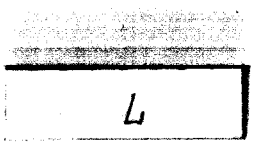
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Exhibit 7
Contests listings

I took this table from *The ARRL Operating Manual* (1996). It lists all major contests. There are **eight CW**-only contests, **seven SSB**-only (phone) contests, and **two RTTY contests**. (Other high frequency contest listed in the table permitted any mode.) The SSB version of the All Asian DX Contest was included while the CW version was inadvertently omitted. I have attached a listing from the May 1998 issue of *QST*, which shows the CW version of this contest. Including the All Asian DX Contest (CW), there are **nine CW** contests compared to **seven for SSB**. This Exhibit demonstrates that there are at least as many major contests on high frequency devoted to CW as to SSB, and that RTTY was a distant third place.

Table 7-1

Major Contests

Month	*Contest*	*Scope*	*Exchange*	*For more Information*
Jan	ARRL VHF Sweepstakes	Primarily W/VE	Grid-square locator	Dec *QST*
Jan	*CQ* Worldwide 160-Meter Contest (CW)	International	W/VE: signal report and state/province; DX: signal report and country	Dec *CQ*; Contest Corral, Jan *QST*
Jan	ARRL RTTY Roundup	International	W/VE: Signal report and state/province; DX: signal report and serial number	Dec *QST*
Feb	ARRL Novice Roundup	Novices/Techs work others	Signal report and ARRL section	Jan *QST*
Feb	ARRL International DX Contest (CW)	W/VE stns work DX stns	W/VE: signal report and state/province; DX: signal report and power	Dec *QST*
Feb	*CQ* Worldwide 160-Meter Contest (phone)	International	See above	See above
Mar	ARRL International DX Contest (phone)	International	See above	Dec *QST*
Mar	Spring RTTY Contest	International	UTC, signal report and consecutive QSO serial number	Contest Corral, May *QST*
Mar	*CQ* WPX Contest (phone)	International	Signal report and consecutive QSO serial number	Jan *CQ*; Contest Corral, Feb *QST*
May	Russian CQ-M Contest (phone and CW)	International	Signal report and consecutive QSO serial number	Contest Corral, Apr *QST*
May	*CQ* WPX Contest (CW)	International	See above	See above
Jun	ARRL June VHF QSO Party	International	See above	May *QST*
Jun	All Asian DX Contest (phone)	Asian stns work	Signal report and age	Contest Corral Jun *QST*
Jun	ARRL Field Day	Primarily W/VE	Transmitter "class" and ARRL	May *QST*
Jul	IARU HF World Championship (phone and CW)	International	Signal report and ITU zone	April *QST*
Jul	*CQ* VHF WPX Contest	International	Consecutive QSO serial number and call sign	Feb *CQ*; Contest Corral Jul *QST*
Aug	Worked All Europe (CW)	EU stns work others	Signal report and consecutive QSO serial number	Contest Corral, May *QST*
Sep	Worked All Europe (phone)	See above	See above	See above
Sep	ARRL September VHF QSO Party	International	Grid-square locator	Aug *QST*
Oct	*CQ* Worldwide DX Contest (phone)	International	Signal report and *CQ* zone	Sep *CQ*; Contest Corral, Oct *QST*
Nov	ARRL Sweepstakes (CW)	W/VE	Consecutive QSO serial number, power level designator, call sign last 2 digits of the year you were licensed, ARRL section.	Oct *QST*
Nov	ARRL Sweepstakes (phone)	W/VE		Oct *QST*
Nov	*CQ* Worldwide DX Contest (CW)	International	See above	See above
Dec	ARRL 160-Meter Contest (CW)	International	W/VE: signal report and ARRL Section; DX: signal report	Nov *QST*
Dec	ARRL 10-Meter Contest (phone and CW)	International	W/VE: signal report and state/province; DX: signal report and consecutive QSO serial number	Nov *QST*

with ARCI member. Others count 2 pts/same continent and 4 pts/different continent. Multiply QSO points by states/provinces/DXCC countries worked per band and by power multiplier (>5 W (1; <5 W (7; < 1 W (10; < 250 mW, (15). Awards. Mail entries by Jun 23 to QRP ARCI Contest Manager, Cam Hartford, N6GA, 1959 Bridgeport Ave, Claremont, CA 91711; **CamQRP@cyberg8t.com**.

Texas QSO Party, sponsored by the Texas DX Society. 1400Z May 23 to 0500Z May 24 and 1400Z to 2000Z May 24. Categories: single op, multi-single and multi-multi; Texas mobile single op and multiop; QRP single and multi xmtr; and a Club Aggregate category. Exchange RST and State, province, country, or maritime region. Texas stations send RST and county. Suggested frequencies: CW - 30 kHz up. Phone - 25 kHz up in General class segments. VHF - 50.200 144.200. Work stations once per band and mode. Texas mobiles may be worked once per band/mode from each county. Score 2 pts/phone QSO and 3 pts/CW and other digital mode QSO. Multipliers: non-Texas stations use number of Texas counties worked (254 max plus Armadillo County mystery station). Texas stations use number of Texas counties, states, Canadian Provinces, and DX countries (less USA, Canada, Hawaii and Alaska). Add bonus points to your final score: Non-Texas stations add 100 points for every 10 Texas mobiles worked per band/mode. Texas stations add 100 points for every 10 Texas mobiles worked per band/mode. Texas mobiles add 5000 points per every 5 counties covered with at least 5 contacts per county and add 100 points for every 10 Texas mobiles worked per band/mode. Send logs (and dupe sheets if over 200 QSOs) by June 5, 1997 to TDXS, POB 540291, Houston, TX 77254; **W5HNS@aol.com; http://n5uh.tech.uh.edu/~tdxs/**.

25-26

Memorial Day CW Sprint, sponsored by the Michigan QRP Club, 2300Z May 25 until 0300Z May 26. CW only, 160-6 meters (except 30, 17 and 12 meters). Classes: <250 mW; 250 mW to 1 W; 1 W to 5 W; and over 5 W. Exchange RST, state/province/DXCC entity and power output (MI-QRP members send membership no.). Work stations once per band. Score 5 pts/QSO w/MI-QRP members, 4 pts/QSO w/non-members outside W/VE and 2 pts/QSO with W/VE nonmembers. Multiply QSO points by states/provinces/DXCC entities worked per band × 1.25 if you are using a homebrew receiver or transmitter. Awards. Send logs to L. T. Switzer, N8CQA, 654 Georgia Ave, Marysville, MI 48040-1243; **n8cqa@tir.com.**

30-31

CQ WW WPX Contest, CW, see Mar *QST*, p 101.

June Events

6	QRP Tactical Contest
13-15	**ARRL June VHF QSO Party**
20-21	All-Asian DX Contest, CW
27-28	**Field Day**

Special Events

*Edited by **Bev Fernandez, N1NAV** • Assistant Contest Manager*

Louisville, KY: Amateur Radio Transmitting Society, Inc, W4CN, 0001Z **May 1** to 2359Z **May 3**, 124th Kentucky Derby, 3.850 7.250 14.250 28.400. Certificate. Shelby Summerville, K4WW, 6505 Lantana Ct, Louisville, KY 40229-1544.

Marion, AR: Driven Elements ARG, K5M, 2200Z, **May 1** to 0200Z **May 2**, and 6th annual Esparanza Bonanza Festival, 7.285 21.375 28.410. Certificate. R Brockwell, 118 Brougham, Marion, AR 72364.

Beavercreek, OH: Upper Valley ARC, KI8CJ, 2000Z **May 1** to 2000Z **May 2** Fourth Anniversary of Parkwood Elementary School's fourth grade class Adopt-A-Ham Program, 145.41 146.94 146.64 145.19. QSL. Mike Fisher, KI8CJ, 1791 Wilene Dr, Dayton, OH 45432.

Eldon, MO: Northside ARC, AAØVM, 1500Z **May 1** to 2300Z **May 3**, Opening of the Lake of the Ozarks Community Bridge, 7.250 14.250 21.350 28.350. Certificate. Northside ARC, Box 954, Rocky Mount, MO 65072.

Aquinnah, MA: Fall River ARC, W1ACT/P, 1800Z **May 1** to 1500Z **May 3**, Iota NA046 from Gay Head Lighthouse Marthas Vineyard Island, 14.260 all HF bands. QSL. Roland Daignault, N1JOY, 19 Davis Rd, Westport, MA 02790.

Freedom Township, OH: Portage ARC, KB8UUZ, 1700Z **May 1** to 2300Z **May 3**, 40th Annual Loyalty Day, 40 20 15 10. Certificate. Tom Parkinson, KB8UUZ, 9992 State Rte 700, Mantua, OH 44225.

Brownsville, TX: CHARRO ARC, KC5PCN, 1300-2000Z **May 2**, operating from the last battle of the Civil War fought near Brownsville, General portion of 20 15 and Phone portion of the Novice 10 meter. Certificate. CHARRO ARC, 3554 Boca Chica Blvd, Brownsville, TX 78521.

Salt Lake City, UT: Utah ARC, N7T, 1600-2300Z **May 2**, Scout-O-Rama Communications Exercise, 7.235 14.265 21.350 28.400. QSL. Eugene Christensen, KC7CSE, 1193 Serpentine Way, Sandy, UT 84094-4633.

Farmville, VA: Southside ARA, KE4ZBH, 1400-2000Z **May 2**, Heart of Virginia Festival, 7.225 14.225 50.200 28.385. QSL. John Austin, N4CFA, 1001 7th Ave, Farmville, VA 23901-2317.

Novi, MI: Novi ARC, KC8FSW, 1400-2100Z **May 2**, 2nd Annual Indy 500 Celebration, 7.244 7.246 7.125 '1.325. QSL. NARC, Box 268, Novi, MI 48376-0268.

Chancellorsville, VA: Rappahannock Valley ARC, NJ4F, 1500-2100Z **May 2**, General portion of 20 40. Certificate. RVARC, Box 1496, Fredericksburg, VA 22402

Annondale, MN: Explorer post 676. KØBSA, 2300-0300Z **May 2, and 1500-0200 May 3**, Sterns Boy Scout Camper-All, 7.290 14.290 18.140. Certificate. Gordy Hanson, NØZRD, 2317 Byrd Ave N., Golden Valley, MN 55422.

Sunflower, KS: Sandhills and Trojan ARC, KØS & WØMI, 0000Z **May 2** 2400Z **May 3**, Operating from the highest point in Kansas, 3.920 14.285 .040 CW. Certificate. Mt Sunflower Expedition, Box DX, Colby, KS 67701.

Philadelphia, PA: The Olympia ARC, WA3BAT, 1300Z **May 2** 2200Z **May 3**, 100th Anniversary of Admiral Dewey's triumph over the Spanish Fleet. 3.898 7.248 14.030 21.040. Certificate. Olympia ARC, 211 South Columbus Blvd, Philadelphia, PA 19106.

Madison, WI: Four Lakes ARC, W9S/W9IXG, 1400Z **May 2** 0200Z **May 10**, 150th Anniversary of Wisconsin Statehood, 28.325 50.175 144.225 144.55. Certificate. UW Space Place, 1605 S Park St, Madison, WI 53715.

Canon City, CO: Royal Gorge ARC, KBØTUC, 1400-2100Z **May 3**, Annual Music and Blossom Festival, Lower portions of General bands 40-15. Certificate. Chuck Ward, NCØA, 1101 Harrison St, Canon City, Co 81212.

Wausau, WI: Wisconsin Valley RA, W9SM, 1500Z **May 5** to 2000Z **May 8**, Dream Flight Wausau, 14.250 21.325 28.325 146.640. Certificate. Wisconsin Valley RA, Box 363, Wausau, WI 54402-0363.

West Mifflin, PA: Belle Vernon High School ARC, KB3BKW, 1400-2000Z **May 7**, Amusement Park Physics and Communications Day, 3.850 7.225 14.225 21.300. Certificate. Belle Vernon HS Arc, 425 Crest Ave, Belle Vernon, PA 15012.

Middlebourne, WV: Tyler County ARO, KC8GXI, 1400Z **May 8** to 2200Z **May 9**, Commemorating the Tyler Co Historic Museum, 3.860 7.230 14.270 28.320. Certificate. TCARO, Box 287, Middlebourne, WV 26149.

Fairfield, CT: Fairfield ARA, WB1CQO, 1400-2000Z **May 9**, 63rd Annual Dogwood Festival, General portion of 40 20 15 10. Certificate/QSL. FARA, WB1CQO, Box 486, Southport, CT 06490-0486.

Luther, OK: Luther Historical Society/Luther Youth ARC, KB2AW, 1500-2300Z **May 9**, 100th Anniversary of Luther, 14.250 21.350 28.400. Certificate, Luther Historical Society, Box 601, Luther, OK 73054-0601.

Broken Arrow, OK: Broken Arrow ARC, W5BBS, 1400-2200Z **May 9**, Annual Roster Day, 3.900 7.200 14.300 21.400. Certificate. BAARC, Box 552, Broken Arrow, OK 74013-0552.

New Bern, NC: New Bern ARC, N4B, 1200-2000Z **May 9**, 100th Birthday of Pepsi, invented in New Bern, 7.113 7.248 14.248 146.610. Certificate. New Bern ARC, Box 12483, New Bern, NC 28561-2483.

Washington, DC: Boy Scout Troop 170, K2BSA/3, 1400-1900Z **May 9**, National Capitol Area Council Scout Show on the Mall, 7.230. Certificate. Jay Chamberlain, AE4MK, 27 Fox Run Ln, Fredericksburg, VA 22405.

Logansport, IN: CCARC, W9V, 1400-0200 UTC, **May 9**, 45th Anniversary of CCARC, 7.255 14.282 28.330 146.520. QSL. The Cass Co ARC, Box 1092, Logansport, IN 46947.

Leesville, SC: Ridge ARC, W4RRC, 1600-2000Z **May 9**, South Carolina Poultry Festival, 14.260 21.360 28.360 147.255. Certificate. RARC, Box 1046, Leesville, SC 29070.

Blackfoot, ID: Pocatello ARC, N7PI, 0000Z **May 9** to 0000Z **May 10**, Tendoy District Boy Scout Jamboree, 7.250 14.250 21.350 28.350. QSL. Pocatello ARC, Box 2722, Pocatello, ID 83206-2722.

Fairmont, WV: Mountaineer ARC, W8SP, 0000Z **May 9** to 2400Z **May 10**, First Mothers Day observance at the International Mothers Day Shrine, General portion of 80 40 20 15. Certificate. Chuck McClain, K8UQY, RR4 Box 161, Grafton, WV 26354.

Selinsgrove, PA: Susquehanna Valley ARC, W3VPJ, 1300Z **May 9** 0200Z **May 10**, 10th Anniversary of SVARC affiliation with the ARRL, 10-80 in the general portion of each band. Certificate. SVARC Special Event Station, Box 73, Hummels Wharf, PA 17831.

Ono, CA: Cops Contest Club, W6P, 0000Z **May 10** to 2400Z **May 17**, Commemorate National Police Officers Week, 7.290 28.490 21.390 14.290. Certificate. Jerry Boyd, Box 252, Igo-Ono, CA 96047.

Dayton, OH: Dayton Amateur Radio Association, W8BI/8, 1200 to 2201Z, **May 15**, 1200 to 2100Z **May 16** and 1200 to 1600Z **May 17**. Dayton Hamvention. 25kHz from bottom of 20 and 40 meter General phone and CW subbands; 25 kHz from bottom of 40-meter Novice/Technician Plus CW subband. QSL. W8BI/8, PO Box 44, Dayton, OH 45401-0044.

Gadsden, AL: Gadsden RC, K4JMC, 1700Z **May 15** to 0500Z **May 17**, Riverfest 98, 3.965 7.230 14.260 147.16. Certificate. GARC, K4JMC, Box 392, Gadsden, AL 35902.

Wheaton, IL: Dupage ARC, W9DUP, 1500-2100Z **May 16**, Armed Forces Day, 7.250 14.290 28.400 145.25. Certificate. John McCarty, Box 71, Clarendon Hills, IL 60514.

Baltimore, MD: Maryland Mobileers ARC, W3N, 1400-2000Z **May 16**, Honoring the Submarine Service, 7.240 14.240 21.340 28.340. Certificate. MMARC, Box 935, Severn, MD, 21144.

Hayesville, NC: Triode ARC, AD4FJ, 1400-1800Z **May 16**, Smokey Mountain Ham Radio Picnic, 7.275

Exhibit 8
Contest scores

I took these scores from articles in *QST* reporting the results of the most recent ARRL DX Contests, both phone and CW, and the ARRL Sweepstakes (a domestic contest), both phone and CW. Scores are determined by multiplying QSO points (that is, the point value for each contact) by certain multipliers. Multipliers are the same for the CW and SSB contests. The more amateurs that participate in a particular contest, the greater the number of QSO opportunities, and the higher scores. The scores in the two CW contests were similar to the scores in the two SSB contests. It is a reasonable inference that the CW contests drew an approximately similar number of participants as the SSB contests.

Scores for the ARRL DX Contest from the October and November Issues of *QST*:

	Phone	CW
W/VE QRP	204,624	468,468
W/VE Low Power	1,018,791	1,602,975
W/VE High Power	4,476,600	3,742,200
W/VE Unlimited	10,373,508	9,435,786
DX QRP	86,388	1,799,424
DX Low Power	1,184,358	3,369,600
DX High Power	7,051,413	5,822,952
W/VE Unlimited	12,587,448	9,781,728

ARRL Sweepstakes Results from May and June Issues of *QST*:

Single Op QRP	144,888	166,058
Single Op Low Power	268,758	190,008
Single Op High Power	371,932	234,788
Multi Op	303,360	217,408

In Exhibit 23, below, David Sumner, K1ZZ, publisher of the ARRL's *QST*, made this observation: "CW contest operators can only chuckle when they hear of the impending demise of the mode. The fact is that scores keep climbing as both the number and the skill of participants continue to increase."

By **Dave Patton, W9QA**
and
Billy Lunt, KR1R

1998 ARRL International DX Contest CW Results

It was a great way to spend a weekend—working DX with 5 W!—*K8OUA*

After the last few years of writing about the dearth of sunspots and poor conditions, the 1998 running of the CW version of the ARRL International DX Contest has provided some actual high-band propagation about which to write! Stations around the world commented on the great improvement of the 15-meter band. Other operators were even more pleased to once again hear old friends across the world who had seemingly disappeared with the sunspots.

Activity was high and scores improved over those from 1997. For those of you who are about to experience your first sweeps through the sunspot maximum, start preparing your stations to really take advantage of 10, 15, and 20! And you might want to revisit your strategy for running stations. The general rule of thumb for a station entering one of the all-band categories is to run on the highest band open to a major population area. So, when sunrise rolls around you will find yourself with a terrific problem—which band to run on? Effectively there will be little time to spend on 20 meters (even though 20 will be wide open!), and while 15 may be the "money" band, if 10 meters opens that may be the place to go. If you have the ability and desire to use another radio simultaneously with your running radio (to find multipliers on other bands, scout another band for propagation, etc) great propagation conditions can be even more fun. Keep in mind that often three bands (and possibly four) may be open to the same area at the same time!

There were some great scores and great battles in the 1998 CW contest. How do you recognize a great score? When you read the contest results and look to the score listings, do you find your score and compare it to the other local competitors and then stop reading? If so, you have a lot more to gain by "looking further into the story!" Besides the enjoyment of understanding how great scores are achieved, you can learn much from the score listings including: which stations have favorite bands or modes; discovering that there really is a huge amount of activity from South America if you know where and when to look; finding that there were no entries from your region on a particular band; or maybe discovering that you too could be very successful on a DXpedition with only a vertical antenna from the Caribbean!

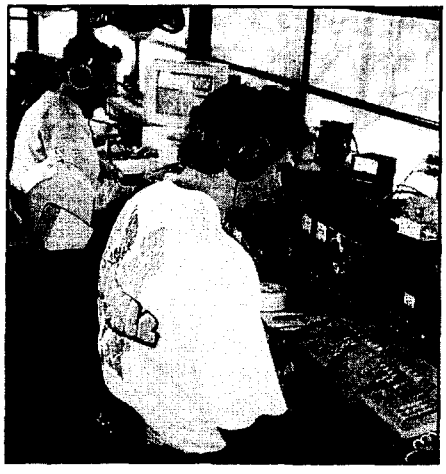
Great scores are those that make top score boxes from an area that has generally worse propagation than the rest of the world—ie, a station located near the Arctic Circle, North Dakota, or the Far East. Of course, a great score does not have to make a top scores box to be "great." A low-power station that beats a high-power station, a station that works a tremendous number of multipliers despite bad conditions, stations that used small antennas or emergency power and still turned in a superb effort, are all examples of "great scores." Some of the best scores come from the battles between stations in the same category such as the multi-op categories. Scores that are close together usually indicate terrific competition! Evidence of that can be found in the USA's multi-two category battle this year!

Starting with the QRP battles, 1998 saw K3PH take the domestic title with a score approaching 500,000! He finished ahead of N7IR who knocked out 397 kilopoints from out west. Both of these scores handily beat the top score from 1997 and are a great indication of improving conditions. AJ2U jumped on the QRP bus in Bermuda operating VP9ID to a 1.7 million-point victory from the DX side! He far outdistanced the ever-present HP1AC, GØTDX and I3BBK.

KN4T knocked out over 1595 QSOs in the barefoot category for a first place win! Walt's Florida location probably helped him extend the band openings on 10 and 15 and beat the stiff competition from W2TZ, K1VUT and VO1MP. Farther west, K5RX came in with just under a million points and a seventh-place finish from Texas. The DX side enjoyed lots of low power activity, but it was KE2VB operating WP2Z who took the crown and the record with a 3.3-million point effort that included over 3740 QSOs! K3DI jumped out of the QRP category this year and took second place from VP2EEI. The "Wisconsin guy," WI9WI placed third with his effort from C6AJZ. The Bahamas proves

Top Ten

W/VE Single Operator, QRP, CW		W/VE Single Operator, Low Power, CW		DX Single Operator, QRP, CW		DX Single Operator, Low Power, CW	
K3PH	468,468	KN4T	1,602,975	VP9ID (AJ2U,op)	1,799,424	WP2Z (KE2VB,op)	3,369,600
N7IR	397,992	W2TZ	1,356,282	HP1AC	172,992	VP2EEI (K3DI,op)	2,422,452
N1TM	362,490	K1VUT	1,242,000	GØTDX	155,568	C6AJZ (WI9WI,op)	1,227,150
W8LVN	322,623	VO1MP	1,223,508	I3BBK	142,884	KP2/KØDI	1,055,700
W4KY	210,000	N8AA	1,148,292	JR4DAH	103,068	9XØA	1,001,478
N1CWR	192,192	NA2U	1,091,718	DL4FN	94,335	L36E	876,345
W8QZA/6	185,277	K5RX	993,300	PY2RNJ	72,765	EA7GTF	779,220
AA1CA	175,422	K4RO	925,704	JA6UBK	68,820	VK5GN	736,020
W3ZZ	170,016	WO4O	910,800	JA9RPU	63,840	ZV8O (PV8ONU,op)	733,026
KD2TT	161,355	WT1O	890,781	WP4JXD	52,272	S57DX	730,944



Dan, K1TO, and Ron, WD4AHZ, are busy running stations at K4OJ's multi-multi station in SFL.

John, W1BIH, and Jack, W1WEF, celebrate their victory as the first place multioperator single transmitter world winners at PJ9C.

every year to be a great place to operate the ARRL DX Contests. It is easy to get to, warm and radio friendly, and in 1998 there were no fewer than five active C6A stations on the bands! There were also a couple of other terrific low-power scores from places that aren't quite as close as the Bahamas: 9XØA produced a megapoint from Rwanda and VK5GN came out with over 700,000 points from far away South Australia. Operating the ARRL DX Contest from VK5 made Martin really maximize his band openings!

The guys with the kilowatts put on another show this year. W1KM won a repeat victory in '98, but only by 32,000 points over K1ZM! Both of these scores and those from KQ2M and N6BV/1 beat W1KM's 3.16-million point winner from 1997. W9RE came in 7th from Indiana, and N6IG placed W6AX into the number 10 slot from California with over 2 million points. The DX side was won handily by W2SC who once again avoided operating the contest from Kansas, instead taking on the challenge from sunny 8P9JG. Tom almost made it to 6000 QSOs. Following Tom were FM5DN, YV5A (OHØXX), LT1F (LU5CW), and NH7A (N6HR). These guys gave us all lots of multipliers in 1998! The European champion for 1998 is F6FGZ.

The single operator assisted category saw KI1G place K1NG in the winner's circle again this year, followed closely by K3WW, and eight more W2s and W3s! Obviously the East Coast PacketCluster network works okay! Both K1NG and K3WW beat W1KM's score and provided solid evidence of the advantage of packet DX spotting assistance.

The single bands were a mixed bag in 1998. The low bands did not perform anywhere near 1997's level, but still great scores abound. W4ZV found 71 countries to win 160 meters from the US, while EA8ZS put his big signal well into North America to win 160 from the DX side. SP7GIQ nearly caught 'ZS with a fine 30,000 score!

Eighty meters saw Rob, W1MK, nearly repeat his score from last year at 274k! K8MK came in second at 173k, and going west, K9DX was third, and K5MR came in at number 5. Way out west, K6SE piled-up 27k from California. The DX side of 80 meters found ON4WW keying OT8T to 121,000 and a win over DF9ZP. In the great score category, KL7RA finished just out of the top 10 with a 32k score from Alaska!

On 40 meters AD6DO abandoned his old KC6CNV call sign, and put up 283,000 points for a terrific winning score over last year's winner, N7DD. One of the C6 stations, C6A/K4PG, produced 227k to win for the DX side. 9A5Y (9A3LG operating) pulled in 2nd worldwide. Interestingly, Europe was a great place to be in 1998 for making the top score boxes. On 160 meters European stations took spots 2 through 10, on 80 they took spots 1 through 10, on 40 they took spots 2 through 10, and on 20 meters, again, Europeans finished number 2 through number 10!

Twenty meters was a battle of zeroes in the US, as WØUA at WØUN took the number one slot over that other "Wisconsin guy" (the *original* Wisconsin guy we must add!), W9WI, who operated NSØZ in Missouri. W9WI is one of the best CW operators in the US, and has quietly compiled nice scores year after year. One can say the exact same thing about WØUA too! Look at these two zero-district scores and understand that you are seeing great scores! W9WI has also won the KC DX Club's CW copying competition at the Dayton Hamvention several times, so obviously that competition truly reveals the best! Other high finishers in the copying competition year after year include K3ZO and K5ZD. Look for their scores very high up in the standings too! From the DX side, Joe, W5ASP, played 20 meters from his favorite ZF2NE spot. Joe repeats his win from 1997 while beating another fine number 2 score from Poland—SP2FAX!

The big story from 1998 was the improvement in conditions and scores on 15 meters. In the early stages of the sunspot cycle upswing, stations in the southern areas of the US, and in fact, anywhere south and/or near the equator really do well on 15 and 10 meters. K5TR put W5KFT's station to good use in winning the US with a 343 kilopoint score over N4ZZ using his funny looking WW4RR club call at 313k. Last year's winning 15 meter score from the US was 61,000 points! FM5CD beat W9VA who was operating at PYØZFO for the top honors on 15 from the DX side. To win from Europe ON5UM keyed OT8A to 159k on 15, so the good conditions were enjoyed everywhere!

Ten meters just wasn't quite there yet for the US and Canadian stations. K4JYO put together enough QSOs for 11,000 points, which was about 10 times better than 1997! LU3HIP had a much better time on 10 amassing 202,000 points and beating the competition of PYØFF.

The always-competitive multioperator categories provided a lot of fireworks in 1998. The K5ZD station and operators pulled-in with a 4 megapoint score and first place domestically in the Multi-single class just ahead of W3BGN and N2RM. From the ABC islands once again this year came the fight for world honors. PJ9C, with W1BIH and W1WEF at the controls beat P49V and V31TP in a 1-2-3 finish that mirrored 1997. Can this finish order happen again next year? Multi-single in Europe is also very popular and TM9C pulled out all the stops to win from the old continent.

Multi-two saw the best competition in 1998. A mere 351,000 points separated the domestic winner, K1AR, from number four,

W/VE Single Operator, High Power, CW

Call Sign	Score	160	80	40	20	15	10
W1KM	3,742,200	124/51	559/69	788/78	1040/89	599/80	40/29
K1ZM	3,709,221	104/52	312/67	910/83	820/88	827/89	50/30
KQ2M	3,457,458	85/49	510/69	796/76	821/90	723/79	43/24
N6BV/1	3,219,990	80/46	291/62	787/80	1139/82	643/74	25/18
N2LT	3,005,775	75/38	267/54	620/74	815/85	935/94	33/20
K3ZO	2,852,700	72/40	225/57	617/69	880/87	715/84	61/33
W9RE	2,372,931	60/38	140/53	341/70	638/81	941/91	59/30
W4PA	2,290,554	37/27	170/53	525/73	905/88	564/83	25/19
K1ZR (at KB1SO)	2,185,440	39/29	203/55	660/71	1010/84	388/63	20/12
W6AX (N6IG,op)	2,053,716	14/12	106/43	535/70	643/85	742/81	86/31

W/VE 160

W4ZV	42,600
W2VO	20,955
K4TEA	16,692
WF2W	15,120
K3OSX	8,322
VE3OSZ	7,638
W4SVO	7,104
W8WEJ	3,219

W/VE 80

W1MK	274,860
K8MK	173,826
K9DX	132,720
VE1JF	118,188
K5MR	77,760
VE3DO	67,776
N2GC	60,450
K3JGJ	60,102
W1UK	53,856
W4HM	27,720

W/VE 40

AD6DO	283,692
N7DD	196,416
N2PP	188,964
K4VX	186,186
(K9BGL,op)	
AA7A	137,124
N2FY	56,283
WB8ZWY	33,930
N8PR	27,048
W4NTI	22,344
W3KT	20,736

W/VE 20

WØUN	495,495
(WØUA,op)	
NSØZ	397,188
(W9WI,op)	
WS1M	277,560
K1DKX	275,616
K2BA	220,806
K7ZA	209,250
W9OF	183,456
W5FO	166,320
K7ZZ	149,202
K9CAN	111,024

W/VE 15

K5TR	343,200
(at W5KFT)	
WW4RR	313,020
(N4ZZ op)	
N5NJ	298,758
(at K5MR)	
N4VZ	263,025
W9IW	218,160
(ES2RR,op)	
K9QVB	170,748
W4SO	158,004
N7BZ	155,034
N4IR	136,290
W6BSY	121,626

W/VE 10

K4JYO	11,931
W9GIL	11,070
W5ZO	9,804
KC5QBG	7,695
W7USA	5,580
AI2C	5,568
K1DII	3,519
W1RFQ	1,425
N3CZB	12

DX Single Operator, High Power, CW

Call Sign	Score	160	80	40	20	15	10
8P9JG (W2SC,op)	5,822,952	269/46	598/57	1198/57	1262/57	1161/56	1376/58
FM5DN	4,275,876	192/37	504/55	893/56	1043/58	1085/59	751/54
YV5A (OHØXX,op)	3,659,880	0/0	352/54	558/55	1100/57	1125/57	1222/57
LT1F (LU5CW,op)	3,534,732	5/5	154/41	807/54	813/57	1007/58	1483/60
NH7A (N6HR,op)	3,172,104	155/42	287/49	842/57	472/54	954/57	679/53
V47KP (W2OX,op)	2,582,139	161/38	296/43	463/48	502/53	891/57	686/48
OA4SS	2,323,785	0/0	194/42	340/52	679/57	759/57	951/57
F6FGZ	2,060,658	147/35	382/43	784/52	933/55	628/54	0/0
OK1RF	2,046,120	122/30	365/43	838/53	829/56	736/54	0/0
S58A	1,883,007	99/29	230/36	821/56	759/56	631/53	43/13

DX 160

EA8ZS	36,036
SP7GIQ	30,987
S5ØU	28,128
S57M	22,134
I3VHO	18,228
HAØDU	15,072
OK1AEZ	10,584
YU7AU	10,212
F6CWA	7,209
YZ4IZ	7,062

DX 80

OT8T	121,476
(ON4WW,op)	
DF9ZP	92,355
(K8ZB,op)	
OM5DX	80,511
YU1EXY	79,821
OM3PA	66,264
DL5YM	65,898
YZ9A	57,933
(YU1NW,op)	
ON4AKL	51,786
S53X	41,769
YU1KR	39,975

DX 40

C6A/K4PG	226,722
9A5Y	207,081
(9A3LG,op)	
S52AW	198,012
S53M	196,896
(S51TA,op)	
EA7KW	188,442
HB5H	187,920
(HB9FAP,op)	
YT7A	175,566
YU7KW	166,896
OT8T	159,318
(DL2CC,op)	
OM5M	146,172
(OM2RA,op)	

DX 20

ZF2NE	350,784
(W5ASP,op)	
SP2FAX	244,260
OH8LQ	228,420
IT9XUC	207,180
S5ØK	190,878
OM3NA	181,431
YT1R	174,522
(YU1ZZ,op)	
DLØDAN	160,215
LA8W	144,420
(LA4DCA,op)	
OK1FPG	141,288

DX 15

FM5CD	326,388
PYØZFO	317,715
(W9VA,op)	
TI7/N4MO	235,809
HC2SL	217,500
L5OFC	178,350
OT8A	159,390
(ON5UM,op)	
PY2XE	136,950
C6A/N4BP	127,200
IK4WMG	124,497
CO8LY	122,907

DX 10

LU3HIP	202,440
PYØFF	145,200
CX9BT	76,845
LU9APM	48,096
PJ5JP	39,216
VK4XA	32,967
CX9BAG	16,920
9A1CAL	252
(9A3JI,op)	
ZV2VT	48
JAØRYN/7	42

By Dave Patton, W9QA, and
Billy Lunt, KR1R

1998 ARRL International DX Contest Phone Results

Best Propagation in Years!—*N3HBX*

Somebody threw away the broken CD from last year as the 1998 Phone DX Contest weekend saw excellent activity and tremendous scores. The score increases over those from 1997 on 15 and 20 meters were astounding, and showed what is possible when the solar flux rises even only a few points. In the US and in Canada, eastern stations happily worked JAs and other Asian stations while hams in the west even more joyously logged hundreds of Europeans and Middle Eastern stations. This year's competition seems to be a precursor of great things to come. Ten meters showed signs of life and it might take only one more year before the polar paths open up for the masses.

The 1998 contest looked like a "tune-up" year for many stations as preparations are being made to enter the next solar upswing as ready as possible for the highest level of competition ever. New technology in station hardware has found its way around the world, dozens of new stations have been built since the last cycle peak, traveling operators are taking trips like never before, and interest in contesting is rising again. The multi-operator categories were particularly popular this year, both to "work out the kinks" and perhaps to attract a fresh crop of enthusiastic operators with whom to staff stations for the future.

K1AR tuned-up his running skills for the future with an awesome 4.4 megapoint victory in the high-power single-op class this year. One of the highlights of all-band contesting is to break 1000 QSOs on a single band while doing well on the other bands, too. Well, John didn't just break 1000 QSOs on one band, but put up 1394 QSOs on 20 and 1296 on 15! Those two bands combined were more QSOs than the other competitors could muster on all bands combined! Second place finisher K1ZM and third place holder N2NT both made the grade at around the 2700-QSO level. W9RE and WB9Z battled it out for the Midwest and finished in 6th and 9th places respectively. From Washington state W7EW operated W7AT into the 12th spot and first from the far west.

W2GD took up residence again in Aruba at P4ØW and put over 7 million points on the board to win the high power single-op category from the DX side. W5AJ went about the same direction and put 8P9P into second place with a nice 5.3 million-point score. What could be better than tropical weather and scorching rates? KB3AFT went to WP3R and took third at 5.2-million points. Getting further away from the home continent N6TJ put his famous ZD8Z call to good use and an 8th place finish followed by NH7A in 9th, and the very welcome multiplier of XQ8ABF

Top Ten

W/VE Single Operator, QRP, Phone

N1TM	204,624
N1CWR	176,040
W6CN	142,875
W8QZA/6	114,480
N6AZR	111,552
N7VY	55,002
NQ7X	54,960
N7IR	51,360
KA5PVB	35,040
N8XA	31,872

W/VE Single Operator, Low Power, Phone

K4ZAM	1,018,791
K5RX	882,318
W2TZ	877,365
KN4T	754,320
WO4O	726,453
N6OJ	706,626
WD5K	701,883
NA2U	692,874
K6RO	654,804
N9JF	651,240

DX Single Operator, QRP, Phone

F5BEG	86,388
LW1ECO	66,825
LW3DWX	62,073
JA2DLM	39,204
JR4DAH	37,386
JA2JSF	36,270
JA6UBK	26,565
CT1ETT	23,424
YU1KN	15,006
OK1DKS	11,475

DX Single Operator, Low Power, Phone

4M5E (YV5NWG,op)	1,184,358
LU8HLI	856,908
PY1OB	667,878
JH4UYB	549,480
L36E	544,872
LU8ADX	541,236
LT4A (LU1BCE,op)	463,275
4A1AC (XE1BEF,op)	419,244
8P6CV	412,257
S57J	364,320

The Cuban and Canadian team at T48RAC finished10th place among the North American Multi-Single stations. (Left to right: CM8DC, VE3ESE, VE3NXB, CO8KL, CO2JA, VE3NQK, CO8LY, CO8HF, CO8VN and CO8TW.)

Benjamin, XE2AUB, completed 400 QSOs operating single-band (10 meters).

W/VE Single Operator, High Power, Phone

Call Sign	Score	160	80	40	20	15	10
K1AR	4,476,600	28/22	222/65	296/78	1394/130	1296/123	80/32
K1ZM	3,726,450	66/43	211/69	252/79	1026/112	1065/116	110/36
N2NT	3,362,646	48/31	255/66	270/83	996/109	1107/109	38/15
K5ZD (K9PG,op)	3,262,800	50/34	226/64	240/72	1273/108	849/98	81/24
N6BV	3,204,792	32/25	211/62	343/76	980/103	1001/105	97/30
W9RE	2,976,162	19/13	93/48	249/73	994/115	1151/107	91/26
W3BGN	2,695,140	35/27	188/56	124/60	1108/106	887/97	73/26
K3ZO	2,599,038	35/26	135/51	244/70	714/98	1044/112	90/26
WB9Z	2,490,597	24/18	155/53	192/67	565/96	1050/110	102/37
K8LX	1,984,344	14/10	66/44	127/68	821/103	748/106	82/25

W/VE 160

AA1BU	5,814
W2VO	5,610
VE3DO	1,539
W6HG	1,134

W/VE 80

K1FZ	136,275
K1LZ	103,284
W9RM	74,844
VE1JF	36,381
W4SVO	33,024
W2LU	31,563
W6ZJ	30,084
(KQ6QL,op)	
NA4CW	10,080
W2FR	7,956
WØSF	7,800

W/VE 40

N7DD	210,936
NC4NC	48,585
W3KT	46,956
KZ2I	46,689
NO9Z	39,195
N6WLX/8	37,914
N5DO	37,422
WA4QDM	28,416
WF2W	26,901
W4JKC	21,336

W/VE 20

VE6JY	715,428
VE3XN	375,192
VA3MM	372,960
N3HBX	339,066
NB7N	306,636
N5DX	274,134
WS1M	253,341
W7FP	235,002
KB2BF	226,044
K6HNZ	216,300

W/VE 15

N2IC/Ø	542,250
N8II	462,396
N7ML	421,377
(KE7X,op)	
NA5B	411,936
WW4RR	404,427
(N4ZZ,op)	
VA3MG	362,340
K4JYO	323,088
N4MXT	262,080
K7VS	232,869
KGØZI	227,808

W/VE 10

KZ5MM	62,640
K4ZW	30,750
KKØSS	25,392
VE1RAA	23,490
AI2C	21,294
W9GIL	20,412
K6KAY	15,732
(N/T)	
W5VGX	15,162
KY5N	14,790
NM9C	14,595

DX Single Operator, High Power, Phone

Call Sign	Score	160	80	40	20	15	10
PØW (W2GD,op)	7,051,413	165/36	445/55	605/55	1596/59	2020/59	2446/59
8P9P (W5AJ,op)	5,353,773	94/27	369/51	694/58	1795/59	1374/58	1487/54
WP3R (KB3AFT,op)	5,290,560	134/34	439/57	887/56	1659/60	1302/59	1090/54
HU1X	5,021,856	118/42	433/56	599/59	1146/59	1610/59	1182/54
KP3P (K7BV,op)	4,861,584	128/32	589/54	636/57	1190/58	1561/58	1090/53
FS5PL	4,738,944	34/13	397/54	626/54	1512/59	1999/59	936/48
V47KP (W2OX,op)	4,187,781	125/28	320/49	721/54	1181/58	1630/58	820/44
ZD8Z (N6TJ,op)	3,450,954	84/26	199/44	311/49	1204/59	881/58	1247/57
NH7A	3,320,898	24/8	158/34	715/54	876/55	1698/58	803/49
XQ8ABF	2,673,000	0/0	1/1	218/42	1262/58	1049/57	1595/58

DX 160

SP7VCK/7	3,024
EA1DVY	630
LY1FW	3
UTØZZ	3

DX 80

ZF2JB	214,878
OT8T	88,836
(ON4UN,op)	
YV1CR	73,899
I4AVG	50,061
OT8L	36,645
S57O	35,802
JH5FXP	35,112
HC1HC	32,430
YTØT	25,536
OL6X	23,808

DX 40

9A5Y	154,413
(9A3LG,op)	
OT8T	138,159
(ON4MA,op)	
9J2AM	133,878
EA3FQV	123,648
VK4DZ	116,325
IR1A	104,676
S5ØO	101,712
OM5M	99,375
(OM2RA,op)	
F6CUK	74,235
YU7KW	71,910

DX 20

SP2FAX	368,691
PA3DZN	341,787
DF9ZP	340,194
GM8X	313,821
S5ØK	300,150
HU4X	296,652
LU2NI	284,316
OH6RX	282,576
RW1ZA	271,695
HA6NF	261,696

DX 15

ZX5J	598,791
ZF2MR	593,304
HC1OT	517,194
P43P	459,492
LT1F	414,816
(LU1FKR,op)	
CT98BOP	413,295
CT8T	356,940
(CT1ESV,op)	
HK4QIM	333,036
IO4LEC	327,120
ZP5MAL	317,538

DX 10

LU6ETB	539,850
LU3FZW	464,448
PQ5W	439,314
LU2DW	413,649
LU5MM	406,215
LU9HS	390,978
CX8CP	367,836
LU5FC	349,353
LW8EXF	330,813
(LU7DW,op)	
LU2FA	316,476

W/VE Plaque Winners—Phone

Single Operator

All Band	K1AR	Frankford Radio Club
1.8 MHz	AA1BU	Butch Greve, W9EWC, Memorial
7 MHz	N7DD	David L Thompson, K4JRB
14 MHz	VE6JY	William F Beyer, Jr, N2WB
Low Power	K4ZAM	Dauberville DX Assn
QRP	N1TM	Michigan QRP Club
Assisted	N2A (N2TX,op)	Richard Hallman, N7TR

Multioperator

Single Transmitter	K8AZ	Steve Adams, WS4F
Two Transmitter	KC1XX	Mad River Radio Club
Unlimited	K3LR	Western New York DX Assn, W2RR

DX Plaque Winners—Phone

Single Operator

World	PØW (W2GD,op)	North Jersey DX Assn
Asia	JH7DNO	NU6S in Memory of Dave Walker, NX6D
Europe	GW3YDX	Jerry Griffin, K6MD
North America	8P9P (W5AJ,op)	Chod Harris, VP2ML
Oceania	NH7A	W7EW—in Honor of W7IYW
1.8 MHz	SP7VCK/7	Fred Race, W8FR, ZL2BT Memorial
3.5 MHz	ZF2JB	K1ZM Communications Inc.
14 MHz	SP2FAX	Central California DX Club
21 MHz	ZX5J	Long Island DX Assn
Low Power	4M5E (YV5NWG,op)	Island Villa Contest Club, WP2Z
QRP	F5BEG	Southern Arizona DX Assn
Assisted	LU4HAW (LU3HIP,op)	Willamette Valley DX Club

Multioperator, Single Transmitter

World	PJ9G	Carl Cook, AI6V/P49V
Asia	JA7YAA	Yankee Clipper Contest Club
North America	VP5A	Nick G Lash, K9KLR
Oceania	WH6H	AH9B/V73B

Multioperator, Two Transmitters

World	6D2X	W6NL & K6BL

Multioperator, Unlimited

World	WP3X	The Not Kenwood Club
Asia	JA3ZOH	Hajime Kato, JQ1RUR/2, KHØG
Europe	9A1A	Operators at K1TTT

who finished tenth with 2.6 million points. The first place score out of European belongs to GW3YDX at almost 1.4 million points.

The low power category was dominated again this year by Jim, K4ZAM (ex WA4ZXA) who maximized 15 meters with 560 QSOs and 95 countries to win over the North Texas station of K5RX. The conditions were good for N6OJ, too, who made 15 meters play to a 6th place finish and first out west. From the DX side YV5NWG used his contest call of 4M5E to make over 2400 QSOs and win the contest over LU8HLI and PY1OB. Fourth place went to a great score from JH4UYB who made over 1200 low-power QSOs from Japan! Congratulations!

F5BEG, operating QRP, made 313 QSOs to produce 86 kilopoints and a winning score in the QRP category! LW1ECO finished second at 66,000. The QRP race stateside was the neat story of the one-two punch of winner N1TM over second place N1CWR, who both moved up from 1997's finish of 7th and 8th places! Congrats on the nice improvement!

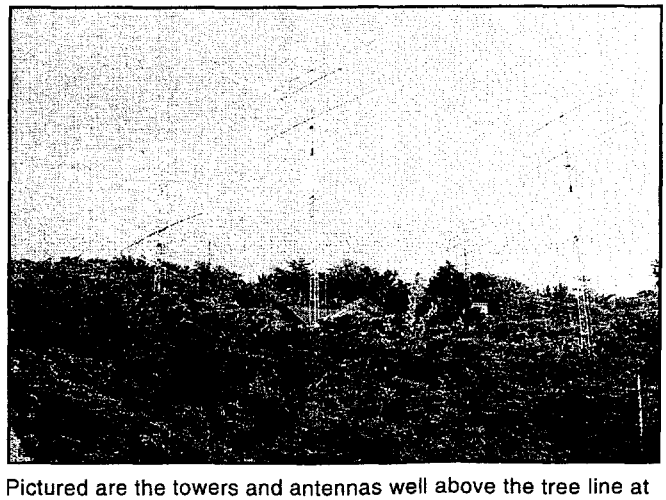
Special Plaques

Single Operator

W/VE Combined Score	K1ZM	National Contest Journal
W/VE Low Power Combined Score	KN4T	Rochester, NY, DX Assn
W/VE 40 Meters Combined Score	N7DD	Pace Engineering, In Memory of Jim Rafferty, N6RJ
W/VE Under 18 Combined Score	AD6DO	Connecticut DX Assn, Father Moran, 9N1MM, Memorial
World Combined Score	V47KP (W2OX,op)	Mike Manafo, K3UOC
Japan Combined Score	JA1ELY	JA7WME
Atlantic Division CW	K3ZO	Richard Pitzeruse, K2NY Memorial—Salt City DX Assn
Great Lakes Division CW	N9AG (N8NR,op)	Livonia Amateur Radio Club, Livonia, MI
Great Lakes Division Phone	K8LX	Livonia Amateur Radio Club, Livonia, MI
Japan All Band CW	JH5FXP	Akita DX Assn
Japan All Band Phone	JH7DNO	Communication Ham Club. JH7YJF
Japan Low Power All Band CW	JH4UYB	Western Washington DX Club
Japan Low Power All Band Phone	JH4UYB	Western Washington DX Club
Seventh Call Area All Band CW	W2VJN/7	Willamette Valley DX Club
Seventh Call Area All Band Phone	W7AT (W7EW,op)	Willamette Valley DX Club
Ninth Call Area All Band CW	W9RE	Northern Illinois DX Assn

Multioperator

Caribbean Multi-Single CW	PJ9C	The YASME Foundation
Multi-Multi Combined World	V26B	W2PV Memorial—Schenectady ARA



Pictured are the towers and antennas well above the tree line at 7J2YAF (JA1KSO,op) Nob operated single-band (15 meters) from this fine station.

The 1997 ARRL November Sweepstakes CW Results

By **Randall A. Thompson, K5ZD**
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and
Billy Lunt, KR1R
Contest Manager

It was three days after the 1997 ARRL November Sweepstakes CW contest and Alan was comparing experiences with Alex, a new member of the local radio club. Alex was recently licensed and Sweepstakes had been his first attempt at CW contesting.

"I couldn't believe how crowded the bands were!" Alex exclaimed. "Every band seemed to be filled with stations calling CQ SS."

Alan nodded, recalling the contest and how much more enjoyable it had become since installing 250-Hz CW filters.

Alex continued, "Some guys were sending so fast that I really had to concentrate to catch their calls. When I called them, I would send QRS after my call—just like you suggested. And it worked! They slowed down to match my speed."

"Of course," replied Alan. "They want to work you as badly as you want to work them. The good operators will always slow down and repeat things as many times as you need."

"There is one thing I don't really understand," said Alex.

Alan leaned forward expecting some deep philosophical question penetrating to the core of his contesting soul.

"What is a precedent?" asked Alex.

Alan blinked and thought for a moment as he tried to understand the question. As one who had come up through the CW traffic handling ranks, it was a question he had never really considered.

He tried to explain. "The correct term is 'precedence.' It is part of the official ARRL message preamble. In traffic handling, it indicates the order in which messages are to be handled: Emergency first, Priority next, then finally Routine.

"The Sweepstakes exchange is derived from the official message format used in traffic handling. That's why there are so many elements in the exchange.

"Precedence became part of the SS exchange in 1966, when it was added after the message number. All exchanges carried the R precedence, for Routine. In 1968, it was changed to indicate power levels—A for 150 W and less, or B for over 150 W. Q for QRP was added in 1987."

"Is that also why they call the year licensed the 'check'." asked Alex?

"Yes," replied Alan. "In a message, the check represents the number of words that are in the message. For the Sweepstakes, since there is no message, it is the year the operator was first licensed."

"I worked one station that sent a check of 17. That guy must be old!" exclaimed Alex.

"Well, some club stations like to use the year they were first licensed just for the novelty. But there are some regular SS participants, like W6BIP in San Francisco, who have been around for a long time and enjoy giving out a low number."

"The hard part for me," said Alex, "was knowing how to ask for repeats on the precedence and check. I didn't know what to send."

Enjoying the role of teacher, Alan explained. "For the precedence, most people send PR? or PREC? to request a fill. If that fails, I sometimes try POWER?"

"Oh," said Alex. "I had several people send PR and I thought they were asking for the number again!"

"Yes, that is a common difficulty. As for the check, usually CK? gets the job done. But YR? or YEAR? are also effective."

"That makes sense now that you explain it," said Alex. "This contesting stuff is a lot of fun. What can you tell me about the Phone Sweepstakes coming up?" asked Alex.

Alan smiled with the realization that the contest flame was beginning to flicker in this one. "Well, it's a completely different contest..."

Rob, K6RB, operating high power from SCV tried for a clean sweep but missed it by only two—YT and MAR.

High Power Category

Heading into the contest, N6TR had made it clear that he planned to drive W5WMU to his third high power title in a row. The rest of the high power entrants were equally determined to stop him. Who could do it?

The answer came from a somewhat unlikely place—South Dakota! Todd, WDØT, operated WØSD to his first Sweepstakes victory and the first ever from that area of the country. Todd is no stranger to the top ten, having finished in third last year, and was considered a true contender. But the fifth call area seemed to have a lock on the top spot with wins in seven of the last eight years. Short of W5WMU's 1995 all time record score, Todd gets a new division record to go with his win. Could this be a precedent setting effort for next year?

In a tight battle for second place, Steve, N2IC, in Colorado just squeaked by Tree, N6TR, (operating at W5WMU) by a mere two contacts. Tree got the contest off to a fast start by making 580 QSOs in the first 6 hours! With 12 hours left to go in the contest Steve knew Tree was more than 100 contacts ahead of him. Undaunted, Steve racked up some big hours on 20 meters during the Sunday afternoon doldrums while Tree struggled! Steve caught him in the final hour to take second overall and a new Rocky Mountain Division record.

Claiming that he only has his 20 meter antennas working, Dan, K1TO, took advantage of his new South Florida QTH to take the fourth spot. Dan made over 600 of his contacts on 40 meters using a ground mounted HF2V vertical! What's he going to do when he gets his real antennas up?

Just five QSOs back is another repeat

Top Ten

CW

Single Operator, QRP

N5TJ	166,058
WØUN (K9AN,op)	137,214
K1TR	125,096
NØAX	114,660
KG5U	110,048
K7MM	106,650
AA7KF	105,490
W7YAQ	97,736
K9OM	95,000
K3CR (KB3AFT,op)	94,572

Single Operator, Low Power

KØEU	190,008
K7BG	184,860
WP2Z (AG8L,op)	183,300
VE7CC	179,172
AD6DO	179,172
N4ZZ	177,276
KN4T	176,170
K7FR	173,404
K5RT	173,168
K6LA	168,744

Single Operator, High Power

WØSD (WDØT,op)	234,788
N2IC	229,416
W5WMU (N6TR,op)	229,100
K1TO	227,362
WBØO	226,572
K7UP (KN5H,op)	217,882
W6GO (N6IG,op)	217,724
K6LL	217,566
K5GN	216,934
K5BN (K5GA,op)	216,618

Multioperator

K4OJ	217,408
KO7X	203,346
K8LX	197,974
W9JA	195,920
K5MDX	192,760
W3GH	189,916
ABØS	188,136
KØRWL	182,806
K6RC	175,696
AA2FB	172,694

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Contest Manager

The 1997 ARRL November Sweepstakes Phone Results

Just a week before the 1997 Phone Sweepstakes, the following invitation from VY1JA in Whitehorse, Yukon, appeared on the Internet:

"I have a free standing shack with a wood stove for heat. It has an 850, a computer, and an amplifier that is giving me trouble. It does work...at least for now. The rotator sticks. The pileups CAN be unruly. The chances of an aurora are still fairly high in November, which means you should bring a camera because looking at the pretty sky may be all your trip is about. The weather can go to minus 40 on the drop of a hat."

Ken, K6LA, took up VY1JA's offer and learned first hand just how difficult blasting RF through aurora can be. Other hams sought equally desirable locations. Jim, K4MA, headed for the vacation paradise of WP2Z on St. Croix in the US Virgin Islands and discovered that there is indeed life on 10 meters. Frank, W3LPL, stopped by KH7R in Honolulu on his way home from Australia to do his first serious SS Phone effort in 25 years. Being over 2000 miles from most Sweepstakes participants, he found the hours of darkness a bit slow (he didn't record a single contact on 75 meters).

And, of course, we need those rare guys who just stay home! VE8EV and VY1AU helped out with Yukon. The new NL section was easy to work thanks to numerous VO1 stations. Wyoming and other relatively rare sections were also well covered. A lucky (and talented) 372 stations earned a mug by sweeping up all 79 sections.

High Power Category

Phone Sweepstakes demands the ability to talk fast, withstand interference and stay in the chair. Last year's winner Rich, N7TR, knows just how difficult it is to stay on top. With a rate of more than 100 QSOs/hour in the first 8 hours, Rich was off to his best start ever and a commanding lead over the competition from his Nevada powerhouse.

Jim, K4MA, enjoyed a solid start at WP2Z, but struggled with the QRM on 20 meters and the low bands. With everyone beaming east and west, even a rare multiplier gets lost in the noise. When Jim went to sleep at 0600Z, he was at least 200 QSOs behind Rich.

Sunday is when everyone begins looking for the sweep. Multiplier lists are checked and beams turned toward missing sections. The PacketCluster networks hum with information on where to find the most needed sections.

Jim finds that he can exploit a Caribbean propagation advantage. He makes the most out of the north-south 10-meter paths and patiently walks hundreds of casual operators through the exchange. He makes 484 QSOs in just four hours to blast into the lead. N7TR doesn't find 10 meters to be so productive. In fact, his only 10 meter contact is with ... WP2Z!

In the end, the propagation advantage is just too much in WP2Z's favor. Despite some impressive rates, Rich couldn't hold him off and finished just 53 QSOs back for his fifth Top Ten finish in a row.

The rest of the high power pack was lead by Dave, K6LL, in Arizona. This was Dave's third year in a row at third place as he anxiously awaits the return of 10 meters. Todd, WDØT, fresh from his CW victory, operated WØSD in South Dakota to fourth spot. N5KO visited N5RZ in West Texas for a close fifth.

Top score from back east was Ken, N4UK, in South Carolina who finished in tenth overall. This marks the first appearance of an easterner in the high power Top Ten in many years. Ken made most of his contacts on 40 meters using an antenna just 43 feet high. K8DX in Ohio was also notable finishing in 14th overall.

Low Power Category

The contest for low power honors was another two-station race featuring experienced A-power aces. Charlie, K4VUD, in North Florida used a tribander and a vertical to record an impressive 1701 QSOs and a sweep for his first national SS victory.

In second was Rob, VE4GV. Last year, Rob used a broken rotator as his excuse for finishing second. This year, he and some friends braved the Canadian cold on the morning of the contest to replace the rotator. It almost worked. With over 1000 QSOs on 20 meters, over 500 on 40, and recording a personal best QSO total, Rob finished just 18 contacts behind K4VUD.

Third place went to Don, N4ZZ, in Tennessee. The top West Coast score was from 17-year old Dan, AD6DO (formerly KC6CNV). Dan did the contest "live" without the use of a voice keyer. John, KK9A, in Illinois repeated his Top Ten effort of a year ago moving up a spot to finish in fifth. W8MJ in Michigan continued the strong showing of midwestern stations to take sixth place. In a very rare trip to the Top Ten by a New Englander, KZ1M in Western Massachusetts took seventh. WXØB and W2TZ rounded out the box.

QRP Category

John, N6MU, took up the QRP challenge and destroyed the competition for his first national Sweepstakes victory. John operated from the 7000-foot mountaintop QTH of N6NB in the SJV section. Half of his QSOs came on the relative quiet of 15 meters and he managed to snag a clean sweep.

Pulling up in second was Tree, N6TR, operating from K7RAT, the club station of the Boring Amateur Radio Club. Tree also took advantage of his Oregon location to make most of his contacts on 15 meters. He missed NNY and ME for his sweep.

Gordon, N7VY, in Arizona continued the West Coast dominance by finishing third. His clean sweep put him ahead of fourth place finisher WBØGAZ in Colorado who had the third highest QSO total but missed too many sections. Last year's winner, W7YAQ, pulled into fifth.

The first score from the east is Sean, KX9X, in Illinois. He also accomplished the difficult job of sweeping all sections. Ten

Nine year old Michael logged for his father's multiop, N1OEF, in EMA.

Phone

Single Operator, QRP

N6MU (at N6NB)	144,886
K7RAT (N6TR,op)	114,730
N7VY	105,544
WBØGAZ	98,550
W7YAQ	85,778
KX9X	81,844
KD2TT	79,200
KØFRP	72,656
KØRI	68,952
K4VFY	62,986

Single Operator, Low Power

K4VUD	268,758
VE4GV	265,914
N4ZZ	226,414
AD6DO	215,986
KK9A	212,036
W8MJ	202,082
KZ1M	193,866
WXØB	191,812
W2TZ	186,576
K3CR	184,702

Single Operator, High Power

WP2Z (K4MA,op)	371,932
N7TR	383,558
K6LL	327,534
WØSD (WDØT,op)	320,266
N5KO (at N5RZ)	318,054
N5LT	313,156
W6V (N6IG,op)	309,680
N5JA	307,784
K5TR (at W5KFT)	306,046
N4UK	305,572

Multioperator

W3GH	303,360
WØR	296,408
W4WA	296,408
KØWA	293,406
KTØR	286,770
WØMU	285,348
K1NG	285,190
K5MDX	284,558
KØDU	276,026
K7IR	274,604

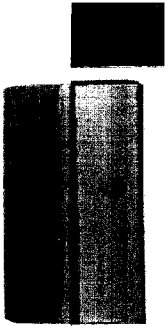

Exhibit 9
DX Century Club participation by mode

This exhibit includes all new DXCC award and endorsements published in *QST* during 1998. I took these pages from the January, February, March, and May issues. I also included the December 1997 issue. New awards and endorsements for Mixed, CW, SSB, RTTY, and Satellite are shown separately. By comparing the number of listing for each mode, one can see that new CW and new SSB awards and endorsements are roughly the same over all, with some variation from month to month. RTTY is a distant third with satellite (VHF/UHF) is far behind RTTY.

By way of example, in the most recent listing (March 1998) there are slightly more new CW members than new Phone members and slightly more Phone endorsements than CW endorsements. There were only six new RTTY members and thirteen RTTY endorsements. For satellite, there were four endorsements and one new member.

Conclusion: This data demonstrates that SSB and CW activity are similar, with RTTY and satellite activity in distant third and fourth place.

DX Century Club Awards

*Edited by **Bill Kennamer, K5FUV** • DXCC Manager*

The ARRL DXCC is awarded to amateurs who submit confirmation for contacts with 100 or more countries on *The ARRL DXCC Countries List*. The totals shown below are exact credits given to DXCC members from December 1 to 31, 1997. There were 329 current countries at that time. The DXCC rules and application forms are contained in *The ARRL DXCC List*, available for $3 from Publication Sales. The DXCC Web site may be found at **http://www.arrl.org/awards/dxcc/.**

NEW MEMBERS

Mixed

AP2TJ/118
DJ3JB/118
DK8RB/107
DL2KDW/212
DL4OCM/119
DL6AMI/120
DL7UKA/248
DL8UVG/117
DS4BHW/122
F8EP/118
IK8TWP/106
JA7FSB/263
JH3IMR/316
JL2PQV/161
KP4GC/101
KP4RF/231
LA1ZIA/110
RW3AX/154
SP6BAA/245
US2WU/284
YB2PBX/190
7N2KRX/314
9A4DA/106
WB1S/183
W1JIM/130
KB2YTN/108
K2DN/118
NG2V/195
WB2JTE/102
KM3V/317
WA3PRC/120
KC4K/229
KU4EC/104
NW4C/186
W4GBF/185
KB5GTO/176
W5TN/112
NO6X/130
NR6C/102
WA6YEE/116
KG7XC/178
KJ7HI/256
N7NN/274
N7SG/131
N7UF/109
AA8BX/104
K8GT/242
N8SHZ/180
W8GAZ/149
W8IFK/127
W8LKX/108
N9PQU/118
KG0UA/103
KØMP/105

Phone

AP2TJ/106
DL3NEO/104
DS4BHW/122
EA3AFJ/136
EA3ARL/126
EA3GJH/110
EA4AKY/128
EA4URE/103
EA6JN/114
F6BAT/104
JA7FSB/210
JH3IMR/234
JL2PQV/120
JN1BAH/313
SV1CIF/153
VK1TX/112
YB2PBX/154
7N2KRX/291
KM3V/143
KE4TGX/103
KR4NW/120
KB5GTO/176
W5RQ/138
K6XX/127
NR6C/101
WB6NFO/156
KG7XC/105
KJ7TH/129
K8GT/155
KB8QLT/100
N8AA/289
N8SHZ/177
N8XLS/103
WA8NBP/118
N9WT/100

CW

DF6SW/119
DL2GV/217
DL2KDW/185
DL7UKA/181
DL8ZBA/114
EA4AKY/111
EA5WI/135
EA8UH/151
I8QFK/158
IK1GCD/149
JH3IMR/108
JN1BAH/297
LU8DYH/109
OZ9MM/106
PP2JT/210
SM3BCS/317
UR7CA/107
US2WU/279
7N2KRX/146
K1MC/107
W1DJW/168
W1TC/327
NG2V/189
KM3V/303
KQ3F/263
N3AS/152
AC4XO/108
WA5PAE/225
WQ5G/132
K6SRZ/118
AB7II/162
KG7XC/151
N7NN/117
N7TP/136
N7UF/105
K8GT/227
N8AA/321
W9RB/110
W9UV/110
WØFS/114

RTTY

EA5FKI/230
LA1ZIA/103
W1TE/105
KM3V/111
W4DKS/103
ACØM/109

Satellite

OZ1MY/107

160 Meters

JE2LPC/106
S53X/108
VE5RA/110
N2KA/101
N3KK/100
N8AA/107
NRØX/128

80 Meters

LU2NI/148
US2WU/143
KQ3F/112
AD6W/105
KI6T/136
W7SX/127
NRØX/195

40 Meters

DK9KX/118
JL2PQV/108
JN1BAH/127
KP4P/108
OZ1FAO/163
US2WU/174
YB2PBX/102
YO2DFA/114
K1NU/101
NG2V/171
WA2ROJ/108
KQ3F/177
W4GF/103
WA5PAE/225
WF5W/125
WQ5G/121
AD6W/143
KI6T/189
AB7II/106
K8GT/117
W8ZQA/100
K9BJM/102
N9DJ/101
W9SE/107
W9UV/110
NIØC/104
NRØX/243

10 Meters

JA5IU/263
JN1BAH/235
US2WU/182
K1NU/102
KQ3F/190
W4RJ/101
KB5GTO/175
K6XX/129
KG7XC/116
W7WHB/105
K8GT/152
N9DJ/109

6 Meters

DJ5JK/101
HC2FG/103

5B DXCC

DL2GV
UN6T
UAØOA
US2WU
WO9F
AD6W
LU2NI
WB4RFZ
KQ3F
W3DM
N5MT
NC6A
SM6TEU
WA3I
IK4HPU

160 Meters

OZ8RO

17 Meters

LU2NI
W5EIJ
N6MM
DF1ZN

12 Meters

WO9F
LU2NI

NEW HONOR ROLL MEMBERS

Mixed

325

HB9BLQ/331
JN1BAH/325

323

JA6OXA/328
JE1SYN/327

321

OZ8RO/327
YU7FW/326
KS1J/329

320

OZ1FVL/325
N4AA/339

Phone

322

SP6ECA/330

321

YB5QZ/325

320

DL6DK/325
GM4UZY/320
JA4BXL/324

CW

321

W3YQ/329

320

HB9AQW/327
LA5LT/325
W1MK/325

RTTY

320

W5ZPA/325

ENDORSEMENTS

Mixed

A92FZ/157
DF6IM/242
DJ1TU/274
DJ1UR/321
DJ2XP/284
DJ5AV/318
DJ6OV/329
DK7YY/318
DK9KX/343
DL2GV/269
DL3NEO/196
DL5UF/241
DL6DK/330
DL9LAI/213
EA2IA/322
EA4JL/352
F5RUQ/315
F6CUK/338
G3OHN/327
HB9AZO/337
HLØCBD/130
IK1GCD/208
IK5MEN/167
IV3JWR/323
JA1JMF/319
JA1QXY/343
JA1SVP/341
JA3HZT/345
JA4BXL/329
JA9CG/343
JE2LPC/333
JF2MBF/332
JH1MQC/327
JH3CXL/340
JH4RLY/335
JI6URU/303
JJ1CZR/253
JL1YVV/205
JT1BG/310
LA4OGA/321
LA5LT/331
LU2NI/327
OE1HGW/359
OE2BZL/264
OE6DK/335
OK1MG/360
OZ1FAO/335
PY4OY/330
SK5PZ/261
SLØAS/333
SLØZZI/271
SM3BCS/361
SM3CBR/302
SM3EKD/208
SM5BTX/165
SM6TEU/322
SM7HCW/338
SM7MPM/319
SP9AI/348
S53X/324
TI5RLI/325
UN6T/284
UR7CA/207
VE3BZ/343
VE5RA/340
XE1AMS/330
YO2DFA/228
ZL1ARY/359
ZL2VS/337
AD1E/297
KA1A/331
KA1CFA/224
KB1W/327
KD1F/315
K1IN/314
K1NU/235
K1QN/208
K1SF/337
N1AE/343
N1CQ/331
N1KB/278
N1NZ/227
WA1MKS/232
WA1QXR/264
WB1BVQ/329
W1CWU/312
W1GOU/181
W1OK/234
W1RZF/305
W1TC/340
W1TE/225
W1TY/319
W1WA/301
W1ZT/272
AE2JL/313
KA2CYN/331
KF2TI/265
KU2A/297
K2BT/346
K2CIB/326
K2EOB/159
K2FF/172
K2FR/318
K2FU/188
K2JG/208
K2JL/311
N2BJ/334
N2IFA/183
N2KA/342
N2KSE/182
WA2GEZ/339
WB2AQC/334
WB2GAI/255
WB2TVS/146
WR2V/301
W2DX/283
W2GFF/260
W2GXP/238
W2QM/372
W2RA/308
W2RD/330
W2SY/353
W2YC/306
W2YR/277
AA3DY/151
KK3S/319
KQ3F/307
K3ATO/310
K3SC/330
N3AS/178
N3KK/324
N3NY/169
WA3I/228
WA3NVS/315
WB3GOC/315
W3DM/229
AC4XO/188
AE4CR/146
AE4EI/244
KE4QDZ/184
K4GZ/252
K4QD/245
K4RD/342
K4UY/328
K4YA/329
N4SI/328
N4SJ/326
WB4FDT/212
W4AU/241
W4OEL/355
AA5XE/276
KK5XI/223
K5GS/333
K5JP/331
K5KEN/236
K5UZ/307
N5DRV/310
N5EPA/326
N5MT/334
N5RRA/235
WB5MTV/332
WF5W/272
WQ5G/186
W5AJ/335
W5EIJ/305
W5JE/341
W5OLN/330
W5RQ/323
W5TFV/289
AA6MP/295
AD6W/317
K6SRZ/151
K6XX/215
NC6A/304
WS6X/326
W6KFV/360
W6NVN/312
W6PMT/328
AB7II/186
K7FD/173
K7LZJ/331
K7XB/347
NW7Q/307
N7MQ/280
N7SEJ/285
N7TP/338
WA7OBH/294
WB7EEI/335
W7HS/311
W7RDX/311
W7SX/286
W7WHB/265
AA8R/324
KB8VA/289
KC8FS/331
KG8BK/311
ND8L/278
N8AA/354
N8JX/338
WB8YJF/312
WZ8A/198
W8AF/298
W8KL/330
W8LTX/267
W8PJY/264
W8SAX/275
KJ9C/240
K9BJM/238
K9NB/341
NA9A/296
N9DJ/331
WA9WJE/342
WA9YYY/326
WD9DZV/232
WO9F/306
WS9W/151
W9DDP/334
W9GXR/307
W9HP/311
W9SE/315
W9UOM/329
ABØX/339
KNØV/333
KØTVD/252
KØXB/304
NRØX/336
NØAH/206
NØEID/136
NØOP/162
WØEKS/338
WØFS/268
WØML/302
WØMOU/168
WØPXM/328
WØTRF/342

Phone

CP2DL/270
DF1ZN/222
DJ1TU/262
DK9KX/342
EA4JL/352
EA5GMB/279
F5RUQ/309
G3OHN/152
HB9AZO/336
HB9BLQ/310
HK4CYR/327
IK8MVH/309
JA1JMF/254
JA1SVP/335
JA6OXA/313
JA9CG/337
JE2LPC/229
JF2MBF/329
JH1MQC/327
JH3CXL/334
JH4RLY/334
JJ1CZR/196
JL1YVV/205
JQ1ALQ/280
JT1BG/304
KP4P/336
KP4RF/229
LA5LT/297
LU2NI/327
OE2BZL/228
OE2YMO/322
OE6DK/332
OZ8RO/284
PY4OY/330
PZ5DX/195
SM6TEU/295
SM7HCW/336
SM7MPM/316
SV1CID/187
SV1LK/332
TG5ITS/173
TI5RLI/325
UR7CA/178
VE2YG/213
XE1AMS/330
ZL1ALE/346
ZL1AMN/347
ZL1ARY/354
ZS6NB/233
AA1AC/302
KA1VHK/294
KE1ET/165
K1SF/333
N1KB/177
WA1MKS/232
WA1QXR/264
WB1BVQ/329
W1GOU/161
W1OK/189
W1RZF/280
W1TE/176
W1TY/319
W1ZT/201
KA2CYN/329
KF2TI/265
K2FF/170
K2FR/296
NN2Q/324
N2BJ/333
N2IFA/183
N2KA/335
N2KSE/182
WA2HMU/286
WA2PNI/273
WB2AQC/327
WB2TVS/144
WR2V/301
W2EJG/223
W2GXP/220
W2RD/328
W2SIS/265
W2YR/238
AA3DY/151
AA3FC/160
KQ3F/252
K3ATO/273
K3IXD/266
K3KFD/237
N3KK/315
N3NY/166
WA3NVS/313
AC4XO/177
AE4CR/142
AE4EI/236
KA4IWG/328
K4GZ/194
K4QD/210
N4AA/265
N4SJ/324
WB4FDT/145
W4GF/139
AA5XE/269
KK5XI/220
KX5V/324
K5GS/332
K5KEN/236
K5UZ/285
N5DRV/229
N5EPA/306
N5GO/238
N5RRA/235
WA5KVO/321
WF5W/173
WQ5G/161
W5OLN/298
W5TFV/253
AA6MP/291
AD6W/228
KB6NAN/186
KF6SK/300
KG6B/330
WS6X/288
W6PMT/328
K7LZJ/331
K7XB/342
NW7Q/306
N7FLT/267
N7MQ/258
N7NN/254
N7SG/130
N7TP/338
WA7OBH/287
WB7EEI/335
W7KEU/286
W7RDX/311
W7WHB/263
AA8R/287
KB8VA/263
KC8FS/329
K8EK/250
K8UPG/125
ND8L/244
N8JX/337
WB8K/194
WZ8A/142
W8AF/296
W8LTX/231
W8NPF/321
KA9W/203
K9BJM/218
NA9A/267
N9DJ/288
WA9WJE/164
WD9DZV/190
WS9W/151
W9DDP/331
W9GXR/277
W9HP/311
W9UOM/324
ACØM/324
KEØK/182
NRØX/301
NØLT/229
NØOP/140
NØOSS/218
WØFS/261
WØHBK/174
WØPXM/328
WØYMH/347

CW

DF6IM/196
DJ1TU/240
DJ2XP/258
DK9KX/331
DL3FT/231
DL3NEO/187
DL6DK/311
EA4AV/307
EA4KU/198
G3OHN/187
HB9DDM/319
JA1JMF/160
JA1QXY/323
JA1SVP/325
JA3CMD/335
JA4BXL/183
JA5IU/330
JA9CG/332
JE2LPC/222
JF2MBF/316
JH3CXL/338
JH4RLY/140
JJ1CZR/229
JL2PQV/154
OE2BZL/229
OK1MG/336
OZ1FAO/333
OZ1FVL/314
OZ8RO/308
SK5PZ/242
SLØAS/333
SLØZZI/270
SM3CBR/293
SM6TEU/314
SM7HCW/331
SM7MPM/252
SP5GH/313
AA1AC/280
AD1E/286
KD1F/290
KS1J/297
K1IN/173
K1QN/176
N1KB/242
W1OK/191
W1TE/192
W1WA/296
W1ZT/205
K2EOB/144
K2JL/233
K2JLA/331
N2KA/245
WA2ROJ/124
WB2AQC/248
WB2GAI/255
W2DX/252
W2EJG/301
W2GFF/228
W2GXP/184
W2RA/293
W2RD/156
W2YC/281
W2YR/146
KK3S/302
K3ATO/226
N3KK/316
WA3I/215
WB3GOC/299
W3DM/158
AA4DO/330
K4CN/329
K4GZ/223
K4QD/176
K4UX/286
K4YA/317
N4AA/256
N4SI/316
WB4FDT/183
W4AU/199
W4DZZ/317
W4GBF/181
W4OEL/320
KA5GMN/292
K5UZ/203
N5DRV/253
N5EPA/278
WF5W/225
W5AJ/272
W5EIJ/215
W5JE/262
W5OLN/277
W5RQ/296
W5SVZ/314
AD6W/280
K6RJ/210
K6XX/188
K6YR/132
N6MM/174
WS6X/258
W6NVN/291
W6TVP/310
K7XB/300
N7MQ/210
WA7OBH/176
W7SX/268
AA8R/191
KC8FS/242
ND8L/220
N8JX/333
WB8K/197
WB8YJF/304
WZ8A/143

KJ9C/231
K9BJM/106
NA9A/242
N9DJ/260
WA9YYY/317
WD9DZV/165
W9DDP/323
W9GXR/247
AØX/325
ACØM/304
NRØX/288
NØAH/134
WØFS/114

RTTY

JA3CMD/307
JF2MBF/233
OZ8RO/129
PAØTAU/161
SM3BCS/192
KA2CYN/153
W2UP/310
N3KK/236
K7XB/277
N8JX/312
WB8YJF/230
KØXB/193
WØML/263

Satellite

JF2MBF/144
TI5RLI/116
WA1QXR/164
W2GFF/179

160 Meters

OK1MG/179
PAØTAU/166
SM3BCS/118
SP5GH/140
W1ZC/156
W4OWJ/232
N6AR/136
K8PV/162

80 Meters

A92BE/196
HB9AZO/121
HB9DDM/143
IK4HPU/144
JA3CMD/187
JA5IU/246
JA9CG/171
JE2LPC/140
JF2MBF/198
JH4RLY/122
OE6DK/143
OZ1FAO/123
OZ8RO/178
SM6TEU/169
SM7HCW/171
SP5GH/221
TI5RLI/195
VE5RA/198
AA1AC/163
KA1VHK/145
KD1F/166
W1MK/291
KA2CYN/172
KU2A/113
WA2ROJ/125
WB2AQC/110
WR2V/112
K3IXD/104
W3DM/113
N4AA/128
K5UZ/116
W5GO/111
W5JE/119
K6RJ/114
NC6A/132
N6AR/296
K7XB/169
WB7EEI/120
KC8FS/119
K8PV/257
WB8K/128
ACØM/168
WØFS/208

40 Meters

A92BE/233
HB9AZO/131
HB9DDM/209
IK4HPU/188
JA3CMD/242
JA5IU/308
JA9CG/222
JE2LPC/181
JF2MBF/251
JH4RLY/189
LU2NI/212
OE6DK/208
OZ8RO/268
SM3CBR/160
SM6TEU/206
SM7HCW/260
SP5GH/230
TI5RLI/225
VE5RA/224
AA1AC/208
KA1VHK/169
KD1F/212
W1OK/153
W1TE/129
KA2CYN/153
KU2A/121
WB2AQC/152
WB2GAI/161
W2EJG/208
W2RD/134
W3DM/141
AA4DO/272
K4GZ/141
N4AA/213
W4AU/136
W4GBF/136
KX5V/114
K5UZ/137
W5EIJ/117
W5JE/132
W5OLN/175
W5RQ/164
KG6B/270
K6RJ/134
K7XB/279
N7MQ/125
N7TP/144
W7SX/247
AA8R/148
KC8FS/185
K8PV/312
ND8L/150
WB8K/173
WB8YJF/160
W8QWI/128
KJ9C/180
NA9A/178
W9GXR/185
ACØM/265
KBØHJ/113
WØFS/186

10 Meters

DK9KX/284
GM4UZY/159
HB9AZO/169
HB9DDM/265
JA1JMF/108
JA3CMD/319
JA9CG/229
JE2LPC/198
JF2MBF/228
JH4RLY/219
LU2NI/292
PAØTAU/301
SLØAS/214
SM3CBR/126
SM6TEU/169
SM7HCW/262
SM7MPM/256
TI5RLI/170
VE5RA/212
ZS6NB/130
AA1AC/160
K1SF/223
KF2TI/125
N2IFA/140
WA2ROJ/189
W2RD/180
W2YR/138
K3KFD/201
WA3NVS/262
W3DM/142
N4AA/223
N5MT/246
W5AJ/132
W5EIJ/203
W5GO/232
AD6W/146
KB6NAN/186
KG6B/277
NC6A/128
N6AR/318
K7XB/194
AA8R/158
K8PV/287
WB8K/173
W8PJY/150
W8QWI/210
NA9A/125
WD9DZV/151
WØPXM/177

6 Meters

DK9KX/105
G3COJ/121

DXCC Notes:

The DXCC Desk is in the midst of a complete computer system changeover. Due to the changeover, there will be some delays in processing, and listings also will be delayed. All listings will be printed when completed. The new computer system is expected to give us increased future flexibility. We regret any temporary inconvenience, but we believe DXCC participants will find the new system to be a substantial improvement.

The ARRL Membership Services Committee announced that both the ARRL DXAC and Awards Committee have voted to delete Southern Sudan, STØ. While the status in Southern Sudan changed in 1983, QSOs made before January 1, 1995 will count for the deleted entity. There are two reasons for that. First, there have been accredited operations since 1983, and that raises a "fairness" issue. Second, the DXCC Desk has processed cards from those operations—many of them onto paper records. Because each STØ credit would have to be individually checked, it would be very costly to the League in terms of time and money to search and remove post 1983 STØ QSOs from the records. In fact, it might not be possible to do the job completely and accurately.

At the same time as the STØ vote, both committees agreed to make no change in the status of Fernando de Noronha, PYØF, and Kure Island, KH7K. QST

DXing on the Edge—the Thrill of 160 Meters

by Jeff Briggs K1ZM

Published by the American Radio Relay League, 225 Main St, Newington, CT 06111; tel 888-277-5289 (toll-free orders only). First edition. ISBN 0-87259-635-4. Available from Amateur Radio retailers or the publisher. Order item #6354. $29.95 plus shipping and handling.

Reviewed by Craig Clark, W1JCC

Many, many moons ago, I was tuning my grandfather's radio across 160 meters. Most signals were pretty weak. One, however, stood out above the others as being quite loud. It sounded almost like a local broadcast station. Listening intently to a deep discussion on antennas for best DX performance, I waited for the transmitting station's call sign. It turned out to be 160-meter legend Stew Perry, W1BB.

I was fascinated as they discussed physical size, gamma matching, receiving antennas and much more. Everything was so large and—to my young mind at least—almost beyond comprehension. Several years later, after getting my Novice ticket (WN1IGG) in 1967, I spent even more time listening to 160 and waiting for the day I could join him on Top Band.

When I upgraded to General, the very first band I built an antenna for was 160! I began to chat nightly on 160 and got to know many of its denizens. Most evenings I chatted with W1AR, WA1FDV (now W1UL,) K1MBI and other locals. Later in the evening, the DXers would come out, and I had a number of interesting and informative QSOs with Stew and his group.

Bitten by the same bug as I, Jeff Briggs, K1ZM, provides a fascinating look at 160. Jeff dedicated his book to Stew Perry, W1BB, because he recognized that Stew's persistence after World War II secured 160 for Amateur Radio use and held off the threat that LORAN-A would take over the whole band.

One of the great mysteries of 160 is, "How does the band work?" Located just above the Standard (AM) Broadcast Band, 160—unlike bands such as 15 or 20 meters—is not immediately associated with long-haul DXing. Yet, many have made contacts tens of thousands of miles away with relatively modest stations. Jeff covers this phenomenon as well as the "early" years of 160 in the first chapter.

Chapters 2 through 8 cover 160 DXing from 1930 to the present. Jeff accurately relates the exciting events of these years. He has plenty of photos too—showing stations, locations and other interesting information. By today's standards, the stations, equipment and antennas then were quite primitive. In those days, your ears and brain were your DSP filter!

After the advent of LORAN-A, the government imposed severe power restrictions on 160. Working DX with just 25 W at night above 1825 kHz was no easy feat. Yet it was done regularly. Jeff covers this era in fascinating detail. In chapter 7, Jeff documents the end of LORAN-A in May 1981and the celebration by US 160 meter operators over the elimination of power and frequency limitations. This momentous change opened the door to DX opportunities Top Banders had only dreamed about.

My favorite was chapter 10, "Best-Ever" 160-meter DXing Anecdotes. These stories detail the excitement and thrill that many of us have had from 160 operation. I especially enjoyed the story of K9UWA's feat of working VU4GDG.

Chapters 11 and 12 cover antennas and the secrets that are used to get the most "bang-for-your-buck" on both transmitting and receiving. Jeff shares some of the secrets that have helped him to be so successful over the years. There's no magic here either; it is all common sense and sound engineering.

Chapter 13 gives you the ten rules to operate by. These tidbits are worth their weight in gold.

In the last two chapters, Jeff concludeswith a look at the future and his predictions of the fun that is to come—plus a photographic potpourri of operators, stations and antennas.

What really makes this book unique is that Jeff has compiled an audio CD-ROM of some of the most memorable events on 160 meters. I was spellbound! W1BB working UK2PCR as taped in Germany by Peter, DJ8WL, "searchlight" propagation from ZL3GQ, and a real exotic QSO—K1ZM working XZ1N as taped by VE1ZZ.

For the 160 meter old timer, this book offers a fascinating look back at the band and its history. For the Top Band beginner, it gives a sense of what came before. This book held my attention as well as any Tom Clancy techno-thriller. I had fun recalling W1BB and the others who have passed on before. Jeff has done a good job with this book. I hope you will enjoy it as much as I did!

Craig Clark, W1JCC, lives in Rindge, New Hampshire, and operates Radio Bookstore and Radioware. He holds 160-meter DXCC #83. QST

DX Century Club Awards

*Edited by **Bill Kennamer, K5FUV** • DXCC Manager*

The ARRL DXCC is awarded to amateurs who submit confirmation for contacts with 100 or more countries on *The ARRL DXCC Countries List*. The totals shown below are exact credits given to DXCC members from November 1 to 30, 1997. There were 329 current countries at that time. The DXCC rules and application forms are contained in *The ARRL DXCC Countries List*, available for $2 from Publication Sales. The DXCC Web site may be found at **http://www.arrl.org/awards/dxcc/**.

NEW MEMBERS

Mixed

CO3ZD/125
HB9DHK/297
IK1YEK/131
JA4ONU/125
JA9QOY/138
JI8PDC/202
J68AS/165
LA3F/111
US7CQ/305
UY7CW/302
VE3TEZ/118
XE1ABA/199
XE1AVM/138
W1HIJ/117
W1MAG/337
KD2GJ/114
K2BJ/101
W3XG/102
K4GN/102
K4RG/115
WA4AGS/153
WA4N/120
KB5U/113
N5ASO/190
WA6KAH/238
W6DPK/205
KJ7WY/110
KG8CX/100
W8JV/106
AA9LC/164

one

CO3ZD/106
CT1CAD/108
CT1EWX/100
G4DJZ/108
HB9DHK/262
HL1OYF/105
JA9QOY/138
JAØJDV/164
JI8PDC/115
JJ3GPJ/112
OZ1CTK/114
US7CQ/250
UY7CW/115
XE1ABA/199
YC7JKS/102
KE3TE/109
W3EH/190
W3PL/125
KR4TG/113
K4GN/102
K4IQJ/263
N5ASO/190
W5BUD/100
WA6KAH/230
W6DPK/205
KJ8F/101
KB8QLT/100

CW

EA1APA/123
JI8PDC/134
JJ3GPJ/152
RW3RO/124
US7CQ/125
UY7CW/202
XE1CCB/135
W1HIJ/106
W1NAZ/108
WA2VQV/102
N6MM/124
W8HB/116
W8PT/103
NØAH/110
WKØF/134

RTTY

JA4RTX/116
JA8EJO/108
K4BU/106
K6FG/101
W7QDM/105

160 Meters

OZ1CTK/115
K3KO/100
W8GF/101

80 Meters

LA9XGA/106
N6MZ/100
WØDJC/124

40 Meters

IK2ANI/136
PY8JA/105
SM5VS/108
SM7CQY/101
WA3IIA/101
K4HB/101
W6BJH/216
KF7PG/102
NYØV/265
WØDJC/101

10 Meters

JH2DOS/196
WA2CDD/136
WB3HLH/105

5B DXCC

G4DXW
N6MZ
WØDJC
KB1MY
K1VUT
US7CQ
W5YU

17 Meters

WØDJC
G4SSH

NEW HONOR ROLL MEMBERS

Mixed

323

W7/DL1UF/329

322

KB1MY/326

321

F5TNI/324
JM1NKT/325

320

DL1FCM/324
G3KMQ/342
9A1CAL/331
N4LUF/325
W7SFF/336

Phone

328

JM1VRW/332

323

WA2WSX/331

321

KB1MY/324

320

HA8IE/325

CW

326

OE1ZJ/335

320

OZ9PP/328

RTTY

320

K5KR/325

ENDORSEMENTS

Mixed

DJ9RQ/343
DL3NBL/326
DL9YC/322
F2GL/345
F6BFH/346
G4DQW/312
G4DXW/330
HA8IE/333
HB9BHY/296
HB9BIN/317
HB9LEI/188
HB9OL/128
HBØLL/349
I1FHA/224
I8QJU/318
IK2GSN/330
JA1AS/313
JA4RTX/315
JA8EJO/330
JAØJDV/219
JF2PZH/331
JJ3GPJ/210
JR2ZUQ/319
JR9XRO/135
KP3R/264
LA9XGA/256
OE1ZJ/351
OE2SNL/304
OE2SNL/304
ON6CW/328
OZ1ACB/327
OZ3PZ/348
PA3EVY/331
PY5ATL/347
SM3GSK/334
SM5BMB/315
SM5JE/310
SM7CQY/251
VE6BSA/327
VY2RO/284
XE1K/322
YL2RP/308
Z24S/356
9A1ARS/266
K1VUT/258
NN1NN/324
W1LRR/294
W1SE/246
KD2T/132
KF2G/295
K2LJH/199
N2LDV/219
N2LEB/231
N2UM/337
WA2WSX/337
W2FZY/373
K3GO/327
K3KO/318
N3VA/305
WA3IIA/295
WB3HLH/166
W3DHN/151
W3EH/202
W3ETT/355
W3GE/300
W3POP/168
KD4EWG/223
KQ4AV/307
K4IQJ/335
NM4Q/301
N4IG/312
W4HHN/346
W4UEB/244
W4YO/367
AD5Q/336
KE5YU/324
K5EOA/320
K5OT/302
K5SC/327
W5IER/181
W5KFN/347
W5OXA/294
KD6EU/287
ND6G/331
N6IBP/309
N6MM/346
N6MZ/321
W6BZE/375
W6JTA/280
W6TEX/331
KF7PG/236
K7CV/241
K7KJF/171
K7ZM/283
W7QDM/284
KC8NU/315
N8CKP/269
N8GFK/185
W8LIQ/331
W8PT/127
K9HMB/339
N9AG/301
W9RV/312
KJØG/134
KØGX/281
NØAH/178
WKØF/187
WØDJC/312
WØGG/253
WØMLY/380
WØNB/338

Phone

DJ9RQ/343
DL3NBL/324
EA2BP/250
F5JQI/324
F6BFH/346
HB9BIN/280
HB9LEI/188
I1POR/341
I7IJU/282
IK2GSN/328
JA4RTX/163
JA8EJO/282
JF2PZH/324
JL2HUJ/142
JM1NKT/304
JR2ZUQ/283
KP3R/150
LA9VFA/226
LA9XGA/155
ON4BCM/209
OZ1ACB/327
OZ3PZ/348
PA3EVY/311
SM5BMB/302
SM5JE/238
SM7CQY/227
SV8JE/314
VY2RO/283
ZS2ACP/199
K1DWQ/310
NN1NN/323
W1LRR/293
AA2A/335
K2LJH/199
N2LDV/219
N2LEB/227
W2WW/255
K3GO/304
N3VA/300
W3GE/288
KD4EWG/223
KE4SCY/209
KQ4AV/300
K4HB/231
NM4Q/301
N4IG/272
N4LUF/311
W4AXL/340
W4UEB/243
KE5YU/322
K5FM/339
K5OT/221
W5OXA/294
ND6G/313
N6IBP/234
N6MZ/192
W6BJH/292
K7CV/237
K7ZM/281
W7/DL1UF/285
W7QDM/168
AJ8J/330
W8LIQ/331
K9HMB/336
KØGX/268
NØMI/333
NØUCR/153
WØDJC/262
WØGG/226
WØNB/314

CW

DF9HE/288
G4SSH/280
HA8IE/301
HB9BIN/293
I1POR/133
IK1GNC/251
IK2GSN/270
IK5RLS/182
JA1AS/290
JA4RTX/308
JA8EJO/322
JF2PZH/307
JM1NKT/299
JR2ZUQ/258
KP3R/250
LA9XGA/245
OE2SNL/297
ON6CW/327
PA3EVY/270
PY8JA/182
SM3GSK/331
SM5BMB/272
SM5JE/290
SM7CQY/147
SV8JE/157
YL2RP/301
Z24S/307
N1AC/324
KB2HK/104
KF2G/226
WA2WSX/308
K3KO/288
W3GXZ/176
KQ4AV/236
N4LUF/248
AD5Q/332
K5EOA/288
K5OT/290
K6FG/317
ND6G/328
N6IBP/254
N6MZ/286
W6BJH/334
W6TEX/307
KF7PG/236
N7ZPU/162
W7/DL1UF/244
W7QDM/276
NØMI/260
WØDJC/220
WØGG/164
WØNB/298

RTTY

HB9BIN/118
IT9ZGY/152
OE2SNL/272
KB2HK/273
ND6G/235
W6TEX/170

Satellite

F6BKI/167
OE3JIS/220
W5AK/154

160 Meters

F6BKI/212
IT9ZGY/220
OE1ZJ/111
OZ3PZ/186
SM3GSK/158
SM5EDX/250
SM5JE/164
SV8JE/168
N2TK/210
W4YO/216
K9BG/137

80 Meters

DF4PL/251
HA8IE/228
HB9BIN/142
JA8EJO/132
OE1ZJ/277
OZ3PZ/297
SM5JE/198
N1AC/225
N2TK/289
K3KO/116
K4HB/119
K4IQJ/231
W4YO/271
K5OT/150
WC5E/122
WI5A/220
ND6G/150
W6BJH/148
W7/DL1UF/190
NØMI/136

40 Meters

DF4PL/265
G4DXW/117
G4SSH/116
HA8IE/250
HB9BIN/232
JA4RTX/165
JA8EJO/206
JF2PZH/116
JM1VRW/140
KP3R/222
LA9XGA/162
OE1ZJ/307
OZ3PZ/315
SM5BMB/135
SM5JE/247
N1AC/225
N2TK/325
K3KO/197
KQ4AV/158
K4IQJ/291
N4LUF/169
K5OT/222
WC5E/113
K6FG/254
ND6G/256
N6MZ/149
K7GEX/130
W7/DL1UF/143
W7QDM/170
N9AG/155
NØMI/164

10 Meters

DF4PL/299
F5TNI/133
G4SSH/129
I1POR/327
I7IJU/174
IK2ANI/174
JA8EJO/184
JF2PZH/173
JR2ZUQ/172
OE1ZJ/308
ON4ACG/247
OZ1ACB/264
OZ3PZ/321
SM5BMB/222
SM5JE/166
NN1NN/186
N1AC/143
KB2HK/148
KQ4AV/138
KE5YU/170
WC5E/138
N6IBP/165
N6MZ/133
W7/DL1UF/200
W7QDM/198
W8HB/126
NØMI/250
WØDJC/135

QST

Special Events

*Edited by **Bev Fernandez, N1NAV** • Assistant Contest Manager*

Robins Air Force Base, GA: Middle Georgia Radio Assoc, WR4MG, 1400Z-2100Z **Mar 7**, 9th Annual Young Astronauts Day, 7.250 14.250 147.300. Certificate. MGRA, Box 7282, Warner Robins, GA 31095

Norfolk, NE: Elkhorn Valley ARC, WØOFK, 1600Z-2300Z **Mar 8**, Nebraska State Ham Convention, 3.880 7.280 28.380. QSL. Elkhorn Valley ARC, Box 1033, Norfolk, NE 68702-1033.

Macon, GA: Macon ARC, W4BKM, 1500Z-2300Z **Mar 21**, 16th Annual Cherry Blossom Festival, SSB: 7.235 14.240 21.335 CW: 7.135. Certificate. Macon ARC, Box 4862, Macon, GA 31208.

Rutland, VT: Green Mountain WS, W1GMW, 1800Z-0100Z **Mar 21**, Commemorating Vermont's admittance into the union, 3.950 7.200 14.290. QSL. Green Mountain WS, Box 84, Rutland, VT 05702

Certificates and QSL cards: To obtain a certificate from any of the special-event stations offering them, send your QSO information along with a 9×12 inch self-addressed, stamped envelope to address listed in the announcement. To receive a special event QSL card (when offered), be sure to include a self-addressed, stamped business envelope along with your QSL card and QSO information.

Special Events Announcements: For items to be listed in this column, you must be an Amateur Radio club, and use the ARRL Special Events Listing Form. Copies of this form are available via Internet (**info@arrl.org**), the ARRL BBS (860-594-0306), or for a SASE (send to Special Requests, ARRL, 225 Main St, Newington, CT 06111, and write "Special Requests Form" in the lower left-hand corner. Submissions must be received by ARRL HQ no later than the 1st of the second month preceding the publication date; ie, a special event listing for **Nov** *QST* would have to be received by **Sep 1**. Submissions may be sent on an MS-DOS floppy disk in ASCII format, via fax at 860-594-0259, via modem (860-594-0306), via the Internet (to **contest@ arrl.org**), or in letter form.

QST

DX Century Club Awards

*Edited by **Bill Kennamer, K5FUV** • DXCC Manager*

The ARRL DXCC is awarded to amateurs who submit confirmation for contacts with 100 or more countries on *The ARRL DXCC Countries List*. The totals shown below are exact credits given to DXCC members from October 1 to 31, 1997. There were 329 current countries at that time. The DXCC rules and application forms are contained in *The ARRL DXCC Countries List*, available for $2 from Publication Sales. The DXCC Web site may be found at **http://www.arrl.org/awards/dxcc/**.

NEW MEMBERS

Mixed

DL1TQ/154
I2CMA/306
I4IKW/333
I4JEE/272
IK2SFZ/102
IK2WAL/262
IK3AES/150
IK3XJP/207
IK4ENA/109
IK4SBR/107
IK4WLU/110
IK4WMH/120
IK7LYL/101
IZ4AIB/203
JP2UGR/103
RK6AXS/268
RU4SS/107
RV1CC/102
RZ6LB/178
SM7TUG/238
UX1KR/110
VR2KM/120
7L3FCZ/120
AI2Q/107
KB2OPQ/101
KY2E/103
WO3T/150
W3YD/253
WB4GTM/110
WZ4P/222
WX5DX/108
W5DRM/111

Phone

CT1EDA/127
HK3SGP/170
HL4GAV/103
I4ASV/263
IK1VCE/108
IK2CHZ/296
IK2PZC/110
IK2QET/186
IK2SFZ/102
IK2TDR/108
IK2VTX/112
IK2YWO/106
IK4DCW/120
IK4DSP/112
IK4RSR/120
IK5PWF/119
IK7USO/102
IK8PGE/267
IK0OEM/120
IN3PEE/263
IT9YRE/245
IV3RQC/191
IV3TMV/281
JA6MWW/300
JG3SKK/113
RK6AXS/200
RZ6LB/178
W2WG/129
W3YD/249
KE4MIL/101
KB5AQV/187
N5ML/103
W9AE/107

CW

IK4WMB/102
IK8VVS/146
JA6MWW/234
JG1JLA/105
JP2UGR/102
LW2EUE/111
RK6AXS/223
SV2BFL/137
ZL2BB/106
7L3FCZ/109
W4SMG/143
K7PT/109
KB8FLY/107
W9AE/105

RTTY

IK2LEY/110
KM6HB/101
W6SL/101

160 Meters

RU3FM/105
RV1CC/102

80 Meters

I2CMA/103
JR3HZW/109
RK6AXS/122
RZ6LB/103
AI2Q/107
W2WG/102
W2YR/103
NN7A/104

40 Meters

IK2DUW/129
IK2YQX/163
IK4AUY/153
IK4QJH/103
JR3HZW/112
RK6AXS/168
RZ6LB/106
W2WG/139
N6PEQ/100
N9AU/296

10 Meters

I2JQ/306
IK2QPO/104
IK4AUY/123
IK4QJH/128
JA6MWW/123
RK6AXS/154
RZ6LB/103
SM3GBA/103
KD2KS/129
W2NNZ/200
W3YD/134
K9FYZ/114
WE9R/126

6 Meters

G3SDL/103

NEW HONOR ROLL MEMBERS

Mixed

326

IK2FIQ/331

325

IK2IQD/330
JA6MWW/325

321

IK1ADH/324

320

KN2L/324
N2QT/325

Phone

328

IK4BHO/333

323

I1WXY/332

322

I4IKW/327
IK4LAI/326

320

I2EZD/325

CW

322

WA6OET/325

321

IK2FIQ/326
IK6BOB/326

320

HB9CGA/325
W6JD/330
KA7T/325

5BDXCC

IK8HJC
IK7JTF
I2CMA
NN7A
KN6DV
US7ZM
KB1MY
RK6AXS
RZ6LB
LW2DFM

17 Meters

K8XP

ENDORSEMENTS

Mixed

DF3IS/289
DL5LBY/171
G5LP/316
G0KRL/198
G0NOA/210
HB9CGA/330
HK3SGP/205
I1APQ/349
I2EAY/260
I2KAJ/332
I2YWR/326
I3THJ/208
I4AVG/336
I4EWH/333
I0KHP/286
IK2DUW/317
IK2FEO/311
IK2ILH/330
IK2LEY/164
IK2SGC/303
IK3RIY/280
IK4AUY/311
IK4EWN/326
IK4HPU/312
IK4MGP/326
IK4MHB/216
IK4QJH/276
IK4SDY/318
IK7HDY/217
IK7JTF/333
IK7XNF/210
IK8DYD/126
IS0JMA/286
JA1SHE/329
JA1XJA/320
JA2LHG/330
JA5BEN/335
JA6CBG/335
JA6CDA/342
JA7QFU/332
JA8CJY/310
JA0BYS/336
JG3SKK/232
JH1LPZ/311
JR3HZW/335
JT1BG/309
KH6CD/380
ON5JV/272
OZ7QB/257
OZ9PP/346
PY8EA/283
SM5BRW/346
UT1II/151
YL2MU/341
4X1FQ/366
9A4RU/205
AG1I/332
KA1EKR/307
KT1M/234
K1BD/333
K1BV/352
K1DII/332
K1NLQ/329
K1TWF/330
K1VMI/208
N1IA/308
W1DIG/330
W1JEL/334
W1TE/207
W1TYQ/362
KA2CFH/282
K2AJY/319
K2SX/337
WB2YQH/352
W2AX/373
W2AXZ/326
W2CVW/148
W2EZ/156
W2WG/270
W2YR/275
KE3Q/340
K3BMI/152
K3HP/322
WT3W/321
K4BYN/306
K4ESE/338
K4YR/374
N4DB/289
N4TL/331
WB4MAR/331
WB4MOG/281
W4PKU/266
W4SMG/249
W4YP/313
KJ5LJ/304
KK5DO/212
KZ5KM/347
K5YU/314
N5ML/158
N5PR/328
N5WD/189
WB5XX/329
W5SP/336
AA6XX/284
KM6HB/285
KN6DV/308
K6GXO/339
K6KA/328
K6KLY/331
WA6URY/163
W6AYQ/339
W6GYM/327
W6JD/342
W6NDR/188
W6SL/311
KA7T/332
K7PT/287
W7MO/340
KB8FLY/199
WQ8T/209
W8IWJ/315
K9LCR/323
K9MF/341
WA9AQN/314
WE9R/327
WT9Q/209
W9AE/157
AA0AV/335
K0ARR/306
K0SD/338
W0IJN/315
W0IR/166

Phone

CX2AAL/318
G3LOJ/232
G5LP/145
G0KRL/163
I1APQ/349
I2KAJ/330
I2YWR/316
I3THJ/208
I4ACO/333
I4FAF/333
I4NJM/221
I4YEL/329
I5PAC/353
I6KYL/243
IK2DUW/312
IK2GSR/283
IK2QPO/241
IK2RHH/264
IK2SGC/303
IK2WAL/261
IK2YQX/229
IK3ABY/221
IK4AUY/311
IK4HPU/312
IK4MGP/325
IK4QJH/265
IK4SDY/317
IK4UNI/221
IK7HDY/215
IK7IMO/240
IK7JTF/333
IK7XNF/210
IK8HJC/324
IK8NIM/241
IK8WCP/246
IK0OHR/195
IN3MQT/224
IS0JMA/284
IV3VBM/238
JA1SHE/329
JA1XJA/312
JA2JRG/331
JA2LHG/326
JA5BEN/334
JA6CBG/333
JA6CDA/329
JA7QFU/328
JA8CJY/188
JT1BG/303
LA6CHA/217
PY8AJD/271
PY8EA/281
SM5BRW/336
VE4AT/334
ZS1FJ/301
KA1EKR/307
KT1M/185
K1BD/333
K1NLQ/266
K1TWF/282
N1IA/283
W1AO/286
W1DIG/329
W1TE/158
W1TYQ/345
W1VRK/333
AA2CN/154
KN2L/321
K2AJY/319
K2SX/289
N2QT/321
W2NNZ/319
W2YR/176
K3HP/322
WT3W/313
W3EYF/323
KI4SR/329
K4ULA/279
N4DB/200
N4TL/329
W4SMG/209
W4WG/333
KJ5LJ/303
KK5DO/183
KZ5KM/347
K5YU/241
N5PR/318
N5WD/176
WB5XX/328
W5BWA/331
W5SP/315
AA6XX/147
KM6HB/279
KN6DV/306
K6GXO/337
K6KA/327
K6KLY/330
W6GYM/326
W6NDR/186
W6SL/264
K7PT/260
W7HUY/234
W7MO/334
KB8FLY/186
W8IWJ/315
KC9GG/306
K9JF/347
K9LCR/323
WA9EZT/319
WE9R/316
K0SD/334
K0TJ/328
W0IJN/302

CW

DJ2UP/204
DL5LBY/161
G5LP/276
HB9DDZ/312
HI3Y/157
I1JQJ/333
I1WXY/312
I2EAY/227
I2EOW/308
I2KAJ/311
I2TZK/240
I2YWR/298
I4IKW/333
I4LCK/323
IK2ILH/327
IK3XJP/201
IK4DCT/331
IK4QJH/137
IK4TVQ/232
IK0IZW/229
JA1SHE/318
JA1XJA/161
JA2LHG/136
JA5BEN/311
JA6CBG/319
JA7QFU/327
JA8CJY/302
JA9TSI/296
JG3SKK/219
LW2DFM/290
OH3JF/328
OZ7QB/245
SM5BRW/327
VE7EW/177
9A4RU/126
AG1I/302
KR1B/304
KT1M/180
K1TWF/317
K1VMI/208
NA1I/317
N1IA/302
W1AO/236
W1TE/171
KN2L/230
K2AJY/200
K2SX/326
NG2U/225
N2QT/300
W2WG/244
W2YR/142
WT3W/205
W3EYF/321
K4VM/164
N4DB/179
W4FC/329
W4GD/327
W4PKU/261
W4WG/290
K5YU/307
W5SP/212
AA6XX/283
KM6HB/157
K6GXO/328
N6PEQ/174
W6SL/261
W6UZ/279
NN7A/265
N7RD/247
W7MO/322
WQ8T/206
K9JF/173
WT9Q/200
K0GSV/180
K0SD/265
W0IJN/255

RTTY

G5LP/201
I1JQJ/292
I2EOW/225
I2PKF/160
I2YWR/209
KN2L/127
N2QT/220
N5ML/127
W6CN/144
K0SD/135

160 Meters

DL1RWN/180
G3SDL/114
I4EAT/210
N2QT/125
W2WG/128
W6FSJ/132

80 Meters

G5LP/169
I2EOW/223
I2YWR/180
I4EAT/308
IK4TVQ/121
JA2JRG/120
JA5BEN/112
JA6CBG/128
RU3FM/194
AG1I/127
K1TWF/122
N1IA/122
W1DIG/226
K2AJY/129
K2SX/179
N2QT/251
WT3W/134
W3EYF/139
K4ESE/289
N4DB/113
W4FC/169
K5YU/125
WB5XX/189
W6SL/126
W7MO/154
K9JF/131
K0SD/195

40 Meters

DL1RWN/289
G5LP/250
HB9DDZ/227
I1JQJ/307
I2EOW/297
I2YWR/196
I4EAT/328
IK4TVQ/192
JA1SHE/216
JA5BEN/128
JA6CBG/160
JA7QFU/292
JA8CJY/151
AG1I/209
K1TWF/198
N1IA/170
W1AO/136
K2AJY/136
K2SX/262
N2QT/286
W2YR/121
WT3W/153
W3EYF/190
N4DB/160
W4FC/224
W4PKU/115
K5YU/190
WB5XX/159
AA6XX/284
KM6HB/150
W6JD/238
W6SL/176
NN7A/111
W7MO/204
K0SD/202

10 Meters

CX2AAL/287
G5LP/142
I2EOW/314
I6KYL/137
IK2DUW/242
IK6BOB/293
JA1SHE/174
JA1XJA/279
JA6CBG/174
JA8CJY/129
K1TWF/231
W1AO/135
K2AJY/251
K2SX/258
W2YR/137
WT3W/190
N4TL/170
W4FC/234
K5YU/198
K6KLY/258
W6SL/167
W7MO/187
K0SD/203

6 Meters

IK8DYD/126

QST

NEW PRODUCTS

MULTICOM FOR WINDOWS FROM MFJ

◊ Designed to bring modern *Windows* capabilities and convenience to the company's popular 1278 and 1278B TNC's, MFJ's new *MultiCom for Windows* (MFJ-1289W) ships on 3.5-inch floppy disks and comes with an extensive user manual and an RS-232 serial port cable.

The new software adds multitasking; the ability to control multiple TNCs (in separate windows); an easy-to-use, customizable interface; on-line help; selectable screen sizes, colors and fonts; and more.

MultiCom for Windows runs on 33-MHz 486 PCs (or faster) with at least 4 MB of RAM and 5 MB of hard disk space. *Windows 3.x* or *Windows 95* is required. Color SSTV and packet operation requires a VGA graphics card (true color suggested).

Price: $59.95. If *MultiCom for Windows* isn't available at your favorite ham radio dealer, contact MFJ at PO Box 494, Mississippi State, MS 39762; tel 800-647-1800; fax 601-323-6551; **http://mfjenterprises.com**.

32-BIT *WINDOWS* 95/NT HOST-MODE SOFTWARE FOR KANTRONICS TNCs

◊ Partnering with Creative Services Software, Kantronics is releasing 32-bit TNC software to take advantage of the newer operating systems' multitasking and multithreading capabilities.

The new software requires a *Windows* 95/NT PC with 8 MB of RAM and 2 MB of free hard disk space. The package supports COM1 through COM4 and features a handy point-and-click interface. Price: $80. For more information, contact Kantronics at 1202 E 23rd, Lawrence, KS 66046; tel 913-842-7745, fax 913-842-9342, e-mail sales@kantronics.com.

QSL ROUTES 97 ON CD-ROM

◊ Compiled by DL9WVM, DL5KZA, SM5CAK and SM5DQC, *QSL Routes 97* details more than 87,000 QSL managers and other DX-handy information.

Price: $30 (surface shipping); $35 (airmail shipping). Pay with a VISA card or with a check payable to Theuberger Verlag Berlin. For more information, contact Theuberger Verlag Gmbh at PO Box 73, 10122, Berlin, Germany. QST

DX Century Club Awards

Edited by ***Bill Kennamer, K5FUV*** *• DXCC Manager*

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NEW MEMBERS
Mixed
DK6YY/113
EI9HQ/107
E21AOY/116
G3HZL/110
G3KDE/110
G3LNG/112
G3NAP/105
GØMRF/105
GØWMW/110
GM4WZY/107
GWØKZK/108
HAØUZ/188
HK3GKE/150
JAØWJN/109
JH2IEE/110
JM7OLW/120
JN3QVC/118
JQ1CPN/103
JR7HAN/113
LA6LHA/104
LU9DC/108
RW9SG/257
SKØTM/118
VE3SWA/207
YL2SM/252
4S7OF/103
5R8EN/102
KE1AU/144
KF2ZO/102
WA2ZNC/105
WB2KSK/277
K3YA/271
KF4C/109
KK4CA/164
W4RS/289
AC5BJ/108
KE5DL/134
W5KN/315
KE6JZF/102
W6HCU/320
KJ7YJ/117
K7BG/247
K7SX/103
W7BJB/100
N8SNM/102
WE8T/100
W8PT/105
KF9YL/101
N9AT/121
N9CO/104
N9QQK/158
W9BP/205
W9LD/109
AAØFT/296
KBØLF/145
KØMS/146
WDØDAN/278

Phone
CT1CJJ/116
DL6HW/110
EA2ASJ/106
EI9HQ/102
G3FNZ/102
G4CCZ/186
G4ZKJ/162
GØDBE/224
GØVBD/181
GDØHWA/109
GM4UZY/319
GW3OCD/120
GW3SFC/118
GWØRTA/104
HK3GKE/138
HLØT/103
IK1YPF/106
JH2IEE/107
LU9DC/108
MØADG/165
SV1RK/220
XE2NLD/238
KA1SAW/120
K2KZI/240
WA2ZNC/105
WA3WMF/103
AD4YM/114
KF4C/109
W4AXO/103
AA5F/256
AC5BJ/103
N5ATV/177
W5KN/307
K6BZS/103
K6RLS/136
KJ7GU/176
K7BG/136
N7QOZ/137
N7SG/102
WA7OK/102
N8GA/109
K9WD/102
N9AT/121
N9GL/113
W9BP/129
KØMS/105

CW
EI4HM/109
F5NTV/318
G3TVI/107
G3VKW/120
G3WNI/118
G3ZEM/110
G4OWT/121
G4RWD/106
G4SFU/102
GM3BKC/244
GM3CIX/214
GM4YLN/231
GWØVSW/109
HAØUZ/109
JA4CVB/105
JN3QVC/118
KP3X/155
OH2JJN/143
PA3CSR/139
VE3SWA/200
K1MU/108
N2BIM/167
WB2UFF/107
W2FG/314
W2ZR/249
W3HER/246
KQ4QM/112
N5BLK/104
W5KN/295
W5WP/135
K7BG/197
K7SO/329
W7DT/101
N8DJX/249
K9YKL/106
W9BP/188
KBØLF/113
KØMS/107
KØSX/105

RTTY
CP1FQ/103
G4ZKJ/110
HK3DDD/113
JAØDWY/107
PA3AXU/174
VK6GOM/105
AD4AA/101
W7KSK/110
W7WM/107
K8PYD/107
N8LCU/107
WA8CDU/146
WB9B/148

Satellite
SMØDY/102

160 Meters
ZS4TX/100
ZS6EZ/101
AI3Q/103
KS3F/113
KK4CA/113
N4XX/100
AJ6T/103
K6VX/120
NI6T/114
N7RT/106
W8LWU/100
KØEU/107

80 Meters
DL3IAC/112
G3KMA/280
G3WGN/110
G3ZEM/110
G4IUF/112
GM3YTS/146
GW3JXN/121
JA7KQC/111
AA1IF/101
W1ECI/103
K2BF/107
NA2U/103
K3YA/263
AD4AA/105
K4MIH/106
WI5A/218
W5YU/269
WI7N/105
AA8OY/109
KS9R/117
W9MJ/100
NØAT/133
WAØGOZ/103

40 Meters
G3RTE/315
JA3LDH/110
JA7KQC/159
JA9BM/109
KP3X/124
VE7IU/114
WQ1H/103
K2BF/111
K2WJ/108
KQ4QM/101
W4JVN/122
KM5G/125
W5HY/102
W5YU/109
AC6DQ/102
K6HMS/109
K6YUI/118
WI7N/139
KE9XN/101
KS9R/132
N9HUK/108
W9ILY/110
KØSX/105
NØAT/124
WBØPWA/103
WØTT/111

10 Meters
DL3IAC/114
G3PMR/183
GM4UZY/117
GW3CDP/103
JA7KQC/108
LU9DC/108
KA1SAW/120
KF5YZ/119
K5DV/107
W5YU/106
K6HMS/117
K6YUI/165
K7BG/152
N9ISN/103
ACØX/102

6 Meters
DK9KX/103

5B DXCC
N2BJ
KE9XN
DL3IAC
JA5AQC
WI7N
N5PG
W9MJ
WAØGOZ
YL2SM
YO2BEH
KS9R
IKØMBB
N4VRR
K2BF
NA2U
JA7KQC
JA8RJE
K6UM
K4MIH
ES4MM

17 Meters
K4MIH

12 Meters
K4MIH

NEW HONOR ROLL MEMBERS
Mixed
325
K1IK/340
K9IR/328

324
S59AA/354

323
G3OCA/327

322
G4ZCG/326
W7WM/334

321
VE3ETB/329
W1ZZ/328
W4DUP/338
K6VX/343
N6NT/325

320
F5NBU/325
KA1CRP/324
K1KZ/323
WA4VA/324
W4ZYT/328
K5QY/327
K6IPV/338
K6RO/324
K6YUI/341
K6ZZ/326
WA8WV/330
KØCX/328

Phone
328
W6CUA/337

322
KI6T/360

321
F5PYI/324
K1IK/335
K6VX/343
W6KR/324

320
DL7AFS/325
GM4YMM/324
LA9HF/324
YBØRX/325
KB9KB/328

CW
326
F6GCP/331

323
JA6VU/329
WB9Z/328

321
AC4G/326
WA7BOD/326

320
K3JGJ/326
WA8JBG/328
NØAT/325
WØPGI/325

RTTY
321
JA3MNP/326

320
W8SEY/328

ENDORSEMENTS
Mixed
CT1EEB/324
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KE9LK/330
KE9XN/324
KF9AQ/220
KG9FL/151
KG9N/322
KI9Q/167
KS9R/335
K9EFR/264
K9EMG/312
K9FD/336
K9IO/283
K9KU/331
K9KVA/319
K9MM/353
K9MUF/313
K9YKL/123
K9YY/328
NK9O/218
N9AW/315
N9FH/143
N9HFR/319
N9HUB/231
N9HUK/297
N9ISN/181
N9JVC/302
N9OPV/251
N9QQK/158
WA9CDY/330
WA9WJE/159
WB9UQE/155
WD9DDO/141
WD9FLI/317
WG9R/206
WO9S/261
WY9E/325
W9AGH/309
W9GIG/216
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W9ILY/163
W9IXX/175
W9KIA/323
W9LYN/200
W9NB/332
W9NWG/320
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KEØRR/310
KGØQG/140
KKØDX/227
KRØI/169
KØDEQ/304
KØEPE/356
KØEU/333
KØHQW/331
KØIIR/269
KØIUC/340
KØKM/305
KØOB/213
KØPA/338
NAØY/364
NOØC/327
NRØX/299
NØDX/255
NØGWR/325
NØMI/332
NØTB/344
NØZA/327
WAØGOZ/280
WAØI/216
WBØPWA/317
WDØDAN/273
WTØY/129
WØCM/376
WØGJ/335
WØPSH/325
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WØZX/252

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DF3CB/334
DF3FI/334
DJ3GW/307
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DK9KX/330
DL1DA/307
DL1KS/329
DL2VPO/240
DL3IAC/220
DL3SZ/326
DL9TJ/326
EA6NB/328
F3AT/339
F3TH/332
F6AJA/332
F6BLP/331
F6HWU/323
FS5PL/169
G3KWK/159
G3KYF/314
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G3NOH/267
G3PMR/286
G3PSM/205
G3RTE/332
G3RVM/236
G3TXF/333
G3VXJ/291
G3XTT/326
G4EDG/334
G4ELZ/332
G4OBK/307
GØEHO/225
GM3PPE/309
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HB9BOS/269
HB9HT/338
HB9JG/287
HB9RG/155
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HK3YH/309
HL2IUA/220
HL9HH/165
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I1LGR/284
I2KMG/335
I2QMU/329
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IT9AXZ/329
JA2KVB/319
JA2MOG/278
JA2NNF/302
JA3AAW/331
JA3DGV/221
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JA3MNP/337
JA4XH/317
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JA8RJE/324
JA8XOD/151
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JH4IFF/331
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JH8UQJ/290
JO1CRA/292
JR1IZM/263
JR1MLU/333
JR1WCT/206
JR4QZH/198
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LA7JO/315
LA9HF/327
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OE2KGM/328
OH4OJ/333
OZ1BTE/332
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PA3AXU/320
PA3BUD/325
PJ2MI/248
PT2BW/302
SM4BNZ/333
SM5BUH/192
SM5CAK/326
SM6AOU/336
SM7BYP/332
SMØBNK/243
VE3BX/335
VE3NI/198
VE3OSZ/273
VE3PNT/306
VE3VHB/160
VE3XO/318
VE3YBH/155
VE7FJE/305
VE7WO/335
VK6HD/334
VK9NL/331
VY2OX/319
ZS4TX/155
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ZS6KR/288
AA1DM/173
AA1IF/164
AD1C/329
AK1N/220
KA1ERL/314
KA1WIF/164
KM1D/319
K1AM/334
K1HJC/324
K1HT/296
K1HTV/319
K1IK/322
K1IT/236
K1JIU/307
K1KOB/266
K1KZ/230
K1MZ/322
K1NTR/329
K1OQG/293
K1SM/274
K1VV/277
K1VW/297
K1YR/284
K1YT/315
NB1B/237
NX1L/327
N1BB/327
N1CC/240
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N1HN/316
N1KC/188
N1MD/197
N1PM/252
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WV1X/304
WW1V/235
W1AO/160
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W1HEO/220
W1MK/324
W1OG/297
W1OPB/261
W1SA/203
W1UC/307
W1YIF/273
W1ZK/292
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KC2BW/129
KF2O/329
K2JF/325
K2LUQ/196
K2PLF/312
K2SY/131
K2TK/324
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N2NO/129
N2TU/330
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WB2RAJ/300
WB2WPM/166
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W2CG/221
W2FCR/313
W2FXA/332
W2HAZ/335
W2VO/208
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K3GGN/279
K3GW/244
K3NW/329
N3AF/225
N3ED/329
N3OS/193
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W3IOP/320
AA4G/158
AA4M/333
AA4MM/141
AA4WX/111
AD4AA/189
AD4QS/151
AD4YM/189
KA4IKH/136
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KN4T/320
K4CIA/330
K4JLA/263
K4LRX/216
K4MIH/273
K4MY/235
K4PB/317
K4RO/236
K4TEA/331
K4TT/216
K4XI/333
NI4H/328
N4JJ/333
N4QQ/316
N4TJ/277
N4TO/323
N4XM/332
N4XR/329
N4XX/273
WA4FFW/321
WA4QDM/276
WB4DNL/189
WB4TDH/335
WB4UBD/322
WD4REX/133
W4AX/320
W4AXO/321
W4EP/280
W4MPY/334
W4OO/277
W4OX/329
W4SD/229
W4TO/295
W4UXI/291
W4ZYT/307
KC5P/266
KF5EA/299
KM5G/206
K5AQ/337
K5CON/253
N5UR/290
N5XUS/123
W5AQ/249
W5EC/265
W5FYZ/249
W5HY/186
W5VCS/192
AA6EW/148
AI6Z/271
KG6I/300
KI6T/303
KM6KO/219
KN6BI/206
K6AM/328
K6ASB/296
K6BZS/237
K6CF/167
K6EL/319
K6FG/316
K6HMS/222
K6OHM/197
K6RO/259
K6UM/299
K6WV/318
K6XN/298
K6YUI/205
NG6W/328
NI6P/194
NI6T/320
N6IG/311
N6NT/293
N6OND/230
WA6OET/325
WA6YOO/280
W6AUG/288
W6BS/302
W6CUA/330
W6HCU/201
W6MD/197
W6MND/292
W6MUS/319
W6MVW/280
W6RFF/283
W6WKE/299
KC7V/332
K7CMZ/270
K7EX/246
K7JS/312
K7LAY/316
K7NK/219
K7NPN/187
K7TED/244
K7WP/192
K7ZBV/332
K7ZD/282
K7ZZ/242
N7AN/297
N7FE/278
N7KH/131
N7OJ/300
N7US/332
N7UT/331
N7WO/231
WA7ZDU/222
WB7B/309
WI7N/230
W7KSK/311
W7MCU/177
W7TE/329
W7WM/242
AA8CH/231
AA8OY/247
KF8VW/279
KM8K/279
K8BCK/318
K8EB/192
K8EJ/336
K8FZ/301
K8PT/303
K8PYD/337
NN8Y/278
N8GZ/333
N8RF/171
WA8CDU/297
WB8IZM/206
WT8C/321
WT8S/311
WW8W/217
WX8S/186
W8ASZ/210
W8DCH/332
W8KZM/265
W8SEY/333
W8TIV/244
W8UVZ/337
W8ZSD/224
AA9BJ/254
AB9E/338
KB9KB/323
KG9N/314
KJ9I/149
K9CC/265
K9GA/324
K9IO/256
K9KU/298
K9MM/339
K9RN/302
K9UIY/232
K9YY/261
NF9V/305
N9AW/306
N9CK/307
N9FH/145
N9KW/326
WA9CDY/213
WB9EEE/331
WB9NOV/314
WB9UQE/328
WD9FLI/170
WO9S/269
W9AGH/280
W9BB/285
W9HJ/317
W9IL/260
W9ILY/255
W9IXX/327
W9KIA/306
W9KNI/343
W9LA/213
W9MJ/252
W9NGA/325
W9ROK/220
W9RXJ/199
W9SZ/275
W9XX/337
AAØMZ/129
KRØI/207
KUØS/325
KØBX/132
KØDEQ/327
KØEU/330
KØHQW/301
KØHRF/322
KØII/328
KØIIR/257
KØJUH/332
KØKM/215
KØKTP/151
KØOB/222
KØPA/320
KØSW/293
NRØX/284
NUØQ/152
NXØI/323
NØAX/308
NØEVQ/235
NØMI/259
NØTB/331
NØZA/307
WAØGOZ/185
WAØI/272
WØCD/319
WØRI/132
WØTT/218

RTTY

DF3CB/272
DJ2BW/314
EA6NB/184
F5NBU/213
G3XTT/171
G4BWP/278
GØARF/301
GM3ITN/265
HAØDU/128
JA2NNF/275
JA3LDH/132
JA8EAT/326
JA8RJE/252
JE1GMM/307
JH2AYB/148
JH4IFF/259
PJ2MI/254
SM6AOU/202
SM6CST/181
VE1BLX/235
VE3XO/245
VO1XC/129
ZS6EZ/129
K1AM/235
K1SM/133
K1ST/252
NX1L/218
N1PM/238
WV1X/131
W1BIH/144
W1CYB/186
AC2P/242
KC2BW/249
K2YG/292
N2FF/269
N2TU/321
WA2UUK/272
WB2CJL/322
WB2RAJ/253
W2FG/327
W2FXA/318
N3SL/253
W3OA/132
AA4M/288
KK4CR/221
KQ4QM/135
N4CC/307
N4XM/175
WA4QDM/140
WA4SFF/169
WA4WIP/318
WB4UBD/315
W4EP/307
KF5EA/246
K5KLA/280
WD5GJB/290
K6WZ/325
K6YUI/251
NI6T/156
WA6PJR/312
WA6YOO/165
W6JOX/310
K7DSR/173
K7DSR/174
K7PI/279
K7WM/184
NJ7H/208
AB8K/268
KF8VW/187
K8MFO/232
WT8S/199
W8DCH/179
K9EMG/162
K9FD/196
K9IO/260
K9YY/163
NC9T/247
N9CK/228
N9US/279
WA9WJE/125
WB9EEE/197
WB9NOV/208
W9BB/208
W9NGA/275
W9RXJ/252
KØBX/212
KØEU/148
NAØY/306
WØIZ/305
WØPGI/257
WØRI/244
N0AT/125
NØTB/180
WØCD/242
WØCM/198
WØPGI/162
WØRI/137

80 Meters

DF3CB/246
DJ3GW/169
DL1DA/124
DL9TJ/215
F6BLP/235
G3KWK/126
G3XTT/264
G4BWP/291
HAØDU/290
HB9BIN/141
HB9JG/121
HB9RG/283
HL2IUA/236
JA3AAW/249
JA3APL/193
JA3MNP/241
JA4XH/177
JA8DNV/283
JA8EAT/310
JA8RJE/180
JAØDWY/192
JH2AYB/150
JH4IFF/231
JR1MLU/182
LA9HF/149
ON4IZ/151
OZ1BTE/195
OZ1LO/232
OZ3SK/123
SM5AKT/163
SM6CST/117
VA3DX/192
VE3OSZ/125
VK6HD/184
K1AM/214
K1HTV/150
K1IK/151
K1JO/208
K1NTR/121
K1ST/201
K1VW/146
K1ZM/288
W1CKA/191
W1JR/220
W1NG/262
W1YY/181
W1ZK/166
KF2O/146
KK2I/152
K2FL/123
K2TQC/205
WA2UUK/181
W2FP/173
W2MPK/120
W2SM/236
W2VO/245
K3NW/189
WG3U/127
W3UR/141
AA4MM/205
K4CIA/165
K4II/124
K4PB/136
K4TEA/227
K4UTE/115
N4CC/165
N4JJ/261
N4KG/236
N4QQ/151
N4TJ/116
N4TO/132
N4XM/133
N4XR/174
WA4FFW/134
W4AX/117
W4OO/155
W4TO/132
W4ZV/290
K5AQ/145
K5UR/281
W5FIX/145
W5YU/116
KG6I/127
K6RK/132
K6TQ/142
W6AJJ/185
KC7V/133
W7LR/142
K8MFO/259
W8UVZ/235
W8XD/163
KJ9I/216
K9AB/173
K9FD/177
K9RJ/232
N9US/196
WB9Z/259
W9NGA/156
KØCS/163
NAØY/213
NXØI/174
N0AT/125
NØTB/180
WØCD/242
WØCM/198
WØPGI/162
WØRI/137

Satellite

DJ5MN/250
JH2AYB/243
PJ2MI/129
VE1BLX/189
NX1L/165
WV1X/126
W1BIH/110
W1JR/108
KC4YRT/176
AA6W/122
WA6UAP/180
WK6AA/237
W7MCU/141
KC9YX/108
N9US/128

160 Meters

DF3CB/157
DJ2BW/191
DJ8WL/261
DK5PR/144
EA6NB/126
F3AT/132
G3XTT/220
G4BWP/203
HAØDU/200
HB9RG/111
JA3AAW/140
JA8EAT/114
JH4IFF/116

DX Century Club Awards

*Edited by **Bill Kennamer, K5FUV** • DXCC Manager*

The ARRL DXCC is awarded to amateurs who submit written confirmation for contacts with 100 or more countries on *The ARRL DXCC Countries List*. The totals shown below are exact credits given to DXCC members from August 1 to 31, 1997. There were 329 current countries at that time. The DXCC rules and application forms are contained in the *ARRL DXCC Countries List*, available for $2 from Publication Sales. The DXCC Web Site may be found at **http://www.arrl.org/awards/dxcc/**.

TOP OF THE HONOR ROLL
Mixed
329
JH1ORA/340

Phone
329
JH1ORA/338

CW
329
JH1ORA/334

NEW MEMBERS
Mixed
DS1BHE/125
DS5USH/132
EY8MM/314
HK3BZO/226
JA1DOF/119
JA1HP/166
JA1NJA/107
JA1RNH/123
JA3QG/140
JA4DC/121
JA0RYN/119
JE1VJT/120
JG2TKH/119
JH1SVO/112
JH2VVH/121
JH3PAS/120
IK2VOC/120
JL7BRH/120
JN6CYC/120
JO1TXS/119
JP1GHJ/120
JR4DAH/124
JR4PMX/118
JR6XIX/115
LX1JH/103
VE3TKI/131
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W1JO/153
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WA3WAW/102
K4VRT/112
WB4MOG/215
AB5QR/105
KJ6YK/106
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DS1BHE/119
F6GVS/178
HK3BZO/191
JA1EEG/107
JA1NEJ/114
JA1NJA/106
JA4DC/121
JA8IYI/281
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JH1XJQ/138
JI1JMK/118
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OE3WQB/102
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YN1XC/109
KE1ET/106
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N2JIX/103
N3NY/126
N3RPI/119
WB3FID/112
K4DDJ/164
N4EK/195
WE9A/292
KØOZ/213
WØZZQ/187

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BV7FN/104
JA1DOF/112
JA1SNF/118
JA3QG/140
JA6VQA/105
JA8IYI/312
JA9XBW/161
JF1IRW/103
JH1SVO/112
JH2NWP/129
JL1UXH/120
JN6CYC/120
JQ3DUE/145
JR3QHQ/127
OE1ZJ/325
W2OW/124
N5OL/110
KB6CQ/101
N6QI/212
AA7UC/116

RTTY
JG3QZN/114
JR1RCQ/116
JR2BNF/104
K4NA/123
W4WX/124

Satellite
JHØBDK/102

160 Meters
DK2WH/107
JA1BK/104
JA7BXS/113
JAØDAI/103
OE1ZJ/105
OE3WQB/102
ON4ON/112
UU1JA/106

80 Meters
DS5RNM/133
JA1EMK/107
JA2QCX/118
OE1ZJ/276
W1PNR/125
KD2KS/141
WA2HZO/104
WB3FID/102
WB3LHD/100
W3TN/134
AJ9K/109
WE9A/101

40 Meters
HK3BZO/110
JA1DOF/119
JA1SGU/108
JA2FGL/104
JE1VTZ/161
JH1SVO/112
JI1NJC/120
JL1UXH/108
JQ3DUE/133
JR3QHQ/127
OE1ZJ/302
SM7NDX/101
W3TN/189
K4VW/127
WA4BIM/106
W5NX/110
N6QI/184
NY7T/109
WZ8P/104
KJ9O/105
WE9A/112

10 Meters
JA1EEG/107
JA1WPX/214
JA9IFF/120
JG2TKH/119
JQ1VNM/110
OE1ZJ/305
K5ALQ/123
KI6T/150
NY7T/110
W8AEF/106
KJ9O/118

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JA6SBW/107
JO1HQQ/103

NEW HONOR ROLL MEMBERS
Mixed
328
JA2CYL/328
JA3GSM/342

327
OE1ZJ/350

325
JE1PNX/328

324
JA1SGU/337

323
WS7I/329

322
JA1QCA/335
JA1RJU/327
JA8IYI/323

321
JA1EPL/327
W6OTC/326

320
JA1IRH/331
JI1DHY/324
K3OSX/324
K4QL/328
KB5WQ/327
K7TCL/332

Phone
325
IKØDWN/329

322
JR4LNG/326
7L1WII/325

320
JA1DIO/332
JO1MOS/324

CW
324
JI2KXK/327

321
JA1NWD/326
N4SU/329

320
JA1BNW/324
JI2EMF/325

5B DXCC
AJ9K
CX3CE
IKØDWN
JA1NWD
JA6CY
OZ7DN
VE7EW
W2OW
W4IS
W4WX
WB3LHD
WE9A

12 Meters
K8IU

ENDORSEMENTS
Mixed
CE3GDN/302
DS5RNM/227
F3SG/325
F9XL/340
G3AEZ/330
G3VDL/256
IN3DEI/340
JA1BNW/347
JA1CLW/317
JA1DIO/339
JA1DJO/327
JA1EOD/355
JA1FGB/339
JA1FUI/308
JA1GYO/229
JA1HGY/351
JA1ILI/276
JA1JAT/280
JA1KNS/321
JA1KRW/322
JA1MJ/357
JA1MOH/344
JA1MZL/317
JA1NWD/333
JA1OHD/331
JA1QOP/338
JA1QWT/331
JA1SJC/323
JA1STF/323
JA1TNV/283
JA1VDJ/343
JA1VN/344
JA1WTI/348
JA1XEL/165
JA1XLU/293
JA1XXL/313
JA2AHH/335
JA2CUS/252
JA2FGL/332
JA2FMW/335
JA2HO/340
JA2JPA/320
JA2QCX/336
JA2QPY/334
JA2TBS/334
JA2WYN/334
JA3APU/332
JA3MLJ/271
JA3PG/330
JA4XZR/327
JA5MOO/210
JA5XAE/244
JA6VQA/333
JA7AO/342
JA7BWT/334
JA7IC/323
JA7JI/345
JA7JM/345
JA7OWD/289
JA7RPC/328
JA7TQK/333
JA7VEI/142
JA8CDT/347
JA8OW/344
JA9BFN/333
JA9CGW/338
JA9IFF/257
JA9XBW/220
JAØAMN/149
JAØBJR/333
JAØBKX/333
JAØCVW/332
JAØKSB/208
JAØNPQ/319
JAØSU/347
JAØUMV/309
JD1AMA/333
JE1CTA/336
JE1LFX/317
JE1REU/305
JE1TBM/132
JE1VTZ/330
JE1WZB/337
JE1XCZ/159
JE2DZC/318
JE2OVG/334
JE2SOY/155
JE2VLQ/334
JE4MZA/210
JF1IRW/323
JF1PUW/337
JF1UVJ/331
JF1ZFR/225
JF2BNG/316
JF6OJX/329
JF6WBP/328
JG1HND/328
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QST

New Products

RG303/U CABLE ASSEMBLIES FROM CABLE X-PERTS

◊ Two RG303/U 50-Ω coaxial cable assemblies (6 feet and 18 feet long, respectively) are now available from Cable X-perts. Both feature PL-259 connectors at each end, which are soldered and tested for RF and mechanical integrity. Longer lengths and bulk spools are also available

RG303/U is a high-temperature, high-power teflon coax with a solid silver center conductor and a mil-spec silver braid shield. It's rated for 6 kW PEP (1.9 dB loss per 100 feet at 30 MHz).

Prices: 6-foot assembly, $14.95; 18-foot assembly, $24.95, plus $6.75 for USA shipping (lower 48). For more information, contact Cable X-perts, 416 Diens Dr, Wheeling, IL 60090; tel 800-828-3340, fax 847-520-3444, e-mail **cxp@ix.netcom.com; http://www.cablexperts.com**.

DAVIS INSTRUMENTS

◊ Davis Instruments, a manufacturer of weather instrumentation systems since 1988, announces the availability of *Weatherlink 4 for Windows*, which gives ham operators new tools and features for working with Davis Home Weather Stations, including improved support for packet radio.

New features include automatically updated strip charts, automatically generated NOAA-type "weather watcher" reports, an improved plotting interface, calculated weather data that's not available on the Weather Station's electronic console, support for the Automatic Packet Reporting System (APRS), and more.

Weatherlink 4 works with IBM-compatible systems running *Windows 3.x, Windows 95* and *Windows NT 4.0*. Prices: Complete package, $165; Upgrades for existing users, $49. For more information, contact Davis Instruments, 3465 Diablo Ave, Hayward, CA 94545; tel 510-732-9229, fax 510-732-9188; **http://www.davisnet.com**.

WEATHER SERVICE "SPECIFIC AREA MESSAGE" DECODER FROM MORRIS SOFTRONICS

◊ The National Weather Specific Area Message Decoder (NWSAMD) allows users to decode Specific Area Message Encoding (SAME) data from the voice channel of any 160-MHz weather service receiver. The device is microprocessor-controlled and is configured via its RS-232 serial port. Configuration data is stored in non-volatile memory.

Designed primarily for Skywarn, ARES and repeater service for retransmitting NWS bulletins and information, the NWSAMD provides switched audio, PTT and control inputs/outputs. The factory assembled PC-board module is powered by 8 to 16 V dc and comes with a detailed user guide.

Price: $149.95. For more information, contact Morris Softronics, Box 48, Hooper, NE 68031; tel 402-654-2482, e-mail **msftrncs@htcnet.com; http://www.htcnet.com/msftrncs**. QST

Exhibit 10

Survey of Low Band DX--CW versus SSB

The DXCC status is the all-time status. The WAZ status for 160 and 80 meters is shown as well.

It is interesting to see how much the top DXers work on CW and how much on phone. For 160 meters, the top DXer works 84% CW and 16% phone on average, while the 80-meter top DXer spends 61% on CW and 39% on phone.

I did a similar survey about 7 years ago, and another one over 20 years ago. One of the most striking differences is that much bigger and better antennas are being used all the time. The scores have skyrocketed accordingly. The use of Beverage antennas has also become very common among the top low-band DXers. Those not using a Beverage antenna often said "No room for a Beverage." Of the listed top low-band DXers, 65% use Beverages. Low horizontal wires (dipoles, loops) and magnetic loops are also popular receiving antennas. Only those using a Yagi or a multielement array feel no need for special receiving antennas.

As far as equipment is concerned we noted the following results:

Kenwood: 44%	Drake 12%
ICOM: 22%	Ten-Tec: 5%
Yaesu: 12%	Other 5%

2-2

Table 2

Low-Band DXer's Survey

Equipment and antennas used by some of the best known DXers.

		TRANSMIT ANTENNAS		RX ANTENNA
CALL	*TRANSCEIVER*	*80-M*	*160-M*	
AA1K	TS940, TS180	WIRE YAGI	INV L 4 ELEV RADS	8 BEVERAGES
AD6C	TS940, TS930	1/2 WV SLOPERS	3/8 WV VERT	6 BEVERAGES
DJ2YA	IC751, TS930	INV L, VERT 80'	3/8 WV INV L	NO ROOM FOR BEVER
DJ4AX	R4C/T4XC	2EL YAGI @165',VERT	120 FT WIRE @165'	NO
DJ8WL	R4C/T4XC	-	PHASED INV L'S	BEVERAGES, LOOP
DL1YD	TS930	HALF SLOPER	HALF SLOPER	BEVERAGE
F5VU	TR7, FT102	DIPOLE, 1/4 SLOPER	1/4 SLOPER	NO
F6BKE	TS930	90' VERT, DIP 50'	90' VERT, DIP 50'	BEVERAGES
G3KMA	TS940, TR7	DELTA LOOP	SH FED TWR, INV L	BEVERAGE
G3PQA	T4XC,T4XC, FT102	50-M LONG INV V	21-M INV L (100RAD)	4 BEVERAGES
G3RBP	IC745, RA329B	-	T-VERTICAL	BEVERAGES, LOOP
G3SZA	IC765	PHASED 1/4 WV VERTS	100' TOPLOAD VRT	BEVER-s, LOW DIP
G3XTT	TS940	IN V, DELTA, VERT	INV L, SH FED TWR	NO ROOM FOR BEVER
GD4BEG	T4XC/T4C, MODFD HRO!	VERT, DIPOLE, DELTA	BOBT, PHASED VERTS	LOOPS, LONG WIRES
GW3YDX	TS930, TS850	50' VERT 2500' RADS	105' VERT TWR	BEVERAGE
HB9AMO	TS940	DELTA LOOP	90 FT VERT (TOP L)	COAX LOOP, BEVER
IT9ZGY	IC781, FT1000,TS940	3 PHASED VERT	INV V, SLOPER	MAGN LOOP 3.7 M
JA1ELY	FT1000, IC780	ROT. IN V. 90 FT	NO	NO
JA2AAQ	TS930	3 DIPOLES	INV V	NO
JA3EMU	IC761	SHORT DIPOLE 28 M	1/4 WVE VERT	NO SPACE
JA4LXY	IC760	1/4 WAVE SLOPER	1/4 WAVE SLOPER	4 BEVERAGES
JA6IEF	TS930, IC760,TS820	ROT DIP, INV V	INV V	BEVERAGE, LOOP
KØHA	TS-830, TS440	6 EL PARAS. VERT ARR	6EL PAR VERT AR	LOOP, RANDOM WIRE
K1MEM	R4C/T4XC, PARAGON	2 EL PHASED ARRAY	INV V AT 70'	BEVERAGE
K1MM	TS940, TS830	SLOPERS AT 90'	INT V, SLOPER	LOW DIPOLE
K2RIH	IC761A, FT576X	DIPOLE 100'	DIP 100' VERT 1 0'	6 BEVERAGES
K1ZM	IC765, TS940	PHASED VERT, DIPOLE	1/4 WV VERT, INV V	BEVERAGES, LOOP
K2UO	IC-765	DIPOLE	LOW DIPOLE	NO ROOM
K3LR	IC765	4-SQUARE	1/2 W CV SLOPER	BEVERAGES 600 FT
K3ZO	TS830, R4C	3 EL KLM YAGI 140'	1/2 SLOPERS, INV L	DDRR, BEVERAGE
K4CIA	IC761, 75A4	VERT, DELTA, SLOPER	TOP LOADED VERT	LOOPS, HORIZ ANT
K4DY	IC-750	LOOP, INV V, SLOPER	SH FED TOWER	NONE
K4MQG	FT102	2 EL CREATE YAGI	NONE	NONE
K4PI	TS940	INVERT L	SH FED 100' TWR	LOOPS, BEVERAGES
K4TEA	KWM380	-	1/2 SQ VERT LOOP	BEVERAGES
K4UEE	TS850S	1/4 WV VERT, INV V	INV V @ 80 FT	2 BEVERAGES
K5TSQ	TS-940	1/4 SLOPER, DELTA LP	1/4 SLOPER	SHORT BEVERAGE
K6NA	TS940, R7	2 EL ARRAYS @ 135'	SH FED 140' TWR	BEVERAGES
K6UA	TS930	8JK, QUADS	130' VERT, DIPOLE	BEVERAGES
K8CFU	TENTEC OMNI V	-	VERT +COUNTERPOISE	4 BEVERAGES
K9UWA	IC-765, DRAKE C-LINE	4 EL INV V ARRAY	4 EL INV V ARRAY	3 BEVERAGES
KA1PE	TEN TEC OMNI V	-	137' VERT	BEVERAGES
KA5W	TS940	VERT, DIPOLE 80'	SH FED TWR 70'	4 BEVERAGES
KC7EM	TS940	4-SQUARE VERT	NO	NO
KH6CC	TS830, R4C	125' VERT ELEV RADS	SAME	2 BEVERAGES
KJ9I	IC765A	-	1/2 WV SLOPERS 160'	BEVERAGES
KV0Q	IC781, R4C, FT980	-	4 EL VERT ARRAY	
LU8DPM	IC-735	VERT, SLOPER, INV V	VERT, SLOPER, INV V	

Exhibit 11
DXpedition logs and W4NZC log

This exhibit includes summaries of two amateur expedition ("DXpedition") logs. The 5A2A operation in Tripoli, Libya, conducted from November 23 to December 4, 1997, and the H40AA operation in the Temotu Province of the Solomon Islands conducted in 1998 are represented. I used this data because I located it easily on the inter net. The pages that I found for other DXpeditions did not include such data. The 5A2A summary shows 25,875 contacts logged, of which 77 **percent were CW**, **21 percent were SSB**, and **two percent were RTTY**. The very high percentage for CW resulted in part from the fact that the team participated in a two-day CW contest. The H40AA summary shows 67,129 contacts with some 23,140 different amateur stations. **Fifty-four percent** of total contacts were **SSB**, **44 percent CW**, and **1.5 percent RTTY**. The higher number of SSB contacts was the result of operating two SSB transceivers simultaneously on the 21 MHz band. The team described 21 MHz as the "production band."

Also attached is a computer summary of the W4NZC log beginning in 1991. The first summary shows the break down between CW and SSB as of 1996. The second summary includes activity into 1998. These summaries show an approximately **equal number of different countries contacted on CW and SSB**. This is relevant because I make a practice of attempting to contact new countries where ever and whenever I find them, with no preference for CW or SSB. The fact that my log contains an almost equal number of CW and SSB totals is some evidence that international activity is evenly divided between the two modes.

5A2A RRDXA DXpedition

Hello, unknown Web Surfer!

Welcome to the WWW home page of the 5A2A DXpedition, another operation by:

Rhein Ruhr DX Association

From November 23 to December 4, 1997, a group of five German operators was on the air from the well-known club station 5A1A in Tripoli, Libya. We participated in the CQ World Wide DX Contest in CW, and did our best to provide SSB and RTTY QSO's to the deserving outside of the contest. Our QSO total looked like this:

	160m	80m	40m	30m	20m	17m	15m	12m	10m	Total
CW	1316	2789	5565	1175	2782	1008	3599	943	814	19991
SSB	47	435	1011	0	1408	396	1265	386	359	5307
RTTY	0	0	0	0	355	0	222	0	0	577
Total	1363	3224	6576	1175	4545	1404	5086	1329	1173	**25875**

During the CQ World Wide DX Contest, our main goal was to maximize our score contributed to the RRDXA club total. We ended up with a claimed score as follows:

H40AA Bulletin 09

H40AA Post-Operation Update
14 June, 1998

The validation of the database as well as the merging of a variety of data files has been successfully completed for the 67,129 H40AA QSOs, and the full-color, folded QSL cards have been received from the printers. QSLing will commence on 29 June and the QSLing team, led by OH2BN, will get the cards out as quickly as possible. The DXCC status of the Temotu Islands should be determined during July, and QSLs should be accepted by the DXCC desk in October.

The Special Edition QSL card project which aimed at contributing to the development of the Solomon Islands Temotu Province has received a fantastic response from DXers worldwide with 430 benefactors contributing USD 22,068. The comments received have been of such a nature that we believe that this project may set a precedent for future DXpeditions, helping to establish DXpeditioning as a valuable asset contributing to the community it involves in its performance.

H40AA team member Bruce Butler, W6OSP has closed the Special Fund and will transfer the donations in full to the account of The Temotu Development Authority (TDA) where Dr. Ashley Wilson, a VSA volunteer from New Zealand, and several community members including the Provincial Premier, will select the projects that the DX community will support. Several education, health and commerce-related projects are being studied.

A large parcel of Special Edition QSLs was airlifted last week to Temotu through special arrangements with Solomon Airlines. Dr. Wilson will start releasing those cards to contributors by mid-June from Temotu's local post office. It is expected that the special cards will reach their worldwide audience by the end of June--the same time that the regular, direct QSLing is started. The special QSLs mailed from Lata will confirm only one QSO, and the remaining QSLs will be sent from Finland. No further action on the part of contributors will be necessary, however.

The highlight of the Special Edition QSL Project was the donation received from Mr. Lee Shaklee, W6BH, who contributed USD 10,000 toward the development of the Temotu province. Lee remembers well the time he spent in the Solomons during WWII and wished to present his gift in the name of DXing for the people of Temotu whom he had visited during the war. He served on U.S. torpedo boats and spent nearly two and one-half years with those friendly people that WWII was severely disturbing. Lee's WWII experiences were ended by a severe case of malaria. The DX community can be proud of this support from Lee and from the 430 others in the effort to help this newest DXCC country to flourish and to be a healthy society for it's 15,000 people.

The H40AA 67,129 QSOs represent 23,140 different call signs logged, resulting in 2.9 QSOs for each DXer worked. The tight operating strategy along with high beam antennas and amplifier power were vital elements which resulted in fair coverage of all areas of the world.

The following split was achieved between the geographical areas: USA/Canada 42.0%, Europe 28.9%, Japan 22.5% and 6.6% for the rest of the world. The production band was 15 m (37.5% of the total QSOs), where simultaneous operating was done on CW and SSB. Occasionally two SSB signals on 15 m were present. SSB QSOs made up 54.2% of the total, CW 44.1% and RTTY 1.5%.

W4NZC LOG AS OF
SEPTEMBER 1998

Countries Worked/Confirmed by Band and Mode

	CW	SSB	RTTY	AMTOR	FM	PACKET	SSTV	AM	BAND TOTALS
160	4/3	1/1	-/-	-/-	-/-	-/-	-/-	-/-	5/4
80	94/62	107/89	-/-	-/-	-/-	-/-	-/-	-/-	146/121
40	107/71	13/7	-/-	-/-	-/-	-/-	-/-	-/-	112/76
30	55/31	-/-	-/-	-/-	-/-	-/-	-/-	-/-	55/31
20	97/56	86/53	-/-	-/-	-/-	-/-	-/-	-/-	140/93
17	34/20	33/22	-/-	-/-	-/-	-/-	-/-	-/-	61/40
15	73/40	70/44	-/-	-/-	-/-	-/-	-/-	-/-	108/76
12	8/7	11/7	-/-	-/-	-/-	-/-	-/-	-/-	19/14
10	37/17	80/55	-/-	-/-	-/-	-/-	-/-	-/-	90/65
6	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
144	-/-	-/-	-/-	-/-	1/-	-/-	-/-	-/-	1/-
220	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
432	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
12G	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
23G	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
OSC	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-
MODE TOTALS	215/178	203/177	-/-	-/-	1/-	-/-	-/-	-/-	

MIXED MODE TOTALS 263/249 Max Available 329 GRAND TOTALS 263/249
Total Contacts 1882

Press the "C" key to see WAS stats or any other key to continue

MAY 1996

ZDDDDDDDDDDDDDDDD Countries Worked/Confirmed by Band and Mode DDDDDDDDDDDDDDDDD?

3									BAND	3
3	CW	SSB	RTTY	AMTOR	FM	PACKET	SSTV	AM	TOTALS	3
3160	-/-	1/1	-/-	-/-	-/-	-/-	-/-	-/-	1/1	3
380	68/40	81/63	-/-	-/-	-/-	-/-	-/-	-/-	103/80	3
340	89/52	7/2	-/-	-/-	-/-	-/-	-/-	-/-	93/54	3
330	49/23	-/-	-/-	-/-	-/-	-/-	-/-	-/-	49/23	3
320	82/44	72/42	-/-	-/-	-/-	-/-	-/-	-/-	116/71	3
317	31/19	29/18	-/-	-/-	-/-	-/-	-/-	-/-	54/35	3
315	65/31	56/30	-/-	-/-	-/-	-/-	-/-	-/-	89/55	3
312	6/5	8/5	-/-	-/-	-/-	-/-	-/-	-/-	14/10	3
310	35/14	76/52	-/-	-/-	-/-	-/-	-/-	-/-	85/59	3
36	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	3
3144	-/-	-/-	-/-	-/-	1/-	-/-	-/-	-/-	1/-	3
3220	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	3
3432	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	3
312G	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	3
323G	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	3
3OSC	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	-/-	3
3					MODE TOTALS					3
3	182/136	166/135	-/-	-/-	1/-	-/-	-/-	-/-		3
3										3

3 MIXED MODE TOTALS 229/201 Max Available 329 GRAND TOTALS 229/201 3
3 Total Contacts 1687 3

@DDDDDDD Press the "C" key to see WAS stats or any other key to continue DDDDDDY

Exhibit 12
Manufacturer data

All new transceivers sold by the major manufacturers of amateur transceivers--Icom, Kenwood, Yaesu, Alinco, Ten Tec--are equipped for CW. A few years ago, some of the least expensive transceivers in the group did not include built in electronic keyers for CW or full CW break-in operation. ("Full break-in" means that the radio returns to receive between dots and dashes.) An example was the Icom IC 725. Now, however, even the cheapest of these transceivers comes equipped with a built-in keyer. The only known exception is the Alinco DX-70, a transceiver specifically designed for mobile operation. Even the DX-70 supports full break-in CW operation, however, and it is equipped with a narrow CW band pass filter, a $100 option on some transceivers. **Obviously, the manufacturers do not believe that demand for CW features is declining**.

Attached are copies of current advertisements for three low end transceivers.

Make the World Your Playground!

Alinco DX-77T Desktop HF Transceiver

- Transmits on all HF U.S. Amateur Bands, 10 ~ 160 Meters SSB, CW, AM, FM and Data
- General coverage receiver 500 KHz ~ 30 MHz, all standard modes
- 100 watts output SSB, CW and FM, 40 watts AM
- Enhanced Direct Digital Synthesis (DDS) eliminates need for SSB Narrow Filter
- Built-in speech compressor
- Front panel mounted speaker with loud, clear audio
- Front panel jacks for convenient connections of key, headphones or external speaker
- QRM/QRN reduction with IF shift, standard CW audio filter and RF attenuator
- Built-in electronic keyer, adjustable from 6 ~ 50 wpm
- Full QSK, 7-step semi break-in operation or Auto Break-In CW modes
- 100 memory channels, each stores mode, split, frequency, AGC, RF attenuation or gain
- Computer control with optional ERW-4
- Front panel CTCSS tone access for 10 Meter FM operations (50 tones)
- Two VFOs plus Memory operation mode
- Rear panel connectors for external amplifier, antenna, power, computer control/cloning

Loaded with features at an affordable price!

The Alinco DX-77T is a design achievement that puts a new desktop HF transceiver within your reach. And this is no "bare bones" radio! The DX-77T was designed from the beginning to be a quality HF transceiver, full of features to enhance its performance and your enjoyment. The DX-77T has "big radio" features at a low Alinco price!

"Radios in this price class typically don't include built-in CW keyers, so it was a pleasant surprise to find one in the DX-77T. Nice going, Alinco!"

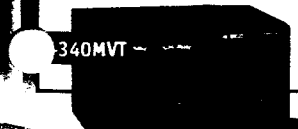
"With the long list of features already included in the DX-77T, first-time buyers may be curious as to what additional capabilities they would find in the next step up."

—QST Product Review, June 1998

Options

EDX-1 manual antenna tuner
EDX-2 automatic antenna tuner
ERW-4 personal computer interface

EMS-14 desktop microphone
EDS-5 microphone extension cable
DM-340MVT DC regulated power supply



Simple ▪ Clean ▪ Dependable

ALINCO.
AMATEUR RADIO'S VALUE LEADER℠

U.S.A. Alinco Branch: 438 Amapola Ave. • Suite 130 • Torrance, CA 90501
Phone: (310) 618-8616 • Fax: (310) 618-8758 • Internet: http: //www.alinco.com

e DX-77T represents the quality, performance and value you've come to expect from Alinco!

World's First HF Rig with CW Auto Tune and DSP Built-in

NEW! HF + 6M Version

Kenwood makes Digital Signal Processing technology available to everyone with the all-new TS-570D and TS-570S. Imagine a DSP radio that you can operate in the shack, the car, or on a remote DX island. These are the first DSP rigs that meet the needs of today's HF operator within a budget. From the first moment that you hear the incredibly clear and powerful audio and operate the new, common-sense ergonomic design, you will realize the TS-570D or TS-570S is the HF rig built for you.

The TS-570D and TS-570S offer the world's first CW AUTO TUNE feature which enables automatic zero-beating for CW operation. Advanced Kenwood design and features coupled with traditional Kenwood HF performance make the TS-570D/570S a masterpiece that you can proudly operate. If you have been waiting for a new DSP HF radio with performance at an affordable price, wait no more.

- **The RCP-2 Radio Control Program also allows the HF operator to design and program multiple radios with custom settings while conveniently saving them to a PC file for future use.**

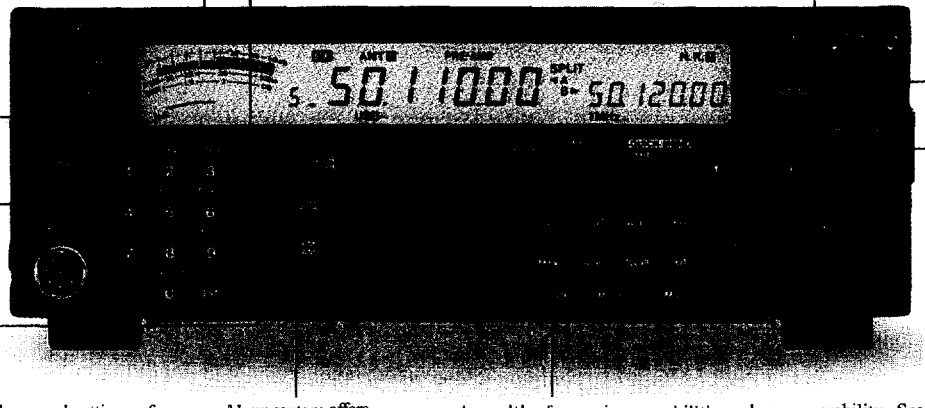
Large LCD display features a 4-stage dimmer while the 7-digit alphanumeric sub-display provides menu mode guidance, split frequency display and digital filter selection options. Easy-to-read S/PWR/COMP/SWR/ALC meters and an operating guidance feature help to greatly simplify operation.

16-bit DSP technology delivers superb audio quality on both transmit and receive. Noise reduction (line enhancer method and SPAC), audio equalization (voice/transmit equalizer and speech processor), slope tuning and automatic IF filter bandwidth selections can be operated with a touch of a button.

Power output can be set between 5 ~ 100 watts in 5 watt increments. 5 watt setting is ideal for QRP operation.

Preset auto antenna tuner with 22 sub-bands from 1.8 MHz - 30 MHz including 6M and memory for both antenna ports.

10-key direct frequency entry



World's first CW Auto Tune enables automatic zero-beating for CW operation.

Quick memory provides five channels for on-the-fly frequency control: M.IN stores data, MR recalls it.

Electronic keyer provides speed settings of between 0 and 100 wpm and dual key inputs on the back – one for the paddle and one for the key.

Menu system offers 46 types of functions to assist novice thru extra class operators.

A wealth of scanning capabilities enhance operability. Scan speed is variable and can be set for time-based or carrier-based resume. Scanning can work across channels, groups of 10 channels, all except locked out channels, or it can be programmed to scan a frequency range between two channels.

• Mobile/fixed station size (10-5/8 x 3-3/4 x 10-11/16 in) • Heavy-duty design • CW message memories • CW reverse mode • Full break-in and semi break-in • High-speed 57600 bps PC control • Dedicated packet port

TS-570D / TS-570S

HF Transceiver **HF + 6M Transceiver**

With a half century of engineering and design experience to draw upon, Kenwood is changing the future of HF communications technology. High quality TX-RX audio reproduction with extremely effective DSP interference reduction delivers pleasing performance to your ear and over the air. You will also enjoy the large, easy-to-read LCD display with a built-in on-screen operator guidance system for simple operation. Features like 10-key direct frequency entry with new "soft-touch" keys, auto-antenna tuner, 100 to 5 watt for QRP operation, variable scanning speed, built-in CW keyer, ANT 1-ANT 2 ports, IF shift control, RS-232C com-port, 100 memory channels, CW reverse, optional VS-3 voice synthesizer and DRU-3A digital recording unit make the TS-570D or TS-570S the radio for you.

JQA REGISTERED FIRM

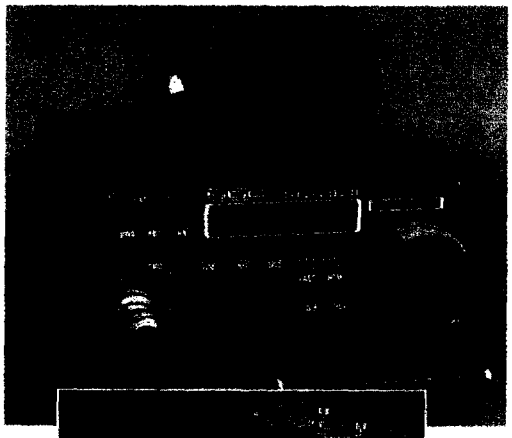
ISO 9001
JQA-1205

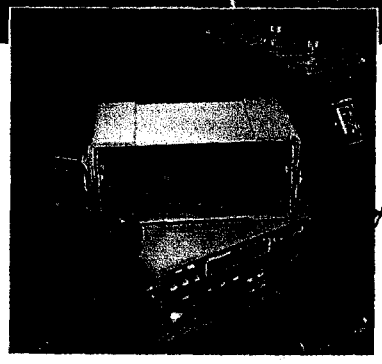
NET

Kenwood News & Products
http://www.kenwood.net
Kenwood Bulletins
ftp://ftp.kenwood.net

KENWOOD
Amateur Radio Products Group
97ARD-1619

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. Box 22745, 2201 E. Dominguez St., Long Beach, CA 90801-5745, U.S.A
Customer Support/Brochures (310) 639-5300
KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8





HF TRANSCEIVER

The SG-2020 is designed as a small, low power, low cost SSB/CW HF companion for use where space is precious or where only portable power is available. The transmitter power of the SG-2020 is adjustable from 0 to 20W output and covers the full frequency range of 1.8 to 29.7 MHz and 500kHz to 30 MHz on receive. Microprocessor controlled – loaded with *"Big Rig"* features making it not only usable as a fine fixed, mobile or portable Ham rig, but also for aviation and boating. The unit has the lowest current consumption on the market; <300mA in receive mode and only 3A at 20W CW on transmit. Optional *PortaPak* battery pack includes a container for ten "D" batteries, a front panel cover with facility to store the standard microphone and an adjustable strap – making the SG-2020 the ultimate *"take-along"* rig. **SGC 05-01**

SGC *No Compromise Communications*

MADE IN USA

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Exhibit 13

Signal to noise ratio for CW and SSB reception

3 EQUIPMENT

The performance of our communication equipment has progressed by leaps and bounds over the years. We see the tendency, however, for many commercial manufacturers to just add bells and whistles, instead of further concentrating on the essential characteristics of a state-of-the-art receiver. I hope this chapter will broadcast a clear message to the manufacturers of amateur communications equipment.

Many years ago every amateur station consisted of a separate transmitter and receiver. The Collins KWM-1 was the first transceiver I remember (late fifties). Today almost everybody uses a transceiver. Separate receivers/transmitters seem to be gone forever. For a very long time I was a very fervent advocate for the "separate" setup. I still think very highly about the Drake twins that closed the "separate" era with great honors.

In this chapter we will briefly discuss the specification topics of both the receiver and the transmitter section of a station, as well as any other equipment that may be included in the transmit and receiver chain of a good low-band DXing station.

■ 1. THE RECEIVER

1.1. Receiver Specifications

Until about 15 years ago, receiver performance was most frequently and almost exclusively measured by sensitivity and selectivity. In the fifties and early sixties a triple-conversion superheterodyne receiver was a status symbol. It was not until the mid-sixties that strong-signal handling came up as an important parameter (Ref. 250). Today we consider the following topics to be most important for a communication receiver (not necessarily in order of importance):

1) Sensitivity
2) Intermodulation distortion
3) Gain compression
4) Dynamic range
5) Cross modulation
6) Reciprocal mixing (VCO noise)
7) Selectivity, notch filter
8) Noise blanker
9) Stability
10) Frequency display accuracy

The above parameters will be discussed in detail and their importance will be highlighted, especially in view of low-band DXing. Fig 3-1 shows the voltage and power relationships involved in the discussion and evaluation of receiver parameters.

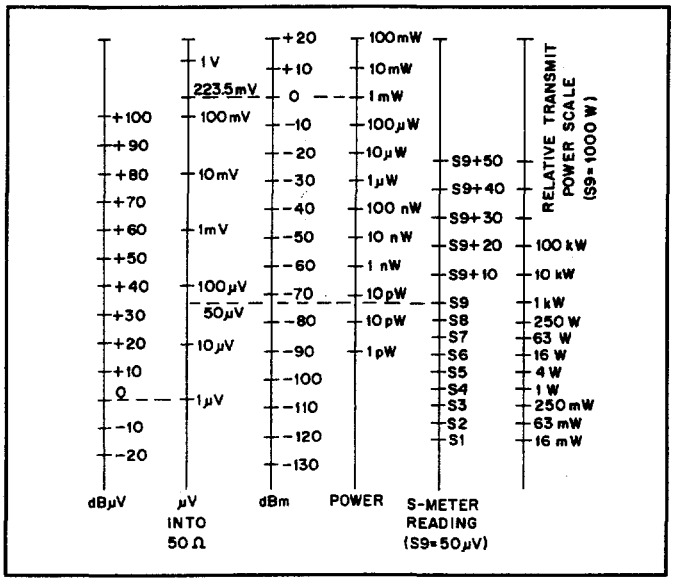


Fig 3-1—This table shows the relationship between receiver input voltages, standard S-meter readings and transmitter output power.

1.2. Sensitivity

Sensitivity is the ability of a receiver to detect weak signals. The most important concept related to sensitivity performance is the concept of signal-to-noise ratio. Good reception of a weak signal implies that the signal is substantially stronger than the noise. It is accepted as a standard that comfortable SSB reception requires a 10-dB signal-to-noise ratio. CW reception may have a much lower S/N ratio, and any CW operator can deal with a 0-dB S/N ratio quite well. Experienced operators can dig CW signals out of the noise at −10 dB S/N ratio. This proves again the inherent advantage of CW over SSB for weak-signal communications.

1.2.1. Thermal noise.

The noise present at the receiver output terminals is generated in different ways. Receiver noise is produced by the movement of electrons in any substance (such as resistors, transistors and FETs) that has a temperature above absolute zero (−273 degrees Celsius or 0 kelvins). Electrons move in a random fashion, colliding with relatively immobile ions that make up the bulk of the material. The final result of this effect is that in most substances there is no net current in any particular direction on a long-term average, but rather a series

Exhibit 14
Transceiver kits and home-brew projects

This exhibit includes an article from the June 1996 issue of *QST* comparing transceivers that amateurs can build from a kit. Note that **all of the transceivers transmit CW only**. As far as I know, there are no kits for building SSB transceivers.

The exhibit also includes a listing of transceiver construction projects from the *1997 ARRL Handbook*. Please note that **all transceivers save one are for CW only**. The exception is **an SSB transceiver whose design has admittedly never been completed**. I have included a portion of the construction article; it demonstrates the complexity of attempting to design and build an SSB transceiver.

By Rick Lindquist, KX4V

Low-Power Transceiver Kits You Can Build

Has the once-hallowed ham radio art of homebrewing fallen by the wayside in an era of ready-to-use equipment? Not judging by the booming market in low-power transceiver kits embraced and enjoyed by many hams—and especially by those in the QRP community.

Here's proof that good things come in small packages. Our selection represents a cross section of available kits, ranging from simple and easy to sophisticated and complex. Kit prices here vary accordingly, from around $75 to more than $300, depending on options. We built, tested and used the G-QRP Club GQ40; the Gary Breed transceiver; the Oak Hills Research OHR-400; the S&S TAC-1; the Small Wonder Labs Green Mountain 20; the Wilderness Radio NorCal 40A; and the Wilderness Radio Sierra. Prototype versions of some of these transceivers have appeared in *QST* and in *The ARRL Handbook*.

Why build it yourself? The big reasons are to save money and to gain the satisfaction that comes from assembling your own gear. Some of our contributors have built literally dozens of kits like these. As Jeff Gold, AC4HF, put it, "I find building kits to be therapeutic and much cheaper than many other forms of relaxation." Regular kit builders also will tell you it's a lot easier to customize or modify a homebuilt kit to make it do what *you* need it to, rather than tearing into a factory-built job (and possibly voiding the warranty).

All of these kits proved to be fun projects. You don't need special tools for building or tune-up, just the standard kit-building tools (diagonal cutters or "dikes," small needle-nose pliers, and a 25 or 30-W soldering iron). In most cases, alignment requires a VTVM or DVM, maybe a frequency counter or well-calibrated receiver, a low-power wattmeter and a dummy load.

G-QRP Club GQ40

The GQ40 is a newcomer to the kit scene in the US. It's a single-bander—20-meter and 40-meter versions are available. I built the 40-meter kit. Although I've put some projects together over the years—including a few simple transmitters, keyers and antenna tuners—it's been ages since I built a kit of any kind. I think the Heath HW-7 was my last. I had little experience winding toroidal coils, which intimidated me at first but turned out to be not so bad. I took my time with this little kit, which consists of a single PC board, a handful of external controls and jacks and a plain aluminum case. (A power on-off switch is optional.) This is not a kit for the rank beginner. If you've got a simpler kit or two under your belt, you'll have no trouble with this one, and I found the results *well* worth the toil and trouble of building it.

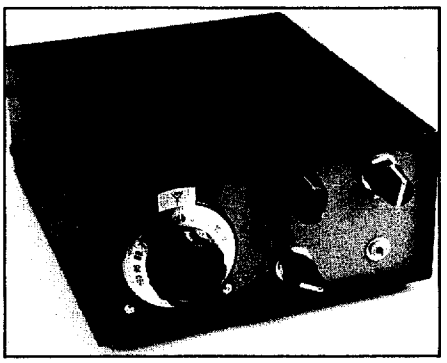
This little set has a superhet receiver, *six*-pole crystal filtering and a vernier tuning dial, and it puts out up to 7 W of RF (continuously variable from zero to the maximum). It's capable of full-break-in (QSK). It's very unpretentious in its stock form. *You* paint and label the aluminum box and front panel to suit your tastes and pocketbook. You can also adjust the tuning range. As built, it covers approximately 150 kHz of the band. I modified mine to cover approximately 50 kHz. Overall, in some respects, I found this a bit more like a real homebrew project than a kit.

Sheldon Hands, GW8ELR, puts up this kit in Wales, so some terminology in the 20-page instruction pamphlet may be a tad strange to American eyes. One "fits" components to the board, which has a component side and a "track" side. You soon get used to the Britishisms (like "whilst") that crop up, too. Unless you plan to convert millimeters to inches, get yourself a metric ruler. The information on how to identify the components was highly useful. My eyes aren't what they used to be, so I found wearing a binocular magnifier very helpful in making certain I "fitted" all the components in their correct places on the fairly crowded board. You simply stuff the components by groups (ie, all capacitors, all resistors, etc) onto the board, wire up the external components, tune it up and put it on the air. Oh, you do have to drill a few holes to mount the tuning cap.

Occasionally, the instruction sheet called for an item the kit did not include. Usually, though, it was something right at hand—a scrap of wire, a capacitor or two. The parts appeared to be of good quality, and the quality of the fiberglass and silk-screened board was average. The thing I disliked most was having to solder some component leads to the top (ground-plane) side of the board. This often obscured or destroyed the silk screening for components yet to be installed. In some cases, I nearly ran out of room to solder

G-QRP Club GQ40

	Measured in the ARRL Lab
Size: (HWD) 2.9×5.9×6.9 inches; weight: 1.6 lb.	
Power requirements:	Transmit, 1.2 A (max); receive, 190 mA (max volume, no signal), tested at 13.8 V.
Typical tuning range:	≈50 kHz (after modification; see text).
Power output (max):	7 W (typical).
Spectral purity:	Meets FCC requirements for spectral purity.
Minimum discernible signal:	–127 dBm.
Blocking dynamic range:	127 dB.
Two-tone dynamic range:	91 dB.
IF/audio response:	Range at –6 dB points (bandwidth): 528-1098 (570 Hz).
Audio output power:	1.6 W at 10% THD into 8 Ω.
Price class:	$160.



Contents

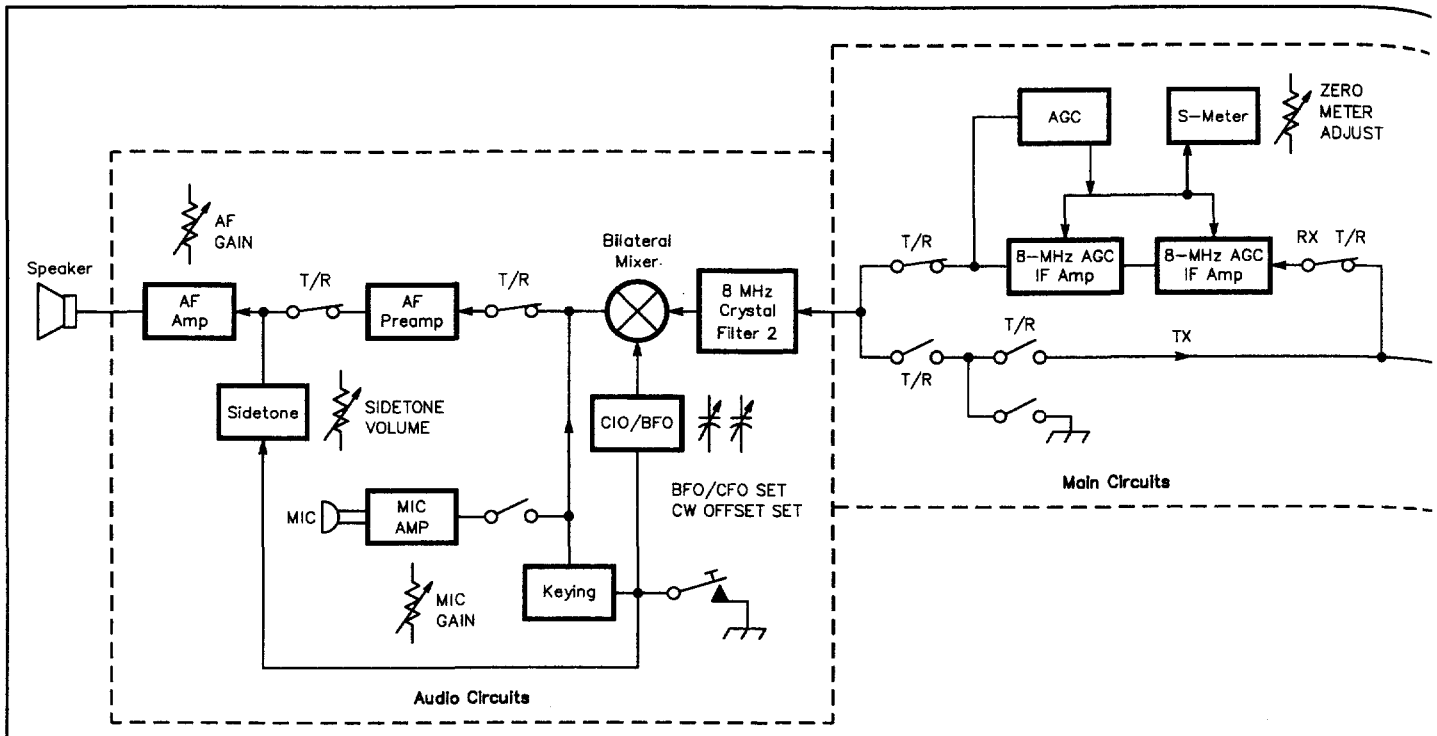


Fig 17.89—Block diagram of the transceiver.

A 30/40 W SSB/CW 20-M TRANSCEIVER

This project is a unique *Handbook* offering. Unlike many projects, this one was not created to be duplicated by the home constructor. This project is for the confident and experienced builder who is looking for a challenge. The transceiver was created in the ARRL Lab by Zack Lau, KH6CP/1, to meet an unusual set of design goals.

Some old-timers may remember Project Goodwill. The project purchased and distributed QRP 20-m CW transceiver kits to prospective hams in many foreign countries with small ham populations. Those transceivers ran out a few years ago, and ARRL began development of a new transceiver.

The goal was to supply an inexpensive, reliable, ready-built transceiver that provided moderate (not QRP) RF output in both the CW and SSB modes. **Fig 17.89** shows the transceiver block diagram. This transceiver was intended for inexpensive commercial manufacture. One of the important design goals was to eliminate as much tuning as possible, much like the microwave no-tune transverters. Of course, this conflicted with the next goal, which was to make the design as cheap as possible without sacrificing too much performance. Another goal was to accommodate a wide-tolerance PC-board process (single-sided with thick traces—50-mils minimum). Finally, the board was to use controls and connectors that are board-mounted.

In an attempt to simultaneously reduce the amount of tuning and keep costs down, a decision was made to use bilateral filters, mixers, and amplifiers where possible. It could be argued that the SBL-1s are too costly for an inexpensive transceiver project, but they offer several advantages. Being inherently bilateral, one needs only two mixers instead of four, reducing the number of parts needed. See the schematic in **Fig 17.90** (see pages 17.86 and 17.87). Also, they have pretty

(See Over)

good carrier suppression, which eliminates a trimmer that would require adjustment, a very important consideration for this project. Finally, they are low impedance devices, which makes broadband matching much easier. As a bonus, they offer good dynamic range performance, sometimes outperforming NE602-based designs by 15 to 20 dB.

The no-tune requirement caused real problems in the power amplifier. The push-pull amplifier uses a pair of MRF477s that could probably be replaced by a single narrow-band MRF477 amplifier. A narrow-band amplifier would require adjustment, but one would get a significant savings. Additionally, a narrow-band amplifier would give more gain, allowing the driver stage to be run with a bit more feedback, increasing stability. The final amplifier shown is only conditionally stable, it will oscillate with severe mismatches. Fortunately, these transistors are pretty rugged, though you may wish to add some sort of SWR foldback circuitry for added insurance. To keep the costs down, such circuitry wasn't developed. A more complex bias circuit that independently biased the transistors might be better, but the simple circuit shown seems to work adequately with matched pairs of RF transistors.

The biasing circuit shows an interesting change in technology—it's probably more cost effective to use an integrated circuit and a variable resistor than to use the old alternative—a hand-selected 2-W resistor. Of course, if you just happen to have a junk box full of 2-W resistors, you're in good shape.

An 8-MHz IF was chosen, which allows the use of cheap microprocessor crystals and a 6-MHz VFO. Matching transformers are used because the mixer and amplifiers present close to 50-Ω terminations. Two separate four-pole filters are used to get a total of eight poles of filtering.

The cost cutting is most apparent in the simple AGC circuit. Initially, a hang-AGC circuit was used with good results, but it was removed to trim the cost as much as possible. An inferior audio-derived AGC circuit was used instead. One advantage of the audio-derived circuit is that it's less susceptible to BFO leakage, something that can easily be a problem when putting almost all the circuitry for an SSB transceiver on a single, single-sided PC board.

The audio amplifier is an old standby LM380 with an appropriate RC stabilization network on the output. While this IC does not have as much gain, or output, as newer chips, like the Signetics TDA 1015, it does seem easier to use. That's an important consideration when filling a big board with circuits that are bound to interact if you give them a chance. 2N5486 JFETs are used for audio switching. While it's certainly possible to reduce the parts count by using quad switching chips instead of transistors, ICs are more difficult to lay out properly in a complicated circuit. The sidetone is a triangle wave.

The VFO uses a JFET and a MOSFET buffer amplifier. Unfortunately MOSFETs are apparently being phased out, but you can still get them from a variety of surplus sources.

Zack built an "ugly" prototype on several unetched PC boards, and that circuit went through many changes as he worked with the manufacturer. What you see here is the circuit as it was when development stopped. It is presented in the *Handbook* because there has been a consistent demand for an SSB transceiver with more that a few watts of output. Consider this a work in progress. If you build it, drop the *Handbook* Editor a note telling your experience and ideas. With a little more development, this could be a useful and widely popular project.

Construction

If the circuits are all working properly, alignment should be pretty easy. While there are two interactive adjustments for the band-pass filter, the BFO/carrier insertion oscillator and the VFO alignment, they aren't terribly difficult. Other adjustments are the S-meter zero, the sidetone volume, transmit gain, MRF477 bias setting, and mic-gain adjustment.

The bias setting for the finals is a trade-off, as one does get more gain and better IMD performance with a higher bias current, but the amount of heat generated is higher. A setting that results in a total current of 1 A during transmit seems to work well.

The mic gain should be adjusted for 30 W on voice peaks for good linearity, while 40 W is available on CW. One of the prototypes has a noise floor of –129 dBm.

1996 Updates

Lance, WS2B, tells us that Motorola recently discontinued the MRF476 (Q23). NTE Cross Reference software gives the NTE236 as an alternative device.

Dan's Small Parts may have the 40673 and the VN10KM.

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Exhibit 15
Side bar from the ARRL Operating Manual.

Satellite Modes Demystified

Since there are a number of amateur satellites operating, and since they operate on a variety of bands, some way of distinguishing the various combinations of bands became necessary. The first amateur transponder in space was the one carried by OSCAR 6. It received uplink signals at 2 meters and retransmitted them on the downlink at 10 meters. When OSCAR 7 was launched it included a transponder with a 70-cm uplink and a 2-meter downlink. To distinguish between the two, the 2-meter-to-10-meter transponder operation was called "Mode A" and the 70-cm-to-2-meter operation "Mode B."

The launch of OSCAR 8 complicated matters by using a transponder with a 2-meter uplink and a 70-cm downlink, just the reverse of the Mode-B transponder of OSCAR 7. This new transponder was built by Japanese amateurs, and in their honor the new setup was dubbed "Mode J."

OSCAR 10 presented yet another possibility with its 23-cm-to-70-cm transponder. The 23-cm band is in that portion of the spectrum called "L band" by microwave engineers, so this uplink/downlink setup acquired the name "Mode L." A similar situation occurred when OSCAR 13 deployed a 70-cm-to-13-cm transponder. Since the 13-cm band is in the S-band part of the microwave spectrum, this mode is called—you guessed it—"Mode S."

The digital satellites, the first of which was the Japanese OSCAR 12, threw a monkey wrench into this (relatively) simple naming scheme. For the first time, amateurs had to contend with transponders that were different in kind rather than just frequency. FO-12 (and its successor, FO-20) carried both an analog transponder and a digital packet-radio transponder. Both transponders received uplink signals on 2 meters and transmitted on 70 cm, conforming to the Mode J band selection. To indicate the band selection while distinguishing between the analog and digital transponders, the analog operation is called Mode JA and the digital operation Mode JD.

Finally, the RS-12 satellite uses a unique uplink/downlink band pair: 15 meters to 10 meters (Mode K).

Some of the satellites can operate two transponders in conjunction. For example, signals in two separate uplink bands are combined and transmitted on a single downlink. When this is done, the operation is designated by a two-letter mode that encompasses the two transponders. For example, OSCAR 13 can combine its Mode B and Mode S transponders into a single downlink band. This operation is known as Mode BS.

Now, isn't that simple?

It's Very Easy to Work RS-10!

(Reprinted from *OSCAR Satellite Report*)

Think you need much to work RS-10? Wrong! I called CQ this morning using a Kenwood TH-26AT hand-held and its 4-inch "rubber duck" antenna, sending CW with the mike button. Back came VE3DJ in Ancaster, Ontario, totally without prearrangement, and we completed a QSO giving me a 569 report! Power output at this end was about 2 watts for the QSO, but I subsequently heard my downlink Q5 with half a watt output. I used my station receiver for the [10-meter] downlink with a long-wire antenna. The rubber duck was indoors!

This morning I called CQ again on RS-10 with my TH-26AT's push-to-talk button and was answered by W1SJM in New Hampshire, who gave me a 449 report. No rubber duck this time, though. RS-10 was only 17 degrees high to the west, so I needed a really large antenna: an AEA half-wave whip!—*by Ray Soifer, W2RS*

telemetry beacon (see Table 13-1). This signal is transmitted constantly by the satellite and carries information about the state of the satellite's systems, such as its battery voltage, solar-panel currents, temperatures and so on. You should hear it just as the satellite rises above the horizon. As soon as you can hear the beacon, start tuning across the downlink passband.

On an active day you should pick up several signals. They will sound like normal amateur voice and CW contacts. Nothing unusual about them at all, except... it sounds like the signals are slowly drifting downward in frequency! That's the effect of Doppler shift. It's not too serious on the 10-meter downlink, but it can be a challenge when the downlink is at 70 cm because the shift is proportional to the transmitted frequency. (More about the Doppler factor later.) Now tune your transmitter's frequency to the satellite's uplink passband. Send a series of dits while you tune the transmitter frequency (yes, the *transmitter* frequency). With any luck you'll soon hear your own signal coming back down from the satellite. A tentative CQ might bring a call from another station that also has the satellite in view. Give it a try. Did you hear an answer? Congratulations! You've just become a satellite operator.

Movin' On Up—Mode A: While Mode K is fun and exciting, there is much to be said for VHF operation. The noise levels at both the satellite and ground station tend to be lower, allowing better reception. If you have an all-mode (CW and SSB) 2-meter transceiver and an HF transceiver, you're set to operate Mode A on RS-10 or RS-15. (While FM signals will pass through the satellites' transponders, use of FM is strongly discouraged. Because FM transmissions use full power at all times, they require a disproportionate amount of the satellite's available downlink power. A satellite can handle many more simultaneous SSB signals than FM signals, and even one FM signal can degrade the usability of the satellite. But there *is* a way you can use your FM transmitter: as a CW transmitter. See the sidebar: *It's Very Easy to Work RS-10!*)

If you don't have a 2-meter all-mode receiver but you do have a general-coverage HF receiver, you might consider trying a method described by K2UBC in *The Satellite Experimenter's Handbook*, 2nd Edition. He describes how to "pick off" a signal from your FM receiver's IF and connect it to your HF receiver to get CW and SSB reception.

The only significant difference when using a 2-meter uplink or downlink is that the Doppler shift becomes more pronounced. Doppler shift is the same effect you hear from a high-speed passing truck: the truck's sound is higher than normal as it approaches, lower as it retreats from you. The same thing happens to radio signals traveling to and from the satellite. See the sidebar: *Doppler Shift*.

Exotica: Phase 3 Satellites

The limitations of LEO satellites, especially their brief periods of availability, are overcome by a class of satellites called "Phase 3." The name comes from the various phases in the development of amateur satellites. The earliest ones, during Phase 1, contained beacon and telemetry transmitters, but not transponders. These early satellites were all in circular, low-Earth orbits—as were the Phase 2 satellites, which carried communications transponders.

Phase 3 satellites are not in low-Earth orbits. Rather, their orbits describe an ellipse. A Phase 3 satellite swings within a few hundred kilometers of the Earth's surface at one end of the ellipse (the *perigee*) and streaks out to 30,000 km or so at the other end (the *apogee*). The physics of an orbiting body dictates that the satellite spends much more of its time near apogee than perigee. Therefore, the Phase 3 satellites spend most of their

Exhibit 16
***QST* article demonstrating the necessity of CW**
for VHF/UHF experimentation

The attached article from the February 1998 *QST* was written by VHF/UHF editor Emil Pocock, W3EP. Mr. Pocock demonstrates how CW is of critical importance to experimentation, even on those frequencies where CW is no longer a licensing requirement. He notes that

> Given the same operating conditions, messages transmitted by Morse code CW . . . signals are always more effective than modes such as AM, FM, or SSB. . . . CW is generally necessary for effective communications on the bands above 50 MHz when stations are close to their working limits and signals are near the noise level. . . . The apparent gain in signal strength simply by going from SSB to CW can be as much as 12 dB (2 S-units). (Page 86.)

The World Above 50 MHz

Emil Pocock, W3EP*

The Necessity of CW

The movement away from Morse code is not a new trend in the amateur service. As long ago as 1947, the World Administrative Radio Conference waived the international code proficiency requirement for radio operators on frequencies above 1,000 MHz. By 1979 the boundary had been lowered to 30 MHz. The FCC followed other countries and started issuing its first "codeless" Technician license in 1991. That license now provides thousands of US amateurs with access to the bands above 50 MHz without any knowledge of Morse code.

VHF and UHF activity is now dominated by FM voice, FM-repeater and digital techniques, including packet repeaters. These modes are designed almost exclusively for easy, highly reliable, local communications. Morse code plays no role in these activities, save for the occasional CW identification heard of repeater stations. Indeed, most VHF and UHF radios are not even designed for CW, even if the operators were proficient in Morse code! The reality is that Morse code is simply not needed for the vast majority of communication found in the current world above 50 MHz.

This World Above 50 MHz

Even if most VHF and UHF work is over routine, local paths, there are many other activities on the bands above 50 MHz that are not so routine. This column has been devoted to encouraging and chronicling those activities for more than 50 years now. Much of it has involved testing and pushing the limits of communication on the pioneer frontiers of the radio spectrum, whether through technical innovations, better understanding of propagation mechanisms or more refined operating techniques.

Much of that effort has been to extend the distance over which two-way contacts at VHF and higher could be made. Sixty years ago, the VHF bands were dubbed good only for line-of-sight work. Amateurs took up the challenge and discovered several unsuspected means to extend VHF propagation well beyond the line of sight, including sporadic E, aurora, meteor scatter and tropospheric ducting. Now it is common to read about international contacts on the VHF and UHF bands. Morse code helped make these achievements possible and still does.

Weak Signal DX

Working on the frontiers of propagation has often meant dealing with weak signals. Higher locations, bigger antennas, greater power and more sensitive receivers have all been used to push VHF communication to its limits, but there is another trick. Morse code is by far the simplest way to improve station performance, and it is the one consistently used from the very earliest years. Given the same operating conditions, messages transmitted by Morse code CW (continuous wave, if you have forgotten!) signals are always more effective than modes such as AM, FM, or SSB.

The reason is easy to understand. CW signals require only a very narrow receiver passband—100 Hz or even less. This means a great deal less noise gets passed with the desired signal. In contrast, SSB requires at least a 1900 Hz bandwidth for good intelligibility, and with the wider passband comes a great deal of unwanted noise that can bury a weak signal. FM and packet use even wider bandwidths. The apparent gain in signal strength simply by going from SSB to CW can be as much as 12 dB (2 S-units), and considerably more when going from FM. The human ear and brain also seem better able to decipher Morse code signals hovering near the noise level than voice signals.

CW is generally necessary for effective communications on the bands above 50 MHz when stations are close to their working limits and signals are near the noise level. This can be true for the day-to-day DXer, the microwave experimenter, the EMEer and the VHF contester, among others. All rely on CW to make their stations as effective as possible. Most VHF, UHF, and microwave distance records, whatever the means of propagation, were probably made using CW. This should not be surprising, given the great advantage of Morse code over other transmitting modes.

Serious VHF operators are accustomed to switching back and forth between SSB and CW, as conditions demand. It is not unusual for a VHF operator to ask another station to change over to CW in order to complete a contact. Perhaps nothing is more frustrating than to answer a weak SSB station with CW, only to hear him come back with "sorry, I cannot copy code." These same operators are also left out of some common propagation modes and VHF activities that can only be used effectively with CW.

Auroral and FAI

It is difficult, usually nearly impossible, to make contact via auroral scatter or field-aligned irregularities by any means save CW, especially at 144 MHz and higher. Both modes impose Doppler shifts that considerably broaden and distort the resulting signals. The human voice becomes garbled and no receiver and no digital filtering can straighten it out (at least yet!). With care, SSB may be intelligible on 50 MHz and rarely on 144 MHz, but CW is vastly superior and used almost exclusively. The distortion is so great at 222 and 432 MHz that any mode but CW is useless. Modest stations can provide great fun with aurora, but it demands using CW.

EME

The technical difficulties in building a station to send signals to the Moon and detect the reflected echoes are so great that even the best equipped stations must cope with incredibly weak signals. That means using CW and narrow bandwidths to pull the weakest signals from the background noise. Even so, modest stations—even those with single Yagis—can and do make EME contacts. This is great fun and does not require special preparation, but of course (and you have guessed it by now) it does require using CW.

It is true that a handful of the world's best equipped stations can make SSB EME contacts with similarly well equipped stations, but this is exceptional. CW is the rule in the world of moonbounce, and even the best stations must make the vast majority of their contacts on CW.

The International Six-Meter Band

Sporadic E, auroral E and especially F_2-layer propagation, can support strong 6-meter signals over thousands of miles. Modest stations using SSB and even FM voice modes can make international contacts under favorable conditions, and often do. The problem is that conditions are often not favorable. DX on this band is often made under marginal circumstances, and

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