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CQ

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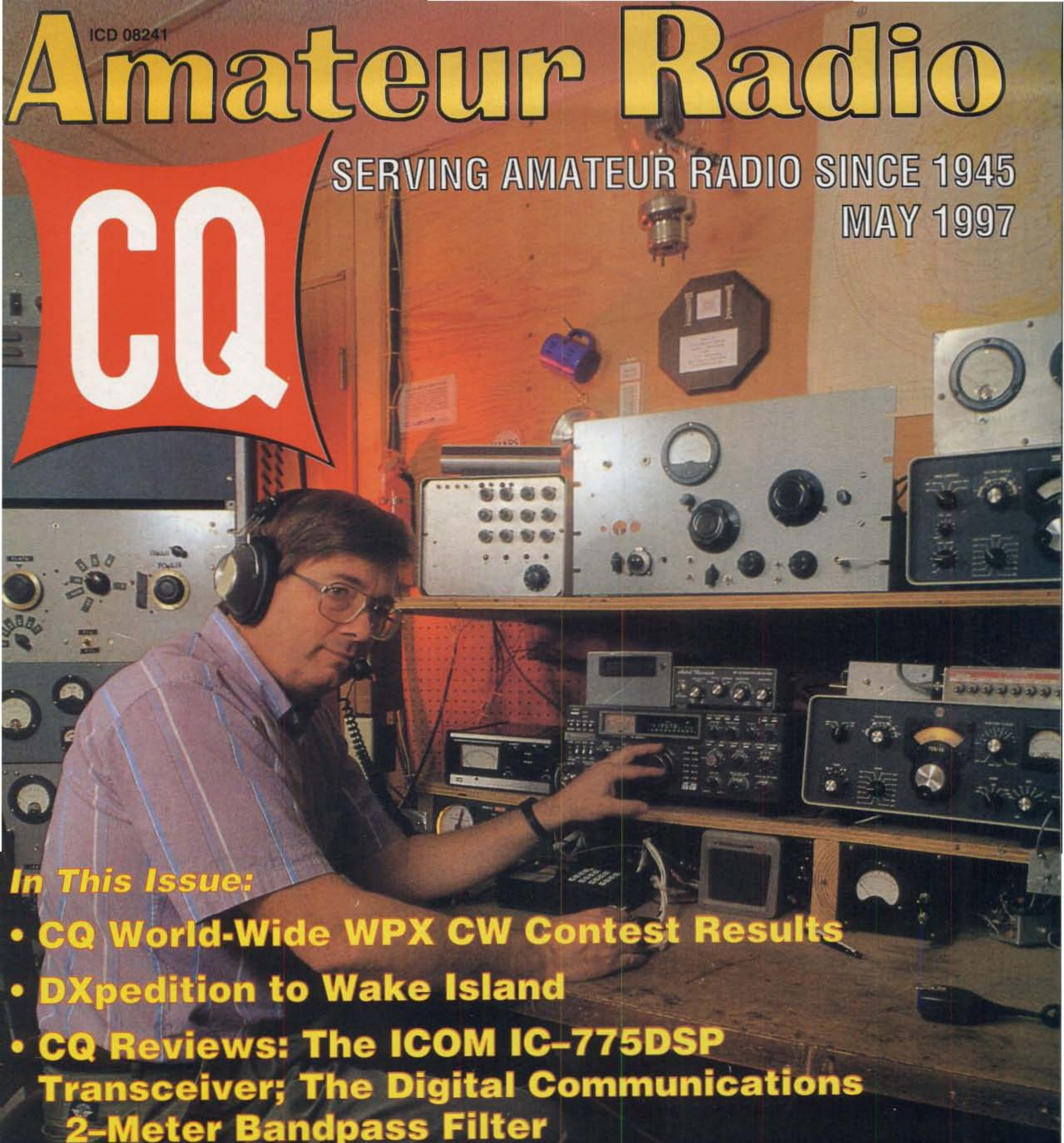

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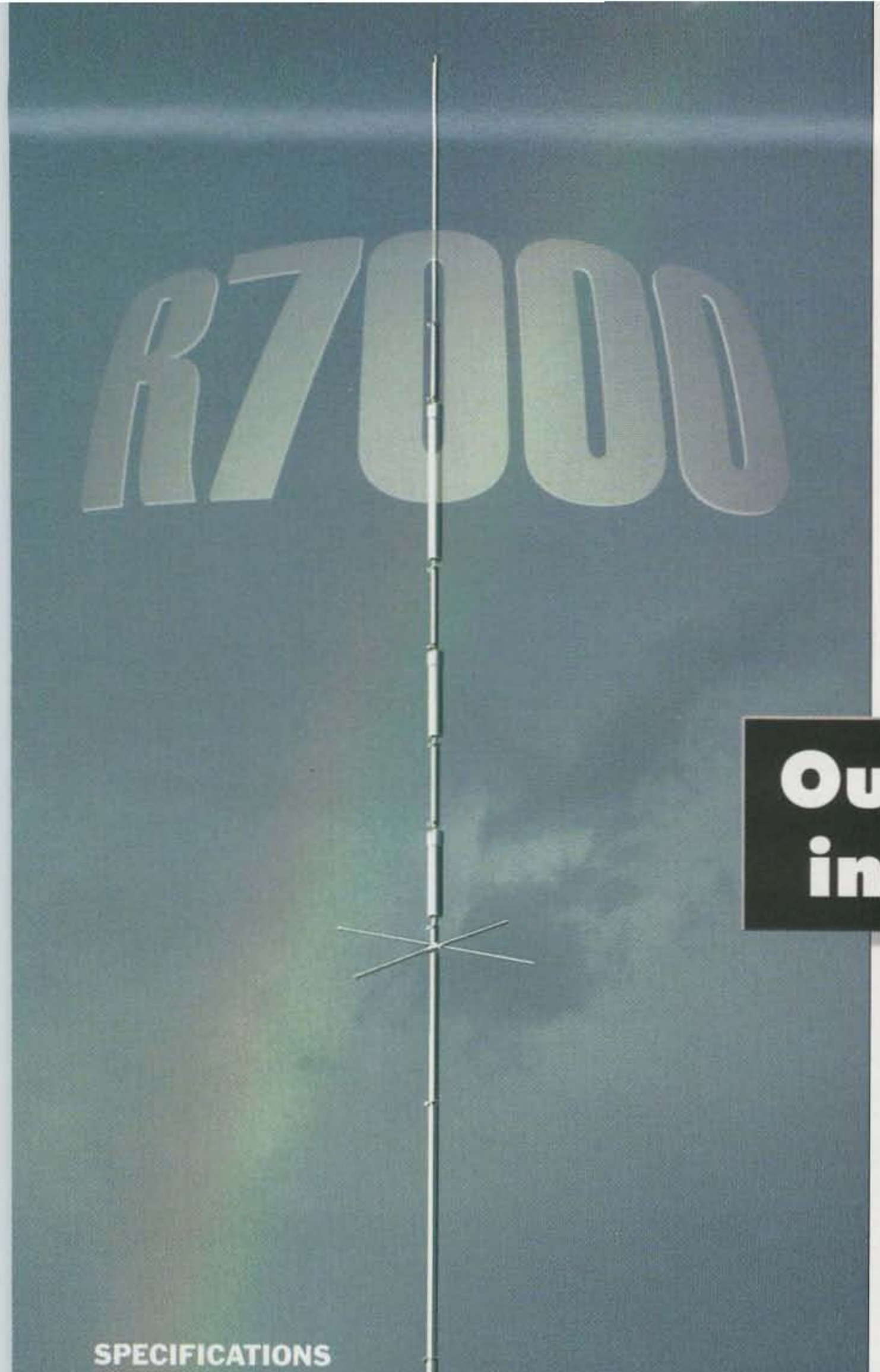
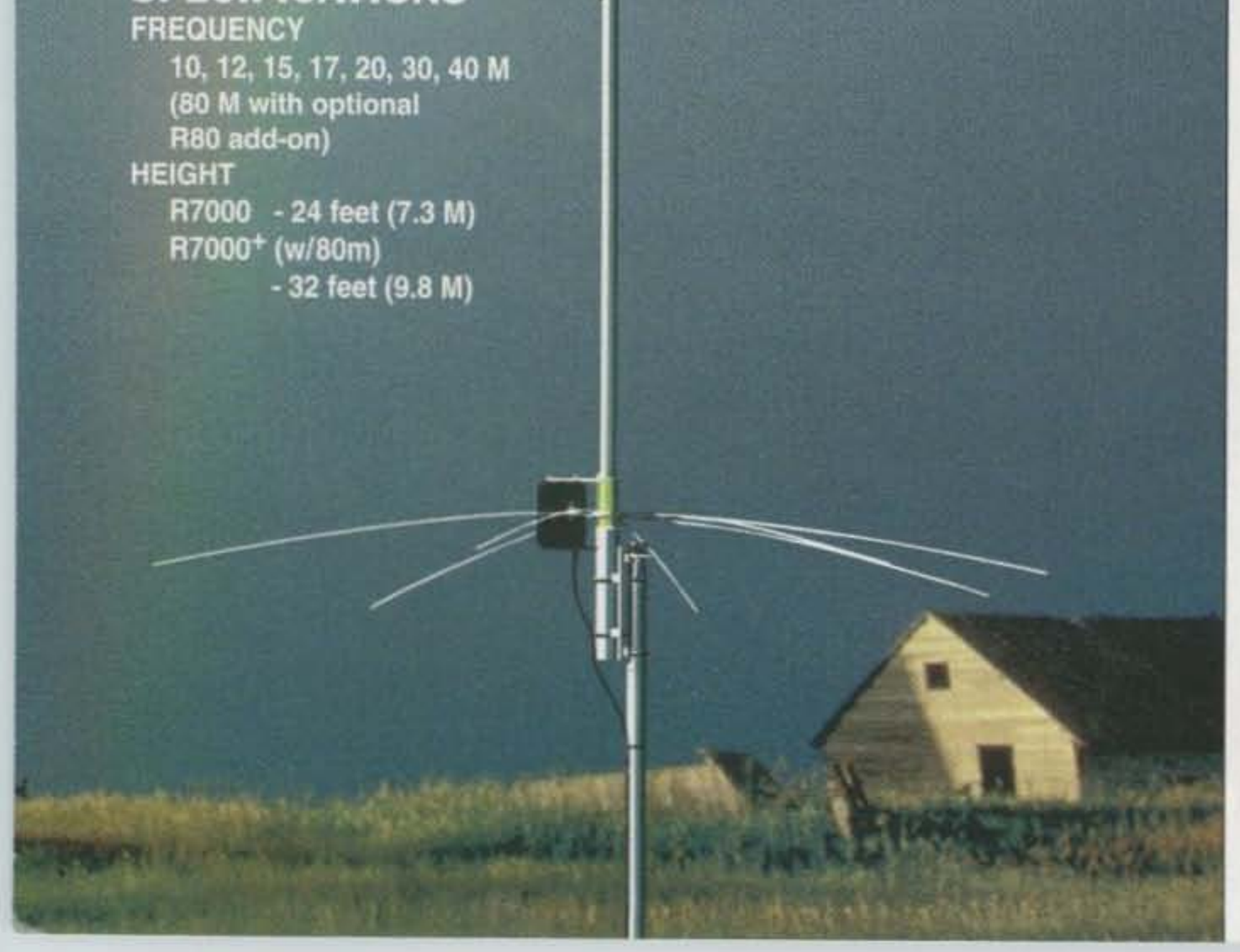


SPECIFICATIONS
FREQUENCY
10, 12, 15, 17, 20, 30, 40 M
(80 M with optional
R80 add-on)
HEIGHT
R7000 - 24 feet (7.3 M)
R7000+ (w/80m)
- 32 feet (9.8 M)



10, 12, 15, 17, 20, 30, 40 Meter

Outstanding Performance, Reliability, and Looks

The Cushcraft R7000 delivers top performance on seven bands in a package ready for home or portable use. The R7000 offers easy assembly, a small footprint, and a "stealthy" appearance in a manageable size. The R7000 is the best choice for all around HF use.

Our customers say it best!

Great Performer

"Making great DX contacts to South America and Europe - in poor propagation conditions. My God what will it be like when conditions improve? . . . can hardly wait . . . will add 80 meters soon. Thank you for an excellent product." N1XAE

Reliable

"The R7000 withstood several New England ice/snow storms with no damage." KA1WIU

Outstanding in its field!

Slim Silhouette

"I have antenna restrictions, but no complaints from neighbors!" KS4VN

Easy Installation and Tuning

"The use of similar size hardware is appreciated as this minimizes the number of tools I have to carry up the ladder . . . After following the R7000 printed instructions the antenna worked the first time. It has been a pleasant experience to put up a vertical antenna which performs to the manufacturer's specifications." K1NB

Automatic Band Changing

"Seven bands right out of the box with no tuning is impressive." WV0H

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A Two Meter delight with many "extras" including Air Band and 440-450 MHz receive. Alinco's popular Channel Scope™ feature alerts you to nearby VFO or memory channel activity, 100 memory channels, autodial memories, 2 VFOs, 9600 packet port, LITZ (long-tone zero) alert and more. Choose the DR-150T or the DR-150TQ that includes CTCSS decode and Tone Scan as standard equipment!

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- 100 memory channels, Two VFOs
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- Air cloning, cable cloning
- Usable for 1200 or 9600 bps packet
- 50/25/10 watt (approx) power output settings
- MARS/CAP capability (permits required)

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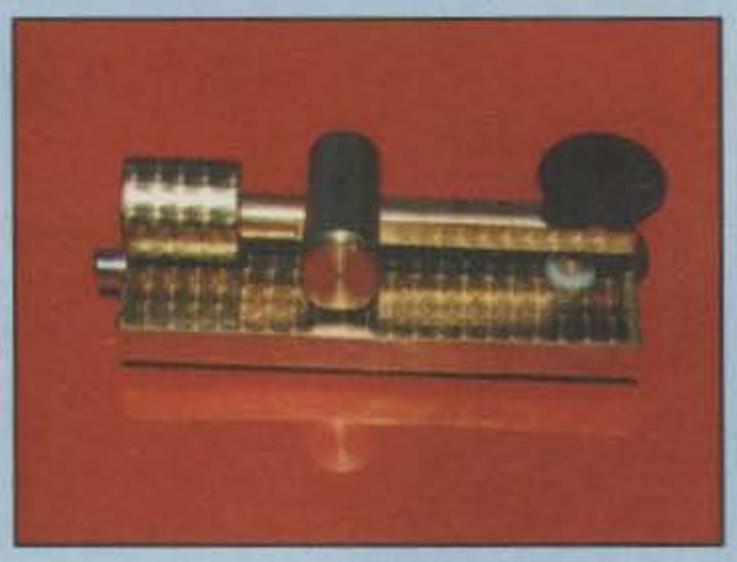

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Features

Departments

ON THE COVER: (Photo by Larry Mulvehill, WB2ZPI)

Meet Bob March, N7UA, of Poulsbo, Washington, located on an island in Puget Sound. As so many of us wish we could, Bob selected the QTH with DXing in mind: 6 acres atop a 400 ft. hill with salt water to the long path—just the stuff that comes in handy when you're DXing on 80 phone and 160 CW. The 4-square on 160 plus beverages for receiving apparently work rather well, as Bob has 221 countries worked on "Top Band." When the sunspots permit, Bob enjoys DXing and contesting on 40 through 10, also. An Electrical Engineer by profession, Bob attributes his career choice to his introduction to Ham Radio at the age of 11 by his mentor, W7APS; he was first licensed as KN7JJL. Like so many of us these days, Bob laments the relatively small number of youngsters who become Hams, and feels strongly about the need to encourage a new generation to taste the joy and satisfaction that grows from the achievement of a Ham license. We heartily agree. (Photo by Larry Mulvehill, WB2ZPI)

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.

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ZERO BIAS

AN EDITORIAL

When I was a kid, I listened to the Lone Ranger on the radio. The announcer would always start with the preamble, "Return with us now to those thrilling days of yesteryear," and we youngsters would get our mind-set ready for cowboys and Indians. Well, to some degree amateur radio today is like sitting back and listening to the Lone Ranger. We all seem to want to return in some part to those thrilling days of yesteryear.

For the last several years I've listened to countless amateurs at hamfests as they tell me what ham radio is really about, what it should be about, and the serious lack of something (they all have a different ingredient) in today's amateur. In some ways, this relates to technical competence and the spirit and tradition of homebrewing. We built our stations, and yes, it was sort of thrilling to be able to get on the air with a rig you built yourself. Of course, we could also run down to the local drugstore and check tubes if a problem arose or simply replace the electrolytic capacitor in the receiver to get rid of the hash. Most drugstores today are not really prepared to check microprocessors. I guess we lived in more adventurous times and were not particularly bothered with voiding a warranty in order to fix something. Our folks probably threw caution to the wind and ripped off those warning tags on mattresses, too.

While nodding at all of the suggestions I receive and sort of agreeing with some of them, it dawned on me recently that for the most part, there aren't any test equipment and tool manufacturers readily visible as exhibitors at hamfests. Certainly you can find some stuff in the fleamarket, but it's generally mixed with a lot of other stuff. And some of the test equipment there defies description as to what it actually tests. Okay, yes, there occasionally are exhibitors selling VOMs and clamp probes for measuring high current, but there is almost nothing for really getting into that brand-new $5000 transceiver and measuring the heck out of it.

The quandary becomes one of access to paraphernalia to measure and quantify the innards and netherparts of that new transceiver (or even build one from scratch), circumvent the proprietary numbers on most parts so that there is the slim chance that RadioShack® might have a replacement, and then effect a miraculous repair should it be needed. I forgot one other item: We still have to buy the big service manual from the manufacturer before we can trace something that resembles a circuit. Perhaps we might even want to make a quick stop at Sears to pick up a good-size rubber mallet to "ease" some of those peculiar square jobs (you know, the things with all the little pins on the bottom) back into their sockets.

Now I know full well that there is a small number of you out there who can and do all of the above with great facility. I wouldn't want to swear an oath as to most of us, regardless of license class. Yes, we can and do build antennas, tuners, amplifiers, and a host of other good stuff around the shack, but bigger gear has simply left most of us with memories of those thrilling days of yesteryear. It's not a sin nor a crime; it's just the way things are in a practical, pragmatic world. The hobby/service grew in proportion to the opportunity for purchasing more and more sophisticated commercial equipment. More and more technology meant more and more amateurs. One way or another, we all evolved more or less into appliance operators, once that most dreaded of insults. We have become skilled manipulators of hardware, whether exotic transceiver or computer (or both), to achieve specific goals. The goal is what is important, not the means, just as a telephone is just the means to talk to someone. No one really cares if it's shaped like a cartoon character or a shoe, or costs $10 or $500. Can it make calls? I don't really know how it works, and don't care. I'm not going to fix it anyway if it breaks.

A lot of us say one thing and yet do another, as evidenced by the recent ARRL survey. Granted though the survey is flawed and specious, the ARRL and numerous individuals want to regard the results as gospel and "so say us all." If you buy the major premise, then to the young people we desperately need, we're all a bunch of "old" hypocrites and something to be avoided. Obviously, that's not the case, although a number of us do speak out of both sides of our mouths. Perhaps a way to dispel that myth is to have asked the survey questions "Do you own the service manual for your transceiver?" "When was the last time you effected a major repair?" Did you build your primary station?" We could also volunteer to retest each time our license comes up for renewal, including a slightly faster CW test. A number of years ago I held a N.Y.S. Joint Pilots and Engineers License for some work that I was doing. It could be renewed twice. The third time you had to retest. No one thought it was odd. It was just the way things were done. We could operate the same way if the test is that important and not just a means of exclusion or a test of motivation. If the test is a measure of what we know and whether we have kept up with changes in technology and laws, then it might be a good thing. If code proficiency at 5, 13, and 20 wpm is that important, then a continual demonstration on a periodic basis, plus proof of use, is not that unreasonable.

We tend to get bogged down in the apparent meaningless and non-relevant aspects of our convoluted licensing structure and forget or discount the magic and flights of fancy that brought us to the hobby in the first place. Each new generation of amateur has fewer or no emotional ties to those golden days of yesteryear and is far more sensitive to the older generation's "do as I say, not as I do" attitude. The simple result of our continual bickering over requirements, whether for need or as a screening technique, is that more and more people are being licensed who want no part of any formal organization such as the ARRL, which in a sense does not represent their interests, foster their views, or in some cases consider them as equals among amateurs. We are slowly approaching 60 percent of the total number of licensed amateurs who will have little or no Morse code experience and will have passed a minimal technical exam. That's over 400,000 people.

It doesn't take a phenomenal number cruncher to see where we're heading. If any sizable number of the 400,000 or so "little or no code" amateurs entice a number of their friends and acquaintances to also become amateurs, then we so-called traditionalists will truly become a minuscule minority. It's also evident that a number of higher class (of license, that is) amateurs also do not follow a traditional path and belong to major groups. Basically, the next several generations of amateurs will come from these groups. This may not be the most desirable situation for amateur radio and especially the ARRL. If, for some abstract reason, a very large number of new no-code amateurs were to join the ARRL and voice a united proposal against any aspect of amateur radio, then that could easily become the official position of the organization. The organization follows what it purports to be the majority of its membership and carries out their wishes. While that may be noble in concept, it generally reverts to a reinforcement of atavism and does nothing for the future.

It's time to look at our relevance in terms of the available technology today and what may be likely tomorrow, and act accordingly. By act, I mean plan for, lead towards, and facilitate our future. The aspects of amateur radio that have drawn all of us to it throughout the years are still there, right now, regardless of sunspot cycles. Many of the options and certainly the variety of activities available today were not even dreamed of 20 or 30 years ago. Those thrilling days of yesteryear are only thrilling because we've chosen to either forget or distort history to suit a particular premise or belief. General Custer wasn't quite the hero the movies made him out to be, and things might have been very different if Marconi came up against NIMBYism and had to fill out Environmental Impact Studies before he could build a tower.

We collectively can choose to be either stumbling blocks or building blocks for the future. The *future* of amateur radio is what it's all about. We've already got today, and it's a bit petty.

73, Alan, K2EEK

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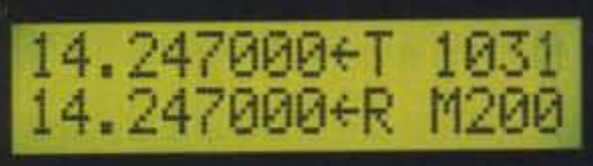

◄ Standard Display shows RX/TX VFO Freq's, time and current memory

◄ Incoming Data

◄ Your Outgoing Data

*US Patent Granted

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Results of the 1996 CQ World-Wide WPX CW Contest

BY STEVE BOLIA*, N8BJQ

The 1996 WPX CW contest experienced the entire spectrum of propagation during the weekend. The bands started hot, cooled off in the middle of the contest, and finished with a bang. Despite the seasonal QRN, low band conditions were excellent, with three new low band world records and several continental records broken. The high bands were spotty, but 20 meters was open 24 hours and was very busy the entire weekend.

DX

3V8BB, again operated by YT1AD, completed a rare double by winning both the SSB and CW single op titles. Africa was again the place to be as both WP2AHW (W2SC op) and HH2PK (9A3A op) posed serious challenges, but could not catch 3V8BB. Multipliers were more plentiful in the Carribean, but QSOs were more plentiful in Tunisia. Fourth place went to USA champion KE2PF, followed by VE3EJ. S59AA was the top European finisher, with GIØKOW and OM8A right on his heels. Rounding out the top ten were K3ZO and TM4US.

Malta was the magic spot in the world on 10 meters. 9H1EL made more than 1600 QSOs on a band that was nearly dead throughout the rest of the world. Second place went to 9A5A, followed by S51AY, UT5UGR, and T99T. South America was the 15 meter hot spot as LU6ETB edged out PR5W (PY5CW operating) for the top spot, with LU7FJ, YV6AZC, and F6BKP pursuing. With 20 meters being open around the clock throughout the world, it's not surprising that the top scores were also not just from one area. OHØNSJ, VP5Z, and YM2ZW finished first, second, and third and less than 200K apart, from three different continents. RZ9UA and YT1BB rounded out the top five and were not that far behind the leaders. The top three 40 meter scores were from South America, with LU1IV breaking VP2VCW's 1986 record by a bunch. XQ1IDM in second and YW1A in third also were above the old record. UA6LAM finished fourth with a European record, and S50A was fifth. EA8/OH2KI erased the 1989 record on YX3A in winning the 80 meter title. LY2BTA was second, 4N1A third, P40A fourth, and UU1J fifth. Top band honors went to Riki, 4X4NJ, also with a world record. SP5GRM was second, S50U third, OH1EH/ OHØ fourth, and 9A4D fifth.

N2WCQ/6W1 (UT4UZ operating) finished at the top of the low power category. Second place went to RAØFU, followed by US champ N2BA, ED3CA, and RA9AE. Rounding out the top ten were AC1O, YU7CB, 9U5DX, EA5FV, and "Rookie" champ IU2E. Europeans swept the top spots on 10 meters with 9A5I first (second overall), followed by T99T and F5PGP. As they did in the high power class, South Americans dominated the 15 meter category with LU7FJ first, YV6AZC second, and LU5VC third. In the closest finish in the contest, VK2APK squeaked by 7M1MCT for 20 meter honors, with IU9AF third, IQ2A fourth, and HA8RH fifth. The top three were separated by less than 60K. EA8CN topped the 40 meter group, followed by ZL3CW (F2CW at the key), PA3AAV, IU3V, and S54A. Eighty meter honors went to ED3ALN, with HA6OY second and 9A240B third. HA8BE was the top band champion, followed by OI1MLB and OK1NG.

ZX2X (operated by PY2OU) was the QRP/p

Hrane, YT1AD, shown at the 3V8BB operating position. Hrane placed first in both modes.

On the left is Martin, LW9EUJ, who took advantage of the station of LU1IV (on the right) to win the world on 7 MHz and set a new world record in the process.

*4121 Gardenview, Beavercreek, OH 45431

TROPHY WINNERS

SINGLE OPERATOR, ALL BAND

World: Steve Bolia, N8BJQ Award. Won by: **3V8BB operated by Hranislav Milosevic, YT1AD**.
USA: Steve Bolia, N8BJQ Award. Won by: **Dave Mueller, KE2PF.**
OCEANIA: Tom Morton, KT6V Award. Won by: **Mirowslaw Rozbicki, VK3DXI.**
Canada: Radio Amateurs of Canada (RAC) Award. Won by: **John Sluymer, VE3EJ**.
Canada Low Power: Amateur Radio League of Alberta. Won by: **Serge Langlois, VD2AWR.**
Japan: The DX Family Foundation Award. Won By: **Fumitaka Asami, JH1AEP**.
Europe: Ivo Pezer, 9A3A Award. Won by: **Franc Bogataj, S59AA.**
USA QRP/p: Richard Arland, K7YHA Award. Won by: **Tom Magera, KA1CZF**.

SINGLE OPERATOR, SINGLE BAND

World: Pedro Piza, Sr., KP4ES Memorial Award (Pedro Piza, Jr., NP4A donor). Won by: **LU1IV operated by Martin Monsalvo, LW9EUJ (7 MHz)**.
World 7 MHz: William D. Johnson, KVØQ Award. Won by: **Nicolas Herrera, XQ1IDM**.
World 3.5 MHz: Lance Johnson Digital Graphics Award. Won by: **Jorma Saloranta, EA8/OH2KI.**
Oceania: D. Craig Boyer, AH9B Award. Won by: **ZL3CW operated by Jacques Calvo, F2CW.**
USA: Kansas City DX Club Award. Won by: **Rick Davenport, Jr., KI1G** (7 MHz).
USA 28 MHz: Bernie Welch, W8IMZ Memorial Award (Walt Smith, K1DWQ donor). Won by: **Robert Patten, N4BP**.
USA 21 MHz: Wayne Carroll, W4MPY Award. Won by: **Robert Beaudoin, WA1FCN**.

MULTI-OPERATOR, SINGLE TRANSMITTER

World: Ron Blake, N4KE Award. Won by: **Station 8R30K operated by OHØXX, OH6DO & 8R1RPN.**
USA: Austin Regal, N4WW Award. Won by: **Station NB1B operated by NB1B, W1KM, W1FJ,K1JKS & WT1O.**

MULTI-OPERATOR, MULTI-TRANSMITTER

World: Dick Frey, K4XU Award. Won by: **Station 9A1A operated by 9A5W, 9A9A, 9A2DQ, 9A2EU, 9A2TS, 9A3NR, 9A4OM, 9A3GW, 9A7R, 9A6A, 9A2B, 9A2R, 9A2SD, 9A3ZA, S51R.**

CONTEST EXPEDITION

World: Ed Roller, K4IA Award. Won by: **Station WP2AHW operated by Tom Georgens, W2SC.**

COMBINED SSB/CW

World: Al Slater, G3FXB Award. Won by: **Hranislav Milosevic, YT1AD**.
Europe: Les Nouvelles DX Group Award. Won by: **R.W.C. Cummings, GIØKOW**.
USA: D. Craig Boyer, AH9B Award. Won by: **Bob Shohet, KQ2M**.

CLUB (SSB & CW)

World: CQ Magazine Award. Won by: **Northern California Contest Club**.
USA: Oklahoma DX Association Award. Won by: **Yankee Clipper Contest Club**.

Ari, OH1EH, operated top band from Aland Island and finished third in the world.

1996 WPX SSB Corrections

The following are corrections to the WPX SSB results published in the March issue.

SØ7NY should have been listed as single operator all band.

AI2C was a TS entry (second place USA).

KB5FZO/T was KB5ZFO/T.

The winner of the USA Novice/Tech plaque was WB2BZR/3/T.

Omitted from the results was:

*WA6KUI A 501,790 531 361 (TS)

VE1RJ was the top Canadian Rookie entry.

7J1AQH operated by VE7HA should have been listed as LP 14 MHz.

champion, with YT7TY second, RA3CW third, VD7SBO fourth, and KA1CZF in the fifth position. GØTDX took the world on 10 meters, as did LU4HFE on 15. TA2BD was the 20 meter QRP champion, with YU1GN a close second. EA3IW edged out VE3SMA for 40 meter honors, and SP4GFG topped HA8LUH for the 80 meter crown. UT8IT was the big winner on top band, followed by YO4FRF.

WF3T was the "Assisted" champion, followed by DL1IAO, AB2E, WK2G, and S53R. IQ7A and K3ANS topped the 20 meter Assisted category; S57AL turned in an excellent score to win the 40 meter title; and DL1FDV won on 80, as did AA2MF on top band. For those who asked, there is a low power Assisted category also, with WS1E the winner, followed by HAØHW and AA3OC.

In the new categories 3V8BB again set the Tribander/Single Element (TS) standard with his top score. 3DAØNX was second, DL2MEH third, LY5W fourth, and ED3CA (low power) fifth. The TS category recognizes stations using just a tribander and a single element antenna for the low bands. Initial responses have been very positive, and the TS category will be carried over into next year. Complete TS results can be found in *CQ Contest* magazine, which will be available about the time you are reading this.

IU2E (operated by IK2VUE) made quite an auspicious start as a double winner in the "Rookie" category with wins on both modes. LY3JY gave Andrea some competition for Rookie honors, followed by OI6KZP.

USA

KE2PF, operating from N2RM's QTH, dominated the US single ops, winning by over two million points. Second place went to K3ZO, followed by KQ2M in a new QTH, KT3Y, and KF3P. Using one of the special Olympic calls may have hindered KM9P more than it helped. Even in the WPX where unusual prefixes are common, many were not expecting the extra digits in the call. Bill finished sixth, followed by K4PQL at KF4IIN, AA3B, K400PI, and AB6FO.

N4BP won 10 meters, with 1995 champion W4YV second. Low power entrant WA1FCN topped the US contingent on 15, followed by W6BSY. Proving that you can win from the "black hole," K8GL easily won 20 meter honors with only modest antennas. N7TT was second and W5FO third. KI1G set a new 40 meter record on his way to the top spot. N6MU was second and W3GH finished third. W3BGN suffered through the static to take US 80 meter honors, and WA3WJD did likewise on top band.

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- Interface to a PC for frequency download using optional OptoLinx PC interface
- Distinctive beeps indicate frequency hits, pager style vibrator for discreet recording
- Automatic EL backlight for night operation
- 16 segment RF signal strength bargraph
- Frequencies are automatically saved when unit is turned off
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Scout with ICOM IC-R10
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WORLD TOP SCORES

SINGLE OPERATOR ALL BAND

3V8BB.....11,739,750
WP2AHW.....10,533,756
HH2PK.....9,519,495
KE2PF.....6,790,795
VE3EJ.....6,420,724
S59AA.....5,160,400
GIØKOW.....5,004,175
OM8A.....4,958,865
K3ZO.....4,710,325
TM4US.....4,624,230
KQ2M.....4,598,300
KT3Y.....4,351,344
KF3P.....4,115,584
OM7DX.....3,980,325
KM9ØØP.....3,807,916
RN6BY.....3,792,735
KF4IIN.....3,613,572
OM5A.....3,507,822
EA2IA.....3,385,344
PA3DZN.....3,241,422

28 MHz

9H1EL.....670,500
*9A5I.....124,425
S51AY.....113,953
UT5UGR.....96,992
*T99T.....91,800
*F5PGP.....77,952
*YU1EA.....66,729
G4IFB.....66,248
*IT9ORA.....60,368
LZ2KRU.....57,996

21 MHz

LU6ETB.....1,726,540
PR5W.....1,718,931
*LU7FJ.....1,552,485
*YV6AZC.....901,600
F6BKP.....550,638
S5ØD.....437,864
LU5VC.....432,653
UA4LM.....279,321
YU7BW.....186,930
S57J.....183,106

14 MHz

OHØNSJ.....3,567,906
VP5Z.....3,448,068
YM2ZW.....3,302,023
RZ9UA.....2,964,240
YT1BB.....2,807,168
OH5NQ.....2,749,483
Z3ØM.....2,651,040
TMØX.....2,563,636
9AØCW.....2,477,820
K8GL.....2,299,776

7 MHz

LU1IV.....7,160,088
XQ1IDM.....5,754,716
YW1A.....4,994,880
UA6LAM.....3,760,164
S5ØA.....3,568,824
S5ØC.....3,418,170
CY7A.....3,317,356
OT6T.....3,316,534
SP7GIQ.....3,280,800
PYØFF.....2,881,100

3.5 MHz

EA8/OH2KI.....1,358,852
LY2BTA.....967,974
4N1A.....905,256
P4ØA.....873,108
UU1J.....806,124
LY6K.....721,026
9A7A.....693,998
*ED3ALN.....678,536
LZ6R.....630,648
YT6A.....601,622

1.8 MHz

4X4NJ.....259,420
SP5GRM.....220,884
S5ØU.....175,440
OH1EH/OHØ.....167,424
9A4D.....149,362
*HA8BE.....137,592
LY3BU.....120,328
*OI1MLB.....86,800
OM3OM.....79,248
*OK1NG.....64,680

LOW POWER ALL BAND

N2WCQ/6W1...3,179,222
RAØFU.....2,369,088
N2BA.....2,002,635
ED3CA.....1,945,125
RA9AE.....1,893,800
AC1O.....1,719,354
YU7CB.....1,366,728
9U5DX.....1,240,566
EA5FV.....1,200,991
IU2E.....1,152,242
WA1LNP.....1,129,101
DL3HRJ.....1,076,758
YO3FRI.....1,042,783
EA3AKY.....1,020,052
LY2FN.....1,013,626
RN3QO.....993,776
SP2QCH.....969,220
YO2DFA.....949,248
F5NLY.....919,863
S51FA.....863,559

28 MHz

9A5I.....124,425
T99T.....91,800
F5PGP.....77,952
YU1EA.....66,729
IT9ORA.....60,368

21 MHz

LU7FJ.....1,552,485
YV6AZC.....901,600
LU5VC.....432,653
YU7BW.....186,930
S57J.....183,106

14 MHz

VK2APK.....1,374,728
7M1MCT.....1,371,681
IU9AF.....1,315,608
IQ2A.....1,237,104
HA8RH.....1,174,104
OI3LIM.....860,310
S57T.....817,225
LY3BA.....806,883
UA4LL.....727,425
HAØHV.....725,220
S57U.....690,146

7 MHz

EA8CN.....1,513,332
ZL3CW.....1,416,768
PA3AAV.....1,133,860
IU3V.....1,099,072
S54A.....1,000,500
TK/DK7YY.....971,460
US2YW.....728,530
OK1EE.....635,800
SP2NA.....589,600
YU7WJ.....562,302

3.5 MHz

ED3ALN.....678,536
HA6OY.....477,280
9A24ØB.....387,612
OK1JOC.....361,950
TA2DS.....355,698
DL4FMA.....339,808
SM7VZX.....296,500
HA4FV.....283,128
S51EA.....254,664

1.8 MHz

HA8BE.....137,592
OI1MLB.....86,800
OK1NG.....64,680
UU5JAA.....53,360
SP5GH.....38,080

QRP/p

ZX2X.....A.....861,080
YT7TY.....A.....761,600
RA3CW.....A.....657,696
VD7SBO.....A.....373,092
KA1CZF.....A.....362,796
GØTDX.....28.....20,880
LU9HUP.....28.....5,084
LU4HFE.....21.....4,477
JH1HRJ.....21.....3,337
TA2BD.....14.....288,376
YU1GN.....14.....204,408
JH1GNU.....14.....161,007
G3LHJ.....14.....80,937
UT5USQ.....14.....76,428
EA3IW.....7.....64,528
VE3SMA.....7.....48,216
N2PEB.....7.....37,184
W8QZA/6.....7.....21,582
VK5AGX.....7.....3,256
SP4GFG.....3.5.....131,016
HA8LUH.....3.5.....103,012
UA4SMM.....3.5.....50,960
W1MK.....3.5.....34,668
UT5UQV.....3.5.....16,102
UT8IT.....1.8.....23,750
YO4FRF.....1.8.....2,730

SINGLE OPERTOR ASSISTED ALL BAND

WF3T.....2,116,884
DL1IAO.....1,982,766
AB2E.....1,341,680
WK2G.....1,283,428
S53R.....819,280
N6ZZ.....678,300
JH3AIU.....673,072
*WS1E.....655,557
N8BJQ.....636,124
N1CC.....552,520

14 MHz

IQ7A.....883,500
K3ANS.....505,932
W6TKF.....196,087
S58MU.....104,424
JA9XBW.....77,588

7 MHz

S57AL.....1,453,224
AA8UH.....137,710

3.5 MHz

DL1FDV.....334,642

1.8 MHz

AA2MF.....320

LOW POWER ALL BAND

WS1E.....655,557
HAØHW.....212,344
AA3OC.....208,278
K1EFI/VP9.....122,578
JK2VOC.....103,040

TRIBANDER/SINGLE ELEMENT

3V8BB.....11,739,750
3DAØNX.....2,836,452**
DL2MEH.....2,215,400
LY5W.....2,120,568
*ED3CA.....1,945,125
N4ZR.....1,890,800
MJ/K2WR.....1,743,364
LY2BM.....1,458,080
*YU7CB.....1,366,728
K9LJN.....1,356,048

LOW POWER

ED3CA.....1,945,125
YU7CB.....1,366,728
EA5FV.....1,200,991
EA3AKY.....1,020,052
F5NLY.....919,863
UA3ABJ.....764,256
WD5K.....668,044
9M2TO.....632,930

ROOKIE ALL BAND

*IU2E.....1,152,242
LY3JY.....1,118,702
OI6KZP.....740,880
*IKØVSW.....697,774
*PU2MHB.....408,382

28 MHz

*DK5ZX.....1,400

7 MHz

*KE3VV.....20,600

3.5 MHz

*S51S.....234,734
*S57NLB.....62,440

LOW POWER

IU2E.....1,152,242
IKØVSW.....697,774
PU2MHB.....408,382
ON4CAS.....218,652
PA3GPX.....81,906

28 MHz

DK5ZX.....1,400

7 MHz

KE3VV.....20,600

3.5 MHz

S51S.....234,734
S57NLB.....62,440

MULTI-OPERATOR SINGLE TRANSMITTER

8R3ØK.....12,302,226
P42V.....11,617,600
IH9/OK1CW...10,449,048
LZ9A.....7,348,175
NB1B.....6,256,128
LZ8A.....5,510,484
HG3O.....5,326,202
K1ZZ.....5,148,760
RU1A.....5,018,972
OH2IW.....5,007,905

MULTI-OPERATOR MULTI-TRANSMITTER

9A1A.....16,268,490
YTØW.....14,550,580
EM2I.....12,380,505
OT6A.....10,243,140
AL3/N7DF.....9,897,586
RW2F.....9,648,666
PA6WPX.....8,072,976
9H3TY.....7,989,445
ED4ML.....6,373,344
LY7A.....5,834,928

**Denotes low power.*

N2BA turned in a great low power score (third in the world LP and number 11 overall) to take the US championship. AC1O was second, with WA1LNP, WD5K, and KG4W rounding out the top five. N5NMX had the top 10 meter score, as did WA1FCN on 15. KØEJ edged out KK9W for 20 meter honors, and AA2SZ finished on top on 40. W4YDD topped the 80 meter category, and AA9AX won on top band.

N4ZR was the first winner of the Tribander/Single element category, with K9LJN second, N9AG third, WR3O fourth, and KC6X fifth.

WF3T topped the world in the "Assisted" class, with AB2E second, WK2G third, N6ZZ fourth, and low power leader WS1E fifth. K3ANS won the 20 meter category, AA8UH won on 40, and AA2MF won on 160.

KA1CZF topped the QRP/p stations, with

K1VUT right behind and KA4RRU third. WA6FGV won the US on 15, N8CQA did likewise on 20, and N2PEB and W1MK won on 40 and 80.

Multis

8R30K operated by OHØXX, OH6DO, and 8R1RPN are the world multi-single champs. Second went to AI6V and NB6G at P42V, with IH9/OK1CW third, LZ9A fourth, and US champ NB1B fifth. The gang at 9A1A took the multi-multi title, just missing the record. Second place went to YTØW, followed by EM2I, OT6A, and AL3/N7DF (who was in Alaska).

In the USA, NB1B operated by NB1B, W1KM, W1FJ, K1JKS, and WT1O finished on top of the multi-single category. The two-man team of K1ZZ and AA2Z came in second, followed by NJ4F, KVØQ, and WC4E. In a close multi-multi race the East Coast came out on top with WZ1R edging out K3EST for the title. WD8LLD was third and AA9OC came in fourth.

Bolstered by a couple of contest expedition scores, the Northern California Contest Club (27 entries) was the 1996 club champion. Finishing a very close second was the Yankee Clipper Contest Club (60 entries), followed by the Slovenia Contest Club (63 entries) and the Potomac Valley Radio Club (32 entries).

The Rest of the Story

To commemorate the 1996 Summer Olympics, special prefixes were authorized for use by US amateurs operating from the state of Georgia. Many were on for the contest, including the previously mentioned KM900P and K400PI, as well as KB96GID, KR26DL, K96BAI, AA96GA, and several others who made these and other unique prefixes available during the contest.

In addition, many other unique and commemorative prefixes were active during the contest period. Amateurs in Austria and Hungary got to use OEM and HAM, respectively, and many others throughout the world took the time and went the extra mile to activate special contest prefixes.

We also had several expeditions for the contest. W2SC did an outstanding job from WP2AHW, as did N2WCQ/6W1 (UT4UZ) from Senegal, W5ASP from VP5Z, EA8/OH2KI, OH1EH, OH1NSJ, and OH1XT who operated from OHØ, 8R30K, IH9/OK1CW, FR/DL1VJ, and several others.

There has been much speculation and discussion about moving the CW WPX Contest from May to the weekend vacated by the Dayton Hamvention to get away from the US holiday weekend and take advantage of the better conditions in April. This is under consideration and I would like to hear your thoughts on this, both for and against (and there are some).

Three combined trophies are given out each year to recognize operators who participate in both modes. The Al Slater, G3FXB, memorial trophy for the highest combined score in both modes went to 3V8BB operated by YT1AD, with first place finishes in both contests. The top combined score in Europe (Les Nouvelles DX Club award) went to GIØKOW, and Bob Shohet, KQ2M, is the winner of the AH9B sponsored USA combined award. Congratulations to these talented operators who placed high up in both modes. To be eligible for one of the combined awards, you have to enter both modes as a single operator, all band participant.

One new trophy has been added for the 1997

USA TOP SCORES

SINGLE OPERATOR ALL BAND

KE2PF	**6,790,795**
K3ZO	4,710,325
KQ2M	4,598,300
KT3Y	4,351,344
KF3P	4,115,584
KM900P	3,807,916
KF4IIN	3,613,572
AA3B	2,506,786
K400PI	2,463,945
AB6FO	2,141,737
*N2BA	2,002,635
N4ZR	1,890,800
NB6U	1,764,135
*AC1O	1,719,354
W9LT	1,633,280
NA5Q	1,593,352
K5ZD	1,420,184
K9LJN	1,356,048
N9AG	1,237,497
K5YAA	1,211,800

28 MHz

N4BP	**19,257**
W4YV	7,905
*N5NMX	5,394
W2HG	984
KA1VMG	90

21 MHz

***WA1FCN**	**31,974**
W6BSY	27,537
*KN4Y	14,700
*KU6T	3,000
*NP4IW/WX6	2,340

14 MHz

K8GL	2,299,776
N7TT	1,192,240
W5FO	1,152,210
KB5WWA	977,976
KY2P	879,448
WA7FAB	713,416
VE7UF/W7	614,790
K9BG	483,582
KØRWL	433,075
*KØEJ	374,420

7 MHz

KI1G	**2,573,408**
N6MU	1,031,490
W3GH	930,528
*AA2SZ	238,896
*W3CPB	133,350
K2XA	130,848
*WA7BNM	113,834
W8AEF	86,190
KX7L	76,930
KE3VV	20,600

3.5 MHz

W3BGN	289,960
W2FR	18,048
*W4YDD	1,150

1.8 MHz

WA3WJD	6,240
*AA9AX	192

LOW POWER ALL BAND

N2BA	2,002,635
AC1O	1,719,354
WA1LNP	1,129,101
WD5K	668,044
KG4W	646,750
N2LSK	587,904
WA6KUI	568,836
AE6Y	475,888
K96BAI	404,736
WV5S	355,576

28 MHz

N5NMX	5,394
KA1VMG	90

21 MHz

WA1FCN	31,974
KN4Y	14,700
KU6T	3,000
NP4IW/WX6	2,340

14 MHz

KØEJ	374,420
KK9W	308,250
WS8O	225,330
N8II	204,325
K2AW	140,436

7 MHz

AA2SZ	238,896
W3CPB	133,350
WA7BNM	113,834
KX7L	76,930
KE3VV	20,600

3.5 MHz

W4YDD	1,150

1.8 MHz

AA9AX	192

TRIBANDER/SINGLE ELEMENT

N4ZR	1,890,800
K9LJN	1,356,048
N9AG	1,237,497
WR3O	982,646
KC6X	714,896
*WD5K	668,044
*N2LSK	587,904
KB96GID	516,312
W3GOI	442,530
WB5B	411,985

SINGLE OPERATOR ASSISTED ALL BAND

WF3T	2,116,884
AB2E	1,341,680
WK2G	1,283,428
N6ZZ	678,300
*WS1E	655,557
N8BJQ	636,124
N1CC	552,520
KO4EW	464,492
WB5B	411,985
KA5W	248,100

14 MHz

K3ANS	505,932
W6TKF	196,087
KB8NTY	74,907
WA2TIF	46,872
K9OSH	21,960

7 MHz

AA8UH	137,710

1.8 MHz

AA2MF	320

QRP/p

KA1CZF	**A**	**362,796**
K1VUT	A	338,826
KA4RRU	A	280,800
N6OJ	A	75,762
W2TZ	A	71,060
WA6FGV	21	1,764
N8CQA	14	7,008
N2PEB	7	37,184
W1MK	3.5	34,668

MULTI-OPERATOR SINGLE TRANSMITTER

NB1B	**6,256,128**
K1ZZ	5,148,760
NJ4F	4,231,385
KVØQ	3,845,786
WC4E	3,639,510

MULTI-OPERATOR MULTI-TRANSMITTER

WZ1R	5,729,640
K3EST	5,276,526
WD8LLD	3,673,141
AA9OC	2,878,143

*Denotes low power.

contest. A USA multi-multi award is now sponsored by Scott Robbins, W4PA, and Doug Robbins, W2DR. Additional trophy donors are always welcome. Please contact me if you are interested.

My thanks to the rest of my crew, EA3DU and N9AG, for their help with the log processing and checking. If you are interested in helping out, please drop me a note.

The 1997 CW contest will be held on May 24th and 25th. Summary sheets and rules can be obtained from *CQ* for an SASE. Rules can also be found posted on the WPX web page at <http://ourworld.compuserve.com/homepages/n8bjq> along with other WPX information. Make sure to mark your logs WPX CW so they get put in the right box in Hicksville. Logs can also be e-mailed to <N8BJQ@ERINET.COM>. See you in the contest!

73, Steve, N8BJQ

WHO SAYS YOU CAN'T IMPROVE A MASTERPIECE

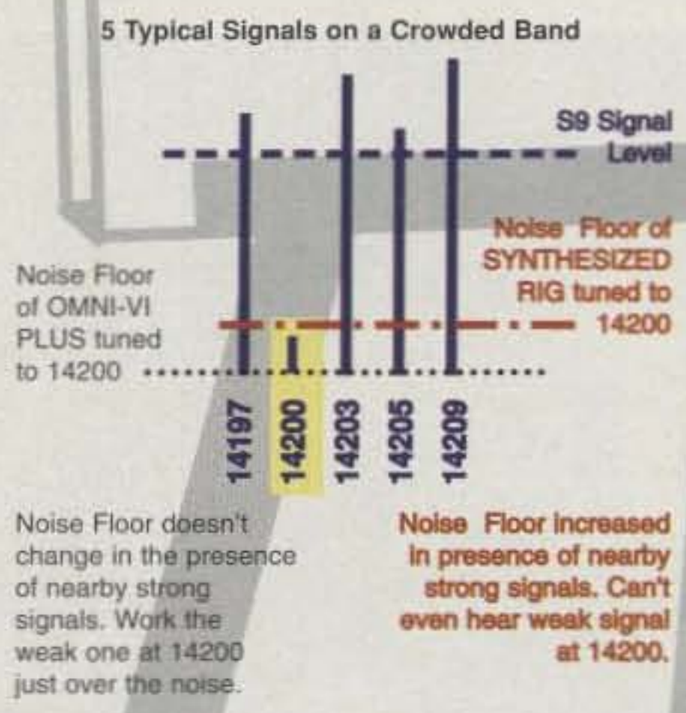
Like a great artist who steps back, reflects, then adds a final brush stroke, we hams at TEN-TEC could not resist a few subtle but powerful refinements to our treasured OMNI-VI. Take a look at this new "OMNI-VI *PLUS*", and judge for yourself how we improved a masterpiece....

JUST THE RIGHT AMOUNT OF DSP...

...to forget about those add-on DSP boxes. New, single button NOISE REDUCTION improves signal-to-noise on the weakest signals - makes SSB and CW leap out of the noise. DSP LOW PASS is now available in all modes providing 5 choices to cut the highs "just the way you want" to reduce listening fatigue. Rig even remembers your separate choices for SSB and CW. The DSP processor adds two more subtle features to the canvas. Built-in AUTO NOTCH instantly eliminates interfering carriers - now work 40 meters day or night. Finally, CW transmit offset is adjustable 400 - 990 Hz with auto tracking sidetone.

WORK STATIONS OTHER RIGS CAN'T EVEN HEAR

Let's compare OMNI to any competitor's synthesized rig with both tuned to the same frequency.



Phase noise generated *inside* the competitor's rig causes the noise floor to *temporarily* increase, covering weak signals *inside* your passband, especially when strong signals *outside* your passband are within a few KHz of where you'd like to listen. No other transceiver comes close. With this masterpiece in your shack, you'll work stations missed by others.

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Random Comments—USA

"This was my first WPX and was a blast! I was first licensed as a ham on April 28, 1995. The new "rookie" category is a wonderful thing. I hope it will encourage many other new hams to join in what has become my favorite facet of amateur radio—contesting. . . . *AA0XZ*. Good contest! Time to step up to computer logging and serious scores. . . . *AA1ER*. This is the first contest that someone asked *me* to QRS. I guess the CW practice is working. . . . *AA8UH*. A 20% score improvement over last year at the absolute bottom of the sunspot cycle, I'll take it. . . . *AB6FO*. ARC welding academy next door was apparently holding exams again. . . . *AB6YL*. KØRI uses a 160 meter horizontal loop fed with balanced feedline through a tuner for all band operation. I strongly support the new categories and hope they will be an incentive for "little pistol" ops to show their contesting skills. . . . *KØRI*.

Had to use the beverages on 20 meters it got so bad. . . . *K4ØØPI*. Good time, but condx not all that hot. Good thing 20 was open!. . . . *K7ABV*. Enjoyed my 50th birthday in WPX struggling against the sunspot null. Myself and propagation are over the hump now. We can only get better!. . . . *K7NPN*. Great contest. What is this about sunspot minimum, on 20 meters from the Midwest "hole" with no stack and modest antennas? Ignore the skeptics. It is possible to do well in contests with modest setups. The weak, watery S0 sig in the beginning of the test turned out to be a patient 9M2 trying to work his way through the European piles. Nice surprise! Need more SA/AF activity. . . . *K8GL*. Good 40 and 80 prop. . . . *KA1DWX*.

Weather too nice to spend inside contesting. No offspring to do the chores!. . . . *KA2AOT*. The contest was fun as usual. It was great to be giving out an unusual prefix this time. Unfortunately, the prefix probably slowed me down rather than helping the score. I'm sure there are a lot of KB9BGI's in WPX logs this year. Thanks to those who copied the call on the first try! . . . *KB96GID*. Ah, yes, I remember the ancient past when there were things called sunspots and life was good. Oh well. For now there is only one way for the sunspot count to go from here—*up*. Ten meters was useless and 15 wasn't much better. There was terrible seasonal QRN on 80. One consolation, 20 meters was in great shape—open all day and night. . . . *KC6X*. First contest of any kind. . . . *KE3VV*.

This was my first WPX CW. Had a fun time. Can't wait until next year once I get the tower up. . . . *KE6BER*. Not bad condx for bottom of cycle. Condx seemed to degrade Friday nite with usual poor AM opening (and QRN). Saturday night was a pleasant surprise here as the low bands opened with low noise. . . . *KF4IIN*. Well, at least I got more points than last year. Conditions weren't that bad, but a lot of big signal DX can't hear as far as they can talk. . . . *KJ9C*. I'll never use a crazy callsign like KM9ØØP again. When I was calling guys, they wouldn't get the callsign. . . . *KM9ØØP*. The signals went around and over QTH, but still worked 37 new US counties. . . . *KN4Y*. Really a thrill to do so well with just wire antennas at low heights. Gained about 10 dB of signal from last year. Now I can't wait for towers, hardline, and better amp for another 10 dB on each band! . . . *KQ2M*.

Beat my 1994 score despite fewer Q's and nighttime thunderstorms. . . . *KRØI*. Operating with this Olympic Special Event call was a *huge* mistake, as was assuming the correct copy of CT was provided to me at Dayton. Only a few people copied the call right first time; some probably never got it right. . . . *KR26DL*. I thought my total score turned out to be quite unique (777,777). Bet I can't do that again. . . . *KW2J*. I have been a ham for only three years. My code copying skills are still neophyte, but each contest helps me improve my code skills. Someday I may be a force to be reckoned with. For now, I will just have fun. . . . *N1OPZ*. Always enjoy this contest! Saturday was great but the going got tough on Sunday. Thanks to all who list so we can get 10 and 15 meters back. Still beat my numbers from last year even with declining conditions. . . . *N2LSK*.

My first time with (relatively) high power. A whole different experience because of the stations you smoke out who are waaay down in the noise. . . . *N4ZR*. Things got off to a good start with 82 QSOs the first hour. Everyone was answering my 100 watt

Yuri, RA0FU, was number two in the low power, all band category.

lickety split and every station was new. Things went to pot the next AM and stayed that way. I couldn't get a good run going at any time, but kept trying. Tnx to all of those who activated rare prefixes. . . . *N8II*. Pray to the Sun Spot Gods. It can't hurt. . . . *NJ3K*. Where were the USA prefixes on 80?. . . . *W3BGN*. Unfortunately, at this time of year the "estate" needs a lot of work, and the mistress of the manor was unrelenting, as long as the sun was shining. Thanks for setting up the TS category. It think it will make a lot of ops feel more "competitive." . . . *W3GOI*.

My score won't scare anyone but had a lot of fun in contest. . . . *W4KYW*. Five hours lost Saturday evening due to neighbor's electric fence controller QRM. . . . *W7HS*. At this point in the cycle, patience is a virtue on 15/10 meters. . . . *WA1FCN*. Chose to work only four bands. Mucho static crashes Sunday. . . . *WA6KUI*. Due to the conditions, decided to try 40 meters single band, rather than 15 meters. Glad I did. Not a serious effort, but had fun, and it was a welcome relief from cleaning the garage. . . . *WA7BNM*. Thanks for the nice contest. It's fun to watch computer add up points when I get a new multiplier. WPX is fun for us little pistols with dipoles up 30 feet. . . . *WA8AHK*. I was ready to go until Murphy put a leak in my water main on Friday. Digging up and repairing the pipeline certainly put a "damper" on my efforts this year! Decided to go for 500 QSOs and 250k points instead of all-out. Better luck next time. . . . *WQ7T*.

My first try at the WPX Contest. I had a good time despite the QRN. This was the first DX contest that I actually enjoyed myself some, probably because there was plenty of NA to work when the DX dried up. Having a relatively rare prefix helped, as I was able to run Europe for the first time (with plenty of NA mixed in). . . . *WR3O*. New antenna on 40. Great! Band condx good for a change. . . . *WT8P*. QRP operation certainly brings a new perspective to this contest. It was a real educational experience, especially in relation to propagation. . . . *K1VUT*. Third year QRP/p. What a blast! Always a thrill to work the DX with 5 watts and a dipole. . . . *N2PEB*. It was a great thrill to work BY5XX

Dmitry, UT5UGR, was fourth in the world on 28 MHz.

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CW & SSB CLUB COMPETITION

CLUB	SCORE	NR OF LOGS
NORTHERN CALIFORNIA CONTEST CLUB	**82,085,236**	**27**
YANKEE CLIPPER CONTEST CLUB	**78,148,760**	**60**
SLOVENIA CONTEST CLUB	58,336,589	63
POTOMAC VALLEY RADIO CLUB	56,475,744	32
CONTEST CLUB FINLAND	42,395,997	19
ARAUCARIA DX GROUP	39,945,747	6
FRANKFORD RADIO CLUB	38,102,407	25
CROATIAN DX CLUB	36,508,122	3
LES NOUVELLES DX GROUP	36,275,026	28
UKRAINIAN CONTEST CLUB	34,815,712	28
YU DX CLUB	33,108,590	8
RHEIN RUHR DX ASSN.	28,979,603	27
MARCONI CONTEST CLUB	25,327,951	7
BAVARIAN CONTEST CLUB	23,746,745	10
9A CW GROUP	21,616,545	4
NORTH COAST CONTESTERS	20,410,974	11
LITHUANIAN DX GROUP	18,917,032	19
KAUNAS UNIV. OF TECH. RADIO CLUB	18,814,382	17
CONTESTGROUP OUDE MAAS	18,757,986	2
MAD RIVER RADIO CLUB	17,148,047	11
PETROVO RADIO CLUB	14,896,570	3
YUCWK CLUB	14,550,580	1
CHILTERN DX CLUB	14,069,966	6
SP DX CLUB	13,579,865	28
VOJVODINA CONTEST CLUB	12,958,942	7
LOW LAND CRAZY CONTESTERS	11,211,681	4
BC DX CLUB	10,991,674	3
MOSCOW DX CLUB	10,364,089	3
RADIOTEAM FINLAND	10,099,584	1
TESSELLO CONTEST TEAM	9,692,920	2
PETROVO RADIO CLUB	9,648,666	1
SOUTHERN CALIFORNIA CONTEST CLUB	9,529,350	15
THRACIAN ROSE CLUB	9,255,480	1
CROATIAN CW GROUP	8,803,050	4
FLORIDA CONTEST GROUP	8,596,285	9
SOCIETY OF MIDWEST CONTESTERS	8,454,002	9
KEY CONTEST TEAM	7,449,016	2
LZ CONTEST CLUB	7,348,175	1
PRINCE GEORGE CONTEST CLUB	7,213,942	1
LU8DQ MEMORIAL	7,160,088	1
WESTERN WASHINGTON DX CLUB	7,070,021	11
FRASER VALLEY DX CLUB	6,465,856	2
PUERTO RICO DX CLUB	6,434,208	1
CAROLINA DX ASSN.	6,302,104	4
RADIO CLUB URUGUAYO	6,238,998	1
CORBEIL CONTEST CLUB	5,978,544	1
EA3NY CONTEST GROUP	5,933,645	1
VARGINHA DXGROUP	5,611,370	1
FOX CONTEST CLUB	5,587,689	10
GUAYAQUIL RADIO CLUB	5,427,501	3
CENTRAL ARIZONA DX ASSN.	5,276,955	5
EASTERN CANADIAN DX ASSN.	5,217,495	2
GPDX	5,183,808	1
FAIRS	5,168,979	3
FRENCH CRAZY CONTESTERS	5,080,216	2
TENNESSEE CONTEST GROUP	5,049,941	7
LYNX DX GROUP	4,906,942	6
CONTEST STATION OF NUCLEAR POWER PLANT LTD.	4,852,750	1
TAGANROG CONTEST CLUB	4,704,783	1
PAPERINO DX TEAM	4,660,972	1
MINNESOTA WIRELESS ASSN	4,523,135	5
ILMENAU CONTEST CLUB	4,493,808	2
NORTH TEXAS CONTEST CLUB	4,469,693	10
COUNCIL OF EUROPE RADIO AMATEUR CLUB	4,447,492	1
CT3M CONTEST TEAM	4,415,738	1
EA DX CLUB	4,338,216	1
ISLAND CONTEST CLUB	4,324,488	2
GADX	4,261,799	1
KIEV CONTEST GROUP	4,195,972	4
SAMOA AMATEUR RADIO ASSN	4,165,080	1
REF 69 RADIO CLUB DE LYON	4,101,616	1
RED DRAGON CONTEST GROUP	4,044,457	1
SANTA CATARINA ISLAND DX ASSN.	4,031,962	2
FRENCH CQ GANG	3,980,760	3
RADIO CLUB SAN FRANCISCO	3,945,650	1
U.F.T.	3,863,421	7
NORTHERN ALBERTA RADIO CLUB	3,841,282	1
LOW BANDS CONTEST CLUB	3,792,054	1
PARAGUANA TEAM	3,791,009	1
OK DX FOUNDATION	3,788,028	2
CENTRAL TEXAS DX AND CONTEST CLUB	3,733,328	2
WILLAMETTE VALLEY DX CLUB	3,702,061	5
NOL CONTESTTEAM	3,556,682	2
TEXAS DX SOCIETY	3,554,549	3
RADIO CLUB SANTA CRUZ	3,445,930	1
RADIO CLUB MISIONES	3,289,652	1
SOUTHEASTERN DX CLUB	3,145,257	5
SALENTO DX TEAM	3,143,322	3
CZECH CONTEST CLUB	3,107,977	2
TEAM ESTONIA	2,981,988	4
CANBERRA DX CLUB	2,959,530	1
SOUTHWEST OHIO DX ASSN.	2,847,800	6
CALGARY AMATEUR RADIO ASSN.	2,837,021	2
OKLAHOMA DX ASSN.	2,732,225	5
WARSAW DX CLUB	2,728,896	2
KHARKOV REGIONAL RADIO CLUB	2,656,998	1
Z30M CONTEST CLUB	2,651,040	1
DELTA MIKE	2,630,478	1
EA CONTEST TEAM	2,565,936	2
LYON DX GANG	2,535,608	2
SP CONTEST CLUB	2,525,687	6
RADIO AMATEUR SOCIETY THAILAND	2,503,386	1
NOVOSIBIRSK TECHNICAL UNIVERSITY	2,368,728	1
KORYAZHMA DX COMPANY	2,352,261	9
UR BARCELONA	2,252,474	5
ORARI LOKALKRAMATJATI	2,210,145	1
DAUBERVILLE DX ASSN.	2,085,042	1
FRENCH DX GANG	2,051,280	1
CALIFORNIA CENTRAL COAST DX CLUB	2,022,127	4
ENDLESS MOUNTAIN ARC	2,000,241	1
CONTEST CLUB OPOLE	1,946,790	1
WESTON SUPER MARE RADIO SOCIETY	1,899,792	1
KANSAS CITY DX CLUB	1,786,862	5
WESTERN WASHINGTON DX ASSN.	1,734,486	1
TUPY DX GROUP	1,707,231	11
CX DX CLUB	1,701,744	1
NORTH ALABAMA DX CLUB	1,665,682	2
LISSONE CONTEST TEAM	1,632,612	1
NORTHERN CORRIDOR RADIO GROUP	1,596,718	1
T.A.C.O.	1,593,352	1
BERGHEM CONTEST CLUB	1,542,948	2
SINGBURI RADIO CLUB	1,482,976	1
SOUTH WIRRAL CONTEST GROUP	1,423,976	1
URE GIJON	1,395,756	1
EASTERN CANADA DX ASSN.	1,343,391	1
BEEMSTER CONTEST CLUB	1,303,281	3
DHAHRAN AMATEUR RADIO CLUB	1,190,808	1
RADIO CLUB VILLA MARIA	1,087,124	1
CW PHILIPPINES	1,069,734	2
CLUB URVO	1,067,710	1
PAIMION RADIOAMATOORIT RY	1,043,460	1
TOP OF EUROPE CONTESTERS	1,038,289	2
NORTHERN MINNESOTA DX ASSN.	1,024,212	1
PAI CONTEST GROUP	1,002,440	2
GRUPO PORTUGUES DE DX	994,962	3
MONFERRATO CONTEST TEAM	981,350	1
BERLIN DX GROUP	971,460	1
NORTH LITHUANIA DX GROUP	967,974	1
NORTHERN CALIFORNIA DX CLUB	931,832	2
SALT CITY DX ASSN.	929,047	6

on 40 meters with 5 watts. Hope it wasn't a pirate. . . . *W4DEC*. High noise levels on most bands made QRPp operation a real chore, but fun nevertheless. Many thanks to those who were willing to dig weak signals out of the mud!. . . . *W6ZH*.

Forty meter QRP with a dipole means two consecutive all-nighters, which gets tough when the QSO rate drops to 1 per hour!. . . . *W8OZA/6*. The secret to contesting is pistacio nuts. We went through 3 lbs of them. We could have done better, but ran out of nuts. We all had a blast. . . . *NJ4F*. Only one European and only 3 JA's worked on 15 meters. Fair conditions on 20 with a nice long path opening to Africa Saturday night. . . . *NT7Y*.

Random Comments—DX

Tribander trap coil blown but always enjoy driving up to 3DAØ land for contests. . . . *3DAØNX*. Unfortunately the contest and rainy season in tropics can't get along—too much QRN in between. . . . *5N3/SP5XAR*. Sending a four-digit number was my dream. I could do it first time!. . . . *7M1MCT*. Very hard job to break the QRM and the pile-up with a longwire antenna and with 100 watts. Anyway I don't give up. See you next year. . . . *9K2/YO9HP*. It was great! Even the AC's faults and bad CDX's. CU next year for sure!. . . . *COØRCT*. Really enjoyed the contest and made my best effort though condx were really poor and most of the time calling CQ was a waste of time. . . . *CX8BBH*.

NORTH SHENANDOAH DX ASSN.	923,098	4
WESTERN NY DX ASSN	920,650	3
NORTH SHORE AMATEUR RADIO CLUB	863,107	2
CRIMEAN CONTEST CLUB	806,124	1
KIWI CONTEST CLUB	783,180	1
MOSCOW RADIO CLUB	764,256	1
ORDER OF BOILED OWLS	758,370	3
LEFT COAST CONTEST CLUB	713,416	1
NICOSIA CONTEST GROUP	669,300	1
BRASILIA DX GROUP	658,860	1
ARI LISSONE CONTEST TEAM	655,620	1
HIGH SPEED CLUB	654,656	1
BATEA DX GROUP	620,092	4
REDE DOS EMISSORES PORTUGUESES	612,745	1
NORTHERN MARIANAS AMATEUR RADIO CLUB	604,420	1
SKY SAT CONTEST CLUB	601,622	1
ROCHESTER AMATEUR RADIO CLUB	588,720	1
SOUTHERN CALIFORNIA DX CLUB	583,625	4
GRUPO ARGENTINO DE RADIOTELEGRAFIA	566,920	1
HAM SOCIETY OF THE PHILIPPINES	536,750	1
RADIO CLUB LOULE	521,656	1
ROCHESTER DX ASSN.	519,435	5
RADIO CLUB NOVELDA	508,260	1
SCHENECTADY AMATEUR RADIO ASSN.	504,031	2
CLYDE COAST CONTEST CLUB	500,964	1
HA DX CLUB	487,770	1
BUCHAREST RADIO CLUB	471,776	1
K-TEAM	464,492	1
ASCENSION ISLAND RADIO CLUB	433,048	1
NORTHSEA DX CLUB	412,920	1
MACEDONIA DX AND CONTEST GROUP	408,772	2
WIRELESS INSTITUTE OF AUSTRALIA	398,880	1
URE CUETA	393,680	1
URE SANTA CRUZ-LA LAGUNA	390,576	1
SHIZUOKA DX RADIO ASSN.	368,697	1
RED RYDER CONTEST CLUB	362,454	1
UNION FRANCAISE DES TELEGRAPHISTES	346,491	1
RADIO CLUBE LOULE	324,896	1
BAYLOR CONYON CONTEST CLUB	301,124	1
CENTRAL GERMAN CONTEST CLUB	299,153	1
MOTHER LODE DX/CONTEST CLUB	279,404	2
ULYANOVSK SIGNAL DX CLUB	279,321	1
STONES RIVER ARC	272,874	1
SOUTHERN RADICALS	266,265	1
SARAJEVO CONTEST GROUP	263,832	2
LILLY AMATEUR RADIO CLUB	261,900	1
UR PALENCIA	259,890	2
KENTUCKY CONTEST GROUP	255,822	3
WEEKEND WARRIORS	240,233	2
NORTH JERSEY DX ASSN.	238,896	1
ANTIETAM RADIO ASSN.	218,722	1
KENWOOD EMPLOYEES ARC	218,328	1
RADIO CLUB CATALUNYA	217,152	1
NAGOYA UNIVERSITY RADIO CLUB	213,663	1
WESTERN WASHINGTON DX ASSN.	211,904	1
FUKUOKA DX ASSN.	206,112	1
KANAUS TECHNOLOGY UNIVERSITY RADIO CLUB	200,668	1
RALEIGH AMATEUR RADIO SOCIETY	198,900	1
LIMARC	194,328	2
KEY CONTEST TEAM MONZA	175,854	1
DEUTSCHER AMATEUR RADIO CLUB	173,160	1
OTTAWA AMATEUR RADIO CLUB	169,686	1
JAPONICA	169,176	1
URE ESTELLA	167,254	1
MISSISSIPPI VALLEY DX/CONTEST CLUB	167,008	2
CENTRAL SHEN VALLEY CONTESTERS	166,164	1
URE TENERIFE	162,197	1
G - QRP CLUB	162,122	3
CAMERON LABS CONTEST CLUB	158,256	1
UDXC	152,680	1
NORTHERN ARIZONA DX ASSN.	144,430	2
GSARC	140,114	3
PUERTO RICAN DX CLUB	135,936	1
KKT	127,078	1
MCKEAN COUNTY ARC	125,550	1
MID-BEDS CONTEST ASSN.	121,716	1
GRUPO DE CW DO DF	120,978	1
TOKYO INT. AMATEUR RADIO ASSN.	118,842	2
QUITO RADIO CLUB	116,720	2
WEST PARK RADIOPS	116,515	2
URE CORDOBA	115,995	1
CARBON AMATEUR RADIO CLUB	114,359	1
ROMANIAN RADIOCLUB	108,336	1
NORTHROP GRUMMAN ARC	104,372	1
LA DX GROUP	104,272	1
SAN FERNANDO VALLEY RADIO CLUB	102,265	1
URE LEON	98,115	1
AMSTERDAM DX CLUB	97,918	1
URE ALICANTE	87,894	1
HAZEL PARK ARC	82,115	2
SP DX CLUB	82,062	1
SAN DIEGO DX CLUB	77,450	2
REDWOOD EMPIRE DX ASSN.	75,762	1
YEGUA VALLEY CONTEST CLUB	72,478	2
MCARC	67,332	1
UR MADRID	61,020	1
BURLINGTON COUNTY RADIO CLUB	58,988	2
SP CW CLUB	58,029	2
URE LUGO	56,474	1
CANTON AMATEUR RADIO CLUB	50,808	1
CANTAREIRA DX GROUP	50,806	1
YV DXPERTS TEAM	49,324	1
LICKING COUNTY CONTEST GROUP	45,310	2
ORARC	40,817	1
PALOMAR ARC	40,478	2
NORTHROP GRUMMAN RADIO CLUB	38,912	1
URE TARRAGONA	38,150	1
R.A.C.	38,130	1
URE MADRID	33,660	1
DANISH DX GROUP	33,488	1
EASTERN IOWA DX ASSN.	33,221	1
WEARC	31,928	1
METRO DX CLUB	30,891	3
SCARA	30,858	1
IVANOVO DX CLUB	29,887	1
SAMARA CONTEST CLUB	29,150	1
HUDSON VALLEY CONTESTERS & DX CLUB	27,768	1
RADIO CLUB SIOFOK	26,082	1
KETTLE MORAINE RADIO AMATEUR CLUB	23,082	2
GREAT FALLS AREA AMATEUR RADIO CLUB	22,500	1
SOUTHERN ARIZONA DX ASSN.	20,072	1
HAMILTON AMATEUR RADIO CLUB	16,410	2
R24 DX CLUB	15,360	2
URE BADAJOZ	15,045	1
PERUGIA DX CLUB	14,620	1
FRESNO ARC	14,328	2
CENTRAL FLORIDA DX ASSN.	14,280	1
ORANGE PARK ARC	13,552	1
RADIO AMATEUR UNION OF NORTH GREECE	12,000	1
DREAM TEAM	9,900	1
MAUI AMATEUR RADIO CLUB	8,869	1
URE GRANADA	7,906	1
SOUTH JERSEY RADIO ASSN	7,308	2
WICHITA AMATEUR RADIO CLUB	6,804	1
UR PALMA	4,992	1
RADIO CLUB CORDOBA	3,825	1
SAAR-LORRAIN DX CLUB	3,510	1
PEJL RADIOCLUB	2,964	1
URE SORIA	2,888	1
URE VIGO	2,820	1
URE SALAMANCA	2,356	1
YREVAN CITY RADIO CLUB	1,680	1
R3ARES DX CLUB	96	1
CTRI CONTEST GROUP	90	1

Missed the short skip we had last year. Nevertheless enjoyed participating much!. . . . *DH8BQA*.

I took enjoyment in distributing points without contest stress. . . . *DL8WCM*. Lots of fun from this part of the globe. CU next year. . . . *DU1KK*. Very poor condx for DX contacts! Not many people on top band this year. What happened?. . . . *EA6ACC*. Had to quit Sunday morning for home bound flight. . . . *EA8/OH2KI*. This is the first time that I am participating in the CQ WPX CW Contest, and must say that I enjoyed very much. The propagation was not good, but the courtesy of the contesters let me the opportunity to work long-distance stations. . . . *EA8QJ*. QSL via UT5BW. . . . *EM1KA*. This year was really hard to work. First morning electricity was switched off. All the next time was strong rain and a lot of QRM. At the first minute 500 watt amp burned and was replaced by 300 watt amp. . . . *EY8MM*.

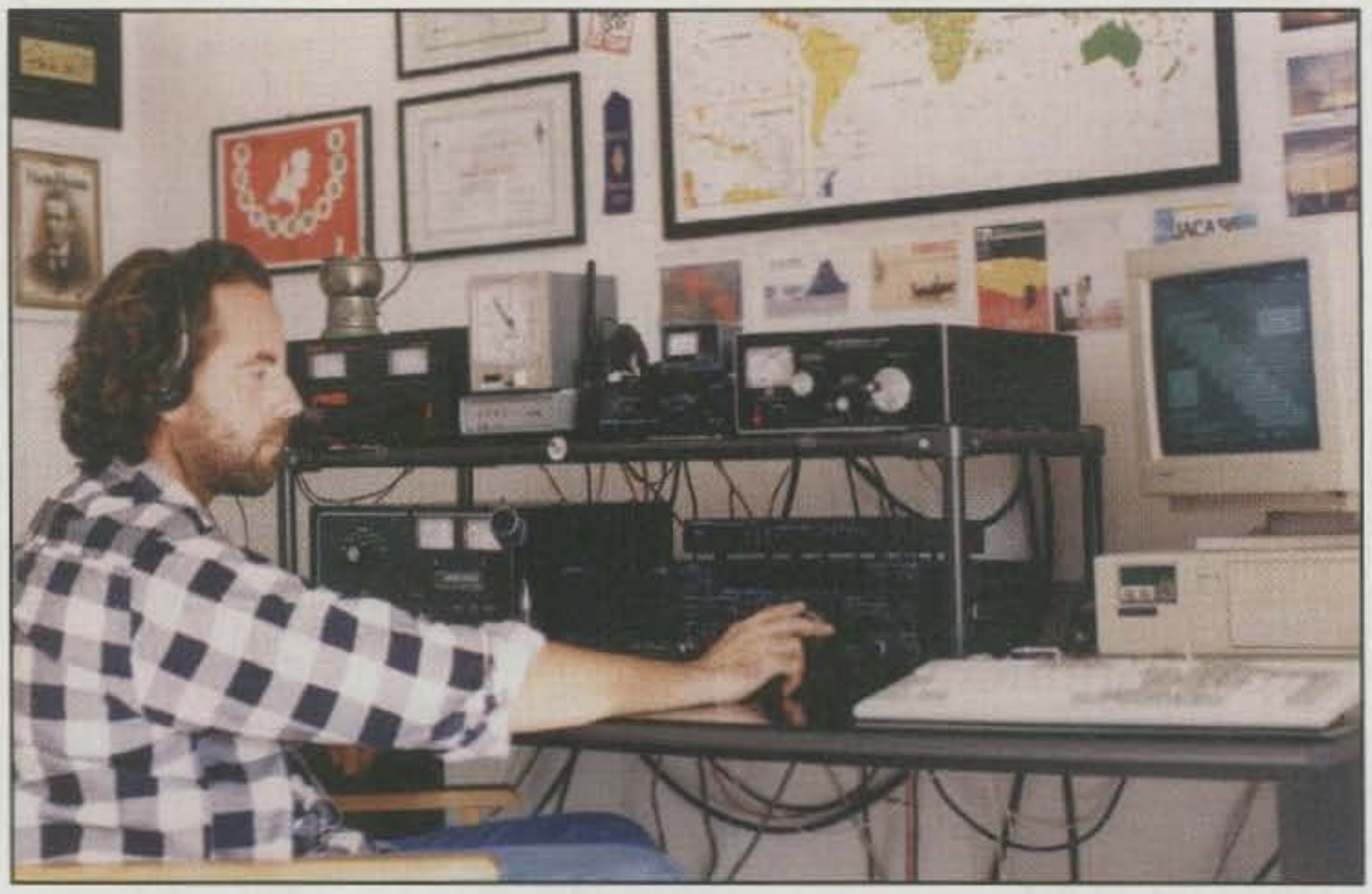
Vy poor conditions on high bands. Only big EU sporadic's on 10 meters with weak points!. . . . *F5NLY*. Have to admit I used the contest as a training ground in an attempt to try and become "computer literate" on an ancient computer I have just acquired. Needless to say, I got myself into a mess from time to time, especially when CQing. Must do better next time. However, I enjoyed it nevertheless. . . . *GØJQN*. My first WPX Contest! Working 9U, CX, FM, VK, ZX, VR, 6W, 8R with 100 watts—<gw.ccc.nottingham.ac.uk/~mzyd108>. . . . *GØWWW*. With the old G prefixes running out of capacity, even the once sparing

UK licensing authorities are now generating wafts of new M prefixes, but we've still got a long way to go to catch up with the prefix-prolific Canadians!. . . . *G3TXF.*

Great fun. Thanks for another great contest. Will keep the QRP flag flying next year!. . . . *G4JZO.* Hunt and pounce with 100 W into an indoor wire ant is not the way to build a big score. It was great fun anyway. Thanks a lot. See you next time. . . . *G4OTY.* This year was tough going with very little in the way of the states. I concentrated on the lower bands to break my previous score. Many thanks for those who listened carefully to my sigs. Best DX was LU on 40 meters and 3V8BB on three bands. . . . *G4UOL.* Great fun as usual. How about changing the TS section to the S (single element) section to help us "little guns"? . . . *G4ZFE.* The powerful EU stations were too much for USA and DX stations. Good to work on 28 MHz again, but no DX there. . . . *G4ZMF.*

Enjoyed the contest. Guess I must be one of the oldest entrants (81 yrs old, licensed in 1933). . . . *G5MY.* Great fun as always. Not many stateside stations on 80 meters, but being called by 3DA0NX made up for that. See you next year. . . . *GB6PX.* New QTH, temp antenna, great fun. I might crack this "super duper contest logging" by next year. . . . *GW3SYL.* I lost two FT757GX during contest. Hope next year I can QRV more time with new radio. . . . *HA0EQ.* It was a hard work between all the KW-linears and with "bad" condx. Not one oversee call!. . . . *HB9XY.* First contest. . . . *IK2UJF.* I like this contest very much. I want to entry on 160 meters in this contest, but I cannot hear any signal of DX station on 160 during this contest. It is very difficult to hear the DX station's signal in this season on 160 in Japan. . . . *JE1SPY.*

The band was reasonably good enough to try QRP participation. Since this was my birthday week, family was kind enough to support me through the contest. This is a good score. WPX contest is great, especially for QRPers since the QSO points and the multipliers go together to yield an appreciable score for QRPers. . . . *JH1GNU.* It's great because one vertical antenna makes me 376 QSOs. . . . *JH2NWP.* I could work many new prefixes and new countries. It was a great fun contest. . . . *JL7PVR/1.* Rain storm and static noise all the weekend long, poor conditions to Japan. Anyway it was nice to break my AZ4F SA record and VP2VCW's one. Thanks to Sandra and LU1IV. . . . *LU1IV.* After 1985 until 1996 I was worked only with dipoles, because strong wind broked my 4-el cubical quad. This year I have KLM KT34XA tribander and my score is much better than last year's. . . . *LY5W.* This DXpedition was devoted specially to the CQ WPX Contest. It was really difficult to operate low power, so the number of QSOs on 80 and 40 is very small. TNX to everybody who called me. . . . N2WCQ/6W1. Thank you for running another nice contest. Time did not permit for more active participation. . . . *OH2LU.*



Roberto, IK7XIV (IQ7A), was the top 14 MHz Assisted station. Roberto is a new contester and also the winner in the Rookie category.

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SPECIAL FEATURES:

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- FUSE PROTECTION
- OVER TEMPERATURE SHUTDOWN

SPECIFICATIONS:

INPUT VOLTAGE: 90-132 VAC 50/60Hz
OR 180-264 VAC 50/60Hz
SWITCH SELECTABLE

OUTPUT VOLTAGE: 13.8 VDC

MODEL	CONT. AMP	ICS	SIZE	WT.(LBS)
SS-10	7	10	1 1/8 x 6 x 9	3.2
SS-12	10	12	1 3/8 x 6 x 9	3.4
SS-18	15	18	1 3/8 x 6 x 9	3.6
SS-25	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30	25	30	3 3/4 x 7 x 9 5/8	5

ASTRON CORPORATION

9 AUTRY, IRVINE, CALIFORNIA 92618
714-458-7277 FAX 714-458-0826

Twenty meter antenna didn't work, 2 amps blew up, went to multi-multi anyhow. We'll be back. . . . *OI1W.* I'll never use a crazy callsign like KM9ØØ. . . . *OM3GB.* They go fast for an old-timer!. . . . *ON4XG.* Technical problems at work forced me to reduce contest time dramatically. Next time I'll disconnect my telephone. . . . *ON7NQ.* Conditions were poor to North America and Japan. But I enjoyed the contest as always. It is a real pleasure to have a Yagi *plus* a 4-square. The Yagi gives you more signal; the 4-square gives you the utmost flexibility in fast direction switching. . . . *OT6T.* Nice to be back contesting, especially CW. Enjoyed for the first time use of computer for logging—what a relief! First night was slow 200 QSOs. . . . *P40A.*

Late Sunday evening beaming stateside I was being called by VK9GA on the back of the antenna. Propagation that good or the F/B ratio that bad?. . . . *PA3AAV.* It is always a pleasure to join in this nice contest. . . . *PA3BEJ.* Tried to work new countries on 80 meters. . . . *PA3BNT.* Running 48 hours multi-multi with only 8 ops on 4 stations is hard work. But it is still fun and that is what it is all about. . . . *PA6WPX.* I worked at S56A station while he paused for 6 hours, and it was fun. . . . *S57NW.* My first WPX (but not the last). Thanks to all who heard my 5 watts radiating from my low dipoles!. . . . *SMØTHU.*

Had a great time even though it rained most of the weekend causing the floor of my tent to get wet. . . . *SO5TW/7.* Great fun, thanks for another great contest, will keep the QRP flag flying next year! My first WPX. . . . *SP4GFG.* Not so easy to find and hold a QRG with 100 watts and ground plane. . . . *TK/DK7YY.* Again a low sunspot number this year but still a lot of fun. . . . *TM4US.* My first WPX contest. Worked 12 new QRP countries!. . . . *VC3JFF.* Next door away on vacation so tried a few watts more. Put me in high power but not sure it did any good. . . . *VD6BF.* WPX is great for QRP!. . . . *VD7SBO.* Conditions were pretty poor, did not make my goal of 200 QSOs. Looking forward to more solar activity. . . . *VE7CQK.*

This was my 400th contest. . . . *VK2APK.* As usual had a lot of fun. Ten meters was completely closed in VK3. Fifteen opened only for a short time. Heard lots of EU on 80 but could not break through. . . . *VK3DXI.* I have enjoyed the challenges of operating CW competitively and having it improve my skills dramatically. Conditions seemed to be very good considering the so-called depressed solar activity. . . . *VK5AFO.* My first WPX CW. Much enjoyed. Sorry I couldn't operate longer. . . . *VO1AH.* VO1 is a special prefix which was available to VO1 stations in April and May to commemorate the 50th anniversary of UNICEF. . . . *VO7GO.* Definitely at the sunspot minimum. Power failure early Saturday along with heavy local QRN in the evenings made it a real struggle this year. And a serious "sniffy/stuffy" head cold didn't make things a bit better. But I had FUN!. . . . *VP5Z.*

This is my mother's callsign. Hope I could help many guys with the VU3 prefix. . . . *VU3FED.* I didn't call CQ. I just answered CQ's and everytime I did it, at the end of the QSO there was already a pileup calling me, and I had to leave. I think many people needed the WP4 mult. I'll know it for next year, but it was fun. . . . *WP4NJD.* Lot of fun. Wish the low bands had played better for us. . . . *XA5T.* Thanks for a nice contest. Did a bit better this year with a beam fixed to EU. Condx were better than last year, but a lot of QRN. . . . *YM2ZW.* This was my 19th CQ WW WPX CW contest and my 1834 contest log entry. . . . *YU7SF.* Very bad conditions, very good contest. . . . *YW1A.* What a slog! The first day was abysmal; terrible conditions and QSB and QRM, etc., etc. Second day better but never really easy. But it was fun, and I hope to be back next year for a better attempt. I'm getting old and tired these days! Thanks for the opportunity to take part. I had a great weekend. . . . *ZL2AGY.*

Station Operators Multi-Op Multi-Transmitter

9A1A: 9A5W, 9A9A, 9A2DQ, 9A2EU, 9A2TS, 9A3NR, 9A4OM, 9A3GW, 9A7R, 9A6A, 9A2B, 9A2R, 9A2SD, 9A3ZA, S51R. **9H3TY:** DL7UTM, DL7URH, DL2RUM, DL7UEA, DL7IO. **AA9OC:** AA9OC, N9CKC, NE9U, NØAXL. **AL3/N7DF:** N7DF, KL7Y, KL7PJ, KL7AF, NL7GP, KL7U, KL7XX. **ED4ML:** EA4KA, EA7CEZ, EA4EMC, EA4AFA, EA4MC, EA4AKQ, EA4ET, EA4CJA, EA4EKR, EA4UA, EA4AED, EA4AFD. **EM2I:** UT2IA, UT2ID, UT2II, UT2IJ, UT2IM, UT2IO, UT2IV, UT2IY, UT3IZ, US2IR, UT8IM, UX8IX, US-I-7ØØ. **F6ENO:** F5WA, F5JVP, F5AKL, F6CEL, F6DKV, F6ENO. **FR/DL1VJ:** DL1VJ & Claudia. **HG8U:** HA8RM, HA8RO, JA8TJ, HA8LGA. **JA1YXP:** JF1QOW, JM1UWB, 7K1EWD, 7L1ETO, 7M1WGZ, 7N1WIY, JJ2JQF, JL2FJA, Gerry. **JG2YIV:** JE2PCY, JF2WEQ, JH2XFO. **JO1YAO:** JA1PEJ & JH1AZO.

K3EST: K3EST, W6RGG, N4TQO, AEØM, WM2C. **LY7A:** LY1DF, LY1EE, LY2AO, LY2BMX, LY2NK, LY2UF, LY3BAD, LY3DA, LY3MU, LY4AA, LY4AF, LYR 346. **OI1W:** OH1NOA & ON1MDR. **OI3NE:** OH1KAG, OH3FM, OH3KLG, OH3LQK, OH3MEP, OH3MMF, OH3MMH, OH3MYD. **OT6A:** DL5FDA, PA3EBT, PA3EZ, PA3GIP, ON1AWB, ON1GL, ON1CIM, ON4DB, ON4MV, ON4AWH, ON4AUC, ON4AWU, ON4BBL, ON4CDC, ON4MA, ON4MV, ON5OT, ON5SH, ON5UM, ON5WL, ON6PU, ON7NB, ON7SF, ON7VU, ON7ABL & Volunteers. **PA6WPX:** PA3BBP, PA3BWD, PA3CAL, PA3DMH, PA3ERC, PA3EWP, PA3FRN, PA3GBQ. **RW2F:** RA2FA, UA2FB, UA2FF, UA2FC, UA2FM, UA2FX, UA2FZ, UA2FBA. **WD8LLD:** KU8E, WD8AUB, WD8LLD. **WZ1R:** WZ1R, KY1H, WM1K, W1MJ, K1MBO. **YTØW:** YU1ZZ, YT1EA, YU1EA, YU1YV, YU1RA, YU1UA, YT1WA, YU7GO, YU7GW, YU7BJ, 4N7DW, YZ4UN, YU7AV, YU7AX, YU7JX, YZ1AU, YU6DX, YU1QD, YZ1EB, YU1JW.

Station Operators Multi-Op Single Transmitter

3ZØWAW: SP5ANJ, SP5ELA, SP5JTF, SP5JTM. **8R3ØK:** OHØXX, 8R1RPN, OH6DO. **9A5D:** 9A2FK, 9A3VM, 9A4SG, Maro, Nikola, Pero. **AC5CT:** AC5CT & W5WLA. **COØRCT:** CO8ZZ & CO8NA. **DJ7TO:** DJ6TF & DJ7TO. **DKØZG:** DJ2RG, DL5WG, DL6MPG, DL8MUG. **DK2OY:** DK2OY, DL4RDJ, DL6RAI. **DLØMFL:** DL1JJI & DL2JRM. **DL1ARJ:** DL1ARJ & DL2ARD. **DL1AUZ:** DL1AUZ, DL5ATD, DL5MX. **DU1KWT:** DU1KWT, DU1MHX, DU1JXP, DU1LR. **EA5BY:** EA5BY, EA5CZ, EA5EU, EA5FID, EA5KW, EA5SM. **ED8URT:** EA8AHH, EA8AMW, EA8ANE. **ES5Q:** ES5RY, ES5MC, ES5RN, ES5MG. **EU5F:** EU6DX, EW6MM, EV6Z. **GB6WW:** G4BUO, GØCKP, NZ1W. **GX3PRC:** GØIVZ & G4ODV. **HA3KNA:** HA3NS, HA3NU, HA3OV. **HG3O:** HA3MN, HA3MY, HA3RG, HA3UH, HA3UU, Ervin. **HG8ITU:** HA8EK, HA8FT, HA8FM, HA8KH, HA8FW, HA8KW.

IH9/OK1CW: OK1CW, OK1DF, OK1DIX, OK1AUT, OK1FF, OK1TP, OK2GG. **II2K:** I2KHM & I2GXS. **IO2L:** I2OKW, IK2NVU, IK2YYE. **IQ4T:** IK4SXJ, I4YTE, IK4HVR, I4IFL, JR6GKT, JI6BRB, JG4KEZ. **JH5ZJS:** JA5BJC, JA5FDJ, JA5JCC, JR5JAQ, JR5VHU. **K1ZZ:** AA2Z & K1ZZ. **KC7V:** KC7V, AA7NO, AA7WP, KE7GH, ZS7NW. **KN5H:** KN5H & K7UP. **KVØQ:** KVØQ, WX7K, KTØF, WBØHBS. **LA1K:** LA5IIA, LA8UGA, LA5NJA, LA7OJA. **LY2BN:** Club Group. **LY6M:** LY1DS & LY2IJ. **LZ1KSZ:** LZ1VA & LZ1MC. **LZ8A:** LZ1UQ, LZ3DJ, LZ3FN, LZ3GU, LZ4AX, LZ5VK, Krasi, Ventzi, Victor, Yanko. **LZ9A:** LZ1GL, LZ1JY, LZ1UK, LZ2DF, LZ2HE, LZ2HM, LZ2JE, LZ2PO, LZ2UU, Vasko. **NB1B:** NB1B, W1KM, W1FJ, K1JKS, WT1O. **NJ4F:** NJ4F, N3AM, K7SV, W5IMC, N4GUS. **NT7Y:** AB7GM, N5CT, WØMHS, N6XO.

OH2IW: OH1JT & OH2IW. **OI1AF:** Club Group. **OI2JNX:** OH2KVH, OH7BX, OH2JNX. **OI4OC:** OH2BVI & OH2JA. **OI8LQ:** OH8LQ, OH8PF, OH8MCT. **OK1KCF:** Club Group. **OK2KDS:** Club Group. **OK8EAO:** DL1CW, DL1SBF, DL5YL, DL5YM. **OL3A:** OK1AY, OK1CM, OK1DX, OK1FCJ. **OL5T:** OK1NR, OK1TC, OK1DNR, OK1FLM, OK1HSK, OK1MUJ. **OM3RKA:** OM5DP, OM5XX, OM5MZ, OM5TZ, OM5TX. **OM9FI:** OM7PY, OM7PA, OM7JG. **OT6P:** ON4GO, ON4LAM, ON5OO, ON5PV, ON6AH, ON6MH, ON6QR, ON6VL, ON7PC, ON7ZV, ON5AV, N4XYA. **P42V:** AI6V & NB6G. **PI4CC:** PA3BUS, PA3BSQ, PA3EPD, PBØAIU. **R3F/9:** RU9CK, RU9CZ, RA9DL. **RK3UWA:** Club Group. **RK9CWY:** RX9CAZ & RA9CJR. **RU1A:** RN1AM, RV1AW, RW1AC, UA1-169-239Ø. **RW6AMM:** Club Group. **RW6AWT:** RN6BN, RN6MM, UA6NP. **RZ3Q:** RW3QC, RW3QO, UA3QDX, UA3QDM.

RZ4AYT: UA4ALI, UA4AIY, UA9COP, RA4AI. **RZ6AXO:** RA6AX, RA6YY, RW6YY, RX6BA, UA6YDX. **SN6F:** SP6AZT, SP9FKQ, SP9HWN, SP9IJU. **SP2PMO:** SP2JKC & SP2FOV. **TM2T:** F5FOP, F6JJX, F5PKR, F5SIH. **TM4Q:** F6FYA, F5LBM, F5SQM. **TM5B:** FB1IPH & F5NBX. **TM5FER:** F5JNT, F5PHW, F8XX. **UR4E:** UR5ECW & UR5EDX. **UT7L:** UR4LQA, UR4LRQ, UR4LSB, UR4LTX, UR8LA. **VD6AO:** VE6KZ, VE6AMR, VE6NJK, VE6CIZ, VE6J, NJ1V, WB5N, XE2KB, N5LNU, N5XTP, XE2YS, XE2YRD, XE2NLA, XE2FU. **YO6KBM:** YO6LV, YO6MK, YO6OBH, YO6DDF. **YO7KJU:** Haizman, Taibusca, Gaspar. **YT7P:** Club Group. **YU1L:** YU1OO, YT1VA, YU1ML ■

(Scores on page 112)

MIRAGE...100 Watts...$199

Boost your 2 Meter handheld or multimode (like ICOM 706) to a super powerful 100 watts . . . All modes: FM, SSB, CW . . . 15 dB GaAsFET receive preamp . . . Reverse polarity protection . . . Silent cooling fan . . . Free HT-to-amp coax and mobile bracket

In Stock at ham dealers everywhere!

Call your dealer for your best price

$199

B-310-G Suggested Retail

NEW!

Power Curve -- typical B-310-G output power							
Watts Out	*25*	*50*	*75*	*95*	*100*	*100+*	*100+*
Watts In	*¼*	*½*	*1*	*2*	*4*	*6*	*8*

For an incredibly low $199, you can boost your 2 Meter handheld to a super powerful 100 watt mobile or base!

Turn "You're breaking up . . . Can't copy" into "Solid Copy . . . Go ahead."

Talk further . . . Reach distant repeaters . . . Log onto faraway packet bulletin boards.

This rugged Mirage B-310-G amplifier operates *all modes*: FM, SSB and CW. It's perfect for *all* handhelds up to 8 watts *and* multi-mode SSB/CW/FM 2 Meter rigs.

***It's** great for the ICOM IC-706 -- you'll get 100 blockbuster watts on 2 Meters!*

Low noise GaAsFET pre-amp

A built-in *low noise* GaAsFET receive pre-amp gives you 15 dB gain -- lets you dig out weak signals.

Fully Protected

***SWR** Protection* prevents damage from antennas whipping in the wind. *Reverse Polarity Protection* can save your amp if you connect power backwards.

Compact but Powerful

Mirage's integrated *HeatsinkCabinet™* and whisper quiet fan gets heat out fast!

The results? An *ultra-compact* 4¾x1¾x7¾ inch 2½ pound amplifier that delivers a *super powerful* 100 watts.

Free Accessories

Free 3 foot handheld to B-310-G coax cable -- just plug and play! ***Free*** mobile bracket! ***Free*** rubber mounting feet for home use!

Plus more . . .

Automatic RF sense Transmit/Receive switch. Remote keying jack. LEDs monitor "On Air", high SWR, pre-amp, power. Push buttons select SSB/FM, pre-amp, power. Draws 15 amps at 12-15 VDC.

Full one year MIRAGE warranty

With Mirage's legendary ruggedness, you may never need our superb warranty.

Dual Band 144/440 MHz Amp

$159.95 BD-35 Suggested Retail

Power Curve -- typical BD-35 output power							
Watts Out (2Meters)	*30*	*40*	*45*	*45+*	*45+*	*45+*	*45+*
Watts Out (440 MHz)	*16*	*26*	*32*	*35+*	*35+*	*35+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*

***Add** this Mirage dual band amp and boost your handheld to 45 watts on 2 Meters or 35 watts on 440 MHz!*

Works with all FM handhelds up to 7 watts. Power Curve chart shows typical output power.

Full Duplex Operation

Mirage's exclusive *FullDuplexAmp™* lets you talk on one band and listen on the other band at the same time -- *just like a telephone conversation!* (Requires compatible HT)

Mirage is the Best! Here's why . . .

- ***Automatic frequency band selection*** --you'll never forget to switch bands
- ***Single input connector and single output connector for both bands*** -- easy to use with dual band radios and antennas
- ***First-class strip-line techniques*** -- superb RF performance and reliability
- ***Custom wrap-around heatsink*** -- runs cool
- ***Reverse Polarity Protection*** -- saves your amp if you connect power backward
- ***Automatic RF sense Transmit/Receive switch*** -- makes operation easy
- ***Low input SWR*** -- keeps your handheld safe from overheating
- ***"On Air" LEDs*** -- for each band
- ***Free mobile mounting bracket***
- ***Free 3 foot handheld-to-BD-35 coax cable***
- ***Small size:*** just 5x1¾x5 inches
- ***Full one year MIRAGE warranty***
- ***Legendary MIRAGE ruggedness***

Call your dealer today for your best price!

35 Watts for 2 Meter HTs

B-34-G

$89.95

Suggested Retail

Power Curve -- typical B-34-G output power								
Watts Out	*18*	*30*	*33*	*35+*	*35+*	*35+*	*35+*	*35+*
Watts In	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*

- ***35 Watts Output on 2 Meters***
- ***All modes: FM, SSB, CW***
- ***18 dB GaAsFET preamp***
- ***Reverse polarity protection***
- ***Includes mobile bracket***
- ***Auto RF sense T/R switch***
- ***Custom heatsink, runs cool***
- ***Works with handhelds up to 8 watts***
- ***One year MIRAGE warranty***

MIRAGE RUGGED!

35 watts, FM only . . . $69.95

B-34, $69.95. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

160 Watts on 2 Meters!

B-5016-G

$299

Suggested Retail

MIRAGE RUGGED!

Power Curve -- typical B-5016-G output power								
Watts Out	*130*	*135*	*140*	*145*	*150*	*155*	*160*	*165*
Watts In	*20*	*25*	*30*	*35*	*40*	*45*	*50*	*55*

The MIRAGE B-5016-G gives you 160 watts of brute power for 50 watts input on all modes -- FM, SSB or CW!

Ideal for 20 to 60 watt 2 Meter mobile or base. *Power Curve* chart shows typical output power.

Hear weak signals -- low noise GaAsFET preamp gives you excellent 0.6 dB noise figure. Select 15 or 20 dB gain.

B-5016-G has legendary ruggedness. *We know of one that has been in constant use since 1979!*

Heavy-duty heatsink spans entire length of cabinet -- prevents overheating. Power transistors protected by MIRAGE's *Therm-O-Guard™*.

Fully protected from high SWR and excessive input power. Has warning LED.

Has smooth adjustable Transmit/Receive switching with remote external keying.

RC-1, $45, Remote Control. On/Off, pre-amp On/Off, selects SSB/FM. With 18-ft cable.

Draws 17-22 amps at 13.8 VDC. 12x3x5½ in.

More 160 Watt, 2 Meter Amplifiers . . .

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An island steeped in history and known the world over became the home for an exciting DXpedition last year. Wake Island conjures up all sorts of recollections and now has given far more pleasant memories.

A DXpedition To Wake Island AL7EL/KH9

BY DON GREENBAUM*, N1DG; TOM HARRELL, K8XP; BOB FABRY, N6EK; AND LLOYD WESTBROOK, W4LSW

Wake, a tiny island formed several million years ago by a volcano, is big in history. Unlike most amateur island destinations, it is known to many people outside our hobby. Located at 19° 17'N, 166° 39'E, it is the first American possession in time zone #1, approximately 2300 miles west of Hawaii.

In May 1995 Tom, K8XP (then AL7EL), went to Wake on business. Hoping to find time to operate, he took along a long wire and an IC-736. Tom was not expecting big pile-ups, but he was very surprised. In his limited operating time he worked over 2100 stations and found that there was a great demand for KH9, especially from Europe and the east coast US. Prior to his departure he left a request to return with a few associates to operate for a week at some future date.

In the fall of 1995 Tom received approval to return and called me, Don, N1DG (then WB2DND), to see if I was interested in joining him. The response was an emphatic yes, and we started to assemble our "team." Wake is the first American possession on the other side of the International Date Line, so we called our group the Dateline DX Association.

I had met Tom ten years ago, when I wrote a logging program for several African DXers. Tom was the QSL manager for some of them, and we worked closely together on the programming. We often talked of going to an island somewhere, and Wake seemed to be perfect in terms of accessibility and the time we had available to travel.

Tom had met Lloyd, then K4HQI but now W4LSW, at Dayton six years before and knew Lloyd to be a fine low-band operator. I knew Bob, N6EK (still N6EK—how can that be?), through my association with the Heard Island team, where I was providing computer assistance. Bob has been on many DXpeditions and is an avid contester. Putting together the team was one of the easiest parts of the operation.

All four members agreed from the beginning that the goal of the operation was not to work as many people as possible, but to use the limited projected openings to Europe as best we could and stick to the lower bands where the demand was keen even though the QSO rates might not be as high. We wanted the operators to be proficient in low-band, RTTY, and satellite operations. We also wanted to take the minimum number of operators, yet retain the ability to stay on all open bands at the same time.

*27 Pill Hill Lane, Duxbury, MA 02332

Here the big-gun DXers stand before one of the big guns left over from WW II. From left to right: Don, N1DG; Bob, N6EK; Tom, K8XP; and Lloyd, W4LSW.

It was decided that three stations would be required to cover propagation and keep activity on the desired bands to a maximum. We drew up our equipment list with those objectives in mind. Our operation was a fine example of how a few people with a little organization and lots of effort can quickly organize some very tough logistics.

Tom contacted Ham Radio Outlet, and both Hy-Gain and ICOM (with the help of HRO). I searched for satellite equipment and also contacted Heil Sound, WØCD and the Battle Creek Special gang, AEA, and Antennaco. Bob contacted the major US foundations for financial assistance, and he also volunteered to be in charge of our computer networking and software needs. Lloyd concentrated on operation logistics, European foundation support, and PR (our resident photographer). He also volunteered along with his XYL, Ruby, to do the QSL chores. In addition to those tasks we all made substantial equipment purchases of radios, amplifiers, and laptop computers.

Requests for funding were sent to the Northern California DX Foundation, INDEXA, the Chiltern DX Club, and the RSGB HF DXpedition Fund. The responses were almost immediate and very generous. In only a month we had 25% of the projected budget covered. Local DX clubs—including the Southern New England DX Association, Salt City (NY) DX Club, and the Western NY DX Association—also made contributions. Financial assistance was also received from the "59(9) Report" and ZJ Electronics.

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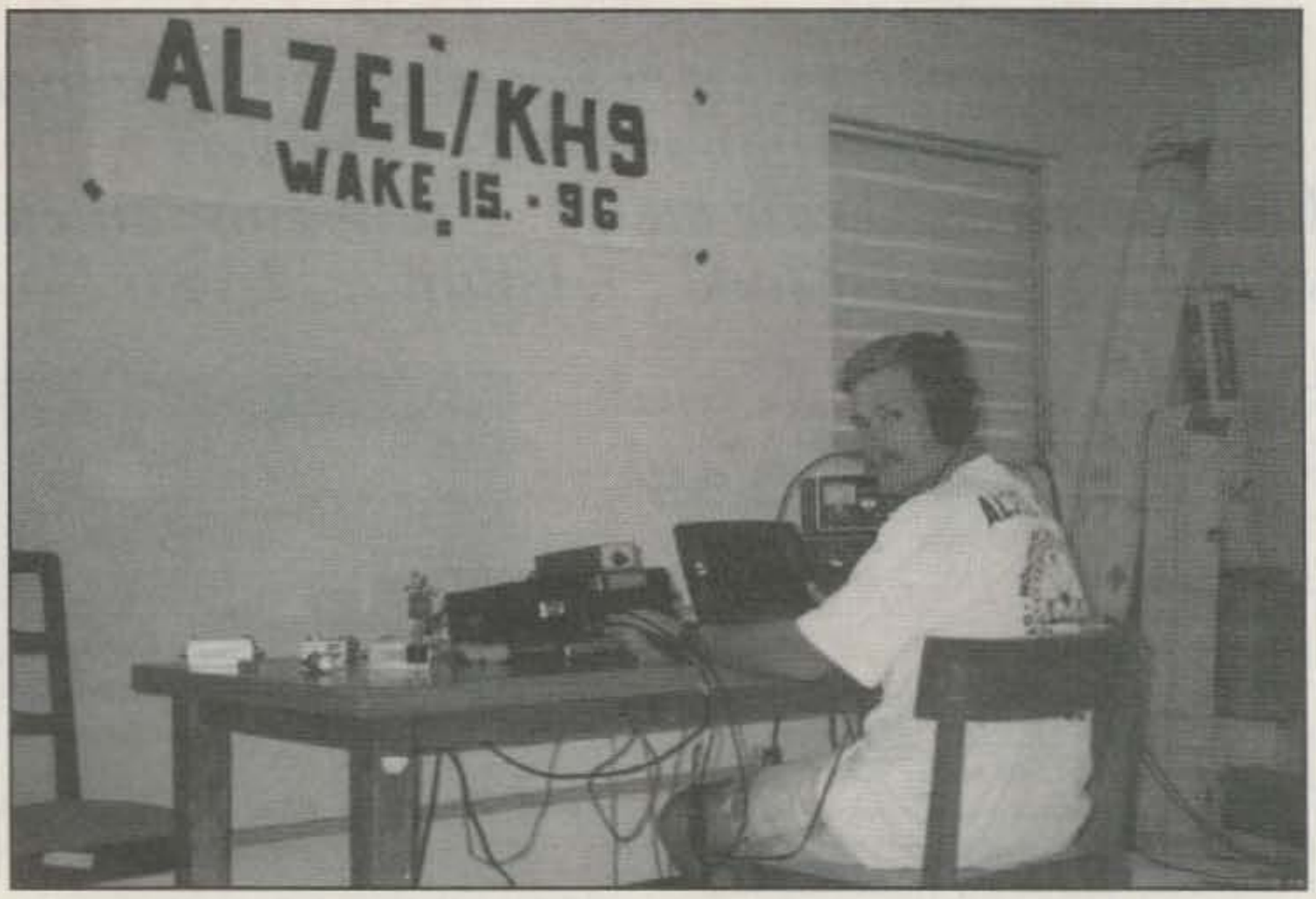


Tom Harrell, K8XP (ex-AL7EL), at the CW operating position.

Ham Radio Outlet arranged with ICOM for a loan of a 736 and with Hy-Gain for four antennas—a TH3, an Explorer 14, a 6 meter beam, and a DX77 vertical. JA8CDG, JA2RW, and JAMSAT loaned us 2 meter and 70 cm equipment (more on this later). The Battle Creek crew put one of their three units on a bus to Boston so we could hand-carry it as baggage. Antennaco of New Hampshire loaned us a 70 cm antenna for our satellite station. Heil Sound sent three headsets and foot switches. Both AEA and NI6T loaned us PK232s. The Radio Works gave us all our coax requirements (not a small order). And several individuals donated equipment right out of their stations.

Going to Wake is not a trivial task—nor is it cheap. Commercial airfare to Hawaii was expensive, and we had to pay the US Air Force for the ride to Wake. There is no shopping around for a better fare; they have a nice monopoly. We had over 550 pounds of shippable antennas, amplifiers, cable, TNCs, etc. We hand-carried all the transceivers and computers. Our freight bills quickly approached $1000. Our airfare to Wake Island cost us another $6500. Food and lodging on Hawaii and Wake came to $1600. Certain equipment had to be bought, because we needed two additional transceivers, amps, and miscellaneous gear. QSLs had to be printed (another $500). Even after the above-mentioned donations, each member was committed to cover his share of the remaining $6500 plus the equipment purchases that averaged another $1500 per person. DXpeditions are not cheap vacations, but they can be fun.

By November we started receiving the equipment. I got a call in the early part of the month from Ken, JA8CDG. Ken said would fly from Tokyo with the equipment to make sure I was experienced before reaching Wake with the satellite gear (6800 miles from home is no place to open a radio for the first time). Ken reached Boston on a typical New England day—blinding snow and wind. United had other plans for his baggage and radios. They were sunning themselves in warmer climes.

Ken and I had a very pleasant visit for a few days, but alas, no radio. Ken and I went over the methods of doing satellite, but his baggage arrived only hours before I had to drive him to the airport. After he left I finally got the antennas built and everything hooked up. The following day, my first contact on AO13 was with AH6NM in Hawaii! I proceeded to work AO10 and 13 from home for a week, and then packed up the gear and shipped out the equipment.

Tom received the 736 from ICOM, and we prepared all the interfaces etc. Both Tom and Lloyd bought IC-706s, and we also tested these with interfaces, etc. NI6T and AEA sent PK232s (never go away without a backup!), and Tom and Bob bought AL80 linears.

Via the Internet I contacted AH6NB, Jim on Kauai, about finding a source of push-up masts in Honolulu. He called the RadioShacks in Hawaii and found two masts about a mile from our hotel. He paid for them and sent me e-mail that we could pick these up on our way to the airport and return them on our way back. As it was, we just had to drop them off with a freight forwarder for shipment to Jim after we came back, and he picked up the shipping costs. We found out later that Jim never even tried to work us, as he didn't need us anywhere. Now that's real amateur radio spirit!

It was now late December and we had a month to go. Tom was busy with the permission forms for entrance to the island. I was writing the home page, and Bob was testing out the radio interfaces. Plans and preparations were proceeding at an unusually smooth pace.

Then it happened. One afternoon while Tom was at work he received the bad news that due to a scheduling conflict we would not be allowed on the island the week we had planned. We were told to reschedule our trip by one week. After our panic subsided, we all agreed to march on. All of us had to incur extra expense in broken airline confirmations, but we had no choice. We were committed to going. Equipment was being received on Wake, and nothing was lost or appeared to be damaged.

We decided to reconnoiter in Honolulu a day

Wake Island Statistics
Dateline DX Association

Total QSOs approximately 9000 (4780 unique calls)

CW.....5722
Phone 2871
RTTY 140
SAT (AO-13).....62

Band	CW	SSB	RTTY
160	455	5	—
80	1434	456	—
40	1901	226	—
30	508	—	—
20	646	1206	67
17	529	590	14
15	213	270	59
12	31	31	—
10	—	30	—
SAT	5	57	—

Countries with which we had 25 or more QSOs (Totals are QSOs, not unique call.)

USA	3699	Australia	60
Japan	3288	Ukraine	50
Finland	198	New Zealand	52
Russia	195	Slovakia	36
Italy	191	France	30
Germany	112	Korea	29
Poland	99	Belgium	28
Sweden	78	Kazakh Rep.	27
Canada	88	Denmark	27

early (Monday, January 29) to get over some of the jet lag, test the computer network, do a little sightseeing, and have some extra time just in case of plane mishaps, etc. We also needed to pick up the masts for the antennas and get some snack food to supplement the mess hall, which had very strict eating hours (to coincide with gray-line openings).

As it happened, planning to allow for delays paid off. Tom, Lloyd, and Bob were to meet in San Francisco (I had to go through Los Angeles), but all four of us were to arrive in Honolulu at the same time. I arrived on time, but the United flight from SFO was delayed seven hours. Tom and Lloyd were entertained by Bob at his home in Berkeley. By the time the weary three touched down at 10 PM, I had rented the van, been to the hotel, and even napped.

On Tuesday we awoke early and started our errands. Bob was doing what he likes second best (operating being number one)—playing with the computers and networking. I had the keys to the van, so I got to play cabby in Honolulu (not a bad spot to drive coming from snowy Boston), and off we went. We did our shopping, picked up the masts, and even found time to go over to Pearl Harbor and the Submarine Museum. We had a wonderful dinner at a restaurant where you cook your own steak and fish on a huge grill and turned in early. It was a very productive, yet relaxing day before our great adventure was to begin.

Our departure was from the military terminal at Hickham Air Force Base on Wednesday morning. As we were going up the plane steps, Tom looked back at me and said something about the weight of the radios we were carrying. The person behind me said, "Are you guys going on a DXpedition?" All of us stopped dead in our tracks. It turned out his name was Mark, and he was N6NZO going on business from Hawaii. You never know where amateurs will turn up. Out of twenty people boarding a flight to a small speck in the middle of the Pacific, five of the passengers were now amateurs! Mark was a welcome addition to the crew, and he often came by, helping out wherever he could.

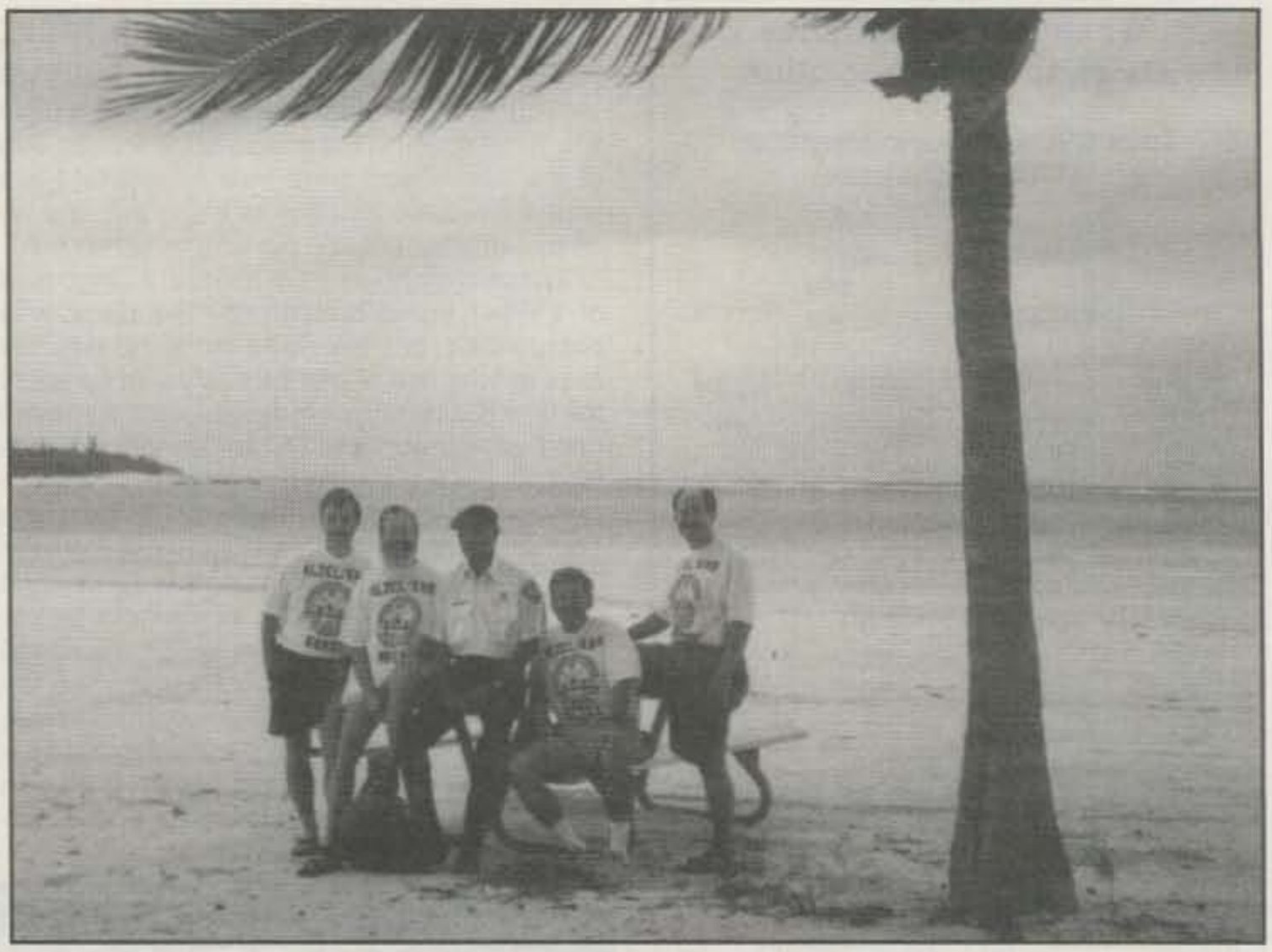
The next six hours were spent in a cargo hold of a C141 facing backwards. The plane was pressurized, but the noise from the engines required the use of earplugs. Most of us spent the time dozing or typing messages to our loved ones on my portable PC for sending on the Internet once we arrived on Wake.

We arrived on Wake at about 2 PM local time Thursday (it's two hours earlier and a day later than Hawaii, being over the dateline). Our first order of business was an orientation by the base commander. We then toured the island with our local contact, Sam Kaapuni, the fire chief, looking for an appropriate operating site. We found and were given permission to use a building away from the main center. It was an old barracks with adequate power and sleeping quarters and near the water.

By 4 PM we had gathered all our equipment, taken a quick picture of the gear, and set about the task of setting up the radios. Since it was now approaching sundown, Tom started building the DX77 vertical while others started unpacking the radios and other equipment. Bob was busy with the computer network, Lloyd and I had started the tribander, and Mark was working on the WARC beam. Given that it had become dark by the time both Yagis were finished, they were not put up until the following morning. We did get the DX77 up before it was too dark, however.

The only damage we found was a broken 572B. We had taken six extra finals for the two AL80s, so we were prepared. By late in the evening the first station was ready, and we put out a CQ on 40 meters. AL7EL/KH9 was *on the air.* At 10:13 PM JA3BSX made it into the log for our first QSO. It was slow the first night, as we started late, missed both the European sunrise and the East Coast gray line, and our Battle Creek Special was still in the case. However, we kept taking turns at the one station while we unpacked the other equipment.

During the night we finished setting up the



The DXpedition team flanks their host, Sam Kaapuni, the Wake Island Fire Chief. Lloyd, W4LSW, and Bob, N6EK, are on the left. Tom, K8XP, and Don, N1DG, are on Sam's right.

other two HF operating positions, satellite station, and RTTY station; put out the first Internet message about our arrival; and assembled the WARC A3WS and satellite antennas. It had been a very long day, but we all were excited about making it to Wake.

The following morning we were up by dawn and off to breakfast at the mess hall. It would be the last meal we all ate together at the same time. After breakfast on Friday we hoisted the two Yagis and had two stations on the air—20 meters into the US East Coast and 17 meters into the southern and midwest USA. While Tom and Bob operated, Lloyd and I built the Battle Creek Special. This is a wonderful antenna. It only took two hours to get it up. That included running out thirty-six 70 foot radials! But putting it up was only half the fun. Any of you who heard us on 40, 80, or 160 know that this performed fantastically. Our signals were loud everywhere and fully 52% of our QSOs on 40, 80, and 160 meters. On three out of the six days there was rain in the area, and signals were often at the QRN levels.

In the early afternoons the bands completely died for a few hours. We took advantage of this time to do maintenance on the stations, beach comb, nap, or look around the island. Wake Island fell to the Japanese in the first days of WW II and was heavily fortified. It was so fortified, in fact, that it was heavily bombed during the war but never invaded. There are pillboxes, gun emplacements, tunnels, and underground bunkers everywhere. Also, the Pan Am "Clipper" terminal and facilities remain partially standing. One of our first QSOs was with Bill Ewing, W1EYT, whose father piloted the second clipper to land there. The lagoon is beautiful, with green-blue water and lots of fish swimming near the shore. A complete history of the island and the pictures we took there are on our Internet web site.

By day two we had our routine down to a science. At sunrise the place to be was on 40 and 80meters to maximize the European QSOs. Each mid-morning we were on 20 and 30 working the US East Coast. Late mornings the MUF rose to 17 meters while 20 remained open to the West Coast. We could work Asia all afternoon, get some sleep, eat lunch, and relax. By 6 PM 20 meters opened for 30 minutes short path to Europe.

On the third day of the operation we received e-mail from DF6JC saying that he was hearing the Pacific long path at 8 UTC (8 PM our time), well after we had QSYed to 30. Well, that night after the 20 meter opening died I turned the antenna long path, and what do you know? We stretched the 20 meter European opening each night by another hour, and DF6JC made it into the log (his only QSO for an all-time new one). The majority of our European phone QSOs were made during this opening, as we were mostly unsuccessful in working Europe on the low bands.

The feedback daily on the Internet was wonderful. In addition to being alerted to band openings, this gave people a chance to vent frustration (usually followed a day later with hearty congratulations for a job well done now that they were in the log). We also received daily updates from AA1V on solar flux, snow back home, etc.

The weekend was "Prime Time at Wake." Everyone was home and the low bands were exceptional. Our run rates from the three stations on 30, 40, and 80 at times hit over 500 per hour. At one point we had all three bands open into Europe. Only having one 80/160 antenna was a disadvantage, as when 30 closed and we wanted to work top band, we had to close down the 80 meter station. All in all, though, the mail we have received clearly shows we made lots of guys happy on 160 (see the QSO recap box).

The satellite station was up by day two, but as luck would have it AO10 was totally turned off to recharge its batteries and AO13 had its

antenna turned away from the Earth. Signals were extremely weak. Lloyd's keyer did not key the 440 rig and I stayed on phone. After the first two days of struggling with the weak signals and many hours of CQing with no response, I took a spare paddle into the room and used it on its side like a straight key. It worked to a fashion (it's been 30 years since I used a straight key), and we finished with 60 satellite QSOs to 5 continents under very poor conditions.

JA8CDG finally made it into the log on the last day. Ken's efforts to procure the gear, fly to Boston in a blizzard, and send me e-mail daily on the bird openings made that a well-deserved contact!

By Monday afternoon things started to get a little quiet, and we were clearly exhausted. In a very quiet period I figured we needed a little levity. While no one was calling, I answered a fictitious stateside call and screamed into the mic, "N4XXX this is the third QSO on this band. That makes 12 contacts. How many !@#$%^ times do you need to work us!" Of course, I never hit the footswitch, but the others didn't know that. I wish I had a videotape of the look of horror on Bob's face. I'm still watching my back, as he's going to get me someday for that.

The week went by extremely fast. Before we knew it, day six was at hand and it was time to start packing up the equipment. First we took down the RTTY and satellite stations, WARC beam, and tribander. We disassembled them during the evening after sundown, while keeping two stations on the low bands during the night. That was a very tight schedule, as we needed to have the carry-on luggage ready at the airport at 10 AM. As soon as sun-up came, Lloyd and I packed the "Special" while Tom and Bob packed the other gear. We soon learned that our pickup flight had been delayed several hours due to equipment problems. It was a good thing as we did not get everything fully packed until about two hours after we were scheduled to be at the airport! The plane finally showed up about 6 hours late, so all was well in the end. If that had not happened, though, it would have been mayhem.

It was now exactly a week after we had arrived on Wake. We all sat around waiting for the flight and seemed totally out of it. Each of us has a different highlight of the week. Bob enjoyed that graveyard shift on top band night after night. On Saturday I had logged N1QMM, my son Micah, on 17 CW; this was the third country from which I had been able to work Micah. Lloyd contacted his wife on 20 phone. All of us had a chance to chat with old friends on the radio while, Tom enjoyed visiting with the friends he had met while on Wake the prior year. There were no disasters, just minor problems we dealt with when they occurred and overcame by teamwork.

This operation would not have happened without the assistance of a great many people. Foundations and clubs provided financing, manufacturers loaned us equipment, while individuals gave us parts of their stations right out of their shacks. Most important, our families understood our need to go out and get the rush of a pile-up.

All the planning is over and the trip is but a blur in our minds, but I have lots of fond memories of this little patch of coral reef in the middle of nowhere and of sharing an adventure with three other great operators. ■

CQ REVIEWS

The ICOM IC-775DSP Transceiver

BY LEW McCOY*, W1ICP

The ICOM IC-775DSP transceiver is a top-of-the-line ICOM product. I have had the 775 for quite some time and have really given it a thorough testing.

Before getting into the review, however, I would like to say that I have been testing and reviewing equipment for articles for more years than I like to think about. Actually, it was 40 years ago when I first did reviews for *QST*. I was employed in the Technical Department of the ARRL at the time. Our goal in those days was to really wring out a piece of equipment, checking characteristics such as ease of use, but primarily testing the technical aspects of gear. I note that now some reviews tend to be very difficult for today's amateur to comprehend. Many of us do not even understand the terms used to describe the various aspects of modern equipment. In plain, simple language, it takes a real hot-shot engineer to even begin to understand what the reviewer is talking about. In many cases (in my opinion) the reviewer completely misses the point. Numerous graphs and charts to show a product's characteristics often will only completely confuse the reader, and I feel sometimes they are unnecessary. Why unnecessary? Simply because modern design has reached a point where one doesn't have to be too concerned about stability, or third-order distortion, or keying quality. Let's give credit where it is due: The manufacturers are very capable and do a good job.

The ICOM IC-775DSP transceiver.

The Basics

Let's try to look at the IC-775 from a different viewpoint, one I hope everyone understands—that is, primarily from an operating standpoint. The IC-775DSP is an extremely exotic piece of equipment. Incidentally, "DSP" stands for Digital Signal Processing. The term "bells and whistles" has been much abused by reviewers, but in this case it is deserved. Basically, the unit is a self-contained, 200 watt transceiver with a built-in power supply. The transmitter covers the 160 through 10 meter bands and in addition offers a general-coverage receiver.

Here are some more basics, and then we'll go into the discussion of performance and features that should appeal to every amateur. The transceiver is 16 3/4"W × 6"H × 15 1/2"D and it weighs 37 pounds. Its power supply is self-contained. I have included the page from the manual that shows all the specifications (fig. 1)—and there are plenty—if you would like to study the details. I also might add that the transceiver I tested met or exceeded all the specs given by ICOM.

The IC-775DSP is really a joy to operate. It takes some getting used to because there are so many features available. The instruction manual is extremely detailed with many illustrations included. It's 8 1/2" × 11" and 63 pages. I spent considerable time studying the manual and the transceiver to familiarize myself with all the features. As a writer myself, I have always been irked by those writers who assume that the reader automatically understands what they are saying. Such is not always the case. For example, I find that buying and using software can be extremely frustrating. I bought a

This closeup view shows the right side of the front panel of the IC-775DSP. On the readout dial, the term "NR" at the left indicates that the noise reduction of the DSP action is operating. This view shows the transceiver set up as "Dualwatch," whereby both usable frequencies are shown. The one at the left is for the main tuning and the one at the far right is the setting of the other VFO. The tuning knob for this setup is the large knob below. Along the far right of the panel are the filter switches just above the Twin PBT tuning control. At the bottom is the RIT/TX control.

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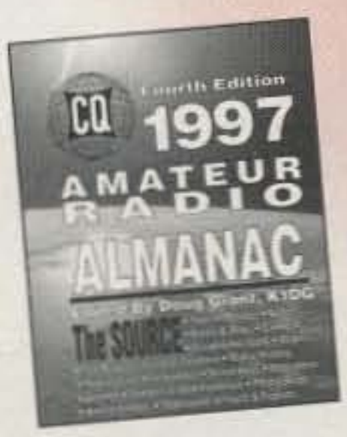

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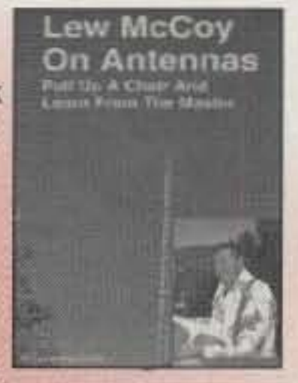

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■ GENERAL

- Frequency coverage:

Receive	100 kHz – 29.990 MHz
Transmit	1.800 – 1.999999 MHz*1
	3.500 – 3.999999 MHz*2
	7.000 – 7.300 MHz*3
	10.100 – 10.150 MHz
	14.000 – 14.350 MHz
	18.068 – 18.168 MHz
	21.000 – 21.450 MHz
	24.890 – 24.990 MHz
	28.000 – 29.700 MHz

*1 1.830–1.850 for Spain version; 1.810–1.850 for France version; 1.815–1.835/1.850–1.890 for Gormany version

*2 3.500–3.800 for Spain, France and Germany versions

*3 7.000–7.100 for Spain, France and Germany versions

- Mode : SSB, CW, RTTY, AM, FM
- Number of memory channels : 101 (99 regular, 2 scan edges)
- Antenna impedance : 50 Ω nominal
- Usable temperature range : – 10 ℃ to + 60 ℃; + 14 ℉ to + 140 ℉
- Frequency stability : Less than ± 200 Hz from 1 min. to 60 min. after power ON. After that, rate of stability change is less than ± 30 Hz/hr. at + 25 ℃: + 77 ℉. Temperature fluctuations (0 ℃ to + 50 ℃: + 32 ℉ to + 122 ℉) less than ± 350 Hz.
- Power supply requirement:

120 V type	100 – 120 V AC
230 V type	220 – 240 V AC

- Power consumption :

Transmit	max. power	760 VA
Receive	squelched	140 VA
	max. audio output	150 VA

- Dimensions : 424(W) × 150(H) × 390(D) mm; $16^{11}/_{16}$(W) × $5^{29}/_{32}$(H) × $15^{11}/_{32}$(D)" (projections not included)
- Weight : 16.5 kg; 36.4 lb (without DSP unit); 16.7 kg; 36.8 lb (with DSP unit)

■ TRANSMITTER

- Output power : SSB, CW, RTTY, FM 5 – 200 W; AM 5 – 50 W (continuously adjustable)
- Spurious emissions : Less than – 60 dB
- Carrier suppression : More than 40 dB
- Unwanted sideband : More than 55 dB
- Microphone impedance : 600 Ω

■ RECEIVER

- Receive system :

SSB, CW, RTTY, AM	Quadruple-conversion superheterodyne
FM	Triple-conversion superheterodyne

- Intermediate frequencies: (Unit: MHz)

MODE	SSB	CW, RTTY	AM	FM
1st	69.0115	69.0106	69.0100	69.0100
2nd	9.0115	9.0106	9.0100	9.0100
3rd	0.455	0.455	0.455	0.455
4th	10.6950	10.6950	10.6950	–

- Sensitivity (Preamp 1 ON):

SSB, CW, RTTY (10 dB S/N)	100 – 500 kHz	Less than 2.0 μV
	1.8 – 29.99 MHz	Less than 0.16 μV
AM (10 dB S/N)	0.5 – 1.8 MHz	Less than 13.0 μV
	1.8 – 29.99 MHz	Less than 2.0 μV
FM (12 dB SINAD)	28 – 29.99 MHz	Less than 0.5 μV

- Squelch sensitivity (Preamp 1 ON):

SSB, CW, RTTY, AM	Less than 3.2 μV at threshold
FM	Less than 0.32 μV at threshold

- Selectivity (Normal filter selection):

SSB	More than 2.4 kHz/ – 6 dB
	Less than 4.0 kHz/ – 60 dB
CW, RTTY	More than 500 Hz/ – 6 dB
	Less than 1.0 kHz/ – 60 dB
AM	More than 6.0 kHz/ – 6 dB
	Less than 20.0 kHz/ – 60 dB
FM	More than 15.0 kHz/ – 6 dB
	Less than 30.0 kHz/ – 60 dB

- Spurious and image rejection ratio : More than 70 dB
- Audio output power : More than 2.6 W at 10% distortion with an 8 Ω load
- RIT/ΔTX variable range : ± 9.999 kHz

■ ANTENNA TUNER

- Matching impedance range: 16.7 – 150 Ω unbalanced (Less than VSWR 3:1)
- Minimum operating input power : 8 W
- Tuning accuracy : VSWR 1.5:1 or less
- Insertion loss (after tuning) : Less than 1.0 dB

Fig. 1– The specifications for the transceiver as published by ICOM. The unit met or exceeded all these specs in my tests. Note the antenna tuner specs. In my tests I used a multiband antenna that was less than 3 to 1 impedance match for 50 ohms. The built-in tuner handled this antenna extremely well.

very large book that describes DOS (disk operating system). When I installed DOS into a computer, I found that all the files were compacted and had to be expanded before they could be used. I went through that book page by page and searched the index, but there wasn't a single word about how to do this. A friend told me to use the "EXPAND" command, but there wasn't a word about that command in the book! The manual for the IC-775DSP doesn't have this problem. Common amateur radio abbreviations are spelled out so you know exactly what is being described. This is an excellent manual and a credit to ICOM.

Features

Let's discuss some of the common features found on most transceivers these days before

This is the left side of the front panel. There are lots of controls, and they take a little getting used to. At the upper left are the preamp controls and the meter reading switch. Below those are the tuner controls, one for either antenna input. Then there are the keyer controls, followed by noise blanker controls, then AGC and compressor controls. At the bottom left are the AF/RF, Balance/Tone, NR (noise reduction level), and Squelch, followed by Mic gain and PWR controls.

getting into the many more unusual aspects of the IC-775DSP. We'll start with the meter and meter switch.

There are six switch positions available to read various functions. First, SWR reads the standing wave ratio on the line to the input (or output) of the unit. Next, the PO power output shows the relative RF power output in watts. The ALC (Automatic Level Control) indication is followed by COMP, which shows the compression level being used. The IO shows the drain current on the final FET, and the last position, VO, indicates the drain terminal voltage of the final FET.

There is a built-in antenna tuner which will match any load from 16.7 ohm to 150 ohms down to an SWR of 1.5 to 1 or less. I employ several antennas; one is a five-band beam that has some wide SWR curves on certain bands. The IC-775DSP brought the SWR down to well within the desired range on all frequencies. The tuner is completely automatic and tunes very quickly, an important feature for contest operation when band changing is necessary.

To give you a quick example of one DX/contest-operating feature, there are two frequency displays—the main display and a secondary display. Either display can be tuned individually. They are labeled the **Dualwatch** function. For example, you can program one of the tuning controls for an automatic CW DX call, activate that calling function, and then tune the secondary control to see where the DX station is listening. A simple instantaneous switch puts your transmit signal on the desired frequency. To elaborate on this function, the memory keyer memorizes and retransmits three different CW keying operations of often-used information such as rig, antenna type, location, etc. (or contest exchange). There are approximately 40 characters and 101 memories available.

One of the main features of this transceiver is the **Dualwatch**, which allows you to receive two signals on the same band at the same time. You can, for example, monitor a DX station who is operating off his frequency. Even more important, the main and sub-frequencies are completely independent and can be controlled with different tuning dials (which include independent dial lock functions). These functions really expand your operating ability. For example, in DX or contest operating you can set up one transceive operation on the desired station while you keep operating on another frequency. Also, as you can see from the photos, the display is very easy to read for both setups.

Another outstanding operating function is the triple stacking register. With this setup you have the equivalent of three VFOs on each band. Three separate registers allow you to memorize the three frequencies and modes used on each band. You simply push the **Band** key once to call up the last used frequency and mode, push the switch twice to call up the frequency and mode used before that, and push it three times to use the frequency and mode before that. This may sound a bit complicated as you read about it, but it only takes minutes to become familiar with this very nice feature.

Still another operating feature is the "Channelized quick split function." This permits the quickest possible method of operating split frequency for DX or net operations. No dial rotation is necessary; simply pushing switches will set split-frequency operation over a range of ±99 kHz in a 1 to 99 kHz step channel operation.

I mentioned the built-in antenna tuner earlier, and another word or two is in order. The tuner uses an automatic preset memory that includes all bands (160 meters, too). When you change bands, the tuner automatically sets itself, so no tuning is required.

Let's now discuss the DSP (Digital Signal Processing) feature and the IC-775DSP. DSP is a fairly new concept in transceiver design, and while the technical aspects are complicated, what it does is simple.

The digital signal processor, a combination of solid-state devices, separates the noise from the desired received (or transmitted) signal before they enter the audio amplifier. Outstanding

signal-to-noise ratio is achieved, providing clean, clear audio in SSB, easy to copy RTTY, and clear SSTV reception. DSP has the feature of pulling very weak signals out of the noise. In the beginning, DSP was used in the audio chain. Just recently, however, the process was moved to the IF (intermediate frequency), where the signal is processed. The IC-775DSP employs a digital modulator/demodulator constructed using a 90-degree phase shifter and radically new architecture. This provides consistently reproducible, clear transmission in SSB and high-quality reception of SSB signals.

Notch filters to take out undesired carrier notes have become a way of life in amateur radio. The **Notch** function in the IC-775DSP is a joy to listen to. Beat signals are notched out automatically with the DSP system; there is no need to tune them out with a notch control.

On CW, under crowded conditions a digital narrow filter can be kicked in, providing an 80 Hz, ultra-narrow CW filter. This effectively cuts nearby interference and pulls out the desired signal with improved signal-to-noise ratio. Another feature for CW work is an adjustable low- and high-pass filter. You can set the desired audio characteristics for transmit and receive independently using these filters. The LPF can be adjusted to 18 levels and the HPF to 14 levels.

Now we get into interference and rejection features. Twin passband tuning (PBT) electronically narrows the receiver intermediate frequency passband width in order to reduce interfering signals that overlap the edge of the IF passband. With twin passband filters you can electronically shift the center frequencies of the 455 kHz and 9 MHz IF filters separately or together for really clear reception during crowded band conditions.

The IC-775DSP has a very cute feature that really is a godsend for CW operators. It is called the **CW Reverse Mode**. This simply means that via a front-panel switch, if you have a CW signal alongside the signal you are trying to copy, you simply hit the switch and you will be listening on the other side of zero beat—away from the interfering signal. I used this control a great deal during a contest, and believe me, it is really a big help.

The IC-775DSP transceiver is a really nice box that puts out a 200 watt signal. The various mode switches are just to the left of the main tuning dial. The readout panel is clear and very easy to read.

In addition to an automatic notch filter, there is a manual notch filter. The manual IF notch allows you to cut out a very strong undesired signal that the AF notch won't touch. This notch provides 45 decibels of attenuation—much more than enough to kill the undesired signal.

The noise blanker is what I would term excellent. Just this morning I had some kind of electrical noise that sounded like line noise. It was running about an S7 on the meter. I turned on the noise blanker and bingo! The noise was gone. I did find some types of noise that I could not get rid of, but with the DSP adjusted I reduced the noise to a noninterfering level.

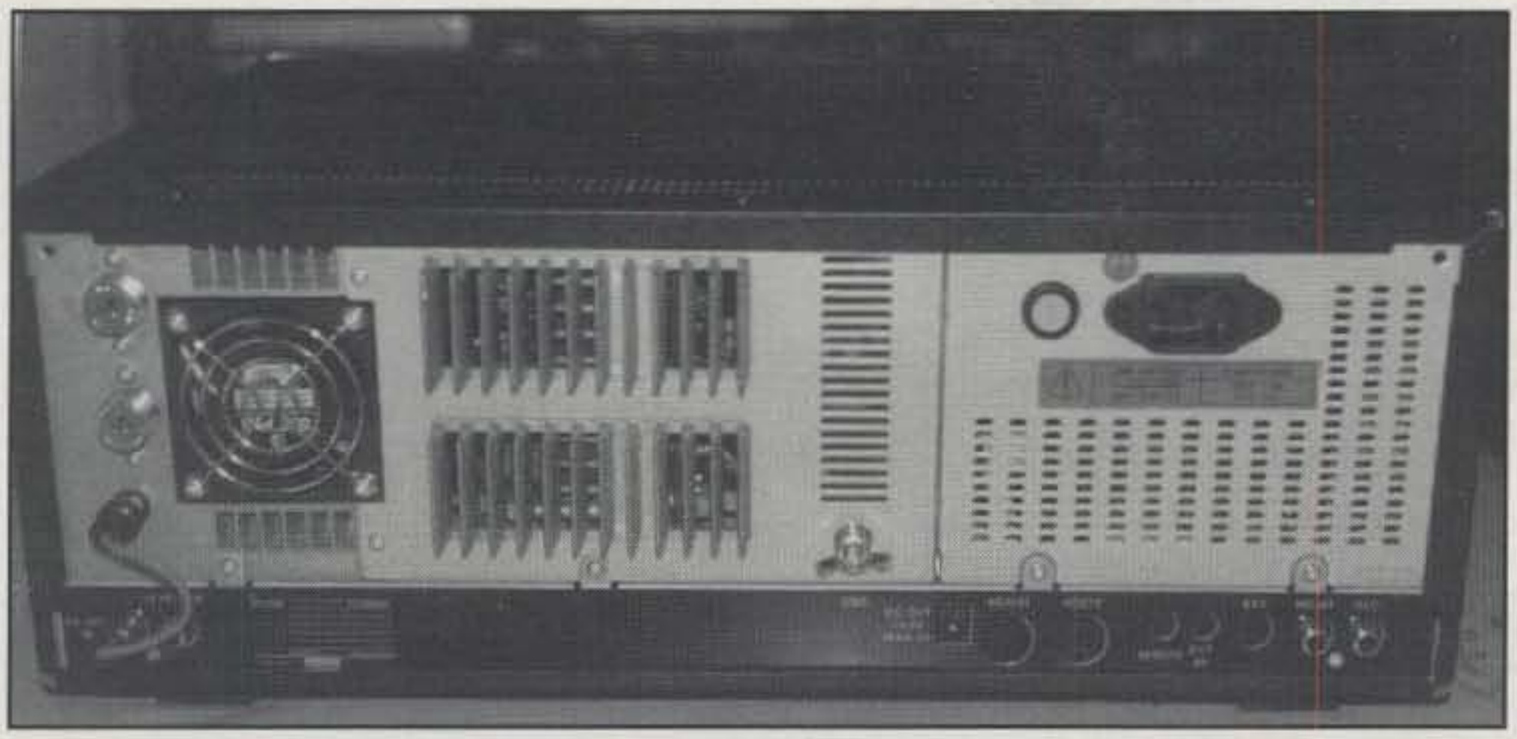
I suppose I should mention drift and warm-up time, because that's an old hat that went into any receiver product review. Well, there is no drift—period. ICOM has come up with a mixerless phase locked loop that is a completely new ball game when it comes to stability. They have what is called a direct digital synthesizer that operates without the use of a mixer. Only one reference crystal is required, and this makes stability unbelievably good.

How about the tuning rate? There are two speeds. With the slower speed and the new phase-locked-loop system, you can tune to a one Hz rate. The high-speed tuning moves you across a band with a few turns of the tuning knob.

There are also two levels of preamp gain to provide gain for weak-signal reception. In addition, there are three levels of signal attenuation on the same panel switch. How well this attenuation system performs is interesting. With radio conditions improving on the higher bands, 20 and up, a strong signal can mess up adjacent signals. The attenuation control has a great effect on cleaning up that problem. The actual gain and signal reduction figures are 10 dB for the first preamp and 16 to 18 dB for the second preamp. The RF attenuator will knock down a signal by 6, 12, or 18 dB.

The CW functions are many. There is a built-in memory keyer that provides three separate channels with an automatic repeater function. Each channel is capable of storing up to about 40 characters. These can be transmitted automatically. This is a big operating advantage during contesting or just general operating. You can store exchange numbers, or your QTH, name, type of rig and antenna, etc. When I mentioned earlier that this rig really has bells and whistles, I meant it!

There is a built-in electronic keyer that has a programmable computer control (which controls the computer dot/dash ratio). The ratio can be adjusted from 2.8 to 1 to 4.5 to 1. Also, the polarization of the iambic paddle can be reversed in **Set** mode. This is convenient in con-



In this rear view the two antenna input/outputs are visible at the upper left. The jack at the lower left is for a transverter/x-verter input/output. Over on the right side are two accessory sockets, for data communications and automatic antenna tuner, TNC, etc. To their right is a key jack, external speaker, and T/R control relay jack. Also available on the back is a 13.8 VDC, at 2 amp terminal. Another jack is for ALC input.

test operating for some of the real hot-shot operators. Also, the front panel has an electronic key jack and the back panel has a normal key jack. Again, connect a paddle to the front jack and computer keying equipment to the rear jack; this makes a great contest convenience! In addition, the IC-775DSP permits adjustment of the CW pitch from 300 Hz to 900 Hz in 20 Hz steps. Choose a pitch that you find comfortable to operate with.

In my testing I married the IC-775DSP to a computer that had a contest operator's program installed. An interface (optional) was used for the computer control. Also, I ran a keying line from one of my serial ports. It was my first operation in a contest where the computer did 99 percent of the work. By simply pushing a button on the keyboard, I sent a contest CQ. When a station called me, I typed in his call and then pushed another button and his call and report were sent. The computer did all the logging, score keeping, and so on. I have to admit it was a lot easier than the old days when we ran multi-op with one assistant logging all the contacts. The IC-775DSP did an amazingly good job in this operation.

As to DSP and so forth—the digital signal processor digitally separates the desired signal from noise components before the signal enters the audio processor. In other words, it operates at an intermediate frequency. An outstanding signal-to-noise ratio is achieved, and weak-signal reception is improved immensely.

As mentioned earlier, the digital notch function is outstanding. Any interfering heterodynes are automatically cancelled out. This alone proves the efficiency of digital signal processing. This is also true with the ultra-narrow CW filter. During pile-ups and while trying to receive weak signals, the ultra-narrow (80 Hz) digital filter does a marvelous job.

Summary

It is obvious from this review that I am very much impressed with the IC-775DSP. Frankly, it is what many of us dreamed of years ago. Back in those early days when we had HROs, Hammarlunds, and so on, we considered them pretty good receivers. Many of us then liked to prophesize what eventually would come about in receiver design, but none of us could have imagined a transceiver with the many fine features that this one has.

The IC-775DSP is a product of ICOM America, Inc., 2380 116th Avenue NE, Bellevue, WA 98004. It has an amateur net price of $4,760.00. ■

The Digital Communications 2 Meter Bandpass Filter

BY ED JUGE*, W5TOO

Many metropolitan areas are becoming "RF-rich" environments, much to the detriment of VHF and UHF communications. Most of my amateur radio years have been spent in a major "intermod alley"—Fort Worth, Texas. Intermod is interference caused when the RF amplifier in your receiver is driven non-linear by a very strong signal. Two or more signals mix in your RF amplifier, creating interference on your listening frequency. Most of the problem comes from commercial radio or paging transmitters.

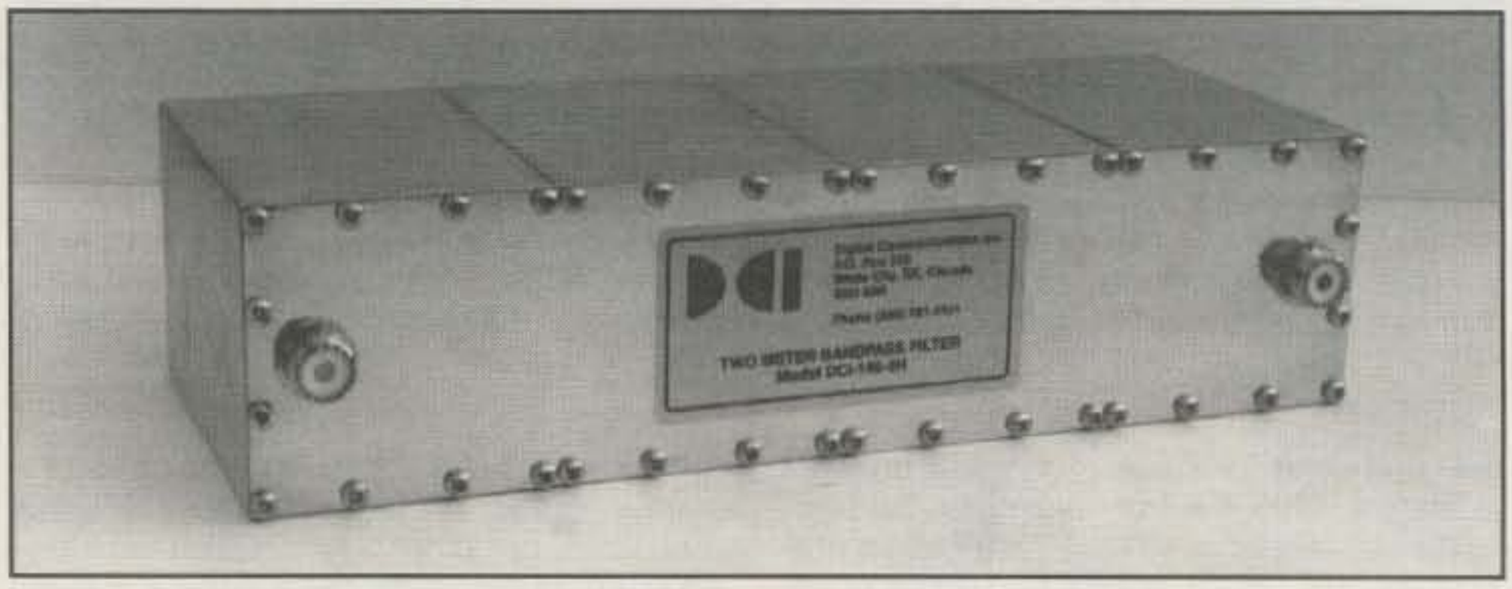
I traded 2 meter mobile transceivers just about once a year, trying each time to overcome that year's increased level of intermod. For three years the strategy worked. Finally, however, even the best amateur equipment couldn't compete. Downtown Fort Worth was a VHF "no-man's land" except for a few users of converted commercial gear. Those of us preferring the rich feature sets offered by dedicated amateur gear had a very real problem.

The subject of this review is the DCI-146-4H 2 Meter Bandpass Filter from Digital Communications, Inc. With this filter I can drive anywhere in downtown Fort Worth and work repeaters or simplex without interference. Of course, there still is a problem with other downtown stations—mobile or HT—because *their* receivers remain crippled by intermod. (Since I hear none of it, I delight in needling them about their "sub-standard equipment.") As I indicated, though, not all "intermod filters" work. I found a number of them that did nothing at all. It's a good idea to ask the vendor about his return policy in case a particular filter fails to work in your geographic area.

Many amateurs choose an HT to double for mobile use. Most find they need an external high-gain mobile antenna. The increased signal level captured by a good external antenna can overpower the HT receiver which is designed to operate with an inefficient 6 or 8 inch "rubber duck." An HT with external antenna is far more susceptible to intermod than a full-size transceiver. A good intermod filter can make the difference in this system working and not working in an RF-rich environment.

There may come a day when no serious big-city VHF/UHF mobile operator will operate without one of these filters. Few investments in amateur gear offer an equivalent payoff in operating enjoyment. You can even choose your transceiver based on the features you want without having to worry about the bandpass design of the receiver. The filter is a one-time purchase. There won't be new features each year as there are in radios.

I didn't have facilities to put this filter through lab tests. The proof, though, is in day-to-day use, and by that standard this filter does a superb job.



The front view of the DCI-146-4H filter shows its rugged, solid construction.

So what are the basic differences in filters? A notch filter reduces the level of signals in the frequency range where most of the intermod originates, usually 152–153 MHz. If your problem originates in that range, you're in business.

Bandpass filters, in the case of 2 meters, are designed to pass the 2 meter amateur band and eliminate most of the rest of the VHF spectrum. The 4-stage, high-Q DCI filter passes 144 to 148 MHz with a passband loss of less than 1 dB. Manufacturer-rated selectivity is –62 dB at 136 MHz and –50 dB at 156 MHz. (Don't expect to receive NOAA weather broadcasts with one of these babies inline!)

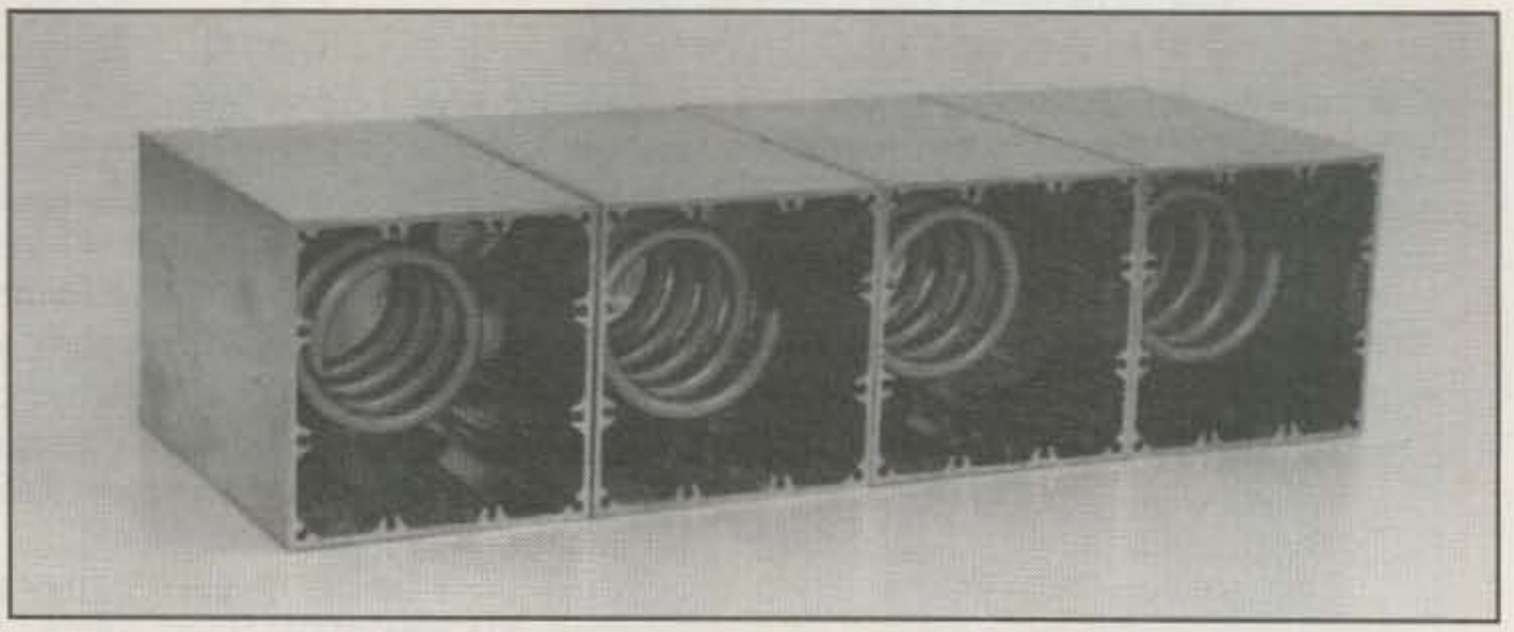
You can transmit through the filter with up to 200 watts, and in-band VSWR is rated at 1.5:1. The unit is a very manageable 12" × 3" × 5" and weighs less than 3 pounds. The case is aluminum and the construction is impressive.

The DCI filter's bandpass design differs from a notch in several ways. A notch can only eliminate unwanted signals over a very narrow frequency range. (Your DC to daylight receivers should still work on most frequencies.) A bandpass filter eliminates virtually everything *except* the operating frequency range. A typical notch offers a maximum signal reduction of about 40 dB, but the average reduction over a range of one or two MHz is probably half of that because the skirts of the filter are quite steep—just like the notch filters on most HF receivers.

A bandpass filter can provide some reduction in background noise as well as out-of-band signals, an advantage especially when using a low-noise preamp.

The DCI-146-4H is priced at $89. DCI also offers a 220 MHz version for the same $89, and a 440 MHz filter for $109. Pick up one of these bargains and not only will you enjoy unprecedented intermod-free communications, but (be warned!) you'll also develop a very wicked grin as you ask your fellow amateurs, "Intermod? What intermod?"

Digital Communications, Inc. can be reached at Box 293, 29 Hummingbird Bay, White City, SK, Canada S0G 5B0 (phone 800-563-5351; fax 306-781-2008). ■



The interior view reinforces the impression of quality workmanship.

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BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

A Primer on Optical Communications—Part V

In the first four parts of this series we discussed the various aspects of communicating with light through free space, in the same vein as RF. This month, in our concluding part, we will investigate a close relative of this technology—fiber-optic communications. The primary difference between this technology and the technology of our previous discussions is that the modulated light travels through tiny fibers of ultra-pure glass instead of through free-space. The rest will be quite familiar if you have been reading this series all along.

"Why glass fibers?" you might ask. Well, as mankind's technological development progressed, the demand to transmit more and more information over longer and longer distances also increased. In the early part of the 20th century simple copper wires sufficed. These soon gave way to coaxial cable, but the bandwidth requirements did not stop here. Today the only "wired" scheme that can handle the data rates needed is fiber-optic cable. As a result, this has become the "modern" medium of choice for the "telecommunications age."

Low-loss glass fiber-optic cables offer many distinct advantages over copper as a transmission medium. The most important are:

1. The fiber will carry much more information and deliver it with less loss than either wire or coaxial cable.

2. The fiber is totally immune to virtually all kinds of interference (even lightning) and will not conduct electricity. It therefore can come in direct contact with high-voltage electrical equipment and power lines. Since it is not an electrical conductor, it also won't create ground loops.

3. As the basic fiber is made of glass, it will not corrode and is unaffected by most chemicals. It can be buried directly in most kinds of soil or exposed to most of the corrosive atmospheres usually found in chemical plants.

4. Since the only carrier in the fiber is

c/o CQ magazine

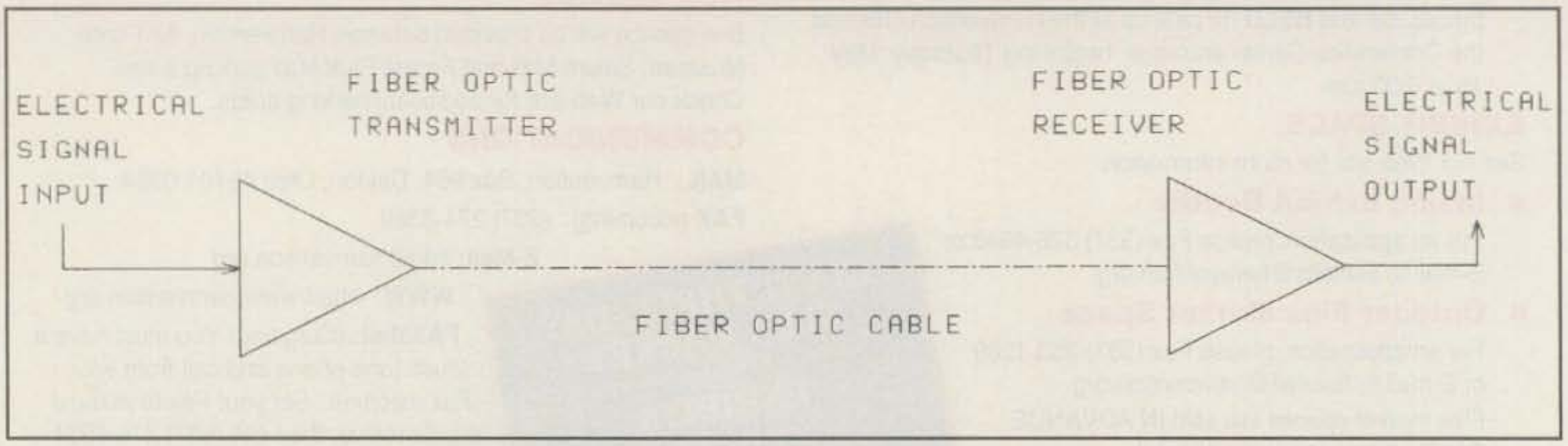


Fig. 1– A basic fiber-optic transmission system.

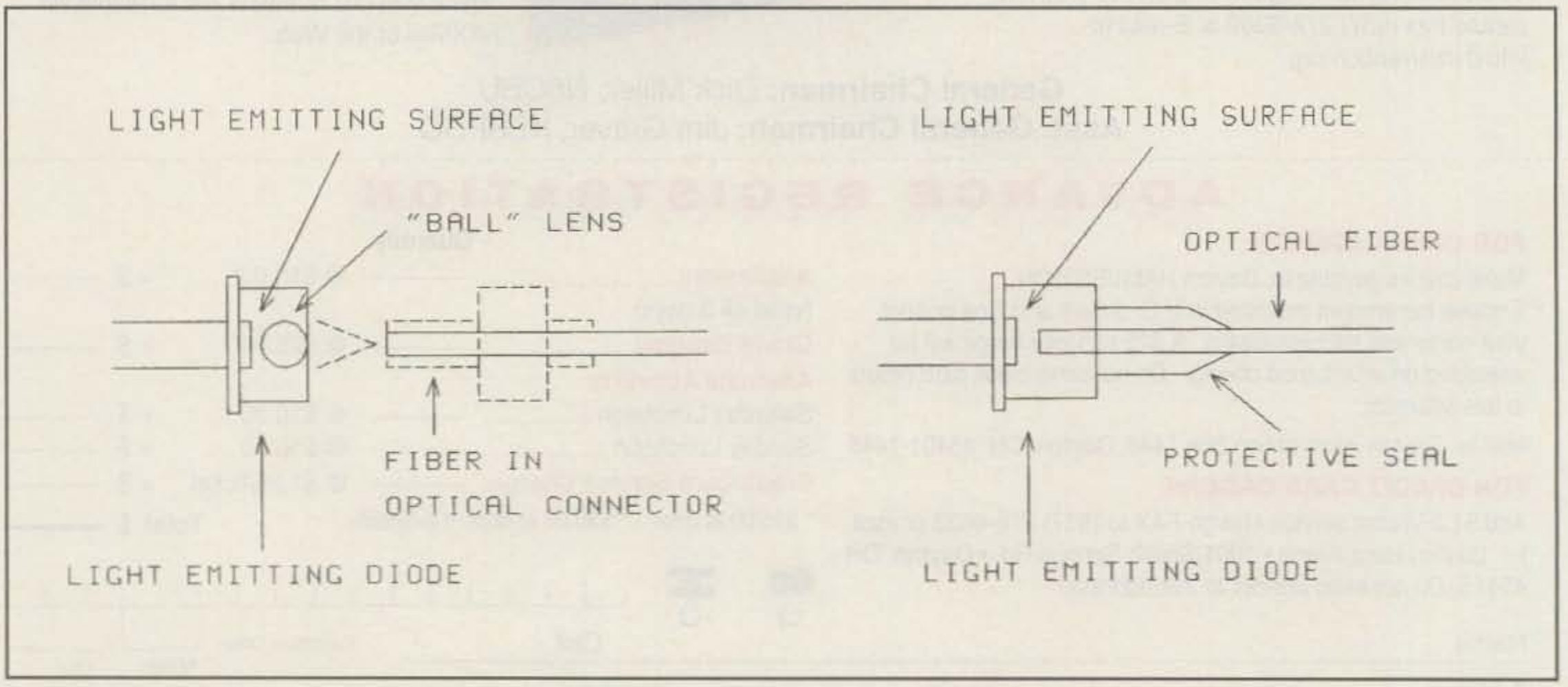


Fig. 2– Methods of coupling a fiber to an emitter.

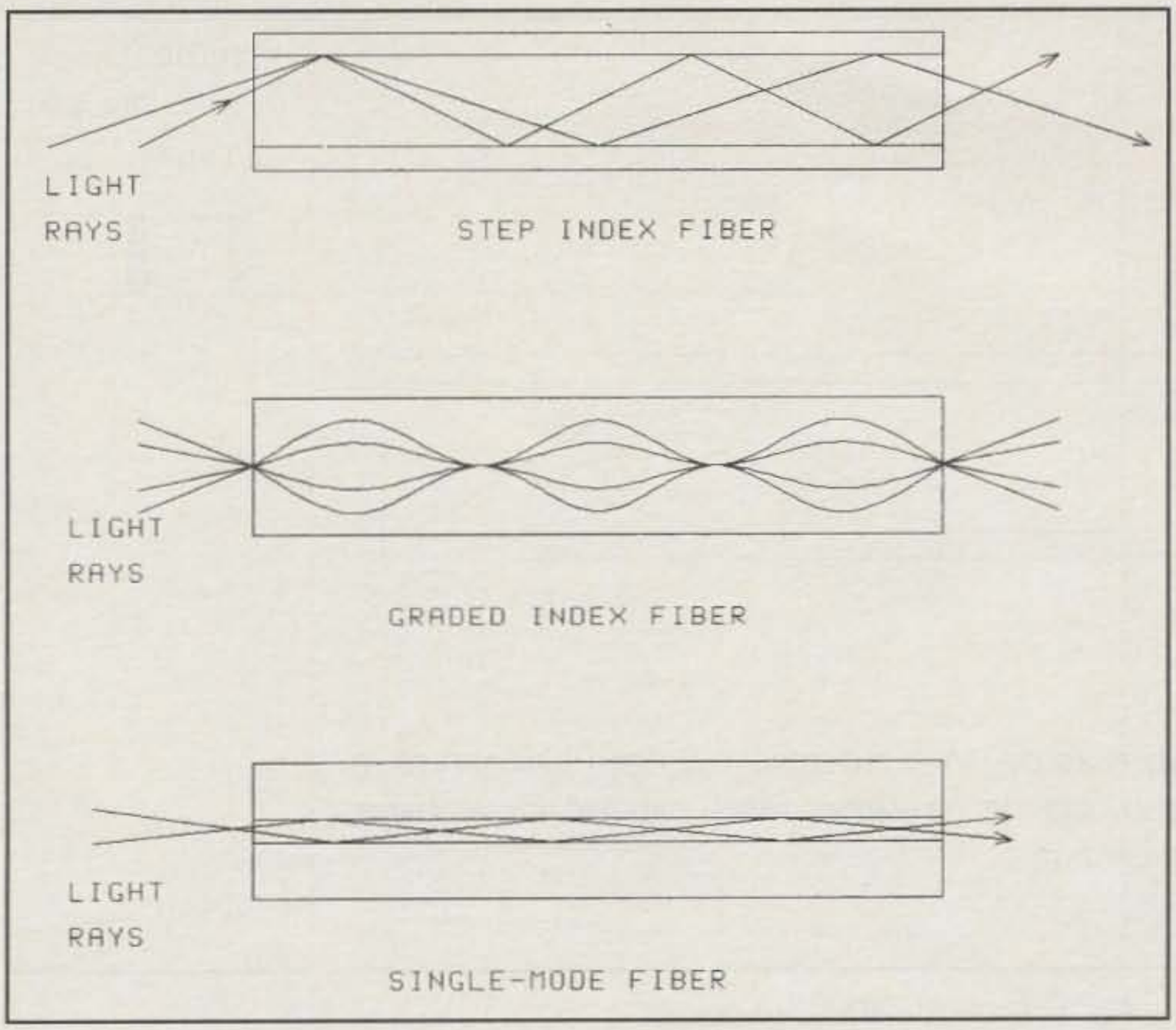


Fig. 3– The three basic optical fiber types.

light, there is no possibility of a spark from a broken fiber. Therefore, there is no fire hazard in the most explosive of atmospheres.

5. A fiber-optic cable, even one which contains many fibers, is usually much smaller and lighter than a wire or coaxial cable of similar information-carrying capacity and is easier to handle and install. It uses less duct space and frequently can be installed without ducts.

6. Fiber-optic cable is very difficult to tap, but very easy to monitor for potential eavesdropping, making it ideal for secure communications systems. In addition, there is absolutely no electrical radiation from a fiber.

The Fiber Optic Link

The basic point-to-point fiber-optic transmission system is shown in fig. 1 and consists of three elements:

1. The fiber optic transmitter, which converts an electrical analog or digital signal into a modulated optical signal in the same way as free-space optical transmitters we have been discussing.

2. The fiber-optic cable, consisting of one or more glass fibers which act as "conductors" for the optical signal.

3. The fiber-optic receiver, which converts the modulated optical signal back into a replica of the original electrical signal. This receiver operates in the same way as the free-space optical receivers we have been discussing.

We will now look at each of these elements and see how they differ from the free-space optical systems we discussed in the previous parts of this series.

Fiber-Optic Transmitters

The basic fiber optic transmitter converts input electrical signals to modulated light for transmission over an optical fiber. The methods of modulation are virtually the same as for the free-space version. The most common devices used as the light source, as in the free-space versions, are the LED and the laser diode. In a fiber-optic transmitter, however, these devices are mounted in a unique optical connector housing that enables the tiny optical fiber to be carefully aligned in very close proximity to the light-emitting region in order to couple as much light as possible into the fiber. In some cases the emitter is also fitted with a tiny spherical lens to collect and focus light onto the fiber, and in other cases a fiber is "pigtailed" directly to the actual surface of the emitter. Fig. 2 shows both methods of coupling.

It is obvious that the main goal of a fiber-optic transmitter is to couple as much light into the tiny optical fiber as possible. LEDs have relatively large emitting areas, and as a result are not as good light sources as laser diodes. They are much more eco-

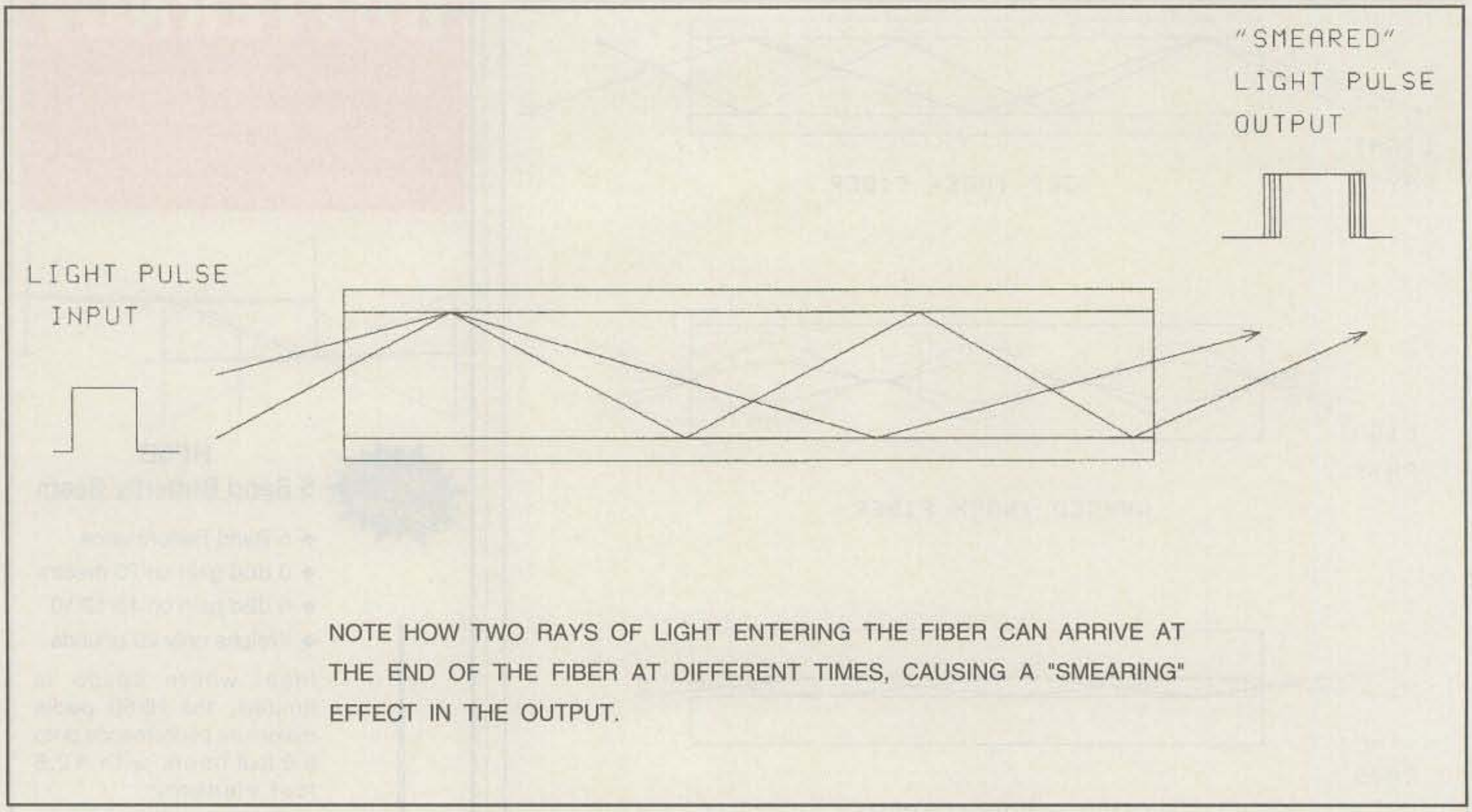


Fig. 4– Limitation of fiber bandwidth.

nomical, however, and also much more linear in terms of light output versus electrical current input. Lasers, on the other hand, have very small light-emitting surfaces and can couple many times more power to the fiber than LEDs. They are usually non-linear, though, and require more elaborate circuitry to achieve acceptable modulation.

As in the case of the free-space transmitter, both emitters operate in the infrared portion of the spectrum, so their light output is usually invisible to the human eye. Their operating wavelengths, however, are chosen to be compatible with the best transmission wavelengths of glass fibers and sensitivity ranges of photodiodes. The most common wavelengths in use today are 820 to 850 nanometers, 1300 nanometers, and 1550 nanometers.

The Optical Fiber

Once the fiber-optic transmitter has converted the input signal to whatever form of modulated light is desired, the light must be "launched" into the optical fiber.

As previously mentioned, there are two methods whereby light is coupled into a fiber. One is by pigtailing, and the other by close proximity to an LED or laser diode. When the proximity type of coupling is employed, the amount of light that will enter the fiber is a function of the intensity of the LED or laser, the area of the light-emitting surface, and the losses due to reflections and scattering.

There are three types of optical fiber in use today: step index, graded index, and single mode. The first two are also referred to as multi-mode fibers. Fig. 3 shows the details of each and how light tends to propagate through them.

As can be seen from the drawing, step-index fiber consists of a core of low-loss glass surrounded by a cladding of lower refractive index glass. This causes light to continually "bounce" between the core/cladding interface along the entire length of the fiber in much the same way that a ball would bounce from wall to wall if it were propelled through a pipe. In graded-index fiber only one type of glass is used. However, the index of refraction gradually decreases as the distance from the core increases. The result is that light continuously bends toward the center of the fiber, somewhat like a continuous lens. In single mode fiber, which can be of step- or graded-index design, the core is so small that only one or two modes (beams) of propagation can exist.

There are currently three popular sizes of optical fiber in general use, although larger sizes do exist for special applications. These have core diameters of 50 microns (.002 inches), 62.5 microns (.0025 inches), and 8–10 microns (.0004 inches). The outer diameter of these fibers range from 125 to 250 microns (.005 to .010 inches). The first two (multimode) fibers are in common use for short and medium length point-to-point transmission systems up to about 10 km or so. Single-mode fiber is commonly used for long distance telecommunications purposes with distances of 40 km or greater easily achieved. The larger core fibers are normally driven by LEDs, while single-mode fiber is almost always driven by a laser diode.

The core of an optical fiber is made of ultra-low-loss glass. Considering that light has to pass through thousands of feet of fiber (or more), the purity of the glass used must be extremely high. As a comparison of the purity of optical fiber glass, consider a piece of broken window glass. The edges appear green because light passing edgewise through the glass must travel several inches. Windows only appear clear because the light path is only 1/16 to 1/4 inch long. Imagine the loss in a thousand feet of ordinary window glass!

Most general-purpose optical fiber exhibits losses of 4 to 6 dB per km at a wavelength of 820 to 850 nm. When the wavelength is changed to 1300 nm, the loss drops to about 3 to 4 dB per km, while at 1550 nm it is even lower. Premium fibers are available with loss figures of 3 dB per km at 820–850 nm and 1 dB per km at 1550 nm. All of these attenuation factors result from impurities and are independent of bandwidth. In other words, a 3 dB loss means that 50% of the light will be lost whether it is being modulated at 10 Hz or 100 MHz. Optical fiber does have an actual bandwidth limitation, but this is well beyond the region of normal operation. The easiest way to understand how

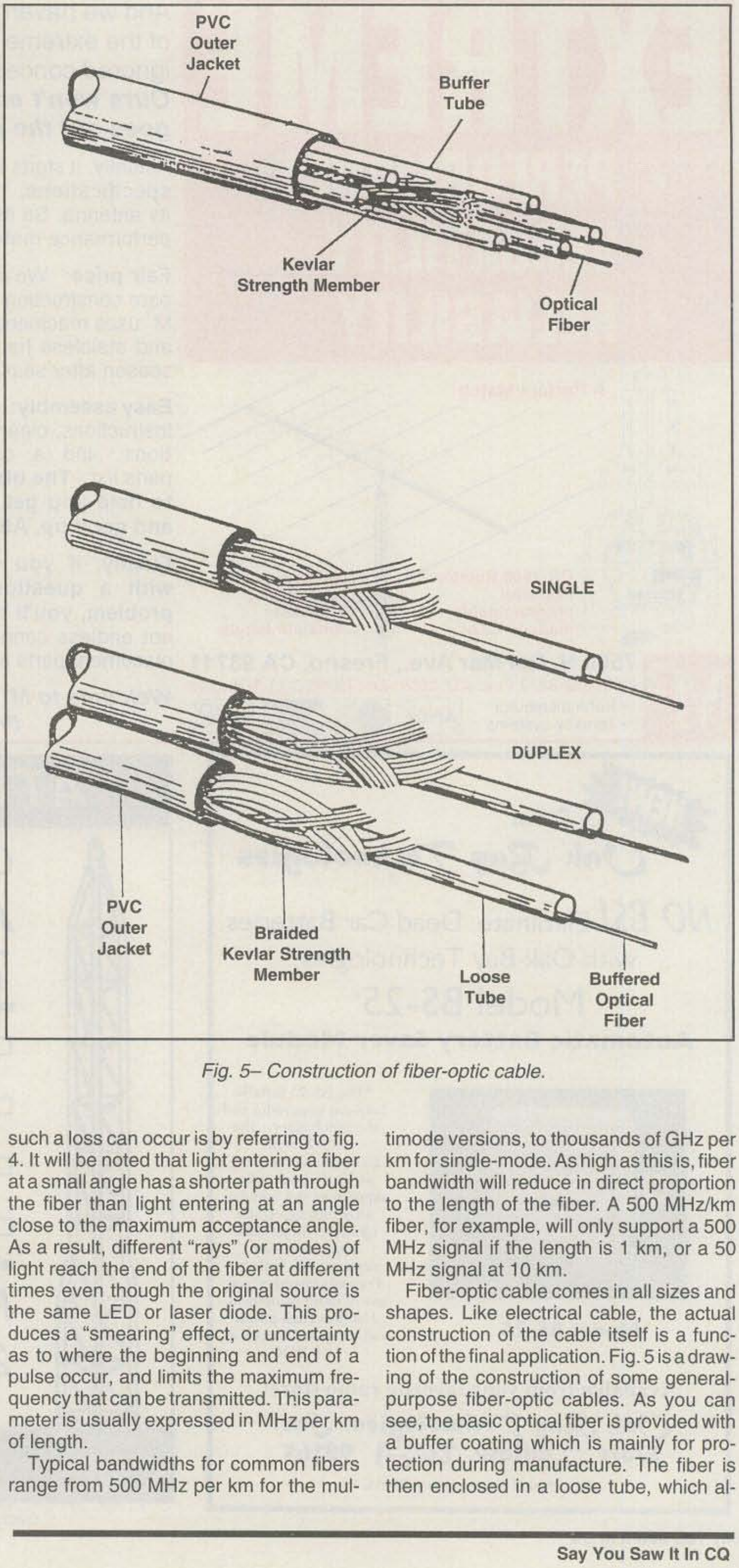


Fig. 5– Construction of fiber-optic cable.

such a loss can occur is by referring to fig. 4. It will be noted that light entering a fiber at a small angle has a shorter path through the fiber than light entering at an angle close to the maximum acceptance angle. As a result, different "rays" (or modes) of light reach the end of the fiber at different times even though the original source is the same LED or laser diode. This produces a "smearing" effect, or uncertainty as to where the beginning and end of a pulse occur, and limits the maximum frequency that can be transmitted. This parameter is usually expressed in MHz per km of length.

Typical bandwidths for common fibers range from 500 MHz per km for the multimode versions, to thousands of GHz per km for single-mode. As high as this is, fiber bandwidth will reduce in direct proportion to the length of the fiber. A 500 MHz/km fiber, for example, will only support a 500 MHz signal if the length is 1 km, or a 50 MHz signal at 10 km.

Fiber-optic cable comes in all sizes and shapes. Like electrical cable, the actual construction of the cable itself is a function of the final application. Fig. 5 is a drawing of the construction of some general-purpose fiber-optic cables. As you can see, the basic optical fiber is provided with a buffer coating which is mainly for protection during manufacture. The fiber is then enclosed in a loose tube, which al-

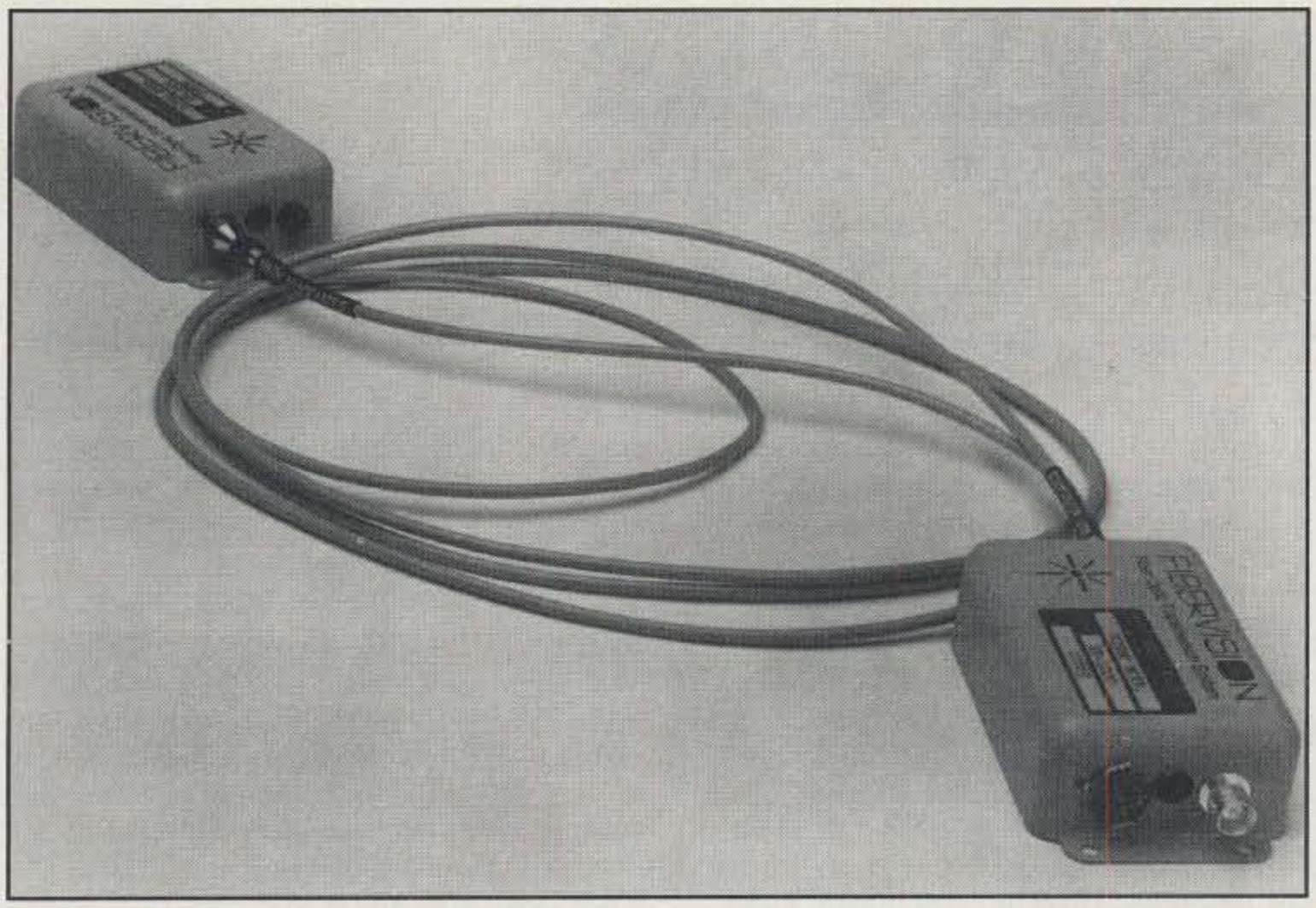


Fig. 6– A commercial fiber-optic video transmission system.

lows the fiber to flex and bend, particularly when going around corners or when being pulled through conduits. Around the loose tube is a braided Kevlar® strength member which absorbs most of the strain put on the fiber cable during installation. Finally, a PVC outer jacket seals the cable and prevents moisture from entering. These types of cables are ideal for most inter-building applications where extreme ruggedness is not required, and they look and handle much like common coaxial cable. Fiber- optic cables are available for just about any application, ranging from direct buried, armored, rodent-resistant cable wound with steel outer jackets, to UL-approved plenum-grade cable. Of course, multi-fiber cable in all of the above constructions is also available.

Our discussion has centered on glass fibers. Plastic versions do exist, however. These are occasionally used in short-haul data-transmission systems. These fibers exhibit very high attenuation factors. At 100 to 200 dB per km, the usable distance that can be covered by plastic fibers is quite short. It is for this reason that any serious data communications systems use glass fibers.

Fiber-Optic Receivers

The fiber-optic receiver converts the modulated light coming from the optical fiber back into a replica of the original signal applied to the transmitter. The detector of the modulated light, as in the case of the free-space optical receiver, is usually a PIN or avalanche type photo-diode. This detector is mounted in a connector similar to the one used for the LED or laser diode. Since the photodiode usually has a large sensitive area, this relaxes the need for special precautions in centering the fiber, with the result that fiber-optic receivers usually are much less sensitive to alignment than transmitters.

As in the case of fiber-optic transmitters, fiber-optic receivers are available in analog or digital versions with circuitry that is very close to that of the free-space receivers already discussed. Either type can form the basis of many other more elaborate systems. Demodulators, various digital protocol converters, etc., all can be added to them to configure almost any type of optical transmission system desired.

Fig. 6 is a photograph of a typical fiber-optic transmitter and receiver manufactured by the author's company. This particular system is designed for baseband video transmissions, and the single-mode version will convey a standard NTSC signal more than 40 km (25 miles) without the need for repeaters or boosters of any kind. If you try to pass a video signal through this length of coax, you will be lucky to get anything that even resembles an electrical signal out of the other end. The picture provided by the fiber-optic system, on the other hand, looks like the picture after 3 feet of coax.

This concludes our series on optical communications. As I stated last month, I sincerely hope that at least some readers have been motivated to "dust off the old soldering iron" and prove that the spirit of amateur radio and experimentation has not yet expired. Please let me know of your successes (and failures).

73, Irwin, WA2NDM

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

The Fine Arts: CW and Keys—Part I

Okay, friends, your requests for more keys columns have been heard, and we are proud to answer them with another double-feature show-and-tell Morse treat. Our special thanks to all who have shared details of their favorite telegraphic instruments and voiced their appreciation of this fine-arts side of amateur radio. An unusual viewpoint for our most conventional mode of communications, you say? Not really. A handcrafted violin and a meticulously produced key have several traits in common. Both reflect their designers' dedication to the art, both may become treasured collectibles in time, and both produce delightful sounds when handled by a true master of their related art. Yes indeed, CW is a very special and unique form of art!

We occasionally hear rumors of interest in CW waning, but closer investigation tends to prove just the opposite. An increasing number of CW aficionados are producing their own style of keys, sales of both independently made and commercially produced keys are high (although big-rig sales are down), and membership in the FISTS CW Club is booming. In addition, a combined University of Wisconsin and John Hopkins University Research program called Morse 2000 Outreach is proving the benefits of Morse code over other whiz-bang concepts as a communications aid for the severely handicapped. CW isn't fading; it's flourishing!

Want to enjoy some real radio fun? Gear up with a couple of new keys, start perfecting your Morse expertise, and check with Nancy Kott, WZ8C (P.O. Box 47, Hadley, MI 48440; include an SASE) on becoming a member of FISTS. You will be set for sunspot Cycle 22 in fine style!

That's enough good cheer soapboxing for this time. Now let's get to the keys!

4941 Scenic View Drive, Birmingham, AL 35210

W9WBL Combo Vertical Paddle

Starting on an upbeat note, I have a first-hand report on W9WBL's recently upgraded vertical dual-lever paddle briefly mentioned in last year's column. The revised paddle is called a V2L-1 (photo 1), and it can be set for single- or double-lever operation as desired. I have been using the paddle both ways on the air, and it handles great! Each lever is adjustable in travel and tension (even while sending), and each has gold contacts. The smooth-feeling cocobolo wood fingerpieces are adjustable in both spacing (between them) and height (above a desk), and an adjustment wrench is included with the paddle. For single-lever operations, one of three different length screws to mate with fingerpiece spacing threads through the right arm and locks it against the left arm (near the fingerpieces). The arrangement is quite clever and effective.

Some operators like iambic action; others prefer the simple bug-like operation of a single-lever paddle. W9WBHL's V2L-1 fills both needs and changes if you change your mind. The paddle is exceptionally well made. Its mechanism is satin-finish brass with stainless-steel screws, and it has 2.2 pounds of steel weights in the framework to minimize "walking" on a desk. Want to put a V2L-1 on your desk? Contact Stan Hails, W9WBL, at 6345 Coffman Road, Indianapolis, IN 46268-2591, or telephone him at 1-800-726-8936. In addition, you can look for Stan in the flea-market at the Dayton Hamvention. He will be the guy selling keys.

N9VKA's Ne Ke

Moving to the next telegraphic delights, your attention is directed to the small, all-brass "Ne Ke" shown in photo 2. This unusual iambic paddle emerges from the workshop of Boyd Mason (8297 Cleveland W., Coopersville, MI 49404), and everyone who tries one loves it. How does the thing work, you ask? Notice the spring metal straps emerging from the white

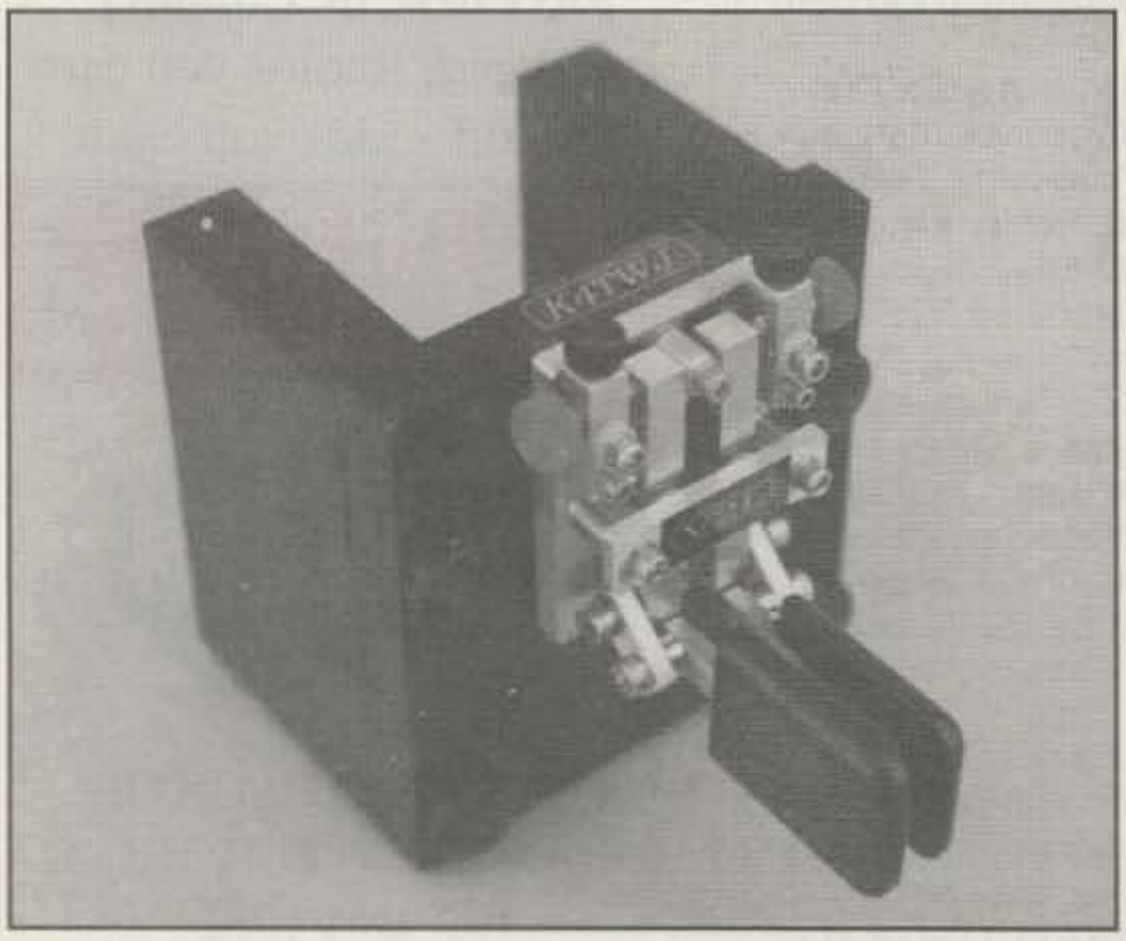


Photo 1– The new W9WBL V2L-1 is a combination single- and double-lever iambic paddle with a vertical mechanism. The paddle's small 3 inch by 3 inch footprint occupies minimum desk space, and the key handles like a champ.

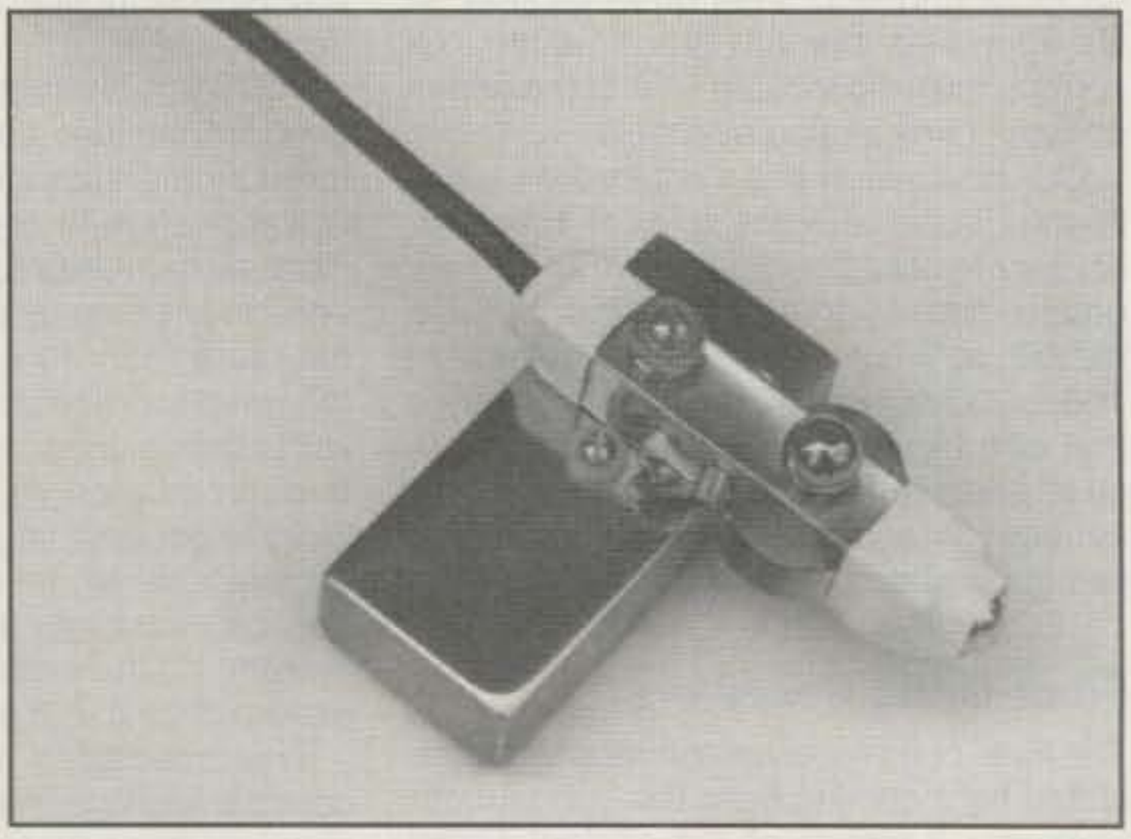


Photo 2– This is the all-brass/QRP version of the Ne Ke being made by N9VKA. The spring straps on the side are substitutes for dot/dash levers. The top retaining nut can be loosened by hand, and the paddle arm can be repositioned in line with the base for carrying in a pocket or operating "conventional style." (More details in text.)

Photo 3– Ne Ke madness for sure! Top left: My leg-strapped Ne Ke is plugged into a self-contained Radio Adventure Company keyer for stand-alone use. Top right: The kit Ne Ke on a black wrinkle base. Left bottom: A black-base QRP Ne Ke positioned in line as discussed in photo 2. The final Ne Ke is a tie-tack paddle.

cover and positioned on each side of the main arm. When you touch or push either one, it flexes forward ever so slightly and contacts a screw on an insulated pad to activate your keyer. The amount of pressure required for each spring metal strip (which feels like travel/tension adjustments to your fingers) can be varied by barely moving the contact screw(s). Overall, the Ne Ke is quite comfortable and enjoyable to use; it also is mouse quiet.

If you missed our brief introduction to N9VKA's original Ne Ke in last year's mobile column, here is a quick recap. Boyd started out making his Ne Ke in an inexpensive leg-strapped version for mobile use, and folks went bonkers over it. I must agree, as my mobile Ne Ke handles very well and its adjustable leg (knee) strap is the best idea for CW mobiling I have seen in years. If you enjoy CW mobile, you simply must try one.

Over half the folks ordering a mobile Ne Ke encouraged Boyd to make versions for home use and for QRP, so he developed the two black-base versions shown along with the mobile Ne Ke and a tie clip Ne Ke shown in photo 3. Ne Ke mania? Maybe,

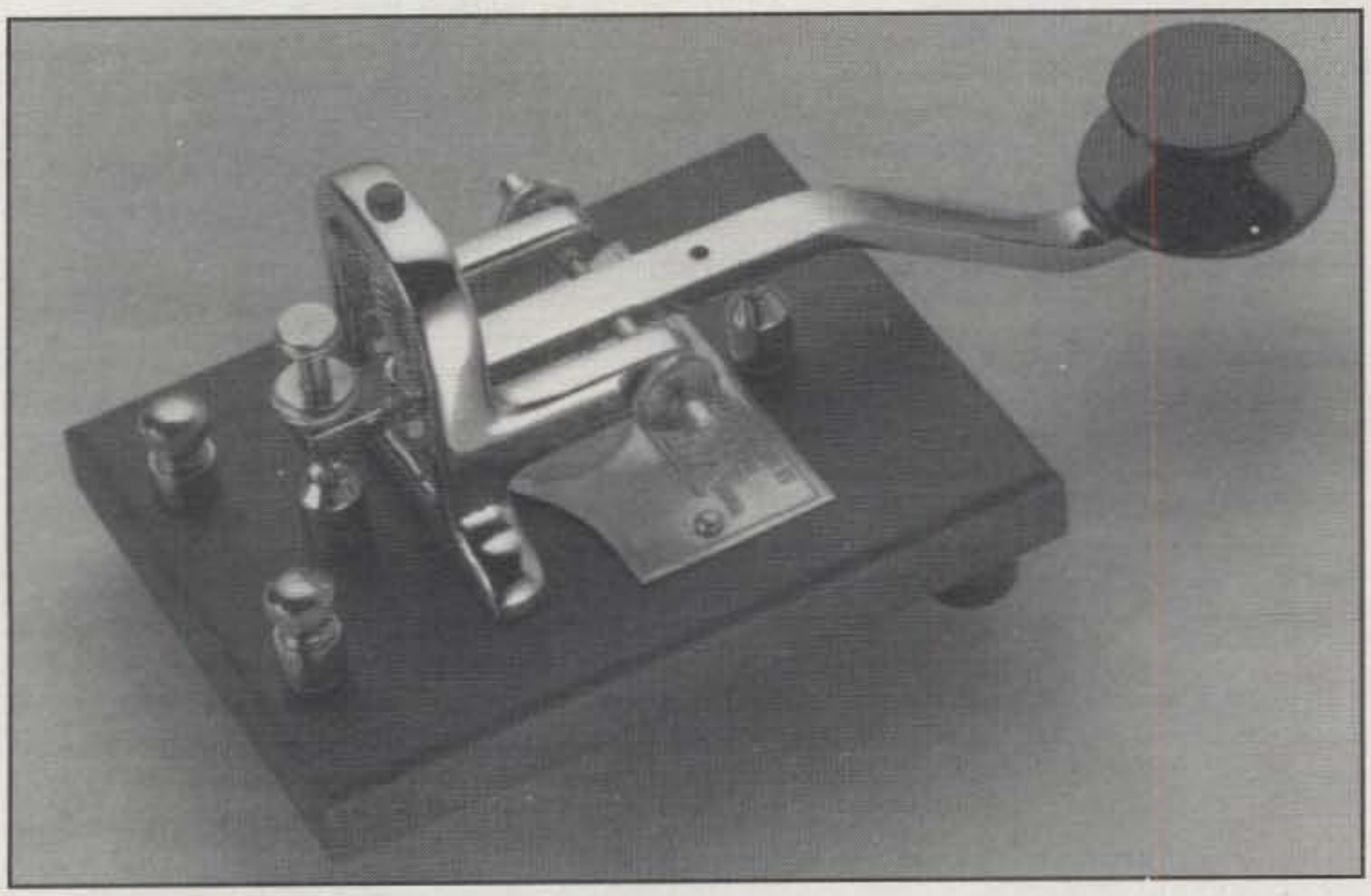


Photo 4– The new black-base/standard-model Vibroplex hand key. Classic lines and a unique feel make this gem a treat to display and use. What a way to enjoy straight key night! Photographer Joe Veras, N4QB, says the illusion of the key floating in air is an old Indian trick.

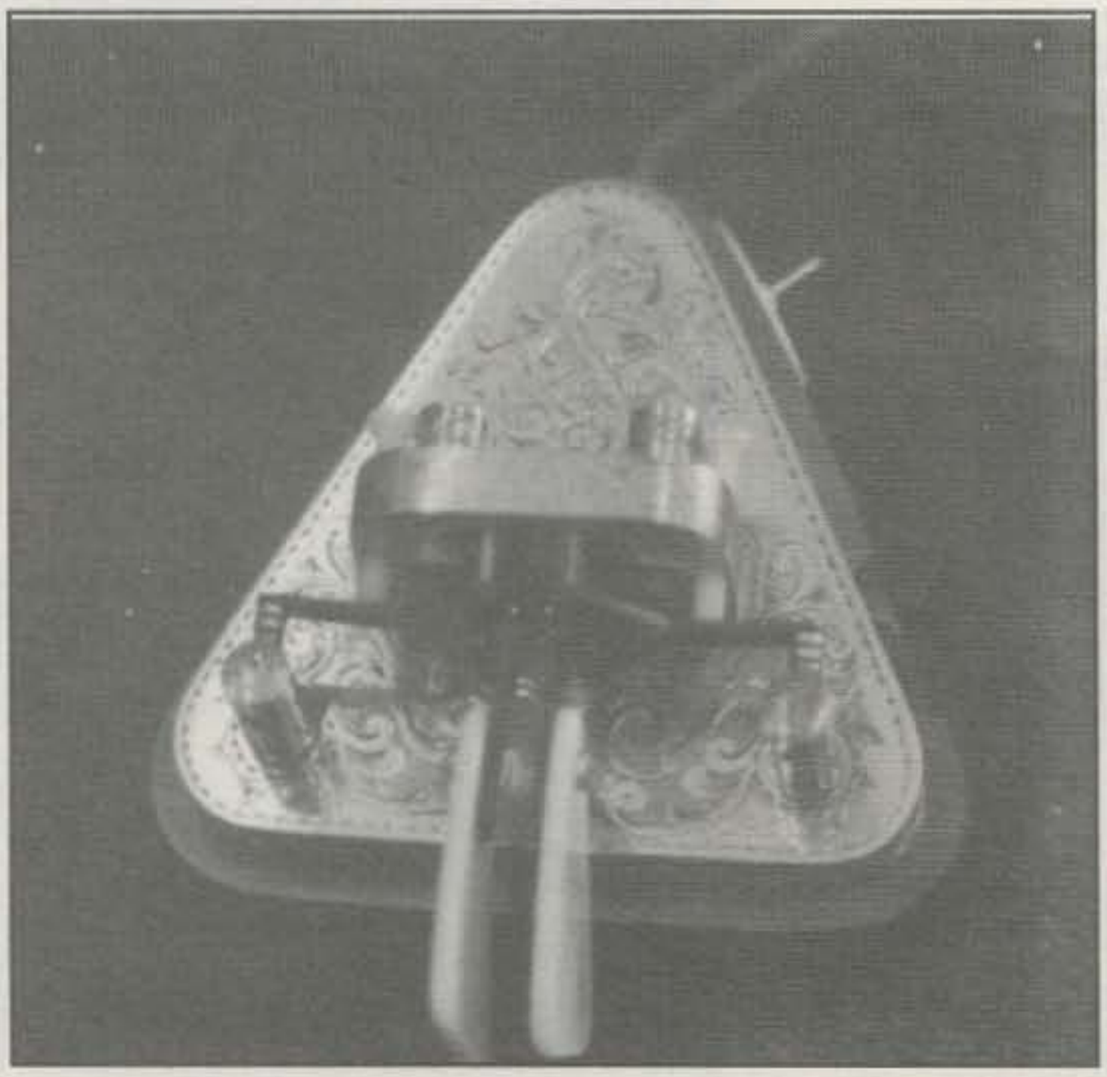
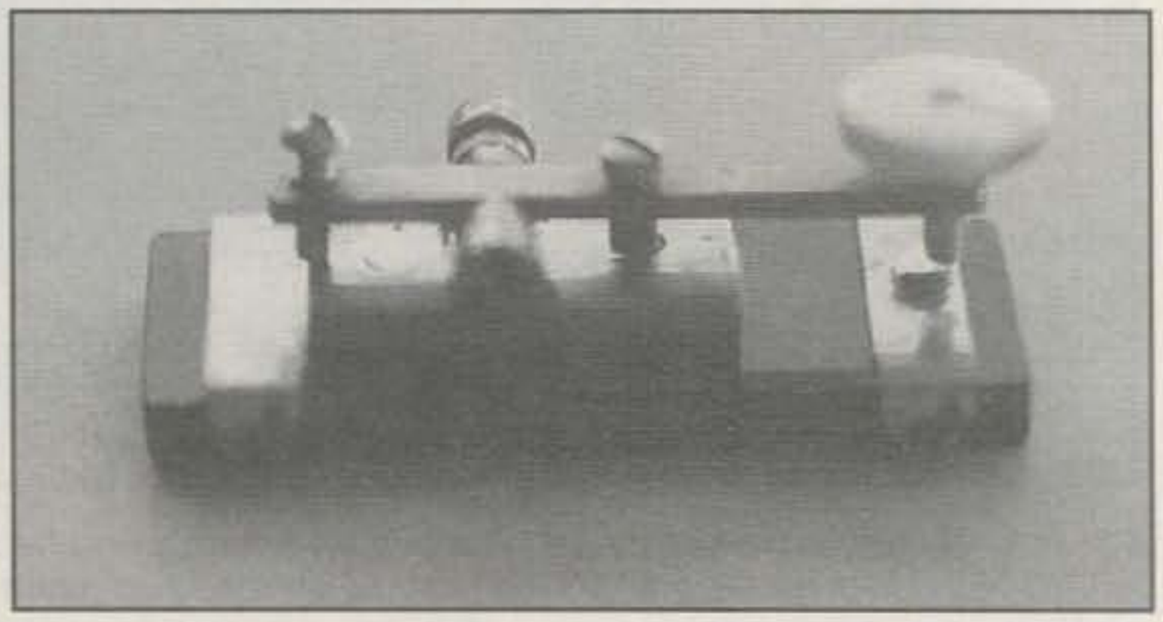


Photo 5– Engraver Smokey Gaines, KN6AE, turns conventional keys and paddles into dazzling works of art. The example shown here is a Brass Racer that has been 24-karat gold plated, scrolled, and fitted with bone fingerpieces.

Photo 6– KN6AE made this ultra-miniature key as a just-for-fun project, but it seems like an ideal mate for my Micronaut QRPp rig featured in last month's column. The key is .5 by 1 inch—smaller than a car key!



but as I have said in past columns, all the fascinating keys are what makes CW operation so much fun!

New Vibroplex Key

Turning our spotlight to commercially-made treats, Vibroplex's new standard model/black-based hand key makes its debut in photo 4. You probably have read about the key's deluxe all-chrome counterpart in recent product announcements, so I'll skip those points and tell you some "from the operating desk" details.

First, the main arm's shape and contours are the same as a classic J-38, which we all recognize and like. Second is the unique tension spring arrangement: It is on top of the arm and pushing down from in front of the pivot point rather than under the arm pushing up from the back of the pivot point. Finally, notice the threaded hole in the arm slightly forward of the base. It supports a bug-type slider

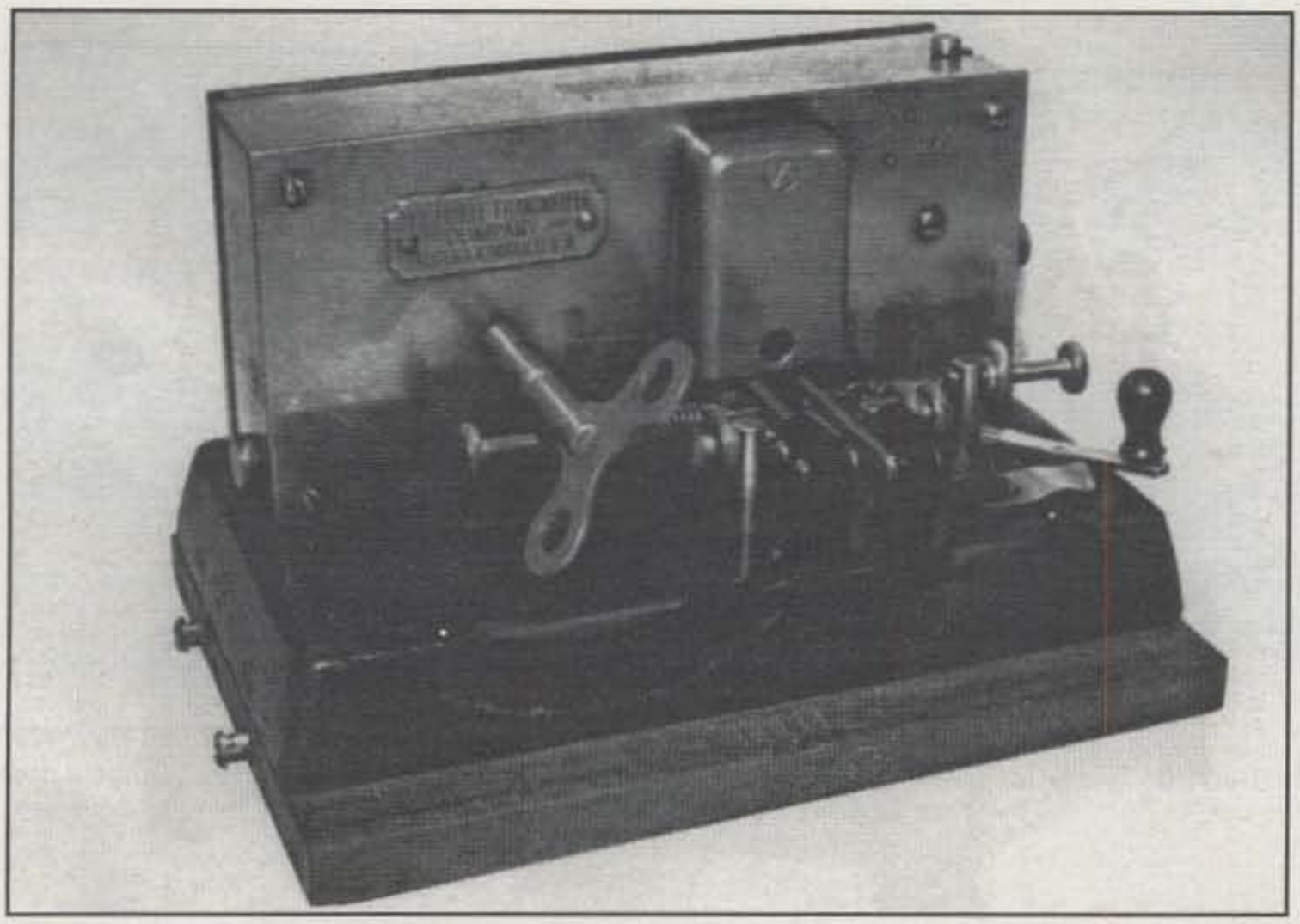


Photo 7– Romance recaptured! This Hulit Wind-Up bug was made in 1909, and it is incredible! The music-box-type mechanism in the rear case drives discs that are released by fingerpieces. The speed adjustment is on the right side, and the keying terminals are on the left. Discussion in text. (Photo courtesy Gil Schlehman, K9WDY.)

dash contact mounted on the arm's underside. This arrangement produces a minute amount of tactile feedback to the operator and gives the key a pleasantly unique feel. It might be described as follows. Usually, a key produces a "klick" sound on "make" and a "klunk" on "break." An "I," for example, would sound "klick klunk, klick klunk." Comparatively, the Vibroplex makes a "ta klick" on "make" and a "klunk" on "break." In this case, an "I" sounds like "ta klick klunk, ta klick klunk." Stop that snickering at my descriptive writing. Relating a key's feel is not easy! Better yet, step up to the Vibroplex booth at Dayton and ask owner Mitch, W4OA, to show you one. Mitch will be easy to spot. He'll be the one wearing a Vibroplex cap. Not going to Dayton this year? Call Vibroplex at 1-800-840-8873 for more info.

Custom-Engraved Paddle

A variety of very special artists grace our society—some working with canvas, some working with wood, and some working with metal. Smokey Gaines, KN6AE, is a distinguished member of the latter category, and the fine details of his handiwork engraving firearms and keys is simply incredible. Although photographs cannot reproduce all the dazzle and glamour involved, one of his customized paddles is shown in photo 5. It is a Vibroplex Brass Racer with built-in keyer, and it is 24-karat gold plated, 95-percent engraved with scroll work, and fitted with highly polished bone fingerpieces. Magnificent, indeed!

Smokey invests numerous hours customizing each key, and each becomes a genuine collectible. One of his Brass Ra-

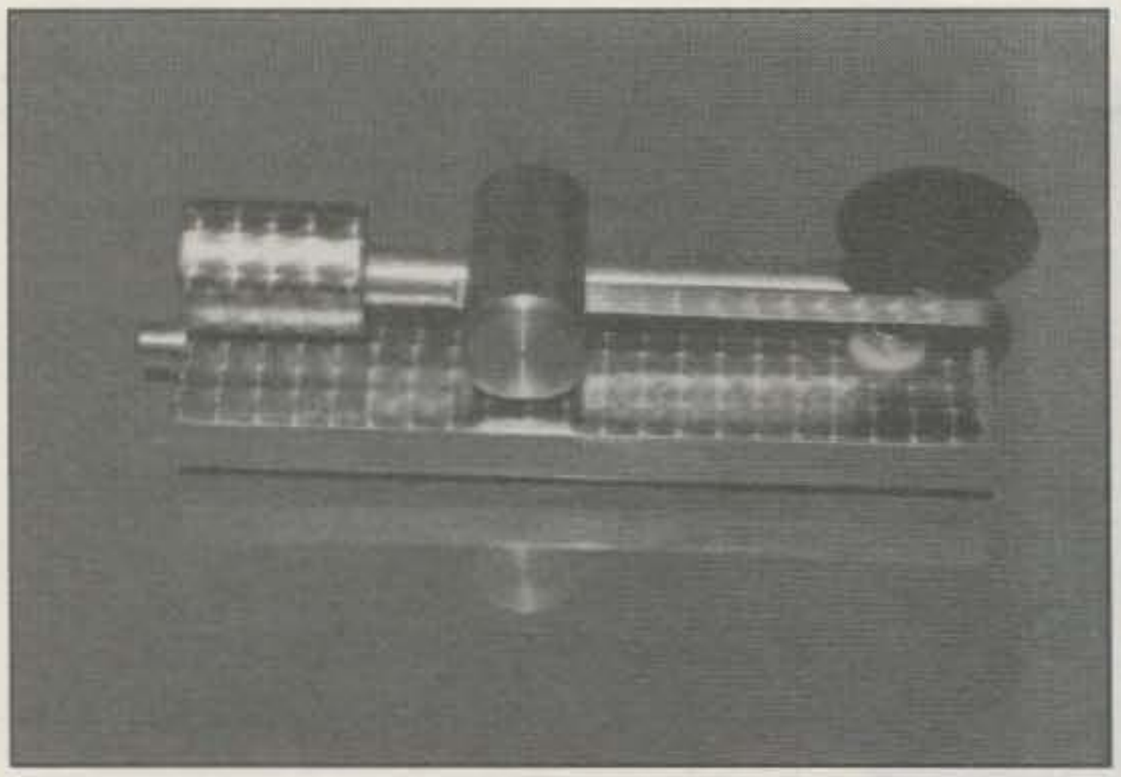


Photo 8– Check out this handkey, gang. It uses a rear weight rather than a spring or magnet for tensioning. The key also has a clean and sophisticated appearance. It was made by KI5WJ, scrolled by N5ABK, and photographed by owner KZ5Z/VK1KZ in Australia.

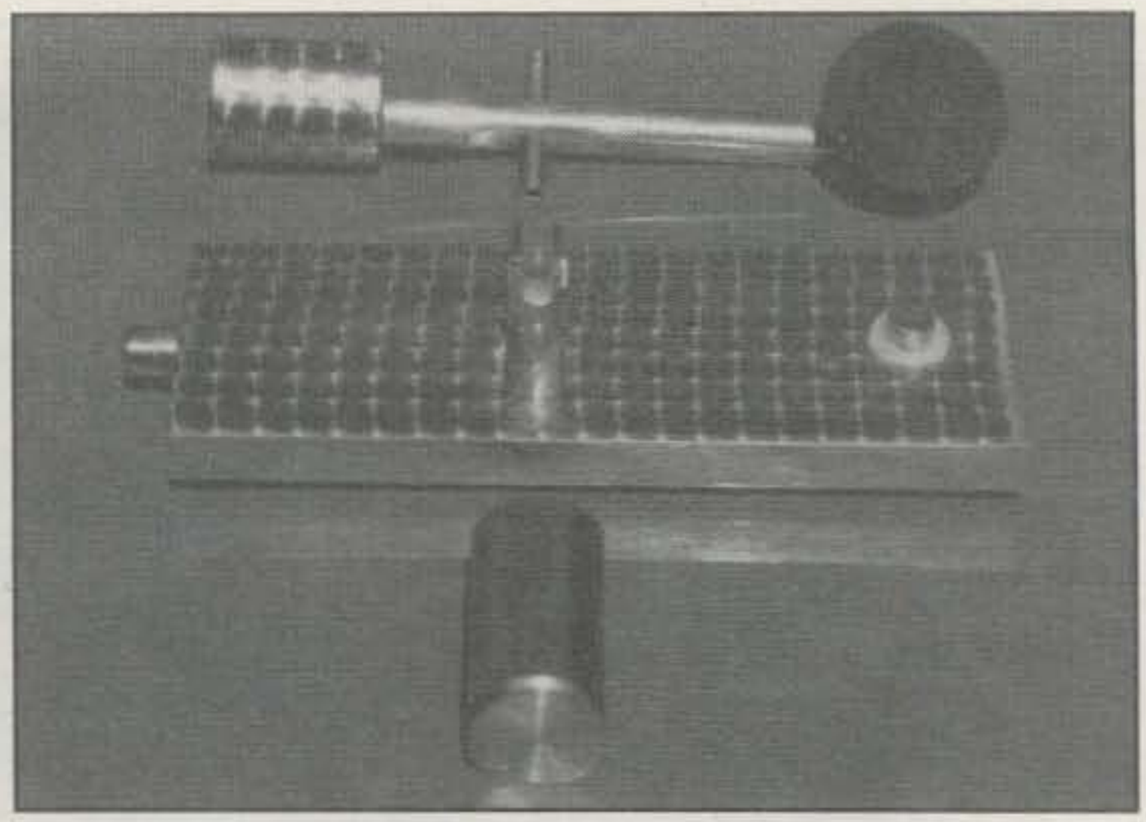


Photo 9– KZ5Z/VK1KZ shows us how his gravity-tensioned key separates into three parts. The arm sits on a base-mounted fulcrum and is secured with a locking cover. Note the RCA socket at the left for keying line.

cers was displayed at the Vibroplex booth in Dayton last year, and it captured everyone's attention. Smokey says he will be glad to rework or customize favorite keys of various types for amateurs wanting true one-of-a-kind show stoppers, so dig down into your pocketbook and talk to the old boy. His address is 640 East Bayan Street, Ontario, CA 91761, and his telephone number is 909-983-8800. I understand, incidentally, that Smokey recently engraved a special key for JY1, King Hussein of Jordan. I also understand His Majesty geared up with a Le-Ne-Ultra Mercury from Steve Nurkiewicz, N2DAN /4, and a special jewel-laden paddle from Gordon Crowhurst, G4ZPY, so he must now have a marvelous collection. I have not heard JY1 on the air in quite a long time, so I guess His Majesty is now working CW QRP exclusively. Makes sense: Keys and QRP are a match made in heaven! Now if we can just talk JY1 into working 30 meters.

Ultra-Miniature DX Key

Before concluding the views from KN6AE, check out the ultra-miniature key shown in photo 6. Smokey made this little tyke from scratch, and it really works. The feel and snappy action are quite good, I might add. The key's phenolic base is one-half by one inch, the mechanism is brass, and tiny screws used in eyeglasses are used at the pivot point and gap. A super-small spring, which looks like it came from an undersized ballpoint pen, is used for arm tensioning and the knob is a ground-down button. The knob is fitted to a screw which mates with the metal strip on the base below it for keying a rig. A metal strip at the key's opposite end is the other connection point. Where and how might a key this small see big-time action? Well, I connected it to my rig and worked 3B8CF with it on the first try, so I now say this smallest key has served to span the longest possible distance.

Hulit Wind-Up Bug

A what?! Yes, you read right. The item shown in photo 7 is an authentic wind-up bug, and it is a real heart-throb! This rare find belongs to Gil Schlehman, K9WDY, and it is also featured (along with many more exotic keys) in my new self-published book *Keys II: The Emporium.* Drop me an SASE or give me a call and I'll tell you more about *Keys II.* It's a CW blowout!

The wind-up was made in 1909 by the Hulit Transmitter Company in Topeka, Kansas, and it automatically produces both dots and dashes like a modern keyer. You just wind the key on the left and start transmitting. The Hulit will run down in two or three minutes, or you can get into real two-fisted CW by winding with your left hand while sending with your right hand. Now that's what we call cranking out the QSOs!

Inside the Hulit's rear enclosure (behind the winding key) is a music-box-type mechanism, complete with special clutch, governor, and wheels sporting short and long notches corresponding to dots and dashes. When the fingerpiece is moved to the left, the dash wheel is allowed to rotate. When the fingerpiece is moved to the right, the dot wheel is allowed to rotate. A knob for setting speed is on the instrument's right side. This is truly an ingenious piece of telegraphic wizardry!

A Unique Hand Key

If you thought every key needs springs or magnets to work, check out the smart-looking item in photos 8 and 9. This palm-

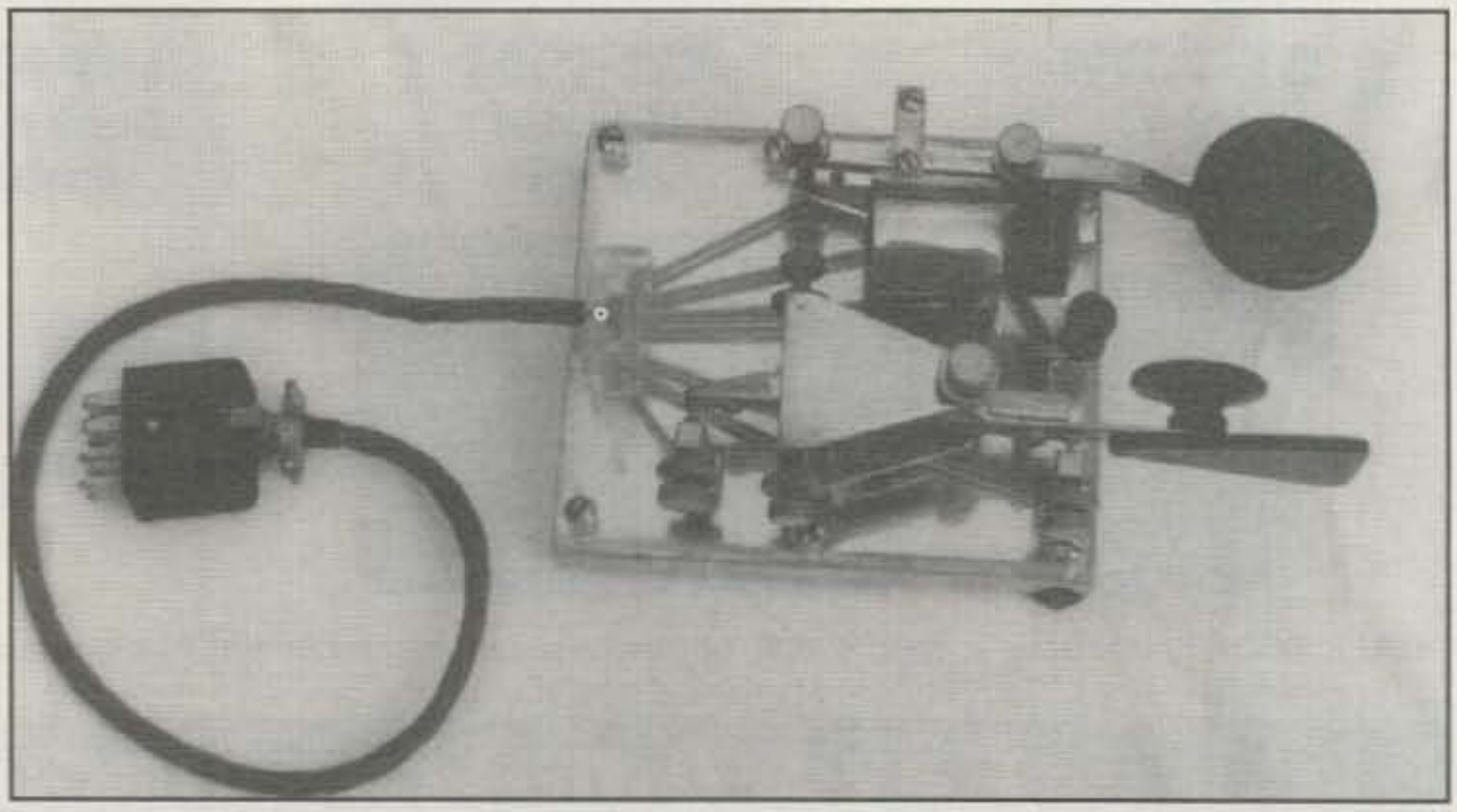


Photo 10– W7ZZ's homebrewed key and paddle combo is a mini CW control center. Note the lever switch for shifting keys between rigs or one rig, or T/R switching and multi-pin plug for station flexibility. (Discussion in text.)

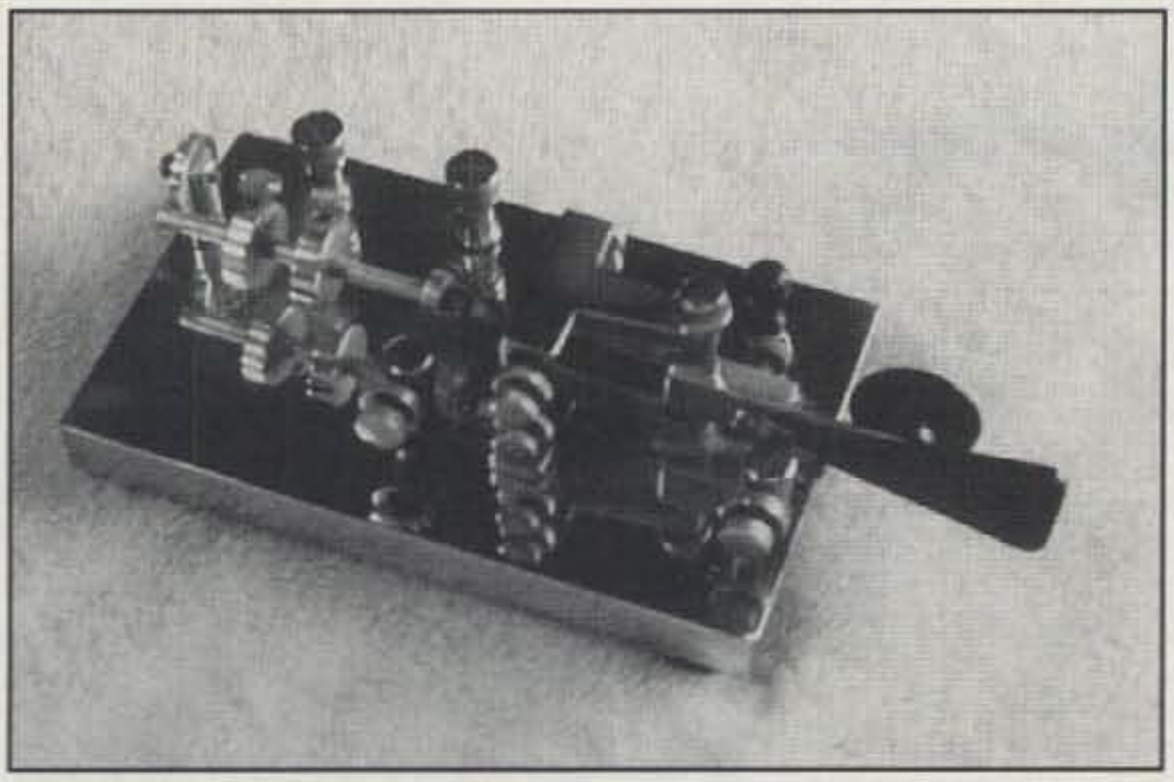


Photo 11– Answering the eternal question of "to refurbish or not to refurbish" may be easier after studying W7ZZ's superb "basket case" restored bug.

Photo 12– Key collectors who already have copies of my Keys, Keys, Keys *book (available from CQ) and new self-published* Keys II: The Emporium *book will surely be interested in NØWAN's new "Bug Checklist." Check with Doug for details.*

The

BUG CHECKLIST

CR Telegraph Speed Key, Second Model

LISTING AND DESCRIPTION OF FULL AND SEMI-AUTOMATIC TELEGRAPH KEYS (BUGS)

First Edition
August 17, 1995

size tyke employs a healthy rear weight as a counter balance, and the overall result is a key of elegant simplicity. I say elegant because the key responds to a light touch, and simplicity because it is comprised of only three main parts. Closer study reveals a few more reasons for calling the key elegant: The scrolled basework is superb, the contact is nicely set into teflon insulation, and the wooden knob is beautifully carved.

This key was made by Larry Guthrie, KI5WJ. Then Henry Kyker, N5ABK, did the base scroll work plus made the knob, and he passed it over to Jonathan Lofton, KZ5Z, who is serving with the American Embassy in Australia and sporting the call VK1KZ. Our compliments to all three chaps on their appreciation of telegraphic art.

Neat Homebrews

Rounding out this month are two interesting keys from Bill Vandermay, W7ZZ (photos 10 and 11). Bill is a long-time CW enthusiast who appreciates the convenience of switching between a paddle and hand key to fit various situations. Interest and need inspired him to build from scratch the impressive combo unit shown in photo 10. The single-lever paddle has a flat, triangular-shaped yoke similar to a Vibroplex Champion bug, and travel/tension adjustments are similar to a Speed-X. The hand key sports a half-bar arrangement, which leaves room for a center-mounted switch fitted with a lever. The complete combo and switch's cover are chrome plated and polished to a high lustre. I understand Bill has been using this combo unit for over 30 years, so it must work doggone good.

I'm not certain if W7ZZ's bug shown in photo 11 is built from scratch or a restored "basket case," but it is a real showpiece. I have a Speed-X bug identical in design, but it looks pitiful compared to Bill's beauty. Possibly that answers the question many folks ask about whether to leave a key in "aged and used" condition or refurbish it to like new.

Conclusion

Space limitations have once again caught up with us. Quick, Dave, tell them about the Bug Checklist shown in "photo" 12! This 18-page pamphlet was put together by Doug Seneker, NØWAN, 505 E. Center, Mt. Vernon, MO 65712, and it is the most complete listing I have seen of bug manufacturers. Everything from Abernathy through Xograph is included, along with a brief printed description. I'm not sure of the price, so check directly with Doug for more details. As always, remember to include an SASE when contacting any of us.

More treats are coming next month. Stay tuned, and I'll be listening for your classic keys on 10.105 ±5 kHz at around 0145 GMT!

73, Dave, K4TWJ

BY BILL WELSH, W6DDB

BILL'S BASICS

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Worldwide Amateur Radio Station Callsigns

The alpha-numeric sequence of callsigns enables one to quickly determine an amateur's country from the callsign she/he uses. American callsigns are included in this list to make it complete.

The ARRL DXCC Countries List is available from the American Radio Relay League, 225 Main Street, Newington, CT 06111-1494. That ARRL list shows the countries which provide credit towards the DXCC award. A list of deleted countries shows countries which still provide DXCC credit if they were contacted during the required earlier dates. A "was" and "is" list enables one to quickly associate previous and current callsign prefixes. This ARRL publication also includes a list showing the allocation of international callsign series, such as AAA– ALZ being assigned to the United States of America.

The list in this article includes almost every callsign that amateurs use. It includes the callsigns one is most likely to hear on the air. Insignificant additional letters and numbers are not included in this list. However, significant additional letters and numbers (such as VP2M to indicate Montserrat) are included.

A listing such as KA–KZ means every prefix from KA through KZ. The listing TE/TI means only callsign prefixes TE and TI, excluding TF through TH prefixes.

The numeral zero (Ø) is treated as if it is a figure ten (10), just as it is used in domestic and foreign callbooks. Notice that the zero is in the callsign prefixes of many rare DX locations. There are 31 of these zero prefixes included in the list which follows these introductory comments. I advise you to contact "zero prefix" stations whenever you hear them. If a particular callsign prefix is used by most of the amateurs in a country, that prefix is shown following the name of the associated country. As an example, the prefix block CA–CE is shown belonging to Chile, and (CE) is included after the name of the country because it is the prefix that is used by most Chilean amateur radio operators.

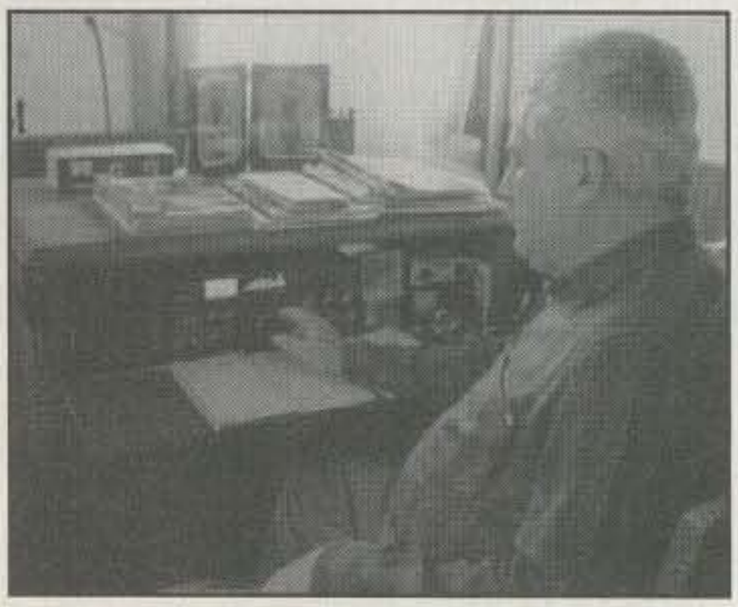
45527 Third St. East, Lancaster, CA 93535-1802

Photographs Wanted

Photographs of new amateurs in their shacks provide introductions to a few of the newer licensees. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year *CQ* subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest *CQ* issue. One award is made each month, no matter how many photographs are printed. DX amateurs who frequently work the American Novice bands are also urged to submit photographs.

Printed Aids

My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing course I instruct.



Rodolo Miksa, LU3DSI, of Ituzaingo, Argentina worked aboard tankers as the Chief Engineer. Rod envied the radio officers in their clean working environment. He was initially licensed as LU2ZA in 1957, and he spent 14 months operating from Orkney Island in the Antarctic. Rod spends time on 21,140 kHz in the Novice 15 meter band.

For ease of use, these printed aids have been separated into six categories: introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#10) SASE to my California address. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements. 73, Bill, W6DDB

Alpha-numeric List of Amateur Radio Callsigns

Prefix	Continent	CQ	ITU	Place
A/AA-AL	NA	3-5	6-8	U.S.A. plus protectorates. See KC4 thru KP5. Substitute A in lieu of K to obtain alternate prefixes
AP/AS	AS	21	41	Pakistan (AP)
ATØ				Antarctica-India *(see note at end of table)*
AY-AZ	SA	13	14/16/73	Argentina (AZ)
A2	AF	38	57	Botswana (A22/A24)
A3	OC	32	62	Tonga (A35)
A5	AS	22	41	Bhutan (A51)
A6	AS	21	39	United Arab Emirates (A61)
A7	AS	21	39	Qatar (A71)
A9	AS	21	39	Bahrain (A92)
BA-BT/BY	AS	23	24	China
BV	AS	24	44	Taiwan
CA-CE	SA	12	14/16	Chile (CE)
CE9	SA	13	73	South Shetland Islands
CEØA	SA	12	63	Easter Island
CEØX	SA	12	14	San Felix Island
CEØZ	SA	12	14	Juan Fernandez Island
CM/CO	NA	8	11	Cuba
CN	AF	33	37	Morocco (CN8)
CP	SA	10	12/14	Bolivia
CQ-CU	EU	14	37	Portugal (CT)
CS3/CT3	AF	33	36	Madeira (CT3)
CU	EU	14	36	Azores
CV-CX	SA	13	14	Uruguay (CX)
CY9	NA	5	9	St. Paul Islands
CYØ	NA	5	9	Sable Islands
C2	OC	31	65	Nauru (C31)
C3	EU	14	27	Andorra (C31/C32)
C5	AF	35	46	The Gambia (C53)
C6	NA	8	11	Bahama Islands (C6A)
C8/C9	AF	37	53	Mozambique (C91/C93/C94)
DA-DP	EU	14	28	Germany
DS	AS	25	44	South Korea
DU-DZ	OC	27	50	Philippines
D2/D3	AF	36	52	Angola
D4	AF	35	46	Cape Verde (D44)
D6	AF	39	53	Comoros (D68)
EA-EH	EU	14	37	Spain (EA)
EA6/EH6	EU	14	37	Balearic Islands
EA8/EH8	AF	33	36	Canary Islands
EA9/EH9	AF	33	37	Ceuta & Melilla
EI/EJ	EU	14	27	Ireland (EI)
EJ	EU	14	27	Aran Island
EK	EU	21	29	Armenia

Prefix	Continent	CQ	ITU	Place
EL	AF	35	46	Liberia
EM-EO	EU	16	29	Ukraine
EP/EQ	AS	21	40	Iran (EP)
ER	AS	16	29	Moldova
ES	EU	15	29	Estonia
ET	AF	37	48	Ethiopia (ET3)
EU-EW	EU	16	29	Belarus
EX	AS	17	30/31	Kyrgyzstan
EY	EU	17	30	Tajikistan
EZ	AS	17	30	Turkmenistan
E2	AS	26	49	Thailand (E21)
E3	AF	37	48	Eritrea
F/FA-FF	EU	14	27	France
FG	NA	8	11	Guadeloupe
FH	AF	39	53	Mayotte
FJ	NA	8	11	St. Barthelemy
FK	OC	32	56	New Caledonia
FM	NA	8	11	Martinique
FO	OC	32	63	French Polynesia
FO	OC	32	63	Clipperton Island
FO2-FO8	OC	32	63	French Polynesia Residents
FOØ	OC	32	63	French Polynesia Visitors
FP	NA	5	9	St. Pierre & Miquelon Islands
FR	AF	39	53	Reunion Islands
FR/E	AF	39	53	Europa
FR/G	AF	39	53	Glorioso Island
FR/J	AF	39	53	Juan de Nova
FR/T	AF	39	53	Tromelin Island
FS	NA	8	11	Saint Martin (FS5)
FT8W	AF	39	68	Crozet Island
FT8X	AF	39	68	Kerguelen Island
FT8Y				Antarctica (Note)
FT8Z	AF	39	68	Amsterdam & St. Paul Isl.
FW	OC	32	62	Wallis & Futuna Islands
FY	SA	9	12	French Guiana
G	EU	14	27	England
GB	EU	14	27	Special Stations-England
GD/GT	EU	14	27	Isle of Man (GD)
GH/GJ	EU	14	27	Jersey (GJ)
GI/GN	EU	14	27	Northern Ireland (GI)
GM/GS	EU	14	27	Scotland (GM)
GU/GP	EU	14	27	Guernsey (GU)
GW/GX	EU	14	27	Wales (GW)
HA/HG	EU	15	28	Hungary
HB	EU	14	28	Switzerland (HB9)
HBØ	EU	14	28	Liechtenstein
HC/HD	SA	10	12	Ecuador (HC)
HC8/HD8	SA	10	12	Galapagos Island
HF	SA	13	73	South Shetland Islands
HH	NA	8	11	Haiti
HI	NA	8	11	Dominican Republic
HJ/HK	SA	9	12	Colombia (HK)
HJØ/HKØ	NA	79	11/12	San Andres & Providencia Isl. (HKØ)
HKØ	NA	8	11	Baja Nuevo
HKØ	SA	9	12	Malpelo Islands
HKØ	NA	7	11	Serrano Bank & Roncador Cay
HL	AS	25	44	South Korea
HL9	AS	25	44	South Korea-U.S. Personnel
HO/HP	NA	7	11	Panama (HP)
HQ/HR	NA	7	11	Honduras (HR)
HRØ	NA	8	11	Swan Island
HS	AS	26	49	Thailand
HU	NA	7	11	El Salvador
HV	EU	15	28	Vatican City
HZ	AS	21	39	Saudi Arabia
H4	OC	28	51	Solomon Islands (H44)
I	EU	15/33	28	Italy
IA	EU	15	28	Tuscan Archipelago (IA5)
IB	EU	15	28	Ponziane Islands
IC	EU	15	28	Capri & Ischia Islands (IC8)
IMØ/ISØ	EU	15	28	Sardinia (ISØ)
IT/IZ	EU	15	28	Sicily (IT9)
JA-JS	AS	25	45	Japan
JD1	OC	27	45	Mini-Tori-Shima
JD1	OC	27	45	Ogasawara Island
JT/JV	AS	23	32/33	Mongolia (JT)
JW	EU	40	18	Svalbard Islands
JX	EU	40	18	Jan Mayen Islands
JY	AS	20	39	Jordan
JZ	AF	37	48	Djibouti (J28)
J3	NA	8	11	Grenada (J37/J39)

Prefix	Continent	CQ	ITU	Place
J5	AF	35	46	Guinea-Bissau
J6	NA	8	11	St. Lucia
J7	NA	8	11	Dominica (J73)
J8	NA	8	11	St. Vincent (J85/J87/J89)
K/KA-KZ	NA	3-5	6-8	U.S.A. plus protectorates
KC4U				Antarctica-U.S.A. *(see note)*
KC6	OC	27	64	Belau
KG4	NA	8	11	Guantanamo Bay, Cuba
KH1	OC	31	61	Baker & Howland Islands
KH2	OC	27	64	Guam
KH3	OC	31	61	Johnston Island
KH4	OC	31	61	Midway Island
KH5	OC	31	61/62	Palmyra & Jarvis Islands
KH5K	OC	31	61	Kingman Reef
KH6	OC	31	61	Hawaii
KH7	OC	31	61	Kure Island
KH8	OC	32	62	American Samoa
KH9	OC	31	65	Wake Island
KHØ	OC	27	64	Mariana Islands
KL7	NA	1	1/2	Alaska
KP1	NA	8	11	Navassa Island
KP2	NA	8	11	American Virgin Islands
KP4	NA	8	11	Puerto Rico
KP5	NA	8	11	Desecheo Island
LA-LN	EU	14	18	Norway (LA)
LB	EU	14	18	Norway-Novices
LJ	EU	14	18	Norway-Schools
LO-LW	SA	13	14/16	Argentina (LU)
LU				Antarctica-Argentina *(note)*
LU	SA	13	73	South Shetland Islands
LX	EU	14	27	Luxembourg
LY	EU	15	29	Lithuania
LZ	EU	20	28	Bulgaria
N/NA-NZ	NA	3-5	6-8	U.S.A. plus protectorates. See KC4 thru KP5. Substitute N in lieu of K to obtain alternate prefixes.
OA-OC	SA	10	12	Peru (OA)
OD	AS	20	39	Lebanon (OD5)
OE	EU	15	28	Austria
OF-OI	EU	15	18	Finland (OH)
OHØ	EU	15	18	Aland Islands
OJØ	EU	15	18	Market Reef
OK-OL	EU	15	28	Czech Republic (OK)
OM	EU	15	28	Slovak Republic
ON-OT	EU	14	27	Belgium (ON)
OR4				Antarctica-Belgium *(see note)*
OX	NA	40	5/75	Greenland
OY	EU	14	18	Faroes
OZ	EU	14	18	Denmark
PA-PI	EU	14	27	Netherlands
PJ	SA	9	11	Curacao (PJ2/PJ9)
PJ	SA	9	11	Bonaire (PJ4/PJ9)
PJ	NA	8	11	Sint Eustatius (PJ5/PJ8)
PJ	NA	8	11	Saba (PJ6)
PJ	NA	8	11	Sint Maarten (PJ7/PJ8)
PP-PY	SA	11	12/13/15	Brazil (PY)
PPØ/PYØ	SA	11	13	Fernando de Noronha (PYØ)
PPØ/PYØ	SA	11	15	Trinidade & Martim Vaz (PYØ)
PPØ/PYØ	SA	11	13	St. Peter & Paul Rocks (PYØ)
PZ	SA	9	12	Surinam
P2	OC	28	51	Papua New Guinea (P29)
P4	SA	9	11	Aruba (P43)
RA-RZ	EU	16	19/20/29/30	Russia
	AS	16-19/23	20-26/30-35/75	Russia
R1	EU	40	75	Franz Josef Land
SA-SM	EU	14	18	Sweden (SM)
SN-SR	EU	15	28	Poland (SP)
SPØ	EU	15	28	Special Stations—Poland
ST	AF	34	47/48	Sudan
STØ	AF			Southern Sudan
SU	AF	34	38	Egypt
SV-SZ	EU	20	28	Greece (SV)
SV/A	EU	20	28	Mount Athos
SV5	EU	20	28	Dodecanese Islands
SV9	EU	20	28	Crete
S2	AS	22	41	Bangladesh
S5	EU	15	28	Slovenia (S51/S56-S59)
S7	AF	39	53	Seychelles (S79)
S8	AF	38	57	Transkei (S83/S84/S88)
S9	AF	36	47	Sao Tome & Principe (S92)
SØ	AF	33	46	Western Sahara
TA-TC	EU	20	39	Turkey (TA)
TE/TI	NA	7	11	Costa Rica (TI)

Prefix	Continent	CQ	ITU	Place
TF	EU	40	17	Iceland
TG/TD	NA	7	11	Guatemala (TG)
TI9	NA	7	11	Cocos Islands
TJ	AF	36	47	Cameroon (TJ1)
TK	EU	15	28	Corsica
TL	AF	36	47	Central African Rep. (TL8)
TN	AF	36	52	Congo
TP	EU	14	27	Council of Europe
TR	AF	36	52	Gabon (TR8)
TT	AF	36	47	Chad (TT8)
TU	AF	35	46	Ivory Coast (TU2)
TV-TX	EU	14	27	France
TY	AF	35	46	Benin
TZ	AF	35	46	Mali
T2	OC	31	65	Tuvalu
T3Ø	OC	31	65	West Kiribati/Gilbert Islands
T31	OC	31	62	Central Kiribati/Phoenix Isl.
T32	OC	31	61/63	East Kiribati/Line Islands
T33	OC	31	65	Banaba/Ocean Islands
T5	AF	37	48	Somalia
T7	EU	15	28	San Marino (T72/T77)
T8/TØ	EU	15	28	Prinicpato de Seborga (TØ)
T9	EU	15	28	Bosnia-Herzegovina (T9Ø/T99)
UA-UZ				See RA-RZ
UA1	EU	40	75	Franz Josef Land
UR-UZ	EU	16	29	Ukraine
VE	NA	1-5	2-4/9/75	Canada
VK	OC	29/3Ø	55/58/59	Australia (VK1-VK8)
VK9C	OC	29	54	Cocos-Keeling
VK9L	OC	30	60	Lord Howe Island
VK9M	OC	30	56	Mellish Reef
VK9N	OC	32	60	Norfolk Island
VK9W	OC	30	55	Willis Island
VK9X	OC	29	54	Christmas Island
VKØ	AF	39	68	Heard Island
VKØ	OC	30	60	Macquarie Island
VKØ				Antarctica-Australia *(note)*
VO1	NA	5	9	Newfoundland
VO2	NA	2	9	Labrador
VP2E	NA	8	11	Anguilla
VP2M	NA	8	11	Montserrat
VP2V	NA	8	11	British Virgin Islands
VP5	NA	8	11	Turks & Caicos Islands
VP8	SA	13	16/73	Falkland Islands
VP8/LU				Antarctica *(see note)*
VP8/LU	SA	13	73	South Georgia Islands
VP8/LU	SA	13	73	South Orkney Islands
VP8/LU	SA	13	73	South Sandwich Islands
VP8/LU	SA	13	73	South Shetland Islands
VP9	NA	5	11	Bermuda
VQ9	AF	39	41	Chagos Archipelago
VR6	OC	32	63	Pitcairn Island
VS6/VR2	AS	24	44	Hong Kong (VS6)
VU	AS	22	41	India
VU	AS	26	49	Andaman & Nicobar Islands
VU	AS	22	41	Laccadive Islands
VY1/VY5	NA	1	2	Yukon Territory, Canada (VY1)
VY2	NA	5	9	Prince Edward Isl., Canada
V2	NA	8	11	Antigua & Barbuda Islands
V3	NA	7	11	Belize (V31)
V4	NA	8	11	St. Kitts & Nevis Islands (V44)
V5	AF	38	57	Namibia (V51)
V6	OC	27	64/65	Micronesia (V63)
V7	OC	31	65	Marshall Islands (V73)
V8	OC	28	54	Brunei (V85)
W/WA-WZ	NA	3-5	6-8	U.S.A., plus protectorates. See KC4-KP5 listings. Substitute W in lieu of K to obtain alternate prefixes.
XA-XI	NA	6	10	Mexico (XE)
XA4-XI4	NA	6	10	Revilla Gigedo (XF4)
XP	NA	40	5/75	Greenland
XQ	SA	12	14/16	Chile
XT	AF	35	46	Burkina-Faso
XU	AS	26	49	Cambodia
XV	AS	26	49	Vietnam
XW	AS	26	49	Laos
XX	AS	24	44	Macao (XX9)
XY/XZ	AS	26	49	Myanmar (XZ)
YA	AS	21	4Ø	Afghanistan

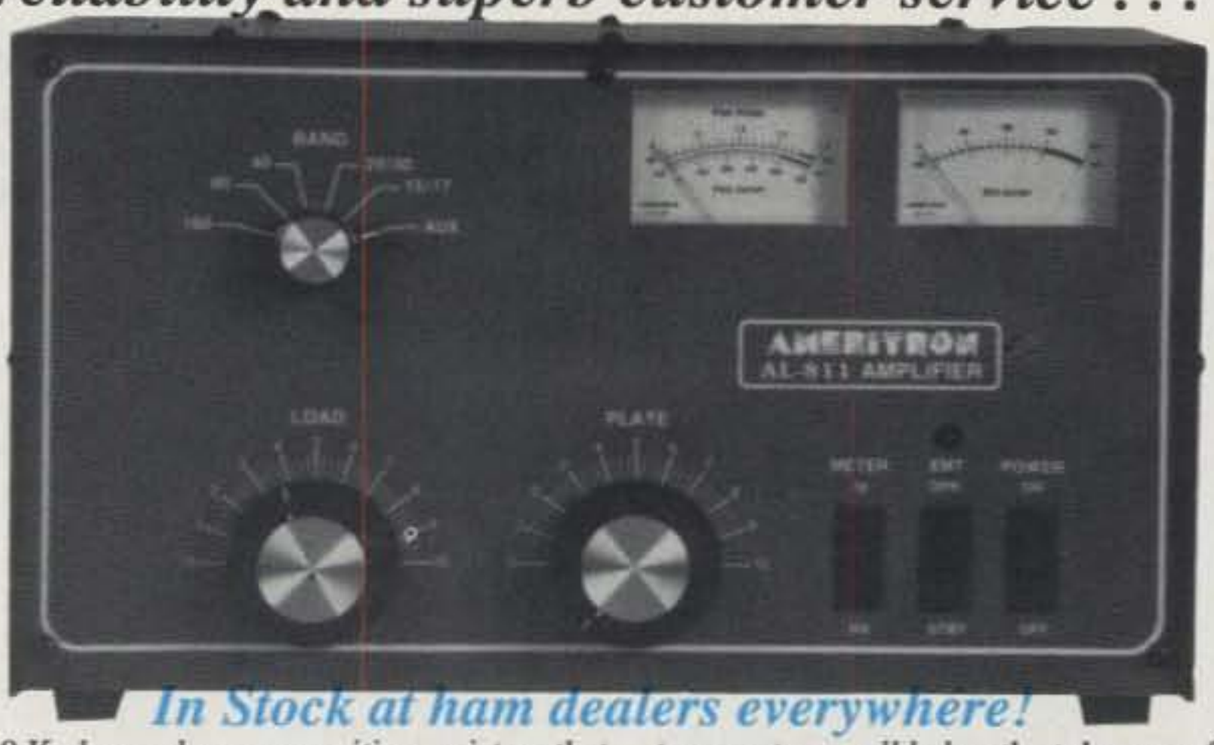
Prefix	Continent	CQ	ITU	Place
YB/YH	OC	28	51/54	Indonesia
YI	AS	21	39	Iraq
YJ	OC	32	56	Vanuatu (YJ8)
UK	AS	20	39	Syria (YK1)
YL	EU	15	29	Latvia
YN	NA	7	11	Nicaragua
YO-YR	EU	20	28	Romania (YO)
YS	NA	7	11	El Salvador
YT/YU/YZ	EU	15	28	Yugoslavia
YV/YY	SA	9	12	Venezuela (YV)
YVØ	SA	9	11	Aves Islands
ZA	EU	15	28	Albania
ZB	EU	14	37	Gibraltar
ZC4	AS	20	39	Cyprus
ZD7	AF	36	66	St. Helena Islands
ZD8	AF	36	66	Ascension Islands
ZD9	AF	36	66	Tristan da Cunha Island
ZD9	AF	38	66	Gough Island
ZF	NA	8	11	Cayman Islands
ZK1	OC	32	62	Cook Islands
ZK2	OC	32	62	Niue Island
ZK3	OC	31	62	Tokelau Island
ZL/ZM	OC	32	60	New Zealand (ZL)
ZL5				Antarctica-New Zealand *(see note)*
ZL7	OC	32	60	Chatham Island
ZL8	OC	32	60	Kermadec Island
ZL9	OC	32	60	Auckland & Campbell Islands
ZP	SA	11	14	Paraguay
ZR-ZU	AF	38	57	Republic of South Africa (ZS)
ZS1				Antarctica-South Africa *(note)*
ZS8	AF	38	57	Prince Edward & Marion Isl.
ZS9	AF	38	57	Walvis Bay
ZX/ZY	SA	11	12/13/15	Brazil (ZY)
ZXØ				Antarctica-Brazil (Note)
Z2	AF	38	53	Zimbabwe (Z21)
Z3	EU	15	28	Macedonia
1AØ	EU	15	28	Sovereign Military Order of Malta
1SØ	AS	27	50	Spratly Islands
2E	EU	14	27	England (2E1)
2I	EU	14	27	Northern Ireland (2I1)
2M	EU	14	27	Scotland (2M1)
2W	EU	14	27	Wales (2W1)
3A	EU	14	27	Monaco
3B6	AF	39	53	Agalega Islands
3B7	AF	39	53	St. Brandon Islands
3B8	AF	39	53	Mauritius Islands
3B9	AF	39	53	Rodriguez Islands
3C	AF	36	47	Equatorial Guinea
3CØ	AF	36	52	Annobon (Pagalu) Island
3DA	AF	38	57	Swaziland
3D2	OC	32	56	Fiji Islands
3D2	OC	32	56	Conway Reef
3D2	OC	32	56	Rotuma Island
3V	AF	33	37	Tunisia
3W	AS	26	49	Vietnam
3X	AF	35	46	Guinea
3Y				Antarctica *(see note)*
3Y	AF	38	67	Bouvet Island
3Y		12	72	Peter I Island (Antarctica)
3Z	EU	15	28	Poland
4C	NA	6	10	Mexico
4F	OC	27	50	Philippines
4J/4K	AS	21	29	Azerbaijan (4K)
4J1	EU	16	29	Malyj Vysotskij Island
4K1				Antarctica-Russia *(see note)*
4K1	SA	13	73	South Shetland Islands
4K2	EU	40	75	Franz Josef Land
4L	AS	21	29	Georgia
4M	SA	9	12	Venezuela
4N4/4O4	EU	15	28	Bosnia-Herzegovina (4N4)
4N5	EU	15	28	Macedonia
4S	AS	22	41	Sri Lanka
4U	NA	5	8	United Nations-New York
4U	EU	14	28	ITU-Geneva, Switzerland
4X/4Z	AS	20	39	Israel
5A	AF	34	38	Libya
5B	AS	20	39	Cyprus
5H1	AF	37	53	Zanzibar
5H3/5I3	AF	37	53	Tanzania
5K	SA	9	12	Colombia
5N/5O	AF	35	46	Nigeria (5N)
5P	EU	14	18	Denmark
5R/5S	AF	39	53	Madagascar & Maddalena Isl.
5T	AF	35	46	Mauritania
5U	AF	35	46	Niger
5V	AF	35	46	Togo
5W	OC	32	62	Western Samoa (5W1)
5X	AF	37	48	Uganda
5Y/5Z	AF	37	48	Kenya
6T/6U	AF	34	48	Sudan
6V/6W	AF	35	46	Senegal
6Y	NA	8	11	Jamaica
7B-7N	AS	25	45	Japan
70	AS	21/37	39	Yemen
7P	AF	38	57	Lesotho
7Q	AF	37	53	Malawi
7X/7T	AF	33	37	Algeria (7X)
7Z	AS	21	39	Saudi Arabia
8J-8N	AS	25	45	Special Stations-Japan (8J)
8J1				Antarctica-Japan *(see note)*
8P	NA	8	11	Barbados (8P6)
8Q	AS	22	41	Maldive Islands (8Q7)
8R	SA	9	12	Guyana (8R1)
9A	EU	15	28	Croatia
9F	AF	37	48	Ethiopia
9G	AF	35	46	Ghana (9G1)
9H	EU	15	28	Malta
9I/9J	AF	36	53	Zambia (9J2)
9K	AS	21	39	Kuwait (9K2)
9L	AF	35	46	Sierra Leone
9M2/9M4	AS	28	54	West Malaysia (9M2)
9M6	OC	28	54	East Malaysia-Sabah (9M6)
9M8	OC	28	54	East Malaysia-Sarawak
9N	AS	22	42	Nepal
9Q-9T	AF	36	52	Zaire (9Q5)
9U	AF	36	52	Burundi
9V	AS	28	54	Singapore (9V1)
9X	AF	36	52	Rwanda (9X5)
9Y/9Z	SA	9	11	Trinidad & Tobago (9Y4)

Note: Antarctica stations can be:
CQ Zones 12/13/29/30/32/38/39
ITU Zones 6/69-74

Continents are shown as AF (Africa), AS (Asia), EU (Europe), NA (North America), OC (Oceania), and SA (South America).

600 WATTS . . . $649

More hams use Ameritron AL-811 amplifiers than any other amplifier in the world . . . The AL-811 has earned a worldwide reputation for legendary quality, flawless performance, proven reliability and superb customer service . . .



In Stock at ham dealers everywhere!

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

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

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

Now you won't have to stand aside while the "big guns" steal your DX. You'll be able to log some of those stations first.

Going from 600 watts to the full legal limit gives you less than one S-unit increase. But is that fraction of an S-unit worth the 3 to 4 times more money it'll cost you?

The AL-811 gives you a powerful punch at a price that's easy on your wallet.

All band, All mode coverage

The AL-811 covers all HF bands. There's no compromise on WARC and most MARS bands -- you get a 100% rated output.

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

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

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

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

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

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

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

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

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

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

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

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

Tuned input provides excellent load for any rig

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

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

Output tank: optimum Q on each band

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

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

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

Quiet pressurized ventilation keeps your tubes safely cooled

A *quiet* blower pressurizes the cabinet with a large volume of air flow. It keeps the 811A tube temperature *well below* the tube manufacturer's rating -- even with a key down carrier at 400 watts output -- without the *overwhelming* noise of oversized fans.

Two illuminated meters

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

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

Ameritron exclusive Adapt-A-Volt™ power transformer

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

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

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

Plus more . . .

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

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

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

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

Made in USA

Made in USA. At Ameritron, we don't just ship amplifiers we build them to last.

800 WATTS . . . $795

Ameritron gives you *four* 811A tubes, 800 watts for the *same* price as the competitor's *3* tube 600 watt unit . . . Why settle for *less* power and pay *more* money?

Only the Ameritron AL-811H gives you *four fully neutralized* 811A transmitting tubes. You get absolute stability and superb performance on higher bands that can't be matched by un-neutralized tubes.

Ameritron mounts the 811A tubes *vertically* -- not horizontally -- to prevent hot tube elements from sagging and shorting out. Others, using *potentially damaging horizontal mounting*, require special 811A tubes to retard sagging and shorting.

A *quiet*, powerful computer grade blower draws in plenty of cool air. It pressurizes the cabinet and efficiently cools your 811A tubes. Our air flow is so quiet, you'll hardly know it's there-- unlike noisy, oversized blowers.

You also get efficient full size heavy duty tank coils, full height computer grade capacitors, heavy duty high silicon core power transformer, slug tuned input coils, operate/standby switch, transmit LED, ALC, dual meters, QSK compatibility with QSK-5 plus much more.

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CIRCLE 8 ON READER SERVICE CARD

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

Sporadic-E Propagation

From the middle of May through the end of July, and again in late November to early January, sporadic-*E* propagation appears more frequently on the VHF+ frequencies in the Northern Hemisphere. This type of propagation occurs when there is a sporadic ionization of the *E*-layer (the layer between 60 and 70 miles [100 and 120 km] above the earth). The ionization takes the form of clouds of ionized gases that move, grow larger and more intense, then shrink and dissipate. These ionized clouds appear in the late morning and late afternoon local time. Late afternoon ionization can last until well after sundown.

One evening a couple of summers ago, for example, I was listening to a local net on a 2 meter repeater. A new amateur checked in at nearly 2300 local time to exclaim that 10 meters was "just hopping with signals." I picked up the clue and immediately turned on my 6 meter radio. The last of the signals on that band faded at around 0100 local time. I then switched to 10 meters, where propagation continued for another hour or so.

Sporadic-*E* ionization propagation has properties similar to other forms of *E*-layer propagation. Depending on the density of the ionization, there is a critical frequency (CF), a lowest optimum frequency (LOF), and a maximum usable frequency (MUF); over this range of frequencies usable signals are refracted back to earth. The CF frequency refracts signals sent straight up and straight back down. The LOF is the lowest frequency that will sustain propagation. The MUF is the maximum frequency that can sustain propagation. The MUF is usually about five times the CF. Although the LOF of a sporadic-*E* event has been detected as low as 14 MHz, interest in the low end hasn't been as strong as interest in the MUF of a particular opening. This is partly because it's very difficult to distinguish sporadic-*E* propagation from other forms of propagation happening at the same time.

As VHF+ operators, we're interested in knowing how high in frequency we can use this mode of propagation. Obviously, 50 MHz is the VHF+ band that benefits most from sporadic-*E*. However, 144 MHz and (on very rare occasions) 222 MHz have experienced sporadic-*E* propagation. The historic 220 MHz contact between Bill Duval, K5UGM (in Irving, Texas) and John Moore, W5HUQ/4 (near Jacksonville, Florida) on June 14, 1987 at 1544 UTC is the only known documented sporadic-*E* contact ever made on that band.

Sometimes clouds of ionization may be in just the right places to cause double-hop sporadic-*E* propagation. Clouds are less often in enough of the right places to induce triple-hop, or greater, sporadic-*E*. For example, almost every summer amateurs living on the upper eastern coast of the United States experience a few days of multiple-hop sporadic-*E* into Europe. Sometimes this propagation extends as far south as the Carolinas. Occasionally, there are openings between the west coast and the far east. Once in awhile stations in parts of the US are able to complete their WAS awards when either Hawaiian or Alaskan stations come in via a multiple-hop sporadic-*E* path.

For the 6 meter operator the most popular propagation mode is sporadic-*E*. It affords regulars to the band opportunities to talk across the country and on occasion into foreign countries. It's the most ready avenue (and probably the first introduction) to DX for the VHF+ operator. Because of its nature, it doesn't take much power to work stations.

What causes sporadic-*E*? No one seems to know exactly. Wind shear gets most of the blame because it seems to cause a bunching up of ions, creating a cloud of ionization. However, the wind shear theory looks questionable when sporadic-*E* is present without it. The "old wives' tales" of amateur radio also have associated sporadic-*E* propagation with thunderstorms, aurora, and meteor showers. While there is some connection between *E*-layer propagation, aurora (more commonly known as auroral-*E*), and meteor showers, the jury is still out when it comes to thunderstorms.

Will sporadic-*E* occur in your neck of the woods? It depends on where you live. Sporadic-*E* seems to be most prevalent in the southwestern part of the United States.

How can you learn to depend on sporadic-*E* propagation? Start by listening to 10 meters. If you hear exceptionally loud signals from an area that's not too far from you geographically, you may want to turn on your 6 meter radio, especially if the "skip" starts to shorten considerably. Once on 6 meters, you can begin listening to see when the skip shortens on the band. You might even find some propagation on 2 meters. Of course, such propagation doesn't always occur. In fact, it only occurs about 10 percent (or less) of the time that it occurs on 6 meters.

Doug Allen, W2CRS, has his own method of detecting sporadic-*E* on 2 meters. An active commercial FM DXer, Doug says he keeps an ear on a clear frequency near the highest frequency on the commercial FM spectrum (108 MHz). When he hears signals coming in from a distance, he immediately turns on his 2 meter radio and starts transmitting. Often he "creates" his own opening. Doug says he can detect all sorts of propagation—from sporadic-*E*, to tropo, to meteor showers—by listening to a clear frequency on the 2 meter band.

During high sunspot activity, when *F2*-type propagation is present more often, sporadic-*E* has been known to contribute to the lengthening of a path of a propagated signal. For example, twice in January 1993 DX contacts appeared to have been assisted by sporadic-*E*. Stations in New Zealand were working stations in Arizona when a path opened to Oklahoma for the ZLs. At the same time, a sporadic-*E* path existed between Arizona and Oklahoma. It looked liked the signal took a ride on *F2* to Arizona then hopped a ride the rest of the way via sporadic-*E*. Within a few days of that opening Dave Batcho, N5JHV, experienced an unusual opening to central Europe. On both ends (stateside and European) of the circuit sporadic-*E* propagation was reported (in the U.S. between the northeastern and the southwestern parts of the country and in Europe between England and central Europe).

Sporadic-*E* propagation presents an opportunity to communicate with distant amateurs, while running marginally equipped stations using very low power. Sometimes you'll find that the signal strength of the station you're working is so intense that you'd think it was local. You need to work that station quickly, however, because sometimes an opening closes as soon as it appears. Such is the nature of the clouds that make up sporadic-*E* propagation.

FAI Propagation: Field aligned irregularities, or FAI, propagation is found on both 6 and 2 meters of the VHF+ bands. Experiments have shown that FAI can exist on 135 cm and maybe even on 70 cm. While this form of propagation has been around for some time (experiments conducted by Stanford University in the 1950s confirmed its existence), it wasn't until Tom Kneisel, K4GFG, documented his 1978 2 meter contact with Dave Ternet, KP4EOR, that amateurs came to more clearly understand FAI propagation.

In Tom's article "Ionospheric Scatter By Field-Aligned Irregularities at 144 MHz," published in the January 1982 issue of *QST*, he tells how he set up a sked with Dave over successive nights during the summer of 1978. When Tom was finally alerted to the fact that Dave was on the band (although off Tom's fre-

VHF PLUS CALENDAR

May 4	Good EME conditions.
May 6	New Moon.
May 10	Highest Moon declination. ARRL 902, 1296, 2304 MHz Spring Sprint contest. (See last month's column for details.)
May 11	Poor EME conditions.
May 14	First quarter Moon.
May 15	Moon apogee.
May 16-18	Dayton Hamvention.
May 17-18	ARRL 50 MHz Spring Sprint contest. (See last month's column for details.)
May 18	Poor EME conditions.
May 22	Full Moon.
May 24	Lowest moon declination.
May 25	Very Poor EME conditions.
May 29	Last quarter moon.

**EME conditions courtesy W5LUU.*

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- *Cross-Needle Meter*
- *6 position Antenna Switch*
- *built-in 4:1 Balun*
- *gear driven Turns Counter*

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$459.95

The VECTRONICS HFT-1500 is not just an antenna tuner . . . it's a beautifully crafted work of art, using the finest components available and the highest quality construction.

Every HFT-1500 aluminum cabinet is carefully crafted with a durable baked-on paint that won't scratch or chip.

The attractive two-color Lexan front panel is scratch-proof. Take a quarter. Scratch the HFT-1500 front panel as much as you want. *You won't leave a mark!*

Arc-Free Operation

Two *heavy duty* 4.5 kV transmitting variable capacitors and a massive *high current* roller inductor gives you arc-free operation up to 2 kW PEP SSB.

Precision Resetability

A sturdy hand cranked roller inductor lets you quickly *fly* from band to band. A precision 5-digit *gear* driven turns counter lets you accurately return to your previous settings.

Large comfortable knobs and smooth vernier drives on the variable capacitors make tuning precise and easy. Bright red pointers on logging scales make accurate resetability a breeze.

Absolute Minimum SWR

***You** can tune your SWR down to absolute minimum!*

Why? Because *all* three matching network components, the roller inductor and both variable capacitors, are *fully* adjustable.

Tune any Antenna

You can tune any real antenna from 1.8 to 30 MHz, including all MARS and WARC bands. You can tune verticals, dipoles, inverted vees, yagis, quads, long-wires, whips, G5RVs, etc . . .

*SSB*Analyzer Bargraph™*

***VECTRONICS'** exclusive* 21 segment bargraph display lets you visually follow your instantaneous voice peaks. Has level and delay controls.

Accurate SWR/Power Meter

A *shielded* directional coupler and backlit Cross-Needle meter displays *accurate* SWR, forward and reflected power simultaneously. Reads both peak and average power on 300/3000 Watt scales.

6 Position Ceramic Antenna Switch

Select two coax fed antennas (tuned or bypassed), balanced line/wire or bypass.

Built-in Balun

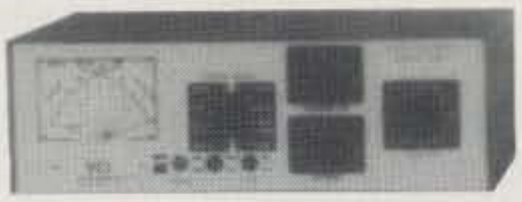
A 4:1 Ruthroff voltage balun feeds dual high voltage Delrin terminal posts for balanced lines. HFT-1500 is 5.5x12.5x12 inches.

Try any product for 30 days

Call toll-free 800-363-2922 and order any product from VECTRONICS. Try it for 30 days. If you're not completely satisfied return it for a full refund, less shipping and handling -- no hassles. All VECTRONICS products come with a one year warranty.

300 Watt Antenna Tuner

VC-300DLP
$159.95



VECTRONICS uses the finest components available to build the highest quality 300 Watt antenna tuner ever made.

You can tune any antenna 1.8-30 MHz. Custom 48 position switched inductor and continuous rotation 1000 Volt capacitors provide arc-free operation. Handles 300 Watts PEP SSB, (150 Watts on 1.8 MHz).

8 position antenna switch, built-in 50 ohm dummy load, peak reading backlit cross-needle SWR Power meter, 4:1 balun for balanced line antenna. Scratch-proof Lexan front panel. 10.2x9.4x3.5 in. Weighs 3.4 lbs.

300 Watt *Mobile* Tuner

VC-300M
$109.95

The VC-300M *Mobile* Antenna Tuner is compact, lightweight, easy-to-operate and is our most economical tuner.

It's compatible with *any* mobile antenna and *any* mobile HF transceiver and is compact enough to fit in the most compact car.

It can also be used at home with dipoles, vees, verticals, beams or quads fed by coax.

Backlit dual movement meter simultaneously monitors Power and SWR. Covers 1.8-30 MHz. Handles 300 Watts SSB PEP, 200 Watts continuous, (150 Watts on 1.8 MHz.). 7.25x8.75x3.6 in. Weighs 3.4 lbs.

SWR/Power Meters

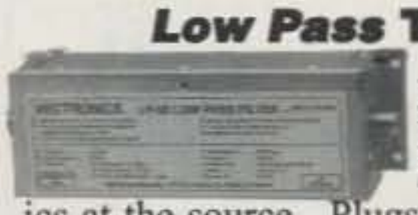
PM-30
$79.95
PM-30UV
$89.95

PM-30, $79.95, for 1.8 to 60 MHz. Displays forward and reflected power and SWR simultaneously on dual movement Cross-Needle Meter. True *shielded* directional coupler assures accuracy. Backlit meter displays peak or average power in 300/3000 Watt ranges. First-rate construction includes scratch-proof case/front panel. 5.3x5.75x3.5 inches. SO-239 connectors.
For 144/220/440 MHz, 30/300 Watt ranges. PM-30UV, $89.95, has SO-239 connectors. PM-30UVN, $89.95, has N connectors. PM-30UVB, $89.95, has BNC connectors.

1500 Watt *dry* Dummy Load

DL-650M, $64.95. Handles 100 watts continuous, 1500 Watts for 10 seconds to 650 MHz. Ceramic resistor. SWR < 1.3. SO-239 connector. **DL-650MN, $69.95** has N connector.

Low Pass TVI Filter



LP-30, $69.95. Eliminates TVI by attenuating harmonics at the source. Plugs between transmitter and antenna or tuner. Handles 1500 watts.

High Pass TVI Filter

HPF-2, $24.95. Installs between VCR/TV and cable TV or antenna lead-in cable. Eliminates or reduces interference caused by nearby HF transmitters.

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CIRCLE 15 ON READER SERVICE CARD

quency by 3 kHz) by a phone call from Doug Welcker, WB4KGY, Tom and Dave both discovered that the peak of their signal was 20 degrees north of the direct (or great circle) path. Tom conducted further schedules with Dave and also with stations in Texas. Each time he observed that his beam heading was north of the great circle path.

Tom also researched the work conducted by the Stanford University scientists. Through his experiments and research, Tom discovered that approximately half of the time FAI occurred right after the peak of intense sporadic-*E* activity along the same path. He found that the FAI often occurred as the sporadic-*E* was starting to die out and would last as long as a half an hour or so after the sporadic-*E* propagation was gone. Tom further observed that during the months of the year when little or no sporadic-*E* was present, he was unable to make FAI contacts. Finally, Tom noted that he could only make FAI contacts at night following nighttime sporadic-*E* events.

In the article Tom described the signal quality as fluttery, like aurora, but not as disruptive or buzzy. He says that there are frequency components of 30 to 100 Hz present, but they don't destroy the signal like those found in aurora. Because of this, SSB contacts are possible. He reported that at times parts of minute-long transmissions were clear and free of the clutter, an observation that he couldn't explain. Tom reported that stations with limited equipment can occasionally work FAI, but high power and/or a good antenna make all the difference.

If you're interested in this form of propagation, wait until you hear the dying embers of a very intense sporadic-*E* opening on 6 meters, turn on your 2 meter radio, point your beam between 15 and 25 degrees north of the direct path you were hearing on 6 meters, and make some noise. You might just make some contacts using this exotic mode of propagation.

Phase 3-D Integration Enters Homestretch

The following is from an AMSAT-NA press release, Orlando, Florida (AMSAT News Service):

AMSAT teams from a number of countries recently converged on the Phase 3-D Integration Lab in Orlando to install the first ten electronic and communications modules into the new Phase 3-D International Satellite. These activities came just a few short weeks after many of the spacecraft's electronic modules, along with the satellite's main flight battery, also arrived in Orlando from the AMSAT-Germany (AMSAT-DL) Laboratory in Marburg.

In a joint statement issued on February 28th, Werner Haas, DJ5KQ, AMSAT-DL Vice President, and Keith Baker, KB1SF, AMSAT-NA Executive Vice President, outlined recent progress made on the satellite. Phase 3-D remains scheduled for launch by the European Space Agency (ESA) on the next flight of their new Ariane 5 vehicle (Ariane 502) from Kourou, French Guyana, in early July.

"We are most happy to be here and to participate with our international partners in the final integration of Phase 3-D," said Werner. "The cooperation with the American integration team in Orlando has been excellent." Werner also expressed his gratitude to Lou McFadin, W5DID, P3-D Integration Laboratory Manager, and the other members of his Orlando Lab team

for their hard work in preparing the satellite for the final integration phase.

Soon after his arrival, Peter Guelzow, DB2OS, AMSAT-DL Digital Integration Manager, successfully accomplished a major integration milestone by powering up and then configuring the spacecraft's onboard Internal Housekeeping Computer (IHU). This was a critical task that had to be accomplished before the individual flight electronic modules could be switched on and tested. Peter gained considerable experience as a Command Station and part of the IHU design team for all previous Phase 3 satellites. Chuck Green, NØADI, was also on hand during these recent activities in Florida to assist Peter with IHU computer hardware.

The remainder of P3-D's equipment control and testing will now be performed in the Orlando Integration Lab using an external control computer and terminal checkout system called COTE (short for "Checkout Terminal Equipment"). Among his many other P3-D tasks, it was also Peter's job to both design and fabricate the COTE.

In addition to his duties as AMSAT-DL's Vice President, Werner Haas has also been responsible for coordinating the entire communications suite for Phase 3-D. While in Orlando, Werner performed a final bench test on each of the electronic modules prior to their installation into the satellite. Under Werner's watchful eye, most of the modules already had been subjected to extensive testing at AMSAT-DL's Laboratory in Marburg. These tests required at least 1000 hours of problem-free operation before each module could be labeled "flight certified" and shipped to Orlando.

A team from AMSAT-OH (a subsidiary of the Radio Amateur Technology Society [RATS] in Finland) was also on hand in Orlando during this time to install their 10 GHz hardware. Using a redundant 7 watt solid-state power amplifier and traveling-wave tube (TWT) amplifier provided by AMSAT-DL, the TWT delivered a measured 60 watts of clean RF output while installed in the spacecraft. Prior to their arrival in Orlando, Michael Fletcher, OH2AUE, and Harri Leskinen, OH2JMS, had already been to Marburg, where their equipment easily passed its flight readiness review. DJ4ZC and DJ5KQ were well satisfied by the excellent construction quality of their transmitter, as well as the perfect operation of the 10 GHz hardware while installed in the spacecraft.

Dr. Karl Meinzer, DJ4ZC, President of AMSAT-DL and Project Leader of the P3-D satellite, was available to assist the team by telephone. Unfortunately, a number of launch details remained to be clarified with ESA to permit Karl to participate personally during this visit. However, Karl, along with many other European module builders, is expected to be present when final testing and alignment of all the flight electronic modules is performed.

A Hungarian group under the leadership of Dr. Bandi Gschwindt, HA5WH, was also slated to arrive in Orlando in mid-March to deliver and install the three flight Battery Control Regulator (BCR) modules for P3-D. The BCRs will control all power within the spacecraft. Bandi reports that the flight units were now completing their final burn-in tests. In addition, Yoshiyuki Takeyasu, JA6XKQ, from the Japanese AMSAT group (JAMSAT), arrived on February 28, carrying JAMSAT's flight SCOPE camera. Yoshi installed and successfully powered up the SCOPE in the satellite on March 1st.

In Germany, Konrad Mueller, DG7FDQ, AMSAT-DL's Structural Specialist and the person responsible for fabrication of the flight momentum wheels for the spacecraft, was putting the finishing touches on the flight wheels prior to their imminent shipment to Florida. Just prior to their departure from Germany, Werner and Peter received a high-quality, fully populated circuit board for control of the momentum wheels from Chuck Green.

It is a very busy time for the project. However, so far, integration and testing are progressing on schedule for Phase 3-D's July launch on Ariane 502.

RS-16 Satellite in Orbit

The following is from the "ARRL Letter," March 7, 1997: Sources at AMSAT report that a new Russian Amateur Radio satellite, designated RS-16, has been launched from the Svobodny Cosmodrome as part of a Zeya satellite package. RS-16 reportedly has an average orbital altitude of 276 miles, producing a footprint some 2000 miles in diameter on Earth.

On March 4, 1997, at 1614 UTC, Jim White, WDØE, reported hearing strong signals from the RS-16 CW beacon on 29.408 MHz. Others in the US and Europe have reported strong signals on 10 meters. The transponders are not yet active. The twice-delayed launch had been expected as early as December. RS-16 is expected to be a Mode A (2 meters up/10 meters down) satellite, like RS-10 and RS-15. It's the first Russian satellite to have a 70 cm beacon, but that beacon is not yet operational. Beacon frequencies are 29.408, 29.451, 435.504, and 435.548 MHz.

When the transponders are operational, the RS-16 frequencies are expected to be: uplink, 145.915 to 145.948 MHz; downlink, 29.415 to 29.448 MHz. Transponder power output will be 1.2 or 4 watts. Orbital elements and additional information will be announced as it becomes available.

FCC Proposes Changes In Spread Spectrum Regs

The following is from the "ARRL Letter," March 7, 1997: Responding to a petition for rulemaking from the ARRL, the FCC has proposed in WT Docket 97-12 to adopt changes in its Amateur Service rules governing spread spectrum. In spread spectrum, the energy of the transmitted signal is distributed among several synchronized frequencies within a band and is reassembled at the receiving end. This reduces power density and duration of a transmission on a particular frequency and lets spread spectrum almost invisibly share the same spectrum with users of other, narrowband modes. Spread spectrum also provides improved communication under poor signal-to-noise conditions and in the presence of selective fading and multi-path propagation, and the ability to accommodate more communication channels operating simultaneously in the same spectrum.

The League's December 1995 petition asked the FCC to relax its rules to give amateur radio more opportunities to contribute to the development of spread spectrum techniques. Specifically, the League sought to have the FCC relax restrictions on spreading sequences and asked for greater flexibility in spreading modulation. In response, the FCC

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CURRENT (max)	30	5.2
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VSWR	2.5kW PEP - 1kW CW
Insertion Loss	Below 0.12
Isolation	Less than o.2dB
Output Port	60dB, 600Mhz
	2

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MODEL 73-030

Micro Miniature 2 meter VHF transceiver.

Covers 144-148 transmit and 138-174MHz receive. Palm size...only 4 1/2 x 2 1/4 x 1" with battery, yet loaded with features. Two watts output with battery supplied but 5 watts is available with an optional 9.6V battery. Features included several battery save modes, 72 user programmable memories, scanning, built in DTMF with auto dial memories. Full LCD panel with frequency and function, channel steps from 5 to 50kHz, keyboard entry, repeater splits, three power ranges, priority channel scan and more. Supplied with 6V-600MA rechargeable battery, flexible antenna. Wall battery charger, belt clip and instructions. Jacks for speaker/microphone, antenna and power.

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Miniature 2 Meter VHF Transceiver

Covers 144-148 transmit and 130-170MHz receive. Backlighted keyboard. Two watts of power output expandable to 5 watts. Miniature 9 cubic inch size, 18 function LCD multifunction readout. Three power levels. Keyboard or rotary frequency entry. Multi-function scan. 20 independent memory channels. Frequency steps of 5-10-12.5-20-25 or 50kHz. Built-in DTMF and paging. Optional tone squelch. Multifunction dial lamp. Dual watch. Battery save feature. Auto power off. Repeater offset and reverse. Monitor switch. Frequency/function lockout. Jacks for external antenna, speaker, microphone. Supplied with 7.2V 700mA rechargeable battery, flexible antenna, wall style battery charger and belt clip.

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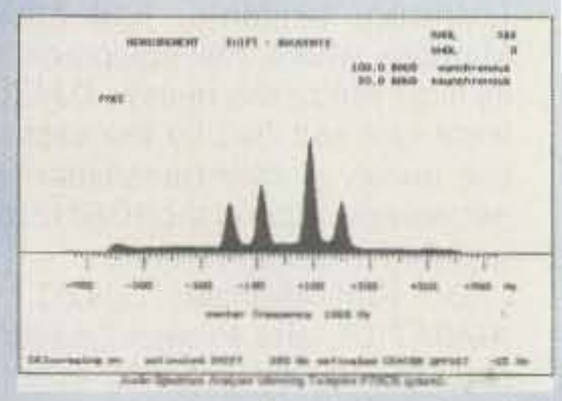
Miniature 70 CM (440MHz) UHF Transceiver

Same as the 73-005a but covers 430-450 transmit and 420-470MHz receive.

Hoka Code 3 Gold



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- TDM342/ARQ-M2/4Package includes: Code 3 Gold software, audio-digital converter and RS232 cable, all ready to go!
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Option 3 Piccolo	Option 4 Coquelet	Option 5 4 special	Option 8
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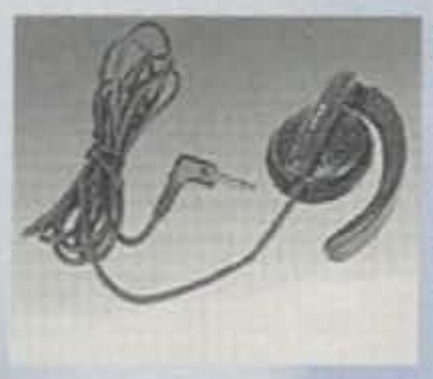
8 Ohm n-3.5mm plug. Fits firmly over ear, lead length 1.5m "k" model has 2.5mm plug.



WEP-400

Adjustable and removable soft pad. 3.15M lead - 3.5mm plug. K model has 2.5mm plug.

WSM-1900

25-1900MHz
29mm micro-magnetic base, 2.75mm coax BNC connector, for wideband receivers

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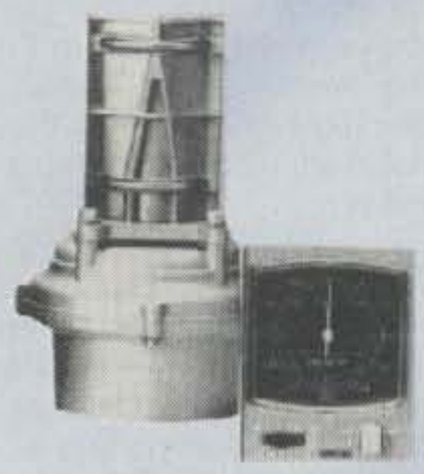

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$GD^2$400kgm^2 Use with larger Tri-Band beams, high rotating speed (35 sec) and 470° rotation. Compare 747SRX/750FXX to HAM IV. The 750 FXX is computer compatible. Note: 360° controller.

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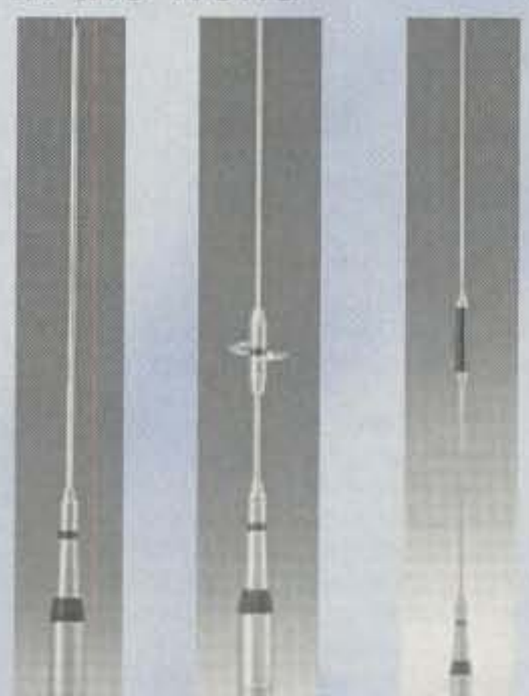

HP2070: VHF 1/4 wave/UHF 3/4 wave o dBd VHF/ 3.8 dBd UHF, GOLD/TEFLON UHF conn., 18.5 inch. long

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HP2000C: VHF 3/4 wave, 4dBd - 6.15 dBi., 143 - 149MHz, GOLD/TEFLON UHF conn., 60 inch. long

HP2000: VHF 1 x 5/8 wave, 3.2 dBd - 5.35dBi, 143 - 149MHz, GOLD/TEFLON UHF conn., 48.5 inch. long

HP7000C: UHF 2X5/8 wave, 6 dBd - 8.15 dBi, 440 - 450MHz, GOLD/TEFLON UHF conn., 34.6 inch. long

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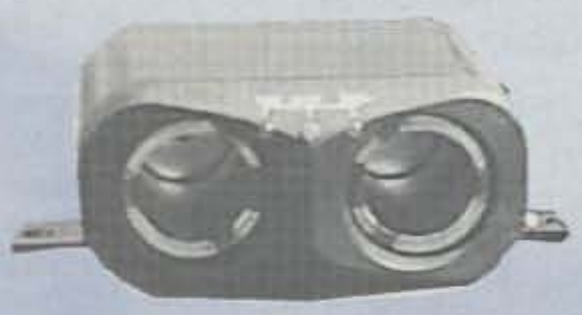

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now has proposed to drop rules restricting amateur stations to transmitting only frequency-hopping and direct-sequencing spreading techniques. As requested by the League, the FCC also has proposed to require automatic power control for spread spectrum transmitters to ensure use of the minimum power level needed to carry out communication.

The FCC also went along with the League's request to permit brief test transmissions using spread spectrum and to allow international spread spectrum communications between amateurs in the United States and those in countries that allow amateurs to use spread spectrum. The current rules allow only domestic communication.

The use of spread spectrum techniques was first approved for amateur radio in 1985 for bands above 225 MHz and at power levels up to 100 W, and there has been some experimental amateur operation since then. The FCC also has authorized Special Temporary Authority (STA) in some instances to allow broader SS experimentation. Since spread spectrum was introduced in the Amateur Radio service, commercial spread spectrum applications have been developed, including personal communication services, remote meter reading, and position locating. But, the League had argued that rules limitations held back further spread spectrum experimentation. No changes are proposed in the frequency bands where spread spectrum is permitted.

The FCC said the rule amendments would "increase spectrum efficiency and allow amateur operators to contribute to technological advances." Comments on the NPRM in WT Docket 97-12 are due May 5, with reply comments due June 5.

1997 SMIRK Contest Rules

Here are the 1997 SMIRK QSO Party rules, courtesy Pat Rose, W5OZI, SMIRK Secretary.

The 1997 SMIRK Contest, sponsored by the Six Meter International Radio Klub, will be held from 0000Z June 21 to 2400Z June 22. It is 6 meters only, voice and/or CW. All voice contacts between the 48 contiguous states and lower-tier Canadian stations must be made above 50.125 MHz; CW below 50.100 MHz, or above 50.125 MHz. Only DX contacts are permitted between 50.100 and 50.125 MHz.

Exchange is callsign, SMIRK number, and grid locator. No crossband or partial contacts allowed. Only FM-*simplex* is allowed. No repeater contacts are allowed.

Regular scoring: Two (2) points for each contact with a SMIRK member and 1 point for each contact with a non-member.

Enhanced scoring: Voice contacts and exchanges between US and lower tier Canadian stations which are made above 50.200 will qualify for double your score. Example: If you can make your exchange above 50.200, score 4 points for each SMIRK contact, and 2 points for a non-SMIRK contact. You cannot work a station twice, once below 50.200 and once above 50.200, but you are certainly permitted to solicit the QSO between 50.126–50.200, then move up to or above 50.200 to exchange information. The purpose of this is to try to determine if stations have any problems with equipment and/or antennas above 50.200 MHz.

Final score is total points multiplied by the total of grid locators worked. Send a legal-size SASE for copy of log forms.

Awards: Certificates will be issued to high scorer in each state, province, or foreign geographical division. Non-SMIRK members *will* receive awards if no entry is received from a SMIRK member in their geographical division.

Send log requests or logs (postmarked no later than July 15) to Pat Rose, W5OZI, P.O. Box 393, Junction, TX 76849-0393. Contest info and official log forms may be downloaded from the SMIRK Six-Shooter Web Page on the Internet at <http://www.cswnet.com/-ka0nno>.

Note that we have deleted the requirement to be a paid-up member to receive an award. If we insisted on that, there wouldn't be many awards, hi. Besides, the idea is to have a fun contest and encourage everyone to participate and try for an award.

Puerto Rico 2 Meter Beacon

The following is from Ken Ramirez, N4UK: In a continuing effort at exploring the Caribbean summertime 2 meter to Conus opening, a 2 meter beacon was installed at my West Coast Puerto Rico QTH this April. The beacon frequency is 144.297.5 MHz.

The beacon location is overlooking the Atlantic/Caribbean Sea border and is ocean all the way to the USA on a 200 foot high hilltop. The antennas are a pair of 4-element Yagis. One 4-element will be aimed at the East coast (roughly NC coast) and the other at Europe towards Spain. The beamwidth of each antenna is about 60 degrees, so coverage should be pretty broad. Power out will be about 60–70

watts. It will be on for the May–July Es season and for the major meteor showers. The beacon should have been on the air by April 1, 1997. The grid square is roughly FK68hb in the southwest part of Puerto Rico overlooking the ocean to the USA at 200 feet ASL. The message on the ider should be "sss de wp3x/b fk68" sent at a faster speed than usual for easier id during Ms bursts. Maybe 25-30 wpm. KP4EIT will be the contact on the island, as he always monitors 144.200. When 6 meters is open to the Caribbean, the 2 meter beacon can be listened for, and when heard, KP4EIT can be called on 144.200 and worked. I was able to work him last summer on a brief 30 second opening on 2 during an intense and long duration 6 meter Es opening. He also heard me call him during a later opening, but a two-way was not completed. W3ZZ worked KP4A a few weeks later under similar circumstances at a distance of over 1500 miles. The most common time frame for this opening appears to be between 4–7 PM local EST. This is also the same time frame that the V4 guys were worked on 2 meters last summer. You can also look for KP4A and WP4O.

Current Conferences

Dayton: The weak signal program for the Dayton Hamvention was not available at press time. However, I do have information on the Weak Signal VHF Group meeting. The information follows.

VHF Weak Signal Group: The VHF weak signal group that meets Monday nights at 0200 UTC on 3.843 MHz would like to invite everyone who is coming to the Dayton Hamvention to our annual banquet. We have reserved a room that will seat 150 on Friday night May 16, from 7 PM until 11 PM at the Holiday Inn North, Wagoner Ford Road, Dayton, Ohio. There will be a cash bar as well as plenty of seating to allow you to mix and mingle with other VHFers. There will be two grand prizes worth over $300 dollars each being drawn starting at 9 PM. Also, there will be a guest speaker who will provide a short talk on VHF activity. There will be a noise figure measuring table, so bring your preamps to tweak.

The cost of a ticket to attend this function, which includes the two entree banquet dinner, is only $29 per person, limited to 150 tickets. You may order your tickets by sending $29 plus an SASE to either Tony Emanuele, WA8RJF, 7156 Kory Court, Concord Township, OH 44077; or Tom Whitted, WA8WZG, 4641 Port Clinton East Road, Port Clinton, OH 43452. Website info is <http://www.wa8wzg.com>. This is one of the largest gatherings of VHF weak signal enthusiasts in the US, so get your tickets early and join us for an enjoyable evening at the Dayton Hamvention!

West Coast VHF Conference: There will be no West Coast VHF Conference this year. However, there will be a west coast Weak Signal VHF gathering in early in October. More details later.

Aurora '97: Aurora '97 is being held April 19 this year. My apologies to Paul Husby, WØUC, for not getting the information in last month's column. For info, check out their web page at <http://www.tc.umn.edu/nlhome/m374/husby002/>.

And Finally . . .

The following was sent to me by Richie Shroff, KB5SNY. It is a compilation of articles from "The Blooper," Vol. 1 No. 6, Muskogee, OK, September 1939. In light of the current problems we amateurs have, this might be interesting reading.

To Those Who Serve, Thanks, By William A. Green, W5BKH, Director, West Gulf Division, ARRL:

As the war clouds hang heavy over Europe and even this, our country, is greatly worried over the possibilities of a titanic struggle in which many will lose their lives, homes, and everything of value, I can honestly tender to those radio amateurs who serve, thanks.

Our country has been very generous to the American Radio Amateur in our use of the radio spectrum. What are you doing to help repay our country for our practically unrestrained use of our hobby? Are you a member of the Army Amateur System? Are you a member of the Naval Reserve? Are you a member of the ARRL Emergency Corps? Have you prepared yourself to render aid to your community in time of emergency? If you have not done one or more of these things, then, fellow amateurs, you have not done your duty to your country and to Amateur Radio.

After all, is not our country the most glorious country on earth; do we not owe it our allegiance? Just for a moment think of the amateur in other countries. Those in the more fortunate places and nations have some small part of the liberties enjoyed by the American ham. Is his power one kilowatt? No, it is more apt to be lim-

ited to fifty or one hundred watts. Is his time unlimited? No, he is allowed to operate at such times that his government thinks he will do the least good. Are his frequencies the same as ours?No, again, he is limited to probably less than half of our available frequency set-up. Now think of the amateur in the less fortunate countries, operating a low power station hidden in the cellar or the attic, expecting any minute to have the police break in and take him away to jail or possibly worse for the mere pursuit of his hobby that some ruler or dictator has refused him the use of. All frequencies utilized by his country for military purposes only, unable to claim his QSL cards for fear of imprisonment, unable to operate legally, unable to buy equipment, even unable to talk radio. Now, do you think that you would care to bear allegiance to a country of that type?

Do you not think that you owe our country just a small part of your time and energy? Don't you think that you could spare a few hours every month to properly train yourself in the art of communication as used by our Army, our Navy, or our own ARRL Emergency Corps? Proper procedure cannot be acquired upon the spur of the moment; it requires preparation and training that you may be fully prepared to step into the job that may be assigned you in time of emergency.

Our Navy has time after time come to the aid of the American radio amateur in protecting the use of the so-called amateur frequencies at international radio conferences. Why have they done this? Simply because of the value of the radio amateur to the Navy and the country in time of need. If you do not do your part, then eventually we shall lose the support of the Navy. They will turn to other fields for their trained operators, they will forget to protect the amateur, and who could blame them? So fellows, remember when you join the Naval Communication reserve you are helping our country, the Navy, your community, and the body of Amateur Radio.

Our Army has always valued the services of the American amateur and has gone to some length to help us. They have never requested for their own use any of our frequencies. They have built up a wonderful communication system for peace time and emergency use. They value the amateur for his cooperation in the Army Amateur Radio System. Without this, how long would the Army support amateur radio, with its use of frequencies that the Army could use to such good advantage for military aircraft purposes?

Not long. When you serve the Army you are also serving Amateur Radio.

Many well-informed citizens of every community have become aware of the ability of the amateur to serve in times of trouble and will go a long way to fight any adverse legislation, but if you fellows fail to serve in time of need surely we will lose that support. When you become a member of the ARRL Emergency Corps you serve your community, your state, your country, and Amateur Radio. See your local Emergency Coordinator; he can give you the necessary information, blanks, and advice.

Amateur radio has given you much pleasure and will continue to do so just so long as you in turn put out yourself. Fail to serve then, fellows, we shall lose our right to the enjoyment of this hobby of ours. It is squarely up to us. Let's do something about it! Become a member of the ARRL Emergency Corps, join the Army Amateur Radio System, or volunteer in the Naval Communication Reserve. [end excerpt]

Section Communications Manager's Column, By Carter L. Simpson, W5CEZ, Oklahoma Section Communications Manager:

Back in 1933, there appeared in the February issue of *R9* an article written by the late Clair Foster, W6HM, that made an everlasting impression on the writer. The name of the article was "Gangsters Incorporated." It wasn't so much what he said about big business and its organized attempts to limit the activities of the amateur or to gain further concessions in the matter of frequency allocation at the expense of the amateur, but rather what he said about the functions of the amateur, of services rendered in the interest of the public, and of the obligations of the amateur to the public.

In his article it was brought out that the Radio Laws of the United States state that all use of the public's air shall be in the interest of the public. The keynote of the Radio Act is that every transmitting station, to justify its use of the air, must be operated for public interest, convenience, or necessity. There is our challenge!

What are we doing as amateurs to justify our existence? Is your motive a selfish one? Are you in the game merely for a pastime and for your own amusement or for what you may gain in a material way because of your associations as an amateur? If the amateur is to be perpetuated, he must indulge in his hobby and take part in activities for more than just amusement, and it behooves every one of us to contribute in some way that will aid in strengthening the amateur's cause, and there are many ways in which this can be accomplished.

In the past the amateur has preformed commendable service and holds favorable position in public opinion, largely through services rendered during emergencies, through his contribution to the art of radio and its development, and through the efforts of the traffic man. Truly, there is no better way in which you can justify your being a ham than by activities along these lines. There are the military services with the Naval Communication Reserve. In the Army and the Navy we American amateurs have our strongest allies. Taking an active part in either or both of these services will better equip the amateur for public service and make him a greater asset to the community instead of a nuisance, as he is regarded by some. There are numerous outlets for performance of commendable service with the Communications Department of the ARRL—as Official Relay Stations, Official Phone Stations, Official Broadcast Stations, Official Observers, Trunk Line Stations, Emergency Coordinators, Assistant Coordinators, and so on down the list. The least that every amateur can do and should do is register with the ARRL Emergency Corps. That is the aim of the League—every active amateur a member of the Emergency Corps. You do not have to be a member of the ARRL to become a member of the A.E.C., either in the emergency powered division or the supporting division. Get in touch with your Emergency Coordinator now. *Get that blank and fill it out! There is a coordinator near you.* If you do not know to whom to go, write to your SCM. Then, after getting lined up in the A.E.C., resolve to get busy and make a contribution to the amateur service, thereby justifying your existence as an amateur.

A dispatch from Washington, August 25[, 1939], stated that if a war broke out in Europe it would be necessary to shut down the short-

wave stations of this country: "Since such transmissions were international in character they might be considered unneutral. Such stations could not be permitted to transmit to Europe because of this unneutral character." Upon learning of this dispatch Secretary Warner of the ARRL got in telephonic communication with Washington, and says that it is not true. Quoting Mr. Warner, "No such restrictions are contemplated in the event of a war in which the United States is not a participant. There is no reason to believe that, if things go along half-way decently, we should be shut down on our high frequencies. No lid is contemplated."[end excerpt]

Comments from the editor, J. L. Hill, W5EGP: Strangely coincidental is the fact that both of the preceding articles by Mr. Simpson and Mr. Green were written on the same identical theme, presumably unknown to each other as both were written at the last minute upon a request from the editor that each write on any subject he might choose. In the opinion of the editor a more timely or appropriate subject could not have been chosen on this, the eve of a new fall and winter season of radio activity, and in view of present conditions in other parts of the world. Therefore, we are proud to print these two fine articles by our Director and SCM, and urge you to read both. Our bet is that it gives you something to think about. [end quote]

Ironically, more than 57 years later J. L. again is giving us something to think about. Simply change the thrust of the two articles a bit and the relevancy is current.

Last month I was on this same subject of working together. However, in a small way I feel like the new preacher who, Sunday after Sunday, preached the same sermon. The church board, thinking that because he was new he didn't have much in his inventory of sermons, was concerned about him. Finally the board chairman asked him several weeks into his repetition why he was preaching the same sermon. He replied that he was going to preach it until he got it right.

You might have caught that there is a double meaning in that story (meaning until the congregation responded). From my observations on the amateur bands and the Internet, I have to conclude that either I am not preaching my message of cooperation right or the members of my congregation (you) are not getting the message. To reiterate, ladies and gentlemen, we have major problems. We are not replacing our ranks. Additionally, within our ranks is so very much divisiveness over such puny issues.

In the March 1997 issue of *QST* in a letter to the "Correspondence" column, Rick Wallis, KA4VHV, wrote about how he was gently coaxing his wife into the hobby. He got her to the point of buying a study guide. Then, unfortunately, one evening they happened to tune into the 75 meter phone band. After they listened to several QSOs of less than dubious nature, Rick turned the receiver off and his wife tossed the study guide into the trash. While Rick's point was directed at the Extra class operators they heard, we all easily can find examples within any class of license in our ranks.

To reiterate: My friends, we have problems that only we can solve, and we must do so immediately. For the time being, however, I will continue to preach the same sermon until I get it right.

73, Joe, N6CL

BY KARL T. THURBER, JR., W8FX

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

May Mania

April showers, May flowers. Yes, once again spring is here, and many amateurs' thoughts naturally turn to antennas in a sort of "May Mania." So do ours, so stay with us.

Antenna Notes

JVH Engineering K5GW 10-Element Yagi. Newark, Ohio based JVH Engineering has introduced a new 10-element, 2 meter Yagi. The $95 antenna (see photo) features excellent gain and a clean pattern. Computer designed and optimized, the antenna has been range tested to verify its characteristics, which include a claimed 12.4 dBd forward gain and a 35 dB front-to-back (F/B) ratio. Features also include a balanced T-match feed with N-style connector and all stainless steel hardware. The antenna can be stacked in pairs for weak-signal or rover operation, or configured in a four-antenna array for EME.

JVH Engineering also offers a variety of antenna parts and supplies. Products offered include aluminum tubing in 6 foot lengths; CATV hardline transformers for 2 meters and 70 cm (see photos); antenna hardware; baluns; power dividers; Teflon film, sheets, tubes, and rod; and Black Delrin rod.

Contact Floyd Reynolds, KB8JVH, at JVH Engineering, 6201 Appleman Rd. SE, Newark, OH 43056 (phone 614-323-2027; Internet <kb8jvh@nextek.net> or <http://www.thresholdav.com/jvh.htm>).

Tape-Jay™ Stealth 2 Meter J-Pole. As we noted in last August's column, sometimes it takes ingenuity to operate when you're an apartment dweller or if you have antenna restrictions affecting your home or condo. Often you're forced to use invisible antennas and the like. Larry Feick, NFØZ's TapeTenna™ Hidden Antenna Kit, which we profiled, was designed to help.

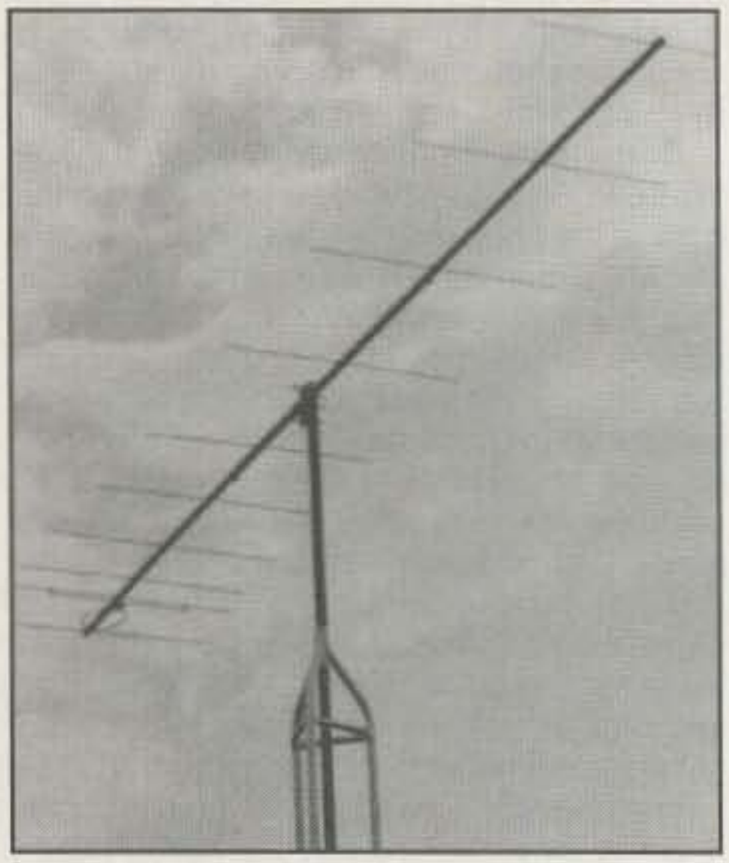
As we pointed out, the $34 kit consists of 108 ft. of highly conductive, 3.5-mil copper foil tape, two feedpoint connectors, and a detailed user manual. Both the 1/2 inch wide tape and the adhesive are strong and durable, and they adhere to most household surfaces, indoors and out. With the kit you can construct "stealth" antennas of most types, including verticals, dipoles, quads, Yagis, and J-poles, for HF, VHF, and UHF.

Now Larry has introduced Tape-Jay, a concealed antenna for 2 meters, billed as "the ticket" to get handi-talkies (HTs) and base units into the repeater from fringe areas. The antenna is made from 3.5-mil sticky-back copper foil. It will stick to practically any material, such as a window, wall, chimney, or even fabric (for a portable J-Pole). The kit includes precut J-Pole elements, a coax connector, cable clips, and instructions.

The strong and durable antenna may be used indoors or out. It's assembled easily in minutes; soldering isn't required, and no special tools are needed for assembly. Best of all, you can paint the antenna to match the mounting surface to render it practically invisible.

The Tape-Jay is $19 plus $4 s/h from HAMCO, P.O. Box 25, Woodland Park, CO 80866.

Stridsberg Engineering Power Dividers. You can use antenna power dividers—sections of fabricated transmission line that act as impedance transformers—to stack or combine antennas. You can do this in arrays of two, four, or more units to increase the gain and directivity of your antenna system. With power dividers' typically low loss and good phase balance, you can obtain maximum benefits from stacking. These benefits are important in stringent applications, such as moonbounce, amateur television (ATV), satellite, and weak-signal work.

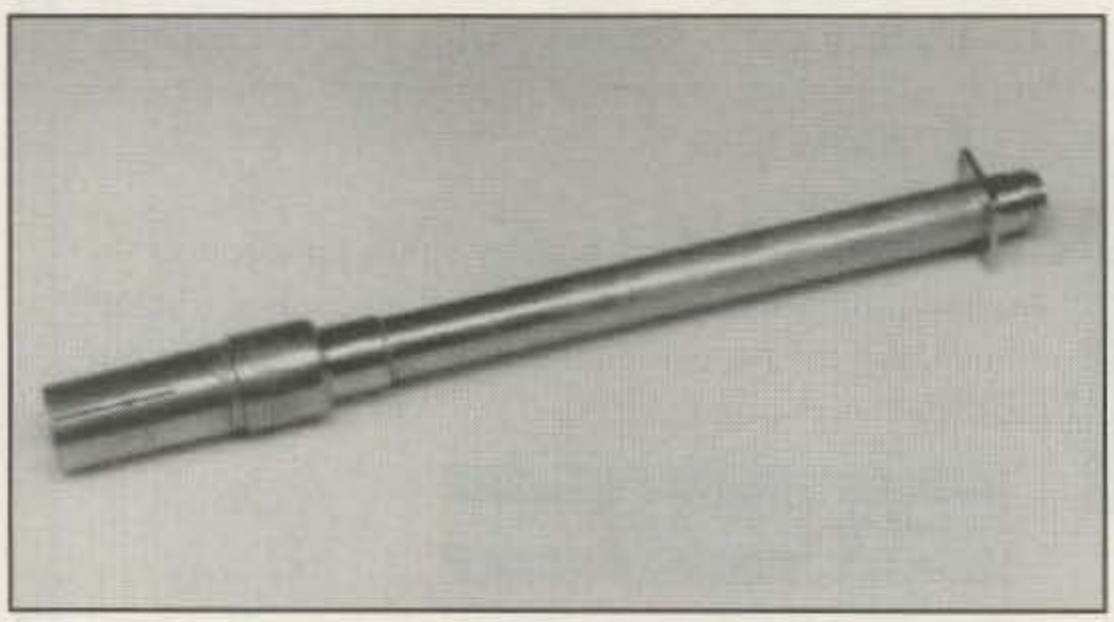


JVH Engineering offers a new 10-element, 2 meter Yagi, the K5GW-10. The antenna's characteristics include a claimed 12.4 dBd forward gain with a 35 dB front-to-back (F/B) ratio. Features also include a balanced T-match feed with N-style connector and all stainless-steel hardware. The antenna can be stacked in pairs for weak-signal or rover operation, or it can be configured in a four-antenna array for EME work. (Photo courtesy JVH Engineering)

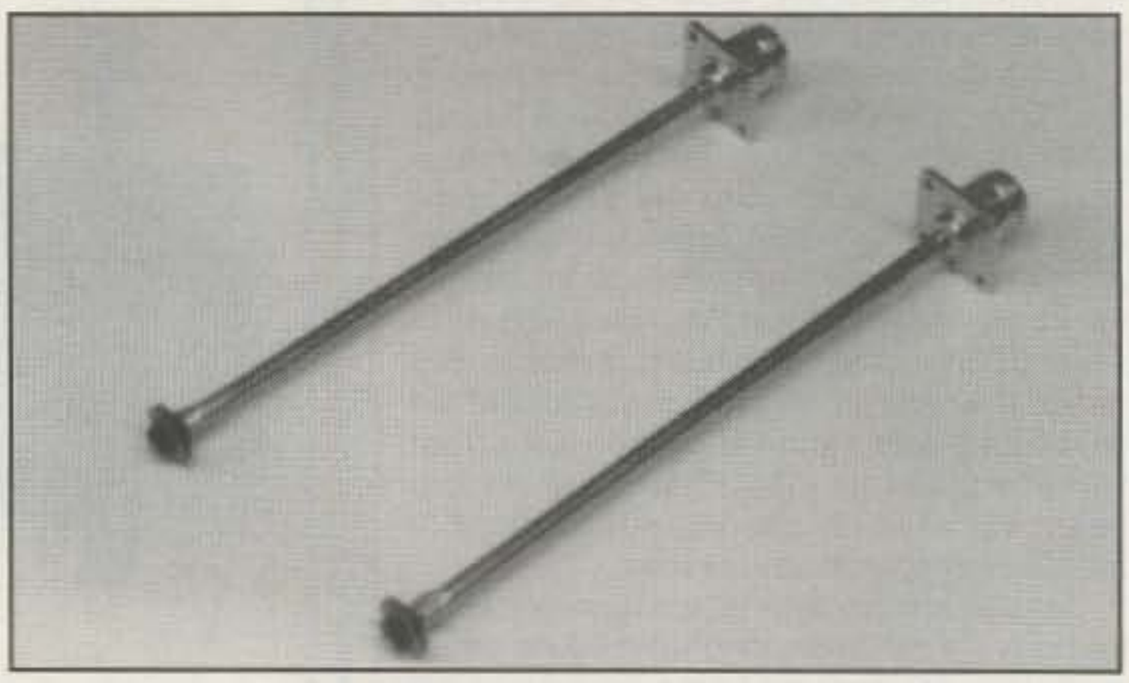
Other applications include repeater linking, beacon systems, and various instances where two or more beam patterns are required.

John Stridsberg, NY5C, offers an extensive line of two- and four-port, VHF/UHF power dividers for the 144, 220, 432, 902, 1296, and 1691 MHz bands. The rugged, 50 ohm units offer a wide bandwidth (± 20%) and low SWR

289 Poplar Drive, Millbrook, AL 36054



JVH Engineering also offers a variety of antenna parts and supplies, including CATV hardline transformers for 2 meters and 70 cm. Features include low-loss air-dielectric design, type N connectors, and easy installation. Shown in this photo is a typical 70 cm transformer. (Photo courtesy JVH Engineering)



This photo is a view of two 70 cm CATV transformers, with the center conductor visible. The transformers are of low-loss air-dielectric design. They're designed to frequency within the 70 cm band when orders are placed. (Photo courtesy JVH Engineering)

Sometimes a simple antenna can be pretty important!

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(<1.2:1) throughout their operating range. N-type connectors are used, and the outer casing of the units is aluminum with baked-on enamel coating. Vinyl end caps are used to seal out moisture and dirt.

Spec sheets and pricing are available from Stridsberg Engineering, Inc., 354 Albert Ave., Shreveport, LA 71105 (Internet <jstridsb@iamaerica.net>).

DCI Intermod Bandpass Filters. So, just what is "intermod"? The term refers to false signal reception caused by various so-called "intermodulation products," although some people refer to intermod generically as any kind of interference. Intermodulation distortion (IMD) often occurs when the RF amplifier in your receiver or preamplifier is driven "nonlinear" by a strong signal; two or more signals then mix in the amplifier and may create an undesired signal on the frequency of interest.

HTs usually work properly with a rubber-duck-type antenna, but often they suffer from IMD when used with larger antennas that tend to aggravate the problem. Some mobile radios also are susceptible to IMD, especially in metropolitan areas with many strong signals present. Often base stations suffer from IMD if they use large, high-gain antennas and preamps.

Rob Kontes, WS7U, imports bandpass filters for 144, 220, and 440 MHz manufactured by DCI Digital Communications, Inc. of White City, Saskatchewan, Canada. The filters, which offer bandpasses of 4, 2, and 3 MHz, respectively, are totally passive. They have a passband loss of 1 dB or less, don't require any DC power, and handle 200 watts. They also help to reduce transmitted spurious emissions. Prices range from $85 to $105, depending on band; custom filters also are available.

According to Rob, the filters solve "worst case" intermod problems. He cites his own case, at East Twin Butte, Idaho, which has a total of 4.5 megawatts ERP from broadcast, commercial, paging, and government transmitters. When the DCI filter was inserted in 2 meter coax, the noise floor dropped and signals that were down in the noise reportedly became full quieting at 30 dB over S9.

Rob also offers a variety of other antennas and antenna parts and supplies, including DC and RF connectors and adapters, plugs, baluns, and more. A spec sheet and price list are available from Rob Kontes, WS7U, 465 Croft Dr., Idaho Falls, ID 83401-4419 (phone 208-522-2839; Internet <ws7u@aol.com>).

Texas Towers Catalog. When we last mentioned Texas Towers in October 1993, we noted that they were expanding into the aluminum tubing market. Their stock includes many popular telescoping sizes. Drawn and extruded tubing are available, as is extruded bar stock. At the time, I also noted that the firm sent me several samples, which have bright surfaces comparable to what commercial antenna manufacturers provide in their kits. Also offered are high carbon steel masts. Various mast lengths are available.

In addition to tubing and masts, and a variety of amateur gear, Texas Towers also stocks antennas, antenna parts, RF and rotor control cable, antenna and guy wire, rotors, other antenna supplies, and of course, towers (Rohn, Universal Tower, US Tower, and Rotating Tower Systems) and tower hardware.

For a 40+ page catalog, contact Texas Towers, a division of Texas RF Distributors, Inc., 1108 Summit Ave., Suite #4, Plano, TX 75074 (phone 1-800-272-3467; Internet <TEXAS RF @aol.com>).

Synthetic Textiles Update. Antenna support lines are used to connect wire antenna ends to their supports; historically, manila hemp rope typically was used. Today, however, many amateurs prefer Dacron® polyester rope (often after experimenting with nonstarters such as plastic clothesline).

Actually, manmade fiber rope is stronger and more durable than natural fiber rope; synthetic rope isn't affected by mildew. Dacron also has far better characteristics than nylon, which can be difficult to knot, and it isn't as elastic as nylon so it doesn't stretch nearly as much. Dacron also has much better resistance to UV degradation from sunlight than does nylon.

In several columns we mentioned that Synthetic Textiles, Inc., of Anaheim, California offers black Dacron polyester double-braided antenna rope in 3/32, 3/16, and 5/16 inch diameters. According to the firm, the specially braided line originally was made by the company at the urging of a local radio amateur.

Synthetic Textiles uses DuPont's color-sealed black Dacron polyester yarn in connection with the braided jacket for added UV protection and resistance to aging and abrasion. The line ties and unties easily, and it also cuts neatly. The ends can be cut and sealed with the firm's inexpensive ($25) 110 volt "electric hot knife." The 3/32 inch rope has an approximate strength of 260+ lbs.; the 3/16 inch rope handles 770+ lbs.; and the 5/16 inch rope, 1790+ lbs. Current prices range from about $40 per 1000 ft. spool up to $60 per 500 ft. length, depending on diameter. S/h is a nominal $5 per order, regardless of quantity or weight.

More details are available from Synthetic Textiles, Inc., 1145 North Grove St., Anaheim, CA 92806 (714-630-2134).

Note: Comparable support ropes also are available from other sources. The Radio Works (P.O. Box 6159, Portsmouth, VA 23703 [phone 1-800-280-8327; Internet <Jim@RadioWorks.com>]) offers several types, including two types of Dacron and a Kevlar®/Dacron combo. The most popular is their olive-drab Dacron rope that's effectively made to military specifications. For a while after "Desert Storm" the olive-drab rope disappeared from the market, everything being manufactured in "desert tan." Now, however, The Radio Works has a working agreement with one of the original "mil spec" textile mills to continue producing the original olive-drab line with about the same characteristics as the military stuff.

Software Stuff

DX4WIN. Steve Bookout, NJ4F, offers through his firm, Rapidan Data Systems, the highly capable DX4WIN Windows-based logging software for both the casual and serious DXer. With the motto "the way logging programs *should* be," DX4WIN is fast and flexible. It also has a number of powerful, convenient features to make operating in a contest fun; if you use a dedicated contesting program, DX4WIN can import your log after the contest.

The program offers support for DXCC, WAS, and WAZ, with separate "flags" that track mixed mode and band awards; import and export of logs; support for various CD-ROM callsign databases and GOLIST QSL manager information; multiple label printing; packet DX spotting; good handling of prefix information; so-

Fig. 1– Symantec's PC Handyman solves more than 20,000 hardware and software problems, and it helps you understand how your PC works by offering interactive solutions to a wide range of questions and problems. It's one of five new products Symantec introduced that help to prevent and correct PC problems. Their new product line addresses the needs of all users, ranging from hobbyists and students to small office owners and computer engineers.

phisticated QSO searching, including QSO filters; and support for popular radio models (ICOM, Kenwood, and Yaesu). Other features include compound QSO sorting, a variety of automatically updated contact summaries and user-designed reports, a flexible user interface, and much more.

You can obtain context-sensitive help, with links to other subjects, simply by depressing the F1 function key. The program also includes a comprehensive on-disk manual (about 100 pages) that you can review online or print out.

DX4WIN is $69.95 plus $6.95 s/h. A demo version is available for $5, the cost of which you can deduct when ordering the licensed version; or, you can download the demo free of charge from <http://www.erols.com/pvander>. The demo is fully functional except that it won't save a log file to disk. However, a sample log file is included so you can manipulate a real log file.

For more information, contact Rapidan Data Systems, 3601 Plank Rd., Suite 389, Fredericksburg, VA 22407 (phone 540-786-2669; Internet <sbookout@mnsinc.com>).

HAMCALC and FOTOCALC Update. In previous columns we noted George "Murph" Murphy, VE3ERP's free HAMCALC software program, which he bills as providing "painless calculations for amateur radio operators." As we noted, it's a DOS-based, BASIC collection of calculation routines that remove the drudgery of math for anyone who dabbles in electronic design or experimentation. All the routines are user friendly, self-explanatory, and run mostly from the main menu or from subsidiary menus. There are well over 100 calculation and conversion routines, plus an on-screen index, helpful hints, utilities, and a "README" file.

In a recent letter Murph notes that during the four years he has offered HAMCALC, it's gratifying to learn that HAMCALC is being used as a learning tool and reference not only by amateur radio clubs and organizations, but also by colleges, universities, and professionals. He also advises that he has never placed HAMCALC on a computer network, for the reason that versions appearing on many of these networks are usually outdated and may not include proper installation instructions.

Murph notes that HAMCALC is freeware and is constantly being upgraded; the latest version is always available from the author on a 3.5 inch, 1.44 MB diskette for $5 s/h (U.S. funds). If your version is current, he'll place you on a list to receive the next version as soon as it becomes available.

Murph also includes a copy of FOTOCALC with HAMCALC. FOTOCALC is a comparable set of math calculations for photographers. The program has many calculation routines relating to filters, electronic flashes, exposure, focusing, lenses, and the like. Contact George Murphy, VE3ERP, 77 McKenzie St., Orillia, ON L3V 6A6, Canada.

New Utilities from Symantec. Since Windows 95 was released in August 1995, Symantec Corp. has issued comprehensive utility software to address a variety of Windows 95 "deficiencies" and to assist you in moving to the new operating system. Several months ago Symantec barraged us with a family of products to help users get the most out of Windows 95. The new product line addresses the needs of all users, ranging from beginners, hobbyists, and students, to small office owners and computer engineers.

Symantec has created five new products, several with the PC beginner in mind, which help to prevent and correct PC problems. PC Handyman™, at $49.95 estimated retail price, reportedly solves more than 20,000 hardware and software problems. It also helps you understand how your PC works by offering interactive solutions to a range of questions and problems (see fig. 1).

Healthy PC™, at $29.95, is the first one-step PC maintenance program for inexperienced Windows 95 users. It features an intriguing, easy-to-understand, and graphic oval-shaped interface designed to help beginning computerists who may be unfamiliar with Windows-style pull-down menus and checkboxes.

Internet FastFind™, at $49.95, provides a quick way for you to find stuff online; it seamlessly combines searches of seven top Internet search engines, and it also notifies you of

changes to important Web pages and FTP sites (fig. 2). It also includes NetFileFind to let you "drag and drop" files from the Internet directly on your PC, and PatchConnect, which automatically creates links to Internet sites where hardware and software updates are posted.

Crash Guard with Anti-Freeze™, at $29.95, prevents most PC "crashes," and it "unfreezes" program lockups. It's said to be the only product that can protect you from losing important files as a result of both application crashes and freezes.

Saving perhaps the best for last, Norton Utilities 2.0 for Windows 95™, at $79.95, is a comprehensive, heavy-duty disk utility for optimizing and protecting PC hard drives and fixing small problems before they become big ones. It includes a variety of sophisticated new features, including System Genie™, to customize Windows 95; Space Wizard™, to safely remove unneeded files; and System Doctor™, to actively monitor your PC on the fly.

For more information, contact Symantec Corporation, 2500 Broadway, Suite 200, Santa Monica, CA 90404-3063 (1-800-441-7234). Also check out Symantec's Web page at <http://www.symantec.com>.

From The Bookshelf

Jade Book. In previous columns we discussed several Jade Products antennas and other items offered by Jane, KA1FUN, and Dennis, K1YPP, Blanchard. As a trivia point, the name of their firm doesn't refer to the esteemed green stone. Rather, it comes from merging the names of its cofounders, JAne and DEnnis.

In keeping with their founding goal of "putting the amateur back into radio"®, they recently introduced *Jade Book*, a handbook of radio lore. Dennis and Jane relate the story that several years ago they needed to find a chart that depicted the clearance hole size of the screws they wanted to use. As they searched, it became apparent to them that this sort of information just wasn't readily available. They decided that it would be great if this type of information were compiled in one book. Out of that simple need, *Jade Book* developed.

Jade Book is a compilation of information, hard-to-find engineering data, humor, and folklore. Newsletter articles, parts of Jade Products manuals, and sections of letters answering commonly asked questions are also included.

The book covers a wide range of subjects. Just a few of them are antennas of various types, grounding, TVI, battery controllers, solar charging, definitions and equations, engineering data, keyers, and even articles on humor. The authors also encourage readers to submit their favorite tidbits of information to them for possible inclusion in the book.

Jade Book is $5 with an order, or $6 by itself, postpaid. For more information, Contact Jade Products, Inc., P.O. Box 368, East Hampstead, NH 03826-0368 (phone 1-800-523-3776; Internet <djade@hampstead.k12.nh.us>; or check out their Web site at <http://www.hampstead.k12.nh.us/~djade>).

***The Wirebook III* Update.** In November 1995 we mentioned a similar but more specialized type of book, *The Wirebook III*. Now is a good time to revisit it, especially since the folks at Jade Products sent their *Jade Book* to me for review as a result of a recommendation from *The Wirebook III*'s author, Pres Jones, N8UG, known far and wide as "The Wireman."

The Wirebook III is a 60-page, concisely written and specialized mini-manual, a how-to-do-it resource for coaxial cable, coax connectors, antenna wire, baluns, lightning protection, grounding, and RF and antenna accessories. As such, it's a highly readable and quite useful collection of hints, tips, and advice for the antenna builder and hobbyist.

Last I checked, *The Wirebook III* is $3 from The Wireman, Inc., 261 Pittman Road, Landrum, SC 29356 (1-800-727-9473).

The ARRL 1997 Handbook. Of course, handy references such as *Jade Book* and *The Wireman III* can't replace comprehensive and definitive amateur radio sourcebooks such as *The ARRL Handbook*, nor do they intend to. *The Handbook* is billed as "the standard in applied electronics and communications," and with good reason.

The new 74th Edition, 1200 pages in 30 chapters, still is the definitive sourcebook. Like the previous edition, the book is organized into five major parts: an introduction, fundamental theory, practical design and projects, construction techniques, and operating practices. This year is the second time in which *The Handbook* includes a companion disk of software.

Besides the applications software on pi-networks, slow-scan TV (SSTV), antennas, coil design, and more, the book includes TISFIND, a Windows database that expands on the parts suppliers, manufacturers, publishers, and others that appear in the book's reference chapter. Also included is a new standard-value-capacitor filter design program, a grid-square locator, and a searchable index of *QST* product reviews since 1970.

As with the previous edition, antennas understandably are not covered as thoroughly as in the *ARRL Antenna Book*. However, one chapter is devoted to antennas and projects, another to transmission lines, and a third to propagation. The 1997 *Handbook*, edited by Paul Danzer, N1II, is $38 in softcover.

The ARRL Handbook is published by the American Radio Relay League, Inc., 225 Main St., Newington, CT 06111 (phone 860-594-0200; Internet <pubsales@arrl.org> or <http://www.arrl.org>).

Five Books from Osborne/McGraw-Hill. Osborne/McGraw-Hill was kind enough to send me five very interesting computer books for perusal and review recently. I'd like to go over them with you.

1. *The Internet Phone Connection*, by Cheryl Kirk. Even if you're a radio amateur, wouldn't you also like to have the ability to "phone home" using the Internet? This $29.99 book/CD-ROM package tells you how to make (virtually) free long-distance calls with your PC. The 276-page book focuses on what you can accomplish with Internet phone technology today, and the CD-ROM includes a large number of sample programs for you to try.

In playing with the CD-ROM and trying out the software, I was struck with the parallels to amateur radio communications the new technology offers—and perhaps even competition with our hobby. But reading this fascinating book and checking out the included software was lots of fun, to say the very least.

2. *The Alta Vista Search Revolution*, by Richard Seltzer, Eric J. Ray, and Deborah S. Ray. This comprehensive book teaches users of the powerful Internet search engine, Alta Vista, how to find information on the Internet. In effect, the book teaches you how to find just

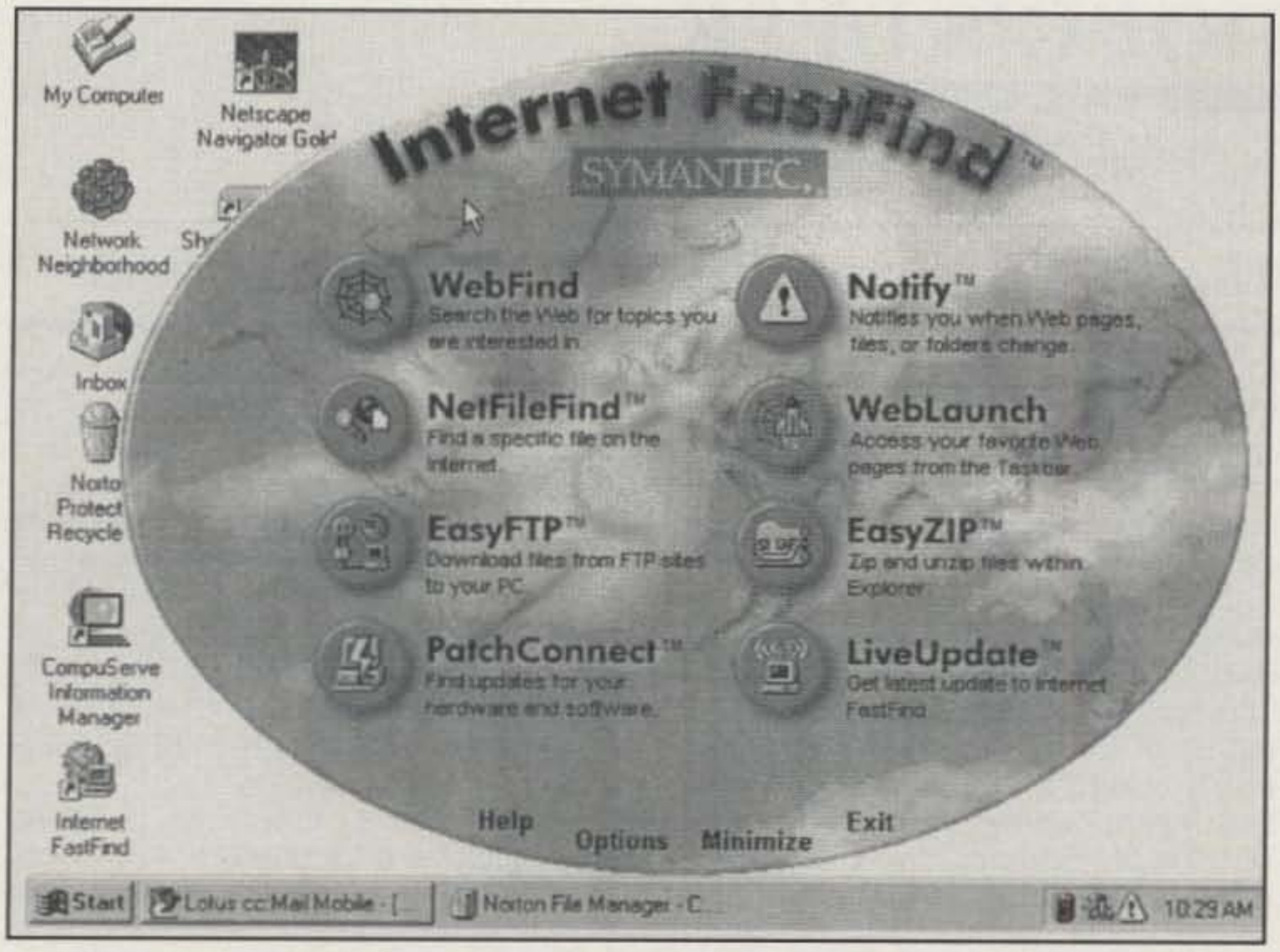


Fig. 2– Symantec's Internet FastFind arguably provides the quickest way to find what you're looking for online; it seamlessly combines searches of seven top Internet search engines, and also notifies you of changes to important Web pages and FTP sites. The program also includes NetFileFind, PatchConnect, and other Internet-facilitating utilities.

about *anything* on the Net, both on the World Wide Web and in Usenet newsgroups. It's interesting to note that Alta Vista has an index of well over 30 million Web pages found on about 300,000 servers, plus at least 4 million articles from well over 16,000 newsgroups. The 274-page book is $16.99.

3. *Harley Hahn's Internet & Web Yellow Pages, 1997 Edition.* This $29.99, 904-page book/CD-ROM package, earlier editions of which we have mentioned in the column, has been updated to reflect the latest Internet developments. The massive directory is billed as a "one-touch guide to the Net" that lets you point, click, and explore Web sites straight from your browser, without having to type in complicated addresses. This feat is possible in that the CD-ROM includes a hot-linked electronic version of the book. The book and CD-ROM can greatly assist you in finding whatever you need quickly and easily; almost every type and area of human activity, including amateur radio, is represented.

4. *America Online for Busy People*, by David Einstein. In previous columns we highlighted several books in the popular "Busy People" series. The books address an important trend —that of busy users who are increasingly dependent on their PCs but don't have the time (or inclination) to become immersed in all the high-tech details. The books in the series assume you're intelligent and literate, but you don't have the time to learn as you would like. As such, they're creatively billed as "the books to use when there's no time to lose."

A recent addition to the series is *America Online for Busy People*, a 277-page book/CD-ROM package that explores the benefits of what is the world's largest online service. Although AOL reportedly has around 7 million subscribers, many PC owners still haven't found the time to connect. Some may already subscribe, but are too busy to sift through the wide range of resources to discover what's right for them on AOL. Osborne targeted this audience with the $22.95 book, which includes a start-up CD-ROM.

5. *Web Publishing with Netscape for Busy People*, by Christian Crumlish and Malcolm Humes. The last book we'd like to mention this month is another in the series, one designed to help busy people without programming experience to create a lively, compelling Web site of their own. The new Web publishing book is especially designed to be used in connection with the popular Netscape Navigator Gold browser and Web publishing package. The 279-page book also is $22.95.

The various books in the "Busy People" series include some very concise, standardized-format timesaving features. The publisher labels these as fast forwards (which are quick reference sections), bookmarks (Web addresses highlighted for easy reference), shortcuts (accelerated routes to completing a task), habits and strategies (tips and techniques), definitions (clever ways to remember jargon), cautions (pitfalls and problems to avoid), and trends (briefings on emerging technologies).

Contact Osborne/McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710 (phone 1-800-227-0900; Internet <http://www.osborne.com>).

Short Bursts

The ARRL Technical Information Service. Whether you're a member or not, you can take advantage of several online features of the American Radio Relay League's excellent resource, the ARRL Technical Information Service (TIS). Besides visiting the League in the ARRL area in the America Online Ham Radio Club (Keyword: Ham or Ham Radio), you also can access the League and its considerable amateur radio and related resources via the Hiram BBS at 860-594-0306. The BBS offers more than 1000 files.

If you have an Internet connection, you also can access the ARRL TIS via file transfer protocol (FTP) at the OAK Software Repository; you'll find it at <ftp://oak.oakland.edu>. This large collection includes all of the Information Server text files (under the /pub/hamradio/arrl/infoserv directory) and the ARRL BBS files (under the /pub/hamradio/arrl/bbs directory). You also can download ARRL files from several ARRL "mirror sites" such as <ftp://ftp.funet.fi/pub/ham/arrl> and others. ARRL HQ also has its own FTP site, at <ftp://www.arrl.org>.

If all those vehicles for getting ARRL information aren't enough for you, you also can obtain many ARRL files by e-mail, via the ARRL Technical Information Server. If you would like to have instructions and an index of available files sent to you automatically, just send an e-mail message to <info@arrl.org>, Subject: Info Request. In the body of the message enter:

HELP
SEND INDEX
QUIT

There also are detailed instructions for communicating electronically with the ARRL in *QST* magazine each month. You'll find the instructions around page 10 or 12 of each issue.

Looking Back Five

Five Years Ago in Antennas and Accessories. Okay, so now you know what the column is like for May 1997. But what was "hot" in May 1992? That column was "Antennas, Software, and More."

Antenna-wise, in May 1992 we recalled antenna farm notes from DXer Mike Wetzel, W9RE, and some notes on coax from "The Wireman," Pres Jones, N8UG. We also discussed using CATV hardline and described the hardline matching transformers offered by Paul Darwactor, W8ZD, of ZD Engineering; noted the Myers Engineering International VHF Yagis from Steven L. Meyers; and covered the Diamond Antennas VHF/UHF antennas catalog.

Turning to software, we described the availability of online amateur software for the Macintosh; various AMSAT tracking programs for the IBM PC, Mac, and C-64; the TSMouse remote-control software for Kenwoods, from LinearLogic; the PC Shortwave Monitor SWL frequency management program; HAM-SOFT public-domain software for the IBM-PC and Commodore; The Norton Backup™ for Windows and DOS; and PCTools V7.1, a capable DOS-based hard-disk utility program from Central Point Software.

We also discussed listening to ELF and VLF "natural radio" emissions using the Conversion Research WR-3 VLF receiver, the National Computer Security Association (NCSA)'s handling of computer viruses and other security problems, and an update to Don Johnson, W6AAQ's book *40 Years of HF Mobileering*.

Wrap-Up

That's all for this time, gang. Next time more Antennas and Accessories topics of current interest. See you then.

Overheard: Long ago I learned that if you have several tasks to accomplish, do the hardest one first, because after you've taken care of it, the rest are a snap.

73, Karl, W8FX

BY DOUG DeMAW, W1FB

DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

Toward Simpler Superhets: A Building Block for Experimenters

Complicated receiver circuits are not essential for what might be termed "casual operating." Receiver dynamic range, high stability, digital readout, and certain internal operating aids seem mandatory for critical operators and weak-signal enthusiasts. This philosophy is due in part to conditioning that has been brought on by the high-performance transceivers and receivers available today. However, for many of today's equipment builders it is desirable to have a receiver project that does not require an array of laboratory test equipment and many weeks of assembly time before a circuit can be put to work. This article shows how to minimize the parts count and circuit complexity when building a superheterodyne receiver.

P.O. Box 250, Luther, MI 49656

Direct-conversion receivers have been popularized in recent years by those who favor CW operation at QRP power levels. This type of receiver offers good performance at reasonable cost. The principal shortcoming of the DC receiver is its inability to reject unwanted signals on the opposite side of zero beat. This creates the effect of QRM when there is activity on what might be called "the other sideband." Furthermore, the overall receiver gain is accomplished at audio rather than at RF. The minimum acceptable receiver gain, from antenna to earphones or speaker, is on the order of 80 dB for weak-signal reception. High audio gain of this magnitude often leads to microphonics when the receiver is bumped. This is caused by high amplification of electrical noise, such as that which can be generated at the bearings of a tuning capacitor.

A superheterodyne receiver is not as susceptible to microphonics. A low-cost crystal ladder filter in the IF system will re-

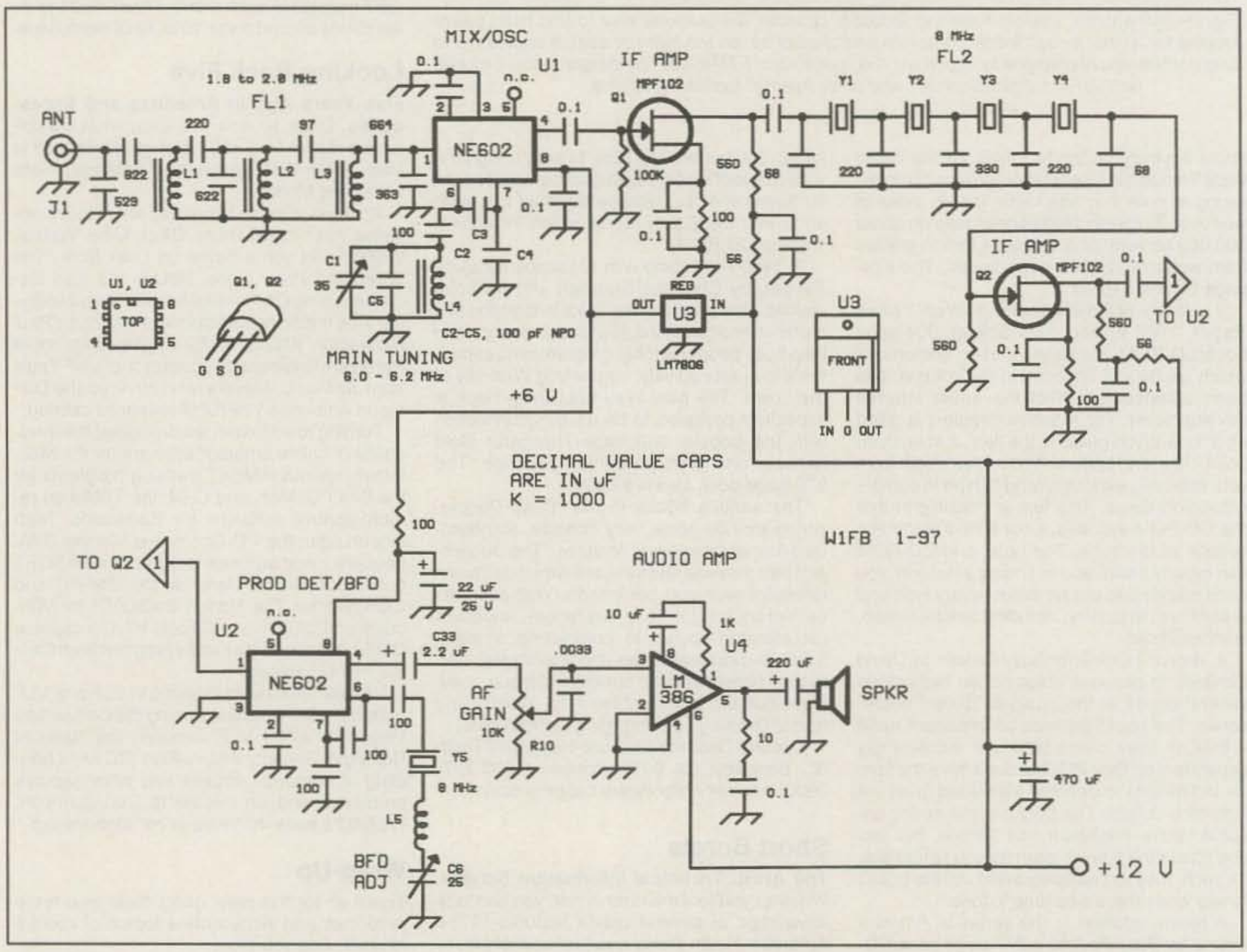


Fig. 1– Schematic diagram of a suggested bare-bones superhet receiver. Component values are provided for operation on 160 meters. Decimal-value capacitors are in µF. Others are in pF. L1, L2, and L3 are 7.5 µH inductors. Use 40 turns of No. 28 enam. wire on Amidon T50-2 toroids. L4 has 32 turns of No. 26 wire on an Amidon T50-6 toroid (glue turns in place with coil cement). L5 is a 10 µH RF choke.

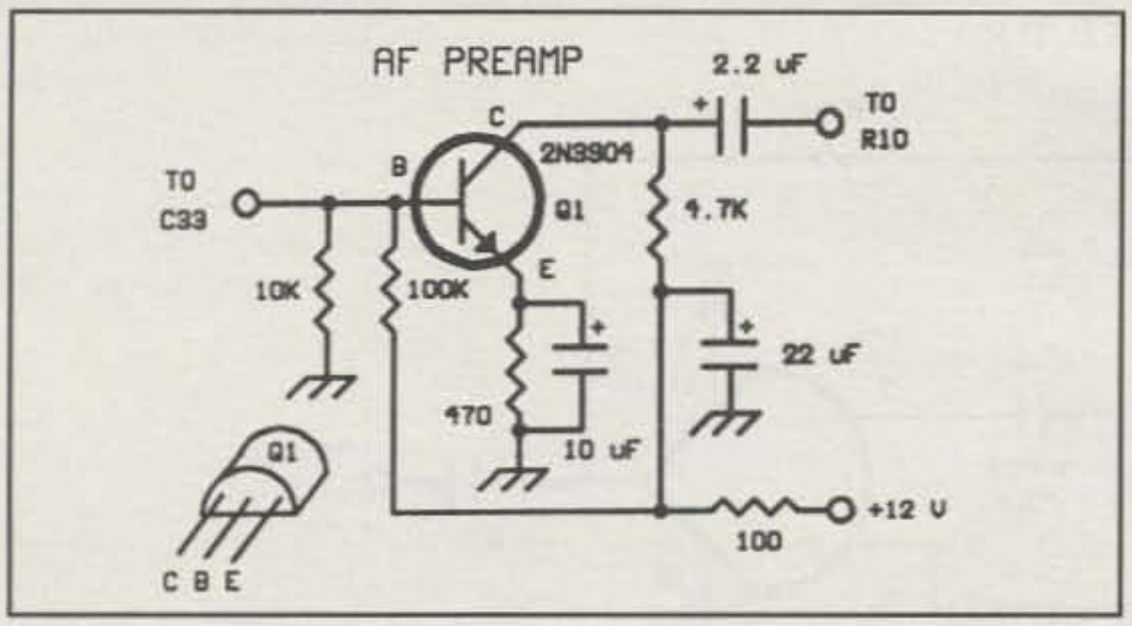
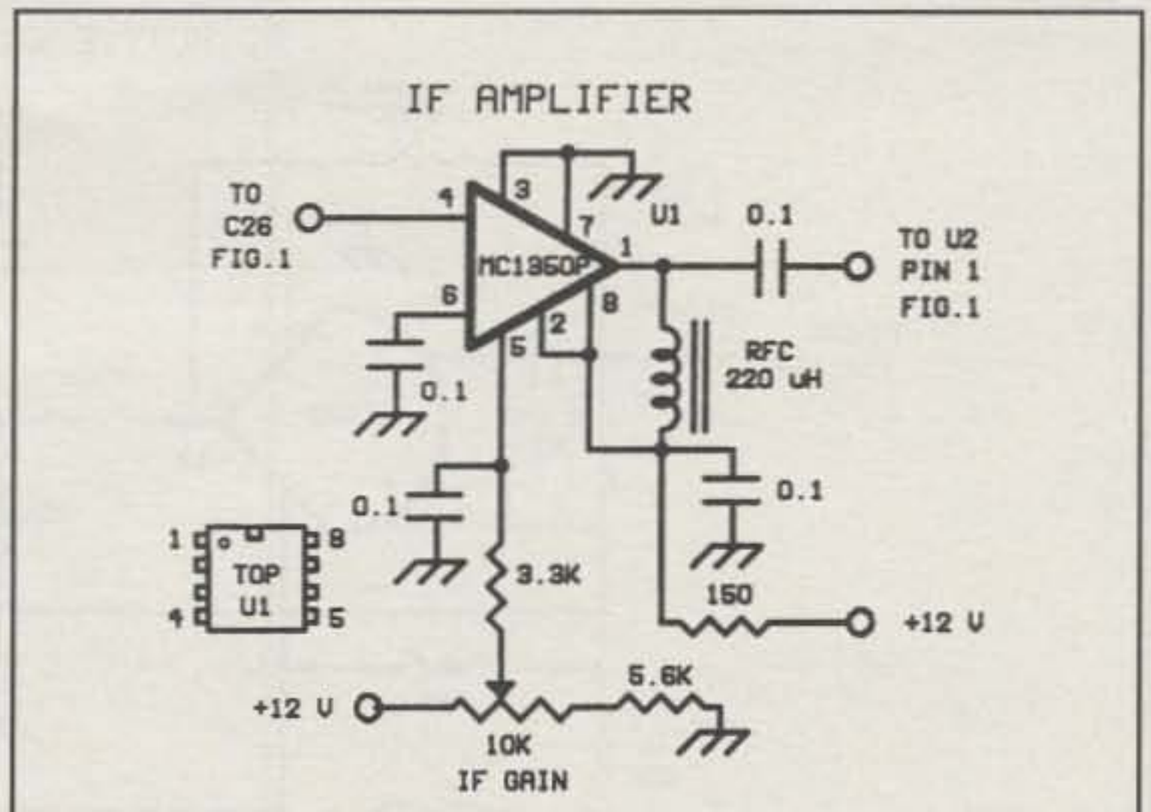


Fig. 2– Simple audio amplifier stage that can be added to the fig. 1 circuit for greater speaker volume (see text).

Fig. 3– A 40 dB IF amplifier for use between Q2 and U2 in fig. 1 to enhance overall receiver gain.→



ject the unwanted respo nse on the other side of zero beat. A simple superhet need not be more complicated than a DC receiver if some simple design rules are followed.

A Design Example

Fig. 1 shows a basic superhet circuit. Only five active devices are required. Although the popular NE602 IC is not a monument to high dynamic range, and it is a bit noisy as a mixer, it is entirely adequate for most nonstringent amateur use below 14 MHz. In this example U1 serves as the mixer and VFO. A standard Colpitts oscillator is employed. The same values are used as when designing a separate VFO that uses a FET device.

A bandpass filter (50 to 1500 ohms) is used at the input of U1. Trimmer capacitors should be used in parallel with standard value capacitors to obtain the values specified in fig. 1. The FL1 bandwidth is 250 kHz. FL1 eliminates the need for a tuned circuit and peaking capacitor at the receiver input.

Output from the mixer is routed to Q1. This stage serves as an impedance matcher and IF amplifier. The characteristic impedance of the SSB filter (FL2) is 560 ohms. Inexpensive surplus computer

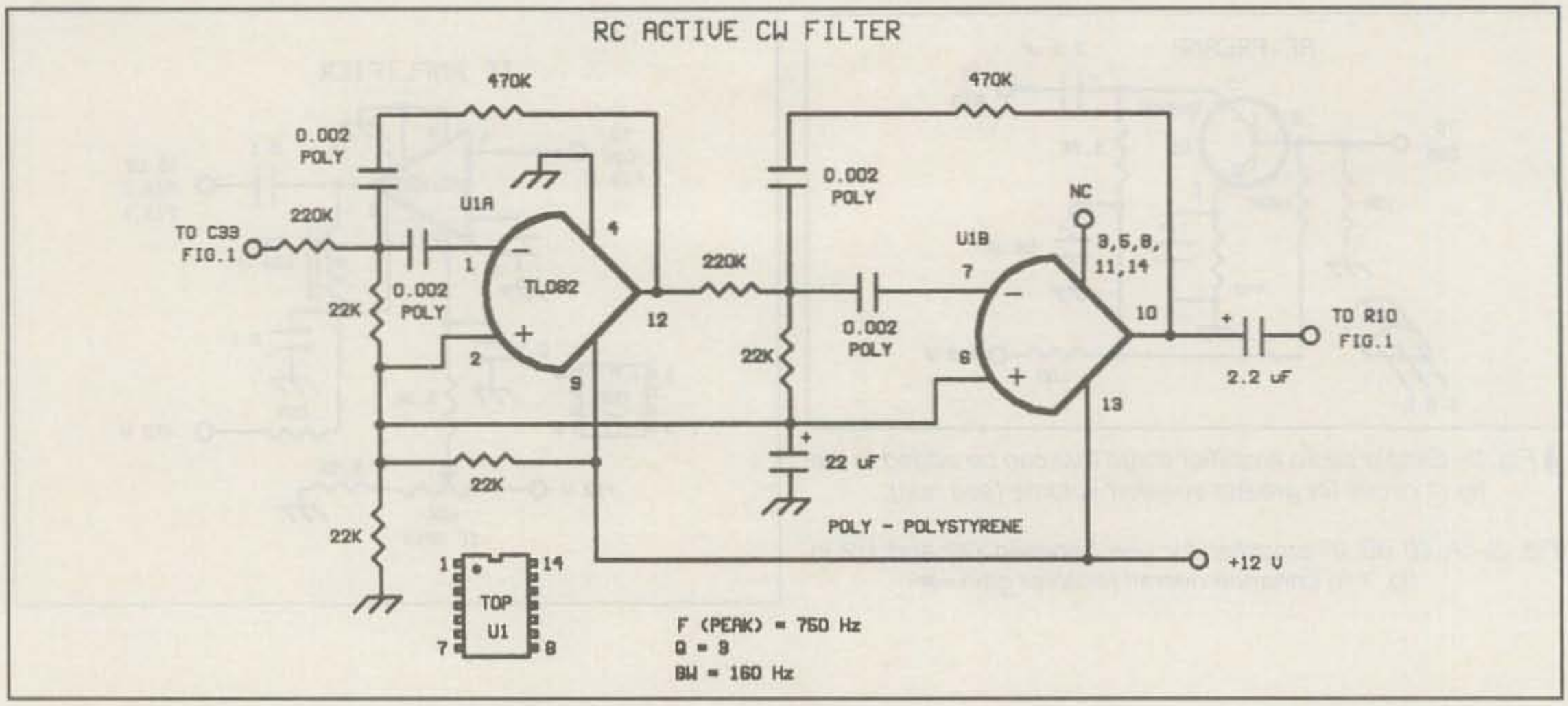


Fig. 4– A two-pole RC active audio bandpass filter for CW reception at 750 Hz. This filter may be installed between U2 and U4 of fig. 1. A switchable 4-pole filter of this type, with a PC board pattern, is described in W1FB's QRP Notebook.

crystals are used in the IF filter. The crystals should be matched in frequency, have high Q, and exhibit low resistance. Design procedures and crystal evaluation are discussed in earlier articles.[1] High Q capacitors of the specified values are necessary in FL2. Silver-mica or polystyrene capacitors are suitable.

Q2 in fig. 1 operates as an impedance matcher and amplifier. Q1 and Q2 provide a combined gain, or approximately 15 dB. This more than compensates for the insertion loss through FL2.

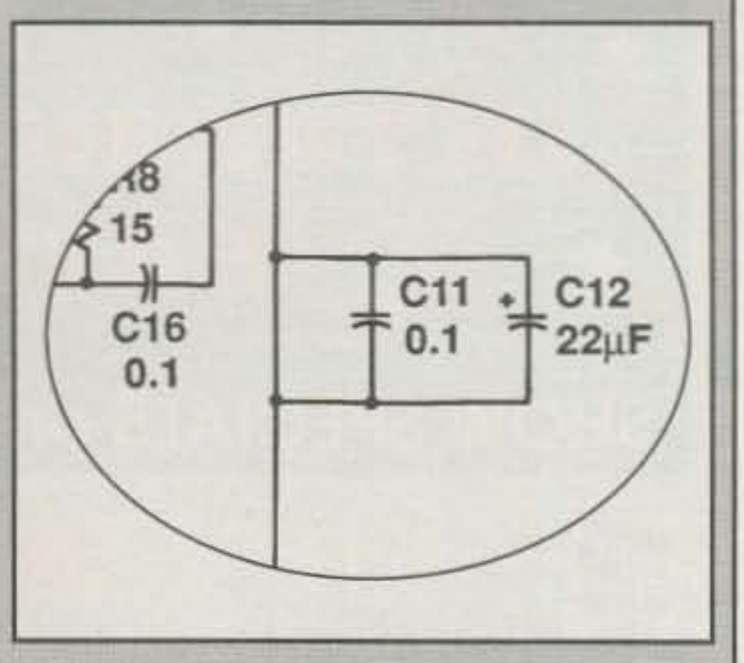
Another NE602, U2, functions as a combined product detector and BFO. Y5 is used in a VXO arrangement to permit wide adjustment of the BFO frequency. This arrangement allows the crystal to oscillate up to 1.5 kHz above its marked frequency, as well as 1.5 kHz or greater below the marked frequency. This enables the user to set Y5 for USB or LSB reception. The VFO capacitors must be small enough in value to allow Y5 to oscillate above the marked frequency. The greater the capacitance of C6, and the larger the inductance of L5, the lower the BFO operating frequency. As with U1, this section of the NE602 operates as a Colpitts oscillator. The U2 conversion gain from IF to audio frequency is roughly 18 dB.

U4 is a high-gain audio amplifier. It is capable of providing ample speaker volume for. signals of medium or greater strength. Headphones should be used when copying weaker signals. Fig. 2 shows an audio preamplifier circuit that may be inserted between U2 and the gain control, R10, to increase the audio output power. U3 is a three-terminal voltage regulator that drops the U1 and U2 operating voltage to +6 from the +12volt bus.

February Corrections

On p. 42 of the February issue of *CQ* there was a review of the S.E.M. Mark-II QRM Eliminator. We have been advised that response to the review has been excellent, but the phone number listed at the end of the review is no longer valid. The new phone number is 011-44-1624-662131. Phone orders are accepted for credit-card sales.

In the February column on p. 91 there are corrections to fig. 2. At the junction of C11 and C12 there is a dead short to ground between RFC2 and RFC3 (a corrected section is shown here). Also, no values were included for C13, C14, and C15. They are, respectively, 300 pF, 680 pF, and 390 pF.



Corrected section of figure 2, "Doug's Desk," page 91, February CQ.

Circuit Enhancement

In addition to the circuit in fig. 2, the receiver builder may want to add the IF amplifier shown in fig. 3. This stage can add a substantial amount of receiver overall gain. No AGC is offered. However, manual IF gain is included by means of a potentiometer. Two stages of IF amplification, using the fig. 3 circuit, would make it practical to employ an AGC circuit and S-meter. Examples of AGC control circuits for MC1590 IF amplifiers are given in *Solid State Design for the Radio Amateur*, an ARRL publication. The MC1350P will work with the referenced AGC circuits, since it has the same inner workings as the MC1590.

A low-noise preamplifier may be added for operation from 14 through 29 MHz. Generally, devices such as the MPF102 and 2N4416 FETs can provide low-noise amplification of 10 dB when used in a grounded-gate configuration. Stability is easy to achieve when the gate is grounded. Things become a bit "iffy" in this regard when using a grounded-source FET.

A separate VFO can be used with the NE602 mixer. This may be desirable for those who seek first-rate frequency stability. An independent VFO is less difficult to stabilize because it is not affected by the internal heating of the NE602. However, the long-term drift with U1 of fig. 1 should stabilize after 15 minutes of warm-up time if NP0 capacitors and a quality inductor are used in the U1 VFO circuit. Drift is not a problem with the U2 BFO circuit because it is crystal-controlled.

CW Selectivity

The suggested bare-bones receiver circuit in fig. 1 is suitable for CW reception while using the FL2 SSB filter. However, greater selectivity is necessary for quality CW reception, especially when dealing with weak signals amid QRM. The RC-active 750 Hz CW filter in fig. 4 may be added between C33 and R10 in fig. 1 to enhance CW reception. Op amps with bifet inputs, such as the TL0 series, are best for this application because they generate less noise than occurs within many other op amps, such as the generic 741. The wide-band noise that is present in the CW filter will be amplified by U4 in fig. 1. If the noise level is great enough, it can mask a weak CW signal.

Summary Remarks

It should be stressed that the fig. 1 circuit represents a basis for experimentation that can lead to a practical design. Component values are given for operation from 1.8 to 2.0 MHz. Scaling for other bands requires changes only at FL1 and the U1 VFO circuit.

The purpose of the foregoing discussion is to present design ideas in a tutorial fashion. Certainly, a circuit as simple as that in fig. 1 will not provide world-beater performance. However, with the optional circuits included in this article it can do a good job for all but the most demanding applications.

The experimenter will find the fig. 1 circuit suitable for testing the practicality of a no-nonsense superhet receiver. In any event, the performance will greatly exceed that of a DC receiver which has an equivalent number of parts.

Those wanting a digital frequency readout may consider the modestly priced DD-1 frequency counter kit that is available from Oak Hills Research.[2]

Notes

1. D. DeMaw, "A Tester for Crystal F, Q and R," *QST*, January 1990. W. Hayward, "A Unified Approach to the Design of Crystal Filters," *QST*, May 1982. W. Hayward, "Designing and Building Simple Crystal Filters," *QST*, July 1987. These articles appear also in *W1FB's Design Notebook*, available from the ARRL.

2. Oak Hills Research, 20879 Madison St., Big Rapids, MI 49307. Catalog available. E-mail <qrp@ohr.com>, or phone 616-796-0920.

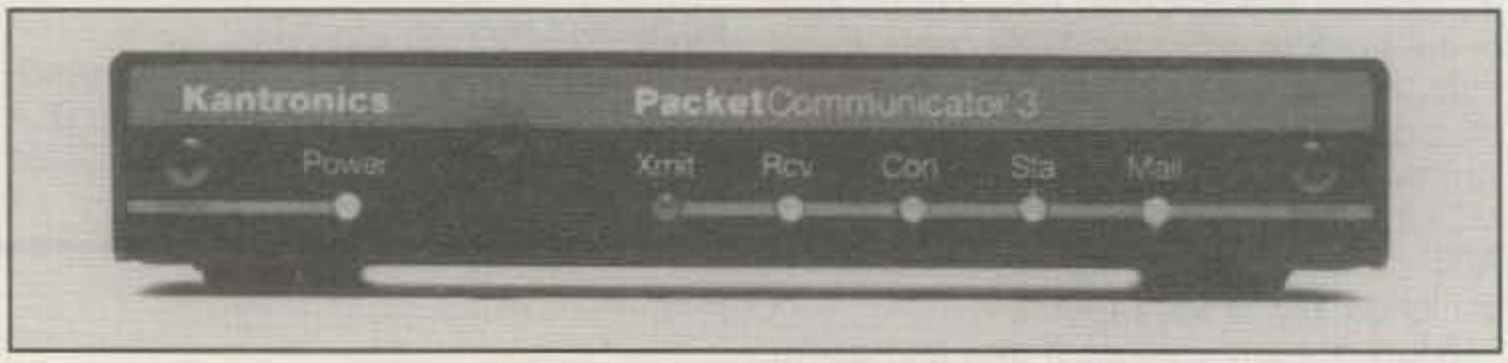
73, Doug, W1FB

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

The Kantronics KPC-3™ Plus—No Ordinary Packet Controller



The Kantronics KPC-3 Plus packet controller.

It was Saturday afternoon and I was working in the lab adjacent to my QTH here in Evington, Virginia. The phone rang. It was Phil Anderson, CEO of Kantronics. Now Phil is not one to call unless he has something he knows will tease my packet radio buddies. We had a nice chat, but by his tone I could tell he was about to drop some good news into my ear.

"Have you heard about the KPC-3 *Plus*?" he asked.

"Sure, I've 'heard' about it," I answered. "I have a KPC-3 (non-plus). Is there a difference?"

Enough said. Wow! There certainly are several differences between the KPC-3 and the KPC-3 *Plus*. I listened as Phil told me about the unit. A similar, yet more sophisticated, set of new enhancements has also been added to the KPC-9612 *Plus*. After hearing about all the new enhancements to these two Kantronics packet controllers (KPCs), I knew that Monday morning I had to call *CQ*'s Al Dorhoffer and use the phrase I had always wanted to: "Stop the presses! I've got a hot one!"

This Is No Ordinary Packet Controller

The KPC-3 *Plus* has a new central processing unit (CPU) which enables Kantronics to effectively generate a new "engine" to handle some advanced features. As a result, the KPC-3 has been discontinued and the KPC-3 *Plus* is taking its place. The new KPC-3 *Plus* features are both firmware and hardware based.

There are several changes in the features list. However, some I favor more than others. The XMITLVL command enables us to change the transmit AFSK level using software commands to control the amount of audio drive to the transceiver, thereby making it possible to set the transmit audio level without ever having to remove the KPC-3 *Plus* cover. In Phil's documentation he calls these the "digital pots."

The KPC-3 *Plus* also sports not one, but two analog to digital I/O's for external control of other devices. This means the operator of some remote repeater who wants to reset or change frequencies of another radio can do so from his/her remote station using predetermined analog commands and control codes. A telemetry command has also been added to allow broadcasts of other inputs on a regular basis. There are other commands that have been removed or discontinued, since they no longer are needed in today's packet environment.

A BREAK command has been added to allow exit from the Converse or Transparent Mode; the user can now send an RS232 break sequence to return to the Command mode.

The BUDLIST and BUDCALLS commands have been combined into the BUDLIST command. The SUPLIST and SUPCALLS commands have been combined into the SUPLIST command. Also, BUDLIST and SUPLLIST parameters have been expanded to allow more specific monitoring.

The CONLIST and LLIST commands now have their own list of callsigns instead of sharing with BUDLIST and SUPLIST as before.

The MHEADER command has been added to the monitor functions. When this command is off, only the data from monitored packets is shown. To avoid confusion, use of BUDLIST is recommended if the MHEADER command is off.

A PBLIST command has been added for the PBBS. This command allows the owner to add family members who are also amateurs to the list of PBBS/mailbox users. If PBLIST is ON, the mail/status LED will blink when mail is available for anyone on the list. The "List-mine," "Read-mine," and "Kill-mine" commands will act on this list.

The MHCLEAR, NDCLEAR, and PHCLEAR commands have been removed. The clearing function is now a parameter of the MHEARD, NDHEARD, and PHCLEAR commands.

The FULLDUP command has been expanded to include a LOOPBACK parameter. The original KPC-3 receive circuit was still active while transmitting when FULLDUP was OFF. Now when FULLDUP is off, the receive circuit is inactive while transmitting. When FULLDUP is LOOPBACK, the receive circuit is active while transmitting.

The CONPERM command has been added, which allows an AX.25 connection to be permanently connected, even after a reset or power failure.

The KPC-3 *Plus* continues to be a full-featured, 1200 baud packet modem (TNC) used for sending and receiving data by radio. With this TNC users can carry on direct conversations (computer to computer), send and receive mail, receive and retransmit GPS data from a GPS unit, monitor DX activity, and more.

The KPC-3 *Plus* is very small in size and draws only minimal power. It even can run on a 9 volt battery, so it's perfect for portable applications. The KPC-3 *Plus* easily connects to an FM radio (VHF/UHF), including a hand-held, and to a computer or terminal. Designed for both new and experienced users, the KPC-3 *Plus* is easy to operate and provides all the performance required by veteran packeteers.

Personal Bulletin Board System (PBBS)

The KPC-3 *Plus* includes the Kantronics mailbox system (PBBS), complete with features found only in Kantronics products. Depending on the RAM size, the mailbox space can be configured for more than 100K, and a mail-waiting light on the front panel flashes to indicate that the user has received mail. The KPC-3 *Plus* offers enhanced forwarding and reverse forwarding to a packet bulletin board, so users can automatically send and receive messages via the worldwide packet bulletin board system. And with remote access, users can take advantage of all the mailbox features from a remote location.

Global Positioning System (GPS) Capabilities

The KPC-3 allows users to configure and make use of GPS data exactly the way they like. The APRS-compatible KPC-3 *Plus* can connect to GPS receivers with a NMEA-0183 interface.

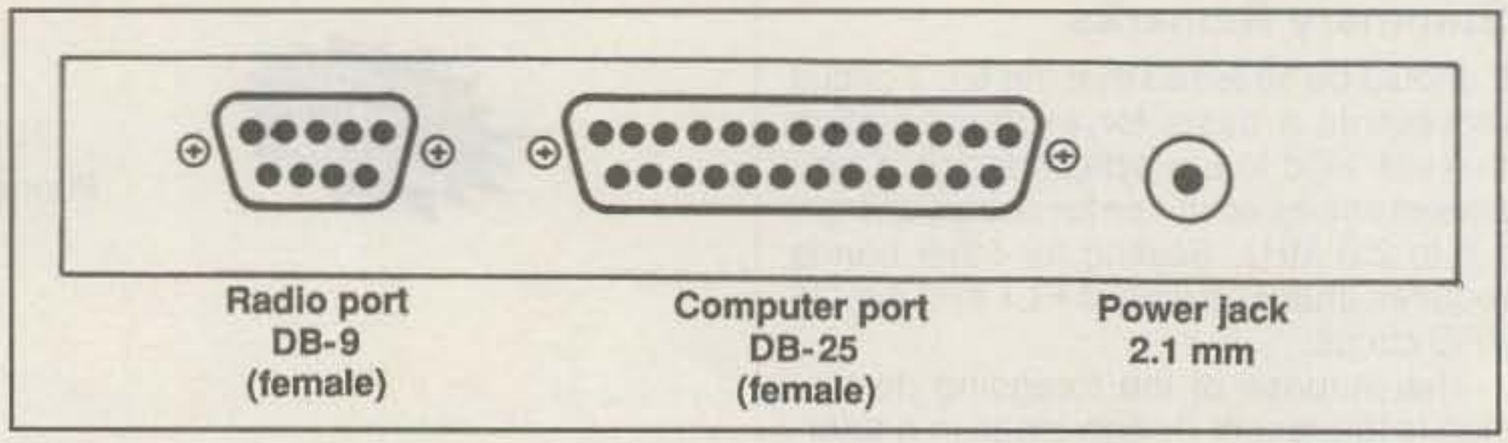


Fig. 1– The rear view of the KPC-3 Plus.

211 Luenburg Drive, Evington, VA 24550
e-mail: buck4abt@inmind.com
**KPC-3 is a trademark of Kantronics, Inc.*

With the multiple string parsing capabilities, users select as many as four of the GPS unit's NMEA data strings. Once the data strings are selected, users can specify which of the four buffers should be transmitted and can specify the beacon start time as well as the amount of time between beacons for each of the buffers. This allows multiple stations to report without data collision. And since the KPC-3's clock is regularly updated by the satellite-determined GPS clock, the transmission times and intervals are always accurate.

In addition, users can set up a tracking buffer to store GPS data for later retrieval. This buffer is accessible via the KPC-3's mailbox. The sysop may also reconfigure the GPS unit remotely by connecting to the KPC-3 *Plus* and changing the parameters.

K-Net™ Network EPROM Option

To further enhance the KPC-3 *Plus* capabilities, Kantronics offers the K-Net, a NET/ROM™-compatible networking option. With the user-installed K-Net EPROM, the KPC-3 *Plus* can function as a 1200 baud network node and a TNC at the same time. The K-Net option is also available for the KPC-9612 *Plus* to enable a full- service 9600 to/from 1200 baud gateway node. Actually, the KPC-9612 *Plus* is two packet controllers in one box.

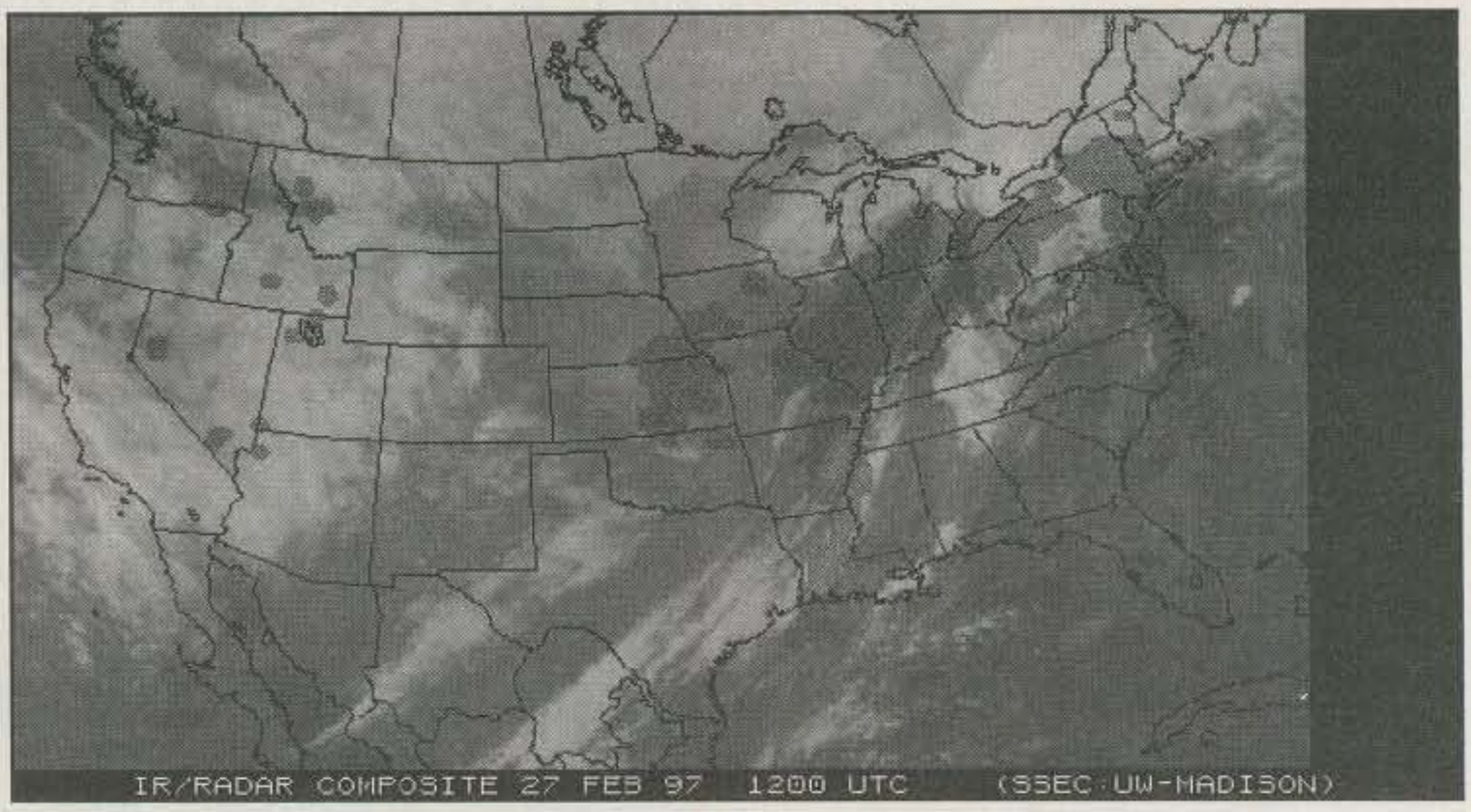
Both the KPC-3 *Plus* and the KPC-9612 *Plus* don't have to be dedicated for node operation only. However, GPS capabilities, the new-user command set, and on-line help messages are not available when the K-Net EPROM is installed. For those who prefer to stack nodes rather than utilize the TNC functions, the K-Net EPROM features a software-selectable NET/ROM interface. Using this mode, you can connect several nodes together and create a powerful network tool.

The Best For Last

Here is where Phil really got my attention: The KPC-3 *Plus* now has a feature included in its platform that enables it to perform the function of a weather data decoder. When the KPC-3 *Plus* is used in conjunction with the special WeatherNode™ computer software, a whole new dimension is provided to the weatherwatch and Sky-Warn organizations.

The WeatherNode™ software is available from Maryland Radio Center (3394 Fort Meade Rd., Laurel, MD 20724 [phone 301-725-1212; fax 301-725-1198]) for $69.95 . Once you have this software loaded into your PC or compatible, you can use the KPC-3 to receive weather facsimile (WEFAX) and weather-related color graphics. There are also bulletins that can be received using the KPC-3 and the WeatherNode™ software. To use this feature of the KPC-3 *Plus* will require that you live in an area that has the weather data broadcasts on VHF or that you have a 1.6 GHz direct receive link from the GOES satellite with a downconverter. The KPC-3 *Plus* can be inserted into the datastream to act as the demodulator. The accompanying radar satellite view of Earth is a data shot received from the Silver Springs, Maryland VHF broadcast on 163.350 MHz. Table I is a partial listing of other area broadcasts.

Direct reception is available from the GOES 8 and GOES 9 satellites at 1690.6 MHz (which is 400 kHz down from WEFAX at 1691 MHz). It's 3 dB down from the WEFAX signal, so you'll need a good antenna.



A radar satellite view of the Earth displayed about 5 minutes after reception from the Silver Springs, Maryland earth station broadcast.

If you have an old TVRO backyard dish that has been replaced by the smaller 18 inch DSS system, put it back in service as a weather receiver for the Galaxy 4 satellite signal. The signal is FM-FM and is a DFSK transmission on a subcarrier frequency of .5425 MHz. Transponder 4, Galaxy 4 at 99 degrees W.

Internet. For more information and quarter hour downloads you can connect via the internet to <http://www.weathernode.com/>. From here you can search the MARYLAND RADIO CENTER pages for lots of additional information. Now you can get a complete dataset for the last hour or the last six hours (in .zip format) from the WeatherNode™ server. The data is updated every 15 minutes.

You can also reach this information from the SouthEastern Digital Assn. Networks (SEDAN) internet site at <http://www.sedan.org>.

If you can't get the data, get in touch with your local emergency managers or local FM broadcast stations and tell them you would like to have the EMWIN data broadcast in your area. You've already paid for the data, so why shouldn't you have free access to it?

If you want to write the NWS, here's the address: Emergency Managers Weather Information Network (EMWIN), National Weather Service, Field Systems Branch (W/OSO13), Attn: Mr. Kenneth Bashford, SSMC #2, 1325 East West Highway Station #16358, Silver Spring, MD 20910.

Amateur Paging

For the KPC-9612 *Plus* user there is the added feature of Amateur Paging. With Version 7.0 for the KPC-9612 *Plus*, Kantronics has introduced digital paging for amateur radio.

In this case an amateur paging system con-

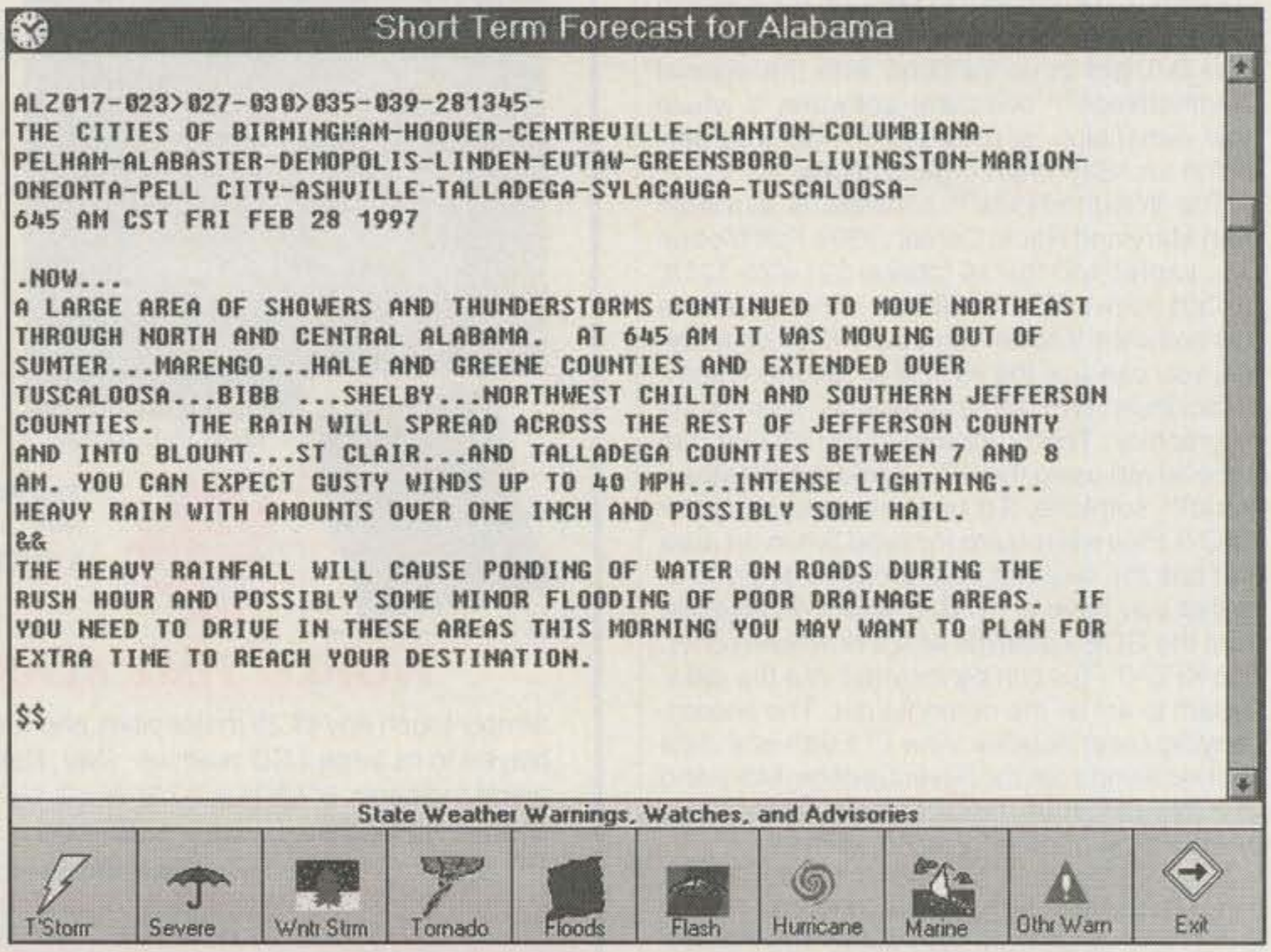


Fig. 2– Text file bulletins are also received using the KPC-3 Plus and the WeatherNode™ software. (See text.)

Florida
Seminole County, 60 watts, 156.105 MHz

Maryland
Silver Spring, 600 watts, 163.350 MHz

Missouri
Buffalo, 30 watts, 139.2125 MHz (new 2/7/97)
Kansas City, 330 watts, 139.2125 MHz

Oklahoma
Atoka, 25 watts, 153.950 MHz
Durant, 25 watts, 150.750 MHz
McAlester, 100 watts, 148.775 MHz
Miami, 100 watts, 150.750 MHz
Norman, 50 watts, 169.025 MHz
Oklahoma City, 125 watts, 150.750 MHz
Ponca City, 80 watts, 150.750 MHz
Poteau, 60 watts, 150.750 MHz
Tulsa, 650 watts, 165.0125 MHz
Woodward, 100 watts, 150.750 MHz

Texas
Austin, 50 watts, 150.435 MHz
Witchita Falls, 50 watts, 150.435 MHz

Wyoming
Cheyenne, 159.180 MHz

Table I– Shown above are a few of the frequencies where the WeatherNode Data can be received using the KPC-3 Plus, a VHF radio, and the WeatherNode™ software.

sists of a computer or terminal, a KPC-9612 *Plus*, a 9600-baud "data-ready" transceiver and antenna, and the desired number of numeric or alphanumeric POCSAG (Radio Paging Code 1) pagers crystalled for the 2 meter or 70 cm band. (POCSAG is the protocol used by commercial paging companies and private paging services.)

The 7.0 firmware includes a Packet Paging Server which can be used to connect to the KPC-9612 *Plus* remotely or through a K-Net node to send a page. The KPC-9612 *Plus* supports both numeric and alphanumeric paging at three paging rates—512, 1200, and 2400 baud. If you're familiar with commercial pagers, you can easily see some applications for amateur paging, such as alerting your ARES, RACES, Emergency Communications, Sky Warn, or Weather Watch Group with one command from the KPC-9612 *Plus*. Kantronics also has the *Pager Handbook* for the amateur operator for $14.95. This handbook is written by Phil Anderson, WØXI, and it details how to convert specific pagers for use on the 2 meter and 70 cm bands.

For more information about the KPC-3 Plus and KPC-9612 Plus, contact Kantronics at 1202 E. 23rd Street, Lawrence, Kansas 66046-5099 (phone 913-842-7745; fax 913-842-2031; technical service 913-842-4476 [hours 9–12, 2–5]).

Glossary of Packet Terms

Once again this month we will continue to build on the glossary of packet terms. We begin with the "G" terms.

G3RUH Modem: A 9600 bps plug-in modem for TNC-2s and other amateur TNCs. Circuitry contains adaptable filters to adjust for bandwidth limitations in commercial radios and a "randomizer" circuit to prevent DC offsets on modulated data. Similar to, but may not be total-

DSP Software

DSP Blaster™ 1.0 replaces hardware DSP boxes. It uses your PC and sound card to provide high- and low-pass SSB filters, CW/DATA/SSTV bandpass filters, CW peaking filters, adaptive noise reduction, automatic notch filtering, and AGC. *DSP Blaster* displays the signal waveform and spectrum to provide insight about the signals you're hearing. It's fascinating to correlate the sound of a voice with its spectrum. A system block diagram makes the program simple to use. Pass your mouse over a filter block to display its properties. Click to alter them or to activate the filter. *DSP Blaster* can run in the background. Mouse required.

RITTY 1.0 is a high-performance software modem that uses a limiterless front-end, optimal matched filters, ATC, numerical flywheel, and other advanced techniques to recover RTTY signals other modems can't. *RITTY* has an FFT spectral tuning indicator, variable mark/space frequencies, precision AFSK, FSK & PTT outputs, and supports WF1B's RTTY contest-logging program.

386/40+387, VGA, and Sound Blaster 16, Vibra 16, or AWE32 required (no "compatibles"). One program, $100; both, $170.

Antenna Software

AO 6.5 automatically optimizes antenna designs for best gain, pattern, impedance, SWR, and resonance. *AO* uses an enhanced, corrected MININEC for improved accuracy. *AO* features 3-D radiation patterns, 3-D geometry and wire-current displays, 2-D polar and rectangular plots with overlays, automatic wire segmentation, automatic frequency sweep, skin-effect modeling, symbolic dimensions, symbolic expressions, current sources, polarization analysis, near-field analysis, and pop-up menus.

NEC/Wires 2.0 accurately models true earth losses, surface waves, and huge arrays with the Numerical Electromagnetics Code. Best for elevated radials, Beverages, wire beams, giant quads, delta loops, LPDAs, local noise.

YO 6.5 automatically optimizes monoband Yagi designs for maximum forward gain, best pattern, minimum SWR, and adequate impedance. *YO* models stacked Yagis, dual driven elements, tapered elements, mounting brackets, matching networks, skin effect, ground reflection, and construction tolerances. *YO* optimizes Yagis with up to 50 elements and does it hundreds of times faster than NEC or MININEC.

NEC/Yagis 2.5 provides reference-accuracy modeling of individual Yagis and large arrays. Use *NEC/Yagis* to model big EME arrays.

TA 1.0 plots elevation patterns for HF antennas over irregular terrain. *TA* accounts for hills, valleys, slopes, diffraction, shadowing, focusing, compound ground reflection, and finite ground constants. Use *TA* to optimize antenna height and siting for your particular QTH.

One antenna program, $70; three, $120; five, $200. 386+387 and VGA required. Visa, MasterCard, Discover, U.S. check, cash, or money order. Add $5 overseas.

Brian Beezley, K6STI • 3532 Linda Vista
San Marcos, CA 92069 • (619) 599-4962
k6sti@n2.net

Features of The KPC-3 *Plus*

Hardware
The KPC-3 back panel design allows for quick and easy connections to the radio, computer, and power.
32K or 128K RAM versions (expandable to 512K), battery backed to save all parameters and PBBS messages.
Software carrier detect allows fast operation with unsquelched audio.
Requires very low power: 6–25 Vdc @ <15 ma (with LEDs off, unit inactive) <40 ma (LEDs on, unit active)
It easily operates on a 9 volt battery.
AFSK output (2 mV-4 V P-P) adjustable with internal potentiometer.
Front-panel LEDs provide operational information: power, transmit (Xmit), receive (Rcv), connect (Con), status (Sta), and mail waiting.
Measures 0.8" × 5.2" × 5.2" (2.1 cm × 13.3 cm × 13.3 cm).
Weighs 11 oz. (0.312 kg).
RS-232 serial port (cable not included).

Firmware
Enhanced GPS capability that is NMEA-0183 and APRS compatible.
Remote access allows sysop to change all KPC-3 *Plus* parameters from another packet station.
User interface supports standard terminal, Host, BBS, KISS, and GPS modes.
KISS mode provides compatibility with TCP/IP programs such as NET and NOS .
Command sets for both new and experienced users.
On-line help messages for each command.

PBBS
Full-featured PBBS with forwarding and reverse forwarding capabilities, message header editing, remote sysop access, and mail waiting LED.

KA-Node
KA-Node allows up to 26 node circuits and local acknowledgment of packets for higher data throughput .

Optional Add-ons
K-Net (TheNET, NET/ROM compatible) networking PROM.
Host Master terminal programs (PC and Macintosh) .
SuperFax II WeatherFax reception program for PC compatibles.
Real-time clock module.
VHF radio cable with audio plug (DB-9 to pigtail).
12 Vdc power adapter.
128K static RAM, expands mailbox space in 32K RAM versions.

The KPC-3 *Plus* is made in the U.S.A. and carries a one-year warranty. The KPC-3 *Plus* package includes:
Male DB-9 connector for radio port.
Mini-plug cable for radio receive audio.
3 foot piece of 5-conductor shielded cable to connect the KPC-3 and the radio.
2.1 mm power connector .
Getting Started and Reference Manuals.
Two quick-start PC terminal programs on 3½" disk.

ly compatible with, the K9NG modem. Believed to be compatible with the most recent TAPR 9600 bps modem.

G8BPQ Code: John Wiseman, G8BPQ, developed a Terminate-Stay-Resident program for the IBM PC and compatibles that would imitate TheNET and allow node access for a program that runs on the PC. This program simulates TheNET node functionality and allows routing from a TheNET system directly to the PBBS or other program running on the PC.

Gain: Denotes an increase in signal power in transmission from one point to another; usually expressed in decibels. (Antonym: "loss," a reduction in signal power.)

Gateway: With packet radio, a gateway is a "bridge" that provides a means to communicate digitally from one frequency into another or from one baud rate to another *(see also Bridge)*. A node-stack connection between two different packet networks, frequencies, baud rates, or LANs. A configuration of nodes where connectivity is available by deliberate manipulation, but where automatic end-to-end routing is not possible. This is useful for connecting two networks together such that users and servers on one network can access users and servers on the other network without compromising networking practices on either end.

HBaud: Data speed between the TNC and the transceiver. Sometimes referred to as the "station to station" baud rate.

HDLC (High Level Data Link Control): A bit-oriented international standard data link protocol that is used in CCITT X.25 packet network links and influences many others. An example is the process employed in X.25 and AX.25 to format data into packets. These packets of data have the destination address, checksum count, and other necessary compo-

Upstate South Carolina Hamfest

The Upstate South Carolina Hamfest will take place on Saturday, May 10th at the Anderson, South Carolina Fairgrounds. Presented by presented by Blue Ridge ARS, it will be in the beautiful South Carolina springtime environment. Enjoy the fun, meet old friends, and visit the indoor dealers and flea-market vendors and outdoor tailgate flea-market. Contact: Gene Owensby, WB4ZBZ, 718 Fountain Inn Rd., Woodruff, SC 29388 (phone 864-476-2609). Talk-in on 146.610 MHz –600.

Packet radio operators and system node operators please note: The System-Wide, SouthNET Packet Radio Conference will be held in conjunction with the Upstate South Carolina Hamfest on May 10th from 10 AM to 12 noon. Forums: Packet user's forum and packet radio network designs. Free "Packet Radio Handbooks," and more, will be given to those who attend.

nents added through HDLC to help make it an error-free mode. The ISO level 2 link level.

Header: That portion of a message containing information for routing, handling, and delivering a message, such as address, size, priority, intermediate routing, and synchronization signals.

Heard or MHeard List: Monitored and Heard. On several different packet devices, including user TNC BBSs, nodes, etc., there exists a feature whereby a list of stations heard is recorded. This list is called a Heard list. Access to the list is different depending on the application. Typing an "M" to a TheNET X-1J4 node will recover a list of recent stations "Heard" by the node.

Hexadecimal: A number system based on 16, providing convenient notation of the 16 possible combinations of half an 8-bit data processing byte. Uses digits 0 through 9, followed by letters A through F to count to 16; thus, two "hex" digits can describe one byte in software. (Example: ASCII letter capital "A" has the decimal value 65 but is written as 41 in hex software code, while small "z" has the decimal value 122 but is noted as 7A in hex, still requiring only two digits instead of three. Numbers to the base 16 (0–9, A–F). Using only two hex digits from 00 to FF, a code of 256 different characters can be described, as is done with the adaptation of ASCII used by personal computers. The added characters beyond 128 often are called "Extended ASCII," or "IBM graphics characters."

Host: The computer or massive memory storage facility where accessible databases are held. These databases are accessed by computers or terminals which are allowed access via pre-assigned passwords or callsigns. The host mode as related to packet is a computer or terminal attached to a TheNET node when operating in host mode for sysop entry to the serial port. Host is also the name given to the computer that controls a TCP/IP or Internet node.

HTS (Hidden Transmitter Syndrome): A condition where throughput is drastically reduced to well below the specified baud rate because a single station is able to hear two or more stations that can't hear each other.

IF (Intermediate Frequency): The function of a radio receiver is to convert a radio wave, which has audio on it, to audio information to be played into a speaker or into a packet modem. The process is often done in two steps. First the radio signal (RF or radio frequency) is converted from the tuned frequency to a known constant frequency. This is done by mixing the incoming signal with the VFO or synthesizer. This known constant frequency is the IF. Next the IF is converted into audio via a discriminator (in the case of FM).

IF Bandwidth: Intermediate frequency bandwidth, or the width of the band of signals that can pass easily through the intermediate frequency stage of a superheterodyne receiver.

Interface: The junction or point of interconnection between two systems or equipment having different characteristics. Has both hardware and software implications. Most interface references related to packet radio refer to the cabling between the TNC and the transceiver, or between the computer and the TNC.

JHeard: A command associated with the PBBS and mailbox features of many popular TNCs. When the JHeard command is invoked, a list of the most recent or "Just Heard" stations will be displayed. If the JHeard command is executed with a "J<space>L" the paths indicating the station's callsign, origin, and digipeaters will be displayed.

Jitter: Short-term instability of the amplitude and/or phase of a signal. The latter condition commonly is called *phase jitter.* Variations in the phase or amplitude of a data-modulated signal having no relationship to the data. In amateur packet signals phase jitter may cause error in decoding the data.

JNOS: A version of KA9Q NOS written by WG7J that combines a BBS, node, and conference server.

Jump Scrolling: Characteristic of a terminal with vertical motions of a whole line of characters at a time in discrete steps of one line, much as a teleprinter terminal might do. Contrast with "smooth scrolling" as done by graphics terminals.

Summary

Next month we will continue with the glossary of terms and cover more ground in the packet world. Be sure to visit the the internet Packet Radio Home Pages at <www.sedan.org>.

73, Buck, K4ABT
(k4abt@sedan.org)

SHOWCASE

ICOM IC-821H All-Mode Dual-Band Transceiver

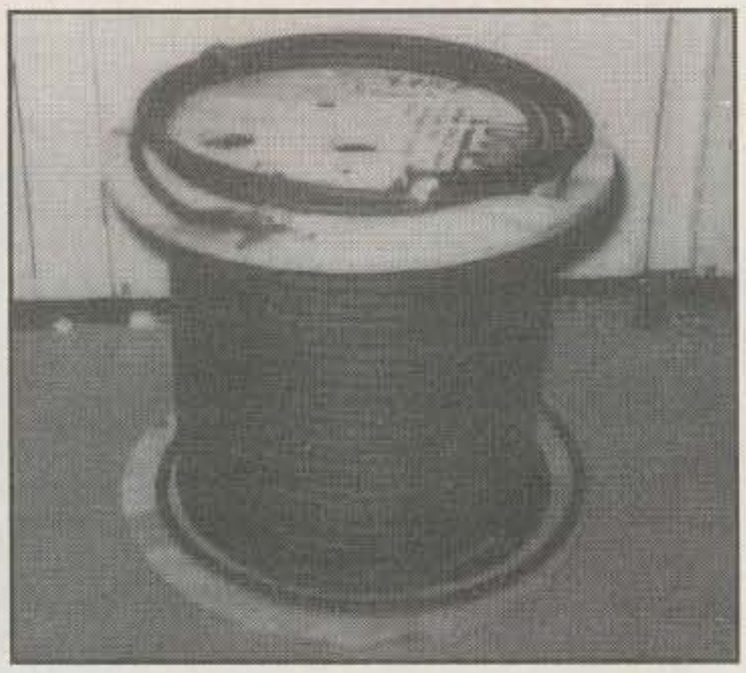
ICOM has announced the IC-821H high-performance, dual-band, base-station transceiver. The IC-821H is compact and lightweight, making it suited for mobile, fixed, or field operation. Features include high-frequency stability and 100% duty cycle operation. Built-in satellite functions include normal and reverse tracking, independent uplink/ downlink control for doppler shift compensation, and separate satellite VFO. Ten satellite memories allow the user to switch from normal to satellite operation, plus recall satellite uplink and downlink frequencies. In satellite mode, the subband is set to the transmitter (uplink) frequency and the main band is set to the receiver (downlink) frequency. CW (including optional CW narrow) can be used with an electronic keyer. A transmit/receive frequency tracking function with shift tracking is standard.

There are independent controls and indicators for each band. To change from the main band to the subband, push a button. Tune automatically at variable tuning speeds by using the sub-tuning function and RIT or SHIFT control. The IC-821H covers 144–148 MHz VHF and 430–450 MHz UHF. Both bands have two VFOs. Additional features include IF shift, a noise blanker, memory allocation function, AF speech compressor, auto repeater and one-touch repeater functions, built-in high stability crystal unit, RIT, and built-in keyer. The unit is priced at $2040.00. For more information, contact ICOM America, Inc., 2380-116th Ave. N.E., Bellevue, WA 98004 (206-454-8155) or circle number 100 on the reader service card.

Belden Low-Loss Coaxial Cable From R.F. Connection

The R.F. Connection has announced the availability of Belden's new low-loss coaxial cable. Belden 9913F is a flexible RG-8/U type 50 ohm transmission cable with black Belflex™ jacket and a high-density foam dielectric. The cable has a 6 inch bending radius, so it can be used for applications where there is a lot of cable movement. The cable is double shielded (the first layer is 100% duobond II and the second layer is 90% tinned copper braid) and has a 10 AWG bare copper stranded center conductor. Its velocity factor is 84%.

The cable has a list price of $1.08. As of this writing The R.F. Connection is carrying the cable for 80 cents a foot. The R.F. Connection also carries a full line of connectors for this cable. For more information, or to place an order, call 1-800-783-2666 or 301-840-5477, or fax 301-869-3860, or circle number 101 on the reader service card. You can also check out their Web Page at <www.therfc.com>.



Alinco DR-140T 2 Meter Mobile/Base

Alinco Electronics' 2 meter mobile/base radio, the DR-140T, sports alpha-numeric display, aircraft band and extended range receive, 51 memory channels, CTCSS encoder, European tone bursts, and DTMF microphone. The new alpha-numeric display is capable of showing up to seven characters and numbers for each memory channel. Included with the base Latin character set are symbols and Cyrillic alphabet characters, as well as numbers 0–9. The complement of memory channels is 50 plus a "call" channel for a total of 51. Each memory channel is capable of recording frequency, CTCSS tone or European tone burst, alpha-numeric display data, repeater offset, and non-standard offsets of up to ±99.995 MHz (full tuning range of radio). The DR-140T can also be equipped with the EJ-20U CTCSS Tone Decode Unit, which adds capabilities to the radio including receiver tone squelch operation, "busy channel" lockout, and the ability to operate with different transmit and receive CTCSS codes loaded into any memory channel.

The DR-140T is priced at $288.00. For more info, contact Alinco Electronics, Inc., 438 Amapola Ave., Ste. 130, Torrance, CA 90501 (phone 310-618-8616; fax 310-618-8758), or circle number 102 on the reader service card.

"Wizard" for Windows From Kangaroo Tabor Software

Kangaroo Tabor Software has created a propagation program for busy amateurs. Wizard reports are compact and are based on the user's station power and antenna gains. Click on the "Best Band" report and see which amateur band is best for a given hour. To find out what the other bands look like for the same hour, click on "All Band Summary" and see your Signal Quality (poor, fair, good, and excellent) displayed for each band. The software also

allows the user to request a concise overview of all the bands for a 24-hour period. This includes service probability, propagation mode, and antenna take-off angle. Request "Dynamic Band Summary" to toggle between signal quality, SNR, TOA, Propagation Mode, and Probability. The 32-bit "IonCAP Plus" engine provides the raw data for Wizard logic.

Wizard is priced at $29.95 plus $5.00 shipping (plus $2.00 additional outside the U.S.). For more information, contact Kangaroo Tabor Software, Route 2, Box 106, Farwell, TX 79325-9430 (fax 806-225-4006; e-mail <ku5s@wtrt.net>; Web Site <http://www.wtrt.net/~ku5S>), or circle 103 on reader service card.

Kenwood TH-235A FM Handheld Transceiver

The Kenwood TH-235A 144 MHz handheld transceiver has an easy to use menu system, 60 memory channels, and a built-in keypad, plus programmable squelch and DTMF memory. All 60 memory channels can independently store essential data in nonvolatile E²PROM, eliminating the need for battery backup. Included is a built-inCTCSS tone encoder and optional decoder (TSU-8) which enables the setting of different tones for receive. Built-in DTSS (Dual-Tone Squelch System) allows DTMF access; the squelch is opened only when a specific three-digit code has been received. Group calling is also possible.

The user can choose from several scan modes: full band scan, programmable band scan, and memory scan with programmable memory channel lock-out. There are also two scan stop modes: TO (time operated) and CO (carrier operated). Up to ten 16-digit DTMF codes with ID can be stored for automatic dial use when making telephone calls through an autopatch system. Telephone number redial is also provided.

Many other features are included and optional accessories are available. For more information, contact Kenwood Communications Corp., 2201 east Dominguez St., Long Beach, CA 90801-5745 (phone 310-639-5300; or http://www.ken wood.net>).

Inch/Metric Tool Kit From Jensen Tools

Jensen Tools has added the JTK®-88 Inch/Metric Tool Kit to their line of products. The JTK-88 contains more than 130 tools, 42 of which are metric, giving users more versatility in servicing both domestic and foreign equipment. Metric tools are stored on removable wing pallets that can be quickly detached when not needed.

For more information on Jensen Tools, tool kits or a free catalog, contact Jensen Tools, 7815 S. 46th St., Phoenix, AZ 85044 (phone 800-426-1194 or 602-968-6231; fax 800-366-9662 or 602-438-1690; Technical FaxBack® Service 602-968-6241, et. 271; or Web site <http://www.jensentools.com>; or circle number 109 on the reader service card.

Svetlana Small-Signal Pentode

Svetlana Electron Devices, Inc., has made available its EF86/6267 audio small-signal pentode. The Svetlana EF86 is manufactured in the Svetlana facility in Russia. The EF86/6267 features very high voltage gain in pentode connection, low noise, low microphonics, low heater-cathode hum induction, solid metal shield canister, low distortion in pentode or triode connection, extended processing and aging creating stable operation, and barium getter and improved vacuum processing.

For further information on this or other Svetlana products, contact Svetlana Electron Devices, 8200 S. Memorial Pkwy., Huntsville, AL 35802 (phone 800-239-6900 or 205-882-1344; fax 205-880-8077), or circle number 104 on the reader service card.

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

CQ 1996 Contest Survey—Final Results

5th Annual Dayton Contest Banquet

The fifth annual Contest Banquet at the Dayton Hamvention will be on Saturday night, May 17th, at the Crown Plaza Hotel (formerly Stouffers), Fifth & Jefferson Streets, in Dayton. Included during the dinner will be CQ Contest Hall of Fame presentations, prizes, and a program. Cost for the tickets is $27.00 per person (NYS residents will be subject to the appropriate sales tax). Seating is limited to 300. To order your tickets with a credit card, call 1-800-853-9797. The cutoff date to order tickets is May 7th. Join us for a fun evening!

The results of the 1996 *CQ* Contest Survey are finally here! Over the past few months I've been pouring over your responses in the oddest of places: ferry boats, airplanes/airports, hotel rooms/lobbies, and even the public library. Such is the life of a busy contest column editor.

As with every "non-scientific" survey of this nature, there are some results that everyone expects and then there are a few surprises. This past year's survey was no exception.

A few of you seemed more cynical than in previous years. When posing the questions about the influence of "no-code" amateurs on contesting and Morse Code requirements in general, a couple of animated responses indicated the feeling that there was a hidden agenda behind the question. Was this a back-door method for justifying the elimination of Morse Code as a licensing requirement? Well, the fact is I was just curious about what was on your minds. That's what surveys of this ilk are all about—a methodology for peering into the minds of fellow contesters to see what they really think about the pertinent issues of the day.

As we move from one year to the next, one disturbing fact continues to appear. For six straight years the average age of survey respondents has risen. This year was no exception, as your average age benchmark rose to 44.2 years (up from last year's 43.4). In a very general way, this is telling, and perhaps warning us of something we all know: Contesters are aging rapiding with no one coming in to fill the open backlog. It's a scary proposition indeed. as we not only see our age rising, but virtually no one doing anything about it!

It has always been my goal to ask questions that are especially relevant or even a little controversial at the time. I hope you find some of the results to be as interesting as I did.

Survey Results

Question 1: Do you favor the elimination of the Morse Code requirement for amateur radio licensing?

Yes—48 (23.4%)
No—157 (76.6%)

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e-mail K1AR@contesting.com
Compuserve ID: 71301,424

Calendar of Events

Apr.	24-26	DX-YL Int'l HF SSB Contest
Apr.	26-27	Ontario QSO Party
Apr.	26-27	Helvetia (HB9) Contest
Apr.	26-27	Nebraska QSO Party
May	3-4	ARI International DX Contest
May	3-4	Massachusetts QSO Party
May	3-4	Connecticut QSO Party
May	3-4	Ten-Ten Spring CW QSO Party
May	10-11	Nevada QSO Party
May	10-11	Oregon QSO Party
May	17	European CW Sprint
May	**24-25**	**CQ WW WPX CW Contest**
June	14-16	ARRL June VHF QSO Party
June	28-29	ARRL Field Day
June	21-22	1997 SMIRK Contest
July	1	RAC Canada Day Contest
July	12-13	IARU HF World Championship

The response to this question was exactly what I expected. To a certain extent, many contesters will claim that they hold themselves to a higher standard. That standard is not intended to be an elitist attitude, but rather reflects on our competitive nature of desiring to be the best at our sport of amateur radio operating. The subject of Morse Code as a requirement for amateur licensing will rage on for years to come. And like it or not, it's probably inevitable that change will come. At least for the moment, we know where the contest community stands on this controversial topic.

Question 2: From a contester's point of view, has the influx of "no-code" technicians in the U.S. had a positive or negative effect on amateur radio?

Positive—101 (49.5%)
Negative—103 (50.5%)

I was pleased to learn that there is some measure of moderate opinion on the subject of U.S. "no-code" amateurs in the contest community. I suspect the selfish contesters view this dominant portion of the amateur populous (yes, dominant when looking at the numbers!) as nothing more than a source of more QSOs when 10 meters opens up again. The more visionary contester sees this well of amateur talent as the next source of many new contesters. We have some work to do to convert the former, I'm afraid.

Question 3: Do you believe that amateur radio will eventually cease its existence, or are we just seeing a lull due to low sunspots and other cyclical factors?

I believe ham radio will eventually go away.—34 (16.7%)

I believe we are just seeing a temporary lull.—170 (83.3%)

While we're in the doldrums of a very depressing solar cycle, it's especially easy to take the view that the sky is falling. Add to that the fact that the Internet and other electronic communication mechanisms have captured the interest of our youth, and potentially you have just outlined a formula for the end of amateur radio as we know it.

Fortunately, contesters hold their dream of amateur radio eternal. The vast majority of us feel that we've seen the results of a cycle bottom before and we'll see it again. Perhaps most insightful was the observation that solar conditions are not going to dictate our future as much as will our own actions. To many of you, the ball is in our court!

Question 4: In general, do you believe that packet radio DX spotting has had a negative or positive impact on contesting?

Positive influence—140 (68.6%)
Negative influence—64 (31.4%)

The subject of packet radio's influence on contesting has been hotly debated within the organizational leadership of most major competitions. It's an unavoidable reality, a tool that will never be taken away from us. However, its availability does not necessarily mean that it possesses universal goodness.

The majority of you feel that packet radio, overall, has resulted in a better form of contesting, albeit with guarded optimism in many cases. If I could summarize your greatest concern it would be that we must be on guard. Use of packet spotting must *never* reduce our operating standards. Contesting, as you so aptly put, is not dialing for dollars based on a screen of supplied data. It is a skill. That skill has been lost to many, according to one third of you.

Question 5: If someone gave you $10,000 to spend on your contest station, how much would you allocate to each of the following categories:

Radios—$1783
Amplifier—$1413
Antennas/Towers—$5913
Computer—$554
Other—$337

Well, if I were an antenna manufacturer right now, I guess I'd be jumping with joy based on the results of this question. One doesn't have to have an MBA from Harvard to realize that amateur equipment sales are flat. One of the great dichotomies of amateur radio equipment is that it is fundamentally reliable and attractive from a cost-of-ownership standpoint. Once you've invested in your $2–4K radio, it's likely to be something that you'll hang on to for years to come.

However, you told us something completely different from an antenna point of view. As you know, an amateur radio operator is never satisfied with his antenna installation. When compared to time spent inside a radio, we tinker with antennas by orders of magnitude. To that end, antennas are where our money will go, if we have money to invest.

An interesting sidebar has to be focused on computers. The relatively small amount of $554 tells me that many of you have already made the computer investments needed for a competitive contest station. To a large extent, many of you told us that computers were part of your amateur station well before your piqued interest in contesting came about.

Question 6: Over the past 12-month peri-

Call Area	No. of Responses	DX Country	No. of Responses
W1	16	DL	3
W2	13	EA	1
W3	25	F	1
W4	20	G	2
W5	16	KH6	2
W6	18	KH8	1
W7	14	KL7	1
W8	17	KP4	2
W9	11	LU	1
WØ	21	OH	1
VE	3	PY	1
		SM	1
		YB	2

USA/Canada responses: 174
DX responses: 19
None indicated: 14
Total responses: 207

Table I– Geographic response analysis.

od approximately how many contests did you operate in which you made at least 200 QSOs?

Number of Contests—4.1

There are truly some crazy contesters out there! While the average of 200+ QSO contest entries averaged around four/year, a few of you had numbers in the dozens. While my own number remains well over ten (and that's with a new business schedule that matches the best), I wonder if any of you operating addicts can convey your secret to activity while balancing life's other responsibilities. Any takers?

Question 7: Do you feel enough recognition is given to geographically disadvantaged areas in contest writeups/results?

Yes—110 (54.5%)

No—92 (45.5%)

The relative balance of answers to this question is deceiving. When I looked at the results from a geographic perspective, the real answers appeared. Not surprisingly, East Coast USA contesters are quite content with the geographic balance of our contest reports. I noticed that the farther west one went, the more concern was expressed. Fortunately, there was overwhelming feedback that contest sponsors are getting more sympathetic about the reporting interests of others, not just the winners.

As one went overseas, the concerns seemed to rise slightly. Unfortunately, the sponsors of worldwide contests have a tendency to highlight the United States. It's only natural. Frankly, I'm guilty of it in this column! Several compliments were offered to the recent expansion of *CQ*'s WW results, as well as the fine coverage being offered by *CQ Contest* and others.

The bottom line: There's still more work to be done here.

Question 8: In your opinion, what is today's minimum "cost of entry" to build a competitive contest station from scratch (excluding land and buildings)?

Average Cost—$17,130

Answers to this question were extremely fascinating. I was intrigued by how diverse the answers were. On the low end, many of you suggested budgetary figures in the $2–5K range. One fellow, in contrast, tried to make a very strong case (with facts and figures) that a competitive contest station cannot be created for less than $125K. If that were the case, I think we'd all consider model railroading as our hobby of choice.

One factor pointed out by a few of you is the reality that most of the large contest stations are not works of art that were created in a couple of months, but rather have been "under construction" for decades. This is certainly the case when you consider the likes of W3LPL, N2RM, N3RS, K1EA, WØAIH, W6GO, W7RM, and so many others. And our international brethren are no exception.

Question 9: How do you prefer to submit your contest logs?

Paper—69 (34.2%)

Disk—92 (45.5%)

Electronically via Internet—41 (20.3%)

I have to admit that the results of this question shocked me. I was most surprised by the number of you who still prefer to submit paper logs. However, when digging into your comments a little more, I learned that it's not entirely because you are still committed to paper logging as your standard operating method, but more because of the fallout that comes from submitting computerized data. A few of you indicated concern that computer-generated logs are subjected to a higher standard of scrutiny. Additionally, many of you felt that submitting electronic logs (especially via the Internet) opened up the floodgates to more errors and missing log entries.

With over a third of us still using paper for

our contest logs, I wonder what all those computers in the shacks are really doing?

Question 10: Have you ever gone on a "DXpedition" during a major contest?

Yes—42 (20.7%)

No—161 (79.3%)

If No, why not? (Circle the most significant reason.)

Cost—25 (15.5%)

Not sure how to go about it—22 (13.7%)

Lack of available time—88 (54.7%)

Not interested—2 (1.2%)

Other—24 (14.9%)

Well, how many of us can be surprised that four fifths of this survey's respondents have never left their native soil to enjoy the thrill of "being on the other end"? Hasn't it always been the dream of an amateur operator to run a DXpedition from some isolated rock on the other end of the globe?

As it turns out from this crowd, the overwhelming reason why we're not booking our flights tomorrow has little to do with anything except pure time limitations. Of course, we all suffer from trying to sell the financial implications to our significant others, but time rules.

I also found it interesting that a sizable number of you simply don't know how to go about the task of operating overseas. Take a look at the "May Contest Tip of the Month" with this limitation in mind.

Question 11: There's extensive editorial coverage of contesting in amateur radio (*CQ Contest, NCJ,* contest writeups, etc.). What contesting subject would you like to see covered in more detail?

I truly appreciate your input on this topic. Not only does it help set editorial direction for this column, but I suspect other contest editors and writers will take notice as well. Some of the topics you indicated in your responses include more coverage of station design, small pistols, big stations, operating tips, antennas, international contesting, technical tips, "poor man" station improvements, etc. You'll be seeing more on these topics in ensuing months!

Question 12: As a contester, which of the choices below best describes your QSLing practices?

Almost always caught up—154 (76.2%)

Hopelessly behind, but trying—42 (20.8%)

I never QSL...just not interested—6 (3.0%)

Now, let's be honest for just a moment. Contesters are not exactly renowned for their tenacity towards QSLing. Some of us are better than others, but our reputation as QSO machines—sans QSLs—is probably deserved in many cases.

Most of you, however, claim to be pretty good at the QSL game. In fact, it should be noted that a goodly number of the responses crossed out the word "almost" in the first response. Could it be that the minority of contesters who don't QSL are generating the heat for the majority to deal with? Could it be that some of the bigger contest stations who don't QSL attract QSOs with DX stations who cannot work anyone else?

There's probably a litany of possible answers to this subject, but the results were interesting.

Final Comments

I hope you enjoyed reading the survey results as much as I did tabulating them for you. There's a wealth of information in this exercise that's impossible to publish in a single month's column. However, rest assured that the extra effort some of you undertook in your answers will be reflected in future columns. Thank you, one and all!

As always, please remember to provide any submissions for the August "Contest Calendar" to me by June 1st. Most of you have figured it out by now, but sending contest announcements directly to *CQ* will only delay the publishing process for your contest. After *CQ* receives your material, they simply package it up and forward it me. In some cases, a few of you missed the deadline as a result. In the future, you'll achieve better results by sending your information to my home QTH!

73, John, K1AR

ARI International DX Contest

2000Z Sat., May 3 to 2000Z Sun., May 4

This is the annual edition of the Associazione Radioamatori Italiani's international DX Contest. The ARI DX Contest is managed by veteran contester I2UIY and should offer a significant amount of activity. Stations are allowed to work each other worldwide.

Classes: Single operator SSB, CW, or RTTY; single operator mixed; multi-single mixed; and SWL mixed.

Frequencies: 160–10 meters (no WARC bands) according to the IARU band plans (RTTY is 80–10 meters). All stations (including single operator) must adhere to the standard 10-minute rule.

Exchange: Italians send RS(T) and province; all others send RS(T) and serial number.

Points: QSOs within your own country count only for multiplier credit. Count 1 point for QSOs inside your own continent, 3 points for QSOs outside your continent, and 10 points for Italian QSOs. Stations can be worked once per band and mode (e.g., 15 CW, SSB, and RTTY).

Multiplier: Italian provinces (103) and DXCC countries (not I or ISØ). Credit multipliers only once per band.

Scoring: Final score is sum of QSO points times the sum of multipliers.

Awards: A plaque will be offered to the highest scoring station in each class. In addition, a certificate will be awarded to the top two to five placing stations as well as the leading scorers in each DXCC country.

Special Award: Two attractive plaques will be awarded by the Santa Barbara Contesters in memory of IN3ANE. They will be assigned to the best OM score under 21 years of age and the best SWL score under 18 years of age.

Free logging software is available for the ARI Contest. You may obtain your copy directly from the contest manager ($5 or 10 IRCs for expenses). Entries may be submitted on diskette in N6TR, K1EA, EI5DI, or ASCII format. Logs must be mailed within 30 days from the end of the contest and addressed to: ARI Contest Manager, I2UIY, P.O. Box 14, I-27043 Broni (PV) Italy.

Texas QSO Party

1400Z Sat., May 3 to 2200Z Sun., May 4

Here's a fun event sponsored by the Texas DX Society with an unusual set of prizes for the winners. Be sure to check it out! As with most QSO parties, Texas stations work everyone, while others work Texas stations only. You may work stations once per band and mode. Expedition stations (i.e., mobiles) may be worked in each county they activate. Multipliers only count once regardless of the number of bands/modes worked.

Classes: Single operator, multi-single and multi-multi; Texas mobile single and multi-op; QRP single- and multi-transmitter, and club aggregate category.

Exchange: RST and state (province, country, or maritime region). Texas stations use RST and county.

Scoring: Credit two points per phone QSO and three points per CW and other digital-mode QSO. Non-Texas stations use the number of Texas counties worked as multipliers (total of 254 plus a 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 5,000 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. Final score is total QSO points times multiplier (counties or states/provinces).

Frequencies: CW—30 kHz up from lower band edge; SSB—25 kHz up from lower General class band edge; VHF—50.200, 144.200.

Send logs and dupe sheets (if over 200 QSOs) by June 5, 1997 to TDXS, P.O. Box 540291, Houston, TX 77254, or via e-mail to <W5HNS@aol.com>. For a complete set of rules see TDXS's website at <http://wb5fnd.tech.uh.edu:80/~tdxs/>. Note: The TQP is supported by NA Contest Software from LTA at 216-565-9950.

Connecticut QSO Party

2000Z Sat., May 3 to 2000Z Sun., May 4
Rest Period: 0400–1200Z, May 4

This annual event is sponsored again by the Candlewood Amateur Radio Association and is opened to all amateurs. The object is to work as many Connecticut stations as possible on 160–2 meters.

Classes: Single operator—fixed, mobile, Novice, QRP (5 watts); multi-single or multi-multi stations; and Connecticut club competition.

Exchange: Signal report and county or state/province/DXCC country.

Frequencies: CW—40 kHz up from lower band edges, Novices operate 25 kHz up from lower band edges. SSB—1860, 3915, 7280, 14280, 21380, 28380 kHz. VHF—50150, 144200, 146580 kHz. RTTY—normal operating frequencies.

Scoring: Credit one point per phone QSO, two points for CW/RTTY. QSOs with club station W1QI and ARRL HQ station W1AW count 5 points. Final score is total QSO points times the number of stations/provinces/DX (DX only counts as a single multiplier) worked. Others use Connecticut counties as the multiplier.

Awards: Plaques and certificates (100 point minimum) will be awarded to category winners. A special certificate will be sent to anyone working all 8 Connecticut counties.

Send your results no later than June 3rd to: CARA, P.O.B. 3441, Danbury, CT 06813-3441.

Nevada QSO Party

0000Z Sat., May 10 to 0600Z Sun., May 11

Here's a great chance to work this rare state by participating in the Nevada QSO Party sponsored by the Frontier Amateur Radio Society.

The rules were rather sketchy, but operation is planned on 160–6 meters. Look for Nevada stations on CW, 15 kHz up from the bottom of the General band and 25 kHz up on SSB.

Exchange: Signal report and Nevada county or state/province/DXCC country.

Scoring: Credit 2 points for CW contacts and 1 point on SSB. One contact is allowed per band and mode. Final score is multiplier (usual counties/state routine) times total QSO points.

Awards: Certificates will be sent to all winners. Send your logs before June 15th to Jim Frye, NW7O, 4120 Oakhill Ave., Las Vegas, NV 89121.

Oregon QSO Party

0000Z Sat., May 10 to 2400Z Sun., May 11

This one is sponsored by the Central Oregon DX Club and is open to everyone. Oregon stations work all stations; all others work Oregon exclusively. The rules were sketchy for this one as well, but here's a summary.

Stations may be worked once per band/mode; mobiles again as they cross county lines. Exchange RS(T) and Oregon county, state, province, or DXCC country. Credit one QSO point for SSB and two points for CW. Oregon stations multiply QSO points times the total of Oregon counties, states, provinces, and DXCC countries; others only use Oregon counties as multipliers (maximum 36). Add 25 bonus points for working both Deschutes and Jefferson counties.

Logs are due by June 30th and should be sent to: Oregon QSO Party, c/o K9QAM, Ron Smith, 23083 Maverick Lane, Bend, OR 97701.

CQ WPX CW Contest

0000Z May 24 to 2400Z May 25

Complete rules were in the January issue of *CQ*. Rules and summary/log sheets can be obtained from CQ Communications, 76 N. Broadway, Hicksville, NY 11801. Check the current rules for the trophy list. As with all *CQ* contests, be sure to indicate the mode of operation on your envelope when you mail your logs. Results of the 1996 contest can be found elsewhere in this issue.

Announcing:

The 1997 CQ World-Wide VHF Contest

Starts: 1800 UTC Saturday, July 12, 1997
Ends: 2100 UTC Sunday, July 13, 1997

I. Contest Period: 27 hours for all stations, all categories. Operate any portion of the contest period you wish.

II. Objectives: The objectives of this contest are for amateurs around the world to contact as many amateurs as possible in the allotted 27-hour period, to promote VHF and above activity, to allow VHF and above operators the opportunity to experience the enhanced propagation available at this time of year, and for interested amateurs to collect VHF and above Maidenhead grid locators for awards credits.

III. Bands: All authorized amateur radio bands above 50 MHz may be used, as authorized by local law and license class.

IV. Class of Competition: (1) Single op fixed station. (2) Multi-op class I fixed station. (3) Multi-op class II fixed station. A fixed station is defined as one that is a regular home station location. You may operate from your home station or you may be a "hired gun" at another home station to qualify for a fixed station category. A multi-op class I station is one that operates five or more transmitters simultaneously on all authorized amateur frequencies above 50 MHz. A multi-op class II station is one that operates four or less transmitters simultaneously on all amateur frequencies above 50 MHz. (4) Single op portable station. (5) Multi-op class I portable station. (6) Multi-op class II portable station. A portable station is defined as one that you set up away from a regular home station location. (7) Rover station. A rover station is one that is manned by no more than two operators, must travel to more than one grid locator, and must sign "rover" or /R. The spirit of this class is to encourage operation from rare grid locators by persons who are inclined to do so. It is not the intent of this class to encourage one operator to move from one super station to another super station in another grid locator in order to compete in this category. (8) QRP station. Anyone operating a station running 25 watts output, or less, is elgible to enter this category. There are no location restrictions. You can operate from your home QTH, or from the highest mountain you can find. However, you cannot run more than 25 watts output on any band.

V. Exchange: Callsign and Maidenhead locator grid locator (4 digits—e.g., EM15). Signal reports are optional and need not be included in the log entry.

VI. Multipliers: The multiplier is the number of different grid locators worked per band. A "Grid Locator" is counted once per band. Exception: the rover who moves into a new grid locator can count the same grid locator more than once per band as long as the rover is himself or herself in a new grid locator location. Such change in location must be clearly indicated in the rover's log. It is required that rover category operators maintain separate logs for each grid locator location.

A. The rover who changes location during the course of the contest is free to contact as many other stations as he or she wishes. The rover becomes a new QSO to the stations working him or her when that rover changes grid locator.

B. The grid locator is the Maidenhead grid locator to four digits (FM13).

VII. Scoring: One point per QSO on 50, 70, and 144 MHz; 2 points per QSO on 222 and 432 MHz; 4 points per QSO on 903 and 1296 MHz; 6 points per QSO on 2.3 GHz and above. Work stations once per band, regardless of mode. Multiply total QSO points times total number of grid locators (GL) worked. Contest entrants may not transmit on 146.52 MHz, or your country's national 2 meter FM simplex calling frequencies, or commonly recognized repeater frequencies for the purpose of making or requesting contacts. Contacts made within your own country, in the DX window of 50.100-50.125 MHz, are discouraged. Contacts made on the SSB calling frequencies of 50.110 MHz, 50.125 MHz, and 144.200 MHz are discouraged. Contest participants are required to use UTC as the logging time.

Incentive scoring: Operators completing two-way CW or MCW contacts may add one point to the QSO value for each contact. As an example, W1XX works stations as follows:

37 QSOs, with 3 QSOs on CW (34 × 1 = 34; 3 × 2 = 6; 34 + 6 = 40) and 10 GL's (10 multipliers) on 50 MHz.

45 QSOs (45 × 1 = 45) and 8 GL's (8 multipliers) on 144 MHz.

26 QSOs (26 × 2 = 52) and 4 GL's (4 multipliers) on 222 MHz.

38 QSOs (38 × 2 = 76) and 5 GL's (5 multipliers) on 432 MHz.

2 QSOs (2 × 4 = 8) and 2 GL's (2 multipliers) on 903 MHz.

6 QSOs (6 x 4 = 24) and 2 GL's (2 multipliers) on 1296 MHz.

W1XX therefore has 245 QSO points (40 + 45 + 52 + 76 + 8 + 24 = 245) × 21 multipliers (8 + 4 + 5 + 2 + 3 = 21) = 5,145 total points.

VIII. Awards: Engraved plaques will be awarded to the top-scoring stations in each category in the world (for a total of eight plaques). Certificates suitable for framing will awarded to the top-scoring stations in each category in each continent. Certificates may also be awarded to other top-scoring stations who show outstanding contest effort. Certificates will be awarded to top-scoring stations in each category in geographic areas where warranted. Geographic areas include states (U.S.), call areas (Japan), provinces (Canada), and countries, and may also be extended to include other subdivisions as justified by competitive entries.

IX. Miscellaneous: An operator can sign only one callsign during the contest. This means that an operator cannot generate QSOs by first signing his callsign, then signing his daughter's callsign, even though both callsigns are assigned to the same location. All contacts above 300 GHz must use coherent radiation on transmissions and employ at least one stage of electronic detection on receive. A station located exactly on a dividing line of a grid locator must choose only one grid locator from which to operate for exchange purposes. A different multiplier cannot be given out without moving the complete station at least 100 meters.

X. Log Submissions: You may request log sheets from the CQ VHF Contest, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801. Include an SASE with your request. Completed logs must be postmarked no later than August 31, 1997 to be eligible for awards. All logs should be mailed to: Joe Lynch, N6CL, VHF Contest Chairman, P.O. Box 73, Oklahoma City, OK 73101. Logs may be submitted on disk, provided a hard copy of the log is sent with the disk and the data is in an ASCII format compatible with an IBM-PC type computer.

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Licensing Changes and The QSL Bureau

The American Radio Relay League (ARRL) has advanced a series of proposals to dramatically transform the amateur radio licensing structure in the United States. Let's examine these proposals in terms of how they might affect DXing.

First note that these are *suggestions,* not fixed rules. They are a starting point for discussion and comment, *not* necessarily final regulations. The ARRL has specifically requested member comments on the proposals, and they will not be part of a formal filing with the Federal Communications Commission (FCC) until the ARRL Board of Directors has taken adequate time to review all comments. Every League member is encouraged to send comments, either pro or con, to his or her elected Board member, directly or via the ARRL Headquarters in Newington, Connecticut.

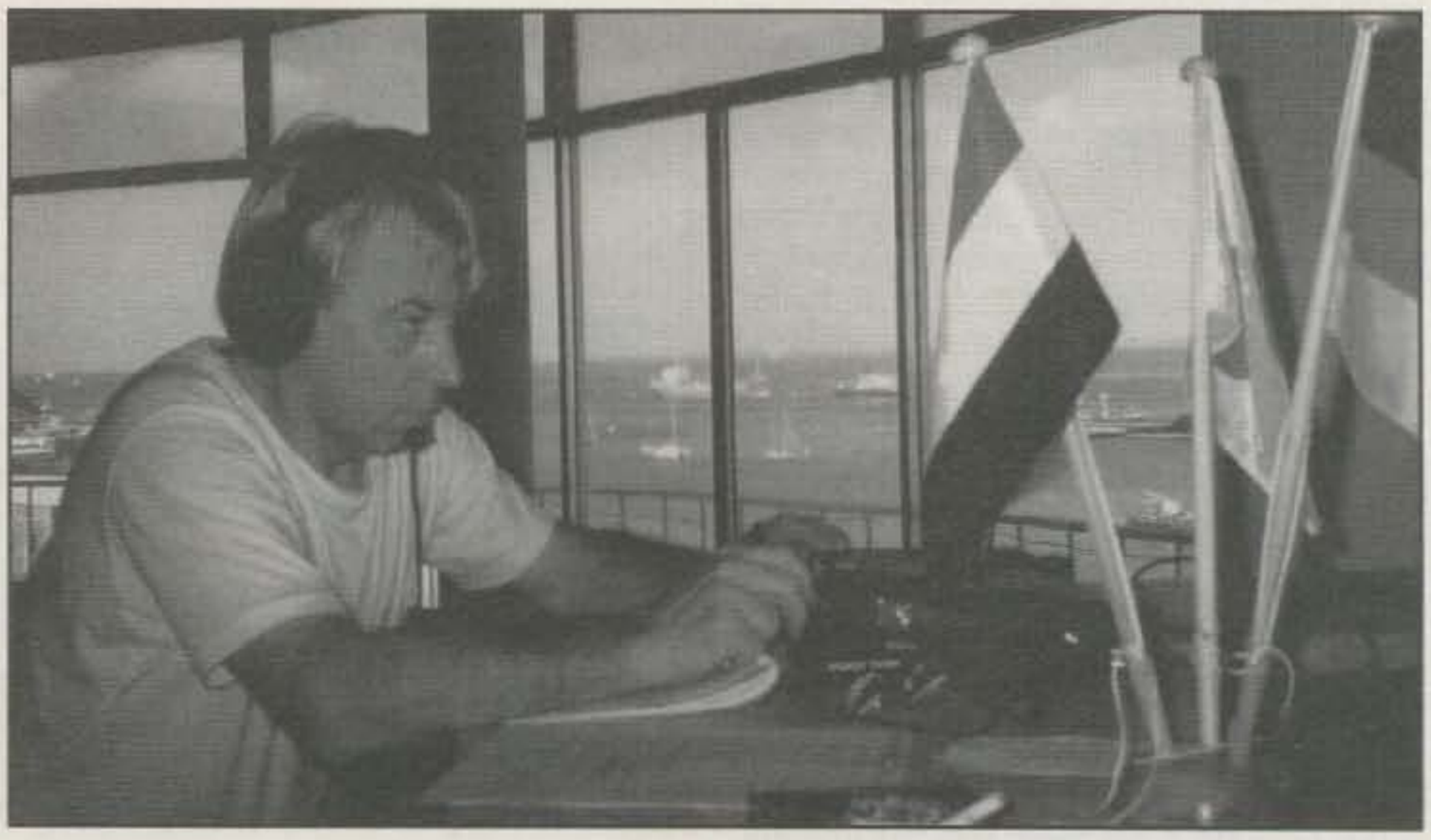
The first proposal, elimination of the Novice license, will have essentially no effect on DXing. It is practically impossible to do serious DXing with a Novice license, as the Novice frequency bands are far from where 99% of DX stations operate. While it *is* possible to work some DX from the Novice bands, in most cases the Novice DXer will need assistance from a higher class operator to ask the DX station to listen up for the Novice. Elimination of the Novice license shouldn't have any effect on DXing.

The next proposal, replacing the existing Technician Plus license with an Intermediate license and expanding HF privileges of those licensees, may have some impact on DXing. The ARRL has proposed that current Tech Plus class licensees be moved into the Intermediate class license, with significantly expanded HF bands. Specifically, the ARRL proposes to open 3525–3700, 7025–7050, 21025–21150, and 28050–28300 kHz to Intermediate class CW, and 1950–2000, 3900–4000, 21350–21450, and 28300–28500 kHz to SSB, with a power limit of 200 watts.

The lower frequencies suggested are not really well-suited to DXing, as most low-band DXing hugs the very bottom of the bands. As the Heard Island VKØIR DXpedition demonstrated, working split and listening in the lower class portions of the bands yields very few contacts. While these proposed additional HF privileges do expand the possibility of working more DX as an Intermediate class licensee, in practical terms, these privileges will have little impact on DX success. Intermediate class licensees will still find that upgrading their license class is more important than having some additional kiloHertz in which to bounce around.

This is not to say that these proposed additional operating privileges will be useless for DXing. As sunspot Cycle 23 advances, the 10 and 15 meter bands will be increasingly useful for DXing. The 200 watt power limit is meaningless; even low-power stations can be highly successful working DX on these bands. If sunspot Cycle 23 really did begin in May 1996,

Lopes, CT1CJJ, Jose, CT1EEB, and Tom, CT1/WT2O/p, operating from Pessegueiro Island (EU-167). Jose is using the logs to protect him from the sun!



DJ9ZB operates as 7O1A from Yemen. The DXCC did not accept this operation for DXCC credit.

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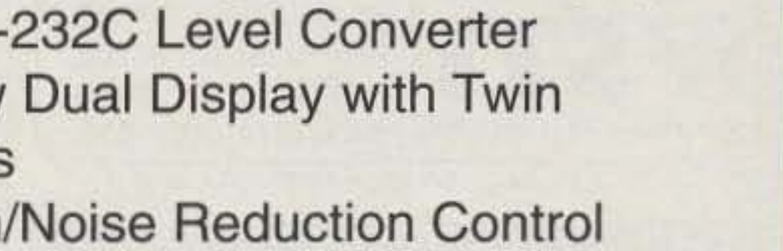

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The WPX Program

SSB

2625 ..... JL6IPK
2626 ..... EA1DST
2627 ..... IK4QJH

CW

2944 ..... JH2OMM
2945 ..... KV7X
2946 ..... YU1WD

CW: 350 DL3NEO, JH2OMM, YU1WD. 400 DL3NEO, JH2OMM, YU1WD. 450 DL3NEO, JH2OMM, YU1WD. 500 DL3NEO, JH2OMM, YU1WD. 550 YU1WD. 600 YU1WD. 650 YU1WD. 700 YU1WD. 750 YU1WD. 800 EA2BNU, YU1WD. 850 EA2BNU, YU1WD. 900 YU1WD. 950 YU1WD. 950 NN7A, LU3DSI, YU1WD. 1000 NN7A, LU3SDI, YU1WD. 1050 NN7A, LU3DSI, YU1WD. 1100 LU3DSI, YU1WD. 1150 YU1WD. 1200 YU1WD. 1250 YU1WD. 1300 WA2EYA, YU1WD. 1350 EA7AAW, YU1WD. 1400 YU1WD. 1450 YU1WD. 1500 YU1WD. 2200 W8UMR. 3650 N6JV.

SSB: 350 IK4QJH, WBØYEA. 400 IK4QJH. 800 NKØS. 1000 DL8AAV.

Mixed: 450 WA2QZD. 500 WA2QZD. 800 EA2BNU. 850 EA2BNU. 900 EA2BNU. 1050 F6CXJ. 1100 F6CXJ. 1150 F6CXJ. 2350 W8UMR. 3550 N9AF. 3600 N9AF. 4050 W2FXA.

10 meters: NKØS
40 meters: DL8AAV
Europe: DL3NEO, EA1DST

Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, IØJX, WA1JMP, KØJN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SMØDJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SMØAJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, YU2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, S57J.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, K9BG, W1BWS, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KBØG, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YBØTK, K9QFR, W4UW, NXØI, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP, S53EO, S57J.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

then we should see significant DX band openings on 10 and 15 meters by the end of this year, improving over the next few years. While the process of converting these proposals into reality will take a few years (if it happens at all), by the time the Tech Plus licensees become Intermediates with increased HF privileges, they should be able to work lots of DX on 10 and 15 meters.

The ARRL's proposals are quite obviously something-for-everyone ideas. The League learned from the Incentive Licensing plans that they should avoid at all costs *reducing* the privileges of any existing licensee. Thus, the League has proposed expanding the SSB subbands for all higher class licensees. They suggest adding 3800–3850, 7200–7225, and 21250–21350 kHz to General class SSB privileges. These additional frequencies will make it easier for General class operators to work DX, but not dramatically so. The 75 meter expansion will allow some Generals to work DX, but DXing on 75 meters is very difficult at best, and Generals will find these frequencies far more useful for local communication. The same holds true for the 40 meter expansion. Ninety percent of DXing on 40 meters is on CW, with only a handful of stations making a serious effort to work 40 meter SSB DX. The 15 meter privileges, on the other hand, should prove to be of significant benefit to General class DXers. This is the portion of the band most useful for DXing, and access to these frequencies should provide Generals a much-improved shot at working DX, especially as the sunspot cycle progresses.

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20 Meter SSB

1000 ..... DU1SAN
1001 ..... AA9SI
1002 ..... IK8HJM

160 Meter WAZ

17 ..... W1JR, 35 Zones Endorsement
101 ..... G4BWP, 36 Zones Endorsement
109 ..... DL3JSW, 30 Zones New
110 ..... SM5AQD, 40 Zones New

All Band WAZ

CW/Phone

7729 ..... Z31JA
7730 ..... I1WQR (CW)
7731 ..... N6PEQ
7732 ..... KV7X (CW)
7733 ..... DL1ASA

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

5 Band WAZ

As of January 31, 1997, 453 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

ON4VT IK1GPG EA1KW

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	OH2DW, 199 (1)
AA4KT, 199 (26)	IK1AOD, 199 (1)
K7UR, 199 (34)	DF3CB, 199 (1)
NAØY, 199 (26)	F6CPO, 199 (31)
WØPGI, 199 (26)	UA3AGW, 198 (1, 12)
W2YY, 199 (26)	VO1FB, 198 (1, 12)
W9WAQ, 199 (26)	EA5BCK, 198 (27, 39)
W1JR, 199 (23)	KZ4V, 198 (22, 26)
VE7AHA, 199 (34)	K4PI, 198 (22, 26)
W1FZ, 199 (26)	G3KDB, 198 (1, 12)
W9CH, 199 (26)	DK2GZ, 198 (1, 24)
ACØM, 199 (34)	KG9N, 198 (18, 22)
IK8BQE, 199 (31)	KM2P, 198 (22, 26)
JA2IVK,199 (34,40m)	GM3YOR, 198 (12, 31)
K1ST, 199 (26)	DKØEE, 198 (19,31)
ABØP, 199 (23)	KØSR, 198 (22, 23)
KL7Y, 199 (34)	K3NW, 198 (23, 26)
UY5XE, 199 (27)	WB6OKK, 198 (22, 37)
NN7X, 199 (34)	S57J, 198 (2,26)
DL3ZA, 199 (31)	W3RU, 198 (23, 26)
OE6MKG, 199 (31)	UA4PO, 198 (1, 2)
HA8IB, 199 (2 on 15)	K5RT, 198 (22, 23)
DK1FW, 199 (31)	JA1DM, 198 (2, 40)

The following have qualified for the basic 5 Band WAZ Award:

DF3UB, 195 Zones	DF7XY, 151 Zones
KA1CB, 195 Zones	F6CPO, 199 Zones
ON4VT, 200 Zones	K4BU, 153 Zones
Z31JA, 184 Zones	IK1GPG, 200 Zones

Endorsements:
EA1KW, 200 Zones K4TSJ, 177 Zones

1033 Stations have attained the 150 Zone level as of January 31, 1997.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

nothing more than the 15 meter SSB band, even with very modest equipment. I worked my first DXCC running barefoot into a $5 vertical antenna at the bottom of the sunspot cycle, mostly on 15 meters. It wasn't easy by any means, but persistence was more important than fancy equipment. Of all the League's proposals for expanded privileges for lower class licensees, the additional 15 meter SSB frequencies for General class operators probably will have the most effect on DX, and in a very positive manner.

Higher class licensees also stand to gain under the League's proposals. The ARRL proposals induce additional SSB frequencies for both Advanced and Extra class operators. The proposed new SSB frequencies for Advanced class operators are 3725–3775, 7125–7150, and 21175–21225 kHz. While the 40 meter SSB frequencies probably will be of little use for

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Currently there are 328 countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is $1.00.

CW

K2TQC....328
K1MEM....328
K2FL....328
K9BWQ....328
K2ENT....328
DL8CM....328
N7RO....328
WØIZ....328
G4BWP....328
K6JG....328
I4EAT....328
SM6CST....328
W2UE....328
W2FXA....328
N4KG....328
K8PV....328
W6DN....327
K3UA....327
N7MC....327
N4MM....327
K6LEB....327
IT9TQH....327
W4QB....326
W9DWQ....326
DL1PM....326
K9MM....326
K2OWE....326
K4CEB....326
9A2AA....326
OK1MP....326
PAØXPQ....326
N4JF....326
W9WAQ....326
AA4KT....326
K9IW....326
YU1HA....326
I5XIM....326
WA4IUM....326
WA8DXA....326
N5FW....326
EA2IA....326
W7OM....326
WØHZ....326
F3TH....326
N6AR....325
K8NA....325
KZ4V....325
I1JQJ....325
IT9VDQ....325
W8XD....325
K4IQJ....325
K8LJG....324
IT9QDS....324
WØJLC....324
W7CNL....324
KB4HU....324
W7ULC....323
WA4JTI....323
W4OEL....323
KUØS....323
DJ2PJ....323
AG9S....322
NC9T....322
DL3DXX....322
W1WAI....322
K2JLA....322
KA5TQF....322
AA5NK....321
ON4QX....321
K9QVB....321
HA5DA....321
WB5MTV....321
IK2ILH....321
K1HDO....321
IT9ZGY....320
VE7CNE....320
N5FG....319
KA7T....319
N6AV....318
VE7DX....318
I4LCK....317
N6CW....316
4N7ZZ....316
W3BBL....315
N4AH....315
K2JF....314
AA2X....314
W5OG....313
WB4UBD....313
K9DDO....312
WB4DBB....312
K7JYE....312
K1VHS....311
G3KMQ....311
WA8YTM....311
N6AW....311
VE7DX....318
N5HB....311
OH3NM....310
WB6OKK....310
K4CXY....309
K4JLD....309
VE9RJ....309
W3II....308
I1EEW....307
N1HN....307
HB9DDZ....305
CT1YH....305
OZ5UR....304
G2FFO....303
K7EHI....302
W7IIT....302
K8JJC....302
WA4DAN....301
HA5NK....301
WG5G/QRPp..301
W6YQ....301
N4OT....301
YU1TR....300
YU2TW....300
KE5PO....300
YV5ANT....299
KØHQW....296
KH6CF....294
YU1AB....294
G4MVA....294
I2EOW....294
KB8O....292
IKØADY....290
LA7JO....289
9A2AJ....289
DJ1YH....288
YU7FW....286
F6HMJ....284
KF5PE....282
LU3DSI....282
W4UW....279
I2EOW....278
WG7A....276

SSB

K4MZU....328
K2TQC....328
K2FL....328
DJ9ZB....328
EA2IA....328
K2ENT....328
OZ5EV....328
VE1YX....328
W6EUF....328
K2JLA....328
N7RO....328
K6YRA....328
W6BCQ....328
K5OVC....328
KZ2P....328
VE7DX....328
AA6BB....328
EA4DO....328
ZL3NS....328
K6JG....327
WA6OET....327
SM6CST....328
W3GG....328
I4EAT....328
W4UNP....328
YU1AB....328
F9RM....328
PY4OY....328
OZ3SK....328
XE1L....328
4Z4DX....328
CX4HS....328
N4MM....328
OE3WWB....328
IK1GPG....328
W7OM....328
K7EHI....328
DU9RG....328
W6DN....328
I4LCK....328
IT9TQH....328
IT9TGO....328
K3UA....327
K9BWQ....327
WØYDB....327
W4QB....327
VE3MR....327
VE3MRS....327
OE2EGL....327
K8CSG....327
K1UO....327
DL9OH....327
WB4UBD....327
K7LAY....327
W2FXA....327
IK8CNT....327
N4KG....327
K8PV....327
W9DWQ....326
W9SS....326
WA4IUM....326
WB1DQC....326
XE1AE....326
KA3HXO....326
VE3XN....326
YS1GMV....326
K9MM....326
ZL1AGO....326
KF7SH....326
ZS6LW....326
VK4LC....326
YV1AIP....326
K9IW....326
WA4JTI....326
YV1AJ....326
YV1KZ....326
W9OKL....326
9A2AA....326
DL6KG....326
KØKG....326
OK1MP....326
WB3CQN....326
I2QMU....326
PAØXPQ....326
N4JF....326
KB4HU....326
KC4MJ....326
SV1ADG....326
CX2CB....326
TI2CC....326
WA4ECA....326
IØZV....326
IKØIOL....326
ZL1HY....326
YU1HA....326
W4NKI....326
KZ4V....326
VE3GMT....326
W4EEE....326
KE4VU....326
AG9S....326
WA4WTG....326
WD8PUG....326
W2CC....326
VE2WY....326
AA4KT....326
PT2TF....326
KM2P....326
N5FW....326
I1EEW....326
K9HDZ....326
WA3HUP....326
LA7JO....326
YV1CLM....326
N6AW....326
ZP5JCY....326
K5TVC....326
KB7VD....326
WB3DNA....325
I2EOW....326
KE5PO....326
I8ACB....325
N6AR....325
WD8MGQ....325
K8LJG....325
K8NA....325
AI8M....325
W4UW....325
WB6OKK....325
VE2PJ....325
I8LEL....325
IT9ZGY....325
K6LEB....325
IK1GPG....325
I1JQJ....325
VE7WJ....325
AI8S....325
K1HDO....325
KC8EU....324
N4KEL/M....324
IK8BQE....324
AA5NK....324
K2JF....324
WB5TED....324
W2FGY....324
YV1CLM....324
YV5CWO....324
W5LLU....324
I8KCI....324
I1POR....324
VE4AT....324
KD5ZM....324
KØHQW....324
W7FP....324
KA5TTC....324
WB4DBB....324
K4JLD....324
KB2MY....324
EA3BKI....324
4N7ZZ....324
YV5IVB....324
N2VW....324
K8YVI....323
NC9T....323
K9HQM....323
KC5P....323
WDØGML....323
WW1N....323
K4SBH....323
WB2JZK....323
CE7ZK....323
K2ARO....323
LU7HJM....323
KA9I....323
N5FG....323
KB8O....323
WN5IJZ....322
XE1CI....322
WB4PUD....322
LZ1HA....322
ZS6AOO....322
WA5HWB....322
VE2GHZ....322
TI2JJP....322
AB7AU....322
KD8IW....322
W5XQ....321
KA5TQF....321
TI2HP....321
I8XTX....321
I8YRK....321
K4PQV....321
KS2I....321
OA4OS....321
W7ULC....321
W3AZD....321
WØULU....321
OE7SEL....321
WDØBNC....321
CT1EEB....321
LU1JDL....320
KF8VW....320
IØAMU....320
K4CXY....320
G4ADD....320
I4WZK....320
I4SAT....320
WE2L....320
EA3EQT....320
WS9V....320
KØPF....320
KE3A....320
VE4ACY....320
N4CSF....320
W6SHY....320
ON5KL....319
WA4DAN....319
KI3L....319
VE3HO....319
WB4PUD....322
XE1MD....319
KB1JU....319
YV1AJ....319
PY2DBU....319
IØSGF....319
K9QVB....318
KB5FU....318
AA4AH....318
G4GED....318
W6NW....318
IK8GCS....318
W6MFC....318
KF5AR....318
I8IYW....318
NI5D....318
WA8YTM....318
F6BFI....318
KX5V....318
WB6PSY....317
9H4G....317
WA6DTG....317
W8AXI....317
XE1XM....317
N5HSF....316
KB1HC....316
KV2S....315
WA9RCQ....315
N3ARK....315
N4HK....315
K2AJY....315
K7TCL....315
NØAMI....314
OE6CLD....314
W5RUK....314
DL3DXX....314
OH5KL....313
WDØDMN....313
KD9CN....313
K1VHS....313
OA4QV....313
EA1JG....313
W1LQQ....313
I4CSP....313
K4LR....312
ZL1BOQ....312
WA9IVU....311
KD5ZD....312
WA2FKF....312
ZS6BBY....311
IN3ANE....311
F1OZF....311
EI6FR....311
WT4K....311
YZ7AA....311
WA5SUE....311
GM4XLU....310
KA5RNH....310
I2MQP....310
HA6NF....310
KF7RU....310
K4JDJ....310
AB4IQ....310
EA5RJ....309
CT1AHU....308
EA3CB....308
W9IL....307
N6AV....306
TI2TEB....306
VE3DLR....306
W3YEY....306
KF8UN....305
XE1MDX....305
DK5WQ....305
EA5OL....305
G4NXG/M....304
KJ6HO....304
VE3CKP....304
WB2NQT....303
EA3CWK....303
EA3BT....303
WA9BDX....302
WA8MEM....302
KD4YT....302
CT1YH....302
RA2YA....301
W2LZX....301
XE2DU....301
AB4NS....301
WP4AFA....300
YU2TW....300
AB4UF....300
WB4UHN....300
KB8NTY....300
YT7TY....300
K6BZ....300
WB6GFJ....299
VE3CKP....299
EA5GKE....298
KJ9N....298
KB5WQ....294
IT9VDQ....293
KJ5LJ....293
TI2LTA....292
W5OXA....292
K2EEK....291
N6ITW....291
YB1RED....291
DJ2UU....291
4X6DK....291
WA3KKO....290
N5QDE....290
OE7KWT....290
N6CFQ....290
IK2PZG....289
LU3HBO....289
KF7VC....288
OK1AWZ....287
IK2DUW....287
IK8BMW....286
TU2QW....286
NM5O....285
EA1AYN....285
EA3BT....285
KQ4WD....284
IK2HBX....284
KE6CF....283
WZ3E....283
YC3OSE....282
VE7HAM....281
WN6J....281
KK4TR....281
YU1TR....280
KN4RI....280
WØIKD....279
EA3CWT....278
WN5MBS....277
VE2DRN....277
GØLRX....277
KC6AWX....276
OA4EI....276
NC3C....275
F5NBX....275
VE2AJT....275
US1IDX....275
Z31JA....275

RTTY

K2ENT....321
NI4H....320
WB4UBD....304
EA5FKI....284
K3UA....283
I1JQJ....273
W4EEU....269
KE5PO....268
G4BWP....256
W4QB....255

DXing for the reasons given above, the expanded 15 meter SSB allocations should provide important additional opportunities for working DX. The extra SSB frequencies also will be helpful during SSB contests, which are a good chance for the beginning DXer to pick up lots of new countries.

The something-for-everyone continues for the Extra class amateurs. The League proposes to provide the highest class licenses additional SSB frequencies of 3700–3750, 7125–7150, and 21150–21200 kHz. The 75 meter expansion should have a moderate impact on easing the usually difficult task of working DX on the band, by spreading out the jam-packed 75 meter DX subband. The additional SSB privileges on 15 meters should also be useful for some DXing, although most SSB DX on the higher bands tends to operate in the Advanced segments of the bands.

On the whole, although these proposals will not have as dramatic an effect on DXing as the last SSB subband expansion, the changes should be neutral or positive for DXers.

Incidentally, the something-for-everyone aspect of the League's suggestions continues even to die-hard CW buffs. While the expanding SSB subbands may seem to go against a pro-CW stance, the League has also proposed toughening the standards of the CW tests to get or upgrade an amateur license. Specifically, the League proposes a return to the one-minute of perfect copy standard, rather than a 70 percent passing grade on a multiple-choice test as at present. Further, the proposal recommends bringing back the sending test, which is not currently used. The League softens the blow of this in-

KA3DBN (left) visits with Rudi, DK7NP. Rudi is editor of the German magazine Funk Amateur, *but here he proudly sports a CQ hat.*

creased standard by suggesting lowering the CW copying speed to 10 wpm from the present 13 for General and Advanced operators. The CW requirement for Extras would remain 20 wpm.

Again, note that these are suggestions for discussion and comment, not fixed rules nor even proposals to the FCC. If you object to some of the suggestions, contact your elected ARRL director.

The Incoming QSL Bureau

With the first wave of massive callsign changes from the vanity callsign system comes an important point for DXers. You will need to make immediate arrangements to receive your cards addressed to your new call. If your new callsign is in a different district than your previous call, you will need to set up an account with an additional incoming QSL bureau. And if you're a fourth-district DXer with a new fourth-district call, you may have to do the same, if the number of letters before the four has changed. If you need to find the address of a new incoming QSL bureau and can't find the information elsewhere, you can always send a self-addressed, stamped envelope (SASE) to the ARRL and ask for their incoming QSL bureau information package.

Remember that your incoming QSL bureau is determined by the district of your base callsign, regardless of physical location and any "portable" designation. Thus, WB2CHO/6 maintains an incoming-bureau account with the W2 bureau, not the W6 bureau.

If your new call is in a different district, contact your new incoming QSL bureau as soon as possible, as unclaimed QSL cards are the single biggest problem of the bureau system. And don't neglect your previous incoming QSL bureau. Cards will continue to arrive for your old call for many years. (I'm *still* getting cards from contacts made 20 years ago.) This means that DXers with new calls will have to put up with the additional expense and bother of maintaining parallel incoming QSL bureau accounts for at least the next few years. Fortunately, the incoming QSL bureau is one of the best bargains in DX, and the additional cost and trouble will be minimal.

Why the difference in the fourth district? That's the only district with two separate QSL bureaus—one for single-letter prefixes (K4, N4, and W4) and one for two-letter prefixes. Roger, N4ZC, long-time manager of the single-letter fourth district QSL bureau, posted a summary of how his bureau works. Even if you don't use his bureau, his comments are worth reading, as he covers most of the important points on how to use the incoming bureau system—a refresher course in QSL bureaus. I'll turn it over to Roger now:

"Many of you have changed your calls under vanity. I thought I'd use this forum to let you know how the bureau system operates in general and the W4 bureau in particular. Most of the US bureaus operate pretty much in the same way.

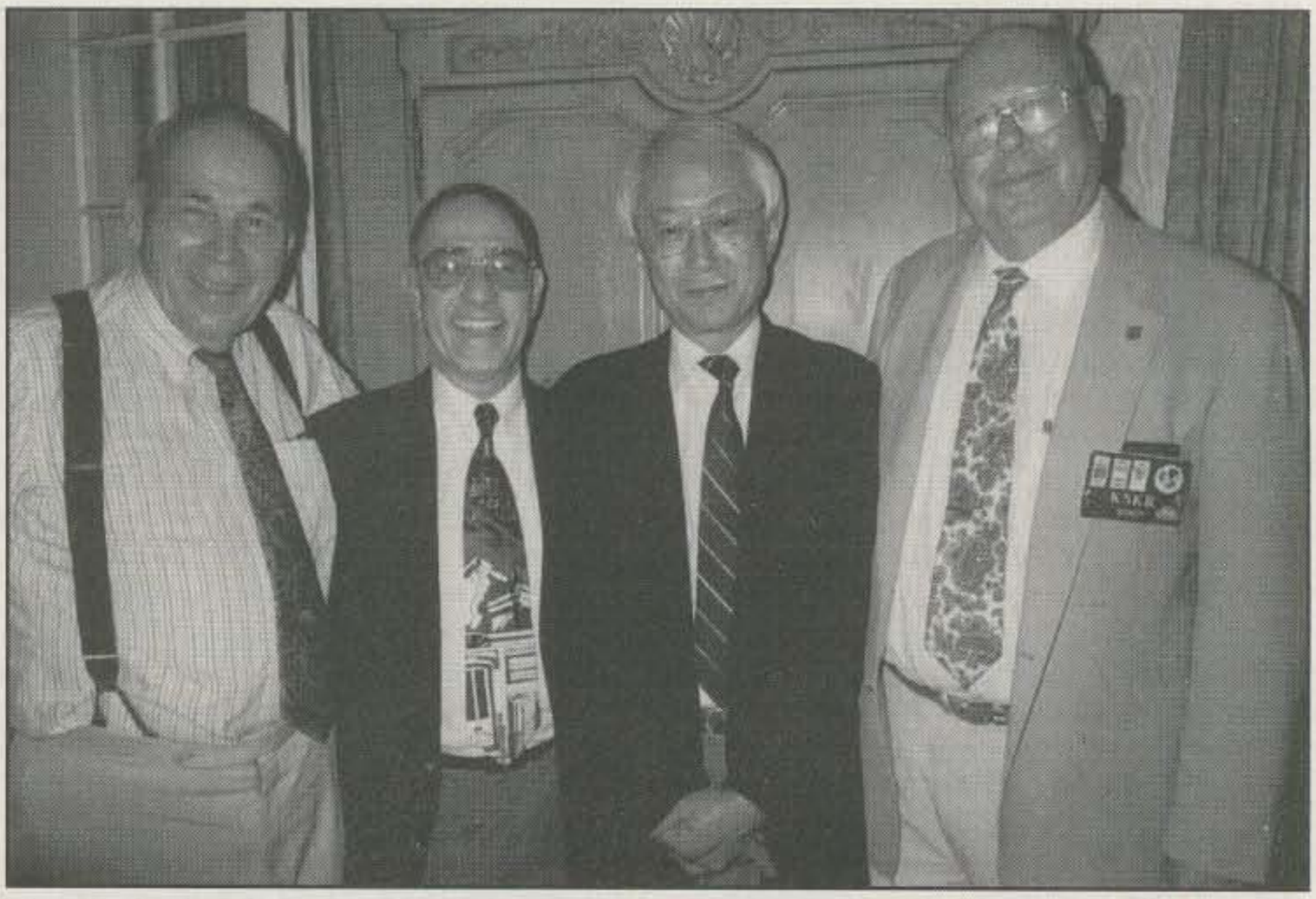
"If your call starts with K4, N4, or W4, I am the manager of your bureau. If your four-call starts with two letters you get your cards from: Sterling Park ARC, Call Box

QSL INFORMATION

BY4AA to CBA
C31LD to VE3HO
C31LJ to VE3GEJ
C4ØM to 5B4AFM
C6AHU to WJ8C
C91CO to W4DR
CE3F to LU8DPM
CG1CZ to VE1CZ
CG1ZZ to VE3BMV
CI2QK to VE2QK
CI3AT to VE3AT
CI3EJ to VE3EJ
CI3IY/7 to VE3IY
CI3LPE to VE3LPE
CJ3NR to VA3NR
CK7U to VE7UBC
CQ9M to G3PFS
CT3BX to HB9CRV
CT3EE to DK7YY
CT3FN to HB9CRV
CT8T to CT1DVV
CYØ/VK1ZZ to WA4DAN
CYØXX to WA4DAN
D25L to PA3DMH
DLØMBG to DL8AKA
DU3/AH8F to G4ZVJ
DX1CW to JA3GN
DX1XW to JA3GN
EA4URE to buro
EA8AH to OH1RY
EA8ZS to EA8ZS
EA9BF to buro
EA9IE to buro
ED1BD to EA1BD
ED3DX to EA3AML
ED6PZ to bureau
ED7SDX to EA7GA
ED9EA to EA7LQ
EI7M to EI5HB
EK4GK to GW3CDP
EO6F to OE5EIN
ER3MM to I8YGZ
ES1J to ES1WW
EX8F to DL8FCU
EX9A to DF8WS
FG5BG to KI6FE (CQWW only)
FG5FG to F6FNU
FG5GA to FG5XZ
FG5HR to F6BUM
FK5DX to WB2RAJ
FM5BH to F6HEQ
FM5DN to KU9C
BY4BZB to ARS of Shanghai, Zhabei District Science and Technology Center, POB 083-105, Shanghai, China
BY4RSA to ARS of Jiangsu Radio Sports Assn., Box 538, Nanjing, China
BY4SZ to ARS of Suzhou RSA, Box 51, Suzhou, China
CN8NK to Mohamed, P.O. Box 6343, Rabat, Morocco
CP6AA to OHØXX, Olli, Suite 599, 1313 So. Military Trail, Deerfield Beach, FL 33442, USA
CQ1A to CT1EEB or WA1ECA are not the managers of the 1996 CQ1A CQWW operation
CT3/OH6LI to OH6LI buro or Jukka Klemola, Aarontie 5, SF-31400 Somero, Finland
CU2AF to Eduardo Machado, P.O. Box 1417, 9500 Ponta Delgada, Sao Miguel, Azores
D44BS to Angelo Mendes, P.O. Box 308, Praia, Cape Verde Isl., Portugal
DU1SAN to Serafin A. Nepomuceno, 186 MacArthur Hwy., Potrero, Malabon 1475, MM, Philippines
DU9RG to Robin U Go, Tukananes, Cotabato City 9301, Philippines
EA6IB to buro or via EA6PZ Armando Costa Serra, P.O. Box 800, 07800 IBIZA, Spain
EM1KA to JA2JPA, Taka Ajiro, 2-14-18, Doubayashi, Shimizu, Shizuoka 424, Japan
EY2Q to EY8CQ, Alex Rubtsov, P.O. Box 32, 117449 Moscow, Russia
FG5GH to Edgar Jacob, Perrin, F-97111 Morne a l'Eau, Guadeloupe Isl., France
FH5CY to Yves Seguineau, Box 555, F-97610 Mayotte, France
(QSL routes for these CQWW SSB operations provided by 425 DX News.)

599, Sterling, VA 20167. If you operate with another call area call portable four, you will continue to get your cards from your home bureau.

"Don't send domestic U.S.-to-U.S. cards via the ARRL bureau system. This includes U.S. IOTA island cards. U.S. IOTA islands of the contiguous 48 states are not DX for the ARRL bureau system. ARRL has told me the one exception to this rule is that WRTC U.S. cards will be sent to every contact via the ARRL bureau system. No WRTC cards have shown up at this bureau so far. You may send cards to U.S. mangers of DX stations via our bureau.



W5VBX, W5ZPA, DXer of the Year JA1BK, and K5KR at the 1996 New Orleans International DX Convention. The 1997 convention is August 22–23.

CQ DX Awards Program

SSB

2217 .....F5YJ 2218 .....EA3FFE

CW

955.....JA3BKP 957.....F5OIU
956.....F5YJ 958 .....JH4NPP

SSB Endorsements

320.....KE5PO/326 320 .....KD8IW/322
320 .....N2VW/324 320.....W6SHY/320
320 .....KB8O/323

CW Endorsements

320 .....VE7CNE/320 275 .....LU3DSI/282
310 .....N5HB/311 200 .....F5OIU/219
300.....KE5PO/300 200 .....EA6AA/215
275 .....KB8O/292 150 .....EA2BNU/152

RTTY Endorsements

250.....KE5PO/268

Total number of active countries is 328. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

"You don't need to be a member of the ARRL to use the incoming ARRL QSL bureau. You only need to send us some self-addressed, stamped envelopes (SASEs) to get your cards. Don't send money. We really don't want to keep track of postage money for thousands of stations. (Some bureaus, like the W2, do like to keep track of your money.) Please send us SASEs between 5" × 7" and 6" × 9". Don't forget to put your call in the upper left corner of your SASE. Please take the time to print your call with neat block letters. You wouldn't believe how poorly some people write their calls. I sometimes need to compare what the call looks like to the *Callbook* address to be sure what is written.

"If you work a great deal of DX or are the manager for a big-time DX station, you may be able to talk your sorter into sending your cards in a box. That will be between you and your sorter. If they say SASE only, it's SASE only. Any postage money should go direct to your sorter, not via the bureau.

"Don't put two calls on the same SASE. Some of the letter sorters are as much as 300 miles apart, so there is no way you can use one SASE for two calls.

"Cards come in for years after the QSO, so you need to keep SASEs on file for your old call for three-four years. I've found the

CIRCLE 88 ON READER SERVICE CARD

following to be the general time frame for bureau cards. If the DX station sends out your card soon after he works you, it takes four months or more. If the DX station waits for your bureau card before he answers via his outgoing bureau, it takes a year or more. Some people feel if they complain, they will get even worse service. *Not so!* Once I give the cards to the letter sorters, I assume they are doing a good job if I don't hear from you. Think about it, guys. How does the manager know if you are getting your cards or not? Don't assume telling the manager once will solve the problem forever. If I ask the sorter and he says, "Yes I was behind, but I'll make sure I take care of it now," I must assume he is doing the job if you don't tell me there is a problem again. If the sorter tells me "no problem" every time I ask, I assume no problem if you don't tell me the problem is back. If I find there is a continuing problem, I'll give the letter to another sorter, but I need your input to determine this. The manager of your bureau can't solve a problem he doesn't know about. He needs your input to tell him of continuing problems."

"The manager of the Sterling Park bureau is Dick Maylott, W2YE (ex-W4LMJ). I know Dick wants to know of any problems you may have with that bureau. His e-mail is <rwmaylott@aol.com>.

"The letter sorter is the person who has your cards, envelopes, and records. Write directly to him first with any questions. Let me know if you don't get a suitable reply from one of my letter sorters. Many times you may think you have SASEs on file when you don't. A quick check with your sorter will let you know. If you work lots of DX and you have received no cards in a long time, drop a note to your sorter to see if you need more SASEs. Drop your sorter a note if you really don't want your cards and want him to round file them. It will save him time and space. Don't forget an SASE for his reply to your question. Your letter sorter is determined by the first letter after the four. W4ABC gets his cards from the A sorter. Contact your QSL bureau manager for the letter sorter who handles your cards. *(Some bureaus prefer to have all contact with the bureau through the manager, and won't identify individual letter sorters.—ed.)*

"We keep cards for a year before we round file them. During the first three years I was with the bureau, I never round filed any. Then, I thought, why am I wasting my time and space for some SO who won't take a few minutes of his time to send me SASEs for his cards?

"I've been the manager of this bureau for ten years now. As a retired USCG radio op, I'm here most of the time and will be happy to make a sked if you want to talk about bureau operation.—73, Roger, N4ZC"

73, Chod, VP2ML

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MIDLAND CONSUMER RADIO

CIRCLE 169 ON READER SERVICE CARD

BY NORM VAN RAAY, WA3RTY

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we congratulate John Thompson, K6OHM, *CQ*'s USA-CA All Counties #919. Here he tells us just what he has done to achieve "the whole ball of wax." I'm sure many of you will find these things familiar, as you reminisce about your own county hunting experiences while reading John's story.

John Thompson, K6OHM, USA-CA #919.

Via John Thompson, K6OHM USA-CA #919

Net Control: "Are there any other check-ins?"

K6OHM (tuning the upper end of the 20 meter band): "Hi, this is K6OHM, and I'd like to check into the net."

Net Control: "Are you mobile?"

K6OHM: "No, I'm at my home QTH in Orange County, California."

Net Control: "Well, you've stumbled onto the Mobile Emergency and County Hunters Net frequency, and as a fixed station you don't have to check-in. Just listen, contact the mobiles, and you'll become addicted to county hunting like the rest of us!"

I can't recall who was net control on my first day of county hunting, but a big thank you is long overdue. What a trip! The things that all of us have done to achieve the "whole ball of wax" (what does that really mean?) are certainly notable. In my case it meant:

- missing scheduled appointments because a state/county needed was being run;
- waking my wife early in the morning to head for a needed county;
- asking a mobile to return to a county previously run when I couldn't hear him/ her or just wasn't around (the ultimate thank you);
- calling long distance to arrange a schedule for a needed county;
- providing the post office with $$$ to buy stamps for Mobile Reply Cards and SASEs;
- sitting around for hours waiting for propagation to improve when a rare one was being run;
- coping with the QRM from other nets (Saturday especially) close to our frequency, those who call without seeing if the frequency is occupied, and the Spanish-speaking stations who camp out at the top of 20 meters.
- attacking my mailbox everyday as soon as mail was delivered to check for Mobile Reply Cards;
- ignoring household duties that just couldn't be done unless my radio could be heard as well (I'll now be able to get outside more!);
- overlooking my exercise program, which needs to be resumed immediately!

When I was first licensed as a Novice in 1954, I was active in Boy Scouts in Cincinnati, Ohio. Moving to California in 1955, I passed my General test and received K6OHM as my call. I've had a blast with hamming over the years, whether it's working DX, collecting IOTA's (Islands On The Air), or now county hunting.

My working career ended in 1994, but I've had a rewarding life in the entertainment profession. From 1961 until 1968 I worked at CBS Television City in the Finance Division. I was there when shows such as Gunsmoke, Carol Burnett, Red Skelton, the Smothers Brothers, Danny Kaye, Judy Garland, and Playhouse 90 were being produced.

An opportunity to change my employer to Walt Disney Productions (now the Walt Disney Company) came about in 1968, and it was a 26-year run that took me from the film studio in Burbank, to engineering in Glendale, Walt Disney World in Florida, and finally Disneyland in Anaheim. I was part of the Systems group Finance, Entertainment, Costuming, and Purchasing during my stay with "the Mouse."

Those attending the Phoenix National Convention heard about some of my adventures at Disney from my slide show entitled "Buying for a Mickey Mouse Outfit!" I plan to give this presentation again at the Orlando National in July, so I hope many of you will join me for this hour of fun.

Thanks to all who helped me so much in accomplishing USA-CA #919. Those who gave me 100 or more counties are KZ2P, WB4FFV, K5GE, KJ5PQ/KG5UZ, NB6A, KK7X, KA9PZI, WAØSBR. Those who gave me 200 or more are KC1NA, N2TPH, and NØLDT. Bob, N4CD, gave me more than 300 counties. Thanks to all of you.

Finally, we all remember our last for "the whole ball of wax," but how many have someone who volunteered to drive from St. Johns county, Florida to Edmonson, Kentucky just to give a last county? Well, Ed Bunch, N4UJK, did it for me, and a giant THANK YOU to you, Ed. I'm looking forward to meeting you at the National. I'm also counting the days until I meet many more of you as well. I'm glad to be a part of this elite group of amateur radio operators. By the way, do you get an asterisk next to your number if you got it during the low in the sunspot cycle?!

Box 76, Pleasant Mount, PA 18453
e-mail wa3rty@epix.net

SPECIAL HONOR ROLL

Paul Veltman, WA6OKQ
USA-CA all Counties #920
February 10, 1997

HONOR ROLL

500		1500	
WA6OKQ	2961	WA6OKQ	1197
DJ6BN	2962		
I2DMK	2963	**2000**	
Z31JA	2964	WA6OKQ	1101
1000		**2500**	
WA6OKQ	1334	WA6OKQ	1029
I2DMK	1335	**3000**	
Z31JA	1336	WA6OKQ	936

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $5.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.50. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

Awards Issued

USA-CA 500: Paul Veltman, WA6OKQ; Franz Ratering, DJ6BN; Massimo DiMarco, I2DMK; Venco Stojcev, Z31JA.

USA-CA 1000: Paul Veltman, WA6OKQ; Massimo DiMarco, I2DMK; Venco Stojcev, Z31JA.

USA-CA 1500: Paul Veltman, WA6OKQ.

USA-CA 2000: Paul Veltman, WA6OKQ.

USA-CA 2500: Paul Veltman, WA6OKQ.

USA-CA 3000: Paul Veltman, WA6OKQ.

On A Personal Note

I finally felt healthy enough to get away from my doctors and was able to visit my sister in Florida for ten days. Had a great time getting warm, walking the beaches, seeing a baseball game, and sightseeing. I got back to Pennsylvania and had four inches of snow the first day back. That I can do without!

73, Norm, WA3RTY

*"ALPHA amplifiers have a world-class reputation for performance and reliability and are used by many of the leading DXpeditions and serious contest entries throughout the world."**

January 1997: VKØIR, Heard Island, South Indian Ocean

It cost the **VKØIR** team $200,000 ***just to get to this most wanted DX country.*** Propagation always is difficult here: "short path" to Tokyo is 7,500 miles, London 8,500 miles, Seattle 12,000 miles.

Operating in the shadow of 9,000 foot volcano "Big Ben", VKØIR makes 80,673 QSOs – from the edge of the world at the bottom of the sunspot cycle! Their amplifiers? The same ***ALPHA/POWER 91βs*** that expedition organizers KK6EK, KØIR and ON6TT took to XRØY in 1995.

RIGHT: January 1994: Powered by four *ALPHA 89* amplifiers, **3YØPI** on isolated Peter I Is. Antarctica dished out more than 60,000 QSOs despite ferocious summer blizzards and often-poor propagation.

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CT1BOH/P4ØE

* In RSGB's February 1997 *RadCom*, Peter Hart, G3SJX, provides our headline and says, "(The ***ALPHA/POWER 91β***) is beautifully made... performed flawlessly...is an excellent amplifier in all respects... at a very competitive price... The ***87A*** really is the ultimate linear amplifier...the 'Rolls Royce' of all linear amplifiers.

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BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

Get Ready For $50 Vanity Callsigns!

The history of "Vanity" callsigns in the amateur service is long and interesting! It actually goes back to June 1990, when Jim Wills, N5HCT, a retired Extra Class amateur from Tyler, Texas, wanted to reclaim his long expired WA5EHQ callsign. That's when Jim filed a Petition for Rule Making in response to an April 19, 1990, FCC Public Notice concerning the assignment of amateur radio station callsigns.

Wills suggested that amateurs be allowed to specify three callsign choices in order of preference and attach a $30 fee to the FCC requesting a callsign change. "The Federal Budget and the amateur community all gain from this proposal," he said. That petition was denied because of the statutory exemption of amateur service applications from fees.

In 1991 Jim contacted his Congressman, Ralph M. Hall (Democrat-TX), who shared the idea with the staff of the House Telecommunications Subcommittee, who were already working on a way to make the FCC at least partially self-supporting. The goal was for the FCC to collect enough user fees to help pay for itself. Hall told Jim Wills that Congress might be able to make the necessary legislative changes to put a vanity callsign fee into effect.

On June 12, 1992 a letter jointly signed by Representative Edward J. Markey (Democrat-MA) and Representative Ralph M. Hall was sent to then FCC Chairman Alfred Sikes. It said, "We are writing to you on behalf of several amateur radio operators who are interested in the establishment of an FCC system for allotting distinctive callsigns. Such callsigns would be available at a fee to radio operators, in order to recover the total cost associated with the program." The addition of Markey's signature to the letter added renewed importance! Markey and the House Commerce Committee control the FCC budget.

On January 13, 1993 Congressman Hall again wrote to Jim Wills about a self-funding program of granting special callsigns to amateur radio enthusiasts that would not place additional demands on FCC resources as long as the FCC set fees at an appropriate level. He also noted that the FCC was already reprogramming their amateur data processing system and that this would be a good time to implement a specialized callsign program.

A major problem was that the FCC still didn't have permission to collect fees associated with amateur radio. Ralph Hall discussed the issue with the staff of Telecommunications Subcommittee Chairman Ed Markey and gained his support for a legislative proposal which would allow the FCC to collect fees for specialized callsigns in the Amateur Service.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (817-461-6443)

1993 Budget Reconciliation Act

That's the official name of the Clinton Deficit Reduction Plan. In the budget bill was a provision for collecting regulatory fees from various FCC licensees. "Vanity" callsigns in the Amateur Service at an initial proposed cost of $7 a year over ten years ($70) were included as part of the Budget Reconciliation Act of 1993. Neither the FCC or the ARRL knew it was coming! The stunning development caught everyone flat-footed. It seemed Jim Wills had worked directly with Congress, who by-passed the FCC's Private Radio Bureau. The League even tried to take credit for initiating the program.

The wording that applied to the Amateur Service, inserted in the Schedule of Regulatory Fees at the last minute, was only four words long. It read, "Amateur vanity callsigns $7." The FCC was authorized " . . . to assess and collect the payment in advance for a number of years not to exceed the term of the license held by the payor."

Actually, Clinton's Deficit Reduction Plan (and vanity callsigns) almost didn't get approved at all! It passed the House by only two votes (218 to 216), and Vice President Al Gore had to break a 50-50 tie in the Senate. President Clinton signed the measure into law on August 10, 1993.

Ironically, even though Congressman Hall was primarily responsible for getting the amateur callsign amendment tied to that bill, he voted against it! He was opposed to the Clinton budget package, and his plan was to get "Vanity" callsigns inserted in the FCC Authorization bill which would be coming up later in the year!

The new FCC computer system was programmed to provide personalized amateur callsigns in 1994. The special callsign program still had to go through rule making before it could be implemented. The FCC issued a Notice of Proposed Rulemaking on December 13, 1993 and approved the final "Vanity" callsign rules almost exactly a year later (on December 23, 1994).

While the ARRL played no part in getting the vanity callsign program through Congress and enacted into law, they were very active in developing the guidelines under which amateurs would be able to obtain callsigns of their choice. In the end, the FCC basically followed their suggestions. However, there were exceptions.

For example, the ARRL wanted a one-time $150 application fee rather than a regulatory fee, with the callsign only being chosen from the amateur's own region. A system of opening gates and a FCC Form 610-V vanity callsign application developed.

Section 9 Regulatory Fees

Actually, the FCC assesses and collects two kinds of licensee fees authorized by the Communications Act. "Application fees" authorized by Section 8 of the Act were already on the books. These fees are to reimburse the government for the administrative costs involved in issuing licenses and permits.

Section 9 (Regulatory) fees are to reimburse the government for the FCC's regulatory activities, including enforcement, rule-making, user-information, and international activities. Both application and regulatory fees can be adjusted upwards in $5 increments based on increases in the Consumer Price Index (inflation) and FCC costs.

Non-profit (including amateur radio), public safety/emergency, and local, state, and federal government stations all are statutorily exempt from paying either application or regulatory fees. The Act does, though, specifically allow a regulatory fee for amateur vanity callsigns.

The ultimate objective of the Section 8 and 9 fee systems is for the FCC to collect their budgetary costs from the same public who obtains the benefit of their services. In fiscal year 1995 the FCC proposed adjustments to the regulatory fee schedule that would recover $116.4 million in FCC costs. The amount that must be recovered is set by Congress.

Congress and the Communications Act initially authorized a vanity callsign cost of $7 annually over a ten-year term ($70). On June 14, 1995—and with the 1995 fiscal year nearly over—the FCC's Office of Managing Director reduced that cost to $3, or $30 for the 1995 fiscal year. Coincidently (or was it), this is the same cost that Jim Wills had suggested in his 1990 petition.

The Managing Director's office came up with the $3 annual figure by initially estimating that 2000 amateur vanity callsigns would be issued at a total cost of $60,000. This was later drastically changed by the Wireless Telecommunication Bureau to a revenue requirement of $840,000 for an estimated 28,000 vanity callsign applications that they felt would be handled annually—about 2300 a month. It still worked out to $3 per vanity callsign, though. However, no amateur vanity callsigns were issued in FY-1995.

Congress required the FCC to recover $126.4 million in FY-1996, but it was well into FY-1996 (which began October 1, 1995) before the vanity callsign program really got going. The first Vanity callsigns were not issued until June 1996, and even then it was only for previously held callsigns. The FCC did not open the program to amateur Extra Class amateurs until September 23, 1996. It soon became apparent that the costs to administer the Vanity callsign program were higher than first thought.

Fiscal Year 1997

For fiscal year 1997 (which started October 1, 1996) Congress is requiring that the FCC collect $152.5 million in regulatory fees, a 21% increase.

On March 3, 1997 the FCC released a proposed fee schedule in order to collect the increased amount required by Congress. Additionally, the FCC proposed to include regulatory fees upon licensees not previously subject to payment of a fee. For example, PCS (Personal Communications Services, the new low-power commercial telephone service) is included for the first time. The NPRM is on the super-fast track. Only a 15-day comment deadline is being allowed, and a Final Report and Order is expected by July 1.

In developing the proposed FY-1997 fee schedule, the FCC took into consideration the estimated number of payment units for FY-1997 and then pro-rated a shortfall among all the existing fee categories. They also evaluated various proposals made by Commission staff concerning other adjustments to the fee schedule. Payment units were obtained through a variety of means, including licensee data bases, actual prior year payment records, and various projections.

The FCC limited the fee increases to a 25 percent increase over the FY 1996 fees. The 25 percent increase is over and above the revenue which would be required after adjusting for the projected FY 1997 payment units. Thus, FY-1997 fees may increase more than 25 percent over FY 1996 fees, depending upon the number of payment units. And in the case of amateur vanity callsigns, it does.

The FCC has again re-evaluated how many vanity callsigns it believes it will issue. It now estimates that some 10,000 applicants will apply for vanity callsigns in FY-1997 (somewhat less than the 28,000 first anticipated!). Based on the Wireless Telecommunications Bureau (WTB) projections of new vanity callsign requests, a regulatory fee of $5 annually, or $50 for a ten-year term, is being recommended. It seems assured that is what you will be paying shortly! Here is the wording from the NPRM covering FY-1997 regulatory fees:

• **Amateur Vanity Callsigns:** This fee covers voluntary requests for specific callsigns in the Amateur Radio Service authorized under Part 97 of the Commission's Rules. For FY 1997, we are proposing that applicants for Amateur Vanity Callsigns will pay a $5 annual regulatory fee per callsign, payable for an entire ten-year license term at the time of application for a vanity callsign. The total regulatory fee due would be $50 per license for the ten-year license term. Section 9(h) exempts "amateur radio operator licenses under Part 97 of the Commission's rules (47 CFR Part 97)" from the requirement. However, Section 9(g)'s fee schedule explicitly includes "Amateur vanity callsigns" as a category subject to the payment of a regulatory fee.

General Mobile Radio Service licensees are also having their regulatory fee increased to $5 per year, based on a five-year license. GMRS is the old 462/467 MHz Class A UHF-CB Service. No unlicensed service—including Part 15 devices, 11 meter Citizens Banders, private aviation and ship radio stations—nor the new Family Radio Service is being assessed a regulatory fee. The costs of regulating these entities is borne by those licensees subject to a fee requirement.

By the way, Jim Wills, N5HCT, who got the vanity callsign program off and running, never did get his old WA5EHQ callsign. He requested and received W5JIM!

See you next month . . .

73, Fred, W5YI

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Solar Cycle Progress

According to the Royal Observatory of Belgium, the mean sunspot count for January 1997 was 6.5. A high of 17 was recorded on January 5, and the sun was absolutely spotless on 11 days.

The January mean level results in a 12-month running smoothed sunspot number of 9 centered on July 1996. This is the same level as reported for the previous month, as the apparent new cycle begins its slow climb. The smoothed number is an average of the mean values for the past twelve months, and it is the basis for measuring the solar cycle. For May 1997 a smoothed number in the mid-teens is forecast.

Solar Flux Values

The Dominion Radio Astrophysical Observatory of Canada, located at Penticton, B.C., reports an adjusted mean value of 74 for the January 1997 level of 10.7 cm solar flux. This results in a 12-month running smoothed solar flux level of 72 centered on July 1996. A level in the high 70s is likely for May 1997. Solar flux levels are directly related to sunspot counts, but are a more accurate and more convenient method for determining solar activity.

May Propagation

The following is an overall picture of HF amateur band conditions expected during this month. For specific times of DX openings refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts valid for May and June, as well as charts centered on Alaska and Hawaii. The Short-Skip Charts contain propagation forecasts for openings varying in distance between 50 and 2300 miles. For day-to-day propagation conditions expected during May see the Last-Minute Forecast, which appears at the beginning of this column.

In May optimum frequencies for DX propagation are *lower* during most of the daylight hours—but higher during the late afternoon, early evening, and nighttime hours—than were observed during the winter months. A considerable increase is expected in sporadic-*E* ionization during the month, and this should result in more frequent short-skip openings on the HF bands, and on 6 meters as well. A seasonal increase in the static level is also normal for May.

10 Meters: A few DX opportunities are expected on this band as the new sunspot cycle begins to rise. An occasional opening may be possible towards South America during the afternoon hours, when conditions are High Normal or better. However, frequent short-skip openings between distances of approximately 750 and 1400 miles should be possible on many days.

12 Meters: Much the same pattern as on 10 meters is expected. Since this is a lower frequency range, the band can be expected to open a bit more often than will 10 meters and stay open for an hour or so longer.

15 Meters: A seasonal decrease in DX openings on this band is normal for May and the summer months, but some fairly good openings to many parts of the world still should be possible during the hours of daylight. The afternoon hours should be best for DX possibilities. Numerous short-skip openings between approximately 600 and 2300 miles should be possible on many days.

17 Meters: The propagation pattern should be similar to 15 meters. With increasing solar activity and summertime propagation conditions in the northern hemisphere, the somewhat lower frequency range of this band may well prove to be a propagation asset. On many days when conditions will not permit 15 meters to open, check this band for openings. When 15 meters does open, expect the same opening on 17 meters, but the band should remain active up to an hour after 15 meters closes. When compared to 20 meters, daytime openings may be similar, but often signals will be stronger on 17 meters.

20 Meters: This is expected to be the best band for DX during May. Opening shortly after sunrise, good DX conditions can be expected to one area of the world or another through most of the daylight hours and well into the hours of darkness. Peak conditions are expected during the sunrise period and again during the late afternoon and early evening. Expect excellent short-skip conditions, often with exceptionally strong signal levels, between distances of approximately 350 and 2300 miles. Quite often, particularly during the late afternoon and early evening, optimum conditions will exist for both short and long skip, and stations a few hundred miles away will be heard at the same time as DX stations several thousand miles away, causing considerable QRM!

30 Meters: This can be another propagation asset during summer months. Peak openings are expected during the nighttime hours, much like 40 meters, but often with higher signal levels and somewhat lower noise levels.

40 Meters: Fewer DX openings are expected because of the shorter hours of darkness and the higher levels of static expected in the northern hemisphere during May. However, some good openings to many areas of the world should still be possible from an hour or two before sunset, through the hours of darkness, until an hour or two after sunrise. Good daytime short-skip openings also should be possible for distances ranging between approximately 150 and 750 miles, with nighttime openings extending up to the one-hop limit of 2300 miles.

80 Meters: A considerable decline in DX possibilities is expected during May because of the shorter hours of darkness and seasonal increase in static levels. Some fairly good DX opportunities should continue to occur, however, for openings to many areas of the world during the hours of darkness and the sunrise period. Weak signals will often be masked by high static levels. Excellent short-skip openings should be possible during the daylight hours over distances of approximately 50 to 250 miles. During the hours of darkness short-skip openings should increase up to approximately 2300 miles. Short-skip propagation also may often be marred by high static levels.

160 Meters: Propagation conditions on this band have passed their seasonal peak and will be on the decline until early fall. Openings up to distances of at least 1000 miles should still be possible during the hours of darkness, and over considerably greater distances at times when static levels are low.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for May 1997

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 4-5, 11-12, 31	**A**	**A**	**B**	**C**
High Normal: 3, 6-7, 10, 13-14, 19, 24, 29-30	**A**	**B**	**C**	**C-D**
Low Normal: 2, 8-9, 15, 17-18 22-23, 25, 27-28	**B**	**C**	**D**	**D-E**
Below Normal: 1, 16, 20, 26	**C**	**C-D**	**D-E**	**E**
Disturbed: 21	**C-D**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair-to-poor (C-D) on May 1st, fair (C) on the 2nd, good (B) on the 3rd, excellent (A) on the 4th and 5th, etc.

E-mail Responses

"I wonder would you have an e-mail number for *CQ* magazine? I can't find mention of it in the magazine itself. Thank you for your assistance. Yours sincerely, *Brendan Rooney, EI7HM.*"

EI7HM de W3ASK. What perfect timing. *CQ* recently received its own e-mail address, and even has established its own web page. You can send e-mail to <**cqmagazine@aol.com**>. Check out *CQ*'s Web page at <**http://members.aol.com/cqmagazine/**>.

You might want to check my Web page, too.

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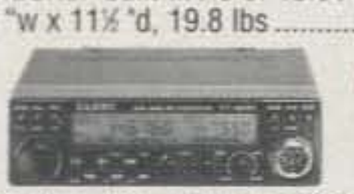

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Similar looks & features: • 31 memories, odd splits • alpha-numeric display • CTCSS encode • 5 scanning functions • track tuning • backlit DTMF mic • 6"w x 1⅛ "h x 7"d.

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FT-50RD/41B 5w w/FTT-12..... **$359.95**
FT-51R 2w 2m/440.....**$479.95**
FT-51R/HP 5w 2m/440 ..... **$489.95**
FT-411E 2.5w 2 meter FM HT.....**$289.95**
FT-911 1w 1.2GHz HT **$469.95**
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FNB-27G 600mA 12V 5W gray battery for FT-26/415/416/530 .....**CLOSEOUT $29.95**
FNB-49 600MA 6V battery; for the FT-10 FT-40, FT-50R .....**SPECIAL $29.95**

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CQ Short-Skip Propagation Chart
May & June 1997
Local Daylight Savings Time
At Path Mid-Point (24-Hour Time)

Band (m)	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	Nil	08-09 (0-1) 09-13 (0-2) 13-17 (0-1) 17-21 (0-2) 21-23 (0-1)	08-09 (1) 09-13 (2) 13-17 (1-2) 17-21 (2) 21-23 (1) 23-07 (0-1)	08-09 (1-0) 09-21 (2-0) 21-23 (1-0) 23-07 (1-0)
15	Nil	07-09 (0-1) 09-13 (0-2) 13-17 (0-1) 17-21 (0-2) 21-00 (0-1)	07-09 (1-2) 09-13 (2-3) 13-17 (1-2) 17-19 (2-3) 19-21 (2) 21-00 (1) 00-07 (0-1)	07-09 (2-0) 09-13 (3-1) 13-17 (2-1) 17-19 (3-1) 19-21 (2-0) 21-07 (1-0)
20	Nil	07-09 (0-2) 09-12 (0-3) 12-17 (0-4) 17-19 (0-3) 19-23 (0-2) 23-07 (0-1)	07-08 (2) 08-09 (2-3) 09-12 (3-4) 12-17 (4) 17-19 (3-4) 19-20 (2-4) 20-21 (2-3) 21-23 (2) 23-07 (1)	07-08 (2) 08-09 (3-2) 09-15 (4-2) 15-17 (4-3) 17-20 (4) 20-21 (3) 21-23 (2) 23-07 (1)
40	08-10 (0-2) 10-16 (1-4) 16-18 (2-4) 18-20 (1-3) 20-22 (0-2) 22-08 (0-1)	08-10 (2-4) 10-15 (4-2) 15-16 (4-3) 16-19 (4) 19-20 (3-4) 20-22 (2-3) 22-08 (1-2)	08-09 (4-3) 09-10 (4-2) 10-15 (2-1) 15-16 (3-1) 16-19 (4-2) 19-20 (4) 20-22 (3-4) 22-01 (2-4) 01-03 (2-3) 03-08 (2)	08-09 (3-1) 09-10 (2-1) 10-16 (1-0) 16-19 (2-1) 19-20 (4-3) 20-01 (4) 01-03 (3) 03-06 (2) 06-08 (2-1)
80	08-10 (4) 10-18 (4-3) 18-20 (4) 20-22 (3-4) 22-00 (2-4) 00-06 (2-3) 06-08 (3-4)	08-10 (4-1) 10-16 (3-0) 16-18 (3-1) 18-20 (4-2) 20-00 (4) 00-06 (3-4) 06-08 (4-3)	08-09 (1) 09-10 (1-0) 10-16 (0) 16-18 (1-0) 18-20 (2-1) 20-22 (4-3) 22-02 (4) 02-06 (4-3) 06-08 (3-2)	08-09 (1-0) 09-18 (0) 18-20 (1-0) 20-22 (3-2) 22-02 (4-3) 02-06 (3-2) 06-08 (2-1)
160	06-09 (4-1) 09-10 (2-0) 10-19 (1-0) 19-21 (3-1) 21-23 (4-2) 23-06 (4-3)	06-09 (1) 09-19 (0) 19-21 (1-0) 21-23 (2-1) 23-01 (3-2) 01-04 (3) 04-06 (3-2)	08-09 (1-0) 09-21 (0) 21-23 (1) 23-01 (2-1) 01-04 (3-2) 04-07 (2) 07-08 (1)	08-21 (0) 21-01 (1) 01-04 (2) 04-06 (2-1) 06-07 (1) 07-08 (1-0)

ALASKA
Openings Given In GMT

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	Nil	00-02 (1) 02-04 (2) 04-05 (1) 12-14 (1)	07-10 (1)	Nil
Central USA	00-02 (1)	01-03 (1) 03-05 (2) 05-06 (1) 13-15 (1)	08-12 (1)	Nil
Western USA	00-03 (1)	00-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1) 14-15 (1) 15-18 (2) 18-20 (1)	08-09 (1) 09-14 (2) 14-15 (1)	10-14 (1)

HAWAII
Openings Given In HST

To:	15 Meters	20 Meters	40 Meters	80 Meters
Eastern USA	12-15 (1)	06-08 (1) 10-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	19-20 (1) 20-23 (2) 23-00 (3) 00-01 (2) 01-02 (1)	21-00 (1)
Central USA	12-14 (1) 14-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-21 (2) 21-22 (1)	19-20 (1) 20-21 (2) 21-01 (3) 01-02 (2) 02-04 (1)	21-21 (1) 21-00 (2) 00-02 (1) 22-01 (1)*
Western USA	13-17 (1)** 09-14 (1) 14-17 (2) 17-18 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-16 (3) 16-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	18-19 (1) 19-20 (2) 20-22 (3) 22-02 (4) 02-04 (3) 04-05 (2) 05-07 (1)	19-20 (1) 20-22 (2) 22-03 (3) 03-04 (2) 04-05 (1) 22-03 (1)*

 # See explanation in "How To Use Short-Skip Charts," which appears in the box at the beginning of this column.
**Indicates best time for 160 meter openings.*
***Indicates best time for 10 meter openings.*
Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates possible 10 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last-Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *daylight* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 PM in Los Angeles; 18 or 6 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

It contains links to the three most informative sites for up-to-the-minute solar, ionospheric and propagation data, as well as a wealth of archival data. My Web page URL is <**http://www.clark.net/pub/gjacobs/gja.html**>.

You will find links here with the NOAA site in Boulder, Colorado, with the Solar Terrestrial Dispatch in Canada, and with the Ionosphere Prediction Service (IPS) in Australia. You will also find several very interesting sites from my shortwave broadcasting clients.

"I just wanted to drop you a line letting you know how much I enjoy reading your monthly column in *CQ* magazine. I am presently a Technician Plus and look forward to good 10 meter openings in the coming years. I have been trying 10 meters every chance I get looking for possible openings. The only one I have worked so far occurred on February 6, 1997 when at approximately 18:15 to 22:30 UT I was able to work several stations from Florida with the conditions rolling into Louisiana and Texas areas. I was also able to work XE1MX in Mexico City and LU8AQE in Argentina. Keep up the good work, and I look forward to your monthly columns. 73s *Kevin Farnsley, NØIVT.*"

NØIVT de W3AKS. This is only the beginning! Most experts agree that the new solar cycle has begun, although the exact date of its birth is still to be determined. As the sunspot counts increase, there should be an increased number of DX openings on the 10 meter band. During the spring and summer months expect a seasonal increase in sporadic-*E* short-skip openings on this band for distances up to about 1400 miles. By this fall and winter, the sunspot count is expected to be high enough to permit a noticeably greater number of worldwide DX openings on 10 meters. Enjoy!

VHF Ionospheric Openings

Sporadic-*E* ionization usually increases considerably during May, and some fairly frequent 6 meter short-skip openings should be possible. These are most likely to occur over distances between approximately 1000 and 1400 miles. Although sporadic-*E* openings can happen at any time of the day or night, the best time to check is between 10 AM and 2 PM, and again between 6 and 10 PM local daylight time.

During periods of intense and widespread sporadic-*E* ionization, two-hop openings considerably beyond 1400 miles may be possible for brief periods on 6 meters, and short-skip openings between approximately 1200 and 1400 miles may also be possible on 2 meters.

If very intense summer sporadic-*E* ionization in the North Atlantic region repeats itself again this year, look for occasional multi-hop openings between the east coast of North America and western Europe on 10 meters.

The *Eta Aquarids* meteor shower should intersect the Earth's atmosphere between May 4 and 6. This should be a major shower, reaching maximum intensity during the early morning of May 5 with an average of 20 meteors an hour. Chances are good for meteorburst short-skip openings during the three-day period of this shower.

Not much auroral activity is expected during May, although some may occur during periods of radio storminess. Check the Last-Minute Forecast at the beginning of this column for those days that are likely to be Below Normal or Disturbed during May.

73, George, W3ASK

Number groups after call letters denote following: Band (A = all), Final Score, Number of QSOs, and Prefixes. An asterisk (*) denotes low power. Certificate winners are in bold. (Countries reflect the DXCC list at the time of the contest.)

CW RESULTS
QRP/p SECTION

WORLDWIDE

ZX2X	**A**	**861,080**	**706**	**380**
		(Op. PY2OU)		
YT7TY	**A**	**761,600**	**901**	**400**
RA3CW	**A**	**657,696**	**1005**	**408**
VD7SBO	**A**	**373,092**	**446**	**303**
KA1CZF	**A**	**362,796**	**409**	**294**
EW6DO	**A**	**359,352**	**362**	**276**
VE3KP	**A**	**350,460**	**412**	**266**
K1VUT	*	338,826	402	298
UA4YJ	*	313,608	577	292
G4UOL	**A**	**302,464**	**624**	**278**
IKØCNA	**A**	**288,550**	**603**	**290**
KA4RRU	**A**	**280,800**	**411**	**300**
YU1LM	*	272,228	607	269
DJ3XK	**A**	**204,255**	**460**	**267**
SMØTHU	**A**	**143,835**	**408**	**223**
JA2XI	**A**	**142,628**	**261**	**197**
F6OIE	**A**	**132,832**	**308**	**224**
OEM1KYW	**A**	**121,200**	**351**	**200**
HP1AC	**A**	**115,128**	**228**	**164**
EA7AAW	**A**	**113,452**	**328**	**226**
PAØADT	**A**	**97,104**	**308**	**204**
G4JZO	*	90,710	297	193
EA7HCB	*	76,230	246	165
ON7CC	**A**	**75,936**	**243**	**168**
N6OJ	**A**	**75,762**	**217**	**183**
W2TZ	**A**	**71,060**	**211**	**170**
AA1CA	*	64,841	177	157
SM5DQ	*	63,366	214	177
W4DEC	*	57,726	192	172
UA9ACJ	**A**	**45,760**	**130**	**110**
HB9XY	**A**	**33,768**	**176**	**126**
VE7CQK	*	33,124	134	91
JA1KJW	**A**	**32,218**	**113**	**89**
SP4GHL	**A**	**25,555**	**176**	**95**
JA5CDL	*	21,606	108	78
DF1NH	*	20,140	134	106
9A3GU	**A**	**20,064**	**125**	**96**
SP4BOS	*	17,738	118	98
OEM1BLU	*	17,316	124	78
EA4BL	*	15,045	100	85
VE2ABO	**A**	**13,325**	**74**	**65**
DL7AFY	*	11,700	83	75
WB6ITM	*	11,676	102	84
W6ZH	*	8,190	101	78
K3WWP	**A**	**7,020**	**97**	**90**
LA3BX	**A**	**7,011**	**62**	**57**
WB6FZH/KH6	**A**	**6,795**	**54**	**45**
HB9AYZ	*	5,022	68	62
YO4AAC	**A**	**3,738**	**44**	**42**
DJ5QK	*	3,318	45	42
DL2TM	*	2,170	36	35
JT1BV	**A**	**1,824**	**36**	**32**
DHØJAE	*	943	29	23
VE7EKS	*	760	21	20
N6AZE	*	360	19	18
OHØ/OH1AF	**A**	**320**	**20**	**16**
GØTDX	**28**	**20,880**	**178**	**116**
LU9HUP	**28**	**5,084**	**43**	**41**
LU1FNH	*	1,200	20	20
LU4HFE	**21**	**4,477**	**41**	**37**
JH1HRJ	**21**	**3,337**	**51**	**47**
WA6FGV	**21**	**1,764**	**53**	**49**
TA2BD	**14**	**288,376**	**420**	**232**
YU1GN	**14**	**204,408**	**430**	**306**
JH1GNU	**14**	**161,007**	**287**	**231**
G3LHJ	**14**	**80,937**	**256**	**207**
UT5USQ	**14**	**76,428**	**287**	**198**
OH2YL	**14**	**36,112**	**176**	**148**
DL2KDW	**14**	**22,080**	**140**	**120**
SO5TW/7	**14**	**20,996**	**137**	**116**
		(Op. K3TW)		
VC3JFF	**14**	**8,201**	**65**	**59**
JI3FAD/1	*	7,308	65	42
N8CQA	**14**	**7,008**	**50**	**48**
DL2PY	*	2,968	56	56
DL6UEG/P	*	1,044	30	29
LX/DL2JRM	**14**	**308**	**14**	**14**
AA8RR	*	100	10	10
EA3IW	**7**	**64,528**	**200**	**148**
VE3SMA	**7**	**48,216**	**115**	**98**
N2PEB	**7**	**37,184**	**124**	**112**
W8QZA/6	**7**	**21,582**	**106**	**99**
VK5AGX	**7**	**3,256**	**26**	**22**
JF2LTH	**7**	**216**	**12**	**12**
SP4GFG	**3.5**	**131,016**	**306**	**206**
HA8LUH	**3.5**	**103,012**	**290**	**182**
UA4SMM	**3.5**	**50,960**	**258**	**182**
W1MK	**3.5**	**34,668**	**96**	**81**
UT5UQV	**3.5**	**16,102**	**100**	**83**
SM3CCT	**3.5**	**9,150**	**78**	**61**
SP4TBM	**3.5**	**1,800**	**32**	**30**
UT8IT	**1.8**	**23,750**	**119**	**95**
YO4FRF	**1.8**	**2,730**	**40**	**35**
SP5NOG	**1.8**	**242**	**11**	**11**

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K5ZD	**A**	**1,420,184**	**880**	**452**
K1VWL	**A**	**890,292**	**805**	**439**
KC1F	**A**	**650,754**	**600**	**351**
W1WFZ	*	523,160	493	328
N4XR	*	416,928	449	303
K2SX/1	*	332,360	401	280
KA1DWX	*	130,273	181	143
AE1D	*	62,865	197	165
K1IU	*	54,468	124	102
K1BV	*	38,340	166	135
KI1G	**7**	**2,573,408**	**1152**	**587**
***WA1LNP**	**A**	**1,129,101**	**964**	**489**
***K8JLF/1**	**A**	**324,000**	**362**	**250**
*KB1AXF	*	44,640	161	124
*W1WEF	*	43,776	146	128
*KB1BOM	*	10,692	58	54
			(Op. K5FUV)	
*KE6BER	*	5,720	63	55
*KV1W	*	3,330	40	37
***KA1VMG**	**28**	**90**	**9**	**6**
***WA1FCN**	**21**	**31,974**	**184**	**146**
KE2PF	**A**	**6,790,795**	**2553**	**781**
KW2J	**A**	**777,777**	**823**	**429**
N2UN	*	491,310	464	309
K2QMF	*	293,670	327	251
N2WLG	*	262,668	307	236
W2OMV	*	158,679	289	243
W2EZ	*	123,195	266	215
W2HG	**28**	**984**	**47**	**41**
K2XA	**7**	**130,848**	**191**	**174**
W2FR	**3.5**	**18,048**	**64**	**64**
***N2BA**	**A**	**2,002,635**	**1178**	**573**
***N2LSK**	**A**	**587,904**	**643**	**384**
*K2UF	*	351,000	403	300
*WF2V	*	171,054	386	258
*NA2Q	*	52,269	150	133
*N2FF	*	30,030	113	105
*K2LUQ	*	27,938	137	122
*KG2BI	*	22,288	134	112
*KA2AOT	*	17,856	101	96
***K2AW**	**14**	**140,436**	**292**	**249**
*KA2GSL	*	4,704	51	49
***AA2SZ**	**7**	**238,896**	**261**	**237**
*WA2VQV	*	16,900	70	65
*WB2DVU	*	13,328	61	56
K3ZO	**A**	**4,710,325**	**1936**	**725**
KQ2M	**A**	**4,598,300**	**1954**	**700**
KF3P	**A**	**4,115,584**	**1989**	**704**
AA3B	*	2,506,786	1412	578
W3GOI	*	442,530	494	330
K3MD	*	255,117	379	277
K5ME	*	218,722	304	238
W3KV	*	181,692	267	206
NM2Y/3	*	167,534	291	211
N3BGV	*	118,582	265	211
N3UMA	*	8,800	51	50
WA3DMH	**14**	**24,795**	**110**	**95**
W3FQE	*	7,392	55	48
W3GH	**7**	**930,528**	**707**	**432**
			(Op. W9XR)	
W3BGN	**3.5**	**289,960**	**318**	**220**
WA3WJD	**1.8**	**6,240**	**65**	**52**
***WV3B**	**A**	**240,645**	**433**	**305**
*N3TRO	*	67,830	252	119
***NJ3K**	**14**	**125,550**	**367**	**270**
***W3CPB**	**7**	**133,350**	**197**	**175**
*KE3VV	*	20,600	109	100
KT3Y	**A**	**4,351,344**	**1927**	**674**
KM9ØØP	**A**	**3,807,916**	**1993**	**749**
KF4IIN	**A**	**3,613,572**	**1858**	**684**
			(Op. K4PQL)	
K4ØØPI	*	2,463,945	1714	685
NU4Y	*	1,208,765	1049	529
WR3O	*	982,646	1025	518
KB96GID	*	516,312	777	404
AD4PU	*	198,900	349	255
W4XD	*	166,164	332	227
KR4UJ	*	94,080	210	192
KR26DL	*	92,736	264	192
W4ZYT	*	85,050	229	175
N4AIG	*	65,985	173	159
WA4ORG	*	25,482	104	93
N4BP	**28**	**19,257**	**209**	**147**
W4YV	**28**	**7,905**	**122**	**85**
KY2P	**14**	**879,448**	**923**	**521**
W4KYW	*	13,845	73	71
N4MM	*	192	8	8
***AC1O**	**A**	**1,719,354**	**1059**	**546**
***KG4W**	**A**	**646,750**	**635**	**398**
*WA6KUI	*	568,836	662	414
*K96BAI	*	404,736	584	372
*AA96GA	*	78,210	269	198
*WB4DNL	*	17,136	80	68
***KN4Y**	**21**	**14,700**	**240**	**140**
***KØEJ**	**14**	**374,420**	**630**	**386**
*N4OT	*	82,510	220	185
***KI4DC**	**7**	**3,840**	**40**	**48**
***W4YDD**	**3.5**	**1,150**	**23**	**23**
NB6U	**A**	**1,764,135**	**1269**	**591**
NA5Q	**A**	**1,593,352**	**1295**	**604**
K5YAA	**A**	**1,211,800**	**993**	**584**
W5UDA	*	643,860	644	438
AJ4F	*	20,241	144	117
W5FO	**14**	**1,152,210**	**1178**	**597**
KB5WWA	*	977,976	1145	578
***WD5K**	**A**	**668,044**	**624**	**443**
***WV5S**	**A**	**355,576**	**512**	**338**
*NN5T	*	114,845	281	223
*NZ5O	*	76,704	240	204
***N5NMX**	**28**	**5,394**	**129**	**93**
AB6FO	**A**	**2,141,737**	**1322**	**551**
KC6X	**A**	**714,896**	**916**	**491**
AG7W	*	289,914	429	229
			(Op. N6IP)	
WA6TKT	*	245,944	313	284
AD6E	*	154,872	285	162
AB6YL	*	138,432	271	224
K6DR	*	66,859	177	139
KD6WP	*	24,480	128	102
W6BSY	**21**	**27,537**	**175**	**137**
KF6AYQ	**14**	**25,654**	**138**	**127**
N6MU	**7**	**1,031,490**	**702**	**365**
***AE6Y**	**A**	**475,888**	**634**	**392**
***W6HAL**	**A**	**146,082**	**317**	**251**
*W6PYX	*	137,164	278	212
*WA6URY	*	47,034	163	134
*NK6F	*	40,180	216	140
*N6GL	*	38,912	190	152
*AA6EE	*	17,901	150	117
***KU6T**	**21**	**3,000**	**54**	**50**
*NP4IW/WX6	*	2,340	75	60
***N6JM**	**14**	**22,680**	**100**	**84**
***WA7BNM**	**7**	**113,834**	**224**	**173**
*WA6VNR	*	4,560	44	40
W7OM	**A**	**432,495**	**510**	**315**
W7/DL3OI	**A**	**338,916**	**451**	**244**
W7/DL5AXX	*	194,832	332	246
W7YS	*	118,750	310	250
KC7UP	*	113,005	265	233
AA7BG	*	22,500	146	125
N7TT	**14**	**1,192,240**	**1110**	**560**
WA7FAB	**14**	**713,416**	**910**	**484**
VE7UF/W7	*	614,790	706	414
K7ABV	*	66,816	204	174
W7AYY	*	60,102	175	162
W8AEF	**7**	**86,190**	**212**	**169**
***WQ7T**	**A**	**280,540**	**555**	**338**
			(Op. NØAX)	
***K7NPN**	**A**	**211,904**	**474**	**301**
*W7YAQ	*	127,650	222	222
*W7QDM	*	77,168	202	182
*WB9PZK	*	35,108	164	134
*AA7VG	*	33,150	125	85
*N7LOX	*	16,758	108	98
*W7VIH	*	7,544	51	41
***W7HS**	**14**	**139,250**	**280**	**250**
***KX7L**	**7**	**76,930**	**203**	**157**
N4ZR	**A**	**1,890,800**	**1229**	**580**
W9LT	**A**	**1,633,280**	**1087**	**512**
N9AG	**A**	**1,237,497**	**1034**	**543**
K8OQL	*	262,880	370	265
KF8TM	*	211,899	307	249
K8CV	*	122,816	245	202
K8DD	*	61,904	169	146
K8GL	**14**	**2,299,776**	**1567**	**678**
***W8UPH**	**A**	**309,964**	**423**	**314**
***WT8P**	**A**	**207,080**	**331**	**248**
*AL7PT/NK8	*	133,484	322	221
*AA8AV	*	122,982	241	199
*W8IDM	*	100,320	236	209
*AC8W	*	55,475	231	175
*WA8AHK	*	50,808	209	146
*WB8BUQ	*	15,210	100	90
*KL7FAP/AJ8	*	96	14	12
***WS8O**	**14**	**225,330**	**426**	**290**
			(Op. N8LXS)	
***N8II**	**14**	**204,325**	**365**	**275**
*N8AA	*	46,664	150	138
*K8LJG	*	40,000	135	125
*AA8SM	*	20,384	126	112
K9LJN	**A**	**1,356,048**	**1200**	**584**
NJ9C	**A**	**251,790**	**567**	**327**
W9RE	*	211,800	300	300
KA9ZZT	*	22,230	109	95
K9BG	**14**	**483,582**	**651**	**431**
K9UQN	*	44,187	156	143
***KJ9C**	**A**	**261,900**	**363**	**270**
***WBØOLA**	**A**	**204,630**	**370**	**285**
***N9ENA**	**7**	**15,480**	**101**	**90**
***AA9AX**	**1.8**	**192**	**18**	**16**
W8ØO	**A**	**1,114,344**	**947**	**536**
KMØL	**A**	**700,737**	**855**	**489**
NSØB	*	136,921	375	269
KØRI	*	119,306	296	242
KMØR	*	82,140	311	222
WØHW	*	77,792	300	208
AAØXZ	*	66,640	272	196
WAØSXR	*	46,368	338	184
WØRA	*	20,140	113	95
KØRWL	**14**	**433,075**	**618**	**425**
***KRØI**	**A**	**112,136**	**242**	**214**
*WAØZAP	*	26,733	165	133
***KK9W**	**14**	**308,250**	**570**	**375**
*KØOAL	*	21,060	113	90
*WØZU	*	2,790	31	31

MARTINIQUE

FM5CD	**14**	**1,261,000**	**1063**	**500**

HAITI

HH2PK	**A**	**9,519,495**	**3107**	**821**
		(Op. 9A3A)		

PANAMA

***HP3XUG**	**A**	**109,743**	**196**	**157**
		(Op. KG6UH)		

ALASKA

***NL7DU**	**14**	**75**	**5**	**5**

U.S. VIRGIN ISLANDS

WP2AHW	**A**	**10,533,756**	**3562**	**831**
		(Op. W2SC)		

PUERTO RICO

***WP4NJD**	**A**	**2,880**	**32**	**32**

CANADA

VE3EJ	**A**	**6,420,724**	**2433**	**772**
VD3IY/7	**A**	**2,642,280**	**1359**	**582**
VE9CB	**A**	**1,343,391**	**1015**	**497**
VY7JA	**A**	**555,360**	**633**	**356**
VO1AH	**A**	**38,130**	**100**	**82**
VE3HX	**28**	**1,484**	**29**	**28**
VD7NTT	**14**	**2,086,656**	**1488**	**608**
VA7A	*	1,702,422	1277	542
		(Op. VE7XR)		
VE6BMX	**14**	**591,717**	**659**	**399**
VD6BF	*	498,460	562	380
CY7A	**7**	**3,317,356**	**1513**	**461**
		(Op. VE7SV)		
VD6LB	**7**	**158,256**	**225**	**168**
***VD2AWR**	**A**	**461,100**	**513**	**290**
***VO7GO**	**A**	**427,584**	**412**	**262**
***VE6KRR**	**A**	**334,367**	**465**	**269**
***VE1/W6IXP**	**A**	**298,776**	**365**	**236**
***VD4YU**	**A**	**119,400**	**256**	**200**
***VA3ZC**	**A**	**92,160**	**200**	**160**
*VE3STT	*	8,850	61	59
***VC3NR**	**7**	**469,044**	**437**	**258**
***VE7WRA**	**3.5**	**107,338**	**207**	**119**

TURKS AND CAICOS IS.

VP5Z	**14**	**3,448,068**	**2001**	**713**
		(Op. W5ASP)		

BERMUDA

***VP9MZ**	**A**	**178,707**	**302**	**213**

AFRICA

SWAZILAND

3DAØNX	**A**	**2,836,452**	**1546**	**478**
		(Op. ZS6CAX)		

TUNISIA

3V8BB	**A**	**11,739,750**	**3987**	**750**
		(Op. YT1AD)		

NIGERIA

***5N3/SP5XAR**	**14**	**487,080**	**499**	**328**

SENEGAL

***N2WCQ/6W1**	**A**	**3,179,222**	**1798**	**566**
		(Op. UT4UZ)		

BURUNDI

***9U5DX**	**A**	**1,240,566**	**1001**	**398**

CANARY IS.

EA8/OH2KI	**3.5**	**1,358,852**	**657**	**347**
***EA8CN**	**7**	**1,513,332**	**665**	**381**
***EA8QJ**	**14**	**104,650**	**201**	**175**

CUETA AND MELILLA

***EA9UG**	**7**	**393,680**	**346**	**190**

ASIA

AZERBAIJAN

***4K9W**	**A**	**118,128**	**228**	**184**

ISRAEL

4X1VF	**3.5**	**87,344**	**140**	**106**
4X4NJ	**1.8**	**259,420**	**260**	**170**
***4Z5FW**	**14**	**220,560**	**306**	**240**

KUWAIT

***9K2/YO9HP**	**7**	**498,520**	**400**	**220**

WESTERN MALAYSIA

***9M2TO**	**A**	**632,930**	**825**	**334**
***9M2JJ**	**7**	**200,796**	**333**	**174**

SINGAPORE

***9V1YC**	**A**	**234,612**	**488**	**252**

TAIWAN

BV3BW	**7**	**25,696**	**106**	**73**

ARMENIA

***EK4JJ**	**14**	**1,680**	**24**	**24**

KYRGYZSTAN

EX2M	**A**	**2,988,768**	**1706**	**573**

TADJIKISTAN

EY8MM	**7**	**1,400,454**	**726**	**363**

THAILAND

HSØ/G3NOM	**A**	**746,900**	**934**	**350**

SAUDI ARABIA

HZ1AB	**14**	**1,190,808**	**1011**	**444**
		(Op. SMØCXU)		

JAPAN

JH1AEP	**A**	**2,058,036**	**1115**	**534**
JH7XGN	**A**	**1,078,650**	**786**	**425**
JA6UBK	**A**	**436,200**	**471**	**300**
JA3ARM	*	242,968	347	251
JAØQWO	*	116,550	222	175
JA2ZJW	*	69,600	162	120
		(Op. JH2CMI)		
JAØFVU	*	40,416	134	96
JA2VQF	*	16,371	121	107
JA3EEM	*	16,146	83	78
JR6CF	*	2,670	31	30
JF6OJX	**28**	**336**	**31**	**24**
JA9CWJ	**14**	**120,086**	**228**	**194**
7L1WGY	*	111,041	274	203
JA5APU	*	105,591	233	183
JR3XEX	*	80,828	200	167
7J1YAJ	**7**	**1,159,080**	**670**	**390**
JA7FFN	*	11,684	49	46
JA5IP	*	11,016	53	51
JA3BIP	*	1,230	15	15
***JK1GKG**	**A**	**446,964**	**493**	**313**
***JA2BY**	**A**	**368,697**	**429**	**291**
***JH2NWP**	**A**	**288,441**	**376**	**243**
*JF3IUC	*	210,875	351	241
*JA9DDF	*	185,948	303	229
*JH3CUL	*	182,108	310	212
*JHØGHZ	*	129,596	258	181
*JE3UHV/1	*	115,500	243	175
*JH4NMT	*	111,709	220	169
*JA8AJE	*	102,312	219	168
*JA7KBR/1	*	94,446	208	159
*JL7PVR/1	*	80,372	194	142
*JR1LEV	*	64,050	171	150
*JK1ATT	*	63,488	157	128
*JH1DYV	*	43,354	125	106
*7K1EQG	*	42,660	142	135
*JA4BAA	*	38,822	132	94
*JH3JYS	*	34,232	120	88
*JA1WHG	*	27,216	103	84
*JA1AB	*	23,976	110	81
*JH4WBY	*	20,020	96	77
*JE1XCZ	*	10,586	75	67
*JG1RDV	*	8,055	59	45
*JAØTEA/9	*	5,676	45	43
*JAØAXA	*	5,334	44	42
*JA7KM	*	4,120	41	40
*JS1MTI	*	2,250	33	30
*JH1UES/1	*	1,860	32	30
*JA1AAT	*	840	21	21
***JA6ZLI**	**21**	**21,340**	**128**	**97**
*JA6BIF	*	5,151	55	51
*JL1MWI	*	620	24	20
***7M1MCT**	**14**	**1,371,681**	**1025**	**503**
***JR4GPA**	**14**	**368,865**	**457**	**315**
*JF3GKE	*	349,760	450	320
*JH4JNG	*	248,196	359	258
*JF2SKV/2	*	119,274	253	193
*JA1BRL	*	117,312	227	192
*JA1HP	*	79,542	200	162
*JA1XCZ/4	*	67,510	170	157
*JJ6TWQ	*	61,758	164	146
*JA5TXA	*	58,656	163	141
*JK7KCC	*	41,328	149	112
*JL2ICO	*	23,828	101	92
*JA9KUG	*	21,528	104	92
*JA3AVO	*	13,752	73	72
*JA6QDU	*	9,577	62	61
*JE6FPP	*	7,791	58	53
*JEØXRP	*	7,632	55	48
*JG3AXP/1	*	3,526	43	41
*JO3JJN	*	1,725	25	25

PROFESSIONAL STANDARDS ASSURE AMATEUR SATISFACTION

Innovation • Value • Customer Service

From the world's leading antennas and rotators to warranties, after-sale support and responsive, knowledgeable customer service, Hy-Gain by Telex is the amateur's preferred choice for exceptional performance and extraordinary reliability.

Highlighted here is just a sampling of innovative products from Hy-Gain. For detailed information about these and many more Hy-Gain products and accessories, write, phone or FAX today.

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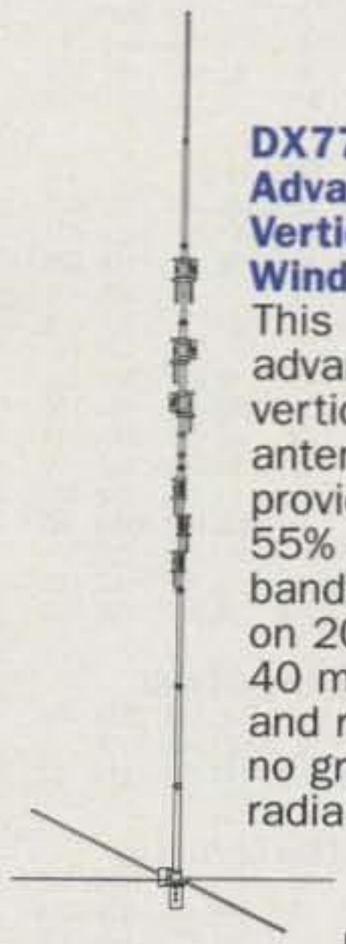
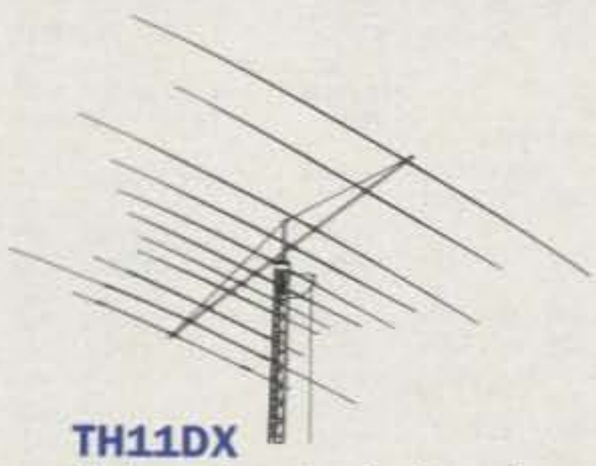


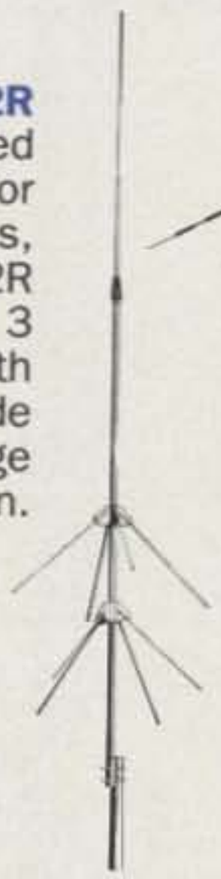
DX77 Advanced Vertical Windom
This advanced vertical antenna provides 55% greater bandwidth on 20 and 40 meters, and requires no ground radials.



TH11DX
This uniquely designed antenna provides the frequency coverage of a log periodic, **plus** the performance of a monobander.

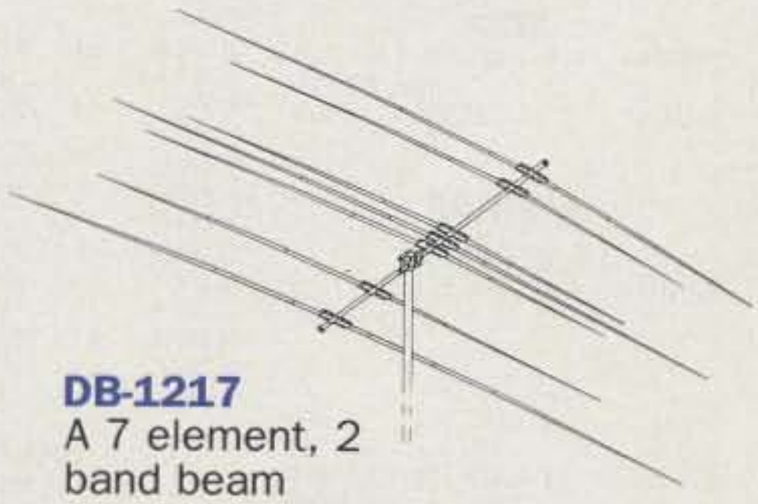
DX88
If you want 80 meters in a vertical, this is your antenna. Better bandwidth than found in add-on kits.

V2R
A rugged antenna for 2 meters, the V2R delivers 3 dBd gain with a wide coverage pattern.



TH3 Mk4
A classic tribander, the TH3 Mk4 is an ideal choice for home stations and DXpeditions.

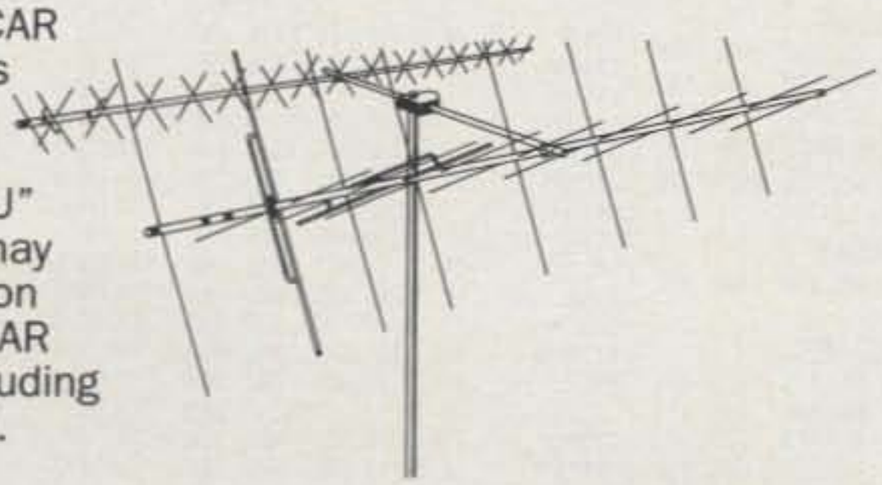
Ham V with DCU-1 Digital Control System
The Ham V is designed for medium communications antenna arrays of up to 15 sq. ft. (1.4 m2) wind load area. The **DCU-1** features digital and analog displays with six presets, automatic brake delay, motor slow down, automatic calibration and programmable center of rotation.



DB-1217
A 7 element, 2 band beam antenna designed for operation on the 12 and 17 meter amateur bands, and packaged for DXpeditions.

V6R
This antenna design is based on 2 collinear 5/8 wave vertical radiators and covers 51-54 MHz.

OSCAR LINK
Hy-Gain's OSCAR LINK antennas are ready for Phase 3D on the "V" and "U" bands. They may also be used on the other OSCAR satellites, including the new JAS-2.



hy-gain by Telex

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Telex Communications,® Inc.
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Lincoln, NE 68507 USA
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Web: http://ourworld.compuserve.com/homepages/hygain

CIRCLE 140 ON READER SERVICE CARD

*JE1LFX	"	1,584	24	24
*JR1LQK	"	1,080	20	20
*JA7AXP	"	1,007	19	19
*JG3WCZ	"	363	11	11
*7K2GMF	"	275	11	11
***7N3ULM**	**7**	**248,352**	**276**	**208**
*JA1NYV	"	44,022	99	87
*JR9NVB	"	29,088	75	72
*JA2GTW	"	25,702	77	71
*JRØBQD	"	21,896	80	68
*JF3XMI	"	5,092	39	38
*JA4AQR/3	"	4,026	23	23
*JAØGZ	"	1,960	21	20
*JA6TQ	"	1,748	19	19
*JR1VNX/6	"	726	11	11
*JR1RCB	"	720	12	12
*JA1XPU	"	414	9	9
***JE1SPY**	**3.5**	**2,070**	**28**	**23**

MONGOLIA

JT1BH	**A**	**562,870**	**788**	**301**

LEBANON

***OD5PL**	**A**	**147,915**	**297**	**171**

TURKEY (ASIATIC)

YM2ZW	**14**	**3,302,023**	**1865**	**631**
		(Op. OK2ZW)		
***TA2DS**	**3.5**	**355,698**	**323**	**189**

ASIATIC RUSSIA

RW9JO	**A**	**867,483**	**867**	**361**
RA9XF	"	448,872	443	236
UA9AOL	"	237,654	313	243
RZ9UA	**14**	**2,964,240**	**1657**	**690**
RZ9OO	**14**	**1,627,920**	**1220**	**560**
UA9XEN	"	1,037,740	850	445
UA9XC	**7**	**253,946**	**235**	**187**
***RA9AE**	**A**	**1,893,800**	**1173**	**425**
*RA9ANR	"	5,040	50	40
***UA4WAN/Ø**	**14**	**456,090**	**561**	**345**
*RN9XA	"	429,012	510	306
*UA9SFR	"	77,250	188	150
*RW9OYL	"	69,090	170	147
UAØSJ	**14**	**46,575**	**166**	**135**
***RAØFU**	**A**	**2,369,088**	**1422**	**576**

KAZAKHSTAN

UN7BY	**3.5**	**326,942**	**356**	**193**
***UN7FW**	**A**	**657,424**	**556**	**272**
***UN9FM**	**14**	**390,793**	**508**	**299**

HONG KONG

VR2NR	**A**	**61,320**	**208**	**140**
***VR2SS**	**21**	**19,596**	**190**	**92**

INDIA

***VU3FED**	**A**	**431,074**	**514**	**287**
		(Op. VU2PTT)		
*VU2PAI	"	397,664	514	272

EUROPE

I.T.U. GENEVA

4U1ITU	**A**	**718,416**	**1175**	**432**
		(Op. WO9S)		

CROATIA

9A2AJ	**A**	**1,850,375**	**0**	**565**
9A3UF	"	104,615	263	245
9AØCW	**14**	**2,477,820**	**1865**	**677**
		(Op. 9A8A)		
9A3MA	**7**	**1,221,220**	**942**	**455**
9A6K	**7**	**1,035,552**	**804**	**402**
		(Op. 9A4LA)		
9A7A	**3.5**	**693,998**	**842**	**353**
		(Op. 9A4RX)		
9A4D	**1.8**	**149,362**	**371**	**191**
		(Op. 9A2D)		
***9A2NO**	**A**	**519,831**	**779**	**351**
***9A3SM**	**A**	**368,187**	**667**	**321**
*9A4RU	"	222,138	483	287
*9A3NW	"	172,020	406	244
***9A5I**	**28**	**124,425**	**498**	**225**
***9A3NU**	**14**	**97,200**	**264**	**216**
***9A3QK**	**7**	**283,128**	**397**	**282**
*9A2WJ	"	94,520	248	170
*9A1CDG	"	288	8	8
***9A24ØB**	**3.5**	**387,612**	**617**	**291**
*9A1CAH	"	22,308	140	99

MALTA

9H1EL	**28**	**670,500**	**1674**	**375**

PORTUGAL

***CT1ELP**	**A**	**15,652**	**140**	**91**
***CT4DX**	**7**	**33,488**	**100**	**91**

GERMANY

DL2MEH	**A**	**2,215,400**	**1728**	**583**
DLØWW	**A**	**1,706,333**	**1424**	**589**
		(Op. DK3GI)		
DL5JAN	**A**	**950,742**	**1042**	**442**
DL7BQ	"	508,740	777	366
DL1TH	"	407,146	630	334
DL4HRM	"	401,489	710	323
DL8SUB	"	363,300	616	346
DL3BQD	"	314,944	605	304
DL1LOD	"	161,240	360	232
DL3DBY	"	102,704	360	196
DJ6DO	"	94,668	287	196
DK5OS	"	74,534	270	166
DL1JPL	"	25,194	114	102
DL6ECA	"	21,909	156	109
DL2HUM	"	21,070	118	98
DJ2IA	"	196	14	14
DK3KD	**7**	**663,924**	**639**	**366**
DJ5GG	"	312,256	442	287
DJØSH	"	276,342	309	237
DL5MHB	**3.5**	**423,340**	**641**	**305**
DL4SZB	**1.8**	**21,504**	**141**	**96**
***DL3HRJ**	**A**	**1,076,758**	**1071**	**458**
***DL3JAN**	**A**	**816,992**	**967**	**422**
***DF2KK**	**A**	**654,656**	**896**	**386**
*DL8WN	"	638,385	950	365
*DL4BQE	"	611,898	834	357
*DL1DTC	"	481,100	770	340
*DL7VZF	"	415,359	647	347
*DJ7IK	"	323,828	500	292
*DL5AWI	"	299,153	454	293
*DJ1OJ	"	292,824	520	294
*DL6AG	"	289,863	546	301
*DL5SVB	"	268,032	397	349
*DL6MHW	"	201,930	445	265
*DL7VOX	"	197,860	418	260
*DL3BZZ	"	179,786	356	241
*DK7ZH	"	106,896	300	204
*DL6UAM	"	106,656	332	202
*DL8WCM	"	75,388	204	188
*DL6UKL	"	73,158	285	178
*DL6KVA	"	66,105	210	117
*DL2YAK	"	64,400	270	184
*DL2RON	"	45,684	181	140
*DL5ST	"	39,032	187	138
*DFØASS	"	36,850	160	134
*DK7AN	"	32,000	180	125
*DF2IAX/P	"	31,185	172	135
*DL8ZAJ	"	30,135	122	105
*DL5AOJ	"	29,160	145	108
*DL7UFR/P	"	26,265	156	103
*DL3KWR	"	23,544	120	108
*DL3JRA	"	10,152	80	72
*DK9KW/P	"	9,000	93	72
*DL9NEI	"	6,656	78	64
*DL4VAD	"	3,510	54	45
*DFØWER	"	0	0	0
***DF5WN**	**28**	**12,056**	**140**	**88**
***DH8BQA**	**28**	**8,424**	**110**	**78**
*DL3VTL	"	1,716	46	39
*DK5ZX	"	1,400	40	35
*DL3ME	"	121	11	11
***DL3SEM**	**21**	**44,551**	**204**	**149**
*DL3BRA	"	9,204	92	78
***DF7TU**	**14**	**102,831**	**329**	**227**
*DJ1DS	"	61,020	228	180
*DL4AAE	"	38,570	159	145
*DL3KWF	"	12,200	100	100
*DL3DRN	"	6,912	60	54
***DL1EMH**	**7**	**71,904**	**214**	**168**
*DJ2YE	"	48,576	150	132
*DL7UXG	"	5,194	57	49
***DL4FMA**	**3.5**	**339,808**	**604**	**287**
***DL4KAX**	**3.5**	**216,216**	**448**	**234**
*DHØDK	"	9,984	76	64

SPAIN

EA2IA	**A**	**3,385,344**	**2290**	**696**
EA3ALV	**A**	**558,150**	**776**	**366**
EA3GHB	"	521,248	912	364
EA1JO	"	416,500	716	350
EA1FBU	"	127,078	341	203
EA2CR	"	1,518	36	33
EA1EXJ	"	90	13	9
EA3FHN	**14**	**1,004,626**	**1125**	**511**
ED1XFC	**7**	**560,952**	**550**	**318**
		(Op. EA1DD)		
EA3AJW	**3.5**	**217,152**	**350**	**232**
***ED3CA**	**A**	**1,945,125**	**1826**	**585**
***EA5FV**	**A**	**1,200,991**	**1406**	**517**
***EA3AKY**	**A**	**1,020,052**	**1262**	**478**
*EA2BNU	"	480,225	713	337
*EA1ABM	"	301,224	599	308
*EA3BOW	"	171,750	370	250
*EA1AKB	"	158,004	384	228
*EA1FBJ	"	141,975	390	225
*EA5BU	"	125,618	358	214
*ED7BB	"	115,995	290	209
*EA4AKY	"	99,099	292	193
*EA3ADS	"	86,856	305	188
*EA3BHK	"	84,328	206	166
*EA5DLT	"	35,763	162	131
*EA7CA	"	33,630	158	114
*EA7TG	"	7,906	79	59
*EA2JJ	"	2,622	45	38
*EA1ATL	"	2,356	40	38
***EA1BMA**	**28**	**2,820**	**60**	**47**
*EA4ATI	"	750	30	25
***ED3NR**	**7**	**268,660**	**451**	**266**
		(Op. EA3AHQ)		
*EA4AUF	"	33,660	112	102
***ED3ALN**	**3.5**	**678,536**	**729**	**356**
*EA7MT	"	48,330	172	135

BALEARIC IS.

EA6ZS	**A**	**4,992**	**71**	**64**
EA6ACC	**1.8**	**35,752**	**159**	**109**

IRELAND

***EI4DW**	**A**	**512,488**	**657**	**376**

MOLDOVA

ER1OA	**A**	**324,648**	**656**	**324**
***ER1LW**	**A**	**855,950**	**1143**	**425**
***ER1EA**	**21**	**6,916**	**86**	**76**

ESTONIA

ES4RD	**3.5**	**139,860**	**348**	**189**
***ES8LZ**	**A**	**841**	**29**	**29**
***ESØNW**	**3.5**	**40,572**	**245**	**161**

BELARUS

EW3LN	**28**	**3,456**	**70**	**48**
***EU2MM**	**A**	**421,960**	**617**	**308**
*EW6BI	"	5,777	56	53
***EW8CY**	**7**	**331,376**	**490**	**278**
***EW3AC**	**3.5**	**82,680**	**261**	**156**

FRANCE

TM4US	**A**	**4,624,230**	**2284**	**710**
		(Op. F6FGZ)		
F6HWU	**A**	**621,299**	**901**	**391**
F5RAB	"	275,124	512	303
F5TNI	"	137,392	301	248
F5OGG	"	9,702	100	66
F6BKP	**21**	**550,638**	**606**	**309**
TMØX	**14**	**2,563,636**	**1926**	**694**
		(Op. F5MUX)		
F6CWA	**1.8**	**21,590**	**108**	**85**
***F5NLY**	**A**	**919,863**	**922**	**471**
***F5JBR**	**A**	**431,472**	**642**	**356**
***F6IIE**	**A**	**419,664**	**775**	**336**
*F5NQL	"	346,491	700	313
*F5RBG	"	340,648	607	316
*F/DF4ZL/P	"	333,488	667	304
*F6GYU	"	287,560	674	280
*F5MOY	"	168,588	373	252
*F6DZD	"	126,000	402	210
*FB1BAM/P	"	10,080	87	80
*F2FX	"	6,102	85	54
*F5JDG	"	4,200	52	42
*F6AXD	"	1,566	32	29
*F5NBK	"	580	20	20
*F5PYI	"	408	18	17
***F5PGP**	**28**	**77,952**	**374**	**203**
***F5TFS**	**7**	**110,112**	**259**	**186**

ENGLAND

G4IFB	**28**	**66,248**	**356**	**182**
GØLII	**14**	**433,048**	**669**	**407**
GB6PX	**3.5**	**585,312**	**705**	**336**
		(Op. G4MVA)		
***G4ZFE**	**A**	**527,364**	**757**	**342**
***G3ESF**	**A**	**428,584**	**707**	**317**
***G3RSD**	**A**	**334,720**	**612**	**320**
*GØJON	"	305,824	600	304
*G3OOU	"	286,713	548	287
*GX4MBC	"	121,716	300	207
		(Op. G4BWP)		
*G4ZMF	"	85,470	262	185
*G3VNG	"	78,679	328	101
*G3TXF	"	68,590	261	190
*G3JJZ	"	61,586	210	166
*G4OTY	"	33,794	170	122
***GØWWW**	**14**	**669,300**	**872**	**460**
*GØWKW	"	341,220	624	363
*GØNUP	"	121,484	343	251
***G6QQ**	**7**	**183,744**	**301**	**232**
*G5MY	"	96,720	175	156

SCOTLAND

***GM4SID**	**A**	**502,632**	**739**	**358**
***GM3CFS**	**14**	**153,657**	**357**	**271**

WALES

***GW3SYL**	**A**	**59,904**	**197**	**156**
***GW4BVJ**	**14**	**31,220**	**163**	**140**

NORTHERN IRELAND

GIØKOW	**A**	**5,004,175**	**2573**	**775**

JERSEY

MJ/K2WR	**A**	**1,743,364**	**1995**	**551**

HUNGARY

HA6NL	**A**	**1,053,390**	**1049**	**481**
HAM5AWH	**A**	**852,600**	**889**	**490**
HA8DM	"	488,905	709	353
HA8ZO	"	445,179	666	357
HA3LI	**28**	**26,082**	**188**	**126**
HA3OU	**7**	**383,616**	**460**	**296**
***HAM6VA**	**A**	**165,908**	**417**	**236**
*HA9PB	"	60,514	201	158
***HA8RH**	**14**	**1,174,104**	**1235**	**552**
*HAØHV	"	725,220	880	474
*HAØLP	"	207,064	483	286
***HA6OL/3**	**7**	**489,240**	**580**	**324**
*HAØEQ	"	413,088	573	312
*HA3PT	"	113,152	279	208
*HA8FT	"	99,912	233	181
***HA6OY**	**3.5**	**477,280**	**711**	**314**
*HA4FV	"	283,128	568	251
***HA8BE**	**1.8**	**137,592**	**350**	**196**

SWITZERLAND

HB9KC	**A**	**66,519**	**249**	**171**
HB9HFN	**7**	**1,188,292**	**974**	**434**
HB9NL	**1.8**	**50,736**	**203**	**128**
***HB9IAE**	**A**	**91,000**	**275**	**200**
***HB9HLE**	**7**	**366,324**	**519**	**342**

LIECHTENSTEIN

***HBØ/DA1WA**	**A**	**192,096**	**396**	**207**
			(Op. DJ9CB)	
***HBØ/DL2SBY**	**14**	**4,223**	**48**	**41**

ITALY

IØZUT	**A**	**1,148,400**	**1191**	**464**
IK5TSS	**A**	**953,760**	**1027**	**480**
I1VTX	"	85,278	285	183
IO3VJW	**14**	**1,304,020**	**1202**	**577**
IR4T	**7**	**2,773,980**	**1436**	**594**
		(Op. IK2QEI)		
***IU2E**	**A**	**1,152,242**	**1350**	**487**
		(Op. IK2VUE)		
***IKØYVV**	**A**	**846,365**	**987**	**449**
***IKØVSW**	**A**	**697,774**	**1096**	**394**
*IKØTUG	"	330,528	587	313
*IKØDWJ	"	160,888	400	238
*IKØADY	"	73,525	245	173
*IK3ORD	"	44,472	157	136
*IK1RQQ	"	37,944	195	136
*IK2UJF	"	14,322	113	93
*IK3SCB	"	12,636	101	81
*IK7QHS	"	12,000	134	75
*IU2S	"	11,562	95	82
		(Op. IK2RXU)		
*IK5RLS	"	4,029	55	51
***IK5TBK**	**21**	**50,020**	**257**	**164**
***IQ2A**	**14**	**1,237,104**	**1240**	**568**
		(Op. I2UIY)		
***IU3V**	**7**	**1,099,072**	**955**	**416**
		(Op. IK3VIA)		

SARDINIA

ISØGSR	**A**	**271,173**	**835**	**259**
***ISØOMH**	**A**	**676,216**	**1043**	**362**
*ISØUWX	"	40,404	229	156

SICILY

***IT9DEC**	**A**	**240,448**	**624**	**272**
***IT9ORA**	**28**	**60,368**	**383**	**154**
***IT9EWJ**	**21**	**320**	**20**	**16**
***IU9AF**	**14**	**1,315,608**	**1438**	**574**

NORWAY

LA9DFA	**A**	**1,082,928**	**1275**	**462**
LA5MT	**A**	**165,680**	**346**	**218**
LA5ZC	"	79,020	214	180
LA9AU	"	4,277	47	47
LA7AK	**14**	**19,440**	**120**	**108**
LA8GK	"	1,344	24	24
LA9GX	**3.5**	**436,692**	**646**	**302**
LA5UF	**3.5**	**380,352**	**601**	**283**
LA4EJ	"	15,132	100	78
***LA4YW**	**A**	**277,134**	**281**	**209**
***LA9WDA**	**A**	**158,631**	**414**	**253**
*LA4BN	"	104,272	251	196
***LA5LJA**	**21**	**6,370**	**86**	**65**
***LA7MFA**	**14**	**329,517**	**605**	**369**
*LA9HFA	"	187,500	461	300
*LA8WG	"	94,380	288	220

LITHUANIA

LY3MR	**A**	**2,337,115**	**1788**	**605**
		(Op. LY2BIL)		
LY5W	**A**	**2,120,568**	**1737**	**593**
LY2BM	**A**	**1,458,080**	**1453**	**520**
LY2MW	"	1,221,104	1296	457
LY3JY	"	1,118,702	1178	442
LY2PAQ	"	706,800	849	380
LY2KM	"	312,405	555	295
LY2DX	"	253,667	469	269
LY3ID	"	200,668	345	221
LY2IC	**21**	**71,631**	**302**	**189**
LY5A	**14**	**2,221,956**	**1561**	**682**
LY2OX	"	497,745	655	405
LY2BTA	**3.5**	**967,974**	**903**	**399**
LY6K	**3.5**	**721,026**	**757**	**369**
		(Op. LY3BS)		
LY3BU	**1.8**	**120,328**	**333**	**178**
***LY2FN**	**A**	**1,013,626**	**1071**	**457**
***LY1DC**	**A**	**202,752**	**439**	**264**
*LY1FM	"	128,898	343	217
*LY3BY	"	31,992	160	124
*LY2CX	"	26,640	159	120
***LY2BR**	**28**	**23,283**	**180**	**117**
***LY3BA**	**14**	**806,883**	**977**	**499**
*LY2NV	"	87,138	250	206

BULGARIA

LZ1BJ	**A**	**1,203,048**	**1335**	**504**
LZ2DL	**A**	**373,232**	**518**	**417**
				(Op. LZ2PFF)
LZ1ZM	"	26,125	140	125
LZ2KRU	**28**	**57,996**	**328**	**162**
				(Op. LZ2PP)
LZ3CW	**21**	**10,212**	**122**	**74**
LZ3AA	"	7,068	62	62
LZ7ØBFR	**7**	**157,600**	**355**	**197**
				(Op. LZ1WL)
LZ6R	**3.5**	**630,648**	**749**	**342**
***LZ2AU**	**A**	**34,840**	**155**	**130**
*LZ4BU	"	9,546	80	74
***LZ2GS**	**28**	**714**	**24**	**21**
***LZ1QZ**	**14**	**48,906**	**228**	**171**
*LZ4RV	"	13,110	127	115
***LZ1FJ**	**7**	**9,000**	**70**	**60**

AUSTRIA

OEM6Z	**A**	**1,115,060**	**1202**	**439**
				(Op. OE6MMD)
OEM2BZL	**A**	**778,914**	**841**	**397**
***OE1TKW**	**A**	**23,562**	**109**	**102**
***OEM1GOA**	**3.5**	**72,116**	**242**	**149**

FINLAND

OI6YF	**A**	**2,844,077**	**2098**	**677**
OI1HS	**A**	**2,457,297**	**1926**	**621**
OH5VT	**A**	**1,178,052**	**1140**	**508**
OI6KZP	"	740,880	936	432
OI6KTD	"	694,008	588	324
OH2VZ	"	57,933	189	157
OH6MRA	**21**	**16,665**	**128**	**101**
OH2LU	**14**	**162,240**	**404**	**260**
OI2BCI	**1.8**	**40,584**	**175**	**114**
***OH1NOA**	**A**	**29,880**	**142**	**120**
***OH3MEO**	**28**	**27,432**	**212**	**127**
***OI3LIM**	**14**	**860,310**	**1024**	**495**
*OH6RC	"	104,720	289	238
*OI1LVR	"	6,237	68	63
***OI1MLB**	**1.8**	**86,800**	**298**	**155**

ALAND ISLAND

OIØ/OH1XT	**A**	**1,105,140**	**1366**	**489**
OHØNSJ	**14**	**3,567,906**	**2366**	**750**
OH1EH/OHØ	**1.8**	**167,424**	**423**	**192**

CZECH REPUBLIC

OL4M	**A**	**867,216**	**1076**	**406**
OK1DG	**A**	**656,489**	**886**	**391**
OK2BU	"	561,735	838	365
OK1XU	"	239,982	479	282
OK1AOU	"	101,565	312	185
OK1XC	**28**	**13,432**	**128**	**92**
OK2SG	"	4,648	69	56
OL3C	**14**	**1,027,689**	**1047**	**507**
OK1AXB	"	295,924	525	334
OL2M	**7**	**2,080,288**	**1082**	**518**
				(Op. OK1MM)
OK1IR	**7**	**1,118,820**	**801**	**435**
OK1EW	"	631,098	681	351
OK2PTZ	"	221,628	370	253
***OK7DX**	**A**	**564,566**	**900**	**358**
				(Op. OK2PHH)
***OK2EC**	**A**	**531,685**	**783**	**355**
***OK2QX**	**A**	**471,042**	**701**	**351**
*OK1MKI	"	420,189	680	321
*OK1FED	"	387,270	607	331
*OK1FKV	"	341,932	634	292
*OK2PHC	"	320,740	598	290
*OK2PO	"	297,330	460	330
*OK1ZP	"	272,136	513	276
*OK1FHI	"	249,587	486	263
*OK1DSA	"	220,416	517	256
*OK2BND	"	210,997	477	257
*OK1KZ	"	187,915	393	245
*OK1FCA	"	95,784	215	156
*OK2SWD	"	81,252	261	183
*OK2PBG	"	71,720	254	163
*OK2AJ	"	42,513	143	111
*OK1RV	"	41,087	195	133
*OK1DXW	"	21,942	136	106
***OK2WM**	**21**	**80,993**	**303**	**199**
***OK2SAT**	**21**	**80,376**	**282**	**204**
*OK1AES	"	72,834	265	199
*OK1AUC	"	56,320	255	146
*OK2EQ	"	31,047	176	131
*OK2BHE	"	3,588	59	52
***OK1FPS**	**14**	**285,600**	**543**	**340**
*OK2TBC	"	211,888	434	304
*OK2BCZ	"	24,354	160	123
*OK1DMS	"	12,852	90	84
***OK1EE**	**7**	**635,800**	**631**	**374**
*OK2VWB	"	202,176	303	234
***OK1JOC**	**3.5**	**361,950**	**605**	**285**

CONTINENTAL LEADERS

AFRICA

1.8	No Entrant	
3.5	**EA8/OH2KI**	**1,358,852**
7	EA8CN	1,513,332
14	5N3/SP5XAR	487,080
21	No Entrant	
28	No Entrant	
AB	**3V8BB**	**11,739,750**

ASIA

1.8	4X4NJ	259,420
3.5	*TA2DS	355,698
7	EY8MM	1,400,454
14	YM2ZW	3,302,023
21	*JA6ZLI	21,340
28	JF6OJX	336
AB	EX2M	2,988,768

EUROPE

1.8	SP5GRM	220,884
3.5	LY2BTA	967,974
7	UA6LAM	3,760,164
14	OHØNSJ	3,567,906
21	F6BKP	550,638
28	9H1EL	670,500
AB	**S59AA**	**5,160,400**

NORTH AMERICA

1.8	WA3WJD	6,240
3.5	W3BGN	289,960
7	CY7A	3,317,356
14	VP5Z	3,448,068
21	***WA1FCN**	**31,974**
28	**N4BP**	**19,257**
AB	**WP2AHW**	**10,533,756**

OCEANIA

1.8	No Entrant	
3.5	No Entrant	
7	**ZL3CW**	**1,416,768**
14	*VK2APK	1,374,728
21	No Entrant	
28	No Entrant	
AB	**VK3DXI**	**2,232,344**

SOUTH AMERICA

1.8	No Entrant	
3.5	P4ØA	873,108
7	LU1IV	7,160,088
14	HC2SL	1,806,870
21	LU6ETB	1,726,540
28	*LU8HSO	44,183
AB	***LU1EWL**	**566,920**

MULTI-SINGLE

AF	IH9/OK1CW	10,449,048
AS	JH5ZJS	4,849,525
EU	LZ9A	7,389,976
NA	**NB1B**	**6,256,128**
OC	VK5GN	2,704,037
SA	**8R3ØK**	**12,302,226**

MULTI-MULTI

AF	FR/DL1VJ	405,145
AS	JA1YXP	4,268,192
EU	**9A1A**	**16,268,490**
NA	AL3/N7DF	9,897,586
OC	No Entrant	
SA	No Entrant	

** Denotes low power.*

*OL3Z	"	189,772	404	209
		(Op. OK2HI)		
***OK1NG**	**1.8**	**64,680**	**243**	**140**
*OK1HGM	"	17,172	113	81

SLOVAKIA

OM8A	**A**	**4,958,865**	**2415**	**789**
OM7DX	**A**	**3,980,325**	**2065**	**727**
OM5A	**A**	**3,507,822**	**2090**	**687**
OM8FF	**3.5**	**369,810**	**514**	**315**
OM3OM	**1.8**	**79,248**	**244**	**156**
***OM3IF**	**A**	**391,960**	**589**	**328**
***OM3IAG**	**A**	**330,321**	**572**	**309**
***OM3CDZ**	**A**	**320,920**	**613**	**284**
*OM3EA	"	120,950	303	205
*OM3BA	"	60,196	200	149
***OM4DN**	**14**	**63,112**	**266**	**184**
*OM9TR	"	59,706	251	186
		(Op. OM3KTR)		
***OM6MO**	**7**	**77,440**	**193**	**160**
*OM3GB	"	60,996	152	138

BELGIUM

ON6ZX	**A**	**821,678**	**1009**	**442**
ON6KZ	**14**	**428,064**	**611**	**364**
OT6T	**7**	**3,316,534**	**1459**	**641**
		(Op. ON4UN)		
***ON4AEB**	**A**	**800,360**	**895**	**440**
***ON4APU**	**A**	**519,460**	**828**	**380**
*ON4ON	"	411,156	662	324
*ON6TJ	"	351,480	580	290
*ON4XG	"	292,638	572	302
*ON4CAS	"	218,652	486	274
*ON5PJ	"	68,688	239	162
***ON7TK**	**28**	**22,990**	**208**	**121**
*ON5AZ	"	3,774	39	34
***ON7NQ**	**21**	**10,125**	**85**	**75**
***ON4PX**	**14**	**24,768**	**146**	**129**

DENMARK

OZ5WQ	**A**	**445,221**	**605**	**333**
OZ4OC	**A**	**164,808**	**386**	**252**
OZ9Y	**14**	**94,311**	**261**	**189**
***OZ5MJ**	**A**	**383,292**	**607**	**338**
***OZ5UR**	**A**	**97,388**	**286**	**194**
*OZ8SW	"	45,708	210	156
*OZ5DX	"	33,488	137	112
*OZ5ABD	"	16,119	99	81
***OZ1BMA**	**14**	**52,116**	**214**	**172**
*OZ/SM7GCZ	"	43,771	176	169
*OZ5RM	"	5,440	67	64
***OZ8XO**	**7**	**2,750**	**55**	**50**

THE NETHERLANDS

PA3DZN	**A**	**3,241,422**	**2114**	**666**
PAØCOR	**A**	**98,469**	**267**	**189**
PA3BTH	"	14,350	95	82
***PAØCOE**	**A**	**333,498**	**606**	**326**
***PA3DUS**	**A**	**312,570**	**336**	**230**
*PA3GPX	"	81,906	281	187
*PAØSOL	"	24,525	142	109
*PA3GFH	"	21,294	126	117
*PA3BEJ	"	17,945	112	97
*PI4DTC/P	"	10,880	75	64
***PAØJED**	**28**	**4,480**	**72**	**56**
***PI4BOZ**	**21**	**21,830**	**156**	**118**
***PA3FHA**	**14**	**102,580**	**302**	**230**
***PA3AAV**	**7**	**1,133,860**	**923**	**445**
***PAØMIR**	**3.5**	**97,918**	**271**	**173**
*PA3BNT	"	19,656	112	91

SLOVENIA

S59AA	**A**	**5,160,400**	**2356**	**776**
S53MJ	**A**	**408,518**	**769**	**341**
S59L	"	398,570	716	328
S57W	"	266,616	455	276
S57NW	"	121,264	263	208
S51AY	**28**	**113,953**	**465**	**223**
S5ØD	**21**	**437,864**	**855**	**392**
		(Op. S57AD)		
S57DX	**14**	**1,840,131**	**1442**	**633**
S55A	**14**	**1,107,041**	**1096**	**533**
S52ZW	"	872,640	1017	505
S5ØA	**7**	**3,568,824**	**1525**	**657**
S5ØC	**7**	**3,418,170**	**1492**	**615**
		(Op. S53RM)		
S51Z	**3.5**	**420,500**	**631**	**290**
S57M	**3.5**	**518,056**	**708**	**379**
S58AM	"	257,868	472	247
S57MRG	"	100,240	260	179
S5ØU	**1.8**	**175,440**	**403**	**204**
***S51FA**	**A**	**863,559**	**1035**	**419**
***S53BM**	**A**	**587,820**	**752**	**388**
***S54X**	**A**	**528,500**	**677**	**350**
*S51WA	"	451,215	615	333
*S57KM	"	131,856	333	201
*S51ZJ	"	24,738	146	114
***S57J**	**21**	**183,106**	**480**	**287**
***S59D**	**21**	**124,844**	**408**	**236**
***S57T**	**14**	**817,225**	**971**	**485**
***S57U**	**14**	**690,146**	**866**	**466**
*S51T	"	40,131	200	147
***S54A**	**7**	**1,000,500**	**846**	**435**
*S51W	"	508,634	556	329
***S51EA**	**3.5**	**254,664**	**433**	**262**
*S51S	"	234,734	466	241
		(Op. S51TA)		
*S59DDR	"	145,960	345	205
*S57NLB	"	62,440	224	140

SWEDEN

SM5IMO	**A**	**2,326,896**	**1728**	**624**
SM2DMU	**A**	**1,473,930**	**1493**	**530**
SM3OSM	**A**	**812,589**	**1012**	**439**
SM5RE	"	54,600	259	150
SMØKV	**21**	**21,160**	**151**	**115**
SM4GNU	**14**	**444,312**	**586**	**374**
***SM3PZG**	**A**	**602,525**	**1000**	**385**
*SM2KAL	"	29,830	190	95
*SK6NL	"	11,748	91	89
		(Op. SM6HRR)		
*SMØBDS	"	9,072	75	72
*SM7UYS	"	6,466	64	61
***8S3FRO**	**14**	**225,700**	**452**	**305**
		(Op. SM3CVM)		
***SM7VZX**	**3.5**	**296,500**	**556**	**250**

POLAND

SP7NMW	**A**	**342,364**	**507**	**341**
SP4EEZ	**A**	**150,804**	**317**	**213**
SP8WJT	"	138,703	331	199
SP3FAR	"	50,397	121	107
SP2DKI	"	34,671	160	127
SP9LAS	"	12,488	61	56
SP9QJ	**21**	**4,389**	**84**	**33**
SP7GIQ	**7**	**3,280,800**	**1494**	**600**
SP6CIK	"	100,264	204	166
SP3ASN	**3.5**	**144,720**	**321**	**201**
SP5GRM	**1.8**	**220,884**	**446**	**237**
***SP2QCH**	**A**	**969,220**	**1210**	**430**
***SP1AEN**	**A**	**421,225**	**513**	**415**
***SP3MGP**	**A**	**420,624**	**471**	**414**
*SP1MHV	"	237,120	346	267
*SP5CGN	"	150,625	360	241
*SP5GKN	"	108,900	250	180
*SP8FHJ	"	71,750	232	205
*SP7BYM	"	56,166	376	332
*SP6CXH	"	37,530	176	139
*SP9KJU	"	7,632	58	53
***SQ6J**	**28**	**6,700**	**100**	**67**
		(Op. SP6EVX)		
*SP3AOT	"	1,120	37	30
***SP3SLA**	**21**	**73,491**	**280**	**187**
***SP9XCN**	**14**	**425,971**	**621**	**403**
*SP5XMM	"	85,476	252	204
*SP8BAB	"	79,540	207	192
*SP8HXN	"	56,672	221	176
*SP2UKB	"	52,096	160	148
*SP6SYF	"	47,360	197	160
*SP5ICS	"	25,760	209	92
*SP3VA	"	17,712	103	72
*SP2EPV	"	13,432	124	73
*SO5JHF	"	1,938	40	38
		(Op. SMØJHF)		
*SP3MEP	"	165	11	11
***SP2NA**	**7**	**589,600**	**595**	**364**
*SP5CNA	"	175,824	320	222
*SP5MBA	"	56,742	176	147
***SP3LPR**	**3.5**	**23,400**	**119**	**100**
***SP5GH**	**1.8**	**38,080**	**136**	**136**

GREECE

***SV2BOH**	**28**	**48,840**	**295**	**148**

DODECANESE

***J45DZX**	**A**	**578,150**	**1242**	**373**
		(Op. SMØCMH)		

BOSNIA

T9/DI6XY	**A**	**536,050**	**990**	**355**
*T98BBF	"	181,692	402	252
***T99T**	**28**	**91,800**	**459**	**180**
***T94YT**	**7**	**192,000**	**292**	**200**

CORSICA

***TK/DK7YY**	**7**	**971,460**	**1084**	**378**

EUROPEAN RUSSIA

RN6BY	**A**	**3,792,735**	**2464**	**801**
RA3AUU	**A**	**2,603,900**	**1927**	**650**
RW3AH	**A**	**1,267,200**	**1123**	**576**
UA4WA	"	1,235,346	1411	469
RA3XO	"	1,166,330	1342	461
RA3DUT	"	605,709	860	403
RZ3FA	"	262,216	568	292
RV1CC	"	226,058	385	241
RN3F	"	202,436	382	221
		(Op. RU3DX)		
RU6BV	"	35,956	122	101
UA3UCD	"	29,887	142	121
RV6ASY	"	18,228	105	93
UA4LM	**21**	**279,321**	**569**	**329**
UA1ODN	**14**	**476,572**	**700**	**421**
RX4HX	"	103,389	353	241
UA3LPF	"	48,348	277	204
RX1AD	"	5,975	87	25
UA1AAN	"	4,212	70	27
UA6LAM	**7**	**3,760,164**	**1523**	**701**
RX6BA	**7**	**1,080,222**	**779**	**429**
UA1OMS	"	574,560	621	360
RX3AP	"	6,649	79	61
UA4CJJ	**3.5**	**196,112**	**684**	**238**
RU1AO	"	168,826	370	217
UA1OZ	**1.8**	**25,872**	**134**	**98**
***RN3QO**	**A**	**993,776**	**1172**	**467**
***UA3AFS**	**A**	**828,374**	**1026**	**478**
*UA3ABJ	"	764,256	1000	419
*UA1OMX	"	385,776	705	342
*RV1AB	"	180,063	363	243
***RZ6HX**	**21**	**70,800**	**270**	**177**
*RA4AV	"	29,854	156	118
***UA4LL**	**14**	**727,425**	**987**	**477**
*UA4AGO	"	205,400	459	316
*RU4HH	"	153,252	367	258
***RA6FV**	**7**	**295,452**	**432**	**283**
*RZ6AZ	"	139,620	259	211
*RW3FO	"	128,622	293	221
*RU4WE	"	111,544	242	191
*UA1AQF	"	28,512	126	108
***RA3PP**	**3.5**	**161,728**	**329**	**224**
*UA3TU	"	108,864	290	189
***RW3PN**	**1.8**	**11,900**	**77**	**70**

KALNINGRAD

R2MWO	**A**	**51,750**	**208**	**150**
		(Op. RA2FBC)		

UKRAINE

UR8QX	**A**	**3,185,868**	**2189**	**679**
UT2UB	**A**	**832,500**	**1039**	**450**
UT4EK	**A**	**433,580**	**707**	**326**
UU2JA	"	136,476	293	223
UT9IR	"	71,967	197	161
UT5HP	"	32,376	153	142
UT5UGQ	"	21,243	110	97
UT5UGR	**28**	**96,992**	**405**	**224**
UX1UA	**28**	**22,330**	**175**	**110**
URØIQ	"	14,062	131	89
UU8J	**21**	**13,345**	**127**	**85**
		(Op. UU7YF)		
US5WE	**14**	**1,779,558**	**1383**	**649**
UR3QQ	**14**	**1,079,689**	**1120**	**529**
US1E	**14**	**1,032,768**	**1302**	**489**
US6UN	"	816,720	1124	492
UXØI	"	724,584	1115	454
		(Op. UXØIJ)		
UT7ZT	"	493,200	815	411
UR5MQS	"	390,096	703	387
UYØZG	"	346,680	568	360
EM7Q	"	9,638	100	79
		(Op. UY5ZZ)		
UR3W	**7**	**832,392**	**754**	**396**
UT4VV	**7**	**605,500**	**749**	**346**
US7IGF	"	249,000	364	249
UU1J	**3.5**	**806,124**	**828**	**394**
		(Op. UU7JM)		
EO7V	**3.5**	**558,256**	**703**	**328**
		(Op. UR7VA)		
UT3UZ	"	271,432	479	262
UX4UM	"	257,346	454	261
UT1WZ	"	203,728	411	238
***UR5UW**	**A**	**604,266**	**841**	**366**
***UX3M**	**A**	**575,970**	**898**	**365**
		(Op. UR3MP)		
*UT5UJY	"	431,520	721	348
*UT5UN	"	388,935	632	335
*UX5EF	"	328,208	582	292
*UY7P	"	256,780	522	270
***UR5FCD**	**21**	**21,700**	**153**	**124**
*UT1ZZ	"	6,624	80	69
***UY5TE**	**14**	**158,613**	**418**	**273**
*UX1L	"	116,095	317	217
*UR5MTA	"	70,680	235	186
*UT3UA	"	32,776	165	136
***US2YW**	**7**	**728,530**	**605**	**407**
*UY2ZZ	"	267,300	391	270
***UX1VT**	**3.5**	**70,030**	**211**	**149**
*UR5FCM	"	58,976	209	152
***UU5JAA**	**1.8**	**53,360**	**206**	**145**
*UT1WW	"	4,128	50	43

LATVIA

YL8M	**A**	**3,015,183**	**2206**	**669**
		(Op. YL2KL)		
YL2SW	**14**	**102,300**	**335**	**220**
YL2GN	**7**	**206,496**	**350**	**239**
YL2SM	**3.5**	**356,320**	**601**	**272**
***YL2KA**	**A**	**441,408**	**610**	**352**
***YL2UZ**	**7**	**355,110**	**513**	**285**
*YL3IG	"	287,742	451	273
*YL2KF	"	56,170	165	137

ROMANIA

YO3GEC	**14**	**19,470**	**212**	**59**
YO3AWC	**3.5**	**304,278**	**565**	**260**
***YO3FRI**	**A**	**1,042,783**	**1130**	**479**
***YO2DFA**	**A**	**949,248**	**1062**	**412**
*YO8FR	"	505,628	622	517
*YO5CUU	"	122,450	351	155
*YO5DAS	"	36,244	230	82
***YO3CTK**	**14**	**108,336**	**282**	**222**
*YRØDCF	"	97,968	304	208
		(Op. YO4DCF)		
***YO4BBH**	**14**	**80,190**	**300**	**198**
*YO3FF/P	"	40,239	220	153
***YR8A**	**3.5**	**161,626**	**351**	**211**
		(Op. YO8AXP)		

YUGOSLAVIA

YT1BB	**14**	**2,807,168**	**1898**	**728**
YU1IG	**14**	**1,980,800**	**1607**	**640**
YT4I	**14**	**1,397,116**	**1308**	**574**
		(Op. YU4WU)		
4N1A	**3.5**	**905,256**	**917**	**396**
		(Op. 4N1DXX)		
YT6A	**3.5**	**601,622**	**743**	**343**
		(Op. YU6YY)		
YT1WA	"	416	13	13
***YU7CB**	**A**	**1,366,728**	**1274**	**501**
***4N7CA**	**A**	**721,048**	**927**	**386**
***YTØE**	**A**	**631,828**	**787**	**382**
		(Op. YU1BO)		
*YU7SF	"	120,681	349	207
***YU1EA**	**28**	**66,729**	**348**	**177**
***YU1HA**	**28**	**55,539**	**249**	**187**
*YU7KM	"	1,833	46	39
***YU7BW**	**21**	**186,930**	**524**	**279**
***YU1PJ**	**14**	**667**	**23**	**23**
***YU7WJ**	**7**	**562,302**	**612**	**351**

MACEDONIA

Z3ØM	**14**	**2,651,040**	**2037**	**720**
		(Op. Z32XA)		
***Z32KV**	**A**	**403,260**	**757**	**330**
*Z37FCA	"	5,512	60	52

ALBANIA

ZA1AJ	**14**	**1,732,572**	**1754**	**612**
		(Op. OK2ZV)		

OCEANIA

THE PHILIPPINES

DU1KK	**A**	**1,120,340**	**1063**	**310**

HAWAII

***W6OUL/WH7**	**A**	**240,944**	**349**	**176**

AUSTRALIA

VK3DXI	A	2,232,344	1239	526
VK5AFO	A	91,434	210	147
*VK2APK	14	1,374,728	982	478
*VK4TT	14	140,024	307	184
*VK1FF	7	280,460	265	185

(Op. WB2FFY)

CHRISTMAS ISLAND

*VK9GA	A	590,550	717	254

(Op. PAØGAM)

INDONESIA

*YB3OSE	A	126,228	266	157
*YB2UDH	14	89,324	190	163
*YB2BKJ	"	6,336	48	44

NEW ZEALAND

ZL2AGY	7	783,180	481	285
*ZL3CW	7	1,416,768	650	376

(Op. F2CW)

SOUTH AMERICA

CHILE

XQ1IDM	7	5,754,716	1457	682

URUGUAY

CX8BBH	14	1,701,744	1097	528
CX7BY	"	74,646	178	143

ECUADOR

HC2SL	14	1,806,870	1143	533

ANTARCTICA

EM1KA	3.5	4,680	31	26

ARGENTINA

LU5GPL	A	3,360	35	32
LU6ETB	21	1,726,540	1179	499

(Op. LU6BEG)

LU1IV	7	7,160,088	1769	689

(Op. LW9EUJ)

*LU1EWL	A	566,920	496	315
*LU3DSI	"	2,759	31	31
*LU8HSO	28	44,183	136	113
*LU3HIP	28	39,984	133	102
*LW8EXF	"	5,500	51	44

(Op. LU7DW)

*LU7FJ	21	1,552,485	1083	485
*LU5VC	21	432,653	496	299

PERU

*OA4EI	14	9,672	62	52

ARUBA

P4ØA	3.5	873,108	492	317

BRAZIL

PR5W	21	1,718,931	1164	501

(Op. PY5CW)

PW2A	7	120,978	162	141

(Op. PT2BW)

*PU2MHB	A	408,382	436	278
*ZW2Z	A	136,220	241	196

(Op. PY2ZI)

*PY3JRG	"	50,500	120	100
*PW2N	"	16,629	83	69

(Op. PY2NY)

*PY2DUN	28	3,096	65	36
*PT2AW	21	6,144	49	48
*PY2OZF	"	720	16	15
*PY2TI	7	8,424	40	39

FERNANDO DE NORONHA

PYØFF	7	2,881,100	1034	470

VENEZUELA

YW1A	7	4,994,880	1394	605

(Op. YV1DIG)

*YV6AZC	21	901,600	784	392
*YV7QP	"	49,324	143	118
*YV5AAX	14	101,994	195	178

SINGLE OPERATOR ASSISTED

UNITED STATES

WF3T	A	2,116,884	1386	609
AB2E	A	1,341,680	914	496
WK2G	"	1,283,428	1009	499
N6ZZ	A	678,300	800	474
N8BJQ	A	636,124	710	436
N1CC	"	552,520	600	380
KO4EW	A	464,492	607	371
WB5B	"	411,985	649	395
KA5W	"	248,100	372	300
N6KI	A	193,000	322	200
N6RFM	A	192,326	287	226
W9OP	A	158,236	250	179
KB2R	"	72,981	183	153
KC8EG	"	56,120	140	115
N1OPZ	"	37,620	119	110
WW1E	"	12,528	60	58
KF2O	"	8,424	54	54
AA1ER	"	7,632	51	48
K3ANS	14	505,932	604	399
W6TKF	14	196,087	415	315
KB8NTY	14	74,907	244	203
WA2TIF	14	46,872	146	126
K9OSH	14	21,960	128	122
AA8UH	7	137,710	350	235
AA2MF	1.8	320	21	20
*WS1E	A	655,557	546	371
*AA3OC	A	208,278	302	261

DX

DL1IAO	A	1,982,766	1294	554
S53R	A	819,280	758	440
JH3AIU	A	673,072	851	368
JF1SEK	"	285,616	354	263
EA7AJE	A	16,356	90	87
IQ7A	14	883,500	1138	500
S58MU	14	104,424	305	229
JA9XBW	14	77,588	187	163
S57AL	7	1,453,224	913	453
DL1FDV	3.5	334,642	555	287
*HAØHW	A	212,344	416	254
*K1EFI/VP9	A	122,578	238	167
*JK2VOC	A	103,040	252	184
*JA7SUR	"	100,128	222	149
*F5TCN	A	82,904	212	172
*JA3VXH	"	80,634	195	151
*VE3ZTH	A	42,896	126	112
*JH7AJD/1	"	15,480	61	60

MULTI-OPERATOR SINGLE TRANSMITTER

UNITED STATES

NB1B	6,256,128	2405	768
K1ZZ	5,148,760	2095	776
NJ4F	4,231,385	1972	743
KVØQ	3,845,786	2017	742
WC4E	3,639,510	1910	742
KC7V	2,044,464	1482	573
NT7Y	1,717,972	1375	614
KN5H	1,615,350	1251	550
WM8W	266,265	385	291
AC5CT	9,222	97	87
WN4KKN/2	40	5	5

NORTH AMERICA

XA5T	3,526,670	2085	607
VD6AO	1,162,179	956	417
COØRCT	976,144	704	361

AFRICA

IH9/OK1CW	10,449,048	4016	696
ED8URT	390,576	451	237

ASIA

JH5ZJS	4,849,525	2036	725
R3F/9	3,662,420	1807	596
JA7YAA	3,106,761	1542	619
JA1ZLO	2,427,104	1389	584
JE6ZIH	2,092,080	1281	552
RK9CWY	1,186,246	862	361
JA2YKA	213,663	310	201

EUROPE

LZ9A	7,348,175	3806	865
LZ8A	5,510,484	3380	788
HG3O	5,326,202	2616	782
RU1A	5,018,972	2888	812
OH2IW	5,007,905	2796	805
GB6WW	4,935,238	2803	803
OI8LQ	4,626,020	2798	764
II2K	4,625,860	2708	781
OI4OC	4,562,096	2712	784
DL1AUZ	4,298,976	2213	736
GX3PRC	4,231,810	2735	730
DK2OY	4,225,300	2362	725
OL3A	4,184,518	2357	709
OI2JNX	4,177,444	2468	782
RZ3Q	4,152,016	2800	761
IQ4T	4,119,120	2379	720
TM4Q	3,700,592	2369	658
SN6F	3,594,630	2226	709
OM3RKA	3,395,841	2060	687
HG8ITU	3,348,352	2435	707
TM5B	3,337,320	2314	685
LY6M	3,212,902	2229	682
PI4CC	2,874,770	1857	667
DJ7TO	2,874,693	1888	669
OT6P	2,859,294	1982	687
UT7L	2,656,998	1923	646
TM2T	2,534,688	2037	624
EA5BY	2,461,536	2045	592
IR3X	2,376,000	2015	594
EU5F	2,318,808	1869	584
3ZØWAW	2,314,032	2061	582
ES5Q	2,154,432	1934	588
SP2PMO	2,097,410	1606	581
DKØZG	2,089,472	1833	583
TM5FER	1,993,446	1975	546
RZ6AXO	1,878,426	1609	583
HA3KNA	1,771,350	1708	525
RW6AWT	1,327,872	1319	532
9A5D	1,319,761	1572	493
RZ4AYT	1,215,120	1420	488
OL5T	1,077,270	1230	482
UR4E	986,309	1291	437
OK8EAO	886,784	1052	433
ED7UE	792,440	1061	440
OM9FI	732,544	909	388
YT7P	691,548	970	403
LZ1KSZ	671,990	990	419
RK3UWA	670,968	1042	392
IO2L	655,620	906	420
YO7KJU	639,582	921	402
DL1ARJ	428,496	636	545
LY2BN	410,712	604	327
YO6KBM	272,525	500	275
DLØMFL	190,190	401	247
LA1K	122,610	320	201
YU1L	109,620	324	210
OK1KCF	93,600	241	180
OK2KDS	88,206	258	183
OI1AF	20,910	144	102
RW6AMM	432	12	12

OCEANIA

VK5GN	2,704,037	1364	527
VK4EMM	2,369,640	1215	455
DU1KWT	228,660	360	185

SOUTH AMERICA

8R3ØK	12,302,226	3680	837
P42V	11,617,600	3300	848

MULTI-OPERATOR MULTI-TRANSMITTER

UNITED STATES

WZ1R	5,729,640	2444	840
K3EST	5,276,526	2384	751
WD8LLD	3,673,141	1900	751
AA9OC	2,878,143	2143	771

NORTH AMERICA

AL3/N7DF	9,897,586	3422	886

AFRICA

FR/DL1VJ	405,145	443	271

ASIA

JA1YXP	4,268,192	1783	664
JO1YAO	269,745	368	245
JG2YIV	90,872	228	148

EUROPE

9A1A	16,268,490	6679	1054
YTØW	14,550,580	6473	1045
EM2I	12,380,505	5408	1033
OT6A	10,243,140	4770	948
RW2F	9,648,666	4599	907
PA6WPX	8,072,976	3917	872
9H3TY	7,989,445	5792	815
ED4ML	6,373,344	4172	788
LY7A	5,834,928	3561	771
OI3NE	3,260,600	2754	685
OI1W	2,657,367	2200	619
HG8U	2,050,924	1020	458
F6ENO	1,587,305	1466	523
EA3CKX	1,067,710	1171	490

CHECK LOGS

The following logs were used for cross-checking. Check logs and SWL logs are always appreciated. Thank you.

3ZØAU, 7L3TDU, CP6UH, DF3OL, DJ5NN, DJ8RS, DK7AN, DK9EA, DL1AKP, DL2AXM, DL2HWI, DL3NEO, DL4GBR, DL5JRA, DL7VAF, EA1AUI, EA1BLF, EA1DLN, EA1EDS, EA3DU, EA4FW, EA7GVW, EW3CW, HAØHH, HA5AF, HA5CQ, IK1ZFP, IR7A, JA1CP, K6FM, K6VL, K8GLE, KX7J, LA1YE, LA4OGA, LA8CD, LA9VGA, LU5CBA, LU9GPM, LZ1GU, LZ1HX, LZ2UZ, LZ3AB, NØXCF, OH5PT, OK1AQW, OK1KWG, OM5RJ, OZ1FUO, OZ7QB, PJ2/OH6RJ, PY1EDB, PY3CFD, PY3CJI, PY7OJ, RU3AA, RV6HA, SMØKV, SMØNJO, SM3CVM, SM6BZE, SP1BLE, SP2GUC, SP2IU, SP2LNW, SP3LFV, SP3VKO, SP4DZT, SP4EAK, SP6AUI, SP6BEN, SP6FBD, SP6NIF, SP7BDS, SP8JMA, SP9FZN, SP9MDY, SV1JA, UA3TGC, UA4YG, UA9OS, UN6T, UR5BCJ, UT1WA, UT2XX, VA3TEE, VD2EM, VE3BR, VE3KKI, YL2KO, YL2PG, YL2UZ, YO6LV, YU7FN, ZS6AJS, ZW9L

CQ World-Wide WPX CW Contest All-Time Records

The contest is held each year on the last full weekend of May. The All-Time Records will be updated and published annually. Data following the calls: year of operation, total score, and number of prefix multipliers.

WORLD RECORD HOLDERS

Single Operator

1.8	4X4NJ('96)	259,420	170
3.5	EA8/OH2KI ('96)	1,358,852	347
7.0	LU1IV('96)	7,160,088	689
14	YW1A('91)	4,617,456	732
21	ZD8LII('91)	5,118,527	743
28	ZS6BCR('91)	3,621,173	617
AB	P4ØW('94)	14,168,115	845

Multi-Operator Single Transmitter

	CQ3X('95)	13,254,620	790

Multi-Operator Multi-Transmitter

	HG73DX('93)	16,543,420	1060

CLUB RECORD

Northern California Contest Club ('92) 97,527,906

U.S.A. RECORD HOLDERS

Single Operator

1.8	K1ZM('95)	40,446	107
3.5	K1ZM('93)	406,080	288
7.0	KI1G('96)	2,573,408	587
14	KI1G('95)	3,330,088	788
21	K6LL/7('88)	2,163,388	557
28	N5RZ('89)	162,134	259
AB	KE2PF('96)	6,790,795	781

Multi-Operator Single Transmitter

	NB1B('96)	6,256,128	768

Multi-Operator Multi-Transmitter

	NSØZ('88)	10,870,380	922

QRPp RECORD

VP2MU('91) 1,554,735

WPX (Prefix) RECORD

HG73DX('91) 1120

CONTINENTAL RECORD HOLDERS

AFRICA

1.8	ZS4FO('95)	4,464	24
3.5	EA8/OH2KI('96)	1,358,852	347
7.0	AM9TY(92)	2,007,990	404
14	ZD8LII('93)	2,687,580	567
21	ZD8LII('91)	5,118,527	743
28	ZS6BCR('91)	3,621,173	617
AB	3V8BB('96)	11,739,750	750

ASIA

1.8	4X4NJ('96)	259,420	170
3.5	UP2NK/UF('85)	701,012	221
7.0	9K2ZZ('94)	3,383,676	487
14	4Z6DX('91)	4,614,030	743
21	7L1GVE('91)	2,811,478	601
28	4X4UH('81)	1,081,262	338
AB	P31A('92)	10,293,858	762

EUROPE

1.8	SP5GRM('96)	220,884	237
3.5	LY2BTA('96)	967,974	399
7.0	UA6LAM('96)	3,760,164	701
14	CT2A('95)	4,231,598	826
21	4N4A('88)	2,585,460	615
28	9H1EL('88)	805,552	398
AB	CR7M('93)	5,645,267	751

NORTH AMERICA

1.8	VE3BMV('86)	43,428	77
3.5	XL7CC('94)	709,730	241
7.0	VP2VCW('86)	4,641,120	586
14	ZF1A('95)	3,871,500	725
21	FS5T('89)	4,552,470	702
28	HI8JKA('89)	891,242	374
AB	WP2AHW('96)	10,533,756	831

OCEANIA

1.8	KX6DC('88)	12,240	45
3.5	KX6DC('89)	258,258	143
7.0	V7A('93)	2,205,922	373
14	N6VI/KH7('95)	3,103,932	606
21	N7DF/WH2('89)	3,243,450	525
28	KG6DX('81)	1,238,806	334
AB	DX1EA('95)	5,942,342	602

SOUTH AMERICA

1.8	YV1OB('86)	11,550	35
3.5	YX3A('89)	1,004,060	305
7.0	LU1IV('96)	7,160,088	689
14	YW1A('91)	4,617,456	732
21	LTØA('91)	4,290,988	686
28	CE3DNP('89)	2,857,038	582
AB	P4ØW('94)	14,168,115	845

MULTI-OP SINGLE TRANSMITTER

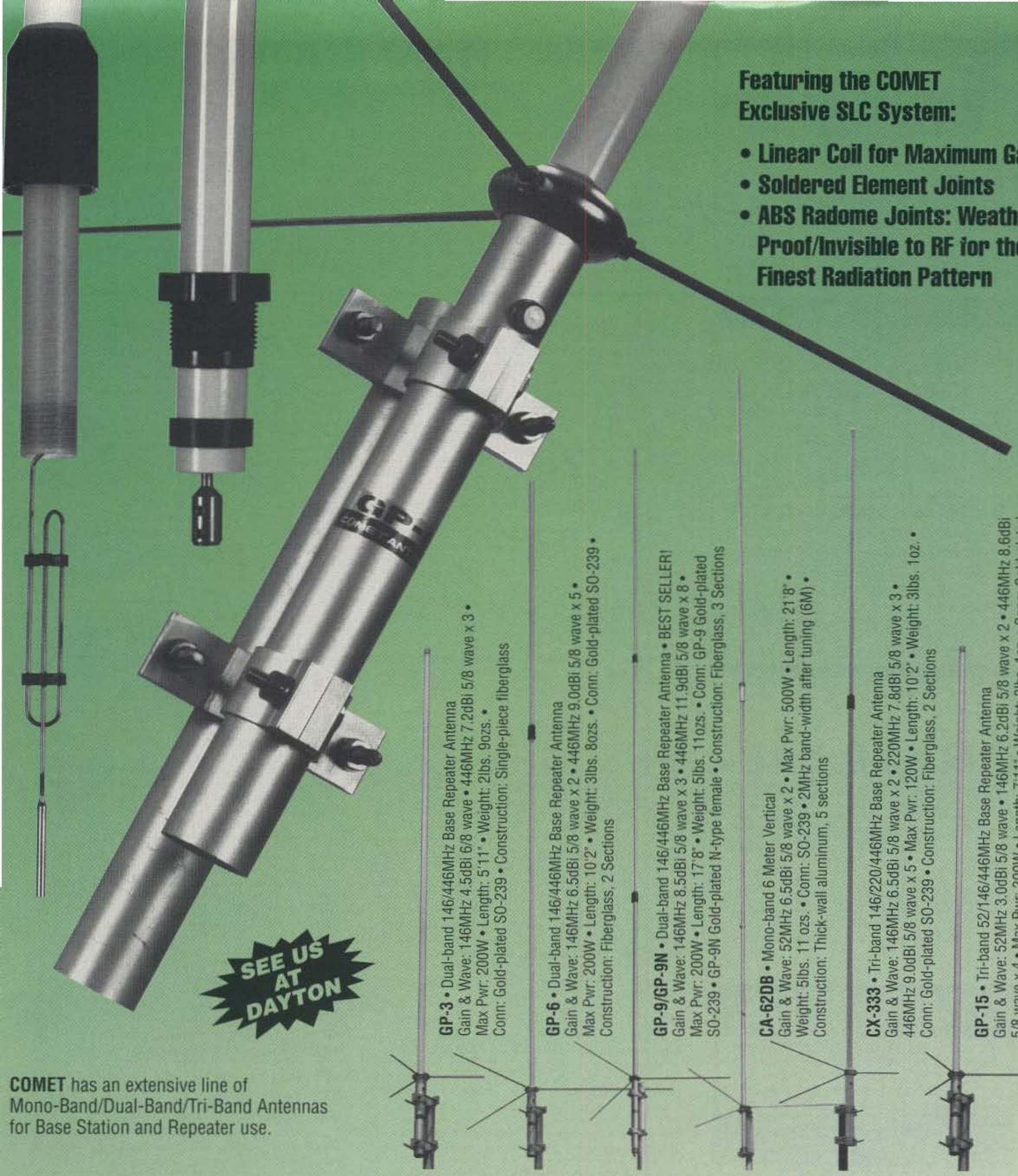
AF	CQ3X('95)	13,254,620	790
AS	YM5KA('90)	13,098,790	839
EU	R6L('93)	9,194,688	939
NA	KP2A('89)	12,843,135	835
OC	AG9A/AH2('91)	9,005,641	787
SA	8R30K('96)	12,302,226	837

MULTI-OP MULTI-TRANSMITTER

AF	EA9CE('84)	4,383,308	482
AS	JE2YRD('91)	8,388,942	866
EU	HG73DX('93)	16,543,420	1060
NA	WL7E('88)	12,826,296	952
OC	KH6XX('85)	8,551,399	647
SA	LQ5A('89)	8,290,016	784

QRPp

AF	5Y4FO('92)	649,057	311
AS	4X4UH('82)	1,028,904	344
EU	LZ2BE('91)	1,137,488	506
NA	VP2MU('91)	1,554,735	469
OC	FO8JP('86)	572,131	259
SA	ZX2X('96)	861,080	380



Featuring the COMET Exclusive SLC System:

- **Linear Coil for Maximum Gain**
- **Soldered Element Joints**
- **ABS Radome Joints: Weather Proof/Invisible to RF for the Finest Radiation Pattern**

GP-3 • Dual-band 146/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 4.5dBi 6/8 wave • 446MHz 7.2dBi 5/8 wave x 3 •
Max Pwr: 200W • Length: 5'11" • Weight: 2lbs. 9ozs. •
Conn: Gold-plated SO-239 • Construction: Single-piece fiberglass

GP-6 • Dual-band 146/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 446MHz 9.0dBi 5/8 wave x 5 •
Max Pwr: 200W • Length: 10'2" • Weight: 3lbs. 8ozs. • Conn: Gold-plated SO-239 •
Construction: Fiberglass, 2 Sections

GP-9/GP-9N • Dual-band 146/446MHz Base Repeater Antenna • BEST SELLER!
Gain & Wave: 146MHz 8.5dBi 5/8 wave x 3 • 446MHz 11.9dBi 5/8 wave x 8 •
Max Pwr: 200W • Length: 17'8" • Weight: 5lbs. 11ozs. • Conn: GP-9 Gold-plated
SO-239 • GP-9N Gold-plated N-type female • Construction: Fiberglass, 3 Sections

CA-62DB • Mono-band 6 Meter Vertical
Gain & Wave: 52MHz 6.5dBi 5/8 wave x 2 • Max Pwr: 500W • Length: 21'8" •
Weight: 5lbs. 11 ozs. • Conn: SO-239 • 2MHz band-width after tuning (6M) •
Construction: Thick-wall aluminum, 5 sections

CX-333 • Tri-band 146/220/446MHz Base Repeater Antenna
Gain & Wave: 146MHz 6.5dBi 5/8 wave x 2 • 220MHz 7.8dBi 5/8 wave x 3 •
446MHz 9.0dBi 5/8 wave x 5 • Max Pwr: 120W • Length: 10'2" • Weight: 3lbs. 1oz. •
Conn: Gold-plated SO-239 • Construction: Fiberglass, 2 Sections

GP-15 • Tri-band 52/146/446MHz Base Repeater Antenna
Gain & Wave: 52MHz 3.0dBi 5/8 wave • 146MHz 6.2dBi 5/8 wave x 2 • 446MHz 8.6dBi
5/8 wave x 4 • Max Pwr: 300W • Length: 7'11" • Weight: 3lbs. 1oz. • Conn: Gold-plated
SO-239 • 2MHz band-width after tuning (6M) • Construction: Single-piece fiberglass

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HAM location, beautiful all-brick rancher, 4700 sq. ft. home includes home office, HAM shack (radio room), antennas, 3 tiled full baths, 3 or more bedrooms, 3 dens. The 3 car garage and smoking room are not included in the 4700 sq. ft. Sturdy quality construction. Type of heat is great for sinuses and very warm. Acre lot, back fully fenced and very quiet and private, secure gates, separate dog kennel, olympic-size well-kept swimming pool. Located on mountain ridge, quiet prestigious neighborhood, nice homes all around, great schools. Located 55 miles from Baltimore and Washington, DC. Ideal location to work in DC, with easy accessibility by train. House and property will be inspected, one year warranty. Pictures, property plat, layout, amenities list, and features in a booklet available to serious buyers for $5 cash, check, or money order. Contact: W3BAG, Box 609, Braddock Heights, MD 21714, or call 301-473-5825.

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CIRCLE 132 ON READER SERVICE CARD

Advertiser's Index *(cont'd)*

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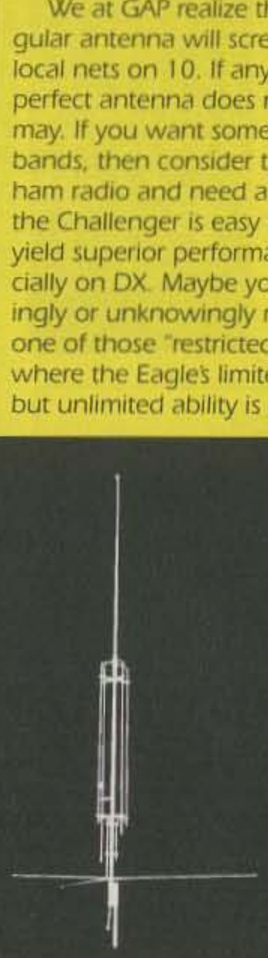
CIRCLE 133 ON READER SERVICE CARD

CIRCLE 63 ON READER SERVICE CARD

GAP: THE PERFECT ANTENNA

We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.



Eagle DX

Challenger DX

Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

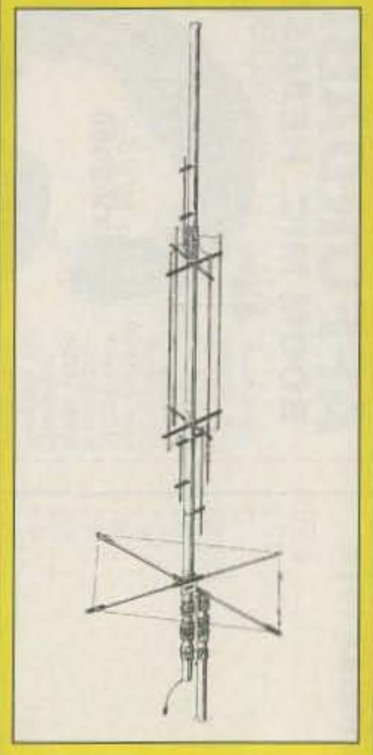
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

Latest Release: **TITAN DX**



This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$269
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$299
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

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FT-920

All-Mode HF/6m Transceiver

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- Simplified Tuning with Shuttle Jog Control
- Omni-Glow™ Dual Display with Twin VFO Knobs
- Separate FET RF Amplifier for High & Low Bands
- Digital Voice Memory System
- Quick Memory Bank (QMB) Instant Frequency Memory System

*Million Instructions Per Second

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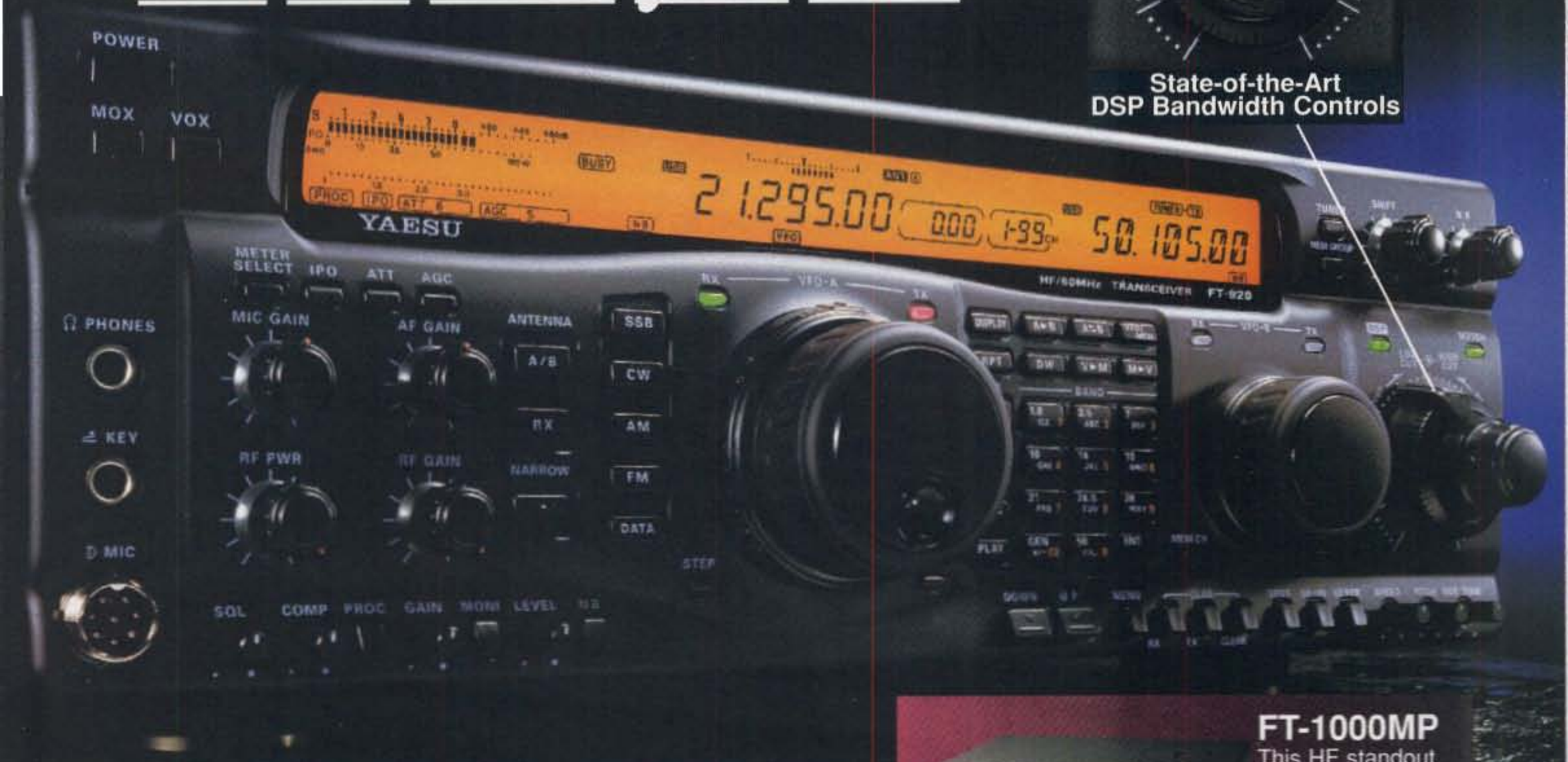
State-of-the-Art DSP Bandwidth Controls



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FT-1000MP

This HF standout features a high-intercept front end design, EDSP, and built-in Collins SSB Mechanical Filter

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Compact Dual Band Mobile **FT-8000R**

Now, a dual band that's so advanced it's simple!

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"High-tech features, too, like the enhanced Smart-Search™."

"Advanced performance, and simple to use. I knew Yaesu would be first with this."

"Yaesu did it again!"

Continuing Yaesu's leading edge engineering philosophy, the FT-8000R Compact Dual Band Mobile introduces industry-first features and no-nonsense operation for today's demanding Amateur. No puzzling key combinations on the FT-8000R; eight clearly marked keys and Yaesu's exclusive Omni-Glow™ display make operation a snap. Want to change bands? Just push the VHF or UHF Volume control!

The FT-8000R is the first mobile to provide superwide receiver coverage – from 110 to 550 MHz and 750 to 1300 MHz*, receiving public safety, marine, and weather channels. Using Yaesu's exclusive Enhanced Smart Search™, the FT-8000R automatically seeks out and loads active simplex channels into up to 50 ESS memory channels in just seconds – ideal when traveling.

Built-to-last, the FT-8000R brings together the most-requested dual band features and a MIL-STD 810 rating for enduring performance. Dual receive (V+V, U+U or V+U), Crossband Repeat (bidirectional or one-way), up to 50 Watts of VHF power output (35 Watts on UHF) with High/Medium/Low selection on each band, and "plug and play" 1200 or 9600 bps packet are just a few.

Clearly a standout, the FT-8000R boasts 110 memory channels (55 per band including one-touch "Home" channels) that store repeater shift, CTCSS encode tone, and packet baud rate. Other essential features include a backlit microphone (another Yaesu first), Time-Out Timer, and an all-new S-Meter Squelch that opens based on the S-meter reading. And, for a programming alternative, the optional ADMS-2C Personal Computer Programming Kit simplifies operation even more.

The FT-8000R dual band mobile is easy - to operate -- and one of the most affordable radios on the market. Bring its high-tech performance home with you today! Available at your Yaesu dealer now!

Features

- Frequency Coverage
  RX: 110~550 MHz
  750~1300 MHz*
  TX: 144~148 MHz
  430~450 MHz
- 3 Power Output Levels
  2m 50/10/5 Watt
  70cm 35/10/5 Watt
- 110 Memory Channels (55 per band,including "Home" channels)
- Enhanced Smart Search™
- CTCSS Encode
- Time-Out Timer (TOT)
- S-Meter Squelch
- Dual Receive (V+V,U+U,V+U)
- Crossband Repeat (bidirectional or one-way)
- PC Programmable w/optional ADMS-2C
- Intelligent Band Display (IBD)
- Receiver Muting
- Auto Power Off (APO)
- MIL-STD 810 Rating
- Omni-Glow™ Display
- 1200/9600 bps Packet Compatible
- Alternating-Band Memory Selection (ABMS)
- DTMF Autodialer (one memory per band)
- Accessories

Consult your local Yaesu dealer.

*Cellular blocked.

YAESU

...leading the way.℠

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FT-8500
Dual Band Mobile
Detachable remote front panel, Alphanumeric Display, Spectra-Analyzer™, Digital Voltage Display, 110 memories in 5 banks, choice of microphones, offers high performance operating flexibility.

Ultra Compact Dual Band Handheld **FT-50RD**

One tough little dual bander!

Features

- Frequency Coverage
  Wide Band Receive
  RX: 76-200 MHz, 300-540 MHz, 590-999 MHz*
  TX: 144-148 MHz, 430-450 MHz
- AM Aircraft Receive
- MIL-STD 810 Rating
- Digital Coded Squelch (DCS)
- 112 Memory Channels
- 12V DC Direct Input
- High Speed Scanning
- Alphanumeric Display
- CTCSS Encode/Decode
- Auto Range Transpond System™ (ARTS™)
- Dual Watch
- Direct FM
- High Audio Output
- ADMS-1C Windows™ PC Programmable
- Four Battery Savers:
  Automatic Power-Off (APO)
  Receive Battery Saver (RBS)
  Selectable Power Output (SPO)
  Transmit Battery Saver (TBS)
- Time Out Timer (TOT)
- 2.5 and 5 Watt Versions Available
- Built-in Digital Voice Recording System (DVRS)
- Full line of accessories

NOW WITH BUILT-IN DELUXE KEYPAD

"You notice how loud this HT's audio is?"

"Yeah, it's Mil Spec tough like a commercial HT."

"Easy to operate, small, great price!"

"Yaesu did it again!"

The foremost in top-performing, durable, dual band handhelds now includes the FTT-12 DTMF keypad with CTCSS enc/dec, DCS enc/dec, DVRS and paging/coded squelch. Manufactured to rigid commercial grade standards, the FT-50RD is the only amateur dual band HT to achieve a MIL-STD 810 rating. Already a winner; the deluxe keypad makes this stand-out HT even better! Water-resistant construction uses weather-proof gaskets to seal major internal components against the corrosive action of dust and moisture. And, the rugged FT-50RD withstands shock and vibration, so throw it in with your gear!

Exclusive features set the FT-50RD apart, too. Wide Band Receive includes 76-200 MHz (VHF), 300-540 (UHF), and 590-999 MHz*. Dual Watch checks sub-band activity while receiving on another frequency, then when a signal is detected, shifts operation to that frequency. Digital Battery Voltage displays current operating battery voltage. Digital Coded Squelch (DCS) silently monitors busy channels. Auto Range Transpond System™ (ARTS™) uses DCS to allow two radios to track one another. And, the FT-50RD is ADMS-1C Windows™ PC programming compatible, too. To round out the FT-50RD, it has four battery savers, and super loud audio—remarkable in an HT this size.

A reliable companion where ever you go, the FT-50RD is one tough little dual bander with all the features you want!

YAESU

...leading the way SM

For the latest Yaesu news; hottest products, visit us on the Internet! http://www.yaesu.com

FT-10/40R
Ultra Compact Handhelds
VHF or UHF. Similar to FT-50RD including MIL-STD 810, and other exclusive features.

ICOM IC-706MKII*

Base station performance with mobile-sized versatility!

The ICOM IC-706MKII HF/VHF all mode transceiver is a powerful combination of next generation technology and ICOM's time-tested craftsmanship. Whether you use the IC-706MKII for base station activity, for mobile operations or on DX'peditions you can't go wrong.

Compact Design

Extremely small and compact, this radio packs all of the features of a top class HF rig in a mobile-sized unit.

- Dimensions: 167(w) x 58(h) x 200(d)mm (6-9/16 x2-9/32 x 7-7/8 inches)
- 2.5 kg (5.5 lbs)

HF+6M+2M!

Cover all modes (SSB,CW,RTTY,AM and FM) from HF to 6 meters AND 2 meters. A powerful 100 watts of output power on HF and 6 meters with 20 watts on 2 meters.

Easy Operation

Switch bands with the touch of a button! The individual band change keys provide quick and easy QSY – the SUB DIAL for easy second VFO operation and RIT adjustment control. Each band stores pre-amp/attenuator and tuner ON/OFF settings.

Other Great Features:

- Enhanced 0.03-200 MHz broadband all mode receive
- Slots for 2 optional crystal filters
- Quiet Thermally Controlled Cooling Fan
- Crossband Split Operation
- Superior Transmit Audio Characteristics
- Large Speaker
- Tone Squelch (option UT-86 required)
- 3 Step Selectable Passband Width (opt.)

- Detachable Front Panel (Optional OPC-581 required)
- "S" menu for quick access to 3 bands
- Built-in CI-V serial communications port
- Spectrum Scope
- IF Shift
- Narrow-FM
- 102 Memory Channels with Alphanumeric Display
- Large Dot-Matrix Display
- Optional UT-102 Voice Synthesizer
- Optional AT-180 Antenna Tuner
- Optional PS-85 DC Power Supply
- And Much More!

PC Ready!
(optional CT-17 required)

Available late May / early June 1997!

ICOM America, Inc. 2380–116th NE, Bellevue, WA 98004 • 425-454-8155.

ICOM
http://www.icomamerica.com

*This device has not been approved by the FCC. This device may not be offered for sale or lease, or be sold or leased until the approval of the FCC has been obtained. All specifications are subject to change without notice or obligation. All ICOM radios significantly meet or exceed FCC regulations limiting spurious emissions. 706MKII397Y