I spoke, literally tens of thousands of my neighbors heard every syllable in full, clear high-fidelity sound. And I had a boss listening even more attentively. Compared to that, a simple two-way radio message on amateur radio is nothing to get all jittery about. It's always a thrill to make contact, but why be nervous? The other guy wants to talk to you, too. Would you be so jumpy on the telephone? And has any amateur ever really had members of the listening audience call in to heckle him or her?

**Concentrate.** Pay attention to content, not technique. You should practice control of your breathing and speaking organs sufficiently to make a habit of feeling relaxed and refreshed, but when actually recording you should focus on the material you are to deliver, be it an advertising script, a set of lyrics, or complex instructions. Do your breathing and speaking exercises outside the studio, so your unconscious mind can take care of that stuff, leaving your conscious side free to work on the task at hand.

**Plan your QSOs.** No doubt you've heard phone operators "umm-ing" and "ah-ing" through an interminably long transmission, filling gaps with "Very good," "OK," and "Yep, yep, yep (sigh). . ." when they have a momentary lapse in their train of thought. So why not just throw it back? Listen to the best A-1 operators; they're not afraid to transmit a quick one- or two-word reply or question. It keeps the rhythm of the contact lively

and natural. Rambling on and on is boring, wastes time, monopolizes the frequency, wears out your voice, and puts other operators to sleep. Keep a note pad handy and scribble a few "cue cards" so you'll have something to say when it's your turn, and stay on your toes. (Would you get away with all that hemming and hawing in a telephone conversation?)

Above all, remember that amateur radio is supposed to be a pleasant, relaxing hobby, not a bizarre form of self-torture. Challenging yourself offers rewards, but pressuring yourself beyond healthy limits will not increase your enjoyment. Daily operation should be managed in a way that leaves you feeling invigorated, not burned out, and contesting or chasing DX can be much more effective if you take care. Amateurs are more impressed by a truly crisp and brief, yet productive conversation with an amateur in 9J-land than they are by a whole logbook full of muddled contacts that may or may not have even afforded a correct exchange of callsigns.

An initial 12-hour marathon of QSOs can send you reeling and even force you out of action during the last few hours, while a smoothly-paced, controlled 48 hours of intelligent operating can yield more quality contacts and a higher percentage of "hits" rather than "misses." If you sound good, you and I will both enjoy amateur radio much more. 

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Phone: October 28-29 & C.W.: November 25-26  
Starts 0000 GMT Saturday Ends 2400 GMT Sunday

**I. OBJECTIVE:** For amateurs around the world to contact other amateurs in as many zones and countries as possible.

**II. BANDS:** All bands, 1.8 through 28 MHz, except for WARC bands.

**III. TYPE OF COMPETITION:**

1. Single Operator (single band and all band).

a. Single Operator. Single operator stations are those at which one person performs all of the operating, logging, and spotting functions. The use of DX spotting nets or any other form of DX alerting assistance places the station in the Multi-Operator category.

b. **New Category: Single Operator Unlimited.** Single operator stations are those at which one person performs all of the operating and logging functions. The use of DX spotting nets or any other form of DX alerting assistance is allowed. The operator can change bands at any time.

2. Multi-Operator (all band operation only).

a. Single Transmitter, only one transmitter and one band permitted during the same time period (defined as 10 minutes). *Exception: One—and only one—other band may be used during the same time period if—and only if—the station worked is a new multiplier. Logs found in violation of the ten-minute rule will be automatically reclassified as multi-multi to reflect their actual status.*

b. Multi-Transmitter (no limit to transmitters but only one signal per band permitted).

c. All transmitters must be located within a 500 meter diameter or within the property limits of the station licensee's address, whichever is greater. The antennas must be physically connected by wires to the transmitter.

3. QRPp (single operator only). Power must not exceed 5 watts output. Stations in this category will be competing only with other QRPp stations for awards.

4. Team Contesting. A team consists of any five radio amateurs operating in the single operator category. A person can be on only one team per mode. A team **must operate** from two continents. Competing on a team will not prevent any team member from submitting his personal score for a radio club. A team score will be the sum of all the team member scores. S.S.B. and C.W. teams are totally separate. That is, a member of an S.S.B. team can be on a totally different C.W. team. A list of a team's members must be received by October 15 for S.S.B. and November 15 for C.W. Send the list to CQ, Att: Team Contest, 76 North Broadway, Hicksville, NY 11801 U.S.A. Awards will be given to the top teams on each mode. A list of a team's members' scores plus the total team score must be submitted to CQ by the normal contest log deadlines.

**IV. NUMBER EXCHANGE:** Phone: RS report plus zone (i.e., 5705). C.W.: RST report plus zone (i.e., 57905).

*A station in a zone or country different than that indicated by its call sign is required to sign portable.*

**V. MULTIPLIER:** Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The CQ Zone Map, DXCC country list, WAE country list, and WAC boundaries are standards.

**VI. POINTS:** 1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only*, contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

**VII. SCORING:** All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multiplier.

*Example:* 1000 QSO points  $\times$  100 multiplier (30 Zones + 70 Countries) = 100,000 (final score).

**VIII. AWARDS:** First place certificates will be awarded in each category listed under Sec. III in every participating country and in each call area of the United States, Canada, European Russia, Asiatic USSR, Czechoslovakia, and Japan.

All scores will be published. To be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award *only*. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

All certificates and plaques will be issued to the licensee of the station used.

**IX. TROPHIES & PLAQUES (Donors)**

**PHONE**

**Single Operator, All Band**

World—Dave Rosen, K2GM—WA2RAU Memorial  
World—Single Operator Unlimited—Pavillion Software  
World—QRPp—Milliwatt Books W0RSP  
U.S.A.—Potomac Valley Radio Club  
Carib./C.A.—Alex M. Kasevich, VP2MM  
Europe—Potomac Valley R.C.—W4BVV Memorial  
Africa—Gordon Marshall, W6RR  
Asia—Japan CQ Magazine  
Japan—Japan Crazy Contesters Club  
Oceania—Northern California DX Club  
South America—CQ Magazine

**Single Operator, Single Band**

World—28 MHz—Joel Chalmers, KG6DX  
World—21 MHz—Peter R. D. Munroe, WB1DQC  
World—14 MHz—North Jersey DX Assn.—K2HLB Memorial  
World—7 MHz—Fred Laun, K3ZO—K7ZZ Memorial  
World—3.8 MHz—Fred Capossela, K6SSS  
U.S.A.—28 MHz—Donald Thomas, N6DT  
U.S.A.—21 MHz—CQ Magazine  
U.S.A.—14 MHz—Southern California DX Club

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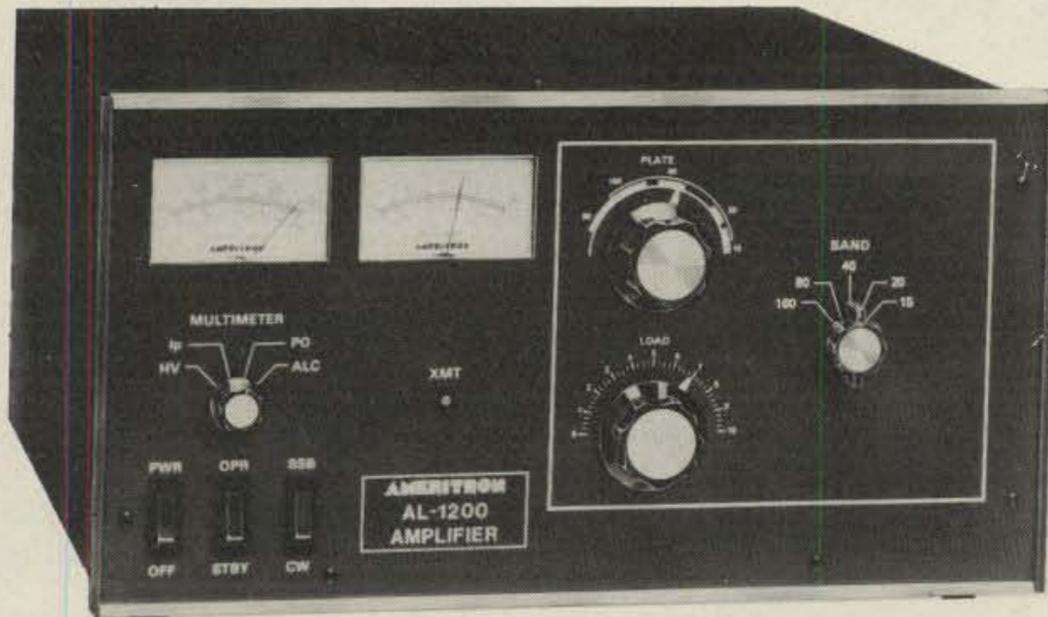
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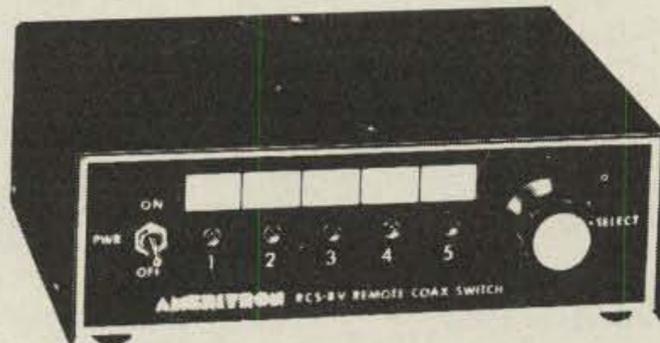
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Carib./C.A.—Pedro Piza, Jr., NP4A—KP4ES Memorial  
Europe—28 MHz Zone 14—A. G. Anderson, GM3BCL  
Japan—28 MHz—Take Yokoyama, JL1BLW  
Japan—21 MHz—DX Family Foundation

#### Multi-Operator, Single Transmitter

World—So. Calif. DX Club—W6AM Memorial  
U.S.A.—Carolina DX Association  
Europe—Bob Cox, K3EST/6  
Canada—Calgary Amateur Radio Assn.

#### Multi-Operator, Multi-Transmitter

World—CQ Magazine  
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Europe—Finnish Amateur Radio League  
Japan—Nippon Television Network Corp.

#### Contest Expeditions

World—Single Opr.—Stuart Meyer, W2GHK  
World—Multi-Opr.—The German CDXG & SDXG  
(DJ3NG & DJ4EI Memorial)

### CW

#### Single Operator, All Band

World—Albert Kahn, K4FW—W2AB Memorial  
World—Single Operator Unlimited—Pavillion Software  
World—QRPP—Gene Walsh, N2AA  
U.S.A.—Frankford Radio Club  
Canada—Canadian DX Association  
Carib./C.A.—Peter Munroe, WB1DQC  
Europe—Edward Bissell, W3AU  
Africa—Gordon Marshall, W6RR  
Asia—Japan CQ Magazine  
Japan—Japan Crazy Contesters Club  
Oceania—Maui Amateur Radio Club  
So. Amer.—CQ Magazine

#### Single Operator, Single Band

World—28 MHz—Joel Chalmers, KG6DX  
World—21 MHz—CQ Magazine  
World—14 MHz—North Jersey DX Assn.—W2JT Memorial  
World—7 MHz—Alex M. Kasevich, VP2MM  
World—3.5 MHz—Fred Capossela, K6SSS  
U.S.A.—14 MHz—Northern Illinois DX Association  
U.S.A.—7 MHz—Jan Perkins, N6AW  
Canada—Canadian Amateur Radio Federation  
Carib./C.A.—DX Club of Puerto Rico  
Europe—Southern New England DX Club  
Japan—21 MHz—DX Family Foundation

#### Multi-Operator, Single Transmitter

World—Anthony Susen, W3AOH  
U.S.A.—Douglas Zwiebel, KR2Q  
Canada—Eastern Canadian DX Assn.  
Europe—Friends of K3AO—K3AO Memorial

#### Multi-Operator, Multi-Transmitter

World—Hazard Reeves, K2GL Memorial  
World—SSB/CW Combined—Ehrhorn Technological  
Operations  
U.S.A.—James Rafferty, N6RJ  
Europe—Finnish Amateur Radio League  
Japan—Nippon Television Network Corp.

#### Contest Expeditions

World—Single-Opr.—Yankee Clipper Contest Club  
World—Multi-Opr.—Bill Schneider, K2TT

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#### Club

World—SSB/CW—CQ Magazine  
Non-USA—SSB/CW—No. Calif. Contest Club—N6AUV  
Memorial

A station winning a World Trophy will not be considered for a sub-area award. That Trophy will be awarded to the runner-up of that area.

#### X. CLUB COMPETITION:

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within a local geographic area defined as within a 275 km radius from center of club area (except for DXpeditions especially organized for operation in the contest; club contributions of DXpedition scores are percentaged to the number of club members on the DXpedition).

3. To be listed, a minimum of 3 logs must be received from a club and an officer of the club must submit a list of participating members and their scores, both on phone and c.w.

#### XI. LOG INSTRUCTIONS:

1. All times must be in GMT.

2. All sent and received exchanges are to be logged.

3. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

4. Logs must be checked for duplicate contacts, correct QSO points and multipliers. Submitted logs must have duplicate contacts clearly shown. The *original* log may be requested by the Contest Committee if further cross-checking of the log is necessary.

5. Use a separate sheet for each band.

6. Each entry must be accompanied by a summary sheet showing all scoring information, category of competition, contestant's name and address in BLOCK LETTERS, and a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

7. Sample log and summary sheets and zone maps are available from CQ. A *large* self-addressed envelope with sufficient postage or IRC's must accompany your request.

If official forms are not available, make up your own 80 contacts to the page on 8½" x 11" paper.

8. All entrants are required to submit cross-check sheets for each band on which 200 or more QSO's were made. All other entrants are encouraged to submit cross-check sheets.

9. Duplicate contacts and broken calls penalty: up to 1%—three (3) additional contacts removed; 1% to 3%—ten (10) additional contacts removed; over 3% is grounds for possible disqualification.

10. QRPP stations must indicate same on their summary sheets and state the actual maximum power output used, with a signed declaration.

**XII. DISQUALIFICATION:** Violation of amateur radio regulations in the country of the contestant, or the rules of the contest; un-sportsmanlike conduct; taking credit for excessive duplicate contacts; unverifiable QSO's; or unverifiable multipliers will be deemed sufficient cause for disqualification. (Incorrectly logged calls will be counted as unverifiable contacts.)

An entrant whose log is deemed by the Committee to contain a large number of discrepancies may be disqualified from eligibility for an award, both as a participant operator or station, for one year. If an operator is disqualified a second time within 5 years, he will be ineligible for any CQ contest awards for 3 years.

The use of nonamateur means such as telephones, telegrams, etc., to elicit contacts or multipliers **during** a contest is un-sportsmanlike and the entry is subject to disqualification.

Actions and decisions of the CQ Contest Committee are official and final.

**XIII. DEADLINE:** All entries must be postmarked NO LATER than December 1, 1989 for the Phone section and January 15, 1990 for the CW section. An extension may be given if requested. Indicate phone or CW on envelope.

**Both phone and CW logs should be sent to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.**

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CIRCLE 87 ON READER SERVICE CARD

**While the weather is still good and the ground is still soft, it might be time to update your grounding system or even to install one.**

# Tips For Good Grounding

BY MICHAEL SIMMONS\*, WB9CWE

One of the most important yet most overlooked features of an amateur radio station is the ground system. Simply relying on a grounded outlet, water pipe, or ground rod driven haphazardly into the ground probably won't do the job well.

There are two reasons for using a ground: safety against accidental shock and improved station performance. The above grounding system can pretty much take care of the safety issue, but an excellent earth ground can actually add to a station's receiving and transmitting performance.

The main objective in ground-rod installation is to achieve the lowest ground resistance possible. There are four tips you can utilize to facilitate this: use of multiple rods, placement in the right soils, sufficient depth, and soil conductivity enhancement.

The use of properly placed multiple ground rods can lower the ground resistance efficiently. Two rods will drop the resistance of a single rod system by about 40%, while three rods will drop it by about 60%. To be effective, the rods must be at least six or more feet apart.<sup>1</sup> Why?

Think of the soil surrounding a rod as a series of concentric cylinders of resistances determined by the cross-sectional areas at right angles to the current from the rod. Near the rod, the cross-sectional area is small, restricting the current. Therefore, its resistance is high. Driving another rod into this high-resistance area does not appreciably lower the overall resistance of the grounding system (one high resistance paralleled with another). Moving away from the rod increases the size of the cylinder and its cross-sectional area, meaning less resistance. Past about 6 to 10 feet away from the rod, the resistance is no longer appreciably reduced. Therefore, when driving two or more ground rods, keep them this distance apart for greatest effectiveness (one relatively low resistance paralleled with another).<sup>2</sup>

The type of soil the rods are in makes plenty of difference. Soils with high ash, brine, or mineral content are the best, measuring an average 14 to 30 ohms per

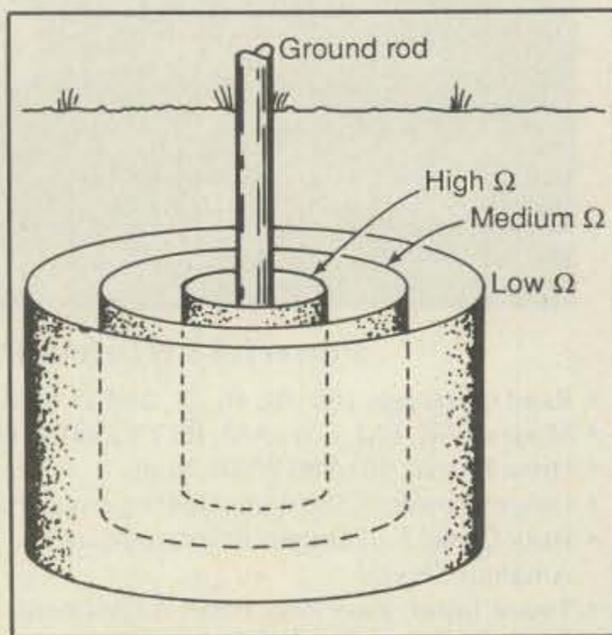


Fig. 1—The soil surrounding the ground rod can be thought of as concentric cylinders of resistances which decrease as the distance from the rod increases.

cubic meter. Loam, gumbo, or clay is next best at 30 to 50 ohms, while rocky or sandy soils are the worst with resistances rising into the hundreds of ohms.<sup>3</sup>

Ground resistance will increase up to eightfold when soil temperatures drop to freezing and below. You should determine the average soil frost line for your area and drive your ground rod at least 2 to 3 feet below that.

When measuring the resistance of your grounding system with a VOM to check its effectiveness, you must take into account two components. Both the AC component from ground currents and the DC component from electrolytic action will af-

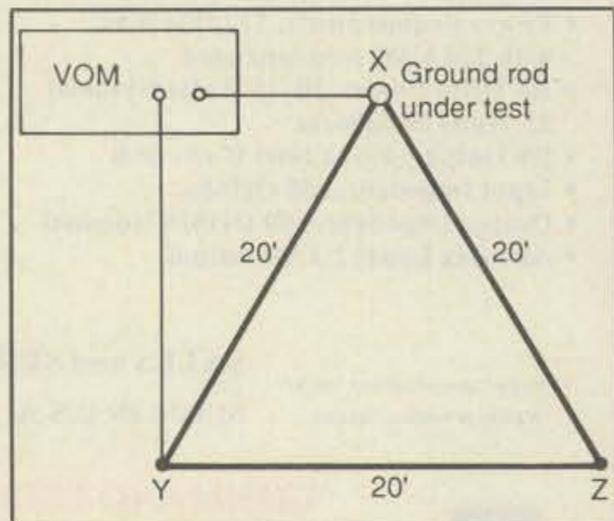


Fig. 2—Suggested setup for measuring the soil resistance of a ground rod.

fect the VOM's accuracy. This mandates the use of two additional ground rods spaced 20 feet apart from each other and the rod being tested. Refer to fig. 2 for the following.

First measure and record the resistance between rods "X" and "Y." Reverse the meter's leads and record that reading. Reversing the leads negates the DC effect. Average the two readings. For example, let's say your first reading was 100 ohms and the second was 75 ohms. Averaging the two produces 87.5 ohms. Repeat this procedure to obtain "X" to "Z" and "Y" to "Z" readings. Plug these readings into the formula  $[(X+Y) + (X+Z) - (Y+Z)]$  to obtain rod "X"'s resistance.<sup>4</sup>

City electrical codes for grounds usually call for a maximum resistance of 25 ohms. If your ground resistance is higher than that, you can parallel more rods to your system. Or if a lack of space precludes that, you can charge the soil around the rod with a pound or so of rock salt or magnesium sulfate. The chemical will have to be replenished about every year to maintain low ground resistance. The ground rod will have to be inspected every few years because of the chemically induced corrosion.

Ground wires should be soldered (silver solder is ideal for this) to the rods, and tightly fastened to the station equipment to prevent any ground noise. Use 14- or 12-gauge copper wires for proper current capacity. Discarded coax braid is desirable because of its flexibility.

When choosing a ground rod, use only the better<sup>5</sup> quality types available at electrical supply houses, as these have thicker copper plating to resist soil abrasion. If you can't obtain one, using a half-inch diameter copper pipe will suffice, provided you can drive it into soft soil to prevent bending it.

## Footnotes

1. E. Kurtz, *The Lineman's and Cableman's Handbook*, McGraw-Hill, 1964, pp. 17-23.

2. R. Ruyle, "What Ground?", *Popular Electronics*, August 1967, p. 59.

3. E. Beck, *Lightning Protection for Electrical Systems*, McGraw-Hill, 1954, p. 292.

4. R. Ruyle, "What Ground?", *Popular Electronics*, August 1967, p. 61.

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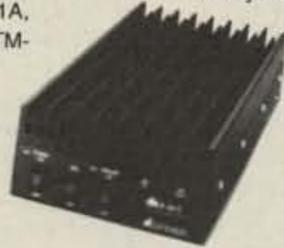
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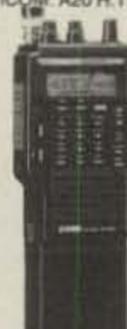
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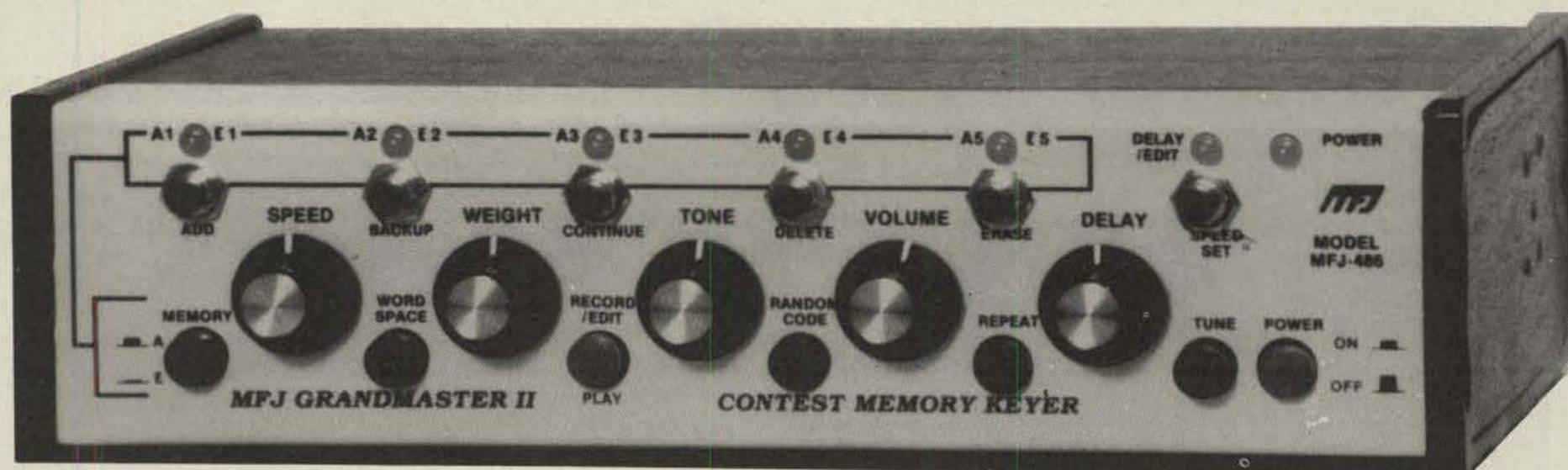
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**Matching** CW speed to a QSO is best done by ear as you adjust a speed knob.

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***K4ABT shows us the fun to be had on mobile packet via his mini-review of the Ranger AR-3500. Buck makes it sound easy and enjoyable, so why not give it a shot.***

## Using The Ranger AR-3500 On HF 10 Meter Packet

BY BUCK ROGERS\*, K4ABT

**N**ow that Novices and Technicians are beginning to use 10 meters, the band is beginning to develop quite a change in personality. New and old operating techniques are merging, and the end result is a complement to the fraternity of amateur radio. This "coming together" of different classes of amateurs demonstrates a blending of the minds. This is a band where those of us who have been here a long time can now pass along some of the ideals that built amateur radio into the hobby of which most of us are proud to be a part.

I've enjoyed QSOs with young and old, rookie and veteran, and each time I have a packet QSO with a new station on 10 meters, I feel I have made another friend. The benefit is a more active band that not so long ago could have become another wasted band. If we look at the additional activity coming into the band every day, then add the ingredient of good band conditions and the growing number of users, you will soon discover there are all kinds of good local and DX contacts to be made on 10 meters.

With much of the activity culminating largely in the Novice and Technician portion of 28 MHz, we are seeing a migration of many General, Advanced, and Extra class licensees to this portion of the band. This is making the band more appealing as a good local coverage band at night and a DX band by day. I am also seeing more repeater activity in the upper region between 29 and 29.999 MHz. So now we can put all this together, and it adds up to plenty of spectrum and many QSOs for several years to come.

For voice there are unlimited contacts taking place in all the modes, both below and above 29 MHz, and I'm including AM, FM, and CW. Single sideband is just one of the modes you will find on 10 meters.

I hear it now: "Hey, Buck! What about

\*506 Pheasant Ridge Drive, Warner Robins, GA 31088



Front view of the Ranger AR-3500.

packet?" Well, let me take a few paragraphs and I'll relate to you what is happening with packet on our top HF band and bottom VHF band (let's suppose that the spectrum below 29 MHz is HF, and the spectrum above 29 MHz is the beginning of VHF). As far as packet radio is concerned, the FCC looks at it as if 28 MHz is the beginning of VHF. The reason I say this is because we are allowed to use 1200 bauds on packet above 28 MHz, and we do. There are 300 baud packets zipping back and forth on 28.101 and 28.103 MHz. The most active 10 meter packet frequency is 28.105 MHz lower sideband.

Some of us **CONNECT** (packet lingo for "making a contact") on one of the 300 baud frequencies, then we QSY to another frequency near 28.200 and go to 1200 or 2400 BPS.

Using the packet controllers that have the tuning indicator LEDs makes it easy to make this change. Thus we have in-

creased our speed four times. In the case of 2400 BPS, we increase our speed approximately eight times.

Packet radio is not taking a back seat to any of the voice modes. Where we used to use CW to punch through the noise and QRM, we are now beginning to use packet to do the same thing. The big difference is that a packet will keep punching until it gets through by virtue of the **RETRY** command. With CW we never had the luxury of error checking, and we never knew if the message made it through or not, until it came time for the target station to respond. And the speed of CW was not as fast as packet, by any stretch of the imagination. Don't get me wrong. I still enjoy a good CW ragchew, and now and then I get on CW (with a keyer, not a keyboard) just to be sure I haven't lost any of the fond memories that come flashing back from my highly active CW era many years ago.

The fun has only begun with all the DX

and new population of 10 meters. I've added a new dimension to my 10 meter packet operation. Follow me through the next few paragraphs as we discover yet another world of packet enjoyment.

## Customized Packet With A Different Twist

There are several new compact mono-band transceivers for 10 meters coming into the amateur marketplace. I decided to try one of these AM, FM, upper and lower sideband, and CW transceivers, but with a different twist to the operation. This one had some features that appealed to my needs, not to mention some extra punch. I know many of you use the single-band transceivers for mobile, and some even put them on a well-regulated 12 volt DC supply and operate the unit from a fixed location.

I chose the Ranger AR-3500 and put it on the air as an HF mobile packet station. Well, why not? My Toshiba T-1000 compatible clone has a mobile adaptor, the TAPR clone with the tuning indicator operates from a 12 volt source, and the AR-3500 Ranger (that name rings a bell from about 30 years ago) 125 watt transceiver also operates from a 25 ampere, 12 volt DC source. It is compact enough to fit under the dash and still maintain all the leg room.

I've operated both 300 and 1200 bauds on 10 meters with this mobile packet radio station, and it is total fun. The enjoyment of a mobile packet station becomes more interesting if you park on a high location or mountaintop and set up. Just one word of caution: Keep the battery charged by running the engine from time to time.

If you operate several hours from the battery and fail to keep the battery charged, then be sure you have your vehicle parked on a grade that will allow you to "coast" to the nearest battery charger. If you have a good battery and alternator system in your mobile, you can operate for a few hours without too much concern. The transceiver is the heaviest drain on your battery. This is no great problem because the load is of such short duration—e.g., the one or two seconds that it takes to transmit a packet. In the receive mode the Ranger, the T-1000 computer, and the TNC draw just under one ampere of current.

The antenna that I use mobile on 10 meters is a trunk-lid, lip-mounted, "Big Mama" CB antenna that I modified to cover the low end of 10 meters. If you are willing to invest a few "bucks" in a reasonably priced 10 meter mobile antenna, then you may want to modify one of the CB mobile antennas. The modification is relatively easy, since the mod requires removing some of the length from the radiator. (See fig. 1.)

Even with the smaller version of the

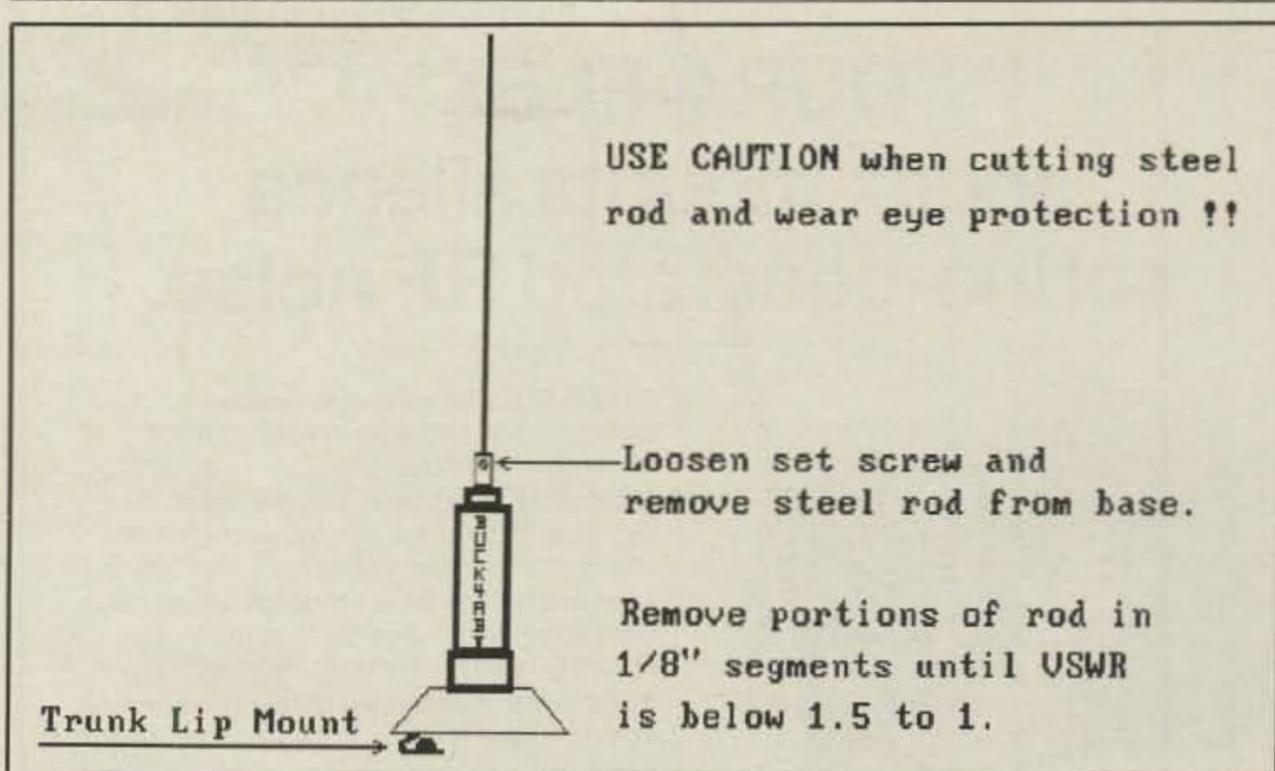


Fig. 1 - Method used to modify some CB antenna for 10 meter use. Note: DO NOT over-tighten set screw.

converted CB to 10 meter antenna, you are still able to run output power in excess of a hundred watts without too much concern for the power limitations of the antenna. The reason is obvious: Since the duration of a packet is short, the transmit period will not be long enough to over-heat the loading coil. If you are the bold type, then go ahead and punch a big hole in the family car and mount the "old standard" 96 inch steel whip and have at it.

With my Ranger (100 watt version) stuffed into the foam-lined briefcase along with the portable computer and the TNC, I still have room for a pocket-size recorder that I use to keep notes of QSLs, addresses, names, or just store information and ideas for articles such as this. Don't forget to carry along a picnic basket with the soft drinks and sandwiches. There is no telling how long you might stay parked on the hill or mountaintop, especially if you "get on a DX roll." I got lost in a DX chase that took all afternoon and into the late evening hours. In the ex-

change I worked New Zealand, South Africa, Argentina, Canada, and Panama. I would have stayed on that hilltop until the band got quiet, but I had to be at the office the following morning.

## A Closer Look At The Ranger AR-3500

The Ranger with its very stable receiver, coupled with extremely good audio output, adds just the combination to the selectivity skirts that are wide enough to accept the high tones when you operate 300 or 1200 baud on 10 meters. The -6 dB points of the selectivity curve in some transceivers are a bit too sharp to allow some of the **SPACE** tones to pass. In the Ranger the -6 dB points are 2.6 kHz for SSB, so the high tones are passed with no problem.

The Ranger has full 10 meter coverage from 28.0000 to 29.9999 MHz. Notice the extra 100 Hz step. This is another one of

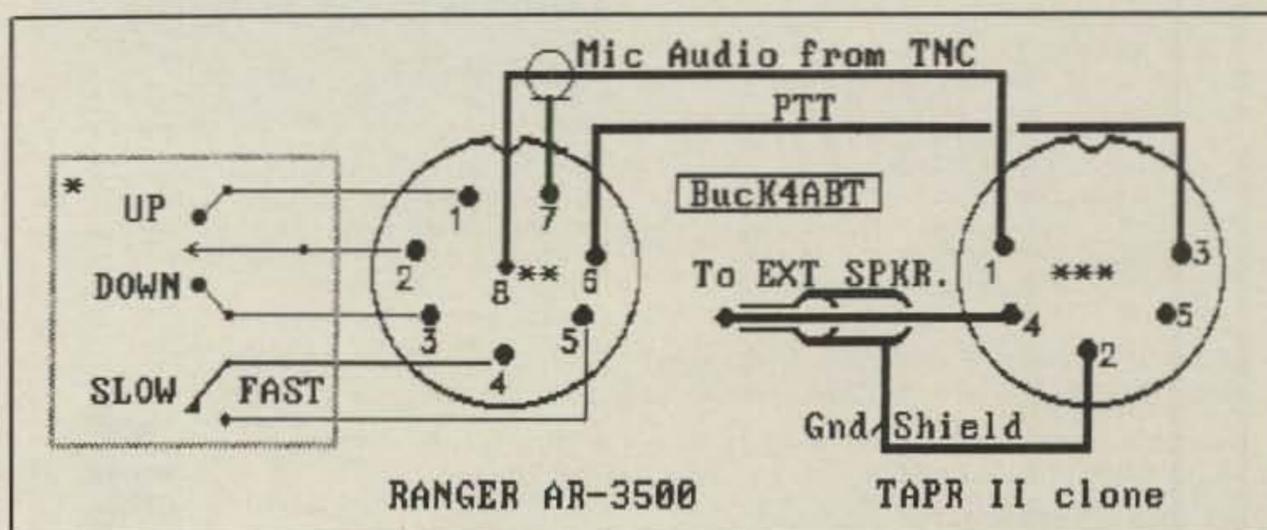


Fig. 2 - Optional connections for frequency control. QSY can also be controlled on the front panel of the Ranger AR-3500. (\*\*Radio Shack P/N 274-025; \*\*\*Radio Shack P/N 274-003.)

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the nice features of the Ranger. The tuning steps are in 100 Hz, 1 kHz, 10 kHz, 100 kHz, and 1 MHz increments. The 100 Hz step is close enough in many cases to get you to the packet receive and print stage, but to make your packeting easier there is a variable clarifier with a range of plus or minus 500 Hz.

Please notice that I said the range is plus or minus 500 Hz. This allows you to move to another packet station that could be almost a full kilohertz away, using only the clarifier and without touching any of the tuning push-buttons.

This brings up another nice feature of the Ranger AR-3500. The microphone has **UP/DOWN** and **FAST/SLOW** frequency control, so you can move from one frequency to another without touching the tuning controls on the front of the transceiver. If we connect the transceiver for packet operation, we can still move anywhere in the band with the front-panel tuning controls.

The interface drawing of fig. 2 illustrates how the Ranger is interfaced for packet operation. Note that **UP/DOWN** frequency control is an option which can be added to the packet interface if you desire. The new Ranger AR-3500 uses the standard 8-pin mic connector that is now used with most HF transceivers.

While we are discussing the microphone, we should make a note of the 500 to 600 ohm microphone input impedance of the Ranger. This input impedance falls into the load requirement of most of our TNCs.

The receive performance of the Ranger tends to support the published CW, AM, and SSB sensitivity figure of 0.25 uV. This is measured for 10 dB S + N/N. The published sensitivity measurements for FM are 0.3 uV for 12 dB SINAD with a minimum discernable signal at -135 dBm.

The Ranger AR-3500 comes in two models. One is the 30 watt version priced at \$319.95, and the other is the 100 watt version priced at \$399.95. The cost to upgrade the 30 watt version of the AR-3500 or the earlier AR-3300 to the 100 watt model is \$110.00. For more information about the Ranger AR-3500, write to or call Clear Channel Corporation, P.O. Box 445, Issaquah, WA 98027 (phone 206-392-0419).

Get in on the fun of HF packet soon, and if you are already on 10 meter packet, look for K4ABT-5. That's the callsign of my mobile packet station.

Just one final note to encourage you to build a portable or mobile packet station. This system can be used in the event of a disaster. It can also be attached quickly to a VHF rig to be used as a backup digipeater when the local node or digipeater fails. The list of uses really begins to increase in size when you get on HF mobile packet.

Happy packeting, de BucK4ABT. 

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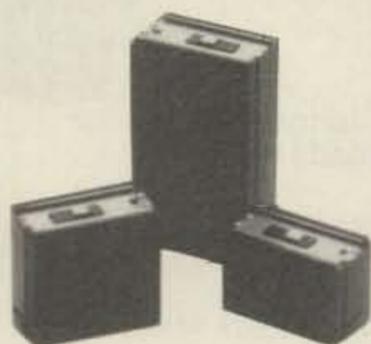
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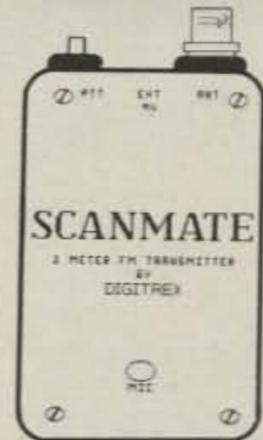
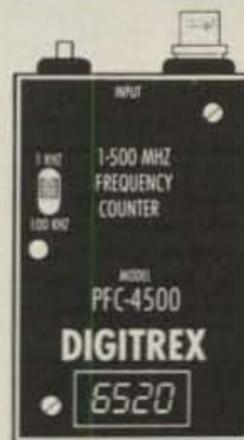
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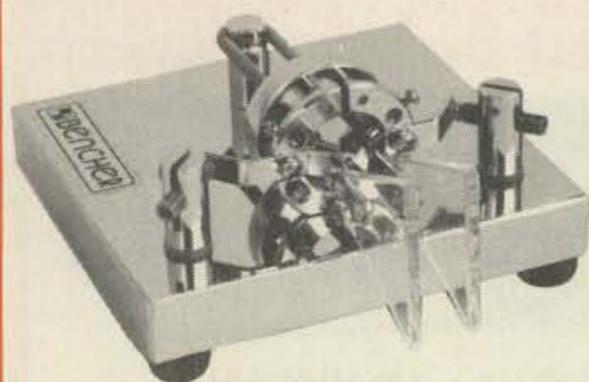
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Additional features include an on-

board 1ppm 20-40°C, 10 MHz time base with calibration adjust trimmer, LCD contrast control pot, CMOS counter inputs (400 mv sensitivity typ), gate light LED, and an 8-bit A/D on board. Four control inputs are for momentary pushbuttons. Connector is a 14-pin dual .025 inch header. Power required is 5 VDC, 50 ma. Cost is \$225 in single quantity (\$149 in hundreds). For more information, contact Optoelectronics Inc., 5821 NE 14th Ave., Fort Lauderdale, FL 33334, or circle number 102 on the reader service card.

## Kenwood BBS On-Line

The Kenwood Communications & Test Equipment Group is now accessible via computer modem. This is an amateur radio computer bulletin board accessible to all. Contact Kenwood Bulletin Board System: 213-761-8284. System parameters are 2400 baud (or slower), 8 bits, 1 stop bit, no parity. Operating hours are 5 PM to 8 AM Pacific time Monday through Friday, and 24 hours Saturday, Sunday, and holidays. Because this bulletin board is being run on a trial basis, these hours are temporary and subject to change.

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Model	Freq. Range Int. Sensor	Forward Power	Connectors
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NS-860A*	1.8-150 MHz	30/300 W/3 kW	SO-239
NS-660PA**	1.8-150 MHz	30/300 W/3 kW	SO-239
NS-663BM*	140-525 MHz	30/300 W	SO-239
NS-663BN*	140-525 MHz	30/300 W	N-Type

\*Back lit with remote sensors available.  
\*\*NS-660PA-Peak power reading

CN-460M

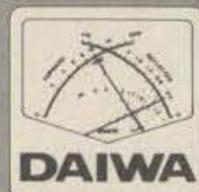
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CN-520

Model	Freq. Range Int. Sensor	Forward Power	Connectors
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CN-460M*	140-450 MHz	15/150 W	SO-239
CN-465M*	140-450 MHz	15/75 W	SO-239
CN-520M**	1.8-60 MHz	200 W/2 Kw	SO-239

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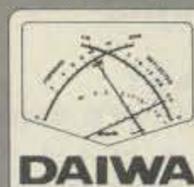
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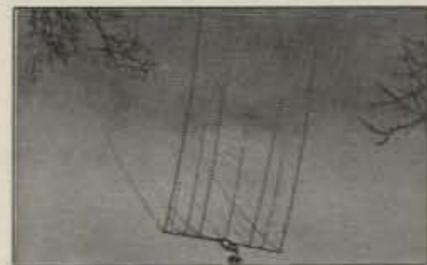
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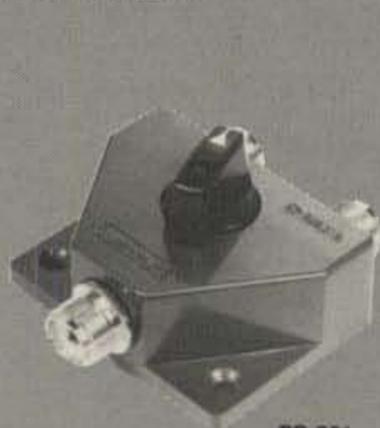


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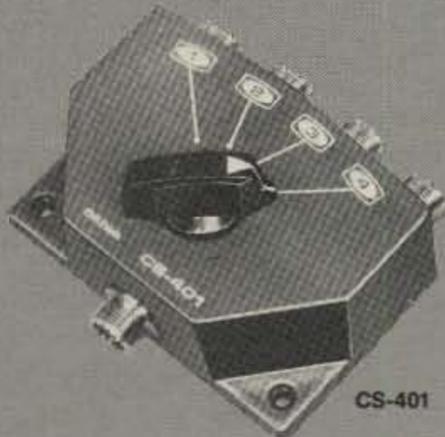
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CS-201



CS-401

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Connectors:	SO-239	N type	SO-239	N type	BNC type
Isolation:	+60 dB	+60 dB	+50 dB	+50 dB	+60 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	500 W PEP 250 W CW
Insertion Loss:	All models less than 0.2 dB				



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CIRCLE 59 ON READER SERVICE CARD

September 1989 • CQ • 59

## A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

### From the Mailbag—Part I

**T**his month we'll catch up on our mail by unzipping the mailbag for some reader queries and comments on a wide variety of antenna topics. Following that we'll take note of some new books and examine some software. First let's dig in the mailbag.

#### From the Mailbag

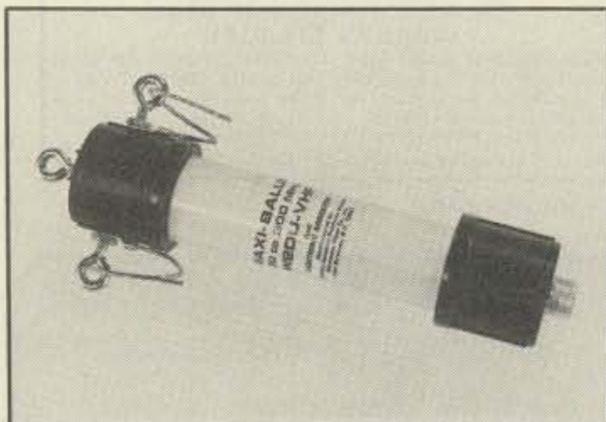
**G5RV Notes de W4RNL.** It's really amazing to total up the number of letters we receive on the G5RV. Most of these involve technical considerations in feeding the antenna, especially regarding coupling at the coax-matching section junction. There seem to be several schools of thought on the best way to feed the antenna, and our discussion of these conflicting viewpoints has caused some confusion in the minds of readers.

L.B. Cebik, W4RNL, a regular correspondent, wrote us with some very thoughtful views on the G5RV antenna. L.B.'s letter is too long to print in its entirety, so we'll summarize its main points, some of which are at odds with those made by Louis Varney and other correspondents in last month's column.

L.B. wonders whether the 102 foot G5RV is "better" than a 135 foot HF dipole fed with 450 ohm line via a transmatch. He believes that this question should be asked, since all the attention focused on the G5RV recently has created the impression that it is superior to longer wire antennas.

As L.B. suggests, the G5RV seems to approach the performance of the 135 foot dipole as a multiband antenna, especially on the higher bands. But we both agree that in general it's best not to arbitrarily shorten a multiband wire antenna unless space demands that it be done, or if you want to slightly alter directionality on the higher bands. At the bottom line, if you have room for a 135 foot flattop and want to operate 80-10 meters, why not go for a full 135 feet?

L.B. also is concerned, as am I, about the use of certain baluns and tuners with the G5RV—a very controversial area. As he points out, exclusively using 450 ohm line and a transmatch with the G5RV is close to ideal in terms of eliminating losses. However, he feels this arrangement is optimum only when the feedline run (particularly indoors) encounters no significant conductive objects to upset feedline balance, and when the transmatch does not use a toroidal ferrite-core transformer balun. Use of a W2DU-style non-ferrite (choke-type) balun can be effective and not be subject to many of the difficulties experienced when ordinary ferrite-core baluns are used at the junction of the G5RV matching section and the coax feedline—even though the G5RV's designer considers the use of a balun with the G5RV to be inappropriate.



*If you wish to feed an HF multiband dipole with coax and prefer to use a balun to effect the "balanced to unbalanced-condition" coupling, consider using a non-ferrite balun to help minimize problems which may occur when running high power levels under mismatched conditions. The W2DU-type balun is representative of such non-ferrite baluns. Although a VHF model is shown here, the principle of operation of the HF version is similar. The baluns are distributed by Unadilla Antenna Manufacturing Co., P.O. Box 4215BV, Andover, MA 01810.*

L.B. believes that there is a lot to be said for using a W2DU-type or other non-ferrite balun with the G5RV to relieve balance-disrupting conditions indoors, particularly if you use the shortest length of lowest loss, highest rated coax possible to minimize overall line losses. L.B. also suggests that using this type of commercial balun or its homebrew equivalent can help eliminate RF in the shack as well.

In case you're not familiar with them, choke-type baluns of the W2DU type are actually short coaxial-line extensions of the main feedline, surrounded by high-permeability ferrite beads. The beads insert a high impedance in series with the outer surface of the coaxial shield conductor, which provides external isolation between input and output, thereby blocking current flow on the feedline's outer surface. With no ferrite core to possibly saturate at high power, and with a large resistive component in addition to the inductance, the balun's sensitivity to changes in frequency is reduced. Thus, you may be able to make much wider frequency excursions from the antenna's natural resonant frequency than with conventional ferrite-core baluns.

But what about the balanced/unbalanced feedline configuration as compared with a straight 450 ohm feedline from flattop to transmatch, ignoring for the moment the problems in maintaining feedline balance indoors? L.B. believes that "The answer to that may depend on the particular transmatch design. The old-style inductively coupled tuner with manual taps ... makes the 450 ohm system clearly superior. However, most commercial tuners have gone to unbalanced T-circuits (and varia-

tions) with a toroidal ferrite-core transformer balun to derive a balanced output. Depending on the quality of that component, using 450 ohm line all the way to the transmatch may be just deferring the problem of transformer baluns from a coax-ladder line junction to the transmatch itself. I know of no ferrite-core transformer baluns which work to near lossless perfection at significant SWR levels throughout the entire frequency span we demand of transmatches. In fact [some new tuners] appear to have dumped the transformer for a choke system."

Thanks, L.B., for your spirited comments in a very controversial area. Your points are well taken, though I'm sure to receive some correspondence differing from these views.

**G5RV Notes de W3LC.** Ken Hahn, W3LC, wrote us last fall concerning problems he was having in loading and "working out" on 10 meters with his 102 foot G5RV, which used a 34 foot matching section direct-connected to a 40 foot length of coax to an MFJ tuner, and later to another tuner. Ken found that both tuners experienced severe overheating of the roller-coil slider rod when running 600-800 watts on 10 meters.

After much experimentation, Ken discovered that in his particular situation use of a 53 foot length of RG-213/U coax resolved the 10 meter problems without appreciably affecting operation on the other bands.

This "one-band problem" is a typical one with multiband dipoles such as the G5RV, especially when the antenna is fed with coax from the matching section. This problem was addressed by Louis Varney in last month's column, in which he acknowledged that a multiband antenna often loads satisfactorily via the transmatch on all but one HF band. The "quick and simple" solution is, as Ken discovered, to add on or cut off a few feet of feeder until the unwanted effect disappears. Varney suggests that doing so is unlikely to affect loading on the other bands.

**T2FD Notes de N6PL.** Our January column, which included some details on W3HH's classic T2FD, or Terminated Tilted Folded Dipole, brought several letters, including a very positive one from Bill Shamey, KJ6GR. Bill says he enjoys reading about "old but good antenna ideas" such as the T2FD.

One particularly welcome letter in response to that column was received from Capt. Paul H. Lee, USN (Ret.), himself something of an antenna expert and author of the *Vertical Antenna Handbook* (presently distributed by the CQ Book Shop). Paul filled us in on some of the lore surrounding Gil Countryman, W3HH's original writings about the T2FD in *CQ* and *QST* in the 1940s and 1950s, several of which we referred to in January:

"Your mention of the T2FD in your column in *CQ* for January brought back old memories. Gil Countryman was a [Navy] Captain who was

317 Poplar Drive, Millbrook, AL 36054

an electronics officer at the Charleston, SC Navy Yard in the early 1950s. As I recall, he was very instrumental in getting the T2FD installed for ship-to-shore use by Navy Radio Charleston (NRC). The antenna I recall was devised by NRL (Navy Research Lab) at Anacostia, DC. It was a very good antenna for that purpose. We had two of them at Charleston with 500 watt transmitters on them, which I remember well.

"Gil was a good friend of mine. He went from there to the Bureau of Ships in Washington. He was always a very active amateur, mostly on CW and was well known in Navy circles. Gil got [the call] W3HH when he moved to DC, and that's when he wrote about the T2FD; I don't recall his W4 call in South Carolina . . . I enjoy your articles . . . Antennas are my favorite subject!"

**EDZ Notes.** In response to our mention of the EDZ in several previous columns, most recently in July 1988 and March 1989, we received a number of letters with comments and suggestions on the 1.28 wavelength Extended Double Zepp as a practical single-band skywire. Letters were received from David Myrick, W3DBA, Jon Kannegaard, N6RSY, and John W. Schwall, W8JAJ. John adds a different wrinkle to the EDZ:

"In 1980 I was keeping weekly skeds with a friend [Mike] in southern France, usually on 15 meters. One Sunday he came on with a much better signal: He discovered a new antenna, or so he thought. What he described was the EDZ; I sent him the description from the *ARRL Handbook*. I told him to next invent the wheel. We got quite a chuckle out of it, but the unique thing about his version was the method he used to feed the EDZ."

"He started with  $2\frac{3}{4}$  wavelength wires folded  $\frac{1}{8}$  wave down as a stub, then fed it directly with coax, shield to one side and center conductor to the other. It took a little tuning to find the spot where SWR was minimum, but with a little patience it [minimizing SWR] could be done." John also notes, "Later, 'we' discovered that if the stub was  $\frac{5}{8}$  wave long, [then] tuning to an SWR of almost 1:1 could be accomplished."

"At the time I was using a 15 meter monobander and wasn't doing much on 10 meters. [So] I built [an EDZ] . . . and suspended it from my tower so as to get it as vertical as possible. . . . Neither Mike nor I used any kind of antenna tuner; all the tuning was at the design point, on the antenna . . . I used 450 ohm ladderline for the stub; Mike used the parent wire from his antenna and approximated 600 ohms because of the unavailability of ladderline at his QTH."

"The other thing we noticed, when using the EDZ as a vertical or sloper, the matching stub should be as close to perpendicular to the antenna as possible. This makes it difficult using the  $\frac{5}{8}$ -wave stub suspended from a tower."

John considers the EDZ to be a very effective antenna: "From southern France to southwest Ohio, Mike's EDZ was consistently one S-unit better than a 12AVQ vertical, and a lot of times as much as two S-units [better]." Too, "The coax feed is very attractive because openwire line isn't the easiest thing to work with bringing it into the shack. Maybe someone will come up with ways to feed two of these in phase on 12 or 17 meters."

Fig. 1 shows the Extended Double Zepp matching arrangement John came up with.

**Operating with Antenna Restrictions.** Raymond Hartl, KB9BYL, wrote us describing an anten-

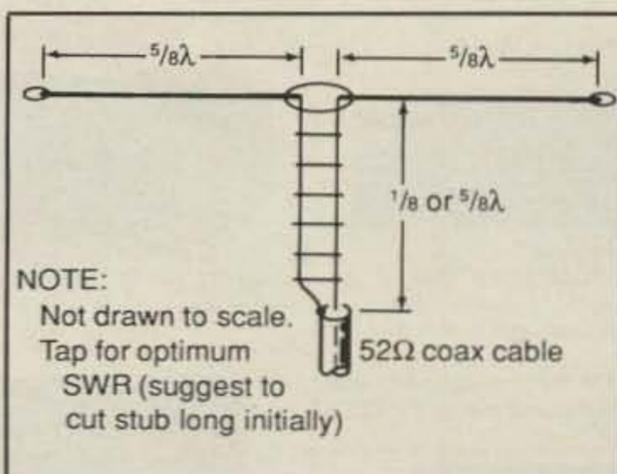


Fig. 1- Easy extended Double Zepp match. W8JAJ finds that he can direct-feed his EDZ (which he's rounded to  $\frac{5}{8}$  wavelength on a leg) with coax via a short  $\frac{1}{8}$ - or  $\frac{5}{8}$ -wavelength matching section. He suggests cutting the matching section slightly long, as some tuning is required to minimize SWR on the coax.

na problem that is all too typical today. Ray just received his Novice license, but lives in a condo and is unable to install an antenna outside of his apartment—the building bylaws forbid cosmetic changes of the building by residents. Ray would like to operate CW and work some DX on the HF bands. What to do?

This type of situation is typical in today's apartment/condo environment. If you wish to fully observe their restrictions, your only recourse may be to operate using totally indoor antennas (especially poor on HF) or limit operations to VHF/UHF where antennas placed near windows may work passably well. Another option is to limit your operating to a mobile, club, or vacation retreat scenario.

If you still want to work out from your home QTH under such conditions, and are willing to risk some flack for minimally disturbing your building's environment, some things you may try include:

1. Using a center-loaded whip installed on a 45-degree bracket (like a flag) on your window or balcony. You may wish to run up your "antenna flag" only at night.

2. Using a half-wave dipole, half indoors and half out, employing very thin wire on the outside portion, which is run to a tree or other available support. This is often more effective than trying to feed a single-wire against ground.

3. Using a thin wire weighted with fishing-line sinkers (if you're on an upper floor), dropping the line down the outside building wall, and feeding the antenna as an upside-down vertical.

Of course, all of these possible solutions probably violate your condo bylaws or apartment rules, so you'll have to weigh the risks of operating clandestinely using hidden outside antennas. Bear in mind that fully indoor antennas, while possibly not violating the rules, tend to cause lots of RFI by radiating right into the building wiring, making it "hot" with your RF.

The *ARRL Antenna Book* has a whole chapter on restricted-space antennas which may give you some ideas if you're forced to operate under such conditions. Other ARRL-distributed antenna books which you may want to look at for ideas include the *Antenna Compendium*, the *Novice Antenna Handbook*, W1FB's *Antenna Notebook*, and G6XN's *HF Antennas for All Locations*. Also, W6SAI's *Wire Antennas*, sold by the *CQ Book Shop*, should provide some useful tips on hidden and restricted-space antennas. Finally, J.A. Stanley's *Ham Antenna Construction Projects* has a whole chapter devoted to compact and indoor antennas. It's Sams book #20654, though I note that my copy is copyright 1969, so it may be out of print today.

In view of the many requests we receive for help with Ray's problem, we'd appreciate readers who have found other good books on invisible and restricted-space antennas to tell us about them. We will, in turn, share the information with our readers. And, speaking of books . . .

## From the Bookshelf

**Follow-Up on K4TWJ Books.** In last April's column we took note of two self-published books by fellow *CQ* columnist Dave Ingram, K4TWJ. One of these was his *Golden Classics of Yesteryear*, a collection of tales, rig views, all-time



Two of fellow *CQ* columnist Dave Ingram, K4TWJ's books are now distributed by MFJ Enterprises. One is Dave's *Golden Classics of Yesteryear*, the other his *OSCAR Satellite Revue*. We reported on both of them in last April's column. (Photo courtesy MFJ Enterprises, Inc.)

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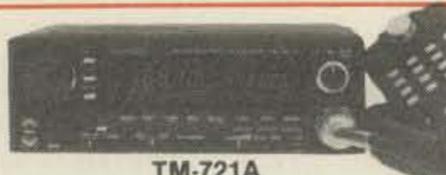
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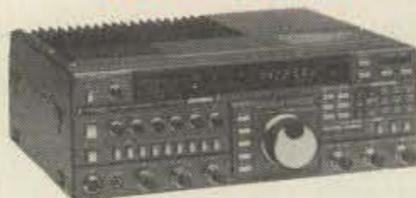
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favorite circuits, keys, and bugs of all kinds from romantic days past. The other was his companion *OSCAR Satellite Revue*, an anthology and guide to satellite setup and success written in nontechnical and easy-to-understand language.

I now see that MFJ is distributing Dave's two books at \$9.95 and \$7.95, respectively. They're available directly from MFJ or through their dealer network. For information, contact MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762.

**Three from Brady Books.** If you're "into" the world of computers, modems, and online computing, three new authoritative Brady computer books may whet your whistle.

Michael Banks' *The Modem Reference* is a complete guide to modem selection, installation, and applications. The book covers just about anything you might want to know about online telecommunications. There's a special emphasis on the details of data transmission; communications protocols; modem selection, installation, and troubleshooting; communications software selection; and using online services and bulletin boards. The \$19.95 book also includes a shopper's guide section that contains detailed information and special offers on a variety of hardware, software, and online services.

There's another authoritative opus from online maestro Alfred Glossbrenner, his *Master Guide to CompuServe*, optimistically billed as "the only book you'll ever need for CompuServe®." If you're thinking about subscribing to the CompuServe Information Service, or have recently subscribed to the service, this is perhaps the book to read for getting the straight story about what CompuServe is and what it can do for you. The book, from one who really knows how to "work" online computer services, also includes a number of tips and techniques not included in CompuServe's own manuals. Glossbrenner's book mentions numerous professional and hobby forums, with the popular HamNet (and information on how to access it) even being mentioned on page 263.

Finally, if you're *really* into computers and want to weigh down your bookshelf with a truly authoritative reference guide to the computer industry, consider at \$29.95 *The Computer Industry Almanac 1989*. This 2 inch thick, 7½" x 9½" tome is chock full of inside information on the people, companies, products, and trends that make this industry endlessly fascinating. Some of the information covered includes profiles of top industry companies, rankings of hardware and software, product trends and award winners, listings of the industry's most influential executives and their salaries, and more. At the bottom line, if you're in the computer industry professionally, you'll probably find the *Almanac* indispensable; if you're a computer user and casual observer, you'll find it a fascinating source of interesting information and trivia.

These books are available in most of the large chain book stores. If you can't find them, contact Brady Books, One Gulf and Western Plaza, New York, NY 10023.

## Software Topix

**EZCODE.** John E. Mahoney, KB6QBS, sent us his very nice Morse shareware Morse code learning program for the IBM PC, EZCODE, which he offers upon receipt of an SASE floppy disk and mailer.

A major feature of the program is the ability

to send from 1 to 50 random characters of fixed or random length; the words tested can be real words from the built-in "words files" containing over 20,000 real words. Characters can be typed to the screen as the code sound is heard. Any ASCII file can be used to generate the code, and the speed can be changed from 5 to 29 WPM in normal operation. Many other advanced "intelligent" features are offered by John's program for the IBM PC and compatibles.

John offers to send a copy of the program to anyone who sends him a double-sided, double-density (360K), 5¼ inch floppy preformatted disk along with a preaddressed floppy disk mailer stamped with the correct postage (usually 45 cents). For this good deal, contact John E. Mahoney, KB6QBS, 1388 Via Del Los Grande, San Jose, CA 95120.

**ProComm Plus.** Although we've highlighted and reviewed several excellent telecommunications software programs for the IBM PC in the column, there's no secret about my comm program of choice: hands down, it's ProComm Plus by DataStorm Technologies.

Many of our readers will already be familiar with ProComm, which has been widely distributed over the past few years as a \$50 shareware product, and thus is available and freely downloadable on hundreds of bulletin boards across the country. Though modestly priced, ProComm has stood up well against tough competition from the many business-oriented communications software programs; the shareware and commercial versions of ProComm are widely used by amateurs as packet terminal programs for their PCs. Now DataStorm has tuned and tweaked their product to turn it into a professionally packaged \$89 commercial product sporting a hefty 371-page user's manual.

Perhaps the most impressive feature of the ProComm series is its inherently intuitive character, which guides you through the entire process of using the program, making it simple to get things done. As such, it is suitable for both the novice computer user and the professional. Despite the thick user's manual, the essentially intuitive nature of the program allows you to take advantage of most of its features without ever cracking the cover on the manual if you so choose.

Another very nice feature is the record mode, in which the program can be set to "learn" log-on sequences and other frequently repeated functions by recording system prompts and your responses, then automatically generate a script file which you can use to automate the tasks in future sessions.

Other major features include ASPECT, a very powerful script command language useful to automate program operation; terminal emulation with a keyboard-remapping option; numerous file transfer protocols; a fully-automated dialing directory; context sensitive help; an advanced host mode with electronic mail capabilities (in effect, a complete mini-BBS); an included text editor; access to DOS from within the program; selection of either pop-up menus or "Lotus 1-2-3" style menus; session logging to disk; and considerably more.

ProComm Plus runs on IBM PCs and compatibles running MS-DOS 2.0 or higher; a minimum of 192K of memory is required for operation. Information on the program is available from DataStorm Technologies, Inc., 1621 Towne Drive, Suite G, P.O. Box 1471, Columbia, MO 65205.

**Propagation Programs for the Mac.** We haven't

been able to afford the luxury of a Macintosh computer in our hamshack, and we envy those who can. Some propagation programs from Engineering Systems might just help you justify your hamshack Mac.

According to information received from Paul E. Schmid, W4HET, DX Window™ for the Mac is a \$60 grayline program that displays a radio map of the world and on it depicts a great circle (grayline) which represents the twilight zone separating day and night on the Earth's surface; it's well known that the grayline is an important factor in HF radio communications.

The program's action is based on the standard Mac user interface. You control the action by clicking on menu selections by using the computer's mouse, or by entering their keyboard equivalents. A dialog box appears when you want to enter a date and time. When you look through the DX Window on the Mac screen, you see the radio map of the world centered on your QTH, and the grayline is drawn on the map for the date and time of your choosing. A shadow pattern is superimposed over the night region to simulate darkness, and in the daylight region a small symbol marks the location directly under the sun (the sub-solar point).

The map can also be used to aim a beam antenna toward any DX location on the Earth's surface, since the azimuthal projection shows all directions from the center without distortion. A window appears when you want to select any of over 400 worldwide locations (keyed to prefixes) and show their positions on the radio map; a scroll bar lets you scan rapidly through the list and click on your choices. Fig. 2 shows major DX Window features.

ESI also offers two versions of Skycom, a skywave propagation program that offers worldwide hourly HF propagation predictions from your location. Skycom 1.1's skywave modeling is said to take into account total path loss, telling you exactly when to fire up your rig and what frequency is optimum for DXing over a given path.

ESI also offers a scientific version, Skycom 1.5, which is designed for more experimentally inclined users. Similar to Skycom 1.1, V 1.5 also includes sophisticated algorithms that allow you to input refinements on day/night atmospheric heights, signal bandwidth, system loss, minimum elevation angle, receive antenna gain, and measured calibration parameters. Skycom 1.5 also factors in signal-to-noise ratio, maximum usable frequency (MUF), frequency of optimum traffic (FOT), vertical F-layer ordinary critical frequency, daylight duration, latitudes and longitudes, and several other components. Either version (the V 1.1 applications version or the V 1.5 science version) is priced at \$45; both are available for \$70 as a package. Skycom is also available for the IBM PC.

For more information, send an SASE to Engineering Systems, Inc., P.O. Box 939, Vienna, VA 22180.

## Short Bursts

**Some Thoughts on QRP Operation.** Nowhere does the importance of using an effective antenna come into play more than operating "flea power," or QRP. When you're running 5 watts or less, a couple of dB tends to make a difference—although perhaps not *quite* as much as you'd expect: 5 watts is only roughly 2.5 S-units below 150 watts, each S-unit being about 6 dB.

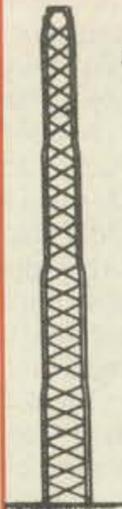
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• Galvanized Finish—Long Life  
• Totally Free Standing—No  
Guy Wires  
• America's Best Tower Buy—  
Compare Save \$  
• Complete With Base and  
Rotor Plate  
• In Stock Now—  
Fast Delivery

Model	Height	Ant Load*	Weight	Delivered Price*
HGX40	40 ft	10 sq ft	228	\$449
HGX48	48 ft	10 sq ft	303	\$589
HGX56	56 ft	10 sq ft	385	\$699
HDBX40	40 ft	18 sq ft	281	\$569
HDBX48	48 ft	18 sq ft	363	\$689

\*Your Total Delivered Price Anywhere in Con-  
tinental 48 States. Antenna Load Based on 70 MPH  
Wind.

## ROHN Guyed Tower Packages

• World Famous Rohn  
Quality and Dependability  
• Rugged high wind survival  
provides safe installation  
• Multi purpose towers  
satisfy a wide range of needs  
• Complete packages  
include: guy hardware,  
turnbuckles, guy assemblies,  
concrete base, rotor plate  
and top section per  
manufacturers specs.  
Packages shown below are  
rated for 70 mph wind zone.  
90 mph wind zone packages  
slightly higher. All tower packages  
shipped freight collect from our  
Plano, TX warehouse, in stock for  
prompt delivery.

Model	25G	Model 45G	Model 55G
50'	\$839	\$1499	\$1939
60'	929	1679	2169
70'	1129	1879	2399
80'	1199	2199	2799
90'	1279	2369	2999
100'	1529	2569	3239
110'	1629	2979	3449
120'	1699	3149	3699



These rugged crankup  
towers and masts now avail-  
able from Texas Towers!  
Check these features:  
✓ All steel construction  
✓ Hot dipped galvanized  
✓ Totally self-supporting—  
✓ No guys needed  
Coax arms, Thrustbearings  
Masts, Motor drives, Re-  
mote controls, Hinged  
bases, Rotor bases, & Raising  
fixtures also in stock.

**CALL FOR SALE PRICES!**

Model	Min.Ht.	Max.Ht.	Ant.load*	Sale price
MA40 mast	21'	40'	10 sq ft	\$629
MA550 mast	22'	50'	10 sq ft	999
TX438	22'	38'	18 sq ft	919
TX455	22'	55'	18 sq ft	1385
TX472	23'	72'	18 sq ft	2279
HDX555	22'	55'	30 sq ft	2079
HDX572	23'	72'	30 sq ft	3559

Note-US Towers Shipped Freight Collect From  
Visalia, CA Factory  
\*Note-towers rated at 50 mph to EIA specifications

## RG-213U

\$ .39/ft \$379/1000 ft.  
Up to 600 ft via UPS  
• RG-213/U—95% Bare Copper Shield  
• Mil-Spec Non-contaminating Jacket for longer  
life than RG8 cables  
• Our RG-213/U uses virgin materials.  
• Guaranteed Highest Quality!

## RG-8X

\$ .22/ft \$209/1000 ft.  
• RG8X—95% Bare Copper Shield • Low Loss  
• Non-contaminating Vinyl Jacket Foam Dielectric

## 9086

\$ .45/ft \$439/1000 ft.  
• Same Specs as Belden 9913  
• Lower loss than RG8U  
• 100% shielded-braid & foil

## HARDLINE/HELIX®

Lowest Loss  
for VHF/UHF!  
1/2" Alum. w/poly Jacket ..... \$ .79/ft.  
1/2" LDF4-50 Andrew Helix® ..... \$1.99/ft.  
3/4" LDF5-50 Andrew Helix® ..... \$4.99/ft.  
select connectors below  
Helix® is a Registered Trademark of the Andrew Corp.

Coaxial Cable Loss Characteristics (dB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	5.8
9086	50	.4	.64	1.7	3.1
1/2" Alum	50	.3	.5	1.2	2.2
1/2" Helix	50	.2	.4	.9	1.6
3/4" Helix	50	.1	.2	.5	.9

## HELIX® CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
1/2" Helix®	\$29	\$29	\$29	\$29
3/4" Helix®	\$55	\$55	\$55	\$55

## COAX CONNECTORS

Amphenol Silver PL259	\$1.50
UG21B N Male	\$3.50
9086/9913 N Male Connector	\$4.95

## ANTENNA WIRE & ACCESSORIES

Stranded Copper 14ga ..... \$ .10/ft.  
1/4 mile 18ga copper-clad steel wire ..... \$30  
Dog bone end insulator ..... \$ .79 ea.

## Van Gorden

1:1 Balun	\$15	Center Insulator	\$8
Dipole Kits	D80 \$31.95/D40 \$28.95		
Short Dipole Kits	SD80 \$35.95/SD40 \$33.95		
All-band Dipole w/ladder line	\$29.95		
G5RV all band antenna	\$49.95		

## ALPHA DELTA

DX-A 160-80-40 Sloper ..... \$49

## CUSHCRAFT

A3 3-el Tribander .....  
A4S 4-el Tribander Beam w/S.S. Hdwre .....  
A743 & A744, 30/40 mtr KIT for the A3 & A4 .....  
R4 20-10 mtr Vertical .....  
AP8 80-10 mtr Vertical .....  
AV5 80-10 mtr Vertical .....  
D40 40 mtr Dipole .....  
40-2CD 2-el 40 mtr Beam .....  
A50-5 5-el 6 mtr Beam .....  
215 WB NEW 15-el 2 mtr Beam .....  
230 WB NEW 30-el 2 mtr Beam .....  
4218 XL 18-el 2 mtr Beam .....  
3219 19-el 2 mtr Beam .....  
424B 24-el 432 MHz Beam .....  
ARX2B 2 mtr Vertical .....



Discoverer 2-el 40-mtr Beam .....  
Discoverer 3-el Conversion Kit .....  
EXPLORER-14 SUPER-SPECIAL .....  
QK710 30/40 mtr. Add-On-Kit .....  
V2S 2-mtr Base Vertical .....  
V4S 440MHz Base Vertical .....  
TH5MK2S Broad Band 5-el Triband Beam .....  
TH7DXS 7-el Triband Beam .....  
TH3JRS 3-el Triband Beam .....  
205BAS 5-el 20-mtr Beam .....  
155BAS 5-el 15-mtr Beam .....  
105BAS 5-el 10-mtr Beam .....  
204BAS 4-el 20-mtr Beam .....  
64BS 4-el 6-mtr Beam .....  
12 AVQ 20-10 mtr vertical .....  
14 AVQ 40-10 mtr vertical .....  
18 AVT/WB 80-10mtr Vertical .....  
18HTS 80-10 mtr Hy-Tower Vertical .....  
23BS 3-el 2 mtr Beam .....  
25BS 5-el 2 mtr Beam .....  
28BS 8-el 2 mtr Beam .....  
214BS 14-el 2-mtr Beam .....  
2BDQ 80/40 mtr Trap Dipole .....  
5BDQ 80-10 mtr Trap Dipole .....  
BN86 80-10 mtr KW Balun W/Coax Seal .....

## HUSTLER

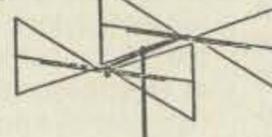
6BTV 80-10 mtr Vert \$149 5BTV 80-10 mtr Vert \$129  
4BTV 40-10 mtr Vert \$99 67-144 2-mtr Base \$129  
G6-144B 2-mtr Base \$89  
Mobile Resonators 10m 15m 20m 40m 75m  
400W Standard \$16 \$17 \$19 \$22 \$26  
2KW Super \$20 \$22 \$25 \$29 \$39  
Bumper Mounts - Springs - Folding Masts in Stock!

## BUTTERNUT ELECTRONICS CO

HF6VX 80-10m Vertical \$159.95 Delivered  
• Full Legal Power  
• Highest Q Tuning Circuits  
HF2V 80-40m Vertical \$149.95 Delivered  
• Full Legal Power  
• Automatic Band Switching  
Accessories:  
RMK II Roof Mtg. Kit ..... \$59.95  
STR II Stub-Tuned Radials ..... \$39.95  
TBR160 160m Coil Kit ..... \$59.95  
30m Add-on Kit ..... \$39.95  
17/12m Add-on Kit ..... \$39.95

FREE UPS on ACCESSORIES when  
purchased with antenna

## HF5B "Butterfly" 20-10m Compact Beam \$259.95



• Unique Design  
• Reduces Size  
• No Lossy Traps  
• Turns w/TV Rotor  
• Boom Length 6 Feet  
• Element Length 12.5 Feet

FREE UPS Shipping in Continental USA

## MIRAGE/KLM

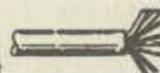
KT34A 4-el Broad Band Triband Beam ..... \$419  
KT34XA 6-el Broad Band Triband Beam ..... \$619

## ROTORS

Alliance HD73 (10.7 sq. ft. rating) ..... \$129.95  
Alliance U110 (3 sq. ft. rating) ..... \$49  
Telex CD 4511 (8.5 sq. ft. rating) ..... \$Call  
Telex HAM 4 (15 sq. ft. rating) ..... \$Call  
Telex Tailtwister (20 sq. ft. rating) ..... \$Call  
Telex HDR300 Heavy Duty (25 sq. ft. rating) ..... \$Call

## ROTOR CABLE

Standard 8 cord cables \$.25/ft.  
(vinyl jacket 2-#18 & 6-#22 ga)  
Heavy Duty 8 Cord cable \$.45/ft  
(vinyl jacket 2-#16 & 6-#18 ga)



## ROHN GUYED TOWER SECTIONS

10 FT. STACKED SECTIONS  
20G ..... \$54.50 45G ..... \$153.50  
25G ..... \$65.50 55G ..... \$197.50  
ALL ACCESSORIES IN STOCK—CALL

## ROHN FOLDOVER TOWERS

Model	Height	Ant. Load*	Price
FK2548	48 ft.	15.4 sq. ft.	CALL FOR PRICES
FK2558	58 ft.	13.3 sq. ft.	CALL FOR PRICES
FK2568	68 ft.	11.7 sq. ft.	CALL FOR PRICES
FK4544	44 ft.	34.8 sq. ft.	CALL FOR PRICES
FK4554	54 ft.	29.1 sq. ft.	CALL FOR PRICES
FK4564	64 ft.	28.4 sq. ft.	CALL FOR PRICES

25G Double Guy Kit ..... \$299.  
45G Double Guy Kit ..... \$319.

\*Above antenna loads for 70 mph winds w/guys at hinge and  
apex. All foldover towers shipped freight prepaid in 48 states.  
Prices 10% higher west of Rockies.

## TOWER/GUY HARDWARE

3/16 EHS Guywire (3990 lb rating) ..... \$ .15/ft  
1/4 EHS Guywire (6650 lb rating) ..... \$ .18/ft  
5/16 EHS Guywire (11,200 lb rating) ..... \$ .29/ft  
5/32 7 x 7 Aircraft Cable (2700 lb rating) ..... \$ .15/ft  
3/16 CCM Cable Clamp (3/16" or 5/32") ..... \$ .45  
1/4 CCM Cable Clamp (1/4" Cable) ..... \$ .55  
1/4 TH Thimble (fits all sizes) ..... \$ .45  
3/8EE (3/8" Eye & Eye Turnbuckle) ..... \$6.95  
3/8EJ (3/8" Eye & Jaw Turnbuckle) ..... \$7.95  
1/2 x 9EE (1/2" x 9" Eye to Eye Turnbuckle) ..... \$9.95  
1/2 x 9EJ (1/2" x 9" Eye & Jaw Turnbuckle) ..... \$10.95  
1/2 x 12EE (1/2" x 12" Eye & Eye Turnbuckle) ..... \$12.95  
1/2 x 12EJ (1/2" x 12" Eye & Jaw Turnbuckle) ..... \$13.95  
5/8 x 12EJ (5/8" x 12" Eye & Jaw Turnbuckle) ..... \$16.95  
3/16" Preformed Guy Grip ..... \$2.49  
1/4" Preformed Guy Grip ..... \$2.99  
6" Diam - 4 ft Long Earth Screw Anchor ..... \$19.95  
500 D Guy Insulator (5/32" or 3/16" Cable) ..... \$1.89  
502 Guy Insulator (1/4" Cable) ..... \$2.99  
5/8" Diam - 8 ft Copper Clad Ground Rod ..... \$12.95

## PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating) ..... \$ .32/ft  
HPTG4000 Guy Cable (4000 lb rating) ..... \$ .52/ft  
HPTG6700 Guy Cable (6700 lb rating) ..... \$ .72/ft  
9901LD Cable End (for 2100/4000 cable) ..... \$9.95  
9902LD Cable End (for 6700 cable) ..... \$11.95  
Socketfast Potting Compound (does 6-8 ends) ..... \$16.95

## GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
.12 in Wall	\$29	\$49	\$69	\$89
.18 in Wall	\$49	\$89	\$129	\$149
.25 in Wall	\$69	\$129	\$189	\$249

**ORDER TOLL FREE 1-800-272-3467**

Texas, Alaska & for information 1 (214) 422-7306



# TEXAS TOWERS

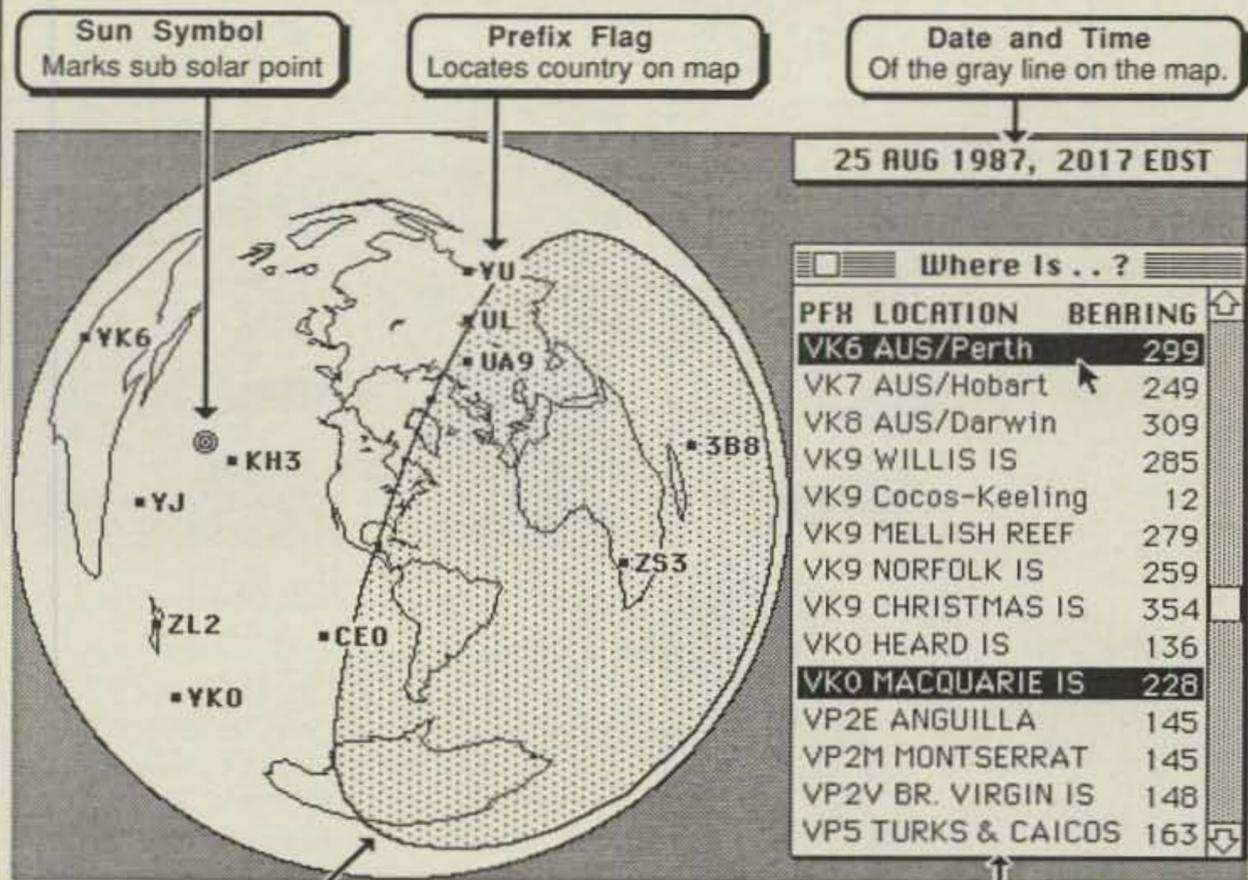
Mon-Fri: 9 am-5pm  
Sat: 9 am-1pm

Div. of Texas RF Distributors Inc., 1108 Summit Ave., Suite 4 • Plano, Texas 75074

(Prices & Availability Subject To Change Without Notice)

(Antenna/tower product prices do not include shipping unless noted otherwise)

## DX Window™ Features



### The Gray Line

The gray line divides Earth's surface between night and day, and its position is an important factor in HF radio communication. DX Window will compute and show the gray line for any date and time you request (using an easy to use dialog box), or you can push a dialog button and have DX Window compute the sunrise or sunset time. Or you can let DX Window simply get the time from the clock inside your Macintosh.

### The Where Is . . . ? Window

The Where Is window is fitted with a scroll bar that lets you scan through a list of over 400 world wide locations which shows their international radio amateur prefixes, and beam headings from your QTH. When you click on an item in the list, it is highlighted, and a small prefix flag is raised on the radio map. You can raise as many as twenty flags. Clicking on a highlighted item removes the highlight and lowers the flag.

DX Window™ runs on Macintosh™ 512, 512 Enhanced, Plus, and SE computers.  
Engineering Systems Inc. PO Box 939, Vienna, Virginia 22180

Fig. 2- DX Window features. This Apple Macintosh program from Engineering Systems, Inc., takes advantage of the Mac's easy-to-use graphic interface to generate grayline propagation information as well as great-circle beam headings to over 400 worldwide locations. The program is priced at \$60.

Why operate QRP? Some of the major advantages, in addition to the challenge factor, include minimum expense and equipment weight, easier emergency communications and portable operation, practical long-term battery operation, and—not the least—scoring advantages in contests. On the flip side, commercial QRP equipment selection is limited, and voice communications is sometimes more difficult using QRP, meaning that CW QRP is the more popular operating mode.

There's a special-interest group for QRPers, known as the QRP Amateur Radio Club International, Inc., whose motto is "power is no substitute for skill." The club, founded by K6JSS in 1961, has as its purpose the joining together of that segment of amateurs who enjoy running low power. The club encourages

the use of QRP by means of awards programs, activities, and contests. QRP ARCI also publishes a quarterly newsletter, holds regular QSO parties, and has a family membership available. Yearly dues are \$5.

For more information, contact Bill Harding, K4AHK, Secretary-Treasurer, QRP ARCI, Inc., 10923 Carters Oak Way, Burke, VA 22015. (An SASE is appreciated when corresponding with any of the club's officers.)

### Wrapping It Up

Okay, that's all for this month. Next month more Antennas & Accessories topics of current interest. See you then.

*Overheard:* Treat others' faults as graciously as you would your own.

73, Karl, W8FX

# 1990 CALLBOOKS



## THE QSL BOOK!

Extending a 69 year tradition, we bring you three new Callbooks for 1990 with more features than ever before.

The 1990 North American Callbook lists the calls, names, and address information for over 500,000 licensed radio amateurs in all countries of North America, from Panama to Canada including Greenland, Bermuda, and the Caribbean islands plus Hawaii and the U.S. possessions.

The new 1990 International Callbook lists 500,000 licensed radio amateurs in the countries outside North America. It covers South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The 1990 Callbook Supplement will be published June 1, 1990, with thousands of new licenses, address changes, and call sign changes received over the preceding six months. This single Supplement will update both the North American and International Callbooks.

Every active amateur needs the Callbook! Fully updated and loaded with extra features, the new 1990 Callbooks will be published December 1, 1989. Order now for early delivery when these latest Callbook are available. See your dealer or order directly from the publisher.

- North American Callbook  
incl. shipping within USA \$31.00  
incl. shipping to foreign countries 37.00
- International Callbook  
incl. shipping within USA \$33.00  
incl. shipping to foreign countries 39.00
- Callbook Supplement, published June 1st  
incl. shipping within USA \$13.00  
incl. shipping to foreign countries 14.00

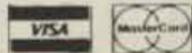
### SPECIAL OFFER

- Both N.A. & International Callbooks  
incl. shipping within USA \$61.00  
incl. shipping to foreign countries 71.00

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All payments must be in U.S. funds.

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CIRCLE 152 ON READER SERVICE CARD

## NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for September is:

**William "Bill" Willis, KC3YT  
USA-CA All Counties #600, Mixed,  
12-16-88**

"As a gift in 1970 my wife, Bea, gave me a little VHF monitor. At the time I thought it was a stupid gift. This receiver was silent most of the time.

"Yes, I did a little time on CB and found it to be worthless, although it did arouse my curiosity about ham radio.

"I obtained my Novice license as WN3SDU in February 1972. This Novice license also qualified me to join Army MARS and to participate on voice. In June 1972 I obtained my Technician license as WA3SDU. Finally, graduation day arrived in March 1974, and I knew my General license was to be granted as the FCC examiner smiled as he spoke his answer.

"My first new transceiver was the Drake TR-4C, which was my graduation gift to myself. You justify the expenditure to your wife saying 'X' dollars divided by approximately ten years equals a cheap hobby, and it keeps you home at night. For me, many late nights were spent working DX, checking into various nets, and finally working the 50 states in 1975. For the bicentennial (1976) I convinced my ham friend to work the 50 states, and I agreed to start again. As you know, a contact doesn't count until you have a signed card. Well, he finished his Bicentennial WAS a couple weeks ahead of me.

"There was a short period when I lost interest in ham radio, after my 2 meter set was stolen from my auto.

"I loaned my brother Willis, KJ4EJ, a receiver hoping that he would get interested in ham radio. Shaking the dust out of it, he returned it to me, and I thought, 'No progress,' as he was planning to move to Florida when he retired in January 1984 at age 55.

"About the time I retired from the DuPont Company Engineering Department in November 1982 at age 57, my interest in ham radio became very lively again. While working for DuPont I was involved in the mechanical design of machinery for producing Nylon, Dacron, and other products.

"In the spring of 1985 my brother sent me a card saying that KJ4EJ wished to communicate with WA3SDU. On our trip to Florida, 'Willis' explained how he was



Bill Willis, KC3YT, proud holder of USA-CA All Counties #600.

working the counties. I had heard of the county hunters but had never participated. After tuning my antenna system to the CH Net frequency, I started calling in to test the water. In July 1985 I worked KB7QO in the 2nd District, Alaska, and that really got me started.

"My first 1000 county contacts were confirmed by May 1986, and KJ4EJ then had 1500. We stayed approximately 500 apart for many months. Our first exposure to the 'eye-ball' QSO was at the Asheville, North Carolina MARAC convention in July 1986. At that time KJ4EJ held an Advanced class license, so I felt that I had to upgrade my license. I received my new class license, along with the call KC3YT, effective in August 1986. Both of us then really got hooked on county hunting.

"My brother and I both drove new autos to the county hunters convention in Manchester, Tennessee in November 1987. Thirteen months later KJ4EJ had 38,000 miles on his car, and I had 26,000 on mine.

"In August 1988 when we compared our lists of counties needed to finish All Counties, we realized there were about four or five we both needed scattered around the country. I needed approximately 75 total, and he needed approximately 30.

"My brother gave me many counties on his trip across the country, and at payback time I gave him many in the southern part of the country. A county in a valley in the mountains of Tennessee comes to mind. I remarked to my wife, 'I don't



KC3YT, with wife, Bea. It was a great day!

know if he will hear me,' and then called out, 'KJ4EJ this is KC3YT.' Willis came right back with '59, brother.' That was the first time my wife showed any real emotion, as she knew we would never have left that county without completing the contact.

"In late September I sent a list to a few active county hunters, and I also acted as net control or assistant quite a lot. My list of needed counties was down to *one* when I arrived at the Manchester, Tennessee convention in November 1988. When KJ4EJ arrived there his list was down to *three*.

"Finally the big day arrived, and I left Wilmington, Delaware at 3:30 AM knowing that KJ4EJ had spent the night in Florence, South Carolina, and that we could easily meet in the afternoon for that *big contact*. However, KJ4EJ stopped at the QTH of K4QFK for a cup of coffee, and must have found Pete with a bottomless pot. I arrived at our destination in the afternoon and asked Paul, WA3TUC, to tell KJ4EJ I was stopping for food at Exit 141. Hearing them questioning 'What city?' kind of threw me off base. I responded, 'He knows where I am,' but in reality KJ4EJ could not believe I would be at the meeting point so early.

"As you all know now, KJ4EJ, USA-CA All Counties #599 and KC3YT, USA-CA All Counties #600 each gave the other the last contact to complete All Counties. That last one was Rockingham, North Carolina for both. Perhaps that is a first.

"That was really the climax of our county hunting, and we, as well as my wife, Bea, and his wife, Sue, thank all those active county hunters for all their help. It is not a few; it is the whole group that counts.

"As I have said to others, we are all blessed to be a part of this great country, and county hunting brings to our attention how lovely is our land.—73, Bill."

333 South Lincoln Ave., Mundelein, IL  
60060

### USA-CA Special Honor Roll

Joyce B. La Gasse, WA1YZV  
USA-CA All Counties #617,  
All SSB Mobiles  
5-5-89

Alfred B. "Al" Cornwall, W7HZL  
USA-CA All Counties #618, All CW  
5-10-89

Robert G. Lawrence, K8DTO  
USA-CA All Counties #619, All SSB  
5-22-89

### Awards Issued

Joyce B. La Gasse, WA1YZV, completed her paperwork in good order and received USA-CA All Counties #617, USA-CA 3000 #648, USA-CA 2500 #724, and USA-CA 2000 #790, All SSB Mobiles, dated 5-5-89.

Alfred B. "Al" Cornwall, W7HZL, made that last step in his quest and claimed USA-CA All Counties #618, All CW, dated 5-10-89.

Robert G. Lawrence, K8DTO, filed his completely filled record book and received USA-CA All Counties #619, USA-CA 3000 #649, USA-CA 2500 #725, USA-CA 2000 #791, USA-CA 1500 #879, USA-CA 1000 #1067, and USA-CA 500 #2331, All SSB, dated 5-22-89.

Alvin B. Unruh, W0AWP, received USA-CA 2000 #789, All CW, dated

### USA-CA Honor Roll

3000		1000	
WA1YZV	648	KD0SA	1066
K8DTO	649	K8DTO	1067
2500		500	
WA1YZV	724	KD0SA	2328
K8DTO	725	UB5DW	2329
		VE1GU	2330
2000		K8DTO	2331
W0AWP	789	NX5Z	2332
WA1YZV	790	EA8AKN	2333
K8DTO	791	WA4NBC	2334
		K7AYC	2335
1500		N0EYK	2336
K8DTO	879		

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is \$4.00. For non-subscribers, it is \$10.00. Initial application must be submitted in the USA-CA Record Book which may be obtained from CQ Communications, 76 North Broadway, Hicksville, NY 11801, USA for \$1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending an SASE to Dorothy Johnson, WB9RCY, USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060 USA. DX stations must include extra postage for air-mail reply.



Operating QTH of Dov Gavish, 4Z4DX, holder of USA-CA 1500 #877.

4-27-89. (Ed. note: Last month we reported Alvin's having received USA-CA 500 through USA-CA 1500, also All CW and dated 4-27-89.)

Tom Peischi, KD0SA, got off to a good start by filing his good application for USA-CA 1000 #1066, and USA-CA 500 #2328, Mixed, dated 5-6-89.

USA-CA 500 certificates went to: Tom Peischi, KD0SA, USA-CA 500 #2328, Mixed, 5-6-89.

Anatoly Chichko, UB5DW, USA-CA 500 #2329, Mixed, 5-12-89.

Ronald P. Smith, VE1GU, USA-CA 500 #2330, Mixed, 5-22-89.

Robert G. Lawrence, K8DTO, USA-CA 500 #2331, All SSB, 5-22-89.

Sam H. Moore, Jr., NX5Z, USA-CA 500 #2332, Mixed, 5-24-89.

Antonio de Armas, EA8AKN, USA-CA 500 #2333, All SSB, 5-26-89.

Clark E. "Gene" Little, WA4NBC, USA-CA 500 #2334, Mixed, 5-30-89.

Roger Nace, K7AYC, USA-CA 500 #2335, All SSB Mobiles, 5-30-89.

Kathleen Nace, N0EYK, USA-CA 500 #2336, All SSB Mobiles, 5-30-89.

### Awards Available

**Andorra 5 Bands Award.** The Andorran Amateur Radio Society has announced the creation of its first permanent amateur radio award. The following rules and accompanying facsimile award were fur-



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The registration fee is 12 IRCs, including postage charges for the award. Apply to the F-DX-F Manager: F6EEM, 4 rue Duguesclin, F35170 BRUZ.

### Notes

We have two corrections to make. CQ, June 1989, page 66, Ray Tordiff, K8LQJ, should be Roy Tordiff, W8LQJ. CQ, April 1989, page 103, DJ7CS (Bruno Stangnowski picture) should be DL7CS. Sorry about that, gentlemen!

Until next month, Happy Hamming!  
73, Dorothy, WB9RCY

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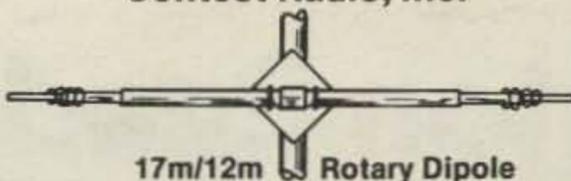
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CIRCLE 123 ON READER SERVICE CARD



### Pressure Mounts on the Electromagnetic Spectrum

**T**his month we discuss what appears to be four separate issues:

1. The FCC's recent refusal to reconsider their ruling to reallocate 2 MHz from the 220 MHz amateur band to business interests;

2. The Commission decision to implement spectrum sharing between current radio services (including the Amateur Radio Service) and low-power devices;

3. We examine a bill being introduced into Congress that provides for reassignment of government radio frequencies over the long term to new technologies in the private sector; and

4. We excerpt from two recent speeches given by Ralph Haller, N4RH, Chief of the FCC's Private Radio Bureau.

Actually, all seem to make the same point! The message is that for all practical purposes the radio spectrum has been used up, but the need for radio frequencies continues to skyrocket.

#### FCC Declines To Reconsider 220 MHz Decision

It sort of looks like the reallocation of 2 MHz from the amateur 220-225 MHz band to business interests is going to stand. The FCC has denied petitions from the ARRL, the National Communications System (which falls under the U.S. Department of Defense), and hundreds of amateurs and amateur organizations asking for reconsideration of its decision to redistribute spectrum presently occupied by the amateur 1 1/4 meter band. The reconsideration matter was presented to the FCC Commissioners by the FCC's Office of Engineering and Technology (OET).

OET said that a number of factors were important considerations in reaching a decision. "... there was a need to provide spectrum for the Land Mobile Service to foster the development of spectrum efficient narrowband technology. Such technology is expected to play an important role in the ... continued growth of the Land Mobile Service."

The FCC "... concluded that the public

interest would be best served by a compromise of allocating 2 MHz, 220-222 MHz, to the Land Mobile Service, and the upper 3 MHz to the Amateur Service."

In response to their August 1988 decision, the Commission received about 700 petitions for reconsideration from amateur groups and individual amateurs. In general, the petitions argued that the entire 220-225 MHz frequency band should be allocated to the Amateur Service on a primary basis. Amateurs contend that the Commission has not given adequate consideration to other alternative allocations for the Land Mobile Service, particularly to the use of the spectrum in the 216 to 220 MHz band.

The FCC replied that they had indeed "... considered a wide variety of alternatives at length. ... However, none provided [a] satisfactory solution. Use of the 216-220 MHz band for the Land Mobile Service substantially increased the risk of interference to TV channel 13 stations operating in the 210-216 MHz band. The restrictions needed to avoid interference would be so severe [as] to make the spectrum unusable for Land Mobile Service in many major urban areas. Also Land Mobile use of the 216-220 MHz band would not be compatible with the existing automated maritime telecommunications systems operating in the Mississippi River and the Gulf of Mexico."

Amateurs assert that contrary to the Commission's conclusion in the Report and Order, it will not be possible to accommodate existing amateur operations in the 220-222 MHz band in the upper 3 MHz of the 1 1/4 meter band. Amateurs are concerned in particular about urban areas where 220 MHz use is greatest. The FCC said, "... we recognize that in the top metropolitan areas, that more efficient use of the spectrum will be required and in some cases, it will be necessary to share frequencies or shift some operations to higher frequency amateur bands."

One of the FCC's principal concerns was the impact of the 220-222 MHz reallocation on amateurs' ability to provide emergency communications. It is well known that amateurs often provide communications in the event of natural disasters and other emergencies when other communication systems fail. The Commission said they believe that amateurs

"... will continue to have ample spectrum to provide emergency communications. Amateurs have designated more than 600 channels which support over 10,000 repeater operations and six amateur bands between 50 and 1300 MHz."

The American Radio Relay League (ARRL) asked the Commission to allow additional oral arguments in the reallocation proceeding. In denying the request, the FCC said they already have "... a complete written record ... some 34 volumes. Further, the interested parties have met on several occasions with members of the Commission and this staff to explain their position. Nothing before us suggests that oral argument would bring forth any new information."

Commissioner Quello said that it was common knowledge that "... the Amateur Service was well disciplined and organized." He felt that the new 220 MHz spectrum division between the Land Mobile and the Amateur Service "was well done ... and good statesmanship." Commissioner Dennis asked about "footnote 16," which suggested the ARRL submit a petition seeking spectrum sharing between amateurs and the maritime mobile users in the 216-220 MHz band on a secondary basis. Dennis also noted that Congress had suggested this as a possible compromise.

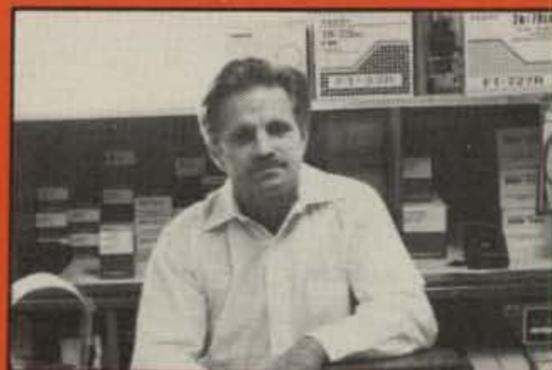
FCC Chairman Patrick also agreed that the reallocation was correctly concluded. "I think it is appropriate for us to allocate [the 220-222 MHz] spectrum on an exclusive basis to encourage the development of narrowband technology and at the same time we do value the Amateur Service greatly and I think we have accommodated their concerns and their needs in terms of spectrum. ... We are talking about a small amount of the spectrum to which amateurs have access, number one ... and number two, we are giving them exclusive access to [the remainder of the 220-225 MHz] spectrum. At that point, Patrick asked for a Commissioner vote. It was unanimous: All Petitions for Reconsideration were denied.

**ARRL Says: Next Stop, Federal Court!** "The Commission's action today is a disappointment, but not a surprise," commented ARRL Executive Vice President David Sumner. "The entire history of this proceeding is one of the Commission ignoring evidence that did not support its pre-

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conceived position. Now it will be up to the Federal Court of Appeals to determine whether, by so doing, the Commission overstepped its bounds."

Commenting on the possibility of shared spectrum use by amateurs of the 216-220 MHz band, Sumner said, "We don't hold out much hope of this coming to pass. The way for the Commission to demonstrate sincerity would have been to deal with this possibility now, rather than to relegate it to some uncertain future time."

Amateurs use the 220 to 222 MHz frequency band for a variety of purposes, including development of a state-of-the-art inter-city data communications network that offers a backup emergency communications capability to the government and the general public. No date has been set by the FCC for terminating amateur access to the 220-222 MHz band.

### §Part 15 Motion Denied

The FCC also denied the ARRL's motion to stay (prevent) the implementation of the new §Part 15 rules. The new rules deregulate much of §Part 15, which governs most nonlicensed radio devices. New low-power consumer products will be allowed on many bands. These bands include amateur spectrum and the spectrum of most other radio services. Several "general" bands were also set aside for slightly higher (but still very low) power levels. The general bands are in Industrial-Scientific-Medical spectrum in which amateurs are allowed to operate.

The League maintains that the general radiation limits for §Part 15 devices are too high. It warned against the co-location of §Part 15 devices and amateur stations in residential areas in the same frequency bands. It argued that, to the extent the FCC permits §Part 15 operations in bands allocated for amateur use, interference will result and amateurs will be irreparably harmed. The ARRL submitted documentation of an interference analysis model which claimed that significant interference will be caused to amateurs from §Part 15 devices.

Disputing the League's position, the FCC said that "Many of the changes in §Part 15 either do not affect amateur operations or would actually reduce the potential that interference would be caused to amateurs." The FCC noted that the only change in emission limits at 1.705-10 MHz was to "... reduce interference potential by placing a limit on peak emissions. . . . Between 10 MHz and 30 MHz, because of the change in measurement technique from average to quasi-peak, the new limit is not substantially, if at all, higher than under the former rules. Indeed, depending on the form of modulation used, emissions limits in this band may be considerably less."

The Commission said that under these

circumstances, it is unnecessary to examine the "predictive virtues" of the ARRL's interference analysis model. Between 30 and 900 MHz, the FCC said, the ARRL's calculations assumed no attenuation due to intervening objects and assumed average [old rules] rather than quasi-peak emission limits [new rules]. "Predictions of interference based on these assumptions are not persuasive," the agency said, pointing out that the ARRL also assumed no attenuation from objects in the general bands above 900 MHz.

"Although we appreciate the League's fears of increased interference in the bands discussed above, they are unfounded," the Commission continued. "We are unaware of any interference to amateur operations from §Part 15 transmitters in the 1.705-30 MHz band. The large numbers of licensed users of these bands effectively preclude the general operation of §Part 15 devices. Only those devices used in relatively shielded areas can be used at the §Part 15 emission limits. It is not likely that this situation will change." The FCC said a similar situation exists in the spectrum 30-900 MHz.

The FCC noted that there have been thousands of §Part 15 field disturbance sensors [security devices] operating above 900 MHz on frequencies allocated to the amateur service for a number of years, at "significantly higher emission levels than permitted under the new rules. Based on the League's calculations, widespread interference to amateurs should be expected. In fact, interference from these devices does not appear to be a problem."

The Commission's action denies only the ARRL's motion for stay, and a motion for stay filed for unrelated reasons by a maker of anti-theft devices. The agency did not rule on any of the seventeen Petitions for Reconsideration filed in the proceeding. Based on this FCC denial, however, it would seem that there is not a high probability of success for the ARRL petition.

### House Bill Looks Toward Shuffling Spectrum

A bill is in the process of being introduced into Congress looking toward reassigning radio spectrum from the Government inventory to the private sector. John Dingell (D-Mich.), Chairman of the House Energy and Commerce Committee, and Telecommunications Subcommittee Chairman Ed Markey (D-Mass.) are backing legislation entitled the "Emerging Telecommunications Technologies Act of 1989."

The long-range legislation looks toward indentifying and reassigning government spectrum to non-government use. The bill directs the Secretary of Commerce to recommend which frequencies

might be reassigned to the private sector two years after the bill is approved. The spectrum would be given, rather than auctioned off, to the highest bidder.

Government radio spectrum is handled by the National Telecommunications and Information Administration (NTIA), while non-government spectrum is allocated by the Federal Communications Commission (FCC). Spectrum identified for reassignment would be transferred to FCC control to be parcelled out to new technologies that presently don't have a place to go.

The bill looks toward reassigning at least 200 MHz of spectrum located below 5 GHz over at least a 10 year period. About 40% of all assigned spectrum is reserved for Government use. The Department of Defense holds the biggest spectrum block.

There is nothing in the bill about amateur radio, but that's not necessarily good news. On the one hand the bill could be seen as relieving some pressure on the spectrum over the long term. On the other hand, the bill could be seen as a signal that it is time for a hard look at the spectrum fat-cats, and, like it or not, many view the holdings of the Amateur Radio Service as a plump tabby indeed—certainly more reason than ever to get the proportion of spectrum to amateur licensees in a more favorable ratio by increasing the number of users.

### Radio Spectrum Use Expands

FCC Private Radio Bureau Chief Ralph Haller, N4RH, recently made two significant addresses. He was a speaker at a luncheon meeting of The Radio Club of America and the annual Amateur Radio banquet of the Armed Forces Communications and Electronics Association (AFCEA) in Washington, D.C. In both speeches Haller offered a thought-provoking review of the uses of spectrum and challenges of the future. Here is an edited excerpt from his two presentations on topics of timely interest to amateurs:

#### N4RH on §Part 97 Amateur Radio Rules Rewrite

"This was our major project of the year. We tried to make the [amateur radio] rules much more understandable . . . to make them match today's technology. The new rules become effective on September 1. We received 173 comments in response to our Notice of Proposed Rulemaking. Many of the comments went to issues well beyond the scope of the rewrite, however, . . . and some sought reconsideration of past proceedings. Others wanted to raise new regulatory issues, . . . or wanted to debate requirements set forth in the Communications Act or the ITU Radio Regulations.

"Such matters previously decided in other proceedings or new regulatory is-

sues first raised in these comments were not addressed in this rulemaking. The rule making was really intended to clarify the rules that were there, as opposed to making major policy changes.

"Unlike the rules in most of the other radio services, §Part 97 now avoids the how-to specifics of amateur radio communication systems. Instead, it tries to simply state basic requirements that each operator and each station must observe. This lets you use your individual ingenuity, to develop communication systems tailored to your own interests and skills."

[Editor's note: We have had the complete text of the new §Part 97 Amateur Radio Rules printed into manuals. These are available at \$2.95 postpaid from: W5YI, P.O. Box 565101, Dallas, TX 75356. Ask for the new §Part 97 Rule Book.]

#### On Special Callsigns (PRB-3)

"We were seeking ways for you to obtain an amateur radio callsign of your choice from private sector organizations. We had 13 individual organizations interested in doing the work. PRB-3 had to be terminated, regrettably, because accessing a private contractor's database, monitoring the system and resolving disputes were simply beyond the resources of the Commission. At this point, we're also unable to offer the service ourselves.

"Now, we know that many of you would like to pick your own callsign. We have not granted a special callsign in 11 years. Even so, we still get about 250 requests each year for special callsigns. We don't have the resources to grant them, so to treat everyone equally and fairly, we don't grant any of them.

"A special callsign system is much more labor-intensive than our current automated system. The automated system assigns callsigns sequentially based on the mailing address and class of license. Prior to 1978, the FCC administered a mini-special callsign system. In it, we issued about 3,600 non-primary station licenses such as military recreation, secondary, club and RACES licenses, and special callsigns for Extra class licensees who met certain conditions.

"Remember, that's 3,600 licenses. In order to do that, we had a staff of six people. To administer the rest of the amateur licenses, which was 120,000, it took five people. Our automated system allows us today to process all of the amateur licenses, new, renewal and modifications, with just 2.5 persons. The automated system has helped us meet the demand for amateur licensing with half of the staff that it used to take to process the non-special callsigns."

#### On Consumption of Spectrum

"In my view, harnessing fire, inventing

the wheel, and controlling the electromagnetic spectrum are the three most significant events in the history of mankind. The origins of wireless communications—that elusive magic carpet that conveys human thoughts through the ether—are buried in antiquity. For example, the word *telegraph* may date back to 300 B.C. It is believed that it comes from the Greek words *tele* meaning *afar off*, and *graph* or *to write*. Together we have 'to write afar off.' The Greeks are also credited with having invented the first telegraph. Torches were arranged to represent letters of the Greek alphabet to convey messages between military units.

"It was only the turn of the century when Marconi made the first radio systems work. His efforts led to a transatlantic contact in 1901. Almost immediately, people began to grasp the importance of radio, especially for ship communications. The sinking of the *Titanic* in 1912 and subsequent legislation to mandate the carrying of radio equipment aboard vessels assured the success of radio. Along with that success came regulation and litigation. People lived for centuries without electronic communications. It took hundreds, even thousands of years for people to understand electromagnetism, but only 60 or 70 years for us to consume the resource.

"Think of your typical day. You wake up to a clock radio. You turn on a light that derives power from a power grid controlled by radio. During the night, police, fire and emergency services have been using radio to ensure safety. Your breakfast is cooked by a microwave oven. You watch the weather radar and news reports on TV. These signals were delivered to the TV station by satellite. You use a cordless telephone to make a call. On your way out, you may trip over the radio controlled toys that the kids have left. You use a radio controlled garage door opener.

"On your way to work, you place a call on your cellular telephone . . . and listen to a Top-40 radio station. Traffic lights you pass are controlled by radio. You hold to the speed limit because the police have radar. The skyline is shadowed by construction cranes that are controlled by radio.

"If you're like me, you commute to work on the Metro [Washington, D.C. subway], where a radio system links the high-speed trains to a master computer. You read a newspaper distributed by satellite. When you arrive at your workplace, music delivered by radio greets you at the elevator.

"Your desktop terminal uses radio to connect to the local network so that you can do your job, whatever you do. In our case, it's answering letters about the importance, or lack thereof, of Morse Code. [Laughter.]

"Radio systems monitor petroleum

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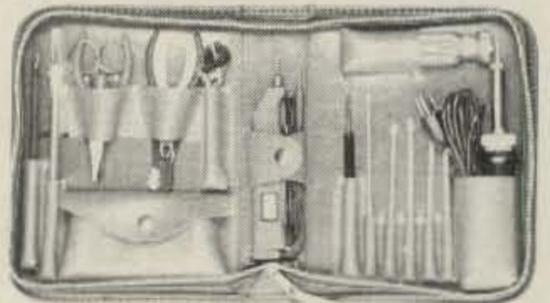
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and utility consumption, and they provide paging service. I haven't even mentioned the uses of radio in military, aviation and marine services . . . or in space. Amateurs know that we've barely scratched the surface of the potential of radio. Look at what's on the horizon: high-definition television, advanced cellular systems, direct-broadcast satellites, nationwide land mobile services, more and more appliances based on radio technology,

computers using radio frequencies, causing potentials for interference to the amateur service.

"Demand for spectrum increases daily. In fact, the rate of demand increases every day. But we've nearly consumed the entire radio spectrum in less than a single lifetime. It's kind of frightening to think about it. Where do we go from here? Can we continue on our merry way of letting each service promote its own narrow

interest? I think not. We've got to start working together. If we don't do that, among all the users that need radio, we're going to suffer the consequences. I hope the various radio services can work together to accommodate everyone's needs.

"One way to do that might be to change from analog to digital systems. We've just granted a waiver to a specialized land mobile operator who plans to use digital, and claims a 10-times improvement in spectrum efficiency. That's the kind of thing that we all need to be working for. Cable television and digital fiber optics offer more potential than almost anything else to ease spectrum congestion. Unfortunately, many of the regulations in this country are geared at inhibiting such technology while they promote existing spectrum uses or communication services.

"The amateur radio community has the potential to offer solutions. You have the spectrum; you have the technology available to you to help develop the new radio systems that will lead us into the 21st century. In the rules rewrite, the Commission made it clear that it wants to encourage the experimental nature of the amateur radio service. You people have a green light. The amateur service is free to branch out into an infinite number of different paths.

"We're encouraged by two significant examples of how the amateur community goes forward on its own. The first is repeaters. It boggles the mind to realize that there's a network of over 12,000 repeaters in this country. Amateurs did this completely on their own, without government funding and mostly on volunteer time. That is phenomenal.

"The other is the volunteer examining system. Last year, over 10,000 volunteer examiners administered over 90,000 elements to 54,000 people at nearly 5,000 exam points. Another 18,000 passed the Novice test. We haven't had a single complaint since we put the VEC system in about the lack of opportunity to take an amateur test. And that's something we as a government couldn't do. When we gave the tests, we had very restricted hours . . . and few exam points. The amateurs really took on this program and made it work. We could not be more pleased.

"Let these two systems serve as models of how the amateur community can work together to find new solutions. I predict that you will meet the challenge to help us find more efficient communication systems. The amateur service will play a very important role in meeting the public's expanding need for communications. Please take advantage of the multitude of opportunities available through amateur radio.

"Oh yes, one other thing. While you're enjoying your hobby, bring a friend along. Both of you will be glad you did."

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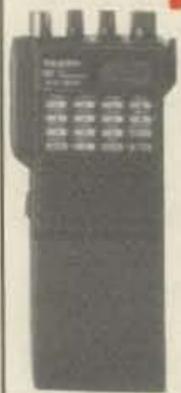
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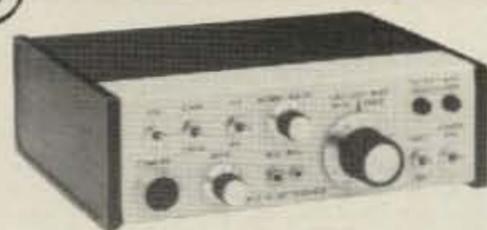
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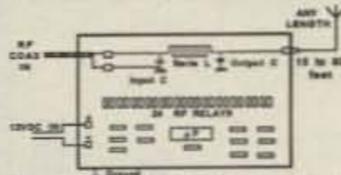


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# Contest Calendar

a monthly feature by  
JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

## CQ World-Wide SSB Contest Remembered

**B**y now I'm sure you have looked at the 1988 CQ WW SSB results in this month's issue. However, what were you doing at 0000Z on October 29, 1948? If you were Katashi Nose, KH6IJ, you had just begun operating the very first CQ World-Wide DX Contest. For Nose, this was only the beginning of 29 future SSB entries. The CQ WW Contest was conceived over dinner in New York City when a group of fellows led by notables such as Larry LeKashman, W2IOP/W9IOP, developed a set of contest rules that have remained fundamentally unchanged for over 40 years. Ironically, although contesters tend to separate contesting from DXing, it was the growth of DX chasing that advanced the phenomenal interest in the contest during the early years.

Judging by the operator comments I found, the inaugural CQ WW contest was a colossal success. The "DX men," as they were referred to, overwhelmingly supported the concepts of zone/country multipliers, 48-hour operating period, one weekend limit, no country QSO quota policy, and so on. The second year's activity (1949) exceeded the first by nearly 100%, forcing the magazine to begin publishing results over a two-month period. In that year 80 meters was experimentally dropped. Imagine how today's 80 meter guns would feel about that. As the contest gained popularity, so did its growing administrative load, forcing CQ magazine to relinquish control in 1952 to the first and only outside CQ WW sponsor, The International DX Club.

In today's modern age of communication it may seem trivial, but promoting the contest worldwide was no easy task in the early 1950s. Without the sponsorship of a major amateur publication, the job of managing and promoting a worldwide contest became nearly insurmountable. The turning point of the contest's history was in 1956 when our friend, Frank, W1WY, volunteered to form a committee and bring control back to CQ under his leadership. This happened quite by accident as he was visiting CQ Headquarters on other business and noticed the enormous pile of logs. It was that encounter which prompted Frank to later recall, "We didn't realize what we had let our-

### Calendar of Events

Aug. 26-27	All Asian CW Contest
Sept. 3	Bulgarian DX Contest
Sept. 6-8	YLRL "Howdy" Days
Sept. 9-10	European SSB Contest
Sept. 9-11	ARRL VHF QSO Party
Sept. 10	North American CW Sprint
Sept. 10	Texas DX Society WARC-Fest
Sept. 16-17	Scandinavian CW Contest
Sept. 16-17	CRRL CAN-AM SSB Contest
Sept. 17	North American SSB Sprint
Sept. 23-24	Scandinavian SSB Contest
Sept. 23-24	CQWW DX RTTY Contest
Sept. 23-24	Classic Homebrew Exchange
Sept. 23-24	CRRL CAN-AM CW Contest
Oct. 7-8	California QSO Party
Oct. 7-8	Pennsylvania QSO Party
Oct. 7-8	VK/ZL Oceania SSB Contest
Oct. 7-8	IRSA Radiosporting Contest
Oct. 8	RSGB 21/28 MHz Phone Contest
Oct. 14-15	VK/ZL Oceania CW Contest
Oct. 14-15	Boy Scout Jamboree
Oct. 15	RSGB 21 MHz CW Contest
Oct. 28-29	<b>CQWW DX Phone Contest</b>
Nov. 4-6	ARRL CW Sweepstakes
Nov. 10-12	Japan Intern'l. DX Contest
Nov. 11-12	European RTTY Contest
Nov. 18-20	ARRL SSB Sweepstakes
Nov. 25-26	<b>CQWW DX CW Contest</b>

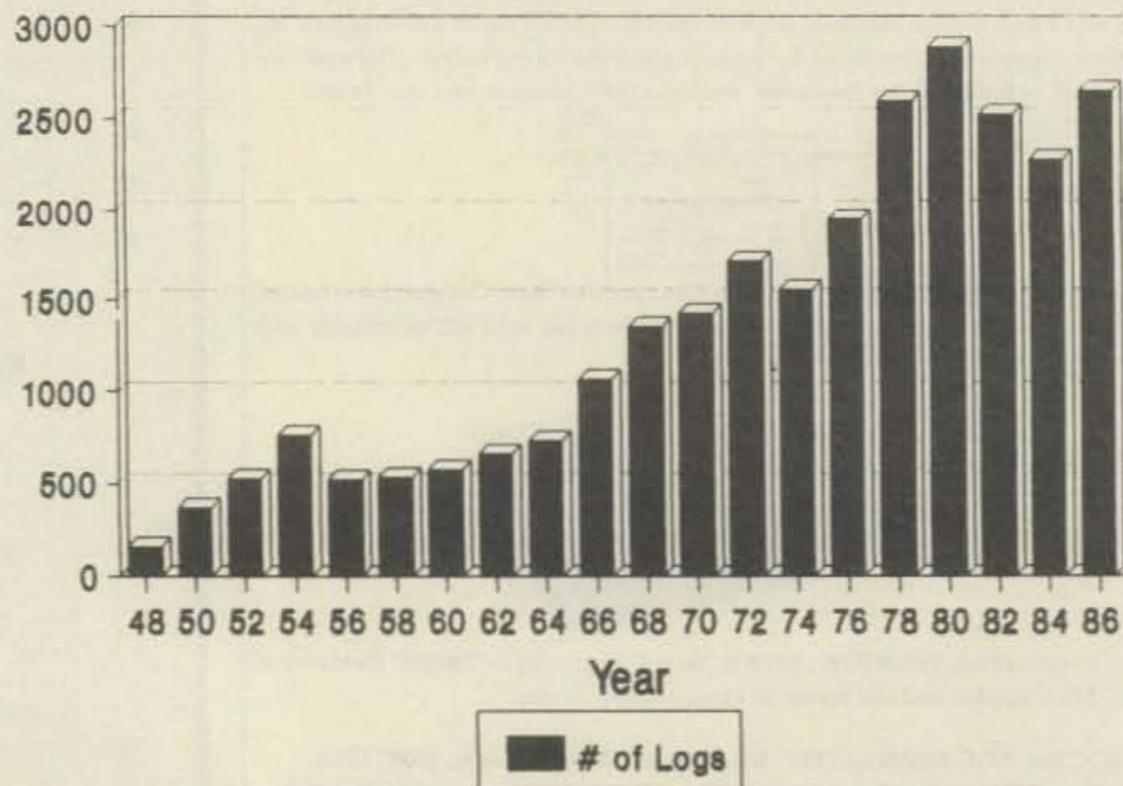
selves in for . . ." in the 1955 results (see Notable Quotes—CQ WW SSB). Frank's able command lasted for 20 years, clearly the longest of any CQ WW Director.

The 1959 contest was a landmark year as the Multi-Operator/Multi-Transmitter category was tested for the first time. Early results were hardly encouraging (see Category Winners chart), but today we can safely say that it was an experiment that worked! The CQ WW changed hands again in 1974 when Fred Caposela, K6SSS, accepted the position of Contest Director. Fred's competent leadership continued the fine tradition of the contest for two more years until the establishment of our current co-directors, Bob Cox, K3EST, and Larry Brockman, N6AR.

### Operating the CQ WW Has It Changed?

How much have winning operating strategies changed in the CQ WW? Many call signs came to mind as I considered who could best answer this question. One of our peers stood out as immensely qualified—Gene Walsh, N2AA. First licensed in 1954, Gene's first entre into the CQ

## Number of Logs CQ World Wide SSB Contest



2 Baldwin Street, Windham, NH 03087

Year	Quote
1948	"Give a DX operator, who spends all his time chasing elusive ones, some rules and you have the makings of a DX contest."
1949	"Experimentally, 80 Meters was dropped from the contest . . . there is continued agitation not to abandon the band as it is useful when properly employed."
1949	"It's the bitter truth, but average power of the U.S. winners was close to a KW."
1951	"Every now and then a few of the boys think too much publicity is given the high point men."
1953	"Space limitations do not permit listing of all the scores . . . You may have a full tabulation of your prefix/country by sending a SASE."
1954	"All logs this year have been checked by the Contest Committee and the Potomac Valley Radio Club."
1955	"We didn't realize what we had let ourselves in for when we offered our hand to CQ in checking the 1955 CQ World-Wide Contest.—W1WY"
1956	"Both the 3.5 and 27 MHz bands were little used by single band operators, although the all banders used them to good advantage."
1958	"Once again it was a run-away for the crew at K2GL . . . the boys were out to break a million points."
1958	"K2GL had as many as four transmitters going . . . Is it true, Buzz, next year you're installing an electronic computer to keep your score?"
1962	"To hear Ed Bissell of W3MSK fame tell it, it's the operator not the equipment that makes a good score."
1963	"VQ4RF had a real problem . . . Safari Ants and had to operate with one hand while he manned a spray gun in the other."
1966	"Many of you will find your claimed scores shaved down a bit."
1967	"The score from VK2ADY/9 was an other typical Don Miller performance . . . This year Don outdid himself."
1969	"Breaking a million by the single operator is now commonplace; a total of 44 stations did it this year."
1970	"We have added a new member to the Committee, Bob Cox, K3EST, who knows what contest operating is all about . . . now he knows what it is all about after the shouting stops."
1973	"The PJ9GIW multi-multi contest expedition . . . Curacao must have thought they were being invaded by an army (wonder what they think of PJ1B today!)."
1974	"Phone is such hard work—W4KFC"
1975	"Many thanks to the W2 who included a check for \$88.20 with this log. Unfortunately, it wasn't made out to the committee . . . besides, if you want to tempt us, it has to be at least three digits!"
1977	"Then there was the chap who dropped us a line asking which magazine would carry the CQ WW contest results—QST or 73?"
1978	"As I was dropping wire out the apartment window from 260 feet, some turkey was coiling it up a few floors below—VE3FAC"
1981	"Who says missionaries only run phone patches?—WB5SNA/HR2"
1983	"Sunspots may decline, but the spirit of the CQ WW contesteer just can't be broken."
1984	"Es mi primer concurso y prometo que no sera el ultimo! Divertdiiiisimo!—EA6SX"
1986	"Finally go them—N5AU"
1987	"Spent 15 minutes using my dummy load, but worked VE1CYL 2 blocks away for a new multiplier!—VE1CBF/QRPP"

Table I—Notable quotes, CQ WW SSB Contest results.

WW was in 1957 as K2KUR. A little-known fact, however, is Gene's efforts in 1963 as 5A1TW. Not only did Gene's 5A1TW 1964 African record stand for 20+ years, his 1963 accomplishments still stand as one of the rare times in the history of the CQ WW when anyone has won *Single Operator, All Band—World* on both modes in the same year!

Amateur radio was much different in the mid-60s. There were fewer pileups, more CW operators, and certainly no DX lists. And, yes, amateurs signed their entire callsigns (a subject for a future column). In 1963 Libya sported 40+ active amateurs, most of whom were not of the contest persuasion. Gene's station was fairly simple—KWM-2 and a TA-33jr/Win-

dom combination with an external HQ-180.

After my interview with Gene I've concluded that unlike today, very different strategies were used in the CQ WW contests of 25 years ago. Of course, you still needed to establish your goal before the contest. However, the way you achieved that goal was much different. For example, contests were not nearly as organized. There were only a handful of people to talk to on the air about contest operating and certainly no one in person except for a few contest clubs. Consequently, there was not nearly as much activity during the contest (see CQ WW Log Entries graph). It was commonplace for 20 meters to drop out at 6 PM local time from an activity perspective. This meant that as a



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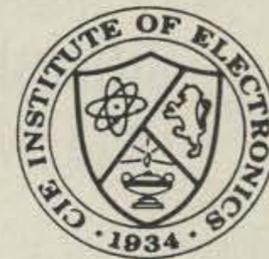
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Year	Single Op		Multi-Single		Multi-Multi	
	Call	Score	Call	Score	Call	Score
1948	W8KML	55,875	W6SA	47,790	—	—
1949	W1ATE	83,664	W6SA	60,060	—	—
1950	W1ATE	88,000	W6AM	40,629	—	—
1951	W4ESK	126,723	W6RRG	69,832	—	—
1952	W1ATE	131,930	W6AM	61,270	—	—
1953	W1ATE	155,742	W7DL	86,223	—	—
1954	W1ATE	176,881	W6AM	98,100	—	—
1955	W6YY	194,484	W2HJR	417,880	—	—
1956	K2AAA	397,500	K2GL	251,008	—	—
1957	W6YY	265,630	K2GL	866,250	—	—
1958	W9EWC	151,726	K2GL	777,218	—	—
1959	W1ONK	212,816	K6EVR	160,994	W8NGO	82,641
1960	W6GHM	113,520	K6EVR	81,788	K2GL	383,112
1961	K5MDX	157,883	W4HXC	110,349	K2GL	319,144
1962	K5MDX	208,517	WA6EPQ	95,964	W3MSK	547,768
1963	K2HLB	324,352	W3TMZ	194,580	K2GL	956,868
1964	W3MSK	598,620	K2IEG	487,326	K2GL	1,094,591
1965	WA2SFP	652,176	K2HLB	559,661	W3MSK	1,868,256
1966	WA2SFP	908,628	WA6EPQ	506,752	K2GL	4,128,215
1967	W4AXE	1,301,776	WA6ZQU	1,451,219	K2GL	5,414,252
1968	W2PV	1,314,403	W2CP/2	1,082,496	W3MSK	5,515,701
1969	K1KTH	1,523,820	W4AXE	2,929,552	WA2ZAA	6,743,880
1970	W6RR	1,837,620	WB2SQN	1,914,349	W3AU	5,741,523
1971	W2PV	1,355,360	WB2SQN	2,591,784	W7RM	6,682,620
1972	W6RR	2,350,964	W7SFA	2,294,522	W3WJD	2,619,440
1973	K6AHV	1,635,039	W7SFA	1,765,921	W2PV	5,248,173
1974	W6RR	1,346,880	W3WJD	2,440,167	W2PV	3,859,185
1975	W3LPL	1,003,055	W6OUN	1,033,518	W3AU	2,890,680
1976	W1ZM	1,885,050	W6ONV	2,420,750	W7RM	5,137,431
1977	W3WJD	2,377,560	K5JA	2,643,580	W2PV	7,302,350
1978	W4DR	2,727,108	K5GA	4,150,306	N2AA	8,940,909
1979	N7DD	3,113,788	K4VX	3,811,563	N2AA	13,299,750
1980	K7RI	2,972,846	K0UK	4,097,840	N2AA	10,687,196
1981	K1AR	3,554,880	K3LR	3,867,840	W2PV	10,618,352
1982	W1ZM	3,182,480	W4QAW	4,455,190	N2AA	10,003,266
1983	AI6V	3,576,528	KX4S	4,191,225	N2AA	8,317,872
1984	K1AR	2,662,116	K2BU	2,791,019	N2AA	7,418,328
1985	K1AR	4,007,648	KX4S	4,603,120	N2AA	10,838,871
1986	K2TR	3,109,503	KX4S	4,335,969	N5AU	11,116,064
1987	KC1F	3,219,970	K1AR	4,531,168	W3LPL	9,529,968

Table II—USA winners—Single/Multi-Operator CQ WW SSB.

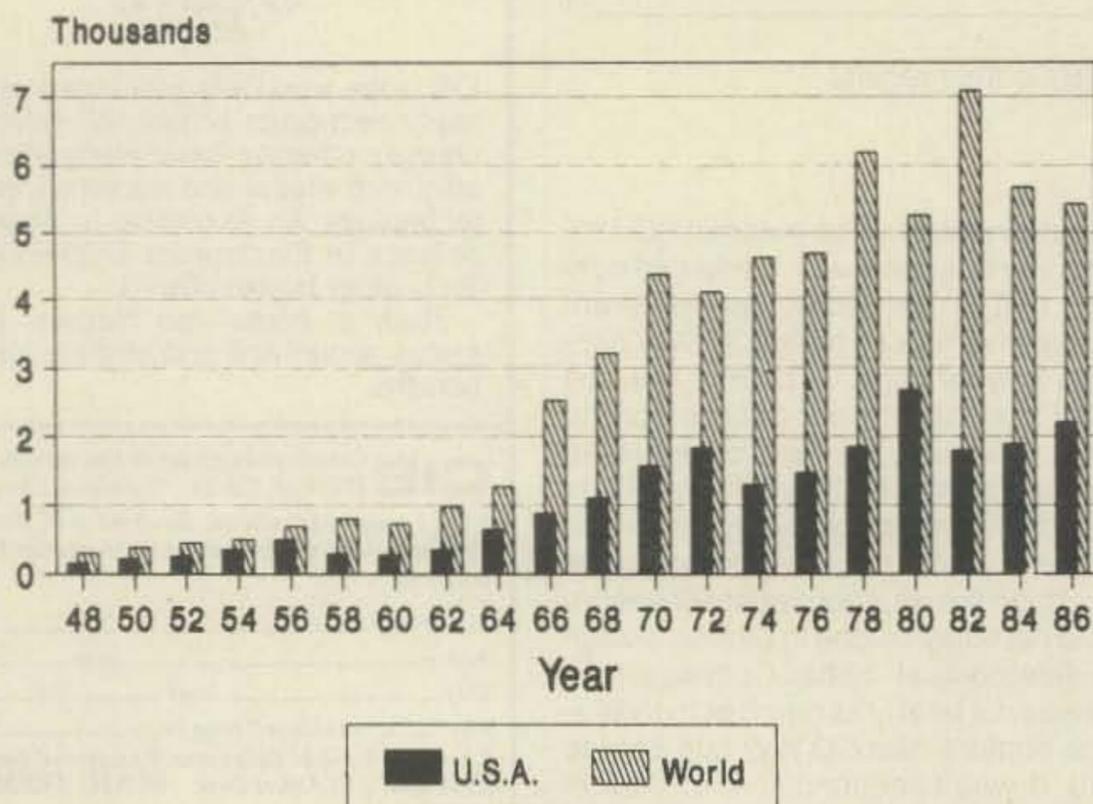
Single Op		Multi-Single	
Call	# Wins	Call	# Wins
W1ATE	5	WA6EPQ	2
WA2SFP/W2PV	4	W7SFA	2
K1AR	3	K1AR	1
W6RR	3	K2BU	1
W1ZM/K1ZM	2	K2HLB	1
K5MDX	2	K2IEG	1
W6YY	2	W2HJR	1
K1KTH	1	W2CP/2	1
KC1F	1	K3LR	1
W1ONK	1	W3TMZ	1
K2AAA	1	W3WJD	1
K2HLB	1	K4VX	1
K2TR	1	W4ATE	1
W3LPL	1	W4HXC	1
W3MSK	1	W4QAW	1
W3WJD	1	K5GA	1
W4AXE	1	K5JA	1
W4DR	1	W6OUN	1
W4ESK	1	W6ONV	1
AI6V/WA6VEF	1	W6RRG	1
K6AHV	1	WA6ZQU	1
W6GHM	1	W7DL	1
W8KML	1	K0UK	1
W9EWC	1		
K7RI	1		
N7DD	1		

Multi-Multi		Multi-Single	
Call	# Wins	Call	# Wins
K2GL/N2AA	14	W2PV	4
W3MSK/W3AU	5	W7RM	2
W2PV	4	W3LPL	1
K2GL	3	W3WJD	1
KX4S	3	N5AU	1
W6AM	3	W8NGO	1
WB2SQN	2		
K6EVR	2		

Table III—CQ WW SSB USA winner tally.

## Winning QSO Numbers CQ World Wide SSB Contest



Single Op/All Bands

DX station your strategy had to include much more time for calling other stations. Today's strategy of "run, run, run" simply wouldn't have worked in 1963. Gene recalled that his rates never exceeded 100 QSOs/hour. In comparison, KC1F's USA winning CQ WW Single Operator SSB 6-million-point score in this issue included rates exceeding 240+ QSOs/hour on 10 meters.

Although multiplier tracking was used, Gene recalls that he rarely moved multipliers from band to band. Furthermore, there were few big signals from any part of the world. Simply put, most contest participants operated from modest stations that were much different from the contest super-stations of today. Contest operating strategy in 1963 sounded more like defining your measure of perseverance in today's terms, although I suppose we'll be saying the same thing about 1989 in ten years.

### Analysis

Analyzing 40 CQ WW results is a contest trivia fanatic's dream. One of the side benefits of this analysis is that I am now the proud owner of a complete set of CQ WW results, 1948-1988. This month's column has a number of graphs/charts that look at the SSB contest from a number of perspectives. One of the most obvious results I noticed was the surprising lack of dynasties. With the exception of



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Astron	CES	Mirage/KLM	Unadilla/Reyco
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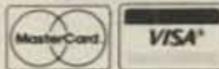
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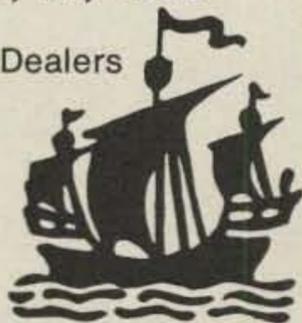
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CIRCLE 83 ON READER SERVICE CARD

Year	Single Op		Multi-Single		Multi-Multi	
	Call	Score	Call	Score	Call	Score
1948	PY2AC	124,068	ZS6BV	6,952	—	—
1949	PY2CK	224,349	HC2JR	196,869	—	—
1950	HC2JR	120,204	CN8ET	186,840	—	—
1951	PY2CK	251,664	MI3US	156,128	—	—
1952	CE3CZ	245,769	TA3AA	226,512	—	—
1953	CT1FT	268,796	TA3AA	282,918	—	—
1954	CN8MM	276,488	F7BM	208,725	—	—
1955	CX2CO	341,214	ON4SZ	170,912	—	—
1956	4X4DK	532,620	I1BDV	207,740	—	—
1957	F8CH	436,974	ON4SZ	582,798	—	—
1958	F8PI	585,120	DJ3VM	357,775	—	—
1959	4X4GB	829,864	HZ1AB	476,190	KA2RB	205,042
1960	VQ4DT	558,285	4X4GB	729,135	ET2US	258,427
1961	CX2CO	876,304	VQ4RF	542,244	DJ3OU	220,818
1962	XT2Z	647,836	CX2CO	991,728	DL0WW	361,616
1963	5A1TW	662,546	DL1KB	623,948	CX2CO	1,026,086
1964	YV5BIG	757,874	YV9AA	1,382,036	YV5AKU	1,463,871
1965	CX2CO	1,815,288	ET3USA	1,222,843	YV9AA	4,795,200
1966	VQ9AA/D	3,624,942	CX2CO	2,600,923	YV9AA	6,195,211
1967	VK2ADY/9	5,045,115	I4GAD	2,764,320	OF2AM	9,259,941
1968	ZD8Z	4,184,680	DL0WR	3,048,903	OH2AM	10,074,120
1969	9Y4AA	4,318,925	ON4UN	5,117,716	PJ0DX	17,613,400
1970	KV4FZ	4,961,551	PA9AF	4,536,780	OH5SM	6,408,171
1971	6D1AA	3,541,714	UK9ABA	3,512,652	4M1A	11,723,580
1972	4M4UA	5,409,315	PJ1AA	4,206,341	ZD3X	14,501,872
1973	ZD3Z	5,085,806	VP2M	5,167,355	PJ9GIW	11,132,443
1974	ZD3X	6,653,881	PY2CAB	6,959,474	PJ9JR	19,469,094
1975	FY7AK	6,636,348	VP2M	5,792,750	DL0PG	7,930,918
1976	PJ9CG	5,214,510	VP2G	5,886,500	VP5M	10,533,172
1977	PJ9CG	6,059,580	FM0FC	6,832,004	EA8CR	21,351,898
1978	9Y4VT	8,281,800	FY7BC	8,989,695	PJ9JR	29,211,300
1979	9Y4VT	6,682,185	HI8XWP	9,872,267	VP2KC	37,770,012
1980	EA8AK	8,996,673	I4RYC	9,918,368	PJ2CC	37,760,742
1981	9Y4VT	11,085,529	VP2MFW	8,321,040	P41C	41,957,244
1982	9Y4VT	11,954,696	9Y4W	16,775,034	OH0W	19,030,501
1983	PJ2FR	10,696,590	9Y4W	16,221,370	TI1C	24,371,948
1984	PJ2FR	8,420,220	4V2C	8,448,099	TI1C	22,157,695
1985	PJ2FR	9,613,615	P44B	11,315,931	HC8X	21,995,053
1986	8R1X	8,940,450	VP2EC	11,547,536	PJ1B	25,366,605
1987	9Y4TT	10,370,962	KP2A	10,693,238	PJ1B	35,815,586

Table IV—World winners—Single/Multi-Operator CQ WW SSB.

Single Op		Multi-Single		Multi-Multi	
Continent	# Wins	Continent	# Wins	Continent	# Wins
South America	23	Europe	11	South America	14
Africa	9	South America	10	Europe	7
Europe	3	North America	9	North America	4
North America	2	Africa	5	Africa	3
Asia	2	Asia	5	Asia	1
Oceania	1	Oceania	0	Oceania	0

Table V—Continental winner tally, world—CQ WW SSB.

the N2AA Multi-Multi operations, the vast majority of USA winners have only won their category once or twice. DX-expeditions led the pack overseas with relatively few nationals taking the top category slots.

While it's really not fair to compare in today's terms, I can't resist the temptation—all call areas but W0 have won the USA Single Operator, All Band category. Similarly, only W8 and W9 have missed the experience in the Multi-Single category. Forty years of CQ World-Wide contests should be enough to prove that picking a coast is the key to winning in the U.S.

Winning scores have dramatically changed from the days of PY2AC's 124,068 point leading Single Operator, All Band world tally. When reviewing past CQ WW scores, you have to conclude that the scoring surge of late really began approximately 10 years ago. Interestingly, as recently as the 1975 contest W3LPL barely surpassed 1 million points to win the USA Single Operator, All Band category. CQ WW scores have usually taken dramatic jumps around sunspot maximum periods. However, they never seem to drop back to previous levels as sunspot activity declines. In 1964 CX2CO nearly tripled the previous Single Opera-

tor World Record. Scores continued to gradually increase until the late 70s when incredible records were achieved in almost every category (e.g., 1979 N2AA, 1979 VP2KC, 1978 9Y4VT, etc.).

As mentioned earlier, the directorship of the CQ WW has changed hands over the years. The order of reign includes W2IOP 1948-49, W6QD/W6ENV 1950-52, IDXC 1953-54, W1WY 1955-73, K6SSS 1974-75, K3EST/N6AR 1976-present. Finally, the CQ WW has had its share of committee members over the years, 56 in all from every call area except W0.

### Closing Remarks

At the risk of sounding parochial, no amount of editorial space can give justice to the CQ World-Wide, the world's most popular DX contest. In fact, I have only scratched the surface. Frank, W1WY, has indicated that he may want to tackle a more personal review of the contest's history in a future CQ magazine article. Look in my October column for a similar historical analysis of the CQ WW CW.

We continue to actively collect your responses to the contest ethics survey found in the CQ August Contest Calendar. There is still time to respond, so please take a few minutes and complete the form. As I mentioned last month, I am looking to occasionally profile a contestant in the Contest Calendar. If you are interested or have a suggestion for someone, please drop me a line.

73, John, K1AR

### YLRL "Howdy Days"

1400Z Wed. to 0200Z Fri., Sept. 6-8

This event is sponsored by the YLRL and is open to all women operators worldwide. All bands and modes are allowed and a station may be worked once on each band/mode for credit. Participants may only operate 24 of the 36 hours in the contest.

**Exchange:** YLRL or non-YLRL member.

**Points:** Two points for member stations and one point for non-members. There are no multipliers. Logs must indicate date, time, band, call signs worked, and operating breaks.

**Bands:** CW—3540-3570, 7040-7070, 14040-14070, 21120-21150, 28180-28210. SSB—3940-3970, 7240-7270, 14250-14280, 21380-21410, 28380-21410.

**Awards:** Top-scoring YLRL member will receive her choice of a YLRL pin, charm, or stationery. Non-YLRL members will receive a one-year membership in the YLRL.

The usual contest disqualification criteria apply. Logs must be sent by October 9, 1989 to: Carol Shrader, WI4K, 4744 Thoroughgood Drive, Virginia Beach, VA 23455.

## ARRL VHF QSO Party

1800Z Sat. to 0300Z Mon., Sept. 9-11

All bands 50 MHz and up can be used for this one. The August issue of *QST* should have had all the details.

It is recommended that you send for official summary and log sheets. A large SASE will get you a supply. Address your request to the ARRL VHF Party, 225 Main St., Newington, CT 06111.

## TDXS WARC-Fest '89

1800-2400Z Sunday, Sept. 10

This new operating event is sponsored by the Texas DX Society to observe the 10th anniversary of the WARC band allocations and to promote this expanded use of these vital frequencies. The contest is more akin to ragchewing than a traditional competition and is open to amateurs worldwide.

**Classes:** Single operator, CW only or mixed mode.

**Exchange:** Operator's first name, QTH (ARRL section, Canadian province, or DXCC country), and antenna.

**Awards:** Participants whose activity places their station in the upper 10% of the high QSO totals received will be issued sequentially numbered certificates of achievement.

Participants are required to operate a minimum of one hour/band. Stations may be contacted once per band/mode. Existing restrictions on WARC bands must be observed (e.g., power limits, license class, etc.). You are requested to provide TDXS with summary sheets detailing your activity. These sheets will show QSOs broken down by band/mode, time/band, ARRL sections/DXCC/Canadian provinces, and signature. Actual logs and dupe sheets are not required.

Submissions must be postmarked by October 15th for consideration and be sent to: Texas DX Society, P.O. Box 540291, Houston, TX 77254-0291. All participants can receive a copy of the final results by providing an SASE with their summary sheet information.

## North American "Sprint"

CW: Sept. 10 SSB: Sept. 17  
Sunday 0000Z to 0359Z (Sat. night)

This is the fall edition of the "Sprint" run by the National Contest Journal. As the name implies, it's a shorty, only four hours long.

North Americans will be contacting other North American stations as well as stations in other countries, single operator only. North American boundaries are as defined by the rules used in the CQ WW DX Contest.

**Exchange:** Call, QSO no., name, and QTH (state, Canadian area, or country).

**Scoring:** Multiply total QSOs by the sum of states, Canadian areas, and other North American countries worked for your final score. (U.S. and VE not countries; KH6 not a state.) There are eight Canadian multipliers: VE1/VO1/VO2, VE2-VE7, VY1/VE8. Non-North American countries do not count as a multiplier.

**Frequencies:** Three bands only: 80, 40, and 20 meters. CW—3540, 7040, 14040. SSB—3850, 7225, 14250. (Plus or minus QRM.)

**Awards:** A trophy to the highest scoring entrant. Certificates to the top scorer in each U. S. call area, Canada, and other North American country. Also to the ten top scores, to each member of the winning team, and the highest scoring entrant on each team.

Team competition is limited to a maximum of 10 operators as a single unit. Pre-contest registration is required for each team before the start of the contest—with WN4KKN for CW and K7GM for SSB.

There are other detailed rules, a special QSY rule, disqualifying penalties, etc. I suggest you write to WN4KKN or K7GM if you do not have a copy of the NCJ.

Entries must be received no later than 30 days after the end of each "Sprint." The CW go to: Trey Garlough, WN4KKN, 7609 Hardy Drive, Austin, TX 78757. The SSB go to: Rick Niswander, K7GM, 910 W. Claremont, Phoenix, AZ 85013.

## Bulgarian DX Contest

0000Z to 2400Z Sunday, Sept. 13

The Bulgarian Federation of Radio Amateurs holds this activity the first Sunday in September each year. It's on CW only, all five bands, 10-80 meters, using the IARU Region 1 band plan.

**Classes:** "A"—Single operator, all band. "B"—Single operator, single band. "C"—Multi-operator, all band, single transmitter. "D"—SWL.

**Exchange:** RST and ITU Zone.

**Points:** QSOs with LZ stations, 6 points. With other stations in the same continent, 1 point. In other continents, 3 points.

SWLs must show calls of both stations heard. Score 3 points if both exchange numbers are copied; 1 point if only 1 is copied.

**Multiplier:** Total ITU Zones worked on each band.

**Final Score:** Total QSO points from all bands times the sum of the multiplier from each band.

**Awards:** Classes "A" and "C"—cups and medals to the three top world scorers and medals to the three continental leaders in each continent. Class "B"—medals to the top three scorers on each

band in the world. Class "D"—medals to top three.

**Logs:** Use a separate sheet for each band, a summary sheet showing the scoring, and the usual signed declaration.

Mailing deadline is 30 days after the end of the contest to: Central Radio Club, P.O. Box 830, 100 Sofia, Bulgaria.

Logs may also include applications for the many BFRA awards: NRB, W-100-LZ, 5 Bands LZ, W-28-Z, Black Sea, and Sofia awards.

## Scandinavian Activity Contest

C.W.: Sept. 16-17 Phone: Sept. 23-24  
1500Z Saturday to 1800Z Sunday

It's the world working the Scandinavians in this the 30th SAC. The same station may be worked on each band for QSO and multiplier credit.

The prefixes used in Scandinavia are: LA, LB, LG, LJ (Norway); JW (Svalbard & Bear Is.); JX (Jan Mayen); OF, OG, OH, OI (Finland); OH0 (Aland Is.); OH0M (Market Reef); OX (Greenland); OY (Faroe Is.); OZ (Denmark); SJ, SK, SL, SM (Sweden); TF (Iceland).

**Bands:** 3.5, 7, 14, 21, 28 MHz according to IARU band plans; 3560/3600, 3650/3700, 14060/14125, and 14300/14350 kHz should be kept free of contest activity.

**Classes:** Single operator and multi-operator single transmitter, all band only. Multi-operator must remain on the same band for at least 10 minutes. Also QRP single operator (maximum of 10 watts output) and SWL (only SAC stations may be logged).

**Exchange:** RS(T) plus a QSO number starting with 001.

**Points:** European stations score 1 point for each SAC contact. Non-Europeans score 1 point on 14, 21, and 28 MHz, and 3 points on 3.5 and 7 MHz.

**Multiplier:** Each call area in the above list of SAC countries worked on each band (call areas, *not* prefixes).

**Final Score:** The sum of QSO points from all bands times the sum of the multiplier from each band. Scoring for SWL's same as above.

**Awards:** Certificates to the winning station in each class, both CW and phone, in each country and each U.S.A. call area. QRP stations will be listed in one common list. The non-SAC SWL winner will be awarded. Plaques to the top-scoring station in each continent.

The usual disqualification criteria will be observed. Include a summary sheet and a dupe sheet for logs with more than 200 QSOs, and a signed declaration. Mailing deadline is October 31st and this year logs go to Trondheim DX Club, LA7Q, Box 5357, N-7002, Trondheim, Norway.

## CRRL CAN-AM Contest

Phone: Sept. 16-17 CW: Sept. 23-24  
1800Z Sat. to 1800Z Sun.

This contest is sponsored by the International Radiosport Assn. and the Canadian Radio Relay League to increase friendship between American and Canadian amateurs. Use all 6 bands, 1.8-28 MHz, in the U.S. General portion of each band.

**Categories:** Single operator, single and all band, low power (maximum of 200 watts input). And QRP (maximum of 10 watts input). Multi-operator, single transmitter (or single operator other than the licensee or a club station).

**Exchange:** RS(T) plus a progressive QSO number, and state or province. Use two-letter abbreviations. For Caribbean use CN, and PC for US possessions in the Pacific and Antarctica.

**Points:** U.S. to U.S. and VE to VE QSOs,

1 point on phone, 2 points on CW. U.S. to VE and VE to US, 2 points on phone, 3 points on CW. The same station can be worked on each band for QSO credit.

**Multiplier:** 50 U.S. states, 2 U.S. possessions (CN and PC), 10 VE provinces, 2 territories (VE8 and VY1), 1 island (Sable/St. Paul). Total of 65 possible on each band.

**Final Score:** Total QSO points from all bands times the sum of the multiplier from each band (maximum of 390 possible). Phone and CW are separate contests. However, combined scores from each band will be used for overall competition by the committee.

**Awards:** Certificates to single operator winners in each class in each multiplier area. And to the top five multi-operator stations in each country for combined phone and CW scores. There are four trophies, American and Canadian champion, combined scores, single and multi-operator categories.

**Log Instructions:** Do *not* use separate logs for each band. Indicate multiplier only first time it is worked on each band. A summary sheet showing the scoring and the usual signed declaration is a must. Entries with over 200 QSOs must include a check sheet for each band.

Official log forms and a more detailed rules sheet are available by sending a large SASE to the address below.

The usual disqualification rules are in effect. Taking credit for duplicate contacts in excess of 2% could mean disqualification.

Mailing deadline is 30 days from end of each contest to: CRRL CAN-AM Contest, W2VE3BMV, P.O. Box 282, Pine Brook, NJ 07058.

**Final Score:** Total QSO points from all bands times the sum of the multiplier from each band.

**Awards:** Plaques to the first-place winners in each class and areas. Certificates to second and third place. And certificates to the top scorers in each U.S. and Canadian call area, and DX country.

Complete and detailed rules were published in the June issue of *CQ* and should be reviewed for more detailed information.

The standard *CQ* log and summary sheets are recommended. It will make you scoring much easier. Sample forms are available from *CQ*. Include a large SASE (or IRC) with your request.

All entries must be postmarked no later than December 1st. An extension may be given upon a written request.

Logs go to: *CQ* RTTY Contest, ATT: Roy Gould KT1N, P.O. Box DX, Stow, MA 01775 USA. Requests for log forms go to: *CQ* Magazine, 76 N. Broadway, Hicksville, NY 11801.

## Classic Radio Exchange

2000Z Sun. to 0400Z Mon., Sept. 24-25

This is the fall edition of this unusual event. The format is still the same as it has been for the past years. Object is to restore and operate older equipment with like-minded hams, not required in the exchange, but a distinct advantage in the scoring.

A classic radio is any equipment at least 10 years old.

The same station may be worked on each band and each mode, and with different equipment combinations. Non-contesters may be worked for credit also.

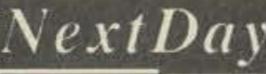
**Exchange:** Name, RS(T), QTH, receiver and transmitter type, and other interesting conversation.

**Scoring:** Multiply total QSOs by total number of receivers, transmitters, state/provinces/countries worked on each band and mode. Multiply that total by your Classic Multiplier, the total age of all receivers and transmitters used. Three QSOs minimum per unit. Multiply age by two if gear is a transceiver. If equipment is homebrew, count it as a minimum of 25 years old, unless its actual construction date is older.

**Frequencies:** CW—60 kHz up from low edge of band. Phone—3880, 7290, 14280, 21380, 28320. Novice/Tech.—3720, 7120, 21120, 28120, 28320.

**Awards:** Certificates and appropriate memorabilia are awarded for highest scores, longest DX, exotic equipment, best excuses, and other unusual achievements.

Send logs, comments, anecdotes, pictures to Jim Hanlon, W8KGI, 5560 Linworth Road, Columbus, OH 43235. Include a large SASE for copy of newsletter with results.

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0000Z Sat. to 2400Z Sun., Sept. 23-24

This is the third annual RTTY Contest organized by *CQ*, and from the response to last year's contest, it has become one of the major RTTY competitions.

**Bands:** All five bands, 10 through 80 meters.

**Classes:** Single operator, single and all band. Multi-operator, single transmitter, all band only.

Keep in mind that single operators are limited to 30 hours out of the 48-hour contest period. Multi-operator stations can operate the full 48 hours.

**Exchange:** RST, state or VE area, and *CQ* zone for stations within the 48 continental U.S. states and 13 Canadian areas. All others send RST and *CQ* zone.

**Points:** One for contacts within own country. Two for contacts outside own country but same continent. Three for contacts outside own continent.

**Multiplier:** One for each state (48) and VE area (13). One for each DX country. (ARRL and WAE list). One for each *CQ* zone (40). All of the above on each band.

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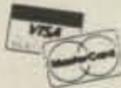
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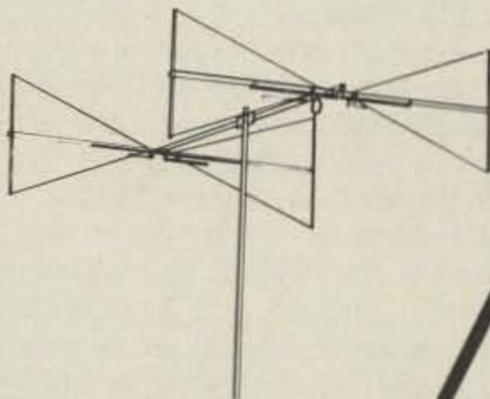
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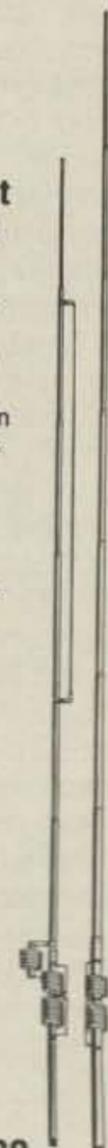
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## A Simple Approach to the Packet Commands—Part I

There are several ways in which we can study the definitions of the many packet commands that are part of each and every TNC we use. The problem many of us have occurs when it comes to defining the commands. Which command does what in relation to which TNC attribute? Sometimes this is not only in relation to the TNC, but with respect to the level of the International Standards Organizations model for "Open Systems Interconnect" (OSI).

The reason I've decided to take on this topic, beginning this month, is not because I'm a foremost authority on packet commands. Instead it is because someone has to be the target of all the letters I'm about to receive from those who will profess to be the authorities on the packet commands and lingo. The packet commands that are mentioned in Part I this month will be covered in detail in Part II next month.

Very few of the TNC firmware writers have time to spell out the reason why they build each command, nor do they want to, since doing so would release a tidal wave of wrath from the critics who want a TNC "tailored" to their specific packet application.

The solemn truth is this: For each new command that is added to the TNC, there are usually two additional commands that are built in to support this new command. This is not because the writer just decided to add them, but because some variable was introduced by the new command that made it necessary to have the added support commands.

An example is the **AUTOLF** command. Where would it be without the **LFADD** or the **SENDPAC** commands? One example familiar to many of us is the **PACLEN** command and its relation to the **MAXFRAME** command. Either of the two latter commands will directly interact with the other.

These latent support commands are what I call "sleepers" and are usually set to, or defaulted to, the proper setting to complement or support the more often used primary command. For the record, these sleepers are also the commands that I normally leave "as is." There are a few exceptions, and the exception will us-

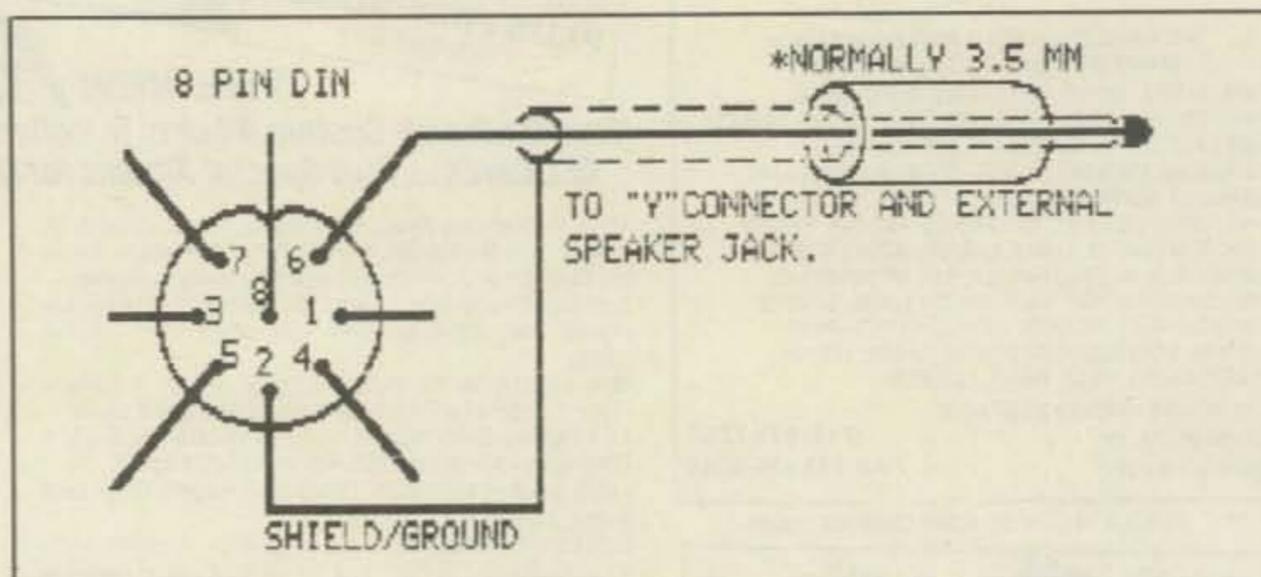


Fig. 1—For the notebook. Simple mod to use tuning indicator of the KAM to tune 1200 baud signals on HF above 28 MHz and operate 1200 BPS. Connect VHF port of the KAM to the HF rig in the same manner used to attach it to the VHF transceiver. Use appropriate connector(s). Use the above illustration to feed the same 1200 baud receive audio to the HF port of the KAM and make the following command changes: cmd: MARK 1200 (was 1600); cmd: SPACE 2200 (was 1800). This enables the KAM user to operate 1200 BPS packet on 10 meters SSB and utilize the tuning indicator to tune the 1200 BPS packets of incoming signals. This should give you four times the speed you are now using. 1200 baud is legal above 28 MHz!

ually apply to the command which is a support command that activates a primary command.

An example of this type of command would be **XON** and **XOFF** settings and the **XFLOW ON** or **OFF** setting which is used to enable or disable the software flow between the terminal and the TNC.

To expand a bit further on the last statement, the TRS-80 Color Computer and the Commodore VIC-20 use software handshaking (**XFLOW ON**), while most PCs and clones use hardware handshaking (**XFLOW OFF**).

### On Occasion We Are Heard . . .

On occasion I've had the opportunity to talk with a CEO of some of the TNC manufacturing companies. While we are discussing the features of their particular TNC, I never miss my chance to interject this one simple line:

**Consider the end user and make the TNC "USER EASY"!**

This includes the way in which the manuals are written. Sure, the "wordy" definitions look impressive. But what do they mean? We buy your TNCs, so why

not give us a product that is easy to use and that comes with most of the commands already defaulted to the most-used setting.

A reminder: The keyboard is sometimes mightier than the sword, and packet is a keyboard medium (statement modified from another one made by someone who referenced the "PEN"). All packeteers are not data communications engineers and experts. Let's not fall prey to the lingering idea that more bells and whistles, commands and features, or buttons and lights make it better.

Most packet controllers have areas of free RAM that are not being utilized because the original equipment builder had no plans for it. Thus this becomes a place to add "pseudo" features.

**The growth and expansion of packet is still in its infancy.** You read that statement correctly, and I cannot emphasize it enough. At a recent conference packet forum someone asked the panel of speakers, "When do you think this 'fad' will peak?" The question in itself was evidence that the person asking it was not very well acquainted with packet radio, or he would have known that packet is a mode of com-

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munications not so different from AM, FM, or SSB. In fact, packet communications is the near real-time threshold to total digital communications. By this I mean it will soon support both video and audio with full color, motion, super high definition, and quadraphonic sound. Packet is a *mode*, not a *mood*.

Like it or not, packet radio is here to stay. Although there may be changes to its protocols, the mode will remain with us for many decades to come.

### We Need "Real" and "Useful" Features

It would seem with all the hullabaloo over the nodes and automatic routing, someone would introduce a "real and useful" feature that would allow the user to input ten of the most often called stations with their paths and node routes. Any time we desired to connect with one of the stations in this routing table, we could invoke a connect request to that station and the predefined path would be implemented.

Even better, we could use some of the expertise of the node firmware writers and have a TNC that would remember the last 10 or 20 paths that were previously used or entered at one time, and store them for later recall. The internal firmware would only store the route if a connect was completed. A user-initiated

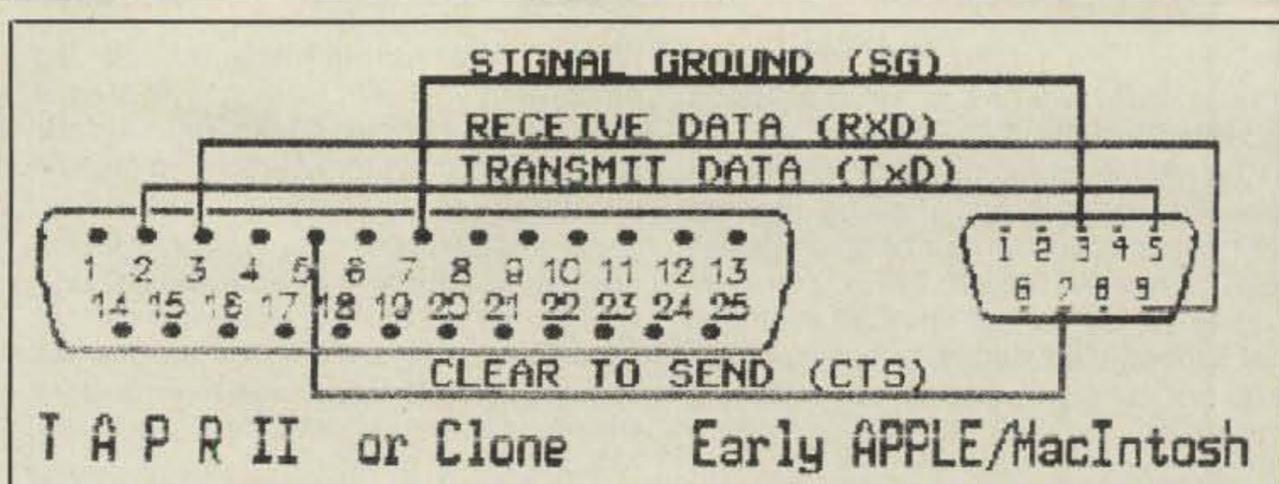


Fig. 2- This figure illustrates the interfacing of the TAPR 2 and the Apple computer. Note CTS line.

prompt for **ROUTE SAVE Y/N** could be included at the connect.

This routing scheme is not too much to ask, and it is needed far more than some of the "so-called" features we have been handed. The addition of this feature might well prove to be an *asset* to the manufacturer who is *first* to implement such a needed feature.

### The Commands are the Personality of the TNC

As time goes on, you will develop an understanding of your system as related to the command structure within the controller. In short, you are about to discover

the uniqueness of your station when compared to other packet stations. Osmosis is your caretaker when associated with the learning curve at your packet station.

Let's begin with the basic, "out-of-the-box" configuration. As soon as you have set the baud rate between the terminal and the packet controller, record or save the terminal program configuration and perm the ABaud of the controller so that it will default to the same setting of your terminal program each time it is powered on. Many terminal programs will allow the baud rate to be made permanent in a config file. By setting up a config file for your station, you won't have to be concerned with the terminal-to-TNC setup each time

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you "boot" the system. Still other TNCs provide DIP switches to set the **ABAUD** and **HBAUD** on the TNC.

The next item you need to input to the packet controller is your callsign. In some controllers this is the point where you will need to type **AUTOBAUD OFF**. Other controllers will either use the DIP switches that I mentioned earlier to set the baud rates, or they will display the following message:

#### PRESS \* TO SET BAUD RATE

When using a controller that displays the previous message, you will be requested to enter your callsign immediately after receiving the **CMD:** prompt. If you have the duplex set to half, there is a chance that you will see double letters each time you type a letter or character. The remedy for this little situation is to set the **ECHO OFF**. Next we should configure our controller to print to the screen any packets that are heard by the transceiver. To activate this mode, set **MONITOR ON**.

Having set the parameters for identifying our packet station, we will next set a couple of "timing" parameters. These commands are necessary for several reasons, but for the moment we are only interested in the start up of our system.

If you are using an RF "linear" power amplifier with relay antenna switching, this will require additional **TXDelay** (transmit delay) input. So to set our Transmit delay, let's start with a **TXD** of 40. Many TNCs default to a **TXDelay** of 30, but practice has shown that this figure is a bit shy of the time needed to allow the transmitter to reach full output. On the other hand, it is wise to keep the **TXDelay** as short as possible, because the extra transmit time will tend to add clutter to a sometimes crowded frequency.

The point that I'm trying to build is this: In order for you to obtain optimum performance from your system, you should

"hone" your parameters to suit the equipment you use. Care not what your neighbor uses for his packet parameters, but build your system settings to suit the personality of your station.

As you become more familiar with the command structure of your packet controller, you will find there are a few of the parameters that are best left as they are. In some cases it would have been better if the manufacturer had left them out altogether.

Every time I speak to a club or group about packet radio, I am assured of being confronted almost immediately with the question "What is the meaning of the ??? command? This is the topic for Part II and next month's "Packet User's Notebook." It is time to clarify some of the complicated controller commands. Some of the packet radio command interpretations tend to confuse even the old timers, to say nothing of how much it completely baffles the newcomer.

With this in mind, next month in Part II I hope to be more successful when we begin identifying and removing the complications from the packet commands and their meanings. It is my intent to develop your understanding of a few of the packet commands that will enable you to be more aggressive the next time you attempt to configure your packet controller.

### The Command Categories

There are some commands that are difficult to determine the difference between their being a feature or a function. This is where I will take my best shot, while trying not to mislead anyone. In Part II we will explore the seven function groups and the command syntax associated with each group. We will explore the universal packet commands so that each one is easy to understand, even by the novice packeteer.

Until next month, Happy Packeting!  
73, de Buck4ABT

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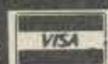
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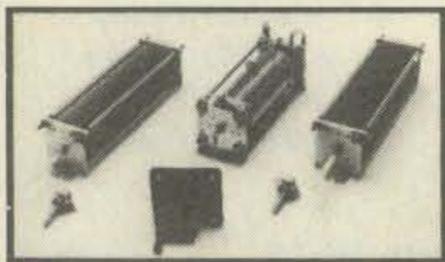
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## A LOOK AT THE WORLD AROUND US

### *Mobiling Today: 30 Minutes From Carton to Contact*

**A**pproximately three years have passed since we discussed HF mobiling in this diverse CQ column, and sunspot activity has been increasing steadily during that time. HF signal propagation is now better than it has been in at least a decade, all bands from 160 through 10 meters are jumping with DX action, and low power signals are again working the world in high style. A re-visit to the world of HF mobiling is definitely in order! This does not mean your requests for more views of classic rigs and keys or information on new OSCAR satellites has been overlooked, however. Please continue sending your photos and information! Those topics, plus more special features, will be highlighted during future months. We aim to please—everyone!

One additional note before we continue. My discussion/update of the WARC bands in June 1989 of this column contained a 10 kHz error in 12 meter frequencies. Please correct your information to read 24.890 to 24.930 MHz CW, and 24.930 to 24.990 MHz SSB. I knew the correct frequency allocations; my pen just "wrote it rotten." It's great to know you read our column so closely!

Thanks to both enhanced Novice/Technician HF operating privileges and sunspot-renewed interest among upper-class operators, many amateurs will seriously consider HF mobiling for the first time during 1989. This article's purpose is thus providing tried-and-proven "helping Elmer" guidance in that venture and assuring your greatest success in the easiest manner. My own experiences in mobiling cover more than 25 years, 20 cars, numerous rigs, and more DX contacts than easily tallied. I've also helped others with their mobile rigs, and recently wrote a *Modern Amateur's Mobile Handbook* that MFJ Enterprises is presently publishing. (You can order a copy by telephoning 1-800-647-1800.) Now I am developing an exceptionally low-cost all-band mobile antenna with very low wind resistance for trunk-lip mounting on "bumperless" cars. That's enough preliminaries, however. Let's get rolling with your mobile plans!

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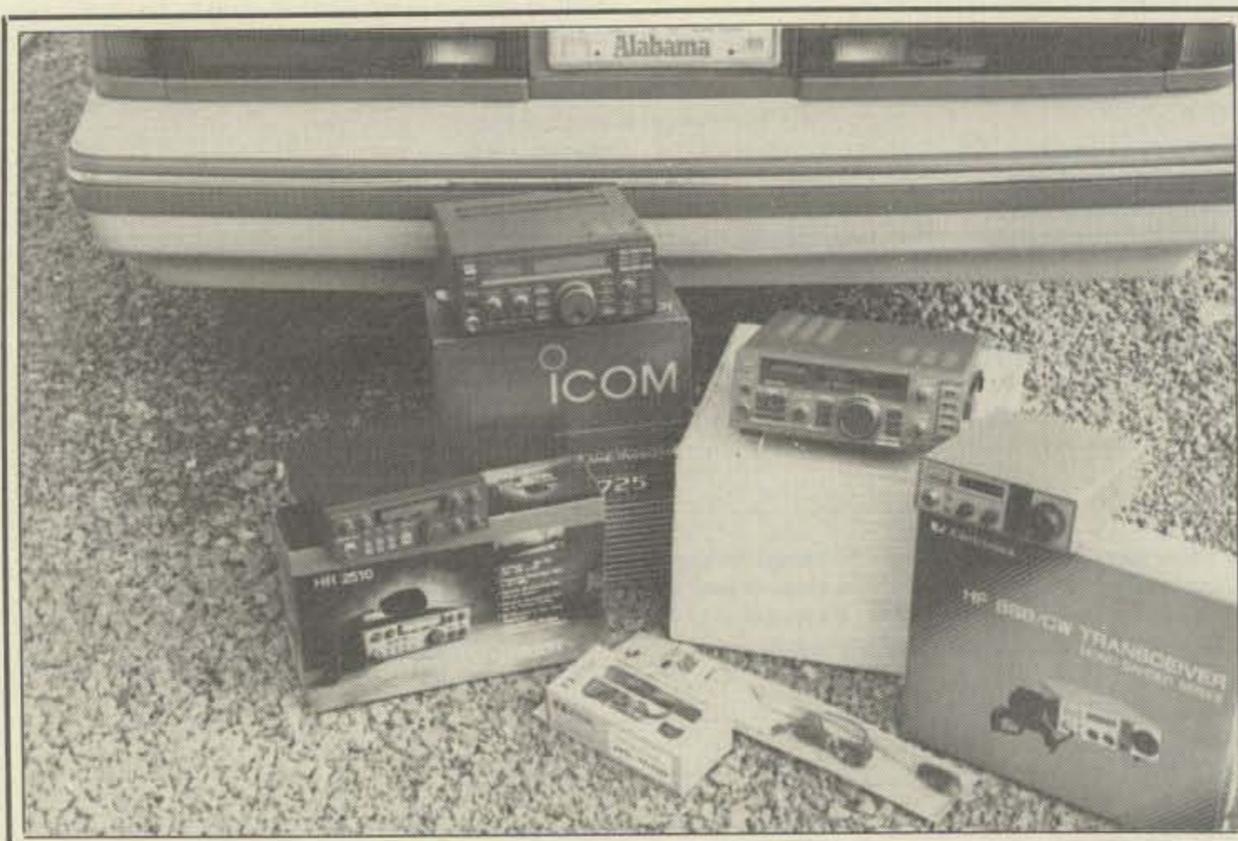


Fig. 1 - A wide variety of compact and ultra-compact HF transceivers are readily available to today's amateur, and they are all great for mobiling. Shown here with their cartons are (left to right) the Uniden HR-2510, ICOM IC-725, Kenwood TS-140S, and Kantronics KT-130. Goodies in front are ICOM mobile boom mike and gear-shift PTT/tuning box. All items fit into Mercury Topaz behind them.

### HF Equipment Selection

As exemplified by the small collection of gear in fig. 1, there's no shortage of mobile transceivers in today's amateur radio world. Use your charge card and any of the toll-free/800-number dealers advertising in this issue of CQ, and selected gear will be delivered to your doorstep. Compact all-band transceivers like Kenwood's TS-140, ICOM's IC-725, and Yaesu's FT-747 are optimum choices. They do not represent a large fortune in your car, and they are impressive high-power performers. Their WARC-band coverage and full shortwave reception are also great. Operating our new bands and eavesdropping on underworld frequencies while mobiling is a blast. Slightly larger rigs, incidentally, often will not squeeze into today's small cars.

If physical room or financial limitations hamper your plans, consider opting for one of the super-small and popular monoband transceivers such as the Kantronics KT-series or Uniden's HR-2510 units, plus the Radio Shack HTX-100. The keys

to enjoyable mobiling with these gems are using a tall antenna (a 3 to 5 dB advantage over short equivalents) to compensate for less power (a 6 dB drop), and operating frequencies favorable to low power. Ten and 30 meters are good choices, and 10 CW is a mobile DXer's haven. I've worked numerous Europeans and Japanese on 10C W while using an HR-2510 and Hustler antenna. You can probably do even better.

Other good frequencies for low-power mobiling are the Extra class SSB portions of 20 and 15 meters. DX is plentiful, QRM is minimal, and your license yields a 3 dB advantage. I do not advise using rigs below 20 watts output for serious HF mobiling. It works, true, but the QSO success ratio is quite low. I also suggest avoiding older transceivers with analog (rather than digital) tuned VFOs whenever possible; their drift from "cold turn-on" is rather noticeable, and they cannot be remote-tuned by mike up/down buttons.

Many amateurs finance their HF mobile pursuits through clever planning and rig trading. A seldom-used VHF trans-

ceiver and extra RTTY system, for example, are exchanged for a monoband HF unit and handheld talkie. Rather than losing anything, they gain more versatile VHF operation plus HF mobiling.

## HF Antenna Selection

As the basic variety of antennas and support items shown in fig. 2 illustrate, this area is overflowing with clever designs to fit every mobiler's needs. A good rule of thumb in their selection is taller is usually better, but daily use depends on your motoring limitations. Some overpasses will not clear 10 foot whips, for example, and today's "bumperless" cars require special mounts for big antennas. Consider your mounting arrangement first, then select an antenna accordingly. Although not in the "30 minute installation" category, I should also mention that even the largest mobile antenna can be installed on almost any car by using an underbody plate, ball mount, or class A/ lightweight trailer hitch. Replace the trailer towing ball with an antenna socket, and you have one heavy-duty mount.

Two quick and easy mounts for light-to medium-weight antennas are the WD4BUM/Lakeview Company trunk-lip and tri-magnetic mounts shown on the left side of fig. 2. Snap either of these gems onto your car's trunk, add a ground strap between the mount and car's frame (the shield salvaged from RG-58 works fine), screw in an antenna, and you're ready for big-time mobiling in minutes. If your car's trunk is slightly angled, add a split washer between the mount's frame and antenna socket, then rotate it until the whip stands upright. Simple, neat, and effective.

The "big daddy" of mobile antennas is the Texas Bugcatcher shown with its open-air coil, base rod section, and top whip in fig. 2. This item is manufactured by Texas Radio Products, and is available in 8.5 and 10.5 foot models. A base-loaded 7 foot mini-Bugcatcher and a husky magnetic mount for same were also added to this line in mid-1989. An 11 foot Bugcatcher with a 20 inch diameter capacity hat (whew!) is also manufactured by GLA Systems/WB5TYD. Bugcatchers work 80 through 10 meters (plus 160 with an extra coil) and all WARC bands. You simply move their coil's tap to change bands and trim SWRs. Bugcatchers are big-signal mobile antennas requiring hefty mounts and sturdy guying. They are included here mainly as a "top banana" reference.

Progressing from left to right in fig. 2, the next antenna is an ever-popular Hustler. This item consists of a thick 4.5 foot chrome-and-aluminum mast plus separate 1.5 foot resonators for each HF band. A Hustler's performance and wind resistance are slightly less than a Bugcatcher, but it is still a mite large for trunk-lid or

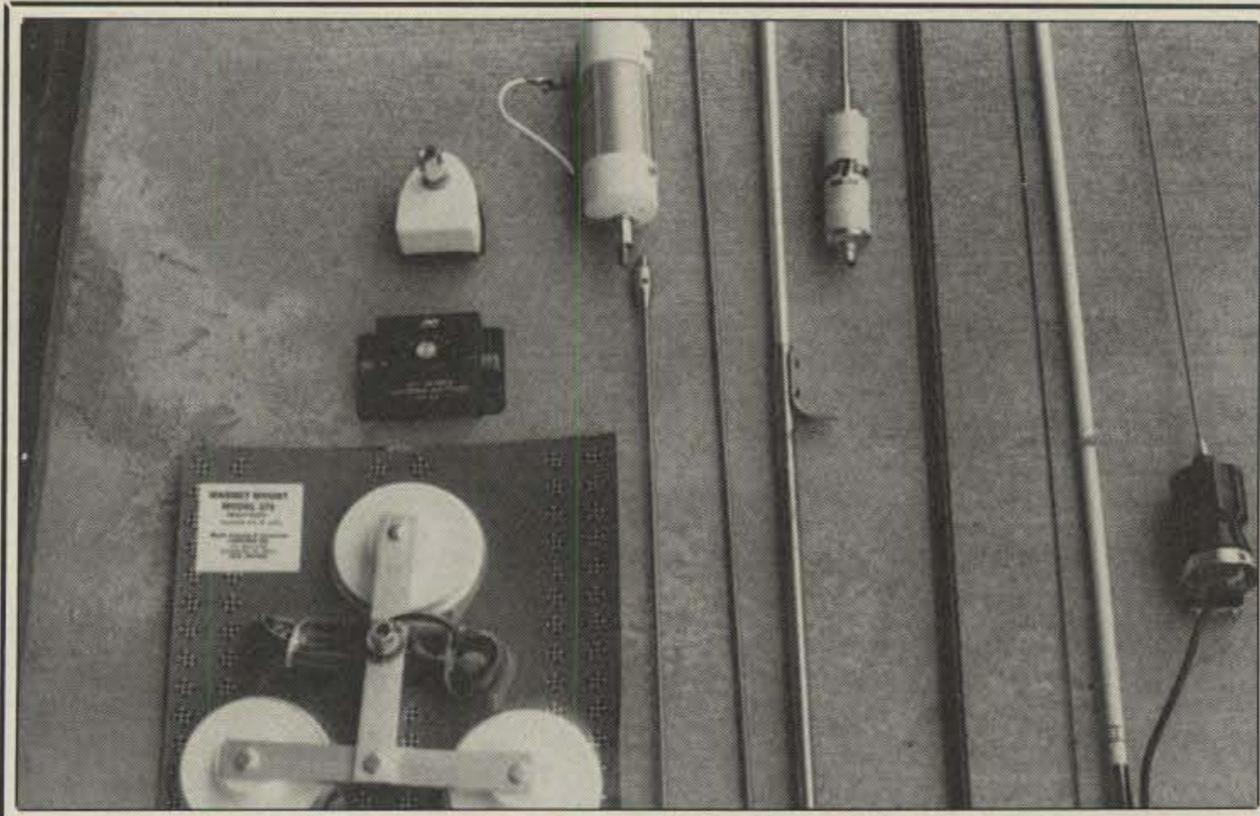


Fig. 2- A mini-collection of popular HF mobile antennas and easy-to-install mounts. Antennas are arranged according to performance, wind resistance, and size with "big" on the left and "small" on the right.

mag mounting. You might squeeze by with that arrangement if you four-point guy the antenna securely and use a small resonator (not larger than an RM-20). If you use Hustler antennas, here are two "big signal" ideas worth remembering. A 42 inch whip (like a thin top whip from a Ten-Tec HF antenna) inserted 2½ inches into an RM-15 resonator works 20 meters with 2 to 3 dB improvement in performance (and less wind resistance). A similar 39½ inch whip substitution in an RM-10

also works 17 meters like a champ.

The next (black) antenna beside the Hustler in fig. 2 is a "WD4BUM antenna" or "Ham Stick," an 8 foot item approximately equal to the Hustler in performance but noticeably lower in wind resistance. These economically-priced single-band whips are one of today's best buys, unless you are gearing up for all bands with a heavy-duty mount. Snap a Ham Stick onto a trunk lip or mag mount, guy it for safety, and you're ready for mobiling



Fig. 3- Our 30 minute installation begins with removal of this compact car's ashtray. Extracting four screws and disconnecting two wires only takes 5 minutes. Similar room-expanding ideas for other car styles are discussed in the text.

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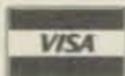
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Fig. 4- A compact HF transceiver fits perfectly in the new space. Rear sits on carpet hump, front is cushioned by foam, and bungee cord hooks around rig to secure it in place. A small pad was also taped under the dash center to prevent rig scratches during installation and removal. A light coat is laid over the rig front to divert evil eyes when the car is left unattended.

in less than 5 minutes. Ham Sticks are a good antenna choice for both multi- and mono-band rigs.

The adjacent (white) antenna is a Ten-Tec helium-filled item. These 6 foot items are manufactured for operation on any single band from 80 through 10 meters. Their wind resistance is almost zero, they almost float in air, and they work well if mounted at or above trunk level. Stated another way, a trunk-mounted Ten-Tec works almost equal to a bumper-mounted Hustler or Ham Stick.

Finally, the right-side item in fig. 2 is American Antennas' "Ham 10" with its trunk-lip mount and 57 inch whip. If you use this antenna with an HF-2510 transceiver, understand its half-size radiator will reduce your signal roughly 3 dB. DX-ing with 12 watts of ERP is more successful on 10 meters than any other HF band, however, and the Ham 10's low profile makes it attractive for neat-car setups.

Now some special notes. The "high-back/aerodynamic" design of many new cars defeats the benefits of below-bump-



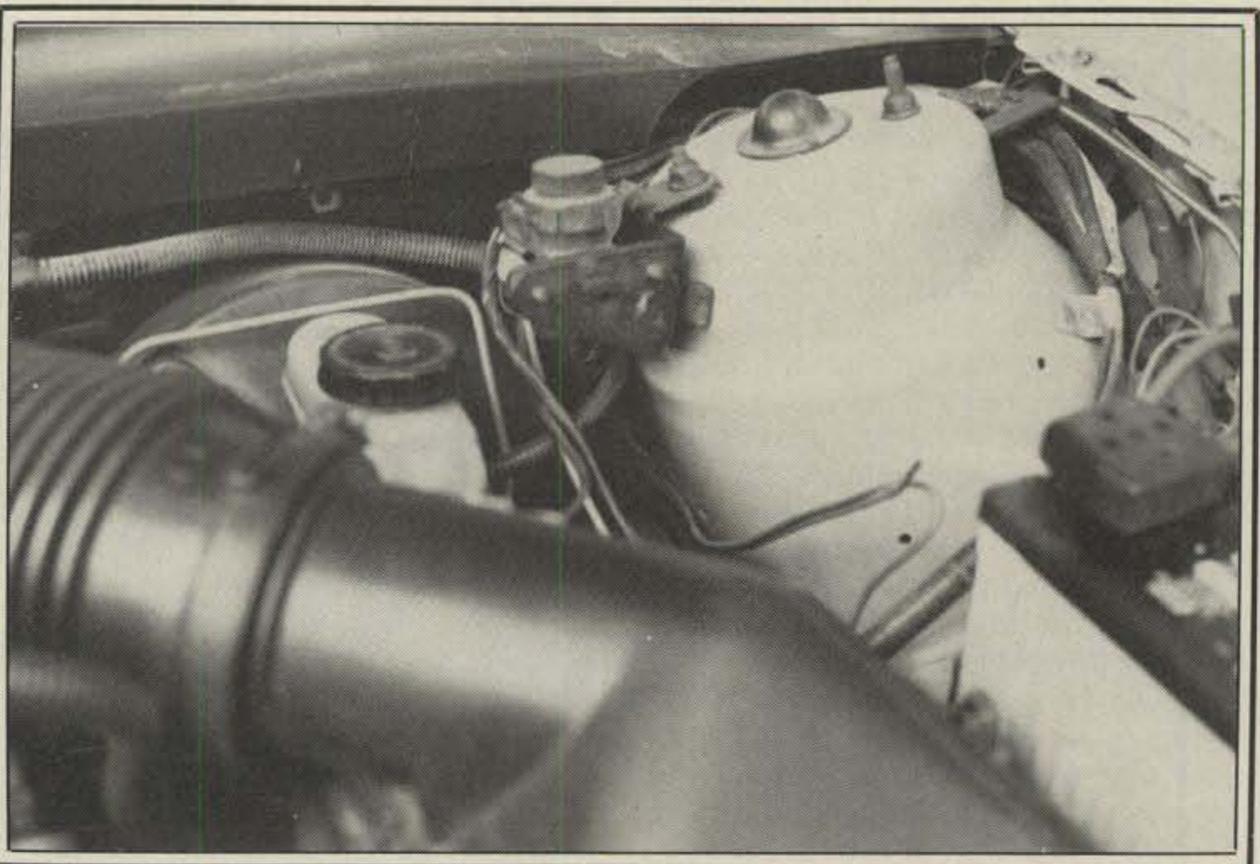
Fig. 5- Tie two knots in the bungee cord to reduce its length, add a DC plug adapter, and a super-small Kantronics KT-130 transceiver fits in the same spot. Two rig mounts in one!

er-level-mounted big antennas. A 9 foot tall antenna positioned only inches from a 3 foot tall trunk and a 6 foot tall antenna mounted atop that same trunk work basically equally well. Beyond this point, antenna selection and mounting are strictly personal preference. I explained the basics; you take it from there.

### Setup Installation

After selecting a transceiver and antenna, your next step is obviously installing those goodies (finally, the 30 minute portion of this article comes into view). Every car has its own limitations in this area, but some universally-applicable ideas noticeably simplify that procedure. I will explain them as we continue with the following "show and tell" discussion.

**Fig. 3.** Cars with bucket seats and a large center console present the greatest challenge to transceiver installation, but exercising your options simplifies the process. Here we are removing a Topaz's large ashtray to yield room for a rig. Extracting four screws and taping/tucking two wires back under the dash takes less than 5 minutes. If your console is "molded in" with the dash, check behind that hardboard and vinyl item; moving a couple of cables and adding a new front cutout can produce a custom "built-in" setup. Alternately, sit in the driver's seat and look over your right shoulder at the console's rear; a transceiver can often be stood



*Fig. 6- Routing the transceiver's DC cable through excess area around the speedometer or parking-brake grommets is quick and effective. Installing an extra fuse right at the battery connection also prevents arcs if an underhood wire's insulation becomes damaged. Time of DC cable installation—5 minutes.*

vertically in that area and secured to the console with a nylon-tie strap/bungee cord. Cars with bench seats are ideal; sit the rig vertically on the floor, prop its front against the seat, and secure it with a bun-

gee cord hooked under the seat (MacGyver's "fix anything" tool is duct tape; mine is bungee cord).

**Fig. 4.** A compact ICOM IC-725 slides perfectly into the removed ashtray's

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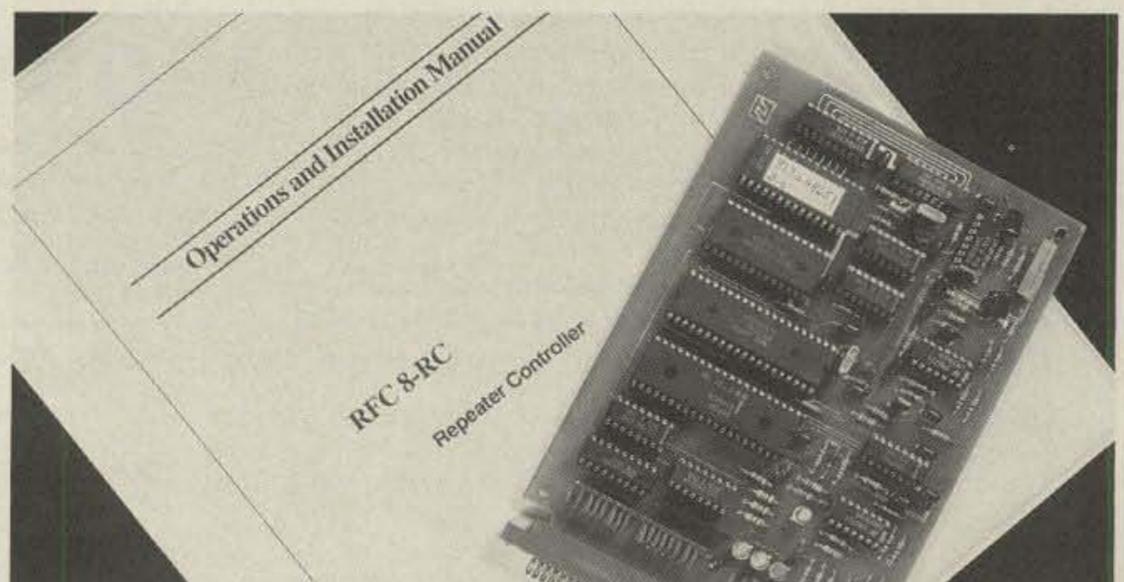
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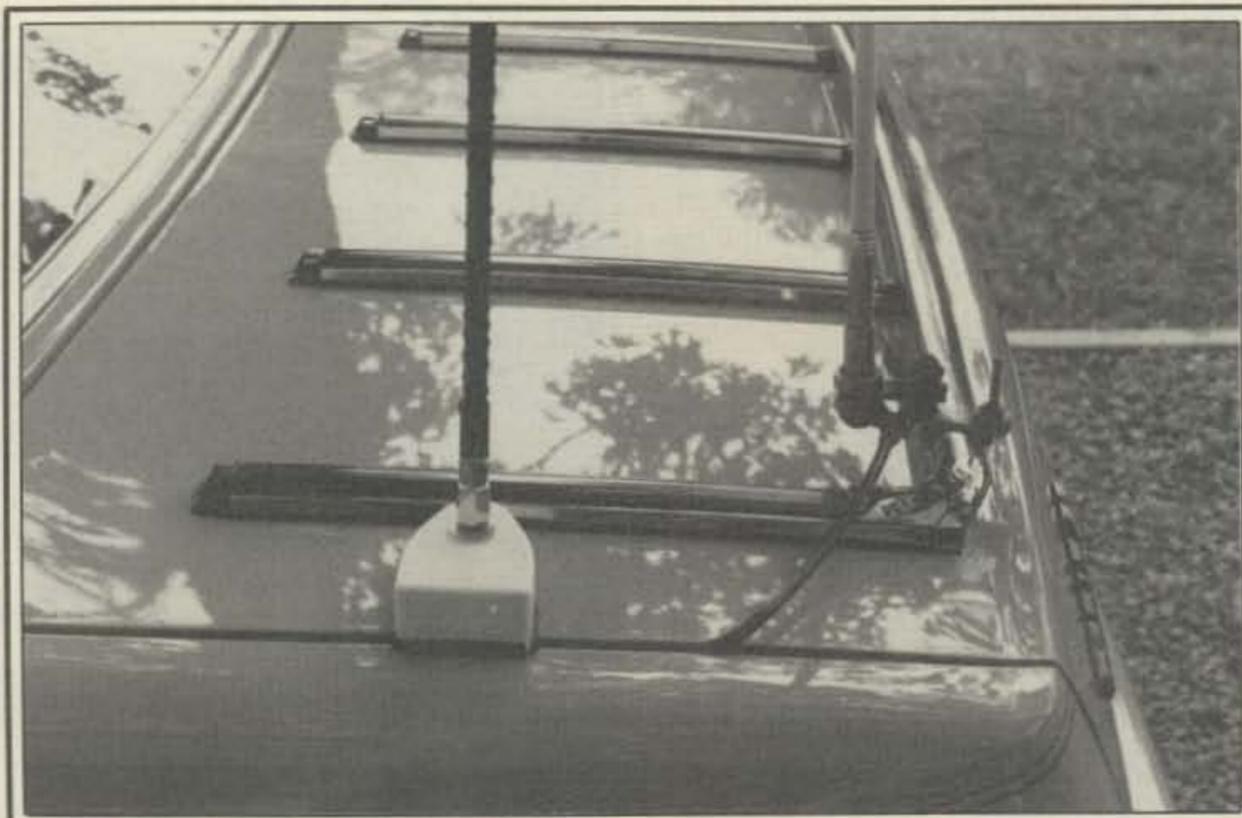
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area. A small cushion (foam packed into an old suede eyeglass case) pampers the rig's front bottom while the rear sits on carpeting—just like home. A bungee cord stretched over the rig and hooked under the console holds everything securely. Mounting time, including trimming excess bungee cord from hook, is 4 minutes.

**Fig. 5.** We also run 30 meter CW mobile with a Kantronics KT-130 and have a ball. A 4 inch long adapter cable plugs into the IC-725's DC cable and into the KT-130. Two knots are then tied into the bungee cord, and *viola*—two rig mounts in one!

**Fig. 6.** Always DC-power your transceiver directly from the battery, not via the cigarette-lighter socket. Look around the speedometer and parking-brake grommets for extra room, temporarily widen that area with a screwdriver, and then push the cable through. Route the DC cable away from, and at right angles, to, electronic fuel injection wires. Install a fuse at the battery's connection, place a spare fuse in the glove box, and then fit the cable's plug into your transceiver. DC cable routing time, including battery connecting—5 minutes (I'm slow but sure).

**Fig. 7.** Two easy trunk-mounting ideas. Lakeview Company's trunk-lip mount on the left was installed in less than 2 minutes. Another 3 minutes was spent adding a short ground strap from the mount's



**Fig. 7-** Two trunk-mounting ideas for "bumperless" cars. Lakeview/WD4BUM on the left slips on within one or two minutes. It is holding a Ham Stick antenna for 20 meters. Homebrewed luggage-rack mount on the right was assembled from U-bolt, extra washers, and antenna-base receptacle installed on flat bar salvaged from a second U-bolt. This mount is holding a super-lightweight Ten-Tec antenna for 10 meters.

under-plastic frame to the trunk's frame, then checking with an ohmmeter to assure a good ground connection was secured. The U-bolt mount on the right was

home-assembled from old parts and "shimmied" with washers on one side for vertical positioning. The Lakeview mount will hold a Ham Stick (light guying suggested). The U-bolt mount will hold a Ten-Tec (guying necessary mainly because luggage rack is flimsy). Other quick mounts include magnetic jobs, mirror, and body-edge mounts.

**Fig. 8.** The next five minutes was spent routing coax cable to the rig, rechecking to assure the good ground connection was still intact, then fitting an antenna into the mount. When routing coax, raise your trunk's carpet near the rear seat and look around a seat-belt retaining bolt/bracket (Careful: Some manufacturers leave sharp edges hidden, and they quickly nick fingertips). In nine out of ten cases you can push a PL-259 and cable right beside that bolt/bracket and it will flop out on the rear seat. Thread it around the seat's cushion, under the rear throw mat, under the front seat or console's edge, and to the rig. Tuck excess out of sight and away from damage between the rear seat's back and cushion, and installation is complete. Total time—19 minutes, thus far.

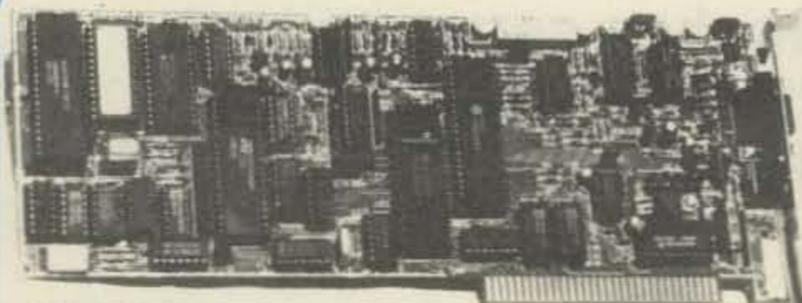
The final step involves connecting the antenna coax to the transceiver, routing a separate and short ground cable between the rig's case/ground and car's frame, tuning the antenna for low SWR, and making a test contact. Use the shield from an old piece of RG-58 for grounding strap. *Do not* omit rig grounding, as it minimizes RFI, feedback, and other gremlins. Use alligator clips for quick disconnects. Follow your antenna's instruction sheet on tuning. Usually, a simple tip-



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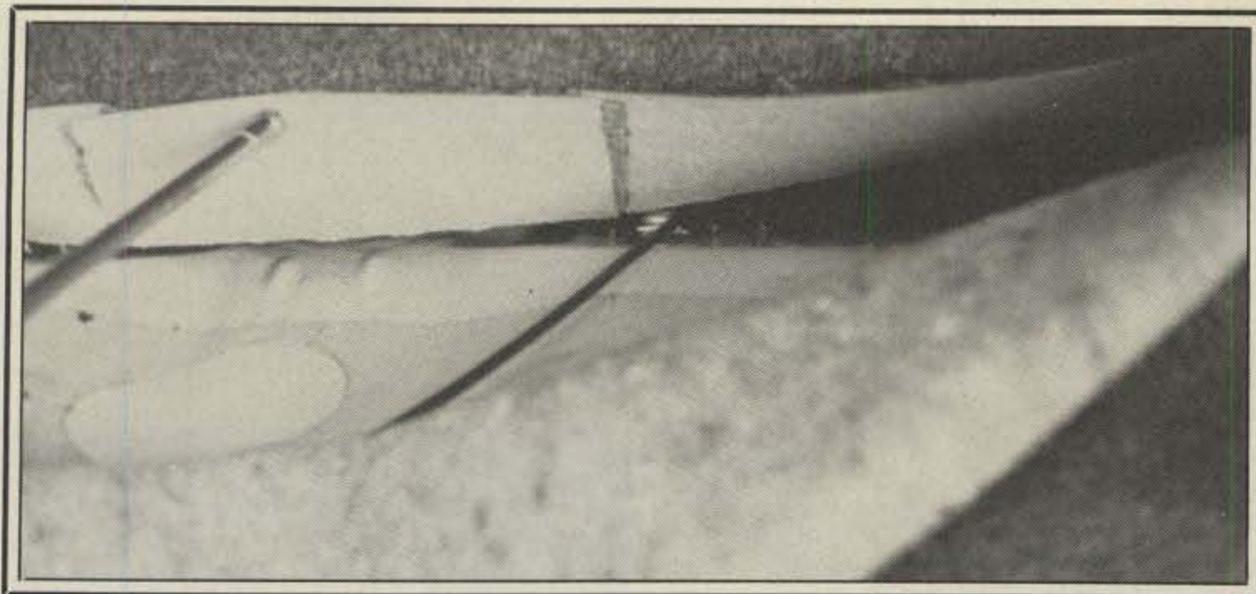


Fig. 8- After coax routing, I folded back the trunk's carpet and held up its far-back cover with a Hustler mast to show my work (and shoot this picture). Notice the metal bracket on the left side of the coax. That's the seat-belt/bracket discussed in the text.

rod adjustment does fine. If matching capacitors are necessary, consider using the MFJ capacitive matchbox sitting between the mounts in fig. 2. Total time of the previous step(s)—5 minutes—but one mobile QSO leads to another, and another, a drive for a burger, and, well, that's the beauty of "take it with you" HF mobiling.

### Finishing Touches

While basic-style HF mobiling is al-

ways terrific, a few finishing touches make it even better. The following ideas and suggestions are thus presented for your mix-and-match pleasure.

Add a short ground strap between the rear end of your car's tailpipe and body. It minimizes ignition noise and RFI, and helps reduce SWR. Use your ohmmeter as a guide to spotting grounded and ungrounded metal areas during that step. Weatherproof exposed cable ends and antenna connections with Coax Seal®

Add a thin external speaker to your seat's headrest, and secure it in place with a rubberband. Listening to weaker stations then involves leaning back with eyes ahead rather than ostrich-craning toward the dash. Rear-view mirror access is also better. If driving, tuning, and talking seems awkward, check out Kenwood's and ICOM's mobile boom mikes which mount above a sunvisor and remote PTT/up-down tuning box which mounts on the gearshift lever. These accessories provide truly enjoyable hands-free mobiling. If your XYL prefers her safe driving to your Indy-500 capers, go for it. You can enjoy CW mobiling with an iambic paddle and programmable message keyer while she yells at other nuts holding steering wheels.

Alternately, combine a copy of *Popular Communications*, Harry Helms' new book *Underground Frequency Guide* plus my own mobile handbook's big chart of underworld frequencies with your full-coverage mobile rig and tune in some really offbeat action from the car. The activity gets especially hot if you are near coastal areas at night.

Our list of additional ideas could continue indefinitely, but we are once again out of space. I will thus conclude by saying read my new *Mobile Handbook* for more ideas, and more classic rig tales will be forthcoming in this column.

73, Dave, K4TWJ

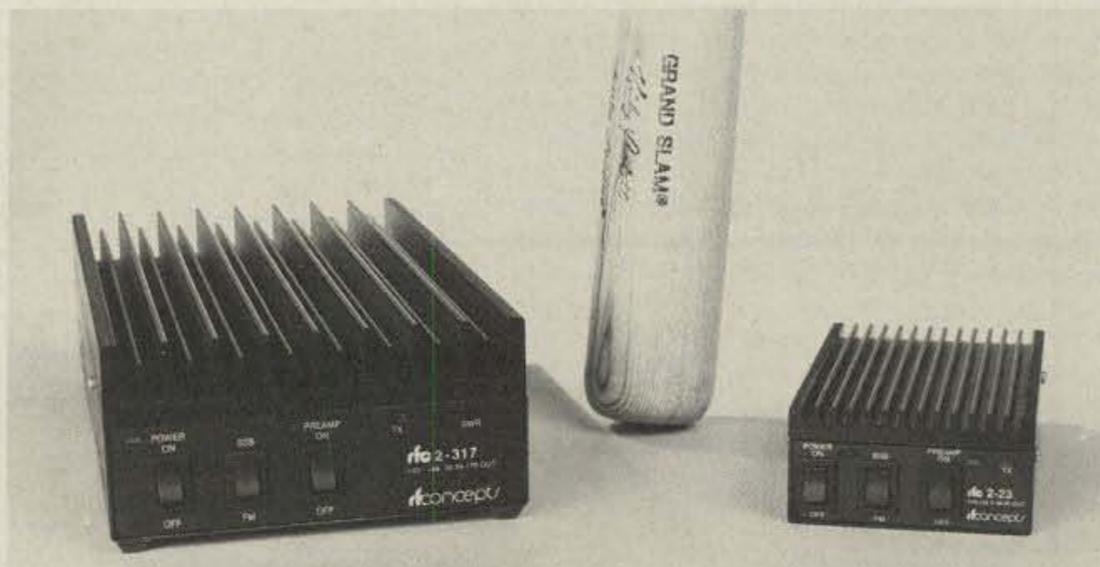
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## "HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

### Goodies

This month's column contains information about amateur radio specialty items such as badges, caps, cups, jackets, patches, pins, and T-shirts. I have included a wide variety of items which amateurs can wear and use. Station equipment and accessories are not covered in this article. Where prices are stated, they are only included to provide some idea of costs; exact current costs should be determined by requesting such information from the seller. If state taxes apply, they will increase the stated prices. If you know about similar items which are not mentioned in this article, please send such information to my California address.

It is hoped that this article will make amateur radio a bit more interesting to many new amateurs. I believe in advertising amateur radio. Everyone who knows me is aware that I am an amateur radio operator. I have my callsign on my doormat, car license plates, belt buckles, T-shirts, sweatshirts, caps, jackets, stationery, cups, glasses, mugs, badges, pencils, pins, and business cards. Almost every day a few people ask me what W6DDB means, which gives me a chance to tell them a little bit about our amateur radio service. Many of those brief introductions have resulted in additional amateurs.

**KC4AYP Pencils.** John Alden, KC4AYP, sells a set of 36 multicolored #2 lead pencils. You may use up to 26 digits (letters, numbers, and spaces) in the name and callsign printed on each pencil. These pencils come with a 3/2 inch high clear acrylic holder. WRITE IT is printed on the side of the holder's base. The price is \$19.95 ppd. John's address is P.O. Box 11423, Blacksburg, VA 24062-1423 (telephone 703-951-4939).

**N1BLY Rings.** M.G. Allen, N1BLY, sells hand-engraved sterling-silver and 14-karat yellow-gold rings. Prices start at \$92. If you want detailed information, send a self-addressed stamped envelope to P.O. Box 112, Waverley, MA 02179.

**ARRL Member Items.** The American Radio Relay League (ARRL) has a nice assortment of items. Most of the League items are only available to members. These items are listed in this article for the benefit of ARRL members. A 14" x 16" gold banner with the ARRL diamond at \$7.50. A bumper sticker printed "Amateur Radio—a National Resource" at \$2. A membership charm or an appointee charm (state your appointment) at \$2.50. The 5 inch member (diamond) or life-member decals at two for 50¢. A 3' x 5' cloth flag at \$21. ARRL flag license plate at \$5. Cloth ARRL flag patch at \$5, 3 inch ARRL diamond patch at \$1, 5 inch ARRL diamond patch at \$2, life-member patch for 3 inch diamond at \$1, and life-membership

patch for 5 inch diamond at \$1.25. ARRL flag pin at \$5, membership pin at \$3, life-membership (replacement) pin at \$3, and League appointee (state appointment) pin at \$3. Life-membership plaque at \$25. Scarf at \$6. Set of 50 ARRL member letterhead stationery sheets with 50 matching business size (#10) envelopes at \$8. Fifty pieces of stationery at \$4 or 50 envelopes (separately) at \$5. Blue or maroon tie with ARRL diamond at \$12. Exact details can be requested from ARRL Membership Services, 225 Main Street, Newington, CT 06111.



Belt buckle from Award Design Medals.

**Award Design Medals Belt Buckles.** Award Design Medals, Inc. offers a unique amateur radio belt buckle. It shows an amateur operating his station. A tower and beam antenna are included in the background. The stated prices include buckle, shipping, handling, callsign engraving, and any tax that might apply. DX amateurs should include an additional \$5 to cover delivery to non-U.S.A. addresses. Payment should be made by check or money order. The all-brass buckle is priced at \$25.95. The two-tone 24K gold and sterling-silver plated buckle is priced at \$54.95. The sterling-silver-plated buckle costs \$29.95. Allow 4 to 6 weeks delivery time. Orders may be sent to Pat Guillory, 9487 Dartry Court, Elk Grove, CA 95758 (telephone 916-684-1730). These are the most unusual amateur radio belt buckles I have seen.

**KB4WIT Lapel Pin.** Bill Bahr, KB4WIT, sells a callsign lapel pin made from 14-karat gold. The letters and number are 3/16 inch high. Each pin costs \$48, ppd. Allow two to three weeks time to receive a pin. A free catalog showing a variety of his products is available to everyone who requests one and sends a business-size (#10) SASE to BahrNo Products, 2535 Marietta Street NE, Palm Bay, FL 32905 (telephone 407-768-2261).

**AB4DQ's Callsign Cups.** Call Sign Cups sells a variety of mugs showing one's callsign. Ten ounce stoneware mugs sell at \$7.45, or two for \$12.95 ppd. The 15 ounce mugs are priced at



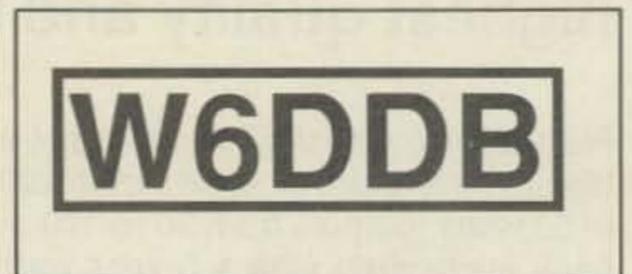
Callsign lapel pin from BahrNo Products, KB4WIT.



Mugs from Call Sign Cups, AB4DQ.

\$9.45 each, or two for \$16.95 ppd. The ARRL or QCWA logo is added to the opposite side of the mug at no extra charge, if you request it and state which logo you want. Walter Van Gieson, AB4DQ, is the proprietor of Call Sign Cups. The address is P.O. Box 17062, Raleigh, NC 27619 (telephone 919-782-1424).

**CBS Laser-Printed Callsigns.** The Computer Budget Shopper (CBS) sells laser-printed callsigns which are suitable for display on the operating table or in the rear window of a vehicle. If you commonly monitor one frequency, it can



CBS laser-printed callsigns.

be printed on the heavy-grade paper below your callsign at no extra charge. The price is \$3 each, postpaid. The address is 2203 Park Avenue, Cheyenne, WY 82007 (telephone 307-635-2173). Jim Hassler, WB7TRQ, offers an excellent 48-page catalog of public-domain computer software at \$2.

**Mugs from J.C. Cramer.** J.C. Cramer sells 16-ounce size handcrafted pottery mugs with

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Hand-crafted pottery mug with name and call-sign from J.C. Cramer.

name and callsign imprinted in the clay. Cinnamon- and oatmeal-colored glazes produce a beautiful earthtone effect. The price is \$16.95 each ppd. The address is Pottery by JC, 650 Cascade, Shelton, WA 98585 (telephone 206-426-7559).

**Caps from Embroidery Warehouse.** The Embroidery Warehouse sells summer (mesh) and winter (corduroy) caps at \$10.45 and \$11.75 each ppd, respectively. The embroidered name, callsign, and town/city can have a maximum of 14, 6, and 14 letters, respectively. Summer caps are red or royal-blue mesh and bill, with a white foam front. Embroidery matches the cap color. Full corduroy (winter) caps are red or navy-blue with gold embroidery. The address is P.O. Box 1476, Severna Park, MD 21146.

**Callsign pins from Fallert's.** Fallert's engraving sells callsign pins of one line (1" x 3") at \$1.25, two lines (1" x 3") at \$1.50, and three lines (1 1/2" x 3") at \$2 each ppd. Any desired logo (ARRL, CD, MARS, etc.) can be added at 75 cents more per pin. The address is 27 Verlynn Avenue, Hamilton, OH 45013.

**Ham Radio Bookstore Items.** The Ham Radio Bookstore has a few items which may be of interest to you. Their baseball-type caps are available in blue, gold, kelly green, and red. The callsign and name are added to the front of the cap, with a maximum of six digits to each line. The stock number is UFBC-81, and the price is \$6 each. Ham Radio polo-shirts and T-shirts are available in small, medium, large, and extra-large sizes. The new Ham Radio logo is silk-screened on the front of each shirt in a vibrant yellow color. Both types of shirts are sold in blue or red (state your choice). The T-shirt stock number is HR-TEE (blue or red), and the price is \$9.95 each. The polo-shirt stock number is HR-PLO (blue or red), and its price is \$19.95 each. Plastic-laminated identification badges are sold at \$2.50 each. The badge/lettering color combinations are blue/white, green/white, metallic-gold/black, metallic-silver/black, red/white, white/black, white/red, woodgrain/white, and yellow/blue. The badge stock number is UID. Add \$3.75 to cover shipping costs of an order. The address is Greenville, NH 03048.

**KB2MB Callsign Pins.** Callsign pins are available in 14-karat yellow gold from Harold Sasnowitz, KB2MB. His company's address is H & M Jewelry Company, 26 Edgecomb Road, Binghamton, NY 13905-4017 (telephone 607-797-5458). Each pin sells at \$49.95, plus a \$4 shipping fee. A diamond can be added to



KB2MB callsign pins.

the pin at an additional charge of \$19.95. A pin can be ordered with the callsign arranged in a horizontal, stepped, or vertical configuration. Callsign jewelry can be ordered in lavalier/charm (vertical only), or pin (horizontal, stepped, or vertical) styles. The callsign letters (and number) are about three-sixteenths of an inch high and approximately 0.7 millimeters thick. Two pins hold each callsign pin securely in place. Harold also sells 12 styles of chains in 8 lengths (7 to 30 inches). Chain diameters range between 0.4 and 4.8 millimeters. Chain prices are from \$6.58 to \$634.76. The photograph shows one of the excellent callsign pins produced by Harold. A \$5 discount is available to amateurs who mention this column. It is advisable to request a current flyer from KB2MB, and your SASE would be appreciated.



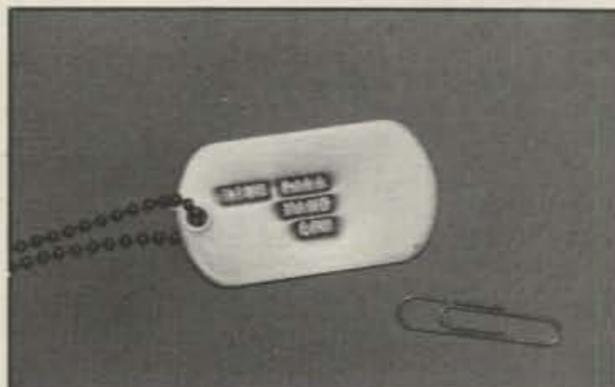
Brass belt buckle from N6MRG.

**Brass Belt Buckle from N6MRG.** Henry Hornsby, N6MRG, manufactures a very good solid brass belt buckle of his own design. Each buckle is machine-engraved and hand-finished. He custom engraves anything a purchaser requests on his buckles. The price is \$11.99 per engraved buckle (callsign only). Add \$1.00 if you order a second engraved line

(name). A nice drawstring-type denim pouch is available at \$1.00 more. These prices include shipping and handling fees, plus taxes (applicable to Californians). His address is Route 1, Box 211, Lake Isabella, CA 93240 (telephone 619-379-4749). He can be called evenings and weekends.

**ICOM Caps.** ICOM America, Inc. offers free baseball-type blue and white caps to convention attendees. Their address is 2112 116th Avenue N.E., Bellevue, WA 98004.

**ID tags from JPW Enterprises.** JPW Enterprises sells high-quality stainless-steel identification tags at \$4.29 each ppd. These dog tags are 1.125" x 2" and each one weighs less than 1/4 ounce. You can have up to 17 digits (letters, numbers, and spaces) embossed on one to five lines. You may want to order these tags for your children, luggage, and pets, as well as for yourself. A 24 inch chain is supplied with each dog tag. The address is P.O. Box 353, Logan, UT 84321.



ID tags from JPW Enterprises.

**Kenwood Caps, Stickers, and Maps.** The Kenwood U.S.A. Corporation gives baseball-type caps, bumper stickers, and DXCC world maps to convention attendees. Their address is P.O. Box 22745, Long Beach, CA 90801-5745 (telephone 213-639-9C00).

**MFJ Eyeball QSL Cards.** MFJ Enterprises, Inc. sells 500 eyeball QSL cards at \$39.95. These 2" x 3 1/2" cards are particularly useful at conventions, swapfests, and radio club meetings. The address is P.O. Box 494, Mississippi State, MS 39762.

**A.T. Patch Company Emblems, Jackets, and Caps.** A.T. Patch Company sells patches (emblems), jackets, and caps in a wide variety of styles, colors, and prices. Emblems sell in a



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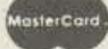
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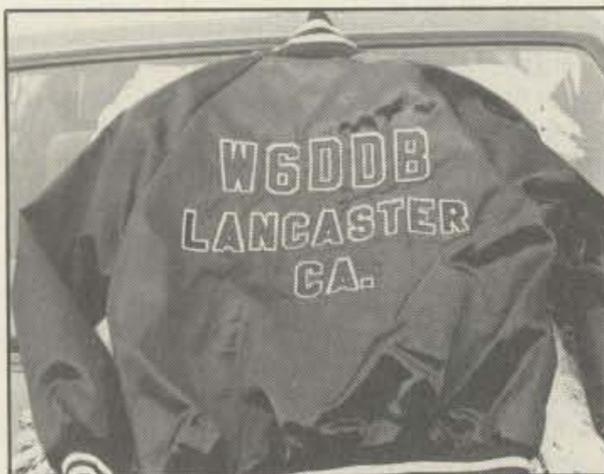
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An example of MFJ's eyeball QSL cards.



Among A.T. Patch Company's items are jackets with name, callsign, and emblems.

basic range of 60¢ to \$5.25 each. Up to six colors can be used in an emblem without extra charge. Each additional color adds 6¢ to the price of every emblem. If metallic thread is ordered, it adds 30% to the base price. Similarly, solid embroidery increases the price 30%, and a felt background costs 20% more. If heat-seal backing is ordered (to avoid sewing), that raises the price 15%. There is an initial \$10 pattern setup charge, and patterns are retained for possible use in filling future orders. These emblems can be added to caps and jackets. Cap emblem size is 3 inches (maximum). Caps cost \$5.95 to \$8.10 (depending on quantity ordered), plus a \$10 initial pattern setup charge. The size of an emblem added to a jacket or windbreaker is 4 inches (maximum). The prices of jackets and windbreakers vary between \$24 and \$36 each (depending on quantity ordered), plus the \$10 initial pattern setup charge. Obviously, these items should be purchased by groups (such as amateur radio clubs) in large quantities to obtain low prices. The address is P.O. Box 682, Littleton, NH 03561 (telephone 603-444-3423).

**Regency Mugs.** Regency Glass Engraving sells 10 ounce capacity coffee mugs at \$10 each ppd. The amateur's first name and callsign are engraved on the cup. The address is P.O. Box 802, Novato, CA 94948 (telephone 415-892-6587). Steve Heimberger produces a nice mug.

**QSL Cards Wall Display.** Joe Saunders, K3UAL, has clear plastic QSL card holders which enable an amateur to display received cards without having to damage them with tape or thumb tacks. I have used this type of QSL display for many years. It has the added flexibility of allowing you to quickly and easily change the cards displayed. These plastic display holders sell at \$5 for a package of three. Each holder can be used to display up to 20 QSL cards. Joe is also a QSL card printer. His



Regency Glass Engraving mugs.

address is 1520 Jutewood Avenue, Hyattsville, MD 20785. His telephone numbers are 301-773-9383 and 301-773-5074. If you want samples of his cards, send 50¢ (stamps or cash) with your request.

**Shure Brothers T-Shirts.** Shure Brothers, Inc. offers a promotional T-shirt at \$7.25 each ppd. The stock number is PR-73, which is appropriate. As usual, these T-shirts are available in S, M, L, and XL sizes. The Shure logo and slogan (Breaking Sound Barriers) appears on the front. T-shirt color changes from time to time. The present ones are athletic grey with red lettering. Orders may be mailed to Shure Brothers, Inc., Service Department, 222 Hartrey Avenue, Evanston, IL 60202-3696 (telephone 312-866-2200). Be sure to include the stock number.

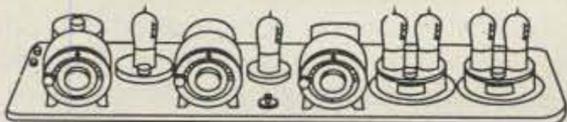
**Magnetic Sign from The Sign Center.** The Sign Center offers an excellent 8" x 19" 100% magnetic sign at \$8 each, plus a \$3 shipping charge. The overprinting is black and orange against a white background. The Amateur Radio Emergency Service (ARES) insignia is accompanied by large lettering of "AMATEUR RADIO COMMUNICATIONS." An area is reserved to add a callsign below the word "RADIO." Another area is reserved for a name or group insignia. The part number is AR819. The address is the Sign Center, Inc., P.O. Box 4097, San Diego, CA 92104 (telephone 619-298-1102).



Suction-cup/magnetic-mount plastic signs available from Sign-On.

**Plastic Signs from Sign-On.** Sign-On sells 2 1/4" x 8" signs featuring the words AMATEUR RADIO and a callsign in white lettering on

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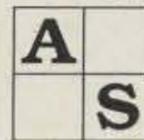
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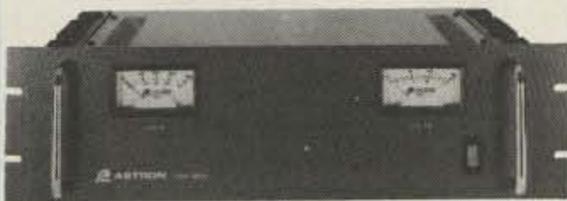
- SOLID STATE ELECTRONICALLY REGULATED
- FOLD-BACK CURRENT LIMITING Protects Power Supply from excessive current & continuous shorted output.
- CROWBAR OVER VOLTAGE PROTECTION on all Models except RS-4A, RS-5A.
- MAINTAIN REGULATION & LOW RIPPLE at low line input Voltage.
- HEAVY DUTY HEAT SINK • CHASSIS MOUNT FUSE

- THREE CONDUCTOR POWER CORD
- ONE YEAR WARRANTY • MADE IN U.S.A.

**PERFORMANCE SPECIFICATIONS**

- INPUT VOLTAGE: 105 - 125 VAC
- OUTPUT VOLTAGE: 13.8 VDC ± 0.05 volts (Internally Adjustable: 11-15 VDC)
- RIPPLE: Less than 5mv peak to peak (full load & low line)
- Also available with 220 VAC Input Voltage

### RM-A SERIES



MODEL RM-35M

### 19" X 5 1/4" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)
RM12A	9	12	5 1/4 x 19 x 8 1/4	16
RM-35A	25	35	5 1/4 x 19 x 12 1/2	38
RM-50A	37	50	5 1/4 x 19 x 12 1/2	50
• Separate Volt and Amp Meters				
RM-35 M	25	35	5 1/4 x 19 x 12 1/2	38
RM-50 M	37	50	5 1/4 x 19 x 12 1/2	50
RS-4A	3	4	3 3/4 x 6 1/2 x 9	5
RS-5A	4	5	3 1/2 x 6 1/8 x 7 1/4	7
RS-7A	5	7	3 3/4 x 6 1/2 x 9	9
RS-10A	7.5	10	4 x 7 1/2 x 10 3/4	11
RS-12A	9	12	4 1/2 x 8 x 9	13
RS-20A	16	20	5 x 9 x 10 1/2	18
RS-35A	25	35	5 x 11 x 11	27
RS-50A	37	50	6 x 13 3/4 x 11	46

### RS-A SERIES



MODEL RS-7A

### RS-M SERIES



MODEL RS-35M

- Switchable volt and Amp meter
  - Separate volt Amp meters
- |        |    |    |                 |    |
|--------|----|----|-----------------|----|
| RS-12M | 9  | 12 | 4 1/2 x 8 x 9   | 13 |
| RS-20M | 16 | 20 | 5 x 9 x 10 1/2  | 18 |
| RS-35M | 25 | 35 | 5 x 11 x 11     | 27 |
| RS-50M | 37 | 50 | 6 x 13 3/4 x 11 | 46 |

### RS-S SERIES



MODEL RS-12S

- Built in speaker
- |        |     |    |                    |    |
|--------|-----|----|--------------------|----|
| RS-7S  | 5   | 7  | 4 x 7 1/2 x 10 3/4 | 10 |
| RS-10S | 7.5 | 10 | 4 x 7 1/2 x 10 3/4 | 12 |
| RS-12S | 9   | 12 | 4 1/2 x 8 x 9      | 13 |
| RS-20S | 16  | 20 | 5 x 9 x 10 1/2     | 18 |

### VRM/VS-M SERIES



MODEL VS-35M

- Separate Volt and Amp Meters
  - Output Voltage adjustable from 2-15 volts
  - Current limit adjustable from 1.5 amps to Full Load
- |                                      | @13.8VDC@10VDC@5VDC |    |    | @13.8V |                     |
|--------------------------------------|---------------------|----|----|--------|---------------------|
| VS-20M                               | 16                  | 9  | 4  | 20     | 5 x 9 x 10 1/2      |
| VS-35M                               | 25                  | 15 | 7  | 35     | 5 x 11 x 11         |
| VS-50M                               | 37                  | 22 | 10 | 50     | 6 x 13 3/4 x 11     |
| • Variable rack mount power supplies |                     |    |    |        |                     |
| VRM-35M                              | 25                  | 15 | 7  | 35     | 5 1/4 x 19 x 12 1/2 |
| VRM-50M                              | 37                  | 22 | 10 | 50     | 5 1/4 x 19 x 12 1/2 |

\*ICS—Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

CIRCLE 163 ON READER SERVICE CARD



Glass and ceramic mugs from Todd W. Skogen.

black, blue, or red flexible plastic. These signs are sold in a suction-cup-mounted model, as well as a magnetic-mounted version; state which type is desired. The price is \$8.50 each, or two for \$15, ppd. The address is 1923 Edward Lane, Merrick, NY 11566. Jack Dulberg, KA2FHU's telephone number is 516-546-4362.

**Glass and Ceramic Mugs from Todd W. Skogen.**

Todd W. Skogen sells 13-ounce etched-glass mugs and 11-ounce ceramic coffee cups at \$10.45 each ppd. First name and callsign are etched on the large glass mug. The first name and callsign are etched in white on one side of the black or blue (state your choice) ceramic coffee cup. The ARRL logo (diamond) can be added to the other side of the cup at an additional cost of \$1 per cup. If at least 24 cups are included in a single order, a 10 percent discount applies. Orders can be placed for cups displaying a club logo on one side, plus individual club member's callsigns and first names on the other side, at \$1 extra per cup. Camera-ready artwork is required, and the minimum acceptable quantity for custom-artwork cups is 24 cups. A club person is required to coordinate such an order. The address is Todd W.



W2PD brass belt buckles.

Skogen, P.O. Box 3025, Fox Valley Station, Aurora, IL 60504 (telephone 312-805-5972).

**W2PD Brass Belt Buckles.** S. Slonim, W2PD, sells solid-brass belt buckles. One-line (name or callsign) buckle price is \$13 ppd. Two-line (name and callsign) buckle price is \$15 ppd. As many as ten digits may be used on each line. The address is 320 Rose Street, Massapequa Park, NY 11762 (telephone 516-797-1128).

**Vibroplex Items for Code Enthusiasts.** The Vibroplex Company, Inc. offers several items which

may be of interest to code enthusiasts. Each item features the famous Vibroplex logo (bug) in some way. Their baseball-type light-blue hat is fully adjustable. It has the Vibroplex emblem in black, red, and gold. The key chain is cast solid brass, and it features the bug logo. Their black-glaze English ironstone mug shows their bug logo in 22-karat gold. Their black polyester patch shows the Vibroplex name and logo in gold and red threads. An 8" x 18" black felt pennant shows the Vibroplex name and logo in gold. Their light-blue T-shirt is half cotton and half polyester. It is available in small, medium, large, and extra large sizes. It features the bug logo. Except for the pennant (\$4), each item is priced at \$6.95. A \$3 shipping charge applies to orders being shipped to U.S.A. addresses. The Vibroplex address is 98 Elm Street, Portland, ME 04101. Their toll free telephone number is 1-800-262-8387, which is also 1-800-AMATEUR. Their FAX number is 207-775-7710. Vibroplex offers several other items that are of interest to amateurs. Vibroplex has been in business since 1890, which means their centennial occurs during 1990. I have used their bugs 45 years, and a Vibroplex presentation bug is an essential part of my home station.

**W0TOK T-shirts and Sweatshirts.** Paul Washa, W0TOK, sells T-shirts and sweatshirts featur-

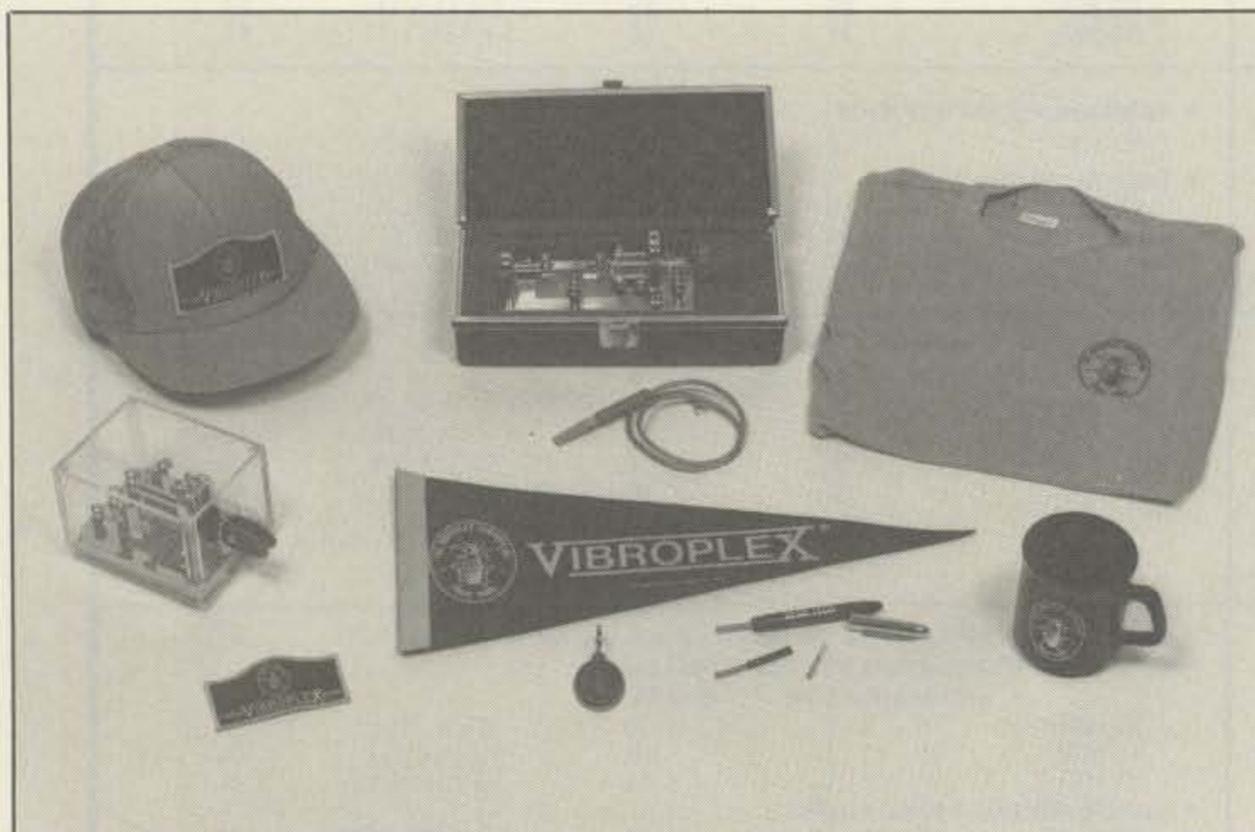


W0TOK's T-shirts and sweatshirts feature the 1964-65 five-cent amateur radio stamp.

ing an enlarged reproduction of the 1964-65 five-cent amateur radio stamp. T-shirts sell in all sizes (S, M, L, XL, and XXL) at \$9 each ppd. High-quality white sweatshirts sell at \$22 each in sizes S through XL, and at \$25 each for XXL, delivered. The desired size must be specified, of course. The address is 4916 Three Points Boulevard, Mound, MN 55364-1245.

**Plaques and Tankards from Wavelength Productions.** Wavelength Productions sells plaques and glass-bottom pewter tankards. Plaques sell in a price range of \$10 to \$60. Any special event, or organization patch or emblem, can be used on these plaques. The tankard costs \$48 each ppd, with up to seven words engraved on it at no extra charge. Bill Smith, N2AXY, runs this company. The address is 68 Kathleen Drive, Syosset, NY 11791.

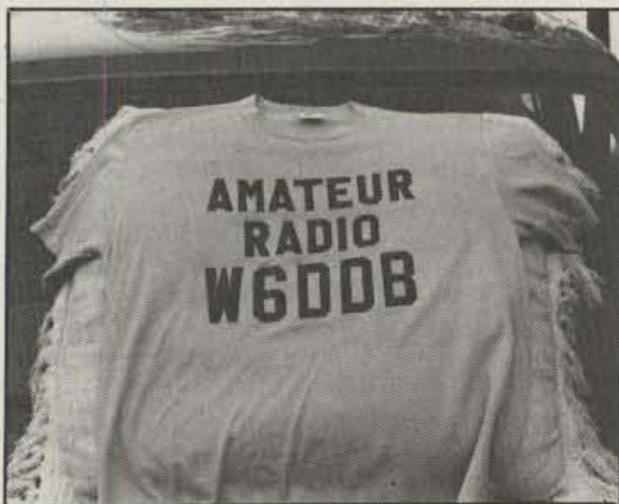
**Jackets, T-shirts, and Caps from Rod Williams.** Rod Williams offers an interesting variety of jackets, T-shirts, and caps. Each item can be customized to include name, callsign, and other information. His address Box 7486, Toledo, OH 43615 (telephone 419-829-6254 and



Vibroplex Company items for code enthusiasts.



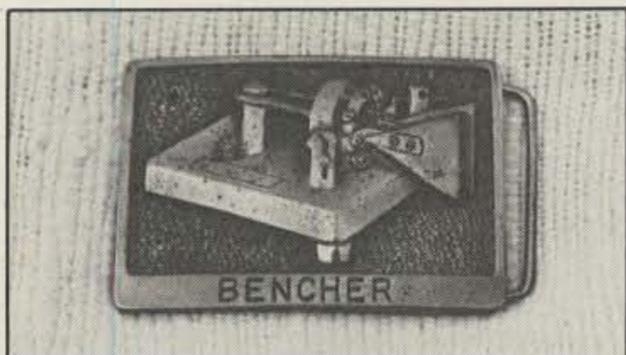
Wavelength Productions sells plaques such as this and pewter tankards.



Jackets, T-shirts, and caps are available from Rod Williams.

419-843-2014). Rod gives clubs a 10 percent discount when they place multiple-item orders. If you want details about Rod's products, you should request information from him. My wife (Marie, W6JEP) and I are two of his satisfied customers.

**N6BOP Shirts and Caps.** Anne Wright, N6BOP, sells a very good assortment of T-shirts, golf shirts, and caps. T-shirts and golf shirts are available in beige (tan), light blue, light yellow, or white. They can be printed on both sides. A red ARRL logo is available in sizes of 2 1/4" x 5" or 1 3/8" x 3". Lettering style can be ivy open or sportswear using black, brown, green, ma-



Wyoming Studios' brass belt buckle features the Bencher keying paddle.



Amateur radio call sign license plates.

roon, orange, red, or royal-blue ink. T-shirts cost \$13.75 each ppd, printed both sides. Golf shirts cost \$17.25 each (printed one side) or \$18.25 each (printed both sides). Her caps have a foam front, mesh back, and a strap to adjust the size. Caps sell at \$8.25 each, ppd. Print styles and colors for caps are as stated for shirts. The address is 2272 Kellogg Park Drive, Pomona, CA 91768.

**Wyoming Studios Brass Belt Buckle.** Wyoming Studios makes a brass belt buckle showing the Bencher keying paddle. The address is 8405 Roberts Road, Justice, IL 60458. The Bencher

address is 333 W. Lake Street, Chicago, IL 60606. Their telephone number is 312-263-1808.

**Call sign License Plates.** Last, but not least, amateur radio call sign license plates are available for use on our vehicles. They provide an effective way to advertise our amateur radio service. If you use such plates, I hope you drive very courteously to improve our image with the general public.

### Caveat Emptor

Several months elapsed between the time I started gathering information for this article and when it appeared in print. All prices are subject to change. They are just stated in this article to provide indications of cost. It is advisable to confirm prices before ordering merchandise.

If you know of similar "goodies" which could have been included in this article, please send information to my California address. There are a few items that have been sold in the past but which are no longer advertised. Some letters to previous suppliers were not answered, causing me to believe that they are no longer in business.

73, Bill, W6DDB

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## NEWS OF COMMUNICATION AROUND THE WORLD

**Long-Haul DX and The Long Path**

**A**sk any DXer about the most difficult countries to work, and that DXer will list countries 7,000 or more miles away. Long-haul DX is much harder to work than close-in countries due to the nature of radio propagation.

Long-distance propagation depends on the refraction of radio waves off various ionized layers in the upper atmosphere, especially the F-layer 150 to 300 miles up. Under ideal conditions, with a very low radiation angle from your antenna, a single bounce off the F-layer may return to earth as much as 2,500 miles away. Since most of us don't have antennas high enough to produce hops of that length, we usually figure a single F-layer hop to be about 1,500 to 2,000 miles long. Thus, many contacts made with stations farther away than this must involve multiple hops.

With each hop the radio waves are scattered and absorbed by both the surface of the earth and the ionosphere. Even more important for long-haul DX, however, is that on each hop the radio waves must pass through the lower D-layer of the atmosphere twice—once on the way up and again on the way down. During daylight hours when the D-layer is at maximum intensity, this layer absorbs the radio waves, decreasing signal strengths and preventing long-haul DX.

**Long Path**

So how do DXers make contacts more than three or four hops away? One solution is to operate at local sunrise and sunset, when the D-layer is weak and absorption is low. But there is another way to make long-haul contacts, especially at times of intense solar activity—the long path.

Since the earth is a globe, there are two paths between any two points on earth, along the great circle that passes through both points. In most cases, the shorter of the two paths is the better for radio propagation, as the shorter length means fewer hops and less scattering and absorption, and thus stronger signals.

However, radio waves can also follow the opposite path, approximately 180 degrees away from the short path, if conditions are right. At the peak of the sunspot



*Left to right, standing: Guillermo, XE1NJ, President of the LMRE; Enrique, XE1EEF; Nellie, XE1CI; Lorenzo, XE1U. Sitting: Dave, G4GED, and wife, Carol; Vic, XE1VIC; George, XE1CE; and Uriel, XE1RA.*

cycle (and occasionally at other times), the F-layer of the ionosphere does not dissipate at night. The presence of the F-layer means the DXer finds some bands open all night long. At sunspot peaks even 10 meters can stay open into the wee hours of the morning. Since the D-layer quickly fades away at local sunset, the absorption associated with the D-layer is also reduced. This combination of an intensely-ionized F-layer and the absence of the D-layer permits multi-hop propagation over the darkness path.

Let's look at a practical example. A station in northern California wants to work ZS8MI on Marion Island. The "short" path is a long one—10,500 miles. Even at an unrealistically low radiation angle of 11 degrees, this distance represents 7 F-layer hops, and 14 paths through the absorbing D-layer. Signals will be weak at best.

On the other hand, the long path is only slightly longer than the short path—14,400 miles versus 10,500 miles. This is only two hops more. When that long path is in darkness between the two stations, which happens soon after local sunset in northern California (sunset 0200Z, sun-

rise in ZS8MI 0400Z), there will be relatively little D-layer absorption on the long path. Signals should be good. (Of course, convincing Peter, ZS8MI, to get out of bed two hours before local dawn to work northern California is another matter, but that's one of the challenges of DX!)

How does the DXer know when to look for the long path? First, the long path is seldom better than the short path on distances of 6,000 miles or less. The large difference between the number of F-layer hops on the long and short path almost always favors the short path.

Second, the long path has to be in darkness, or mostly so. The only time long-path signals are stronger than short-path signals is when the radio waves traveling the long path don't have to pass through the absorbing D-layer.

Third, the solar activity must be high enough that the F-layer continues to refract radio waves throughout the night. If the F-layer is weakly ionized and dissipates at night, the long path also disappears.

Finally, the geomagnetic field must be reasonably quiet (planetary A-index below 20, planetary K-index below 3). An active geomagnetic field can disturb the F-

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### DR-510T - 45 watt 2M/440 Dual Transceiver

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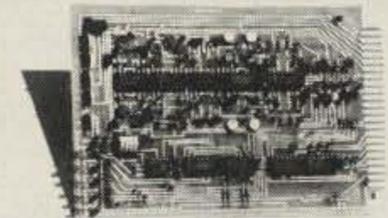
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1401	CT1QF	1404	VE1ACK

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2071	KD2BW	2073	DU1DZA

### CW

2581	NJ1T	2585	YU2VV
2582	OZ2E	2586	N2FKE
2583	W4UW	2587	IV3EAD
2584	LU1DOW	2588	G2AKK

### WPNX

248	KA1OWC
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### VPX

257	PA-2164	258	OK1-32647
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Mixed: 450 GM3BCL, G0CLP, CT1QF, YU2VV, VE1ACK, WM0G. 500 GM3BCL, 1000Z, CT1QF, YU2VV, VE1ACK. 550 GM3BCL, KD2BW, 1000Z, CT1QF, YU2VV, VE1ACK. 600 GM3BCL, 1000Z, CT1QF, YU2VV, VE1ACK. 650 GM3BCL, CT1QF, YU2VV, VE1ACK. 700 GM3BCL, CT1QF, VE1ACK, K1BAZ/DV1, W4WKQ. 900 WA3BNW, CT1QF, YU4BR, VE1ACK, K1BAZ/DV1. 1000 HA5NK, G3VQO, CT1QF, YU4BR, VE1ACK. 1050 HA5NK, CT1QF, YU4BR, VE1ACK. 1100 KS3F, YU4BR, VE1ACK. 1150 YU4B4, KS3F, VE1ACK. 1200 YU4BR, SM4-3434, VE1ACK. 1350 KB0G. 1400 ONL-4003. 2050 IN3ANE. 2300 I2PJA. 2350 I2PJA.

SSB: 350 WD5KBB, HB9DLU. 400 WD5KBB, HB9DLU. 450 WD5KBB, HB9DLU, IV3PVD, K1BAZ/DV1. 500 HB9DLU, IV3PVD, K1BAZ/DV1. 550 HB9DLU, IV3PVD, K1BAZ/DV1. 600 IK7BDN, HB9DLU, IV3PVD, K1BAZ/DV1. 650 IK7BDN, HB9DLU. 700 HB9DLU. 750 HB9BVV. 800 WB6SRK, HB9BVV. 850 HB9BVV. 900 HB9BVV. 950 HB9BVV, I2IAU. 1000 HB9BVV, I2IAU. 1050 KB0G. 1100 KB0G. 1150 LU8ESU. 1200 KD9OT, W8ESU. 1350 KL7AF, K4CKS. 1400 K4CKS. 1500 G4CPJ. 1850 NJ0C. 2300 I2PJA. 2350 I2PJA.

CW: 350 OZ2E, NJ1T, YU2VV, IV3EAD, G2AKK. 400 OZ2E, NJ1T, YU2VV, IV3EAD, G2AKK. 450 OZ2E, NJ1T, YU2VV, JE3CYH, IV3EAD, F6CWA, G2AKK. 500 OZ2E, NJ1T, YU2VV, IV3EAD, F6CWA, G2AKK. 550 OZ2E, NJ1T, YU2VV, IV3EAD, F6CWA, G2AKK. 600 OZ2E, IV3EAD, JA2GCW. 700 OZ2E, K6UXO, IV3EAD, K1BAZ/DV1, JA2GCW. 750 OZ2E, KB0G, IV3EAD, K1BAZ/DV1, JA2GCW. 800 IV3EAD, JA2GCW. 850 IV3EAD. 900 IV3EAD. 950 IV3EAD, JA7FFH. 1000 NF5Z. 1450 W8UMR. 1500 W8UMR. 1700 W3TVB.

10 Meters: HB9CSA, IT9CUE  
 15 Meters: HB9BVV, HB9CSA, I3ZSX  
 20 Meters: WB8SRK, F6CWA, HB9CSA  
 40 Meters: IV3PVD, HB9CSA  
 80 Meters: F6CWA, WM0G  
 160 Meters: HB9BVV

Africa: WE2L, HB9CSA  
 No. America: KK3Q, KD2BW, HB9BVV  
 So. America: KB0G, KS0Z, HB9CSA  
 Europe: KD2BW  
 Oceania: HB9BVV

Award of Excellence: KB0G, HB9CSA

Award of Excellence with 160 Meter Endorsement: KB0G

Award of Excellence Plaque Holders: W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2\*\*, AB90, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, WB1LC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KB0G, HB9CSA.

Award of Excellence Plaque Holders with 160 Meter Endorsement: W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, WB1LC, W1BWS, NN4Q, G4GUE, LU3YL/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE0DXM, VE7IG, K9BG, AB90, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, W3ARK, HI8LC, KA5W, UR2\*\*, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KB0G.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

## The WAZ Program

### 10 Meter Phone

330	I4AVG	332	PY1OL
331	I2EOW		

### 15 Meter Phone

278	I4AVG	282	K4RIG
279	JA1IOQ	283	PY1OL
280	JA6AKV	284	VE7DX
281	IK2FCZ	285	N6CGB

### 20 Meter Phone

746	I4AVG	750	IK7DBB
747	TF5BW	751	PY1OL
748	HB9DLU	752	IK2BLA
749	I8RS		

### 40 Meter Phone

53	I4AVG	55	I2EOW
54	I8SAT	56	PY1OL

### 80 Meter Phone

51	I4AVG	53	PY1OL
52	I8SAT		

### 15 Meter CW

150	W0VU	151	JF3LOP
-----	------	-----	--------

### 20 Meter CW

327	G4UZN
-----	-------

### 40 Meter CW

102	JA0DAI	103	AA4AV
-----	--------	-----	-------

### 80 Meter CW

24	JA0DAI
----	--------

### All Band WAZ

#### SSB

3345	HK3JUH	3357	NL7NF
3346	IK8BMW	3358	YT7CC
3347	EI8EM	3359	YV2EJU
3348	NU0A	3360	N6DJY
3349	JR1IFC	3361	XE2FL
3350	N7ER	3362	GI3KVD
3351	K7DXJ	3363	WD5KBB
3352	DL4MFC	3364	EA3BKI
3353	KA9PJZ	3365	EA3FAH
3354	N1FBN	3366	KI6BU
3355	JA6RHH	3367	YB3CN
3356	K1WVX		

#### Phone/CW

6545	W9IV	6561	W7DG
6546	WA6AJB	6562	WB2GFI
6547	HA0DH	6563	DL8YT
6548	W4VOS (CW)	6564	DL1RX
6549	W4VOS	6565	G3SJK
6550	NF5Z	6566	SM5MLE
6551	JA0RWF	6567	WZ6Z
6552	K8FC	6568	OK1LLC
6553	W3NUS	6569	W0BBT
6554	KB6IUA	6570	WD4FZO
6555	W4USW	6571	EA1OD
6556	YU2VV (CW)	6572	N6CGB
6557	YU2VV	6573	WB8SFF
6558	KN2Q	6574	HB9DEU
6559	KZ3H	6575	WA4DPU
6560	JA9YE	6576	DL4MCF

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Leo Haijman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.O. awards is \$4.00 for subscribers and \$10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application.

layer, and reduce signal strengths, particularly on multi-hop paths.

At times of intense solar activity (such as this month), watch for long-path openings to distant stations whenever the geomagnetic activity is below minor storm levels.

### Some Practical Observations

Paul Hansen, AE6H, offers a few notes about particular long-path openings.

**20 Meters:** The classic long path to the west (along the darkness path) opens right around local sunrise and lasts up to 3 hours. From the West Coast, for example, this path reaches into northern Europe and southern and eastern Africa with good signal strengths. As the sun rises, the Indian Ocean stations are good targets. There is another, weaker long-path opening to the southeast an hour or two after local sunset, with occasionally strong signals into Asia.

**15 Meters:** At periods of excellent propagation, the same paths are open on 15

meters. Since absorption decreases with increasing frequency, the 15 meter signals are often stronger than those on 20 meters. The maximum usable frequency (MUF) must be higher for 15 meters to stay open all night, but that does happen at sunspot peaks, especially around the equinox (September 23 this year). Look southwest in the morning hours and southeast in the early evening.

**10 Meters:** Yes, Virginia, there is a 10 meter long path. This path is seldom reported, but is probably open far more than DXers take note. Again, the best times are within a half hour of local sunrise, to the southwest, and then again several hours after local sunset, to the southwest. If 15 meters is open, try 10 meters. These paths usually involve very late night operation on one end or the other of the path, and since most DXers associate 10 meters with daytime propagation, few check 10 meters in the middle of the night. However, students of the long path know that this can be a very pro-



Mr. Mohamed Abdelaziz, the President of the Saharan Arab Democratic Republic (Western Sahara, S0) discusses the next S0 DXpedition with Martti Laine, OH2BH (holding paper), and Jarmo, OH2BN. An interpreter leans between Martti and President Abdelaziz. Martti then traveled to Western Sahara to put S01MZ on the air.

ductive opening. Signals are typically weak (S2-5), but very workable, with no QRM.

**Warning:** The maximum signal strength on the long path is seldom found exactly 180 degrees away from the short path. Most long paths are skew paths, bouncing and warping their way around the polar regions and catching scattered areas of intense ionization. If your antenna is particularly directional (multi-element monobanders, for example), probe around 30, 40, even 60 degrees to either side of the "official" long-path bearing for maximum signal strength.

### DX Gatherings and Events

The W9DXCC DX Convention, sponsored by the Northern Illinois DX Association, will be held Saturday, September 9 at the Glen Ellyn Holiday Inn, near Chicago, Illinois. For more details on this excellent one-day affair, contact the NIDXA at P.O. Box 519, Elmhurst, IL 60126.

On the other side of the Atlantic, the Clipperton DX Club holds their 11th annual convention at the Hotel Ibis-Paris la Defense September 23-24. The program will include presentations by Jacky, F2CW, on his Marquesas and Austral Islands trip, and other talks by prominent DXers. For more details, contact Jean-Louis Dupoirier, F9DK, 11 Rue Henre Barbusse, Cressely, 78470 St. Remy les Chevreuses, France, or F6EXV at his *Callbook* address.

The always-innovative Texas DX Society has come up with another on-the-air event that should appeal to many DXers.

On Sunday, September 10, from 1800-2400Z, the TDXS is sponsoring a Sunday Afternoon Social on the three WARC bands. Ten years after the WARC conference where amateurs won access to these new bands, the WARC-Fest '89 is on 10100-10150, 18068-18168, and 24890-24990 kHz. Categories are CW only or mixed, single operator only. Exchange operator's first name, QTH (ARRL section, Canadian province, or DXCC country), and antenna type. Operation 1 hour minimum per band, and observe all existing regulations on band usage (power limits, etc.). Work stations once per band-mode. Send summaries of your activity with contacts broken down by band-mode, time spent on each band, and "multipliers" contacted to Texas DX Society, P.O. Box 540291, Houston, TX 77254-0291. (Official summary sheets are available from TDXS, and their use is recommended.) Send in your summary sheets by October 15 for consideration of a Certificate of Merit, awarded to the top 10% of stations in each category. Include an SASE for a copy of the results.

Another unique event in September is the Glasnost Bowl, the first college football game played in the Soviet Union. On September 2 football teams from the University of Illinois and the University of Southern California will meet in the Dynamo stadium in Moscow. Two or three special event stations will operate September 2-3, with certificates for working all three stations, or working any combination of stations on all five traditional HF bands. WB6JHC at USC will be on 3550,

## 5 Band WAZ

As of June 1, 1989, 226 stations have attained the 200 zone level.

New recipients of 5 Band WAZ with all 200 Zones worked:

I4YNO  
G4GED  
I8SAT  
JA1FNA

The top 20 contenders for 5 Band WAZ are:

- |                |                |
|----------------|----------------|
| 1. N4WW, 199   | 11. NS7Z, 198  |
| 2. W0JLC, 199  | 12. K7UR, 198  |
| 3. SP9PT, 199  | 13. KB0U, 198  |
| 4. K6YRA, 199  | 14. PY7ZZ, 198 |
| 5. K8EJ, 199   | 15. K6SIK, 198 |
| 6. K9GX, 199   | 16. VE8DX, 198 |
| 7. AA4V, 199   | 17. I8IGS, 198 |
| 8. SP6JCY, 199 | 18. PY1OL, 198 |
| 9. K2UU, 199   | 19. W0PGI, 198 |
| 10. HA8XX, 198 | 20. NY2E, 198  |

571 Stations have attained the 150 Zone level, as of June 1, 1989.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (65 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application.

7040, 14050, 21050, and 28050 kHz on CW and 3875, 7250, 14250, 21350, and 28350 kHz on SSB. W9YH at Illinois will be 5 kHz higher, and UZ3AZO from Moscow University will be another 5 kHz higher. Send contact data, including QSO number, with two units of first-class postage, to TCARC, P.O. Box 4101, Urbana, IL 61801.

### Young Honor Rollers

A couple of DXers commented on Hugh Cassidy's remarks about young DXers on the Honor Roll. Hall of Famer San Hutson, K5YY, was first licensed at age 14, and reached the 300-country level 13 years later. He made the Honor Roll at age 29, after 15 years as a ham. Ten years later he hit the top of the Honor Roll.

Dick LeMassena, W6KH, was also first licensed at age 14, and made the Honor Roll 10 years later at age 24, with the call W7WVE. He writes, "I'm not sure that this was any great feat, as many of us were gung-ho teenage DXers in the fifties and early sixties. For example, I also notice that Ronnie Camp, K6EVR, was on the Honor Roll in the sixties; he's about my age. We didn't have large spotting nets or list operations. We had to battle the East Coast wall on our own. (They never stood by for the 6s and 7s in those days.) I can't say for certain whether getting on the Honor Roll is more or less diffi-

cult these days. After all, there were only 143 of us in November 1964."

## Honors for CQ Magazine

The Araucaria DX Group of Brazil has issued their DX Certificate of Merit Number 1 to CQ magazine, "to recognize this special magazine, promoting and incentivating DX contest activity." Other recipients of this honor, in order, are: Martti Laine, OH2BH; Jorge Bozzo, LU8DQ; Kanazawa University JA9YBA; John Dorr, K1AR; Frank Donovan, W3LPL; Gordon Fogg, N5AU; Jim Neiger, N6TJ; Carl Cook, AI6V; Carlos Fonseca, TI2CF; Pedro Piza, Jr., NP4A; Bob Cox, K3EST; Larry Brockman, N6AR; Steve Bolia, N8BJQ; and Dick Norton, N6AA. Congratulations to the recipients!

## DXing Aids

Dieter Konrad, OE2DYL, has published the 8th edition of his "DX Nets around the World," which lists more than 100 active DX nets. Cost is US \$3.00, including airmail postage. The complete package of editions 1-8 is available for US \$10 (3 IRCs equals US \$1.00), no checks. Order with self-addressed envelope from Bessararbirerstr 39, 5020 Salzburg, Austria.

Len Traubman, W6HJK, offers a 20-page syllabus of Russian phrases for

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AEA DX and many more. Accommodates all battery sizes. You can switch from one battery SIZE to another in a microsecond!

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## CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 321. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by a SASE for confirmation. The fee for endorsement involving the issuance of a sticker is \$1.00.

### CW

W9DWO	321	N6AV	315	K9QVB	311	I3OBO	301	K4CXY	292	K2JF	283
K2FL	321	K6LEB	315	K8PYD	310	WB4RUA	300	N5DX	291	JH1VRO	282
K4CEB	321	W1NG	315	K3UA	310	W0SR	300	I8WY	291	K7ZR	280
K2TQC	321	N4KG	315	AA6AA	309	DL6QW	300	WA4DAN	291	I5XIM	280
N4JF	320	W8KPL	314	W9RY	308	K2OWE	299	WA4JTI	290	W2LZX	280
ON4QX	320	K9AB	314	EA2IA	308	K3FN	298	KQ9W	290	W9NUF	280
K9MM	320	DL8CM	314	W4OEL	307	DJ7CX	297	IT9QDS	290	HB9AFI	279
K6JG	320	N6CW	313	N2KW	307	KBLJG	297	N4AH	290	KA2DIV	279
DL1PM	319	K1MEM	313	SM6CTO	306	WD9IIX	296	W1WAI	290	DL1QT	277
W4BQY	318	W2FXA	312	K9IW	305	KD8V	296	W1WLW	289	KA3R	276
SM6CST	317	K6EC	312	AB4H	304	N8MC	295	W4BV	289	W6DN	276
SM3EVR	317	OK1MP	312	W6SN	304	W9WAO	295	K1VHS	289	DJ2PJ	276
W6PT	316	YU1HA	312	K9BWQ	304	W0HZ	295	G2GM	289	NS7Z	276
K4XO	316	W0IZ	312	W7CNL	302	N5FW	294	K8NA	288	K4SE	275
N4MM	316	N6AR	311	WA8DXA	302	IT9TQH	294	W6YQ	287	W3BBL	275
DL3RK	316	DJ1XP	311	IT9ZGY	302	NN4Q	293	G2FFO	287	G3KMO	275
N4PN	315	W6ID	311	YU2TW	301	WD9IIC	292	W9SC	287	F3TH	275
DL7AA	315										

### SSB

K2FL	321	N6AHU	316	WB3DNA	311	KD8V	304	XE1HI	298	N8BJQ	286
W6EUF	321	XE1AE	315	WA4WTG	311	KC8YM	304	K5DUT	297	VE6PW	286
W4UG	321	I8YRK	315	K9HQM	311	I1POR	304	HP1JC	297	N3ARK	286
VE1YX	321	N6AR	315	DK2BL	310	XE1KS	303	YU7KV	297	N9CPW	286
K6WR	321	I4ZSO	315	AA6AA	310	W2LZX	303	XE1OW	297	K9MNT	286
N4JF	320	I8KDB	315	WA4JTI	310	KB0U	303	WA4ECA	297	KB5RF	285
F9RM	320	K9LKA	315	AB9O	310	K0GT	303	WD9GQV	297	I8IGS	285
EA4DO	320	ON5KL	315	WD8MGO	310	G4ADD	303	WB3GPR	296	KF5AR	285
W9DWO	320	OZ8BZ	315	KU9I	310	KS0Z	303	KB3KV	296	KD8V	284
TI2HP	320	K9AB	315	W6SN	310	W0ULU	303	I0SGF	296	KC7EM	284
W4DPS	320	N6AW	315	N6AHV	310	W4BQY	303	K8NWD	296	WB3HAZ	283
W0YDB	320	K1UO	315	KB9OC	310	K1MEM	302	W0IYR	295	VE3MV	283
K6YRA	320	W7OM	315	W8IMZ	310	N5FG	302	KK0C	295	ZP5JCY	283
I4LCK	320	YV5DFI	315	NY5L	310	W6FET	302	G3XTT	295	CX4HS	283
ZL3NS	320	VE7DX	315	IV3YRN	310	I3OBO	302	VE3XO	295	I4CSP	283
4Z4DX	320	VE3XN	314	I8KCI	310	K9UAA	302	KI3L	295	KB1JU	283
VE3MR	319	YS1RRD	314	N4PN	309	KP4EQF	302	IN3ANE	295	AE2B	282
DL9OH	319	K8LJG	314	ZL1BIL	309	N5FW	302	WB4PUD	295	AI9R	282
OZ3SK	319	K3UA	314	WD9IIX	309	I5EFO	302	I7UNX	295	TG9EP	282
DJ9ZB	319	W3GG	314	K9QVB	309	KQ9W	302	WD0BNC	294	N1ALR	282
ZS6LW	319	I2LLD	314	K4CXY	309	I2MOP	302	I5BDE	294	WA8YTM	282
I8AA	319	W1NG	314	W2FGY	309	XE1MDX	302	WB3CQN	294	PY2DBU	281
YU1HA	319	W1LOQ	314	KR9O	309	KE4HX	302	SM6CST	294	NP4CC	281
W3AZD	319	SM4CTT	314	W6NLG	309	WA3HUP	301	KB8O	294	NX0I	281
KS2I	319	W7FP	313	VK4VC	308	VE3FJE	301	VE3DLR	294	TI2LTA	281
N4MM	319	EA4LH	313	YV5AIP	308	WB4NDX	301	K4JLD	293	K9TI	280
W4EEE	319	W8PCA	313	N6AV	308	YU2TW	301	K4SE	293	G4FAM	280
ZL1AGO	319	N2SS	313	IT9TGO	308	N4CRU	301	KC8JH	293	KU9Z	280
K9MM	319	VE7WJ	313	A18M	308	KZ0C	301	A15I	293	XE1XM	280
N7RO	319	OE2EGL	313	NS7Z	308	N8BKF	301	W9NUF	293	WD9IIC	280
I0ZV	319	K2JLA	313	YV1AJ	308	WT4T	301	KD5ZM	293	W9VA	280
W0SFU	319	WZ4I	313	NN4Q	308	KB2HK	301	WB6OKK	293	KB5DN	279
K6JG	319	F2MO	312	WA4DAN	308	K7LAY	301	W5LLU	293	EA6DE	279
OZ5EV	319	W0SD	312	W8ILC/QRp	308	AG9S	301	WA4LOF	292	JH8NYK	279
VE3GMT	318	K9RF	312	XE1OX	308	KB9KD	301	AC0A	292	KX5V	279
W9JT	318	K4MOG	312	K8CMO	308	K2JF	301	VE3FEA	292	N6CGB	279
PY1APS	318	K9HDZ	312	WB1DOC	307	WE2L	301	VP9CP	292	WN5K	279
YV1KZ	318	LA7JO	312	I0MBX	307	W6MFC	301	WB1KG	292	K4BYK	278
VE2WY	318	LU3YL	312	KV2S	307	KE4VU	301	SV1JG	292	VE3IUE	278
YU1AB	318	G4CHP	312	VK3JF	307	VE4AT	300	VE3IPR	291	WA4IUM	278
W9SS	318	N6OC	312	NJ2C	307	SV8CS	300	W4JFE	291	DF6EX	278
W4NKI	318	W6DN	312	VE4SK	307	G4GED	300	DU9RG	291	KG9N	278
DL6KG	318	9H4G	312	SV1ADG	307	WB5TED	300	XE1CI	291	I8WYD	278
OE3WWB	318	VE3MRS	312	KB3OQ	307	I2ZGC	300	KB2MY	291	WB0UFL	277
K5OVC	318	W4UNP	312	KA9ABC	307	NW5K	300	ZL1BOQ	291	W4PTT	277
DJ1XP	317	KC8EU	312	W4UNP	307	WB6GFJ	300	KB7VD	291	KB0SY	277
KD8VM	317	W4SSU	311	WA2MID	307	JH1VRO	300	VE3CKP	290	WD9DMN	277
W2SUA	317	K6EC	311	N4KE	306	WB6PSY	300	IK8CNT	290	N8AMI	276
CT1FL	317	W0SR	311	KB5FU	306	IT9TQH	300	KC2FC	290	N7ASL	276
N4WF	317	K8NA	311	KE3A	306	K4LR	300	F6BFJ	290	WA4OPW	276
IT9ZGY	317	NJ0C	311	K3LUE	306	KA3HXO	300	JA5PUL	289	KC2RS	276
K9BWQ	317	N2KW	311	W6BCQ	306	IK8BQE	300	W9TA	289	WA9IVU	276
I0AMU	316	W2CC	311	WD8PUG	306	WA2HFKF	300	A19U	289	WA9RCQ	276
OK4OS	316	WB4UBD	311	NA5W	305	K1VHS	300	OK1AWZ	288	K0HQW	276
EA2IA	316	A18S	311	KZ8Y	305	WA0TKJ	299	WA6DTG	288	I2WZX	276
I8ACB	316	KZ2P	311	K8VFX	305	I6PLN	299	KA9TNZ	288	KA5YCM	276
K8PYD	316	W2CC	311	EA1QF	305	KA8T	299	KF5DX	288	WB1EAZ	275
W8ILC	316	KB8DB	311	K4RIG	305	DJ7CX	298	EA3KW	287	VE7BSM	275
K4XO	316	I4EAT	311	K8ZZU	305	K9SM	298	AB9E	287	VE5FX	275
W8JXM	316	YS1GMV	311	I4WZK	305	I8LEL	298	W9SC	287	W0FF	275
N4KG	316	W9OKL	311	W4UW	304	JH4PRU	298	PA0XPQ	287	I8INW	275
A18S	316	I8XTX	311	KB4HU	304	EA9IE	298	I2EOW	287	WB8TLI	275

Say You Saw It In CQ



Sig, SU1EE (WA9INK), operates this extremely well-equipped station on CW, SSB, and RTTY from Egypt. He moves on to Zaire this fall, where he has requested the call 9Q5EE.

amateur radio. The booklet provides English words and phrases for QSOs accompanied by the Russian translation, and the English transliteration, to assist in the pronunciation of the Russian. The booklet is free of charge, thanks to the support of the Beyond War Foundation. Contributions are happily accepted. Contact Len at 1448 Cedarwood Drive, San Mateo, CA 94403.

### CQ DX Awards Program

#### SSB

1688	NI5D	1692	KB4HBH
1689	CP8PX	1693	N4ODI
1690	KH6VP	1694	I7UNX
1691	N0WT	1695	IK7DBB

#### CW

752	VE3PWK	754	GI4SNC
753	YU2VV		

#### SSB Endorsements

320	W4UG/321	300	WE2L/301
320	K6WR/321	300	W6MFC/301
320	4Z4DX/320	300	KE4VU/301
320	K6YRA/320	300	WA2FKF/300
320	14LCK/320	300	K1VHS/300
310	OZ5EV/319	275	I7UNX/295
310	K6JG/319	275	KB2MY/291
310	DL6KG/318	275	KB7VD/291
310	K5OVC/318	275	KF5DX/288
310	OE3WWB/318	275	I2EOW/287
310	A18S/316	250	IK7DBB/253
310	VE7DX/315	200	NI5D/248
310	WZ4I/313	28 MHz	KH6VP
310	KC8EU/312	28 MHz	N0IWT
310	K9HOM/311	28 MHz	IK7DBB
300	W4BQY/303		

#### CW Endorsements

320	K2FL/321	275	K2OWE/299
320	K4CEB/321	275	WA4DAN/291
320	K2TQC/321	275	N4AH/290
320	K6JG/320	275	K1VHS/289
310	W4BQY/318	275	G2GM/289
310	SM3EVR/317	150	YU2VV/187
310	DL3RK/316		

Total number of active countries is 321. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

### QSL Information

Joe, W6OVO, is available for QSL managing duties.

In the old-timer category, W2SNM has the pre-1970 logs for 9U5DP, 9U5OP, and 5H3JP. Mary Ann, WA3HUP, can confirm the 1968-1975 operations of CQ6GA, XX6GA, CR6GA, XX6XX, and CR6XX.

1Z9B to KA6V  
 3A2EE to F9RM  
 3B9FR to F6FNU  
 3C1MM to EA1QF  
 3D2RW to ZL1AMO  
 3X1SG to ON7GV  
 4J1FS to OH5NZ  
 4K8F to UA1DJ  
 4K1DV to UZ1CXA  
 4S7NMR to KZ8Y  
 4U1UN to N2AK  
 5H3TW to K3ZO  
 5N8ALE to DJ2VZ  
 5N8UDE to DL3VD  
 5V7TM to F6FNU  
 5W1UY to DK7UY  
 5W1YL to HB9CUI  
 601YD to F6AJA  
 7S6DO to SM6DEC  
 7X4VU to FE6IFF  
 8P9FD to KH6WZ  
 8P9FE to WB6LMN  
 8R8PA to 5B4PA  
 9H1JP to 9H5CO  
 9H3GQ to DK4SW  
 9H3IA to PA0PUR  
 9H3IE to PA0BEA  
 9J2B0 to W6ORD  
 9M2RU to N6LHN  
 9M6HF to WE2K  
 9Q5DX to KQ3S  
 9X5AA to W4FRU  
 A22AA to A22CQ  
 A22AV to W8XM  
 A35AA to N5XX  
 A35SA to KB7QC  
 BV2DA to DJ9ZB  
 C56/G3SXW to G3SXW  
 C56/G3TXF to G3XF  
 CN8FC to WA4QMQ  
 CR5CQK to CT1CQK  
 D68TW to K3ZO  
 EC9JB to EA9IB  
 EJ8A to W2ORA  
 ER4L to UA4LCO  
 FG5DX to WB7RFA  
 FG5R to W7EJ  
 FK8FU to NA5U  
 FO/DK7UY to DK7UY  
 FO8BEF to FE1JCN  
 FO8VO to N6VO  
 FR4FD to F6FYA  
 FR5FO to F6FYA  
 FR5FO to VK1DA  
 FT4ZE to F2CW  
 H2A to 5B4SA  
 HC8JG to WA6ZEL  
 HH2BM to KC8JH  
 HK8EHM to WD9DZV  
 HK8TCN to K4TXJ  
 HL5BDS to HL1ASS  
 HL9TF to WB0DUL  
 HT3A to SM0KCR  
 HX6JUN to F5AM  
 IS00MH to VK1DA  
 J20RAD to F6AJA  
 J4/DK6AS to DJ8MT  
 J52US to WABJOC  
 J73EH to WA4WIP  
 JX8A to LA5NM  
 JX1UG to LA5NM  
 JX7DFA to LA2KD  
 JY9SR to W3FYT  
 KC6SI to JA7HMZ  
 L6D to LU4DQ  
 LE3JP to LA1K  
 LV3F to LU6FAZ  
 LW1EZK to LU6EF  
 N200AXA to N8AXA  
 OD5LP to HB9CRW  
 OH8M/OH2AP to OH2AP  
 OT8C to T10RC  
 P29LB to KC2ZH  
 P29VMS to DL2GAC  
 PY8FF to W9VA  
 RB8J/RB5LVV to UB5JRR  
 RL9MM to RB7GG

SB1MZ to EA2JG  
 S79J to K4ERO  
 SQ8DXC to SP9JPA  
 SU1EE to WA9INK  
 SU1EK to W2GUV  
 T26LP to ZL1AMO  
 T28RW to ZL1AMO  
 T38BC to ZL2QW  
 T32AB to N7YL  
 T32AF to K7EHI  
 T58DX to I2JSB  
 T5CT to K4CAI  
 T5MF to I2MQP  
 TA2BK to DJ0UJ  
 TC8A to TA1A  
 T12JJP to I0WDX  
 TJ1BW to DL6FAL  
 TK8KC to F6FNU  
 TK5EP to F6ESH  
 TL8RM to F6FNU  
 TR8RLA to NV7J  
 TT8CW to F2CW  
 UA10/UA88DU to RA3SD  
 UA10/UA88EZ to RA3YA  
 UF6FJ to UF6FFF  
 UR8RWH to UR2RE  
 US8SU to JG1OUT  
 V31BB to K3FEN  
 V44KQ to WB2LCH  
 V85DA to VK1DA  
 VK8GC to VK9NS  
 VK8MP to VK6AGC  
 VK5AQZ to KJ5W  
 VK9LA to DJ5CQ  
 VP2MQ to W4ZFE  
 VP2V/DF2PI to DF2PI  
 VP5/W4NPX to W4NPX  
 VP5/WV5M to WN5A  
 VP8BW to G3NKO  
 VP8WV to G4MUU  
 VP8WA to WA4JQS  
 VQ9PB to W7OKQ  
 VS6/KB1CM to KB1CM  
 VU2TTC to W8XM  
 VU2TTC to W4XM  
 VU2ZAP to W3HNK  
 VU7JX to W2XP  
 VU7NRO to VU2APR  
 XM1XG to VE1XG  
 XX9TO to KA8HOK  
 YB2BNJ to W8AH  
 YB8ATI to W9NNC  
 YB8ATY to W9NNC  
 YJ8JS to N4EVS  
 YN/SM00IG to SM0KCR  
 YS1GMV to W3HNK  
 ZD7CW to N4CID  
 ZD8RP to G0BNA  
 ZD8SE to G3XKR  
 ZD9BV to W4FRU  
 ZF2MJ to K9DXO  
 ZK1DD to G3MCN  
 ZP6XDW to A22CQ  
 ZS10JUN to ZS6TJ  
 ZS8MI to ZS6PT  
 ZV7WX to PT7CQ  
 ZV7XW to PT7CQ  
 ZX2A to PT2BW  
 ZX5C to PY5CC  
 ZX5C to PY2CC  
 TR8CJ to P.O. Box 587, Port Gentil, Gabon  
 OE5GML/YK to Manfred Grubauer, P.O. Box 573, Austrian UN Btn., Damascus, Syria  
 5H3BL to P.O. Box 4094, Dar Salaam, Tanzania  
 8P6BBS (1988 CQ WW SSB Contest only) to KH6WZ  
 VP5T (1989) to Steve Dove, NM2Y, P.O. Box 73, Elm, PA 17521  
 HC5J, HC5M, HC8EX (1988 CQ WW DX Tests) to Association DX-EX, P.O. Box DX, Cuenca, Ecuador  
 D4DH not via WB6HGH



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CIRCLE 93 ON READER SERVICE CARD

## THE SCIENCE OF PREDICTING RADIO CONDITIONS

The sunspot cycle continues to rise at a near record pace. The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a mean value of 138.4 for May 1989. This results in a 12-month running smoothed sunspot number of 130 centered on November 1988. Solar-cycle progress is measured in terms of the smoothed sunspot number.

The present cycle has already surpassed the maximum values of 13 of the previous 21 cycles that have been recorded to date. If the present pace continues, this will be *one* of the most intense, if not the most intense, cycle to be observed.

A smoothed sunspot number of 178 is forecast for September 1989 by the National Geophysical Data Center at Boulder, Colorado.

There was a corresponding increase in the 10.7 cm solar flux level during May. The Algonquin Radio Observatory in Ottawa, Ontario reports a monthly mean value of 194.4.

September is a month of change for propagation conditions on the HF amateur bands. On some days conditions will seem to be much the same as during the summer months, while on other days the first signs of wintertime conditions will be noticeable. For this reason, this month's column contains both Short-Skip and DX Propagation Charts. The DX charts are valid for the period from mid-September through mid-October, and the Short-Skip Charts are valid for the entire months of September and October.

### September Conditions

During September a greater number of DX openings are expected on 10, 15, and 20 meters during the hours of daylight. Improved nighttime DX propagation conditions are also forecast for the 40, 80, and 160 meter bands, with considerably lower static levels. A seasonal decline in conditions is expected on 20 meters during the hours of darkness, but this is expected to remain a good band for DX almost around the clock.

The fall, or *autumnal*, equinox will occur on September 22 as the sun crosses the plane of the equator on its apparent travel from northern to southern skies. On this day the hours of daylight and darkness are equal in length throughout the world. The effects of the equinox are felt on HF propagation conditions from about

11307 Clara Street, Silver Spring, MD  
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### LAST MINUTE FORECAST

Day-to-Day Conditions Expected for September 1989

Propagation Index .....	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 2-3, 18, 30	A	A	B	C
High Normal: 1, 4-5, 7-8, 17, 19, 22	A	B	C	C-D
Low Normal: 6, 12-13, 15-16, 20-21, 25-26, 29	B	C	D	D-E
Below Normal: 9, 11, 14, 23, 27-28	C	C-D	D-E	E
Disturbed: 10, 24	C-D	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.  
B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.  
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.  
D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.  
E—No opening expected.  
3 dB per S-Unit.

### HOW TO USE THIS FORECAST

1. Find propagation index associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the propagation index, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a propagation index of 3 will be good (B) on September 1, excellent (A) on the 2nd and 3rd, good (B) on the 4th and 5th, good-to-fair on the 6th, etc.

mid-September through early October. During this period the characteristics of the ionosphere are similar over large areas of the world, and this is usually the best season for DX openings between the temperate regions of both the northern and southern hemispheres. A similar period occurs during the spring equinox, which is centered on March 21. Look for an improvement in conditions between the USA and South America, to the South Pacific area and Australasia, to southern Asia, and to southern Africa and Antarctica. This improvement should be noticeable on all bands 10 through 160 meters, and the best time for equinoctial-type openings should be the twilight periods around local sunrise and sunset, but they will occur at other times as well. Many of these inter-hemispheric openings may follow either the *long* or the *short* great circle path, so be sure to check both directions.

### VHF Ionospheric Openings

Solar activity is now high enough to support F-2 layer DX openings from the

### CQ DX Contest Special 1989

This year's CQ World-Wide DX Contest will be held on the following dates:

October 28-29: Phone Section  
November 25-26: CW Section

As during the past 38 years, next month's "Propagation" column will be devoted to a special, comprehensive forecast which will focus on both sections of the contest period.

U.S. to many areas of the world on the 6 meter band. During September and early October it may be possible to take advantage of equinoctial-type openings on this band between the U.S. and the temperate areas of the southern hemisphere. The best times for such openings are the afternoon hours.

Later in the evening there are increasing possibilities for transequatorial (TE) type openings on 6 meters between southern locations in the USA and South America. TE conditions usually peak during late September and early October, and the best time to look for such openings is between 8 and 11 PM, local standard time. While F-2 layer openings on 6 meters are generally steady and quite strong, TE openings are usually weak and often accompanied by flutter fading.

Although summertime sporadic-E ionization should fall off considerably during September, an occasional 6 meter short-skip opening may still be possible over distances ranging between approximately 1000 and 1300 miles. Best time to check is before noon and again during the early evening.

No major meteor showers are expected during September, but some minor ones may permit meteor-scatter-type openings on the VHF bands on September 20th and for a few days thereafter.

There is usually a seasonal increase in auroral activity during equinoctial periods, so expect some 6 and 2 meter auroral-type short-skip openings during the month. The best possibilities for such openings should coincide with periods of expected radio storminess. Check the Last Minute Forecast at the beginning of this column for those days during September that are expected to be Below Normal or Disturbed.

73, George, W3ASK



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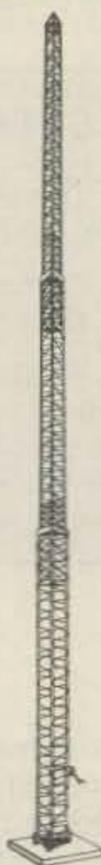
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- FK2558 FOR FK4554
- FK2568 PRICES FK4564

Rohn fold-over towers are shipped freight prepaid from the factory. Freight additional on other towers.

## ANTENNAS & ACCESSORIES

### TELEX/hy-gain

- TH7DXS: 7-el. tribander
  - TH5 Mk2: 5-el tribander
  - Explorer-14: tribander
  - Disc. 7-1: 40 M. dipole
  - Disc. 7-2: 2-el 40 M. beam
  - Disc. 7-3: 40 M. director kit
  - 205BAS: 5-el, 20 M. beam
  - 204BAS: 4-el, 20 M. beam
  - 155BAS: 5-el, 15 M. beam
  - 105BAS: 5-el, 10 M. beam
  - 18HTS: 80-10 M. vertical
  - 18ATV/WBS: 80-10 M. vertical
  - V2S; V3S; & V4S
  - 64BS & 66BS: 6 Meter beams
  - OSCAR Link Antennas
- Complete inventory. Call for prices.

### HUSTLER

- 6BTM 80-10 mtr vertical.....\$139.95
  - 5BTM 80-10 mtr vertical.....124.95
  - G6-144B 2 mtr base antenna.....89.95
  - G7-144 2 mtr base antenna.....124.95
- Complete mobile systems.  
CALL!

### MOSLEY: Close-out prices

CL33, TA33Jr, TA34, TA40KR

### ROTORS

#### TELEX/hy-gain

- HDR-300
- T2X
- HAM IV
- CD 45 II

#### YAESU

- G400/400RC
- G600RC
- R2000RC
- G5400B

#### ALLIANCE

- HD-73
- U-110

### KLM

- KT34A.....\$409.00
- KT34XA.....599.00
- 2M-16LBX.....169.95
- 432-30LBX.....124.95
- 2M-22C.....189.95
- 435-40CX.....219.00

HF Monobanders **in stock.**

### BUTTERNUT

- HF6V Vertical
- HF2V Vertical
- RMK II roof mount kit
- STR II radial kit
- TBR-160 coil
- WARC resonators
- HF5B Compact beam

### CUSHCRAFT

- A3S (RFE exclusive) Tribander.....
- A4S Tribander.....
- R5 (10,12,15,17,20).....
- AP8 (80 - 10 Vertical).....
- AV5 (80 - 10 Vertical).....
- 40-2CD 2-el 40M. beam.....
- A50-5 5-el 6M. beam
- 617-6B 6 Mtr. boomer
- A147-11 11-el 146-148MHz.....
- 215WB 15-el wide band 2M.....
- 32-19 19-el. 2M beam.....
- 4218XL 18-el 2M Boomer.....
- 424B 24-el 432MHz.....
- AOP-1 OSCAR pack.....

Call for prices on the **entire** Cushcraft line.

### TOWER HARDWARE

- 3/16 EHS Guywire.....\$0.15/ft.
- 1/4 EHS Guywire.....0.18/ft.
- CCM clamps 3/16 ".....0.39
- 1/4 ".....0.49
- Thimbles; 1/4TH.....0.39
- Tumbuckles:
- 3/8 E&E; E&J.....6.95 / 7.95
- 1/2E&E; E&J.....12.95 / 13.95
- Rohn TB-3 Thrust bearing.....64.95
- Preformed "Big Grips"
- 3/16 ".....2.49
- 1/4 ".....2.99
- Guy Insulators
- 500D.....1.69
- 502.....2.99
- Earth Anchor; 4 ft. screw-in.....19.00

Phillystran Guy Systems:  
We have a complete inventory of cable and accessories.

### ALPHA-DELTA

- DX-A Sloper.....\$46.95
- DX-DD.....65.95
- DX-CC.....79.95
- DX-KT.....28.95

Protect your station with Alpha-Delta coax and rotor line protectors. Call us!

### AMPHENOL CONNECTORS

- 83-1SP (PL-259).....\$1.49
- 83-822 (PL-259 teflon).....\$1.59
- 82-61 (N-male).....\$3.75
- 82-202-1006 (N for 9913).....\$3.49

We stock a full line of connectors.  
**Connectors installed!**

## WIRE & CABLE

### BELDEN COAX: (When you want the best)

- 9913 low loss.....\$0.48/ft.
- RG-213/U (8267).....\$0.49/ft.
- RG-8/U (8237).....\$0.39/ft.
- RG-8/U (8214).....\$0.43/ft.
- RG-214/U (8268).....\$2.99/ft.
- RG8X (9258).....\$0.23/ft.
- RG-11A/U (8261).....\$0.44/ft.
- RG-58A/U (8259).....\$0.18/ft.
- RG-59/U (8241).....\$0.19/ft.

### COPPERWELD ANTENNA WIRE:

- Solid: 12 ga...\$0.12/ft.; Solid: 14 ga...\$0.09/ft.; Stranded 14 ga...\$0.10/ft.

### ROTOR CABLE:

- Standard(6-22, 2-18).....\$0.21 Heavy Duty(6-18,2-16).....\$0.38/ft.

We stock Andrew Helix & Connectors.

For direct burial we recommend Andrew LDF4-50A Helix.  
(Long life, low loss. \$1.99/ft.)

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  - FT-712RH 35W 440 fm xcvr
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  - FGR-8800 150KHZ - 30MHZ Receiver
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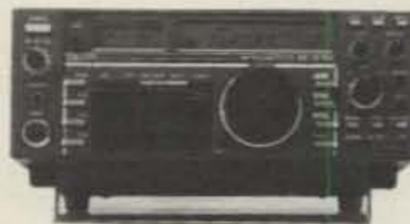
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MODEL 561 CORSAIR II

### OTHER TEN-TEC PRODUCTS:

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- Model 585 Paragon
- Model 425 Titan Linear Amplifier
- Model 238 Antenna Tuner
- Mobile Antennas! Metal Project Boxes.

## BOOKS

Handbooks, Callbooks, Antenna Books, etc.

## KANTRONICS



KAM All mode terminal unit

## MICROPHONES



ASTATIC

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- D104 SE .....\$81.95
- D104SE+ .....\$99.95



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\$59.95

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ACCESSORIES SWITCHES



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TNC UNITS DUMMY LOADS  
ANTENNA BRIDGES CLOCKS

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- BY-2 Iambic Paddle, chrome .....\$64.95
- BY-3 Iambic Paddle, gold .....\$149.00
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- RS-50A.....199.95
- RS-20M.....109.95
- RS-35M.....159.95
- RS-50M.....219.95
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**HOW TO USE THE DX PROPAGATION CHARTS**

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An \* indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual dates on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate daylight time is used not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the propagation index will increase by one level; for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

**September 15 to October 15, 1989  
Time Zone: EDT (24-Hour Time)  
EASTERN USA TO:**

	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	08-10 (1) 10-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	08-09 (1) 09-11 (2) 11-14 (4) 14-15 (3) 15-17 (2) 17-19 (1)	02-04 (1) 04-06 (2) 06-10 (3) 10-12 (2) 12-15 (3) 15-17 (4) 17-21 (3) 21-02 (2)	18-19 (1) 19-21 (2) 21-23 (3) 23-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 20-22 (1)* 22-01 (2)* 01-04 (1)*
Northern Europe & European USSR	09-10 (1) 10-13 (2) 13-14 (1)	08-09 (1) 09-10 (2) 10-13 (3) 13-14 (2) 14-16 (1)	03-06 (1) 06-08 (2) 08-11 (3) 11-13 (2) 13-17 (3) 17-19 (2) 19-21 (1)	18-20 (1) 20-04 (2) 04-06 (1) 21-04 (1)*
Eastern Mediterranean & Middle East	09-10 (1) 10-12 (2) 12-14 (1)	08-09 (1) 09-12 (3) 12-14 (2) 14-16 (2) 16-18 (1)	07-09 (2) 09-15 (1) 15-17 (2) 17-21 (3) 21-23 (2) 23-01 (3) 01-03 (2) 03-07 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	09-12 (1) 12-14 (2) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-19 (3) 19-20 (2) 20-22 (1)	05-08 (2) 08-15 (1) 15-17 (2) 17-21 (4) 21-00 (3) 00-03 (2) 03-05 (1)	20-23 (1) 23-02 (2) 02-04 (1) 00-03 (1)*
Eastern & Central Africa	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	08-10 (1) 10-13 (2) 13-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	12-14 (1) 14-17 (2) 17-22 (3) 22-02 (2) 02-03 (1)	20-02 (1) 00-01 (1)*
Southern Africa	09-11 (1) 11-12 (2) 12-13 (3) 13-14 (2) 14-15 (1)	08-11 (1) 11-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-08 (2) 08-15 (1) 15-16 (2) 16-19 (3) 19-00 (2) 00-03 (3) 03-04 (2) 04-06 (1)	19-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*

Central & South Asia	09-11 (1) 19-22 (1)	08-09 (1) 09-12 (2) 12-13 (1) 20-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-22 (2) 22-01 (1)	05-07 (1) 20-23 (1)
Southeast Asia	11-14 (1) 18-21 (1)	08-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-10 (2) 10-12 (1) 15-18 (1) 20-21 (1) 21-00 (2) 00-02 (1)	06-08 (1)
Far East	09-11 (1) 18-20 (1)	08-09 (1) 09-11 (2) 11-13 (1) 16-18 (1) 18-20 (2) 20-22 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (1) 18-20 (1) 20-22 (2) 22-00 (1) 00-03 (2) 03-04 (1)	05-08 (1) 18-19 (1) 05-07 (1)*
South Pacific & New Zealand	09-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	08-09 (1) 09-11 (2) 11-14 (1) 14-17 (2) 17-18 (3) 18-20 (4) 20-21 (2) 21-22 (2) 22-00 (1)	12-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-04 (3) 04-08 (2) 08-10 (3) 10-12 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2)* 07-08 (1)*
Australasia	10-12 (1) 14-16 (2) 17-18 (3) 18-19 (2) 19-21 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-14 (2) 14-17 (1) 17-18 (2) 18-20 (4) 20-21 (2) 21-23 (1)	07-09 (2) 09-11 (3) 11-13 (2) 13-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-02 (3) 02-04 (2) 04-07 (1)	02-04 (1) 04-06 (2) 06-07 (3) 07-08 (2) 08-09 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-11 (4) 11-13 (3) 13-18 (4) 18-20 (3) 20-21 (2) 21-22 (1)	03-05 (2) 05-07 (3) 07-10 (4) 10-14 (2) 14-16 (3) 16-23 (4) 23-03 (3)	19-20 (1) 20-21 (2) 21-04 (4) 04-06 (3) 06-07 (2) 07-08 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-09 (1) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-11 (3) 11-15 (2) 15-16 (3) 16-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	10-16 (1) 16-17 (2) 17-18 (3) 18-00 (4) 00-03 (3) 03-05 (2) 05-07 (3) 07-10 (2)	21-00 (1) 00-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	15-19 (1)	11-15 (1) 15-17 (2) 17-21 (3) 21-22 (1)	16-17 (1) 17-20 (2) 20-03 (3) 03-05 (2) 05-07 (1) 07-09 (2) 09-10 (1)	23-01 (1) 01-05 (2) 05-07 (1) 04-06 (1)*

**Time Zones: CDT & MDT (24-Hour Time)  
CENTRAL USA TO:**

Western & Southern Europe & North Africa	09-11 (1) 11-13 (2) 13-14 (1)	08-10 (1) 10-12 (2) 12-14 (3) 14-16 (2) 16-17 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-16 (4) 16-18 (3) 18-23 (2) 23-03 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 21-23 (1)* 23-01 (2)* 01-02 (1)*
Northern & Central Europe & European USSR	09-13 (1)	08-09 (1) 09-11 (2) 11-12 (3) 12-13 (2) 13-15 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-13 (2) 13-17 (3) 17-19 (2) 19-21 (1) 23-04 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)
Eastern Mediterranean & Middle East	10-13 (1)	08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-16 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-20 (3) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1)	20-23 (1) 21-23 (1)*
Western Africa	10-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	05-08 (2) 08-15 (1) 15-17 (2) 17-19 (3) 21-23 (3) 23-02 (2) 02-05 (1)	20-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern & Central Africa	11-13 (1) 13-16 (2) 16-17 (1)	09-10 (1) 10-13 (2) 13-17 (3) 17-18 (2) 18-19 (1)	13-15 (1) 15-17 (2) 17-20 (3) 20-23 (2) 23-00 (1) 07-09 (1)	21-00 (1)

Southern Africa	09-11 (1) 11-12 (2) 12-13 (3) 13-14 (2) 13-15 (1)	07-09 (1) 09-12 (2) 12-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-19 (3) 19-22 (2) 22-01 (3) 01-05 (1)	20-21 (1) 21-23 (2) 23-01 (1) 21-23 (1)*
Central & South Asia	09-11 (1) 19-21 (1)	09-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-22 (2) 22-01 (1)	06-08 (1) 19-21 (1)
Southeast Asia	10-12 (1) 12-13 (2) 13-15 (1) 17-18 (1) 18-19 (2) 19-20 (1)	09-11 (1) 11-13 (2) 13-15 (1) 18-19 (1) 19-20 (2) 20-22 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 16-20 (1) 20-23 (2) 23-02 (1)	05-09 (1)
Far East	15-17 (1) 17-19 (2) 19-20 (1)	10-16 (1) 16-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-16 (1) 16-19 (2) 19-21 (1) 21-23 (2) 23-00 (3) 00-01 (2) 01-03 (1)	03-05 (1) 05-08 (2) 08-09 (1) 06-08 (1)
South Pacific & New Zealand	11-13 (1) 13-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	08-09 (1) 09-15 (2) 15-17 (3) 17-20 (4) 20-21 (3) 21-22 (2) 22-00 (1)	04-08 (2) 08-11 (3) 11-13 (2) 13-18 (1) 18-20 (2) 20-22 (3) 22-02 (4) 02-04 (3)	00-01 (1) 01-06 (3) 06-08 (4) 08-09 (2) 09-10 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	08-09 (1) 09-11 (2) 11-15 (1) 15-16 (2) 16-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	06-08 (2) 08-11 (3) 11-13 (2) 13-16 (1) 16-18 (2) 18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-04 (3)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1) 05-06 (1)* 06-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (4) 11-14 (3) 14-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	07-10 (4) 10-12 (3) 12-14 (2) 14-16 (3) 16-23 (4) 23-03 (3) 03-05 (2) 05-07 (3)	19-20 (1) 20-21 (2) 21-22 (3) 22-05 (4) 05-06 (3) 06-07 (2) 07-08 (1) 20-23 (1)* 23-05 (2)* 05-07 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-09 (1) 09-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (2) 19-20 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-15 (2) 15-16 (3) 16-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	11-16 (1) 16-17 (2) 17-20 (3) 20-01 (4) 01-04 (3) 04-06 (2) 06-08 (3) 08-11 (2)	21-00 (1) 00-05 (2) 05-07 (1) 01-06 (1)*
McMurdo Sound, Antarctica	16-19 (1)	12-15 (1) 15-18 (2) 18-21 (3) 21-22 (2) 22-23 (1)	16-18 (1) 18-22 (2) 22-01 (3) 01-04 (2) 04-08 (1) 08-10 (2) 10-11 (1)	23-01 (1) 01-05 (2) 05-07 (1) 05-07 (1)*

**Time Zone PDT (24-Hour Time)  
WESTERN USA TO:**

Western & Southern Europe & North Africa	09-12 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-15 (1) 22-00 (1)	06-07 (1) 07-10 (2) 10-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-21 (1) 23-01 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European USSR	09-11 (1)	08-09 (1) 09-11 (2) 11-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-17 (2) 17-18 (1) 21-23 (1)	20-21 (1) 21-22 (2) 22-23 (1) 21-22 (1)*
Eastern Mediterranean & Middle East	09-11 (1)	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1) 20-22 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (3) 16-20 (1) 20-23 (2) 23-01 (1)	20-23 (1)
Western & Central Africa	09-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	08-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	01-07 (1) 07-09 (2) 09-14 (1) 14-15 (2) 15-16 (3) 16-20 (4) 20-23 (3) 23-01 (2)	21-00 (1)

**HOW TO USE THE SHORT-SKIP CHARTS**

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distances (columns) of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 40 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An \* indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

- (4) Opening should occur on more than 22 days
- (3) " " " between 14 and 22 days
- (2) " " " between 7 and 13 days
- (1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate daylight time is used at the path midpoint. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are HST. To convert to daylight time in other USA time zones, add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to daylight time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone, 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave length above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the propagation index will increase by one level for each 10dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Department of Commerce, Boulder, Colorado, 80302.

		21-22 (1)	22-00 (3) 00-02 (4) 02-04 (3)	07-08 (1)*
South Pacific & New Zealand	10-12 (1) 12-13 (2) 13-14 (3) 14-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	07-09 (1) 09-10 (2) 10-12 (3) 12-14 (2) 14-16 (3) 16-21 (4) 21-23 (3) 23-01 (2) 01-02 (1)	14-17 (1) 17-19 (2) 19-21 (3) 21-02 (4) 02-04 (3) 04-08 (2) 08-09 (3) 09-11 (3) 11-12 (4) 12-14 (2)	21-22 (1) 22-23 (2) 23-00 (3) 00-05 (4) 05-07 (3) 07-08 (2) 08-09 (1) 09-11 (3) 12-06 (2)* 06-07 (1)*
Australasia	09-12 (1) 12-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	07-08 (1) 08-11 (2) 11-14 (1) 14-15 (2) 15-17 (3) 17-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	08-10 (3) 10-12 (4) 12-13 (2) 13-15 (1) 15-18 (2) 18-20 (1) 20-22 (2) 22-23 (3) 23-02 (4) 02-04 (3) 04-08 (2)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 09-11 (3) 12-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	08-09 (1) 09-10 (2) 10-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-23 (4) 23-02 (3) 02-06 (2)	19-20 (1) 20-21 (2) 21-22 (3) 22-04 (4) 04-05 (3) 05-06 (2) 06-08 (1) 20-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	07-08 (1) 08-09 (2) 09-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (2) 08-10 (3) 10-15 (2) 15-16 (3) 16-19 (4) 19-20 (3) 20-21 (2) 21-23 (1)	09-15 (1) 15-17 (2) 17-18 (3) 18-23 (4) 23-03 (3) 03-05 (2) 05-07 (3) 07-09 (1)	21-23 (1) 23-03 (2) 03-05 (1) 00-03 (1)*
McCurdo Sound, Antarctica	14-16 (1) 16-18 (2) 18-19 (1)	10-14 (1) 14-16 (2) 16-20 (3) 20-21 (2) 21-23 (1)	08-10 (1) 15-17 (1) 17-19 (2) 19-22 (3) 22-00 (4) 00-03 (3) 03-08 (2)	22-00 (1) 00-05 (2) 05-06 (1) 03-05 (1)*

**CQ Short-Skip Propagation Chart  
September & October 1989  
Local Daylight Time At Path Mid-Point  
(24-Hour Time)**

Band Meters	Distance Between Stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	NIL	10-19 (0-1)	10-12 (1) 08-10 (1-2) 12-14 (1-3) 14-15 (1-4) 15-17 (1-3) 17-19 (1-2) 19-22 (0-1)	09-09 (1-2) 08-09 (1-3) 10-12 (2-4) 12-14 (3-4) 14-15 (4) 15-17 (3) 17-19 (2) 20-22 (1-2) 20-22 (1)
15	NIL	08-10 (0-1) 10-14 (0-2) 14-15 (0-3) 15-17 (0-2) 17-21 (0-1)	08-10 (1-2) 10-14 (2-4) 14-15 (3-4) 15-17 (2-4) 17-20 (1-3) 20-22 (1-2) 22-01 (0-1)	08-09 (2) 09-10 (2-3) 10-17 (3) 17-20 (4) 20-22 (2-3) 22-23 (1-2) 23-01 (1) 01-08 (1-0)
20	12-14 (0-1) 14-17 (0-2) 17-22 (0-1)	08-10 (0-3) 10-12 (0-4) 12-14 (1-4) 14-17 (2-4) 17-18 (1-4) 18-22 (1-3) 22-03 (0-2) 03-08 (0-1)	06-08 (1-2) 08-10 (3-4) 10-18 (4) 18-22 (3-4) 22-01 (2-3) 01-03 (2) 03-06 (1)	06-08 (2) 08-10 (4) 10-14 (4-2) 14-16 (4-3) 16-22 (4) 22-00 (3-4) 00-01 (3) 01-03 (2) 03-06 (1-2)
40	08-10 (2-3) 10-12 (3-4) 12-18 (4) 18-20 (3-4) 20-23 (1-2) 23-06 (0-1) 06-08 (1-2)	08-10 (3-4) 10-12 (4-3) 12-16 (4-2) 16-18 (4-3) 18-20 (4) 20-23 (2-4) 23-01 (1-4) 01-06 (1-3) 06-08 (2-3)	08-10 (4-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-20 (4-3) 20-01 (4) 01-04 (3-4) 04-06 (3) 06-08 (3-4)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-04 (4) 04-06 (3-4) 06-08 (4-3)

Eastern Africa	11-13 (1) 13-15 (2) 15-16 (1)	09-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-23 (1)	20-23 (1)
Southern Africa	09-10 (1) 10-12 (2) 12-14 (1)	07-09 (1) 09-11 (2) 11-14 (3) 14-16 (2) 16-17 (1)	01-07 (1) 07-09 (2) 09-10 (1) 12-16 (2) 16-20 (3) 20-01 (2)	19-22 (1)
Central & South Asia	09-11 (1) 17-19 (1)	08-11 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	02-08 (2) 08-10 (3) 10-12 (2) 12-17 (1) 17-21 (2) 21-02 (1)	06-08 (1) 19-21 (1)
Southeast Asia	09-10 (1) 10-11 (2) 11-12 (1) 16-17 (1) 17-18 (2) 18-19 (1)	07-10 (1) 10-13 (2) 13-16 (1) 16-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	03-07 (2) 07-09 (3) 09-12 (2) 12-13 (1) 21-22 (1) 22-01 (2) 01-03 (3)	03-06 (2) 03-06 (1)
Far East	15-16 (1) 16-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	09-11 (1) 14-15 (1) 15-18 (2) 18-19 (3) 19-20 (4) 20-21 (2)	04-07 (2) 07-10 (4) 10-13 (3) 13-15 (2) 15-20 (1) 20-22 (2)	01-03 (1) 03-07 (2) 07-08 (3) 08-09 (1) 03-05 (1)* 05-07 (2)*

80	07-09 (3-4) 09-11 (4) 11-19 (4-3) 19-00 (4) 00-05 (3-4) 05-07 (2-4)	07-09 (4-2) 09-11 (4-1) 11-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-07 (4)	07-09 (2-1) 09-17 (1-0) 17-19 (2-1) 19-21 (3-2) 21-22 (4-3) 22-06 (4) 06-07 (4-3)	07-09 (1-0) 09-17 (0) 17-19 (1) 19-21 (2) 21-22 (4-3) 22-04 (4-3) 04-06 (4-2) 06-07 (3-1)
160	17-19 (1-0) 19-21 (2-1) 21-06 (4) 06-08 (3-2) 08-10 (2-1) 10-12 (1-0)	18-20 (1-0) 20-21 (1) 21-03 (4-3) 03-06 (3-2) 06-08 (2-1) 08-10 (1-0)	20-21 (1-0) 21-23 (3-1) 23-03 (3) 03-06 (2-1) 06-08 (1)	21-23 (1-0) 23-03 (3-2) 03-06 (1) 06-08 (1-0)

**HAWAII  
September & October 1989  
Openings Given in Hawaiian Standard Time #**

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	06-08 (1) 08-12 (3) 12-14 (2) 14-16 (2) 16-17 (1)	05-06 (1) 06-08 (2) 08-12 (1) 12-16 (2) 16-18 (3) 18-20 (2) 20-22 (1)	11-14 (1) 14-16 (2) 16-18 (3) 18-21 (4) 21-00 (3) 00-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	18-20 (1) 20-23 (2) 23-00 (3) 00-01 (2) 01-02 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Central USA	06-08 (1) 08-11 (2) 11-14 (4) 14-16 (2) 16-17 (1)	05-06 (1) 06-08 (2) 08-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-22 (1)	09-14 (1) 14-16 (2) 16-18 (3) 18-22 (4) 22-00 (3) 00-04 (3) 04-06 (3) 06-09 (2)	18-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-04 (1) 21-22 (1)* 22-00 (2)* 22-02 (1)* 00-02 (1)*
Western USA	07-09 (1) 09-11 (2) 11-14 (3) 14-16 (4) 16-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-14 (3) 14-17 (4) 17-19 (3) 19-22 (2) 22-00 (1)	10-15 (2) 15-17 (3) 17-19 (4) 19-00 (3) 00-02 (2) 02-04 (1) 04-06 (2) 06-08 (4) 08-10 (3)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 21-22 (1)* 22-23 (2)* 23-02 (3)* 02-03 (2)* 03-04 (1)*

**ALASKA  
September & October 1989  
Openings Given in GMT #**

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	18-20 (1) 20-23 (2) 23-00 (1)	16-18 (1) 18-22 (2) 22-01 (3) 01-02 (2) 02-03 (1)	14-16 (1) 21-23 (1) 23-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	08-12 (1)
Central USA	19-21 (1) 21-00 (2) 00-02 (1)	17-19 (1) 19-22 (2) 22-00 (3) 00-02 (4) 02-03 (2) 03-04 (1)	15-17 (1) 21-23 (1) 23-00 (2) 00-04 (3) 04-05 (2) 05-07 (1)	08-11 (1) 11-13 (2) 13-14 (1) 11-13 (1)*
Western USA	20-22 (1) 22-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	18-21 (1) 21-23 (2) 23-02 (4) 02-03 (3) 03-05 (2) 05-06 (1)	16-18 (1) 18-20 (3) 20-00 (2) 00-02 (3) 02-04 (3) 04-05 (2) 05-06 (2) 06-10 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

# See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.

Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

\* Indicates best time for eighty meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2), or higher.

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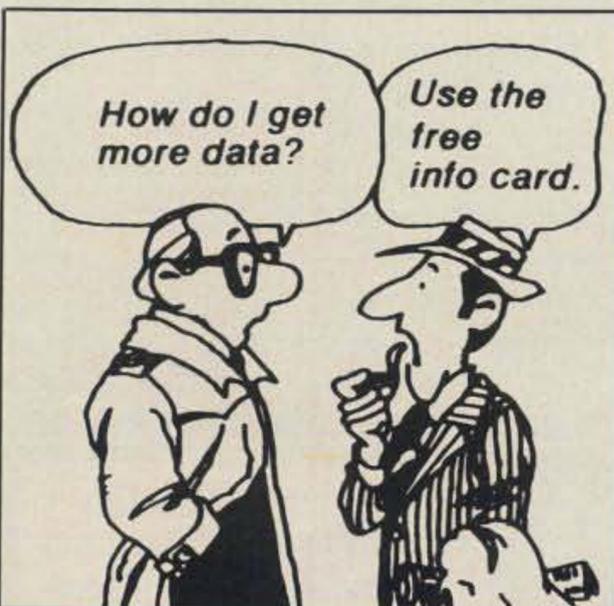
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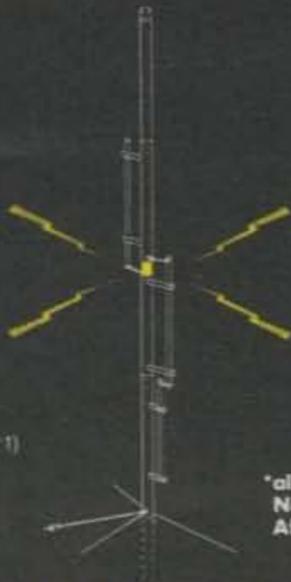
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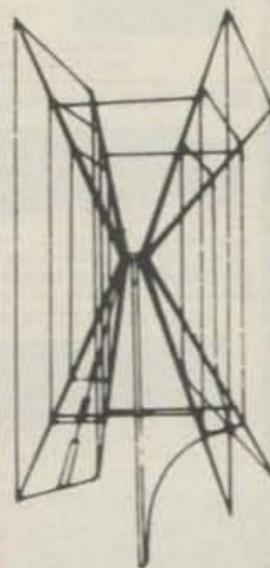
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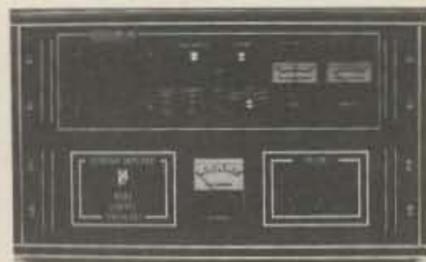
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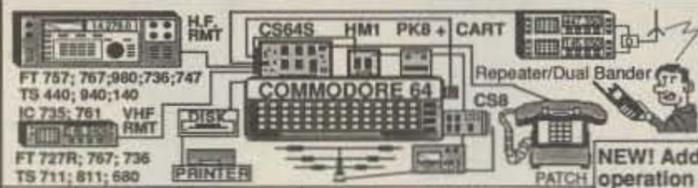
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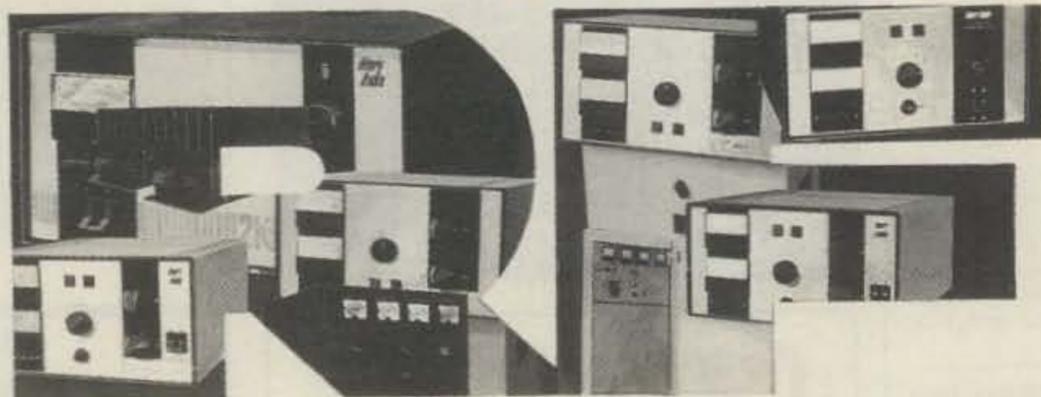
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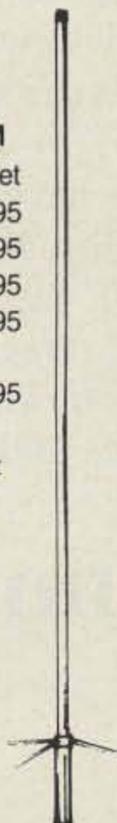
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P/N	Net/Ea	P/N	Net/Ea	P/N	Net/Ea
BFR96	\$ 2.75	MRF653	14.50	2SC2904	32.50
MRF134	16.00	MRF654	20.00	2SC2905	34.50
MRF136	21.00	MRF660	10.75	40582	9.50
MRF136Y	47.00	MRF843/F	22.50	LOW NOISE FIGURE	
MRF137	24.00	MRF846	37.75	MGF1402	17.95
MRF138	35.00	MRF873	29.75	MRF901	1.25
MRF141G	190.00	MRF1946	15.00	MRF911	2.00
MRF148	34.00	PT9847	21.00	MRF966	2.00
MRF150	79.50	RF120	22.00	NE25537/2SK205	3.25
MRF151G	179.50	SD1229	12.00	NE41137/3SK124	3.25
MRF153	395.00	SD1272	12.00	J310	1.00
MRF156	537.00	SD1278-1	13.75	U309	1.75
MRF171	34.50	SD1405	16.00	U310	1.75
MRF172	58.75	SD1407	25.00	2N4416	1.00
MRF174	80.00	SD1428	29.50	3N204	2.00
MRF208	14.50	SD1429-3	16.00	3N211	2.00
MRF212	19.50	SRF2072	12.75	OUTPUT MODULES	
MRF221	11.00	SRF3662	24.00	SAU4 440 LIN	49.50
MRF224	13.50	SRF3775	13.00	SAU17A 903	50.00
MRF237	2.00	SRF3800	17.50	SAV6 158	42.50
MRF238	14.00	2N1522	11.95	SAV7 146	42.50
MRF239	15.00	2N3553	2.25	SAV12 146 HT	23.50
MRF240/A	15.00	2N3771	3.50	SAV15 222	58.75
MRF245	32.00	2N3866	1.25	SAV17 146 50W	66.50
MRF247	24.75	2N4048	11.95	M57710A	32.75
MRF248	33.00	2N4427	1.25	M57713	49.50
MRF260	8.00	2N5109	1.75	M57715	42.25
MRF261	9.00	2N5179	1.00	M57726 144	59.95
MRF262	9.00	2N5589	13.00	M47727 144	69.50
MRF264	10.50	2N5591	13.50	M57729 440	69.95
MRF309	60.00	2N5641	12.00	M57732L	33.00
MRF314A	29.75	2N5642	13.75	M57735 50	57.50
MRF315A	32.50	2N5643	18.00	M57737 144	48.50
MRF316	64.50	2N5944	10.00	M57741L/M/H	57.00
MRF317	59.75	2N5945	10.00	M57745	89.95
MRF327	57.00	2N5946	12.50	M57755	78.75
MRF406	13.50	2N6080	7.50	M57762 1296	69.95
MRF412	22.00	2N6081	8.50	M57764 806	74.00
MRF421	24.00	2N6082	10.00	M57712.M57733 use	
MRF422	36.00	2N6083	11.00	M57737.SC1019 SAV7	
MRF427	17.00	2N6084	12.75	SC1027 use SAU4	
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MRF479	13.75	2SC2289	13.75	5894	59.90
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MRF492	14.75	2SC2290MP	39.50	6550	16.95
MRF497	14.25	2SC2312C	4.75	7581/KT66	14.95
MRF515	2.50	2SC2379	31.25	8874	349.50
MRF555	3.00	2SC2509	9.00	8875	369.95
MRF557	5.25	2SC2559	28.25	8950	18.00
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MRF644	23.00	2SC2695	31.75	3-500ZPENTA	114.50
MRF646	\$25.00	2SC2781	\$32.75	3-500ZEIMAC	129.95
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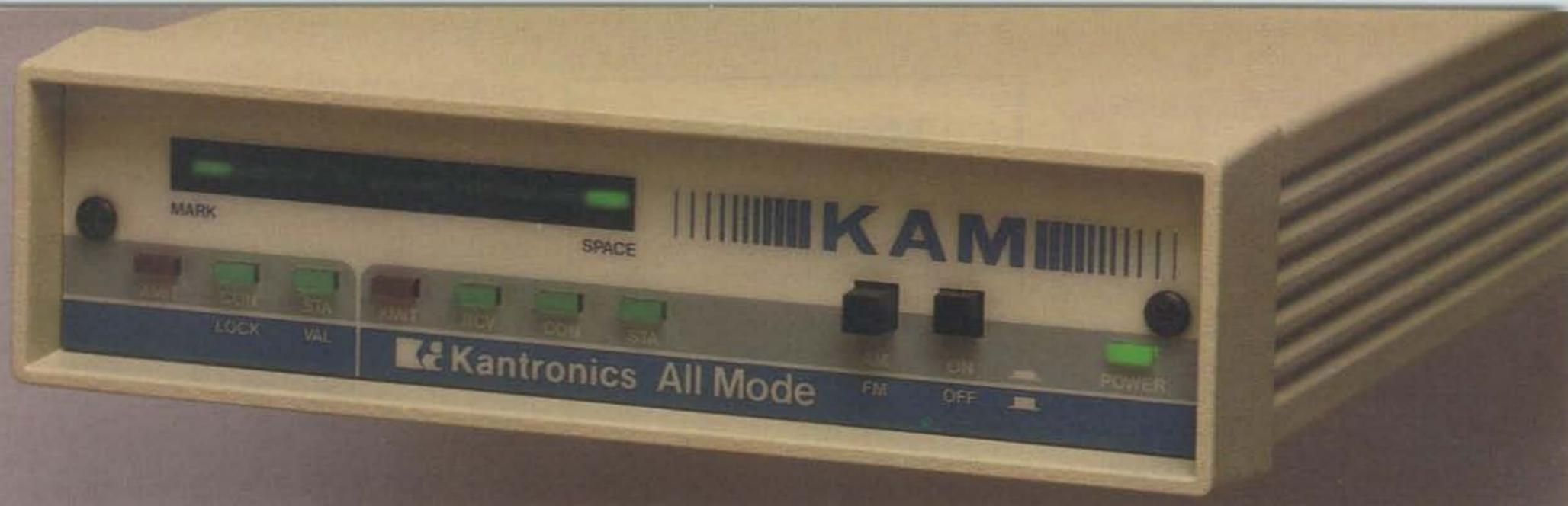
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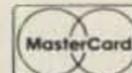
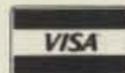
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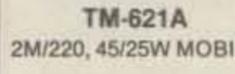
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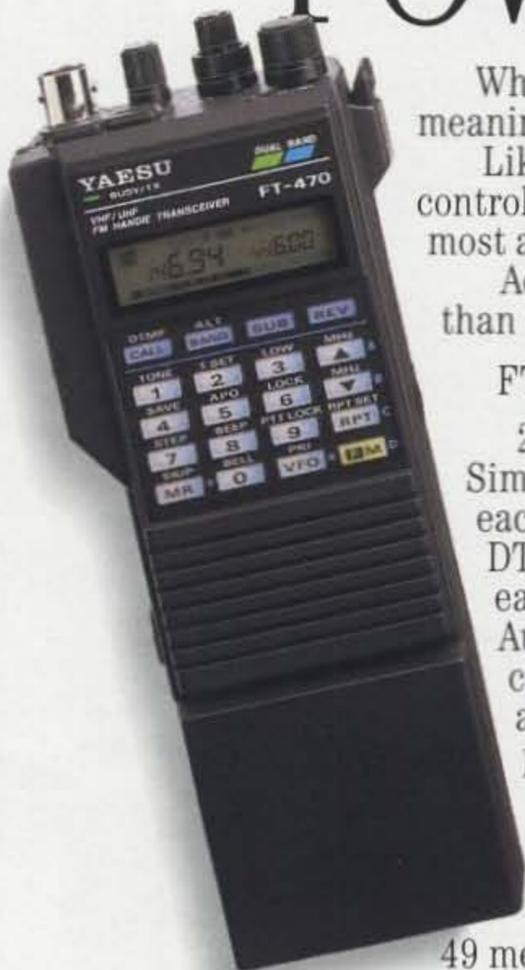
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