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JULY 1999

CQ

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W1AW

U.S. $3.

0 75470 08241 2

r: Dave Sumner, K1ZZ, at W1AW

IO AMATEUR'S JOURNAL

ICOM Connect 2000

IC-2100H

IC-207H

IC-2800H

IC-2100H Rugged 2M • 55 Watts • Easy to Use • Full Function Mic • CTCSS Encode/Decode • IMD Fighter • MIL SPEC 810[11] • Green/Amber LCD • PC Programmable*

IC-207H Super Compact, Detachable Control Panel* • 2M/440MHz • 2M (45W)/440 MHz (35W) • Work One Band at a Time • Up to 9600 bps Packet* • Air Band RX[†] • CTCSS Encode/Decode • MIL SPEC 810[11]

NEW IC-2800H Audio Excellence and Video Excitement • 2M/440MHz • 3" (d) TFT Color LCD Screen • NTSC External Video Input • WFM & AM (Rx Only), FM • 50W/2M, 35W/70CM • 9600 bps Packet Data Port • V/U, U/V, Dual Band, Cross Band Repeat • Independent Band Controls • CTCSS Encode /Decode • Air Band Rx[†] • Duplexer • Attenuator • Full Function Mic

LEGACY

IC-706 SERIES

The most versatile series of compact, multi-band rigs ever made.

NEW IC-706MKIIG THE BEST LITTLE RIG GETS EVEN BETTER

More power, 440 MHz, and still more features! The new IC-706MKIIG adds 50 watts on 2 meters, 20 watts on 440 MHz, AF-DSP, auto repeater, CTCSS encode/decode, and backlit keys. Tried, tested and proven, the '706 series is your best choice for a complete ham rig.

IC-706MKII PROVEN PERFORMANCE

"Upgrade" of the wildly popular IC-706, the IC-706MKII continues to take the world by storm. 100 Watts on HF & 6M, 20 Watts on 2M. Incredible features. The '706 series has earned a reputation as rugged, hard working rigs that perform as well on a serious DX'pedition as they do in a car or shack.

NOW WITH DSP AS STANDARD EQUIPMENT

Enter ICOM's Connect 2000 monthl giveaway and you could win a ne IC-2800H or IC-706MKIIG. It's eas

Once a month, ICOM will post question on its Website, at authorize ICOM dealers, in the ICOM Funm bile, and at ICOM attended ha events. Your job is to find the corre answer and mail it in. Once month, ICOM will select at rando one correctly answered entry ar reward the sender with that month new radio. See your authorize ICOM dealer or the ICOM Americ Website for complete rules. N purchase necessary. Void whe prohibited. Contest ends 3/31/00.

ICOM Connec 2000

IC-821H 2M/440MHz • All Mo • REAL Satellite & Digital Performan with Continuous Adjustable Tx Pow • Sub Band Tx, Independent Rx • 96 bps Packet Data Port • Noise Blanker IF Shift on Main/Sub • Satellite Tracki with Doppler Correction • Compact Siz

IC-821H

NEW IC-T81A World's First QUAD HT • Easy to Use • 6M/2M/440MHz/1.2GHz • AM & WFM (Rx Only), FM • 5W@13.5VDC*, 1W/1.2 GHz • Ni-Mh Battery • CTCSS Encode/Decode • Auto Repeater • JIS-4 Water Resistant • PC Programmable*

IC-T8A Easy to Use, Compact 6M/2M/440MHz Tri Bander • AM & WFM (Rx Only), FM • 5W@13.5VDC* • Ni-Mh Battery • CTCSS Encode/Decode • Auto Repeater • MIL SPEC 810[11] • PC Programmable*

IC-W32A 2M/440MHz • 5W Out of Box • Easy! No Function Key • 200 Memories with Alphanumeric Display & Paging • V/V, V/U, U/V, U/U • Backlit Keypad • Wide Band Rx[†] • CTCSS Encode/Decode • MIL SPEC 810[11] • PC Programmable*

Most ICOM rigs are PC programmable with select ICOM options

PC Ready!

NEW IC-T7H 2M/70CM • Easy to Use • Up to 6 Watts* • Air Band Rx[†] • CTCSS Encode/Decode • Pocket Beep • Auto Repeater • Work One Band at a Time • MIL SPEC 810[11] • PC Programmable*

IC-Q7A 2M/70cm Mini Size • Big Audio • 30 to 1300 MHz Rx[†] (Cell Blocked) • 200 Memories • CTCSS Encode/Decode • Advanced Scanning • MIL SPEC 810[11] • Includes 2 "AA" Ni-Cds & Charger • PC Programmable*

IC-T22A 2M • Fun, Shirt Pocket Small and Easy to Use • Large Alphanumeric Display • Wide Rx Coverage Includes Air Band[†] • 5W@13.5V* • 3W@9.6V Standard • MIL SPEC 810[11] • 80 Memory Channels

NEW IC-T2H 2M • Super Rugged Construction • 6W@9.6V Standard • 500 mW Audio • MIL SPEC 810[11] • 8 Front Panel or PC Programmable* Keys • Includes "AA" Ni-Cds and Charger

ALL MIL SPEC HTs

Too new! IC-T81A's MIL SPEC test is pending

IC-T81A IC-T8A IC-W32A IC-T7H IC-Q7A IC-T22A IC-T2H

IC-707 Extra Class Performance at a Novice Pri • 100W (AM 25W) • All Mode • Simple to Use • Bi Well Spaced Keys and Dials • Large Backlit LC Display • 500 kHz–30.0 MHz General Coverage Receiv • Full Duty Cycle • Large, Front Facing Speak • PC Programmable*

IC-707

IC-746 HF/6M/2M • 100W • All Mode • Full Duty Cycle • Quad Conversion Receiver • IF-DSP • Front Panel Adjustable NR • Audio Peak Filter • Auto Notch Filter • 3 Optional Filter Positions • Twin Passband Tuning • 4.9" LCD/Dot Matrix Display Shows All Operating Conditions, Metering and Spectrum Scope • CW Memory Keyer • VOX • Automatic Antenna Tuner • PC Controllable*

IC-746

IC-756 HF/6M • 100W • All Mode • Full Duty Cycle • Quad Conversion Receiver • Dual Watch • IF-DSP • Front Panel Adjustable NR • Audio Peak Filter • Auto Notch Filter • 2 Optional Filter Positions • Twin Passband Tuning • 4.9" LCD/Dot Matrix Display Shows All Operating Conditions and Spectrum Scope • CW Memory Keyer • VOX • Auto Antenna Tuner • PC Controllable*

IC-756

IC-775DSP HF • 200W • All Mode • IF-DSP with Noise Reduction, Auto Notch, Audio Peak Filter, Manual Notch and Twin Passband Tuning • Adjustable Noise Blanker • Dual Watch • Adjustable AGC • CW Keyer • Auto Antenna Tuner • VOX • CTCSS Encoder • PC Controllable*

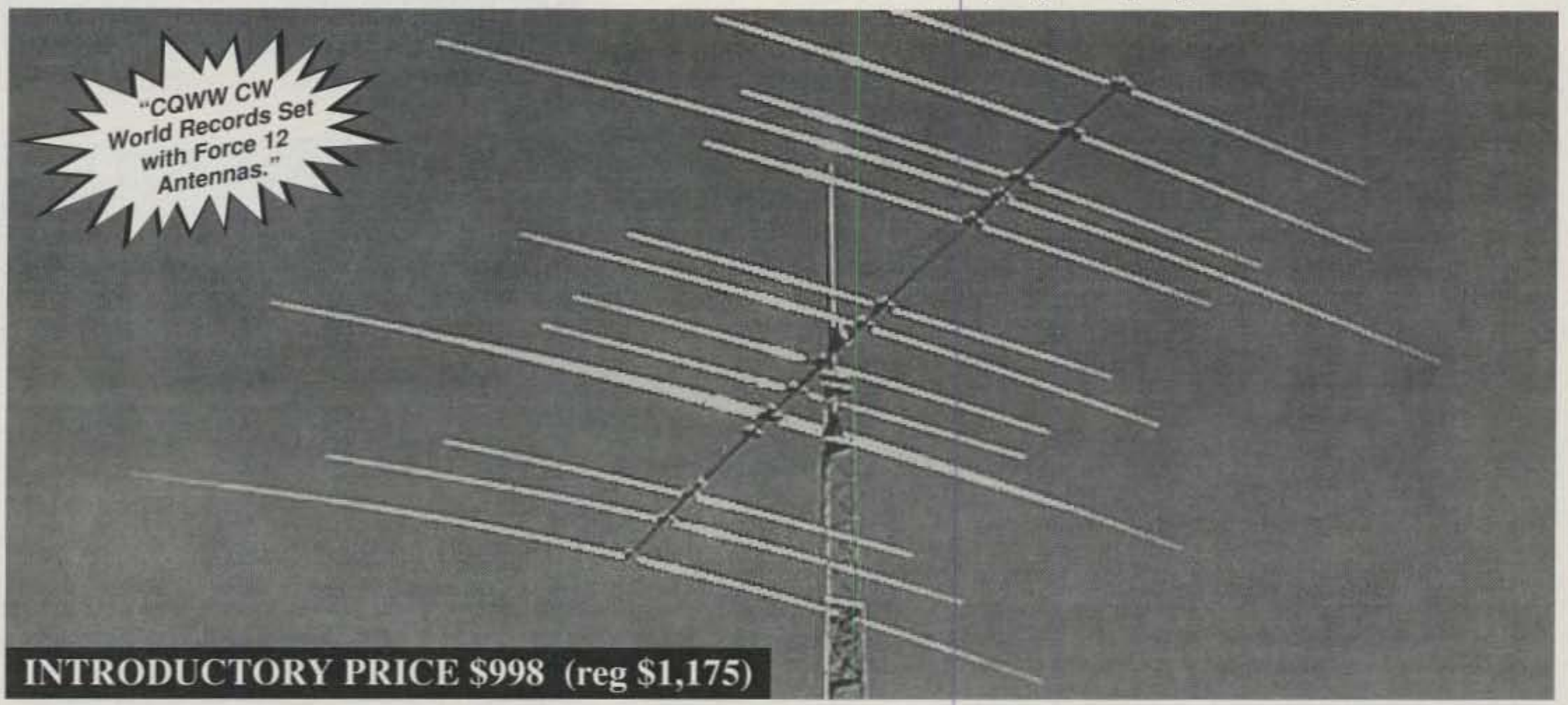
IC-775DSP

IC-781 The Ham's Ultimate 150W HF Rig • Features all the Bells and Whistles • Built-in Power Supply • All Mode • CRT Display with Band Scope • PC Controllable*

IC-781

C-31 XR *The Magnum Tribander that has no equal Anything else is just an antenna*

> Based on our proven C-3, multi-monoband, no trap design
> Highest gain, superior patterns, stepped gain for stacking.
> Wide-spaced 3el 20 & 4el 15, 7el on 10 mtrs, all full size
> Single feedline OR individual feedlines, your choice
> 5KW, 100 mph standard, 31' tapered boom
> Less than 100 in/lbs mast torque @ 70 mph
> 30" open space for side mounting
> Fast, "plug and play" assembly



The **C-31XR** is truly the next generation in tribanders; designed for maximum performance on 20-15-10 mtrs, plus strength, ease of assembly, low mast torque, side mounting and stacking. The **C-31XR** is 3 monoband Yagis overlaid on the same boom. There is a wide spaced 3el 20, a wide spaced 4el 15 and 7 elements for 10 mtrs. The gain target to beat was our own **C-3**, which was shown to have the most gain across 20 & 15 mtrs according to independent testing by K7LXC and NØAX. We did it! The **C-31XR** exceeds the C-3 by 1.4dB on 20, 1.5 on 15 and 3dB on 10 mtrs. F/B and side nulls are exactly what you would expect; excellent. There is nothing better than the **C-31XR**.

Specifications: 31' boom, 14 elements, 85lbs, 10.5sqft, 100mph, 5KW, single feedline, no traps, all elements full size

CONGRATULATIONS!

6Y2A set a new Multi-Multi CW World Record using all Force 12 antennas, primarily verticals. This is especially impressive, as it is from a 2-point country, with 18,000 QSO's (on CW!!).
P40E (Jose, CT1BOH) operating from P43P's QTH (Jacob) used all Force 12 antennas, too, to set a new Single Op CW World Record. These are all Force 12 Yagis, an EF-180B rotatable 80 and C-4XL. More and more top stations are putting up Force 12 antennas.

Force 12 Inc. is now the exclusive manufacturer and dealer for Tri-Ex Amateur Towers
call us for the finest crank-up, free standing and guyed towers

Call or write for a comprehensive brochure on the **Force 12** product line. The brochure includes true specifications and explanations of terms. For the best $10.00 you will ever spend ($12.50) w/postage), ask for the book entitled, **ARRAY OF LIGHT (Straight talk about Antennas and Related Information).** These 76 pages are a compilation of practical subjects, questions and answers, installation tips, operating helps and data on antenna design including a section on traps.

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CIRCLE 22 ON READER SERVICE CARD

CQ Amateur Radio

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FEATURES

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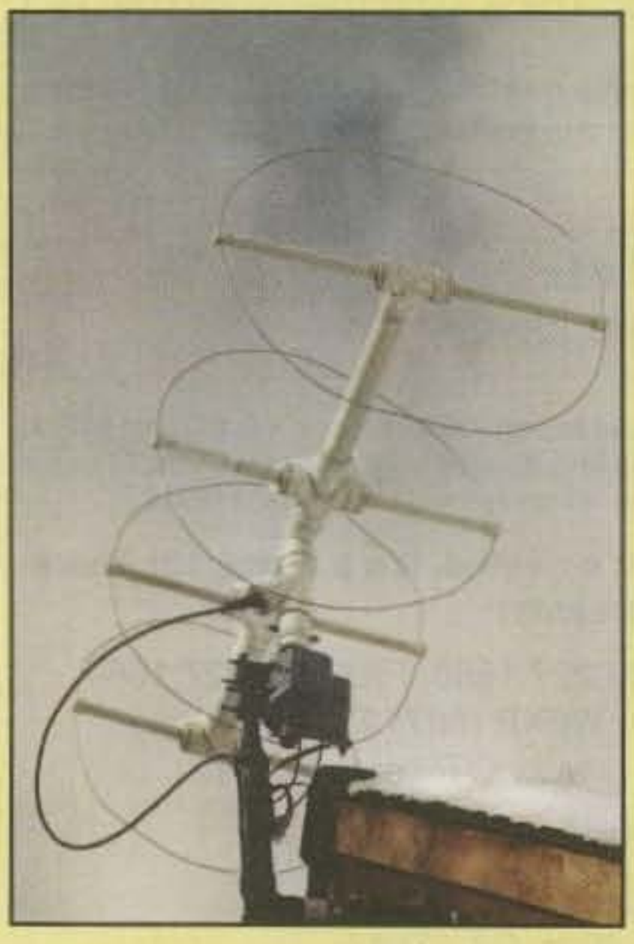

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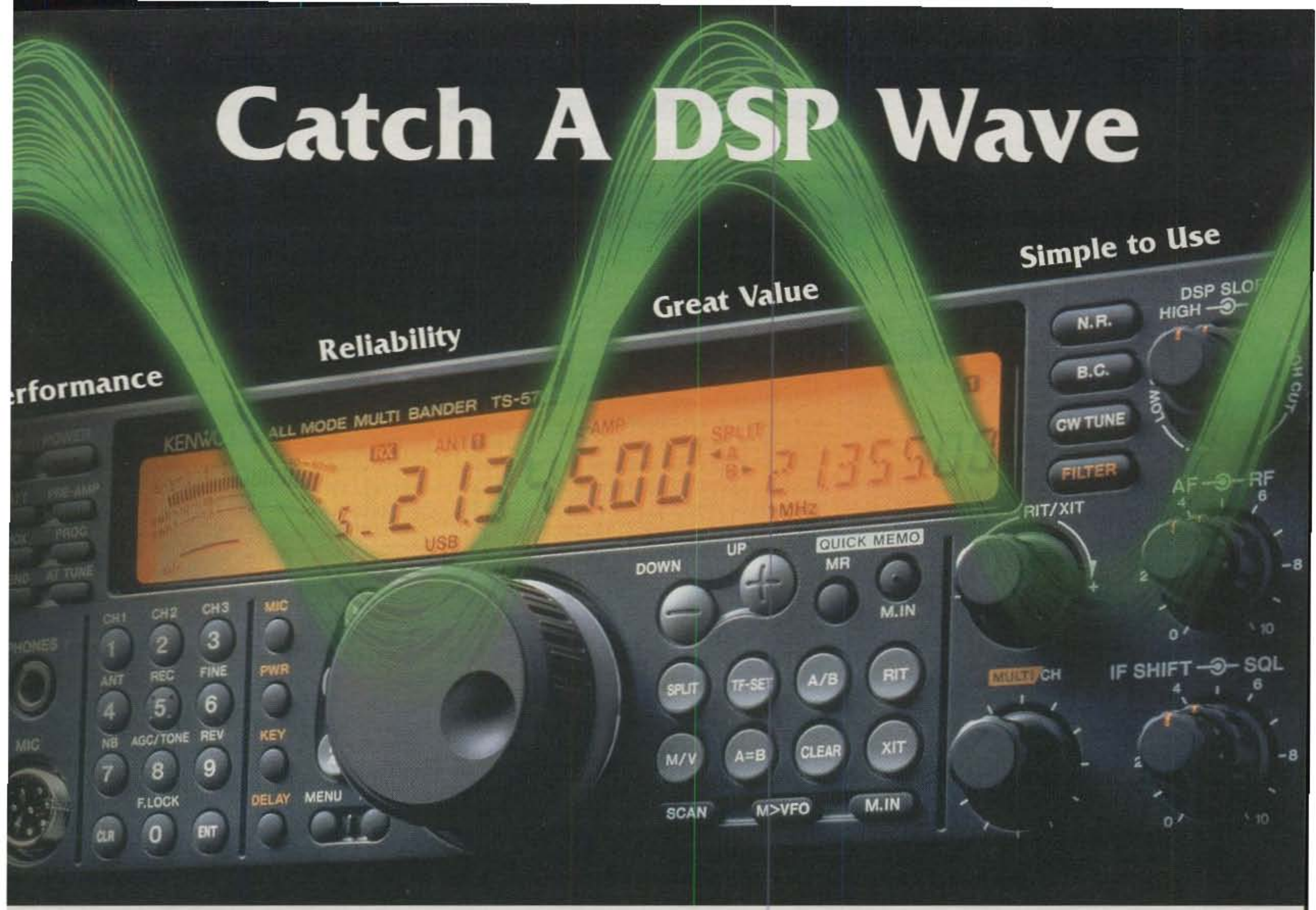
DEPARTMENTS

ON THE COVER: No, this is not a *QST* cover trumpeting the 85th anniversary of the ARRL, but with that significant milestone in mind, this month we're pleased to bring you the ARRL's Executive Vice President, Dave Sumner, K1ZZ, at one of the HF operating positions at League Headquarters station W1AW. Completely renovated ten years ago this month, W1AW stands as probably the most widely known amateur radio station in the world, truly a treasure in the history of this grand hobby. Although Dave's personal station is slightly less impressive than W1AW, it serves him quite well in his CW contesting and DXing. K1ZZ is a regular in the CQ WW DX CW Contest as well as the ARRL DX CW 'test, but he's recently rediscovered the wonders of 6 meter SSB and CW. If there's one quality about Dave that stands out above all the others, it's his remarkable memory for call letters. He's sure to deny it in his modest way, but we're convinced that he's capable of recalling the name and call (usually prior calls, too!) of just about every ham he's ever come in contact with, whether on the air or in person. (Photo by Larry Mulvehill, WB2ZPI)

Catch A DSP Wave



TS-570D(G) HF TRANSCEIVER/TS-570S(G) HF + 6M TRANSCEIVER

Kenwood has not been standing still since the introduction of the TS-570D/S HF Transceiver last year. Now you can command even more of Kenwood's advanced DSP technology with the G model.

The **DSP** filters and extracts signals with digital technology that is unmatchable with standard analog circuits. It provides **CD-class transmit and receive audio quality** that can be shaped to your needs, and two powerful noise reduction systems: **Line Enhancer Method** for SSB/AM modes, and **Speech Processing by Auto Correlation** (SPAC) for CW mode. DSP also enables the **CW-Auto Tune** feature that automatically zero-beats CW signals.

The **Extensive Memory Functions** provide a bank of 100 memory positions split into 90 standard channels for general operation and 10 for programmable VFO, programmable scan and long-term memory. Memory contents can be scrolled, copied or locked out. In addition there are **5 quick memories** for storing frequencies and modes on the fly, perfect for the busy DX contester.

The powerful **Menu System** incorporates **46 menu features** and an **on-line guide** for instant reference. The **large amber backlit LCD display** provides 4 light levels for clear readability under any lighting conditions.

The TS-570D/S has no shortcomings in the construction and performance area. The **continuous-duty 100 watt transmitter** incorporates a large heavy-duty heat sink with integrated cooling fan for non-stop operation even under extreme environmental conditions. The **wide-band receiver** is rock-stable from 500 kHz through 30 MHz with **dual pre-amps** and **dual bandpass filters** for exceptional selectivity and sensitivity.

With the features and performance of a high-end radio integrated into an affordable mobile-size package, the TS-570D/S is the perfect choice for the field or to build a full station around at home.

- ***FREE* operating manual via FTP site** ftp://ftp.kenwood.net
- Beat cancel
- 2 position antenna switch
- CW auto tune adjust (a world's first)
- Channel scan, program band scan, memory scan with channel lock-out and group channel scan, all with TO (time operated) or CO (carrier operated) resume modes
- Compact 10-5/8 inch by 3-3/4 inch front panel size for any travel or installation requirement
- Preset auto antenna tuner with 18 sub-bands
- Variable electronic keyer (0 and 100 wpm)
- Packet and FSK features
- RCP-2 software for PC-based display and memory configurations available via the Internet
- Full functionality on 6M (TS-570S) including DSP, 100 watts output and preset Auto Antenna Tuner

TS-570D/S (G) new features

■ TX sound quality monitor with 9-step monitor volume for absolute control over voice quality ■ NR1 (SSB) is operator controllable in 9-step increments, or automatically tracks input signal strength ■ New CW DSP Filters (80 Hz, 150 Hz and 500 Hz) give you a total of 11 user-selectable filters ■ NR1 and NR2 settings can now re-configure automatically when changing mode groups (SSB/AM/FM to CW/FSK) ■ Manual weight feature (with built-in electronic keyer) for adjusting the relative length of dots and dashes in 16 steps between 1:2.5 and 1:4.0 ■ Equalize receive signals, and use different settings for both TX and RX ■ "One-touch" DSP filter wide mode allows 'resurfacing' to check the band conditions when operating in narrow mode ■ Dual selectable Beat Cancel (BC) works against intermittent beat interference (except in CW mode) ■ CW auto tune mode links only with the RIT frequency without changing the transmit frequency.

Advance Technology Upgrade is available in new production models and for pre-existing TS-570D/S; contact you dealer for details.

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ZERO BIAS

AN EDITORIAL

I know the cover says July, but I'm writing this towards the end of May, the week after Dayton. My body is still trying to recover from four days (including travel and set-up time) of frenetic activity. Dayton is the essence of what I wrote about last month—namely people. In fact, it's a celebration of people, amateur radio people. From the moment you arrive at the airport and then travel through most parts of the city, you're greeted with signs welcoming you to the Dayton Hamvention. Dayton is unlike most hamfests, whereby there is one small cryptic sign at the site itself telling folks what's going on, and the city only finds out you're alive if you break the law.

Typically, the sage among us ask the same questions each year, hoping for some correlation or insight into the meaning of what's going on. "Are there more people or less people than last year?" "Are there more exhibitors or fewer exhibitors than last year?" "Is the fleamarket filled or are there a lot of empty spaces?"

While it might be statistically interesting to know the answers to these questions, the proof of the pudding to me is attitude and how much stuff people cart away. For the first time in a long time, I saw a lot of HF gear toted out, along with antennas and just about every accessory you could think of. It was as though there was a great attitude adjustment, and people were positive, enthusiastic, and looking forward to the future. It was a weekend of "Show and Tell" where everyone couldn't wait to tell what they bought and what they were going to do with it. Most people I know wound up spending more this year than last and certainly seemed happy about it. It wasn't maintenance driven; it was future driven, and a means to do more of something in the weeks and months ahead.

I don't know what it all means exactly down to the last percentile, but what it demonstrates to me is that enjoyment of this sort in order to be truly meaningful has to be shared. It's as if you took a trip to the Grand Canyon, and upon taking in the view there wasn't someone you could sort of poke with your finger and point out something special or terrific to see. It's the sharing that gives it that extra meaning. What it also demonstrates is that enjoyment is contagious. If everyone around you is having a good time, you'll have one, too.

The next criteria you look at to judge the experience is the amount of "stuff" you can actually look at. After Dayton there is no clear-cut second in the pecking order, so if there are fewer or more of any category, it doesn't change anything overall. There's more "stuff" at Dayton than anywhere else. There are more people there than anywhere else. In fact, if you stand still for a while, you'll meet people you haven't seen in many years and hardly recognize anymore. However, they still remember you. I know I met a number of people I hadn't seen in quite a long time. The best part of this experience is that it's real rather than virtual—well, maybe a bit surreal would be a more apt description.

Surprisingly, only one or two people asked me if I knew anything about when the FCC would make a decision on the licensing changes. Obviously, I didn't know, but a few folks there helped pass on a rumor about this summer. For the most part, it seems to be an accepted fact, and most amateurs just want to get on with things. The intransigent few who stopped by our booth and wanted to argue the CW issue, as our means of identification, really can't be mollified. Our identity to the real world, and our value to the government (federal, state, or local) is our continuous willing participation in providing communications during any emergency situation. It really doesn't matter how technically proficient we are, or what our code speed is. What matters is whether or not we will get off our collective butt and get out there and do something to help. Otherwise, for the most part we're invisible, or "cute."

The "cute" part came from local TV coverage of this annual Dayton event. The TV channel obviously sent a truck and crew to tape preparations for the Hamvention. I don't know how long they were there, but the segment that appeared on the early morning news that I saw was about 2 to 3 minutes. The first part had a reporter with Gordon West, WB6NOA. The reporter was trying to send the number of the TV channel via Morse code. As this was going on, two electrodes on the table were igniting a hotdog via the code transmission, demonstrating, in a sense, spark transmission. Gordon is a good speaker and teacher, and that demonstration, which usually involves a pickle, is but a small part of a lecture series to teach a point. Taken by itself, you have to admit it's odd.

The last part of the segment featured a surplus dealer in the fleamarket who described us as nerds and computer freaks. Admittedly, he was not being negative or disparaging, but his choice of words to describe our "uniqueness" could be taken several ways.

Watching this, I began to wonder if I were a parent looking for something to involve my child in, would I take little Johnny or Sally to the Hamvention, based on what I had just seen. Well, I'm not sure I would spend all that money just to ignite food. A gas grill is probably a better, safer option. If sending Morse code can ignite food, what's it going to do to little Johnny's and Sally's brain when they are sitting right next to it? Also, would I want to have my child known as a nerd or computer freak? So at best, to the early morning TV viewer we're "cute." Which proves that you can't always believe what you see on TV, but that doesn't stop you from making a decision based on it.

So much for the civilians, who usually don't come out to these things anyway. What about the rest of us "nerds" and "computer freaks"? I think you had to have had a good time, or have been working very hard to be miserable. There was plenty of new stuff to see, covet (in the good sense), and buy. There were the usual victuals available at the food concessions, and the smell of grease mixed with kerosene permeated a good portion of the fleamarket area, along with wafting smoke from the cooking grills. That's part of what makes Dayton, Dayton, and I wouldn't have it any other way. However, to me, the chef's hats (or grungy baseball caps with call letters) belong to the chili that was offered. It was hot and tasty. With any luck, the dry cleaners will get the chili stains out of the slacks I was wearing.

One of the really nice things about Dayton is the people you meet—people you wouldn't normally see, just read about. One of the interesting people I had the chance to meet and spend a bit of time with was Riley Hollingsworth, K4ZDH. He is the new top FCC amateur radio enforcer, and in a sense our new sheriff. It's apparent after a few minutes that he comes to the job with a lot of experience within the FCC. He's dedicated, focused, and determined to do a good job. It looks like some areas of "Dodge City" are going to get cleaned up either the easy way or kicking and screaming. Some of the things we've been complaining about for years are no longer falling on if not deaf, then earmuffed ears. They are being heard loud and clear. Miscreants beware. He's also a nice guy to talk to.

The last person I had a chance to talk to tapped me on the shoulder as we were packing up on Sunday. Ade Weiss, K8EEG, came by, and we spent time catching up on many things that had happened over the years since the last time we saw each other. Yes, I did try to entice him to write a few articles, but after listening to him and his schedule, I figured his plate is more than full for a while.

That's what Dayton is basically about—meeting old friends and making new ones. It's sharing via total immersion a great hobby with a lot of great people. It's the feeling you get when you finally get to the airport, when the bags under your eyes have their own bags, when everything hurts and you plop yourself down to wait for your flight. Do you rest? No way! You start a conversation with the person next to you and you both go over all the things you saw, the things you bought and are trying to get home via carry-on (which now weighs 318 lbs.), and a variation on the game plan you plan to use next year. You may be tired and broken, but you're a winner of another Dayton experience, and in a few days all the pain will be gone.

Granted, your local hamfest won't have all that there is at Dayton, but it's more than enough to give you that feeling and experience. And, the next time you hear yourself complain that there are no kids there, ask yourself why you didn't bring your own, or your nephew or your niece, or even your neighbor's kids. Kids are kids, one at a time. And, as an amateur radio experience just for yourself, a hamfest, big or small, is just about the best way to be part of the "real" world of amateur radio.

73, Alan, K2EEK

THE DIRECTOR
HF Multiband Beam Antenna

SMALL FOOTPRINT BIG SIGNAL

Cushcraft's newest multiband HF antenna provides 5 band directivity in a package small enough to mount to a tripod. The **MA5B** is a design that does not sacrifice ruggedness, performance and power handling for size and ease of installation.

▪Easy To Tune
No complicated gamma matches to adjust.

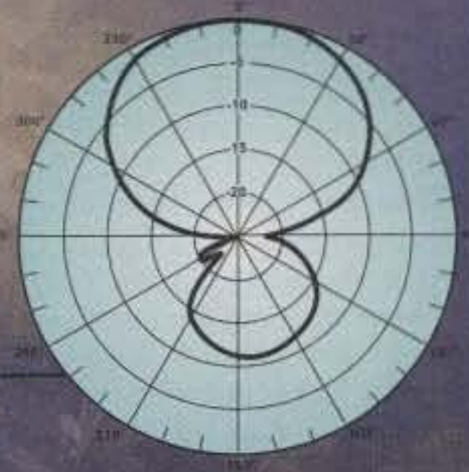
▪Easy To Turn
With a boom length of 7 feet and a longest element length of 17 feet, a lightweight TV rotor will do the trick.

▪Low VSWR
Flat response across all 5 bands. VSWR minimum 1.2:1.

▪Rugged Construction
Cushcraft's tried and true stainless steel mounting hardware and heavy wall aluminum tubing make for a rugged,long lasting antenna.

▪Single Feed Point
Only one coaxial feed line is necessary for all 5 bands.

High Front To Back Ratio On 10/15/20m



MA5B SPECIFICATIONS						
FREQUENCY	10	12	15	17	20	Meters
ELEMENTS	2	1	2	1	2	per band
GAIN	5.3	1.0	4.8	1.0	3.6	dBi
FRONT TO BACK RATIO	10	0	12	0	22	dB
SIDELOBE ATTENUATION	25	25	25	25	25	dB
VSWR 2:1 BANDWIDTH	665	>110	255	>100	90	kHz
LONGEST ELEMENT	17.1ft (5.2m)					
TURNING RADIUS	8.8ft (2.7m)					
BOOM LENGTH	7.3ft (2.2m)					
BOOM DIAMETER	1.5in (3.8cm)					
MAX. WIND SURFACE AREA	3.22 ft² (.3m²)					
MAX. POWER HANDLING	1.2 kw					
WEIGHT	26.5 lbs. (12 kg)					

For more information on this outstanding HF Multiband Beam Antenna, visit our web site at **http://www.cushcraft.com** or contact any one of our dealers worldwide.

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ANNOUNCEMENTS

Six Club 1999 Sprints – The second sprint of 1999 will take place on Saturday, July 17, from 2300–0400Z. Each QSO is worth one point in his/her own country and two points for each contact made outside own country. (Hawaii and Alaska considered separate country.) Multiply total QSO points by total number of grids worked. For more info, log deadline, and snail mail address, e-mail <sixclub@6mt.com>.

USI W/VE Islands Contest – This contest, sponsored by the US Islands Awards Program, will be held from 1600Z July 31 to 2359Z Aug. 1, on HF bands, all modes. Categories: W or VE island station, non-island station, or island rover, plus DX non-island station. Non-island stations send signal report and state, province/territory, or country. Island stations send signal report, island name, and USI or CISA number. Scoring: Five points for each W/VE island plus island operators score one point for each non-island station. Multipliers: Each different state, province/territory, and for island operators each different DX. Work stations once per island. Awards. Send logs by Sept. 10 to USI contest manager Ray Phelps, AD4LX, 1440 SW 53rd Terrace, Cape Coral, FL 33914 (<ad4lx@usa.net>; <http://www.eng.mu.edu/~usi/>.

Central States VHF Society Conference, Cedar Rapids, Iowa. The 1999 Central States VHF Society Con-ference will be held July 23–25 at the Shearton Four Points Hotel in Cedar Rapids, Iowa. This is traditionally the nation's largest VHF/UHF technical conference. Sessions kick off Friday morning. A full slate of technical programs is planned, including sessions on digital signal processing, receiver design, VHF power amplifiers, aurora detection, EME dish construction, and more. There will also be noise-figure and antenna gain measurements, plus family activities and Saturday night banquet. For more info, visit the CSVHFS Web site at <http://www.csvhfs.org>, or contact society President Rod Blocksome, KØDAS, 690 Eastview Dr., Robins, IA 52328, or via e-mail at <kØdas@csvhfs.org>.

Western States Weak Signal Society Conference, Flagstaff, Arizona. The 1999 WSWSS technical conference will be held July 24–25 in Flagstaff, Arizona, the same weekend as the annual Fort Tuthill hamfest, a major southwestern hamfest. For more info, visit the WSWSS Web site at <http://www.wswss.org>, or contact conference chairman Alf Green, NU8I, via e-mail to <nu8I@home.com>.

These Special Events are scheduled for July:

Calgary, Alberta area amateurs; special prefix for Calgary Stampede; July 1–14. Details: <www.cara.ampr.org/stampede.html>; questions: <ve6yc@rac.ca>.

Naturists ARC; from locations throughout North America; July 5–11 on 7.265, 14.265, 21.365, 28.465 ±QRM. For certificate send QSL and 9 × 12 SASE to Naturist ARC, P.O. Box 200812, Austin, TX 78720-0812.

K2RUK, from 250th anniversary of settlement of Ogdensburg, NY; Ogdensburg ARC; 1800Z July 31 to 0200Z Aug. 1 on 7.272 and 14.272. For certificate send SASE to Walt Brady, N2YMY, 17 Birch Hgts, Edwards, NY 13635.

W2ZZJ, from 173rd anniversary of birth of Dr. Mahlon Loomis; Stratford, NY; 1300–2000Z July 21; General phone 75, 40, 20 meters and Novice 10 meters phone, plus 2m repeaters. For certificate send QSL, contact # and #10 SASE (55 cents) to George Sadlon, W2ZZJ, 5738 Sthwy 29A, Stratford, NY 13470.

W3O, from 30th anniversary of Apollo 11 moon landing; Beardstown, IL; Spaceage Radio Society; 0000Z July 16 to 2400Z July 24; CW 3545, 7045, 14045, 21145, 28145; phone 3945, 7245, 14245, 21345, 38445. For certificate send contact info to Bruce Boston, KD9UL, 815 E. Third St., Beardstown, IL 62618.

K5B, from from 150th anniversary of founding of Boerne, TX; Kendall ARS; 1300–2300Z July 24 on 7225 and 14,250 kHz. For certificate send QSL and 9 × 12 SASE to David McDaniel, Pres. KARS, 412 Cedar Place, Boerne, TX 78006.

W8P, from Warren's Packard Automobile Centennial Celebration, Warren, OH; Warren ARA; early evening July 2 through morning of July 5. Check 50–100 kHz down from upper edge of 80, 40, 20, 15 phone, plus 28.450 MHz; CW 50 kHz above bottom edge of 80, 40, 20, 15, 10. For certificate send QSL and $1.00 (cash or stamps) to WARA, P.O. Box 809, Warren, OH 44482. (More info 330-889-2602 or <wb8ujv@onecom.com>)

KE9XQ, N9XVG, KB9OFK, from Copper Harbor Expedition UP, activate grid EN67, Michigan; Riverland ARC; 1400Z July 10 to 1400Z July 11 on 146.52, 50.125, 28.400, 14.026. QSL with SASE to Bill Wood, KE9XQ, W2788 Birch Ln., Lacrosse, WI 54601 (e-mail: <drmarkdc@aol.com>).

W9ZL, from EAA Airventure '99 fly-in, Wittman Regional Airport, Oshkosh, WI; Fox Cities ARC; SSB and RTTY operation beginning July 30 through Aug. 1, 9 AM to 4 PM, in General portion of phone bands. For certificate send QSL and SASE to Wayne Pennings, WD9FLJ, 913 N. Mason, Appleton, WI 54914.

WØNOZ, from Laura Ingalls Wilder Pageant Grounds, DeSmet, SD; Huron ARC and LARK; 1700Z July 3 to 0100Z July 4 and 1300–0100Z July 5; on 50.165, 28.465, 21.340, 14.265, 7.265, 3.880 MHz. Certificates and QSLs by request to WØNOZ, Huron, ARC, P.O. Box 205, Huron, SD 57350.

GB60ENI, from 60th anniversary of handing over enigma secrets in Poland during WW II, Bletchley Park;Polish ARS and Milton Keynes ARS; 0900Z July 23 to 2300Z July 25 *(no frequencies given)*. For more info contact MKARS <GB2BP@geocities.com>, or P.O. Box 817, Milton Keynes, MK3 6ZT.

GS7UEG/P & MSØBPG/P, from Islay, Jura, and Colonsay (Scotland), IO65 and IO66; Northern VHF Activity Group (ops. G7BXA, G7HSP, G4YQW); July 4 to July 31 on 144.222, 50.122 MHz and WAB and IOTA freqs. on all HF bands. To QSL direct to QSL Manager G7DKX include an SAE and IRC; otherwise all cards will go out via the bureau.

The following hamfests, etc., are scheduled for July:

July 3, **Monroe County ARC Hamfest**, National Guard Armory on Hwy. 163, Tompkinsville, KY. Contact David Welch, K4PL, 111 Pocahontas Trail, Glasgow, KY 42141 <dwelch@glasgow-ky.com>.

July 4, **27th Annual Fire Cracker Hamfest & Computer Show**, Emerick Cobort Park, **Bressler, PA**. Call 717-939-4828, or e-mail: <n3njb@aol.com>. (Exams)

July 9–11, **International Peace Garden Hamfest**, International Peace Garden, (US-Canadian border **between Dunseith, ND and Boissevain, MB**). Contact Dave Snydal, VE4XN, 204-728-2463, or e-mail: <dsnyfal@mb.sympatico.ca>; or Duane Hagen, KEØVF, 701-794-3309, <dhagen@westriv.com>. (Exams)

July 10, **30th Annual PHDARA Hamfest**, Kansas City Market Center, **Kansas City, MO**. Contact PHD Hamfest, P.O. Box 28954, Kansas City, MO 64188-8954; or 816-436-0069, Bob, WAØCLR.

July 10, **5th Annual SwetFest**, Railroad Square, **Brunswick, MD**. For information, check <http://www.qsl.net/madra>, e-mail: <madra@qsl.net>, or call Voice BBS 301-416-8447, or 301-473-4151. (Exams)

July 10, **30th Annual Swapfest '99**, American Legion Post 434, **Oak Creek, WI**. Call 414-762-3235.

July 10, **Ontario Hamfest '99,** Milton Fairgrounds, **Milton, ON, Canada**. Contact Alan Montgomery, <montgomery@bigwave.ca>; <http://www.bigwave.ca/~ve3coj/barc/flyer>.

July 10, **1999 Batavi Hamfest**, Genesee Fairgrounds, **Batavia NY**. Contact Harold Hay, 716-343-2844; e-mail: <wa2abq@aol.com>.

July 10, **Straits Area ARC Swap & Shop**, Emmet County Fairgrounds, **Petoskey, MI**. Contact Tom, W8IZS, 616-539-8459, or Dirk, KG8JK, 616-348-5043, <kg8jk@qsl.net>. (Exams)

July 10, **P.E.I. Amateur Radio Fleamarket**, Silver Fox Curling & Yacht Club, Summerside, **P.E.I., Canada**. Contact Ella, VE1PEI at 902-886-2280 or e-mail: <mccormick@ns.sympatico.ca>; Web: <http:www3.pei.sympatico.ca/wmillman/sparc/>.

July 11, **Valley Forge Hamfest & Computer Fair**, Fire Co. Fairgrounds, **Kimberton, PA**. Contact Bill Owen, W3KRB, 679 Malin Rd., Newton Square, PA 19073 (610-325-3995), e-mail: <hamfest-info@marc-radio.org>; Web: <http://www.marc-radio.org/hamfest.html>.

July 11, **Kankakee Area RS Hamfest '99**, Will County Fairgrounds, **Peotone, IL**. Contact Billie Kerouac, KF9IF, 815-939-7548, <dkbk@ megsinet.net>; Web: <http://geocities.com/capecanaveral/hanger/5711>. (Handicapped accessible)

July 11, **North Hills ARC Hamfest**, Northland Public Library, **Pittsburgh, PA**. Contact Rey Whanger, W3BIS, 120 Cove Run Rd., Cheswick, PA, 412-828-9383; <w3bis@freewwweb>; Web: <http://nharc.pgh.pa.us>. (Handicapped accessible)

July 17, **North Texas Hamfest**, Grayson County Airport, **Sherman-Denison, TX**. Contact Wilmer O. Kinsey, WB5DCU, 350 Mitchell Rd., Sherman, TX 75090-3223, 903-893-5872; <wb5dcu@gte. net>; Web: <http://home1.gte.net/wb5dcu/amrad. html>.

July 17, **NOARSFEST '99**, Lorain County Fairgrounds, **Elyria, OH**. Contact John Schaaf, KC8AOX, 216-696-5709 (leave message), e-mail: <kc8aox@qsl.net>. (Exams)

July 17, **Superfest '99, Larimer County Fairgrounds, CO**. Call 970-352-5304.

July 17, **Cary ARC Mid-Summer Swapfest**, Cary Community Center, **Cary, NC**. Write to: Cary ARC, P.O. Box 53, Cary, NC 27512. (Exams)

July 18, **Sussex County ARC Hamfest**, Sussex County Fairgrounds, **Augusta, NJ.** Contact Dan Carter, N2ERH, 8 Carter Lane, Branchville, NJ 07826; 973-948-6999; e-mail: <n2erh@email.com>; on Web: <http://www.scarcnj.org>.

July 18, **Fox River Radio League Hamfest**, Waubonsee Community College, **Sugar Grove, IL**. Contact James Von Olnhausen, N9UZC, c/o FRRL, P.O. Box 673, Batavia, IL; 630-879-3042; e-mail: <n9uzc@amsat.org>; <http://www.frrl.org/hamfest.html>. (Exams)

July 18, **Tailgate Electronics, Computer & Amateur Radio Fleamarket**, Albany & Main St., **Cambridge, MA**. Contact W1GSL, P.O. Box 397082 MIT BR., Cambridge, MA 02139-7082 (617-253-3776). (Handicapped accessible)

July 18, **Van Wert ARC Hamfest**, Van Wert County Fairgrounds, **Van Wert, OH**. Contact Van Wert ARC, P.O.B. 602, Van Wert, OH 45891-0602; e-mail: <barnesrl@bright.net>; <http://www.bright.net/barnesrl/w8fy.html>. (Exams)

July 23–24, **Ham Holiday '99**, Oklahoma State Fair Park, **Oklahoma City, OK**. CORA web site at <www.geocities.com/heartland/7332>, or write Ham Holiday '99, P.O. Box 850551, Yukon, OK 73085-0551; or e-mail: <n1lpn@swbell.net>. (Exams)

July 24, **Cincinnati Hamfest**, Diamond Oaks Career Development Campus, **Cincinnati, OH**. Contact Dana Laurie, WA8M, 280 Hillcrest Dr., Cincinnati, OH 45215-2610;513- 761-7388; e-mail: <wa8m@arrl.net>. (Handi-capped accessible)

July 25, **BRATS Hamfest & Computer Fest**, Timonium Fairgrounds, **Baltimore, MD**. Contact BRATS Hamfest, P.O. Box 5915, Baltimore, MD 21282-5915; <http://www.smart.net/~brats>; e-mail: <brats@smart.net>; phone/fax: 410-461-0086. (Exams)

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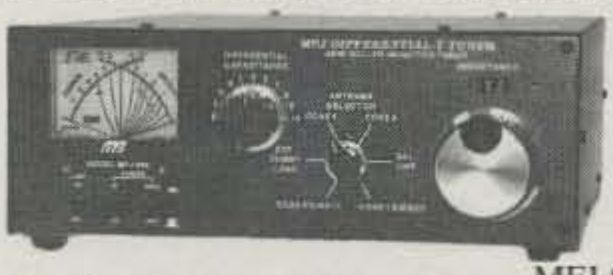

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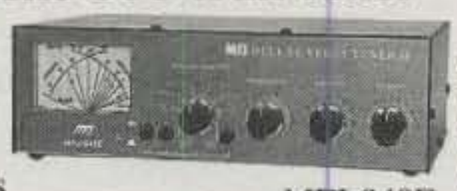

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OUR READERS SAY

"On The Air" Display

Editor, *CQ:*

On a return trip from India, I came back through San Francisco airport. On the North Terminal Connector gallery (mostly United Airlines flights) there is a display (called "On the Air") of radios from the 1920s through the 1960s. There is also a display of microphones and some examples of broadcast-band receivers of notable aesthetic design or function. It is a great place to spend an hour or two. I was frustrated that I had an insufficient layover time to see everything.

There I ran into a retired nun who saw one of the old radios from the 1940s. She confessed to me that when she was a child, she used the light from the back of a tube radio to read by after it was time for lights out!

The exhibit runs through July 1999. It is well worth the visit! More info is available at <www.sfoarts.org>.

Dean E. Hale, KF7CR

"This Is Not Your Father's MININEC"

Editor, *CQ*:

Your antenna design-related articles, such as "Getting the Most Out of Antenna Patterns (Part I)" by L.B. Cebik, W4RNL in your January 1999 issue, are excellent primers on antenna patterns and pattern- producing software. As with all of these articles, there is a general referencing of antenna modeling software as "commercial implementation" of MININEC or NEC-2. It's curious to note that the modern descendants of MININEC—"MININEC for Windows" and "MIMINEC Professional" written by the original MININEC authors—are never referenced in the articles. The new versions run under Microsoft Windows, not DOS, and are to MININEC what Windows 98 is to DOS. Yet in these articles I see only the old MININEC mentioned with comments by the author mentioning MININEC's limited capabilities and comparing it with other more recent commercial derivations. The limitations of the older BASIC version have been eliminated and more capability added in the latest MININEC versions.

P. Michael McGinnis, N6TYF

A Preference

Editor, *CQ:*

Re: "Coax Cable Protection," by Klaus Spies, WB9YBM, CQ, February 1999, p. 34. I wish to draw your attention to a problem with the right-angled SO-239 connectors advocated by the author of this article. Most of these, especially low-cost units, rely on a simple spring contact to make the internal connection and are notoriously unreliable and frequently give rise to high SWR readings. This problem was described some years ago in *Break-In* (official journal of the New Zealand Assn. Radio Transmitters) and *Electron.* Personally, I prefer to replace the SO-239 with a UHF cable socket on all my VHF/ UHF equipment. They are more compact and have far better electrical properties. This also means I cannot mistakenly connect to the HF systems, which are all PO/SO-239 connectors.

John Walker, ZL3IB
Editor, *Break-In*

Amazing Activity

Editor, *CQ*:

[There was] an amazing amount of activity, as expected for such an event (the CQ WW DX Contest 1998). In participating in one of my favorite DX contests, I've made a few observations. Probably one of the worst stereotypes of a "contester" is to jump onto a frequency and just start transmitting "CQ CQ. . . . " I found this to be disturbingly true.

I witnessed exactly that on 1.849 MHz on Saturday night. In checking the band for possible new contacts, it becomes apparent who is on the band and where. There was an ongoing QSO on 1.850 MHz, which was of no pertinence to the contest activity. A few stations were shooting the breeze. Just then a DX station appeared on 1.846 MHz—not a big deal, but sizable and very aggressive pileup. One station suggested he run split op to allow smoother QSOs. Great idea. However, it was decided to listen 3 kHz up. No one checked to hear these stations on 1.850, and you can guess what happened. Every station in this pile-up scenario is guilty in the incident, including the DX station. As a result, the "contester stereotype" had been re-established.

On the flipside of this, in many cases on bands that are heavily congested with this-and-that nets, the apparent net control op should be, and probably is, aware of the activity on hand. The nets carry on as usual (I find this to be very courageous), and naturally the interference occurs. Perhaps the same concept of listening first, before transmitting, would apply, but keep in mind that most stations that transmit on these coveted frequencies are DX stations who can't hear the nets anyway, and, of course, everyone wants to work them. Fault in this case would fall on both sides.

It would be wise for all stations contesting to be aware of current activity on the bands before carrying on. I (a contester) would prefer to get along with everyone on. Let's see if we can learn from this: Listen first, ask second, and be aware of any, if not all, activity on a given band. From this we might establish mutual respect for all activity.

Mike Del Pozzo, KR4TG

OOOPS!

In the May issue in the article "The Elusive Q . . ." by VE3ERP, on p. 29 in the box, under the head "Inductance Equations," the "n =" equation should be "Q =".

Also in the May issue, on p. 32, we ran an article entitled "Riding White Water Rapids Maritime Mobile." Although we received this article from the author shortly before publication, we were unaware that the article had been previously published in *QST* in November 1989. We apologize to our readers and to the ARRL for this oversight.

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Need a weekend building project to satisfy that amateur radio craving? N4PC presents an electronic keyer that's easy to build and fun to use.

How To Homebrew Your Own Electronic Keyer

BY PAUL CARR*, N4PC

I have heard many people say that they would like to try a simple, useful building project, but the circuits are so complicated that it would take an electronics engineer to understand the wiring schematic. Furthermore, they have said that even if they could follow the diagram, they could never find the parts required for the project. Third, if they could handle the schematic and find the parts, they would never be able to make a good circuit board. This project avoids all these objections. The result is an easy-to-build electronic keyer that looks great on the operating desk and functions very well. Does this sound interesting? Read on.

The front view of the completed electronic keyer.

Background

This circuit is based on the popular '555 timing circuit. This chip is readily available, and it is an extremely versatile timing device. There are a total of three timing circuits required: one for the space function, one for the dot function, and one for the dash function. I happened to have a '555 in my chip collection, and after I searched for a while, I found a '556. The '556 is two '555 timers in a dual inline package. This completed the search for the necessary ICs. The only other parts required were a collection of resistors, capacitors, diodes, and a couple of common transistors.

I promised that I would avoid the problem of a circuit board and its associated challenges. This can be accomplished very easily by using the Experimenter's Circuit boards available from RadioShack (catalog #276-159A.) The integrated circuit sockets can be soldered directly to the Experimenter's circuit boards and subsequently mounted on a piece of blank copper-clad circuit-board material. More on that later.

This should dispel your initial fears about the project. Let's take a couple of minutes to look at the schematic.

Circuit Design

This circuit is very similar to the keyer presented by my friend Wes Hayward, W7ZOI, in the ARRL publication *Solid State Design for The Radio Amateur*. I have made some subtle changes to suit my particular operating preferences, but the overall concept is the same. The performance is very good for a simple keyer.

For the following discussion, refer to fig. 1. Three separate timing circuits generate the three functions: dot, dash, and space. As a result, the timing ratios can be controlled individually by R1, R2, R3, and their associated 1 µF capacitors. I chose to use the 3 to 1 ratio that has become the standard in keying circuits, but these ratios can be changed to suit if you so desire. The output of the keyer is through a 2N3053 transistor. I have not found any of my transistorized rigs that the keyer would not key. However, if you find that condition to exist, it should be a simple matter to use the output of the 2N3053 to key a small relay and use the relay contacts to key the transmitter.

Construction Layout

I had a small cabinet that measured 4" × 6" × 2.5", which provided ample room to house the circuit without crowding. I also cut a piece of single-sided, copper-clad circuit-board material to serve as a ground plane. I used RadioShack Experimenter's Circuit boards as tie points for the individual components. These boards come

*97 West Point Rd., Jacksonville, AL 36265

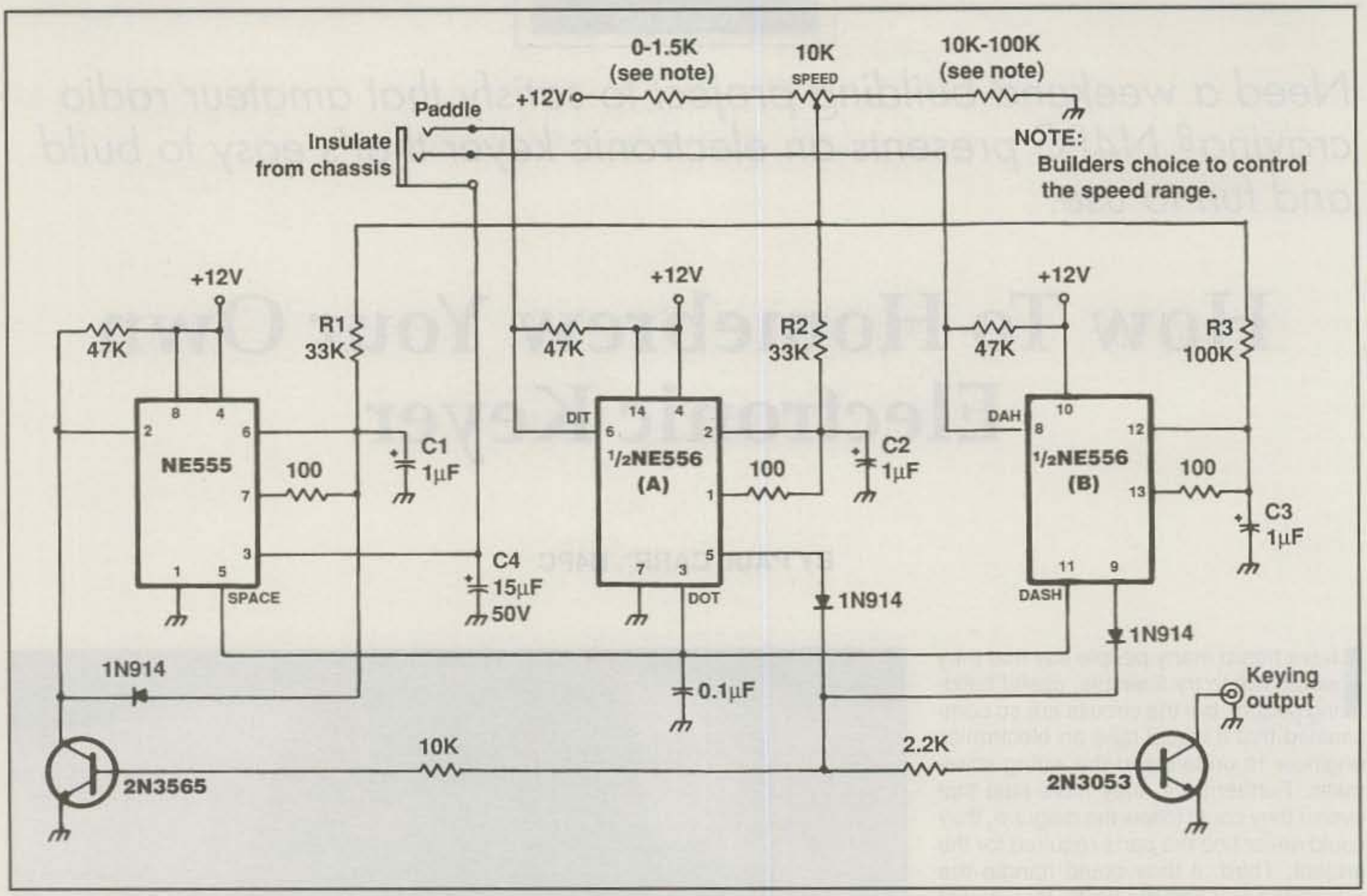


Fig. 1– Schematic diagram for the weekender electronic project. All components are readily available.

two to a pack, so one pack is all that is needed. This procedure provides a good technique for building simple circuits without the hassle of etching boards.

Start construction by drilling four holes in the corners of the copper-clad board. These will be used for mounting when the finished circuit is installed in the cabinet. Next cover the non-copper side of two Experimenter's boards with a couple of layers of electrical tape. This will prevent solder from leaching through the holes in the board and causing a short circuit to the ground plane. Mount two IC sockets on these circuit boards. Bend the legs of the IC sockets to the side so they can be soldered to the circuit boards. Do not allow the legs of the IC socket to go through the holes in the circuit board. To do so is to invite disaster. The boards are now ready for final assembly.

Final Circuit Board Assembly

I broke the boards apart, smoothed the edges, and placed them symmetrically on the copper-clad ground plane. I installed a ground on pin 1 of the NE 555 and connected the 1 µF capacitor on pin 6. This held the board in place for the remainder of the construction process. Likewise, I placed the ground and timing capacitors on the NE 556. This provides a good way of mounting these boards and no drilling is required.

The remainder of the components can be mounted by starting at the NE 555 and working toward the NE 556. If a component requires connection to a cabinet-mounted component, place the hook-up wire as you go. It will be connected later. Pause and check the accuracy of your

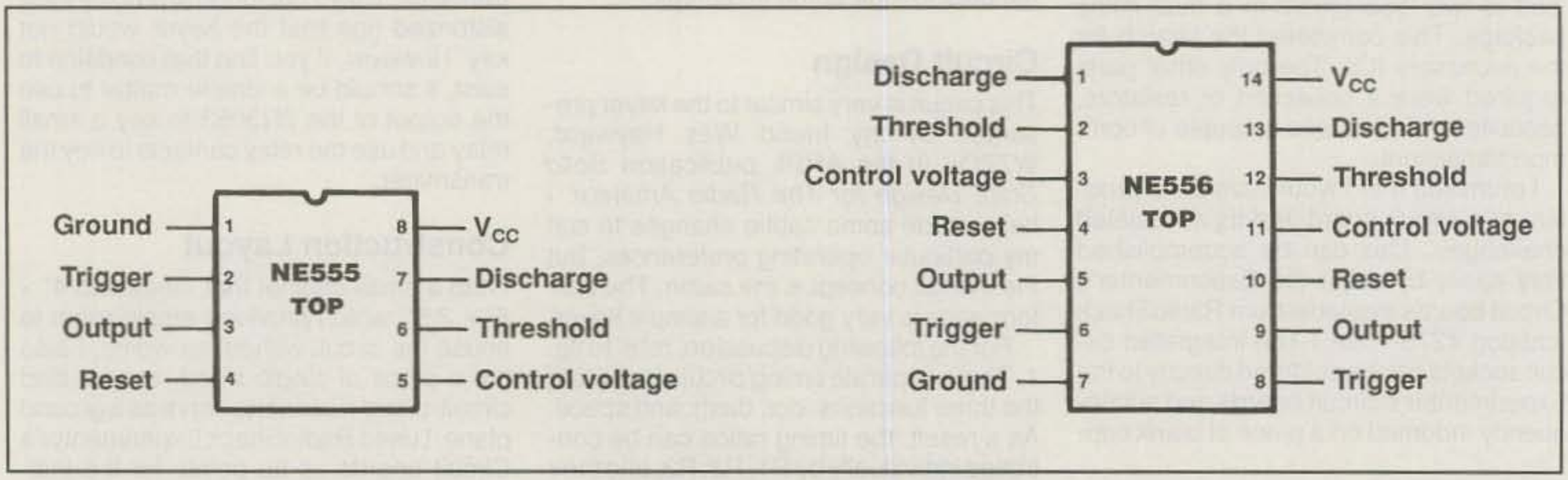


Fig. 2– Base diagrams for the integrated circuits used in this project.

work periodically. It is easier to find wiring mistakes as you go as opposed to trouble shooting an entire circuit! You may want to test the circuit before you install it in the cabinet. Now would be a good time to take care of this.

The Finishing Touches

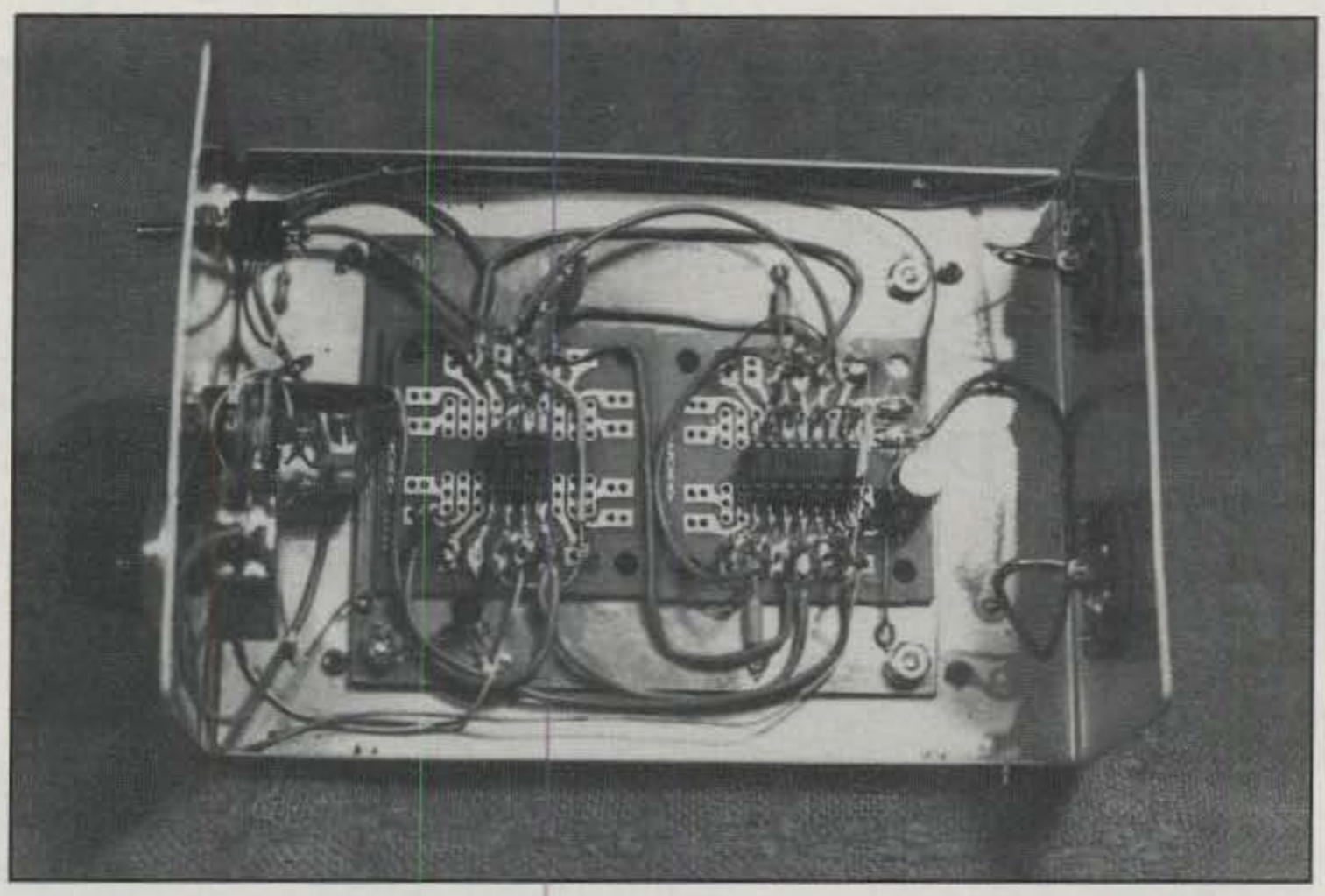
There is a total of five devices that need to be mounted on the cabinet panels. As can be seen in the photograph, the front panel contains the on-off switch, the speed control, and the jack for the paddle. The back panel contains a connection for +12 volts and the keying line. One word of caution: The jack for the paddle must be insulated from the cabinet, so be sure to use an insulated shoulder washer when mounting this component. Drill the bottom of the cabinet to correspond with the mounting holes for the ground plane of the circuit board.

You can now mount the circuit board and complete the wiring. Check the wiring one more time to be sure no errors have crept in. You are now ready for the final test. Place the cover on the cabinet and sit back and enjoy the fruits of your efforts!

Afterthoughts

The only problem that I encountered during final test was when the keying paddle was released, the circuit would continue to key in a random fashion. By looking at pin 3 of the NE 555 with an oscilloscope, I discovered that there was a random pulse on the line at times. Placing C4 from pin 3 to ground easily cured this. That is the only problem I found.

The circuit easily keys all my QRP rigs, and it is a delight to use. This is a fun construction project and you can take pride in saying, "I built it myself." ■



The interior view shows the simple point-to-point wiring described in the text. The copper board and circuit boards are available from RadioShack.

With summer upon us, here's a novel opportunity for amateur radio to put its best foot forward and go out to meet the public.

Huge Crowd Sees Amateur Radio Displayed At The Erie County Fair

BY GREGORY YOUNG*, KE2VW

When I first read this article, there was something about it that made me want to hold on to it and read it again at a later time. Basically, it was not something the article contained or any particular event described by the author. What it has, to me, is a unique and worthwhile approach to the marketing of amateur radio.

Typically, most displays of amateur radio are goal oriented. For example, we may invite the public to visit a Field Day site and watch the activity. The same may hold true for a special event station or perhaps even a contest station. Within these activities, the goal is making tremendous amounts of contacts for a specific purpose. Those who do visit are in a sense secondary to the function. Not only does someone have to explain the overall concept of amateur radio, but we add the sometimes confusing (to the uninitiated) aspect of why we're doing all of this repetitive activity. The focus, by design, is on the activity and not the visitor.

What the people in this article do is put the "client" first and cater the activity to attract the visitor, who is the reason, aim, and ultimate customer who is in a sense being asked to sign on to amateur radio. The pace and activity demonstrated are geared toward the visitor and not a tally on a log sheet. So, when people ask about reaching new people, you might suggest this approach. —K2EEK

Bob Dudek, WA2ABN, with two young CW initiates. The code reader is not visible in this particular photo.

This year served as the fifth season in which the South Towns Amateur Radio Society (STARS) sponsored an exhibit of amateur radio at the Erie County Fair, the second largest county fair in North America. The fair is located south of Buffalo, New York, in the township of Hamburg. For the 159th annual fair, held in August 1998, the theme was "Out of this World," a fitting theme for our activities.

8590 Phillips Rd., Holland, NY 14080

The display was started five years ago, when I approached the board of directors of the fair to allow a display of amateur radio, something our club had done back in the early 1980s. I admit I had another motive besides exposing the public to what we as hams do! Serving as one of the directors for a singing/dancing troupe, I found myself at the fair for the entire eleven days of its course, and I wanted to play amateur radio during my "off times," so it seemed like an enjoyable task.

With all the competition we as amateurs face in trying to attract members to our ranks, my initial plan was to set up a complete display, one which would show essentially *every* mode amateur radio offers. STARS was approached and was extremely supportive of this project, so we started out in the spring of 1994 to plan for this immense undertaking.

The first course of events was to determine the number of participating amateurs we would need to run the exhibit. Based on the hours the building was open, the shifts were divided into approximately four hour blocks—10 AM to 2 PM, 2 PM to 6:30 PM (to allow for those working to get home and have dinner first), and 6:30 PM to 10:30 PM.

Thirty-three shifts were needed to cover the eleven-day event. Based on the size of the display and the need to have enough amateurs available to talk to visitors, as well as interact with the display, I planned on assigning three amateurs for

Larry Shannon, K2KVS, behind the booth answering questions.

each shift, requiring 99 assignments each season!

The areas we wished to cover in the display included an interactive, hands-on CW display that could involve children (which has become one of the major draws of our exhibit), a vintage radio display, a National Weather Service display, an operational HF special event station, an operational HF digital station (to cover AMTOR, PACTOR, RTTY, SSTV, etc.), live ATV, VHF/UHF FM simplex, repeater, and weak-signal work, satellite work (RS series), and packet, which doubled as a way to send out NTS "radiograms."

Although it seemed a bit challenging, with a committee of approximately 20 amateurs working towards this end, it would prove to become a reality!

The fair board was approached to find us a location that would provide adequate space and electricity for our needs, as well as access to the building's roof for our antenna needs. After some negotiation, a suitable area was found on the second floor of a two-story building, which fortunately also houses the county sheriffs and a great security system. This proved to be significant, as all equipment once set up had to be left in place for the duration of the fair. Since the equipment was in large part on loan, we were quite concerned with security.

The Erie County Fair functions with a

Left to right: Bob Sender, KB2JHY, Bob Witt, WA2IQX, Rick Lepkowski, N2VZ, and the author, KE2VW, installing triband beam, rotor, and tower at the display site.

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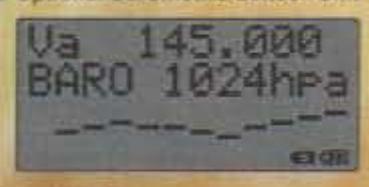

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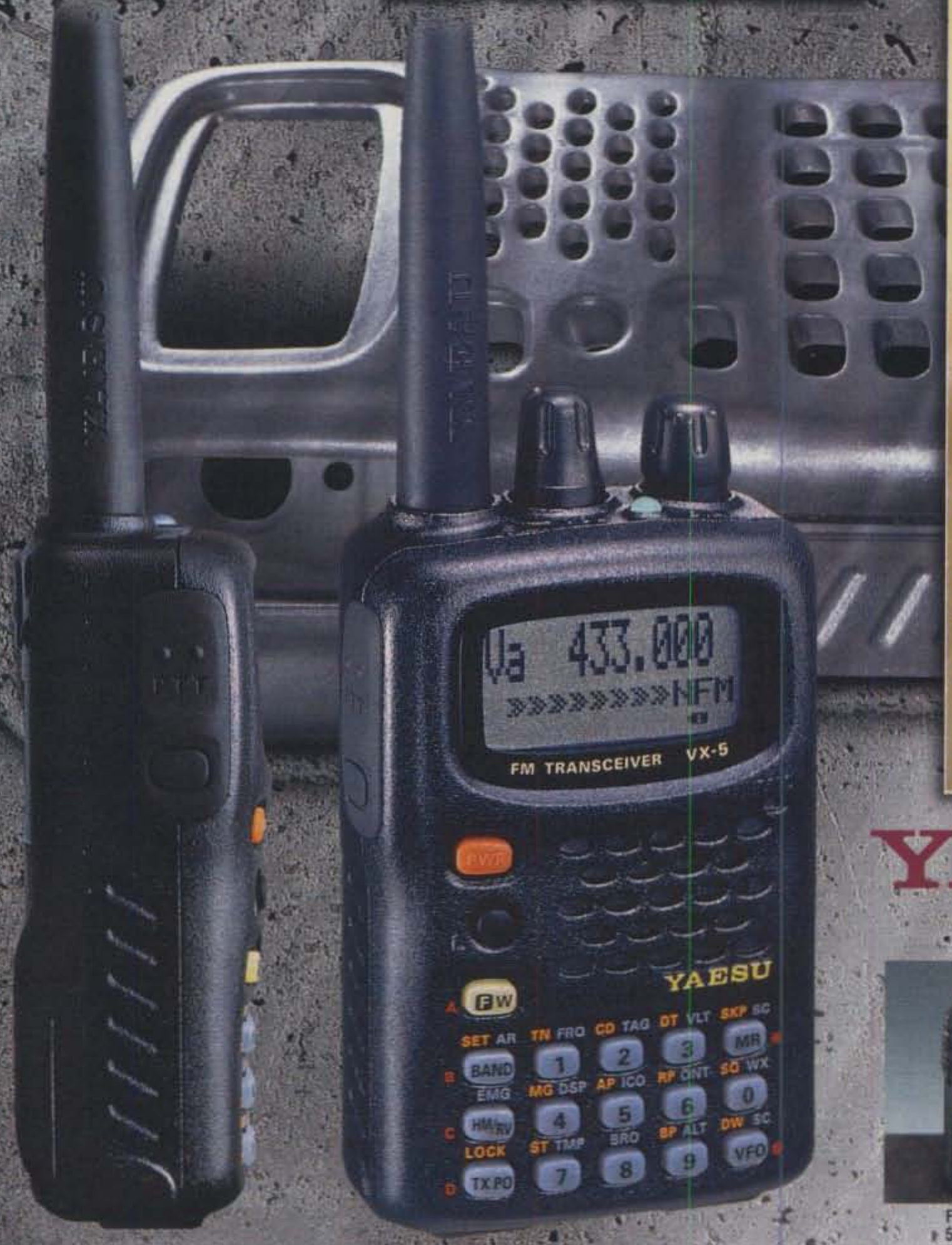

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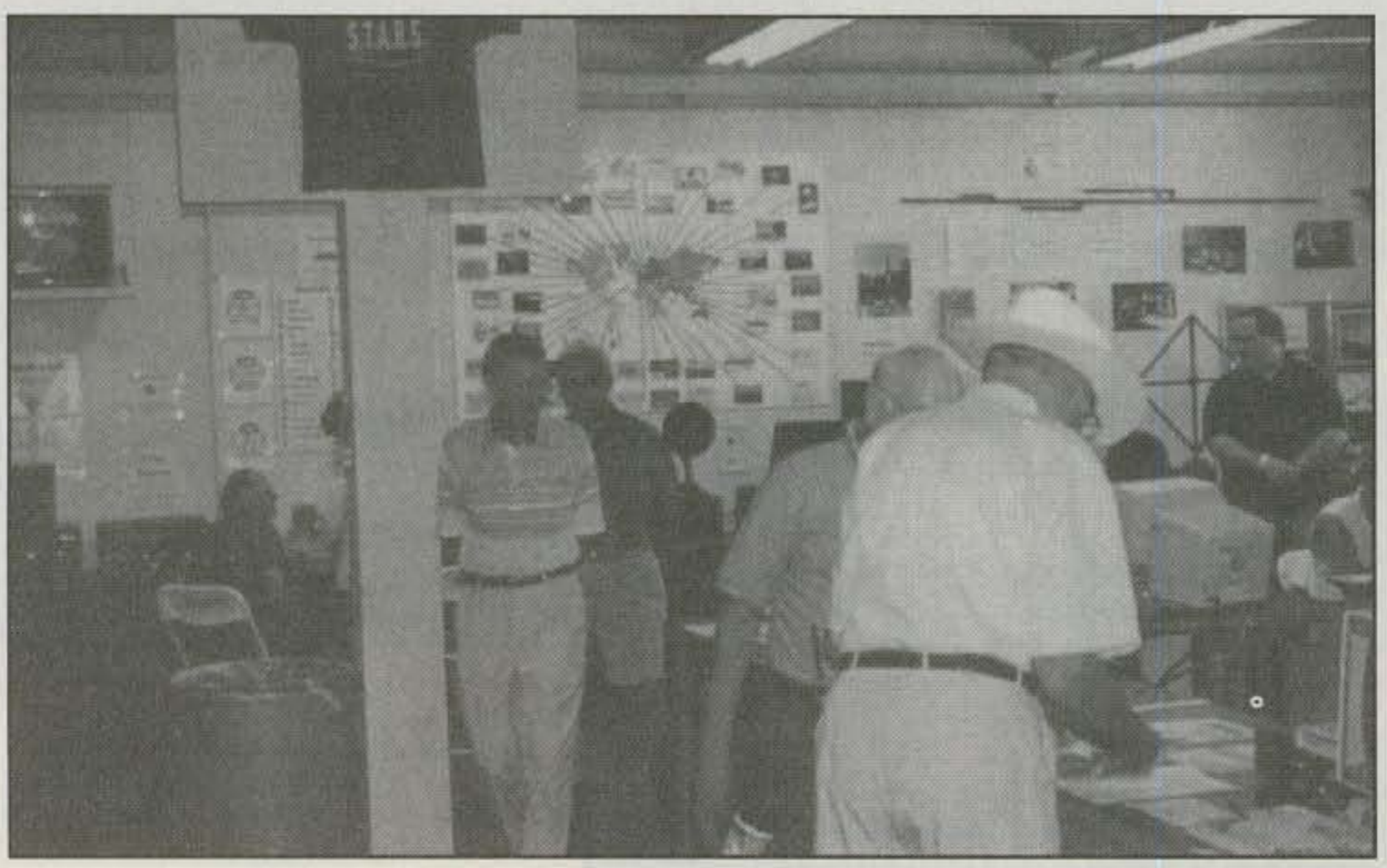


Vern Siegel, AA2AC, Curt Young, KC2CQD, and John Crawford, Jr., KG2OY, manning the display.

large volunteer "army" of supporters who make improvements to the buildings and grounds, as well as the displays. We were quickly involved in that army, building tables, putting in multiple conduits and outlets to meet our electrical needs, building locking under-the-counter cabinets to secure our "mobile" supplies, and then painting the entire display in our club colors of blue and white. This was done over a two-year period, after conclusion of the first season, to be sure we were committed to a long-term undertaking. We were!

As the photographs show, the display is basically in two parts, based on the layout of the display area. What is not shown is the large workbench, refrigerator, and storage area located behind the STARS banner. This area has proven to be essential to those working the exhibit, not only as an area to maintain equipment, but as an area to just "get away" for a few minutes, without having to leave the exhibit.

We decided to show a videotape that would be relatively brief (under 15 minutes) and that would include regional activities. I took the ARRL-produced "New World of Amateur Radio," cutting it down in length, adding local shots of Field Day activities, etc., and dubbing in an introduction. This tape is displayed continuously during the hours the display is operated.

As we are on the second floor, we needed a draw to get people to come up and visit our display. The signage was just not enough. We put a speaker in the hallway that leads upstairs, and I brought in the "Rhythm of the Code" audio cassette that I purchased at Dayton six years ago. That also runs continuously, but it has been a bit controversial at times. (The sheriffs threatened to shoot the speaker, and then me, in that order, if they heard one more dit or dah!)

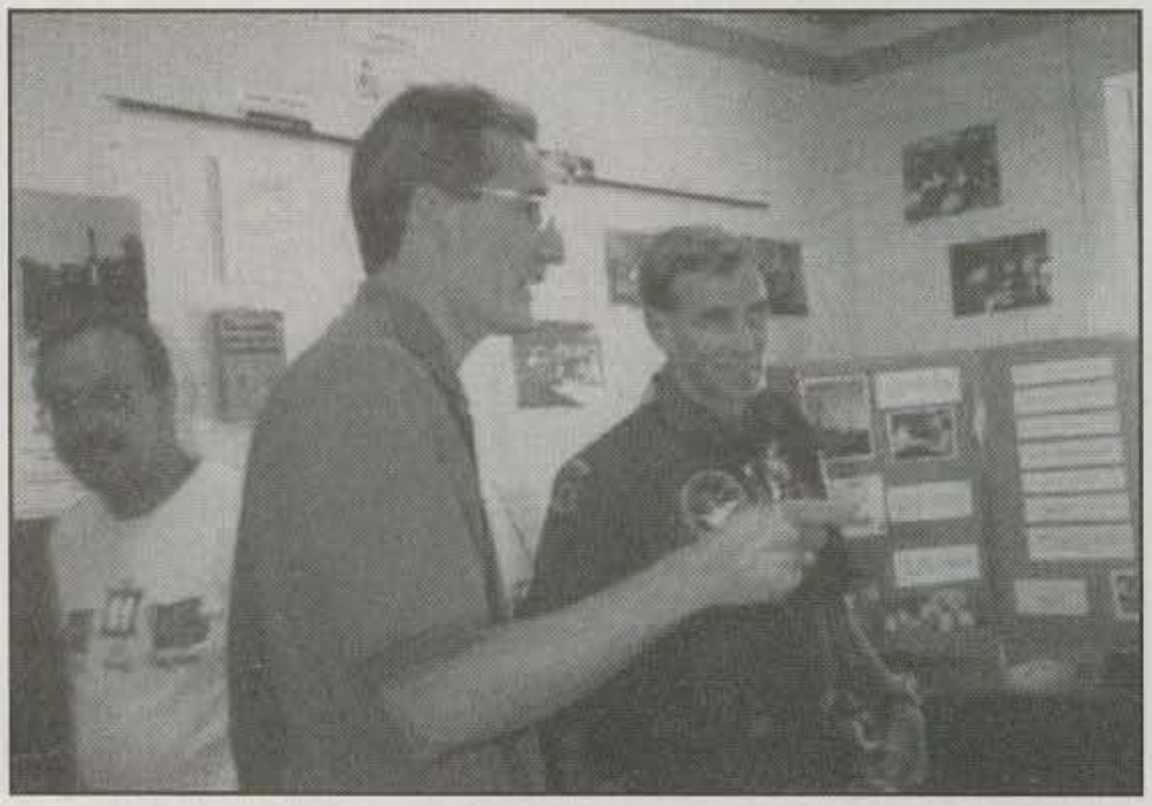
Commercial signage was purchased for two sides of the building to let people know we were there. We found that word of mouth was a much better draw for our display, after we had been there for two seasons.

For the "interactive" part of the display, WA2ABN designed a code practice system, letting our visitors use straight keys and headphones to send each other messages. An overhead chart was provided to enable them to know how to send the characters. We had twin CW oscillators, allowing for four to use the display at one time. A code reader was donated by N2DNR, which served to be a source of amazement to the children participating in this part of the display, and a source of consternation to some amateurs when "that darned machine" couldn't seem to decode their "perfectly sent code."

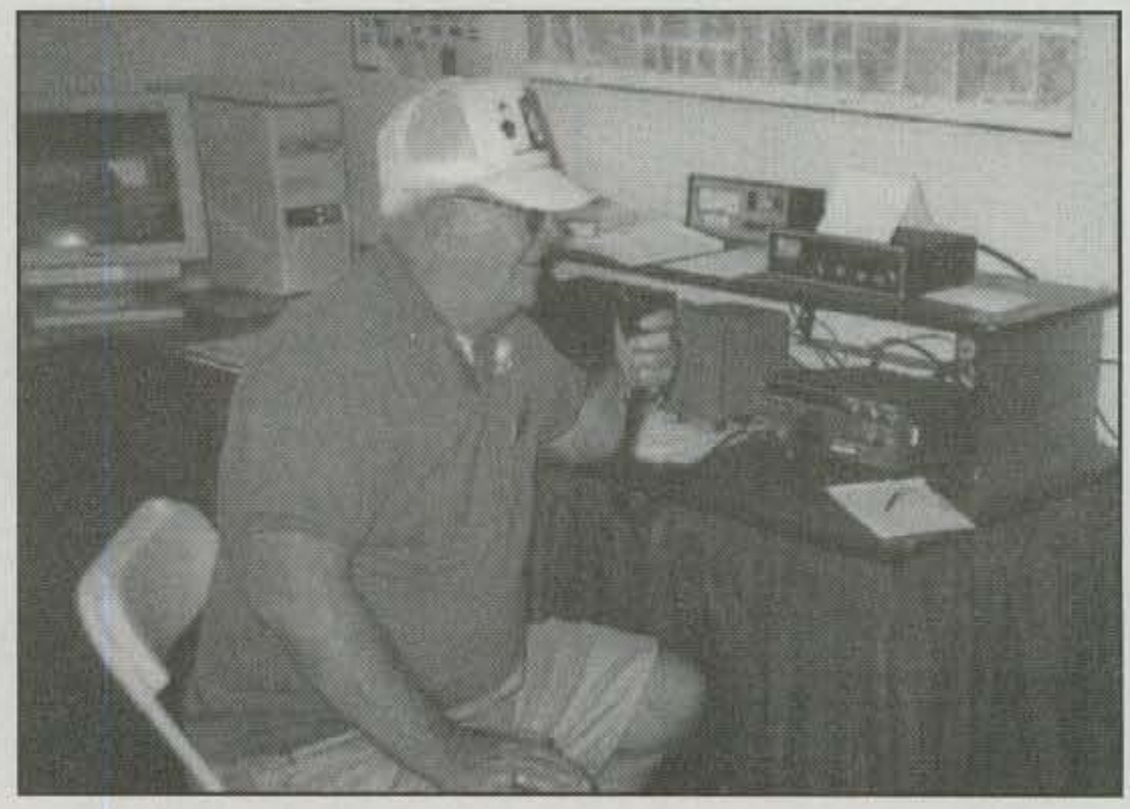
We gave younger participants *Archie Amateur Radio* comic books that we obtained from the ARRL. We could easily go through several hundred each season, but not wishing to ask for that quantity, we limit the comic books to only those children who really became involved in the CW display.

KD2KK contacted the Niagara Antique Wireless Association, run by Gary Parzy and Larry Babcock, who very graciously loaned us pristine examples of vintage gear. Many of our more senior visitors were often heard to say, "I had that one when I was a kid." We did have a working spark gap display, but opted not to use it, as we would wipe out the fair's public address system located near our display!

N2TEZ, who also happens to work for the National Weather Service, was in charge of their part of the display, which included a continuously running video pre-



The author, KE2VW, pointing out exhibit highlights to shuttle pilot William Gregory, KC5MGA.



Norm Jones, KD2KK, working day two of the special event station at the display.

sentation, as well as a number of handouts, including Skywarn information for the amateurs who visited the display (over 170 visited our display this past season).

Our amateur guests this year included some new faces, such as Bernie Fuller, N3EFN, from the ARRL, and astronaut, shuttle pilot William Gregory, KC5MGA, who was most impressed with some of our ATV photos from a weather balloon, taken at about 110,000 feet.

Our HF special event station, spear headed by KE2LO, KD2KK, and KB2ZTL, consisted of our club's Kenwood TS-430S running 100 watts into our 3-element Cushcraft triband beam or our homebrew G5RV. This past season netted over 200 contacts. KG2OY printed the certificates that will be mailed out to those contacts.

WA2TVT was in charge of our HF RTTY, AMTOR, PACTOR, and SSTV station. This part of the display used our club's ICOM 735, a PK-232, a Heath scope, and a 486 computer. We used either of the above antennas, plus had access to indoor 10, 15, 20, and 40 meter dipoles in the building's attic. We used a switch box he designed to allow either rig access to any of the antennas. In our first 45 minutes of operation we used RTTY to contact and have brief ragchews with Moscow; Cologne, Germany; Madrid, Spain; and Florida.

Our club's new dual-band VHF/UHF Kenwood rig served to demonstrate FM simplex and repeater use to the public.

The packet station used a Kenwood all-mode 2 meter rig to demonstrate packet BBS and DX Cluster operation, as well as SSB simplex work.

The primary use of the packet setup was to send out "radiograms" for our guests to areas in the US and Canada. This has been a major area of interest for the public in past years, but has shown a steady decline in popularity with the advent of e-mail, to which most of the public now has access. This past season we sent out 77 messages, compared to 195 the previous season.

We were very pleased to have KB2VVD come to the display to run several sessions of the Western District Net, our regional traffic-handling net.

For satellite demonstrations we used our 10 and 15 meter antennas to communicate with the RS satellite series, as well as MIR.

Our ATV demonstration consisted of live portable video using a small color camera and a 1.5 watt transmitter. We took the unit on the grounds, even taking it on the ferris wheel, which gave us quite a view (as well as allowing our cameraman free rides, up to the point of near nausea!). This year we decided not to send anyone out of the display area, as it was too busy, even with three hams every shift.

I had planned an aerial exhibition of ATV, but unfortunately the equipment arrived too late (one day before the fair) to get it together for this season's fair. I will have it "flying" next season, however.

The net results of this season's exhibit were the above-mentioned HF contacts, "radiograms," and amateurs visiting our display. Most important, however, we had managed to interest 46 people in signing up for our amateur radio classes, which run mid-September to mid-November.

Why do we do it? Fun is the number one answer, but number two has to be (and it's my main reason) the ability to bring amateur radio to the masses, to stimulate interest by the public in "what we do best." In the process, we hopefully plant the seed in some to come and join us in our fun!

That, in a nutshell, is the exhibit. If you are travelling through the western New York State area in mid-August, be sure to look us up. Directions can be obtained on any of the local repeaters. ■

N7ML explains an interesting phenomenon he's experienced in meteor shower communications.

Split Meteor Scatter Signals

BY C. MIKE LAMB*, N7ML

Six meter meteor scatter has been my passion since about 1960, when I worked schedules with W6NLZ (John Chambers) and other California stations from my QTH in Longview, Washington. With scatter signals, you are working with extremely weak signals. Therefore, if you are serious about it, you will want to have the best receiver, transmitter, and antenna system you are capable of coming up with. That is why for years I was always building better and more powerful amplifiers, until I finally came up with a reliable maximum legal power amplifier that would take the punishment. It also gave me an early interest in maximizing antenna gain and reducing feed-line loss, not to mention getting the best low-noise receiver front end I could obtain.

When I started, I built a 4-65A amplifier that I could push to about 150 watts output, a far cry from my homebrew 6146 transverter output. With this power level, I began making contact with other stations at about 1000 miles distance, off ionized meteor trails. Prior to having a KW, I never received a residual scatter signal report.

In the old days, there were a number of West Coast stations that would gather every Saturday and Sunday morning between about 0600 and 0900 local time. The stations on the northern end of the path transmitted the last 30 seconds of each 60-second schedule and the southern stations transmitted the first 30 seconds. Most of us used crystals ground for the bottom end of the band; we could often tell who someone was by the frequency on which he operated. Operation during the AM days was strictly on CW. However, with the advent of SSB and good linear amplifiers, many of us gravitated to SSB scatter operation. We were very dependent upon good meteor bursts, and thus the best schedules were made during meteor showers.

By the mid-1970s I had my homebrew 4PR-l000A amplifier capable of full power output and an H-Frame holding four each 4-element Yagis on 12 foot booms. At this time, when the *E*-layer MUF was reasonably high, residual scatter reports were more commonplace, but meteor bursts were always counted on for working other lower powered stations.

In December 1975 I wanted to work CW meteor scatter one night during the *Geminids* meteor shower, which turned out to be a good one that year. An old scatter friend of mine (KH6HI, ex-K7DTH) was visiting me from Hawaii that evening. While the XYLs were visiting upstairs, Bert and I went down into the ham shack to work the shower. We fired up, called CQ, and were surprised to hear a big pile-up of about five stations calling all at once. I picked out a call, W6YKM, and proceeded to work Fred with good reports both ways.

We signed and I went on and called CQ again with no response for a few rounds. Then another CQ resulted in a big pile-up of stations calling. The only call I could get was W6YKM again. I turned to Bert and asked if he could copy any other calls, to which he said all he heard again was Fred. Fred just wanted to let me know that he was getting some tremendous bursts over S9, for which I thanked him and started calling CQ again. This time I asked Bert in advance to catch the highest pitch signal he heard and I would copy the lowest pitched signal.

Sure enough, a few CQs later and we had the big pile-up again. This time I got W6YKM on the lowest pitch signal and I listened in disbelief as Bert told me the highest pitch signal was *also* W6YKM!

I had never heard of this phenomenon before and neither had Bert. Right away we conjectured as to what it might be. We came up with a theory that I still believe to this day. I told others familiar with scatter work, and none of them had experienced this nor read about in any journals. After all these years, still not hearing anything about it, I decided to write this article thanks to encouragement from friends to whom I have told the story.

Here is our theory. Bert and I decided that during the shower the meteors came in bursts of several meteors all at the same time. Although the meteors arrived at the same time in groups, apparently they dispersed into the atmosphere in different directions and/or at different speeds. There were resulting ionization trails that caused simultaneous Doppler shifts of differing and discrete amounts. What we observed was the same signal from W6YKM that was being returned by different ionized meteor trails with separate and discrete Doppler shifts.

I would appreciate hearing from any others who have noticed this phenomenon or who know about any other articles on the subject.

Epilogue

The week of November 15, 1998 brought about the news of the *Leonids* meteor shower in the general media. Not being terribly active on meteor scatter these days, I did not pay a great deal of attention. However, I have been monitoring 50.110 these days to alert me to the possibility of *F2* skip openings. Monday morning at about 0600 local time while I was going through my e-mail, I was alerted by some noise breaking my squelch. It turned out to be a very loud signal on 50.125 overloading my noise blanker. I promptly proceeded to work K7RAT in Oregon and realized it had to be the shower I had read about in the newspapers. I then fired up the amplifier and proceeded to call CQ and the fun began. In the next 24-hour period I worked over 200 QSOs in 22 states, VE3, VE6, VE7, and VE8 in who knows how many grids. The meteors were coming in waves so powerful that it actually raised the MUF of the *E*-layer above 50 MHz for minutes at a time. One station in Minnesota actually peaked 30 dB over S9 for about 5 minutes and was S9 or more for at least 20 minutes. Several operators kept claiming that it was sporadic-*E* and not meteor scatter. I disagree. I think that whereas it sounded like sporadic-*E*, it was certainly caused by large groups or streams of meteors entering the ionosphere. Interestingly, there were not a lot of split meteor bursts as I might have expected. I did hear a few beacons with a residual auroral modulation on Tuesday morning with meteor bursts that raised the signal level from about S4 up to S9. In those instances, I was listening to two separate and distinct signals: an auroral low-level signal and a clear but distinct signal several S units stronger, both from the same source!

This recent meteor shower was the best meteor scatter experience I have had in 38 years of playing with this propagation mode. I worked one mobile station running 100 watts in Las Vegas, a station running 8 watts with a 3-element beam, and a station in Illinois running 100 watts to a dipole in his attic. Power and a big antenna were just not necessary! I had pile-ups calling me at times that rivaled big European pile-ups on 20 meters when the band is wide open.

If you have not experienced this mode of operation before, you need to try it for yourself. The more activity, the greater number of scatter contacts that will be made. The best time to try this mode is between 0600 and 1000 local time Saturday and Sunday mornings at around 50.125 MHz. ■

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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*

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100 Watts for 2 Meter HTs

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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*

- ***100 Watts out with all handhelds up to 8 watts***
- ***All modes: FM, SSB, CW***
- ***Great for ICOM IC-706***
- ***15 dB low noise GaAsFET preamp***
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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*

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- ***All modes: FM, SSB, CW***
- ***18 dB GaAsFET preamp***
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- ***One year MIRAGE warranty***

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

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Wouldn't it be nice, every so often, to ease on back to a simpler time, when tubes and dreams glowed in the dark and everything was possible? Well, we can't live there, but we can visit from time to time as N9AHQ explains how we can get in on the fun.

Resurrecting the Hallowed Hartley

How To Build an Instant Antique and Join the Fun of Old-Time Wireless

BY HOWARD ZEHR*, N9AHQ

Tonight each CW signal on this segment of 80 meters has its own personality. Bob's is loud and assertive, a real presence. Dan's is soft and melodious with a slight chirp. Some sound like chickens or buzzers. Tonight I'm told my signal is the best-sounding Hartley on the band. Earlier in the week, though, when the wind was blowing my center-fed Zepp, I could hear in my receiver that my signal sounded like the warble of a wren.

As I chat with another station in the 1929 QSO party, I hear other stations swoop quickly onto the frequency, then wait in the shadows for their turn.

This is the excitement of old-time radio—simple equipment, often homebrewed breadboard style with classic tubes and shiny coils. Twice a year, on consecutive weekends in late November and early December, members of the Antique Wireless Association (AWA) gather on 80 meter CW to work each other. The basic rules are simple: 10 watts maximum input using a transmitter from a 1929 or earlier design. Self-oscillator designs such as the Hartley and MOPAs (Master Oscillator Power Amplifier) are popular. During the rest of the year, the OT (old-time) rigs are used just for the fun of it.

Coming back to amateur radio in 1994 after 25 years away from it, I often thought of building a simple tube-style QRP transmitter. Then I worked Bob, W2ZM, and Dan, K8JWR, and I was hooked. Bob told me about the AWA and its newsletter and about the article he had published there on the construction of a simple Hartley oscillator.[1] I immediately sent my $15 dues. Meanwhile, Dan sent me a copy of the article, I ordered a type 27 tube ($3.00 used!) from Antique Electronics Supply,[2] and within a week I was on the air, 1929 style, in time for the contest.

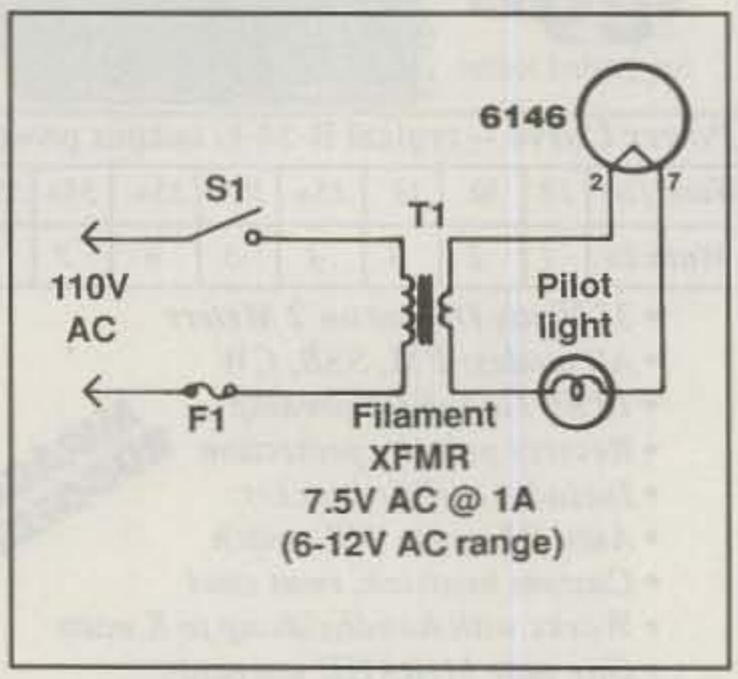


Fig. 1– W2ZM's circuit for a Hartley oscillator, published in the AWA newsletter.

Building a 1929-style transmitter is simple and half the fun of OT radio. Using Bob's circuit (fig. 1) for a Hartley oscillator, I built it in open breadboard style as it was often done in the early days of amateur radio. Why bother to drill holes in an aluminum chassis, and why hide all the interesting-looking parts anyway? It was finished in a few evenings.

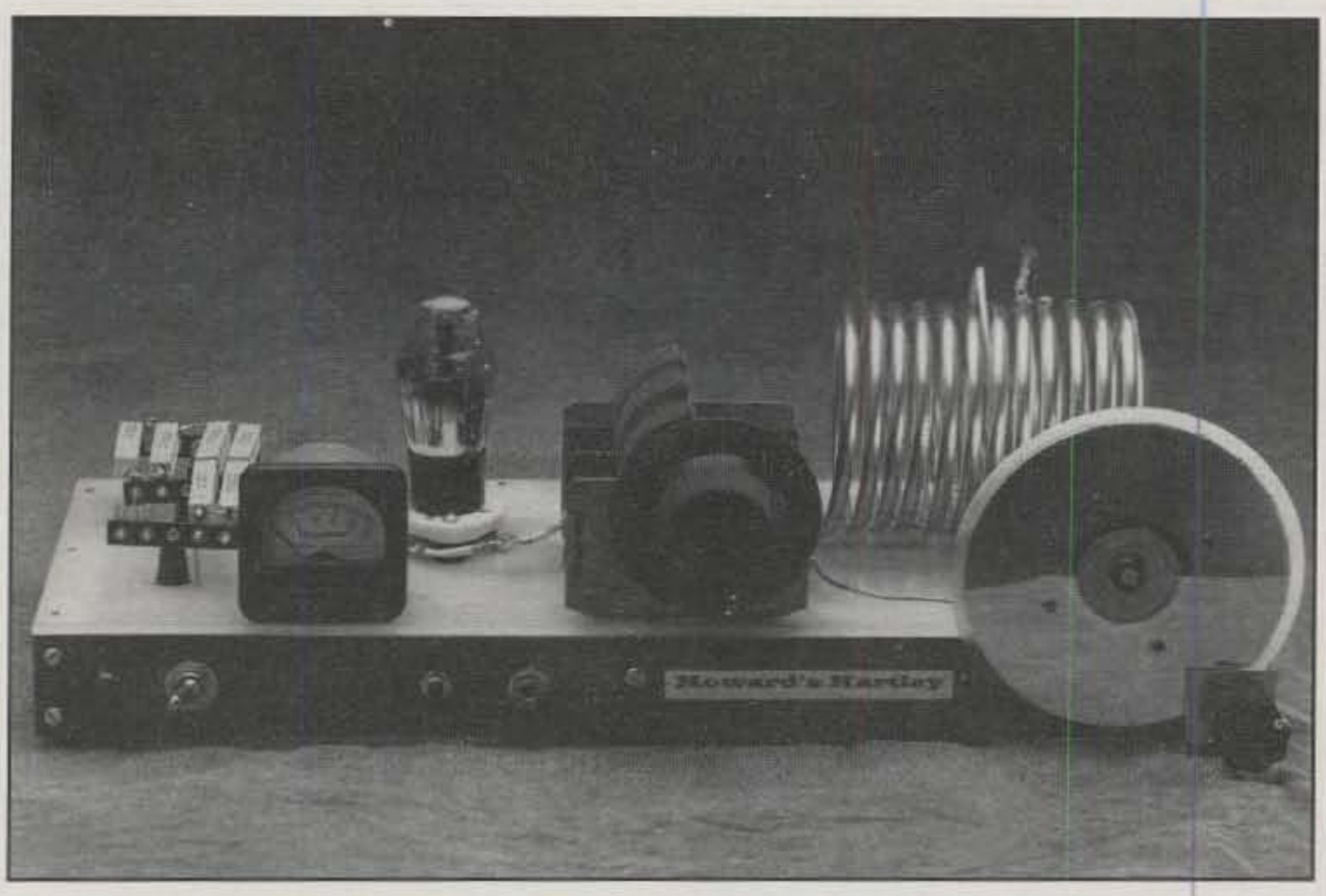
A Hartley is a self-excited oscillator, the equivalent of a simple VFO used as a transmitter. On the plus side, this means adjustable frequency and no crystal. However, the down side is that the frequency of oscillation is affected somewhat by the load on the oscillator. Any variation in your antenna will affect your signal, so when the wind blows your wire antenna, look for some warble. Also, you can't spot your frequency on a dummy load and then switch to the antenna, since the two loads will be somewhat different; instead, you have to tune on the air. Fortunately, at 5 to 6 watts out, you probably won't drown out anyone.

Often these rigs are built on a simple piece of wood. However, I decided to use a piece of frosted plexiglass that I had lying around and nailed it to a simple wood frame. In this way, I could hide some of the wiring under the "chassis" and also would have a place to mount the switches and jacks.

The circuit here includes a power supply using parts such as those scavenged from an old color TV. Since I like to repair and use Swans, however, I decided to make things easy by using a Swan power supply. All that is needed is about 300 VDC and a filament supply. As the old tubes have low filament voltage (the 27's is 2.5 volts at 1.7 amps), you will have to use dropping resistors or modify a filament transformer.

The heart of this transmitter—and what helps it to look classy—is its tuned circuit based on a tank coil wound from copper tubing. Buy about 12 feet of shiny 1/4 inch copper tubing and wind it on a 3 inch form (I used a jar I found in the cupboard), and then separate the turns a bit. Use 12 turns for 80 meters and 22 for 160 (Bob reports that 7 turns will work for 40 meters, but it will be very susceptible to antenna movement). If the coil vibrates, it will vary the frequency. A piece of masking tape along the coil will help dampen movement, but I mounted mine on a 1/2 inch strip of plexiglass along its length, giving extra stability. You will also need to provide a tap for the grid circuit, which is found by experiment when you fire up the rig. Use an alli-

*168 S. Sunset Dr., Broadway, VA 22815
e-mail: <zehrh@aol.com>



The Hartley oscillator is distinguished by its 1929-vintage tube and copper-tubing tank coil. The CD serves as a vernier dial to spread out the tuning and reduce hand capacitance when tuning. On top of the tank coil to the right is the grid tap. The light-colored wire to its left is the swinging coupling loop L1B.

gator clip initially, although once you have tested it and found the best spot, you will want to drill a small hole and use a self-tapping screw to hold it solidly. Tank current is surprisingly high in a Hartley. Therefore, it is important to use heavy wire or strap to connect the coil and capacitors in the PA circuit.

To couple the rig to the antenna, plan to use a one-turn loop of insulated number 14 or 12 wire the same diameter as the coil and inserted part way into the middle of the coil.[3] You will need to be able to vary the degree of insertion (It will probably work best about half way in.), so you may want to rig up a simple pivot or swing arm to move it up and down and/or in and out. You can use a female coax connector on the coupling loop to attach the coax to your antenna or tuner.

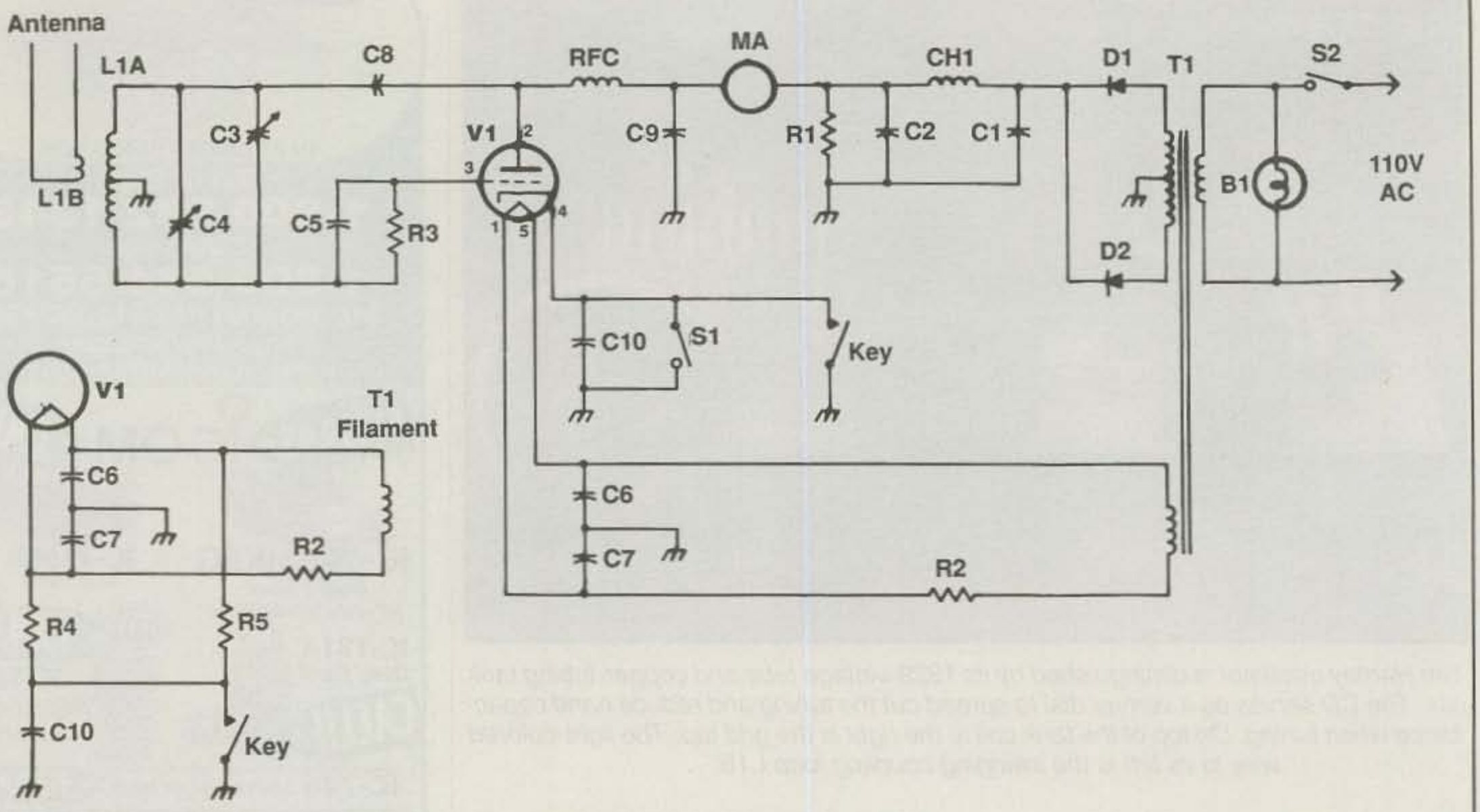
Placement of parts overall is relatively unimportant, with one exception (which I forgot when I made mine). As your hand approaches the tuning capacitors, it will affect the capacitance and therefore the frequency, making tuning tricky. I minimized this by making a vernier control from a CD which in turn is friction-driven by a knob (a bit of a time warp here, but it adds to the interest). However, I'd suggest mounting the smaller "bandspread" capacitor at the back of the "chassis" and using an insulated shaft extension to bring the control to the front for tuning. Be sure to keep your spotting switch away from the capacitors, too. As there is no metal chassis to serve as a common ground, I used a leftover piece of copper tubing as a ground bus.

When you are ready to test it, let it warm up for several minutes, and then push the key or spotting switch. You should be able to find the signal in a nearby receiver. Without the coupling coil inserted, it will probably draw about 10 mA. Adjust the tap for highest current draw and best frequency stability while listening to the signal. My tap is on the fifth turn from the "bottom," or grid end, but some report having to go as far as the middle. Now with an antenna or dummy load and an RF output meter connected, move the coupling loop in and out for maximum output,and then readjust the tap and make it permanent. With 300 volts input, you should be able to draw about 30–35 mA, or about 9–10 watts input. The input power will vary with the degree of antenna coupling. This should be adjusted for maximum power output. However, when the wind is blowing your antenna, you may be able to increase frequency stability by loosening the coupling somewhat, and thus reducing the power.

You will need some sort of TR switch. I'm using a simple MFJ antenna switch that shorts the unused connector. Using a Swan or a TS-830S for a receiver, I have not been in danger of damaging the receiver and thus have been able to listen on it as a monitor for keying. However, take care not to overload your receiver, especially if it has a solid-state front end.

There's not much else to it. Be extremely careful in and around this rig, as it is an open chassis. Stay away from the high voltage, of course, and discharge the filter capacitor by shorting it before touching those circuits.

Chances are that you can find some of us hanging around 3550–3580 in the evenings. If not, we'll see you next fall in



PARTS LIST

V1 — A number of tubes can be used, including the 12A, 71A, 45, and 01A. Many use tubes 24 or 27, however, which have a 5-pin base; the diagram here uses the 27. Tubes and sockets are easily available new or used from Antique Electronics Supply or other sources. You could run two type 27 tubes in parallel for 20W input; with a 5V supply, you can eliminate the need for a dropping resistor by connecting the two filaments in series.

T1 — Power transformer 300–350 V each side of center tap. Also filament winding of 5–12.6 V.

L1 — L1A wound from 1/4" copper tuning. L1B is a single turn of insulated #14-12 wire inserted into L1A. (See text.)

CH1 — 5–10 H filter choke

D1, D2 — 1 kV or higher PIV silicon diodes

C1, C2 — 20 mFd @ 450 VDC (C1 is optional)

C3 — 350 pF receiving type variable capacitor

C4 — Small variable capacitor for "bandspread" tuning—e.g., 50–75 pF

C5 — 250–500 pF ceramic, 200 V minimum

C6–C9 — .002 mFd @ 600 V disc or ceramic

C10 — .5–1 mFd

R1 — 15 K ohm 20–25 W to bleed the power supply and maintain voltage stability.

R2 — Filament dropping resistor, depending on tube and transformer voltage. For type 27 (2.5 V at 1.7 A) and 5 VAC, use series and parallel 1 ohm resistors to get 1.5 ohms. For a type 27 and 12.6 V, use series and parallel 1 and 10 ohm, 10 W, resistors (available from Radio Shack) to get 6 ohms. When mounting them, remember that they will get quite warm. A more elegant solution is to perform minor surgery on a transformer by removing turns or adding a winding to get 2.5 V output.

R3 — Grid leak resistor; 10 K ohm 2 W for all but the 71 A or 45 tubes which require 30–50 K ohms

RFC — 2.5 mH 100 ma choke (or wind about 100 turns #30 enameled wire on 1/2" dowel)

MA — 0-50 milliammeter. You probably could use a 6 or 12 V pilot light bulb as a current indicator.

S1 — Push-button switch for spotting frequency

S2 — SPST toggle switch

B1 — Neon pilot lamp

Notes:

• Type 24 and 27 tubes have a cathode. For other tubes without a cathode, connect the key to the filament circuit with a 15–20 ohm 1–2 W resistor on each side of the filament as in fig. 2.

• If type 24 tube is used, connect screen directly to plate so that it will operate as a triode.

• If the tube takes off into parasitic oscillation, insert a 4- or 5-turn, 1/2" diameter coil at grid pin.

Fig. 2– Schematic diagram for the venerable Hartley oscillator. You can build your own and join in on the fun.

the AWA QSO party. It's relaxed, not terribly competitive, and downright musical. If nothing else, your rig should get some comments from visitors to your shack.[4]

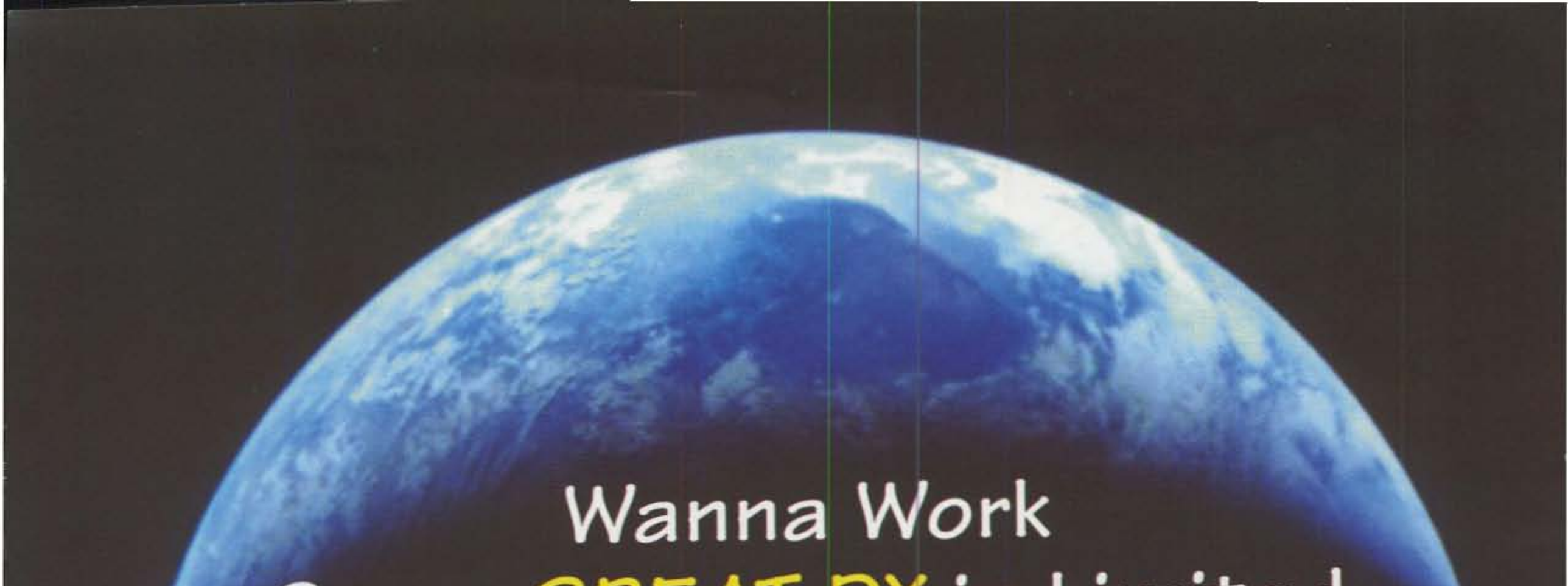
Footnotes

1." An Inexpensive Way to Build a 1929 Transmitter," *The Old Timer's Bulletin*, August 1998, pp. 30–31. Circuit adapted by permission of author Bob Raide. The *Bulletin* comes with the $15 membership fee. To join the Antique Wireless Association (AWA), send a check to AWA c/o Joyce Peckham, Secretary, Box E, Breesport, NY 14816.

2. Phone 800-706-6789; <www.tube-sandmore.com>.

3. An alternative, recommended by Ross Hull in "Overhauling the Transmitter for 1929," QST, August, 1928, is to use a coupling coil of 3 to 4 turns placed close to the plate end of the main coil. Coupling is then adjusted by moving it closer and farther from the coil.

4. Special thanks to Dan Metzger, K8JWR, for his suggestions. ■



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- Only 82' overall length.

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1/4 Slopers— Wanna Work Some GREAT Low Band DX in Limited Space Areas? Here's How to Do it RIGHT !

GENERAL PRODUCT USE

Alpha Delta designs and produces a line of high performance 1/4 wave slopers for limited space installations. For extra reliability, these antennas do not use traps of the traditional types with coils and capacitors but ISO-RES inductors that serve a trapping function. There is no separate capacitor, therefore, to break down under high RF voltages. All models use stainless steel hardware to accommodate extreme weather conditions. When our antennas are properly installed, tuners are usually not required.

APPLICATION: 1/4 WAVE SLOPERS

Alpha Delta slopers are designed for users who desire effective low band DX performance, but who have limited space installation capabilities. These slopers can be easily attached to existing towers and masts without the need for additional supports. However, please note the unique installation requirements explained in the following sections.

While 1/4 wave slopers are only about half the size of the regular 1/2 wave dipole, their installation requirements are very different than a dipole for proper SWR and operational performance. The 1/2 wave dipole, when mounted in the clear, is essentially a self-resonant antenna and relatively easy to tune. However, a 1/4 wave sloper relies on three important additional factors for proper "no tuner" operation and lowest SWR.

1. A 1/4 wave sloper is essentially an "up side down" vertical where the traditional radials are up in the air over the high feed point with the radiating element sloping downward. In actual practice, these "radials" are actually the elements of a HF beam antenna and this beam is referred to as the "capacity hat" for the sloper. In addition, the sloper feedpoint must be at least 4 to 5 feet below the beam for proper decoupling. The tower or support must be clear of unbroken guy wires, other wire antennas or near by metal objects such as gutters, rooftops or metal fascia.

   If a 1/4 wave sloper is put on a tower without the "capacity hat" on top, tuning will usually be difficult and will exhibit a high SWR. In this case a sloper can perform well but a wide range antenna tuner will be required.

2. Since a 1/4 wave sloper is essentially one half the size of a regular 1/2 wave dipole, the "missing part" of the sloper is made up by the ground return path through the tower or metal mast. If a non-metallic support or a crank-up tower is used, it will be necessary to provide a "down lead" wire from the sloper bracket to the ground. This "down lead" wire should be 12 gauge or larger and attached to a ground rod. Also to decouple RF currents from the coax shield, it is good practice to wind an "RF choke" at the feedpoint of the sloper. This is done by winding six or eight turns of the coax at a diameter of approximately 6 inches. A common practice is to secure these turns with electrical tape. (Graphic Assistant #1: Refer to the graphic assistant drawing on the back to use as a reference while reading this section.)

3. Sometimes when a sloper is installed in what seems like an ideal situation, the user still finds a relatively high SWR. Our Customers have reported that to correct this situation, it has been necessary to install additional ground rods or radials at the base of the tower due to a poor RF ground condition. After doing this they report normal SWR bandwidth results.

PRODUCT DESCRIPTION: 1/4 WAVE SLOPERS

Alpha Delta provides two 1/4 wave slopers, the model DX-A twin sloper and the model DX-B single wire sloper. Both models are designed to meet varying installation space requirements.

Model DX-A Twin Sloper

This model is designed to provide broad band characteristics by having two separate slopers driven from a common feedpoint. One sloper wire is about 67 feet long and resonates on 75/80 meters. The other sloper wire utilizes an ISO-RES inductor and resonates on both 40 and 160 meters. The 40/160 wire has an overall length of about 55 feet. The two wires should have an included angle of 90 degrees or more. When installed, this configuration looks like an inverted "V" dipole but must meet the installation requirements noted in previous sections. Broad-banded characteristics are accomplished by dividing the ham bands across two separate sloper wires. This model can be used at installation heights of 35 feet to 40 feet or more.

The Model DX-A is priced at: $59.95 each (plus $5.00 shipping and handling)

Model DX-B Single Wire Sloper

When dimensional and space limitations do not permit the use of the model DX-A twin sloper, the model DX-B provides a space saving option. The antenna is a single wire utilizing two ISO-RES inductors and an under slung parallel wire with stand offs for operation on 160, 80, 40 and 30 meters. The overall length of the model DX-B is about

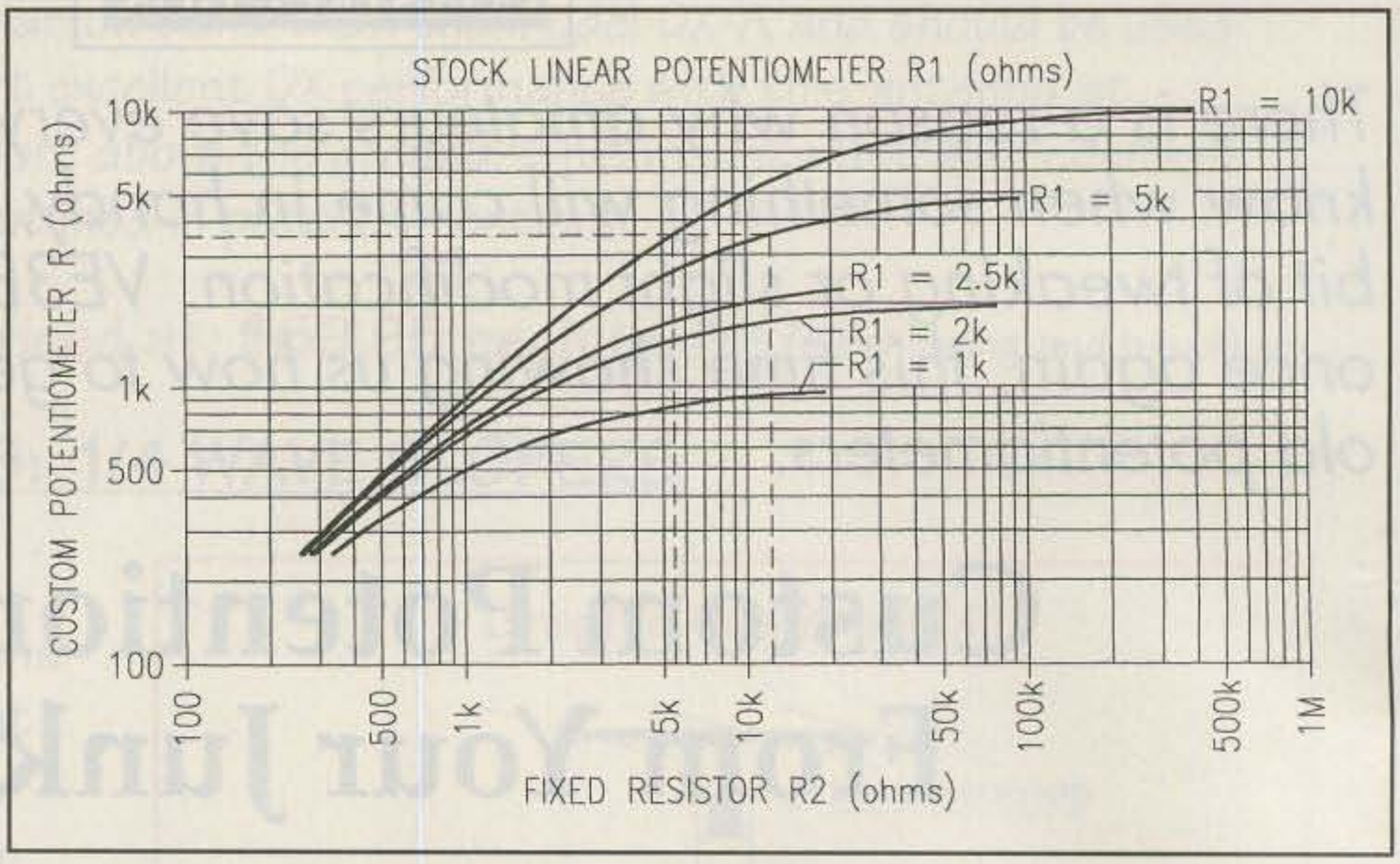

Fig. 4– Relationship of R, R1, and R2.

surements, the pot has a non-linear (probably logarithmic) taper. If either of the two measurements is about 10% of the total resistance between the two end terminals, then the taper is probably a modified logarithmic taper commonly known as "audio taper," because it is widely used for audio volume controls.[2] This is the taper shown in fig. 3.

The Difference Between Linear and Logarithmic Tapers

A cursory glance at figs. 2 and 3 will reveal the principal differences between the two types of taper. A linear pot (fig. 2) controls stuff like voltage by varying its resistance at a nice, even gradual rate. Notice the strange dB (decibel) scale on the right-hand edge of the graph. It goes a little crazy, but who cares? Voltage freaks have no interest in dB.

On the other hand, in a logarithmic pot (fig. 3), as the wiper is moved at a nice, even gradual rate, the attenuation in dB also changes at a nice, even gradual rate. To the human ear, nice, evenly stepped volume levels[3] are measured in dB. Audio

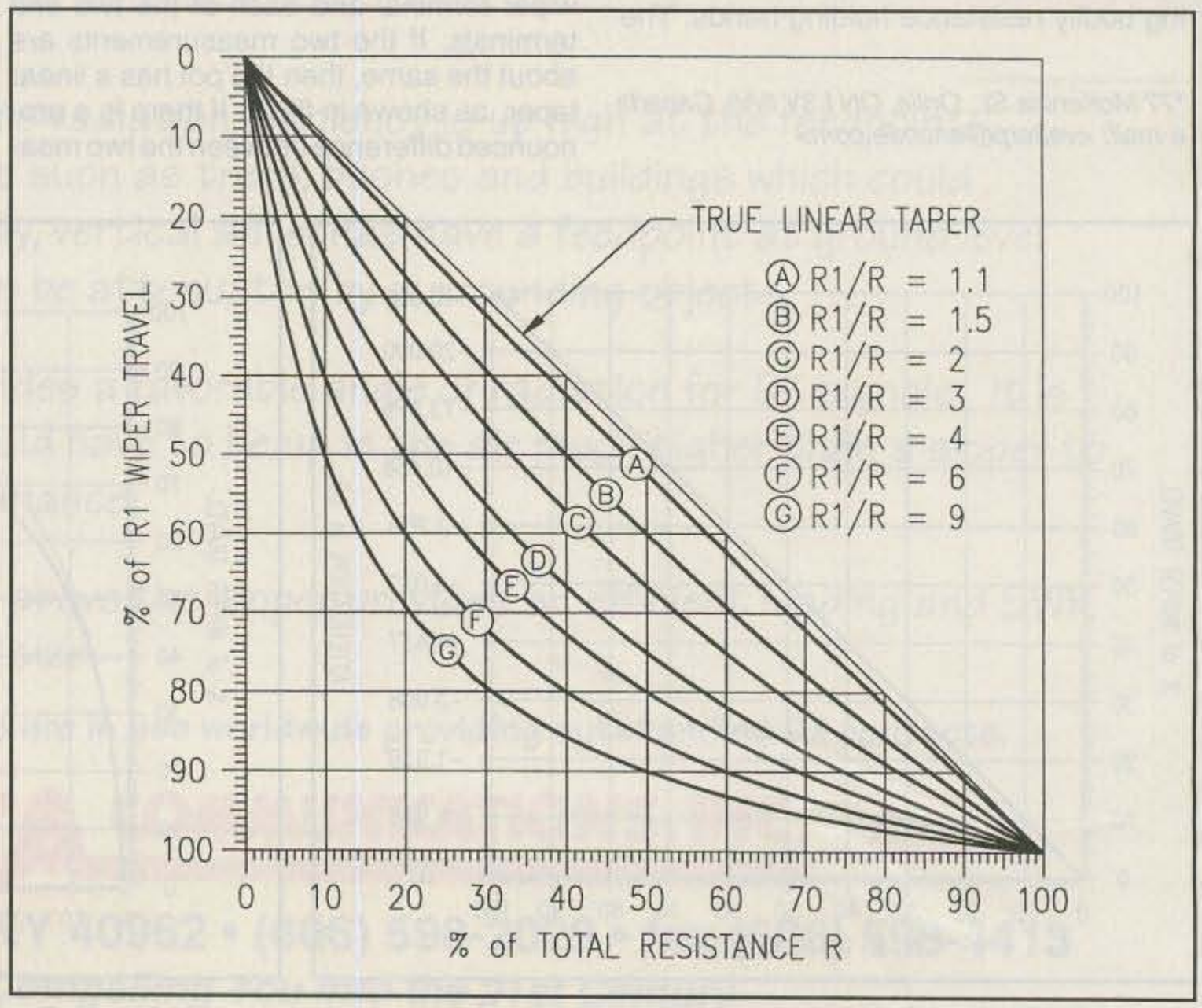

Fig. 5– Typical custom potentiometer tapers.

freaks don't care about how the resistance changes, which is quite drastically as the wiper moves.

I am glad to have all that off my chest. Esoteric things such as logarithms, decibels, and even words such as *esoteric* make me nervous.

Changing The Resistance Value of a Linear Pot

All we have to do is add a fixed resistor R2 to pot R1, as shown in fig. 1. We can calculate the value of R2 from the equations in fig. 1, or find it graphically in fig. 4. The result will be a pot with the desired value, but with a taper that is not quite linear. It will be somewhat *potbellied,* as shown in fig. 5. Fig. 4 is calibrated in kilohms, but the same scales and curves apply to ohms or megohms, as long as we read all values in the same units. The R1 curves shown are for the most common standard pot value multipliers of 1, 2, 2.5, and 5. We can take a *potshot* at other curves by estimating their locations by eye. Let's assume we have dire need of a linear pot with a full scale resistance of R = 3500 ohms. As indicated by the broken lines in fig. 4, a full scale resistance of R = 3.5k can be obtained with a 10k pot (R1) in parallel with a resistor (R2) of about 5.4k, or a 5k pot (R1) and R2 of about 12k. To make an informed decision as to which pot to use, we have to do a little arithmetic to find the ratio of R1 to R. In the case of the 10k pot, the ratio is about 10k ÷ 3.5k = 2.9, and for the 5k pot about 5k ÷ 3.5k = 1.4. Referring to fig. 5, we find the 10k pot with a R1/R ratio of 2.9 has a taper pretty close to curve D, while the 5k pot's taper is closer to curve B, which is much closer to a true linear taper.

A much simpler and more accurate way to do all this is to run the HAMCALC[4] (version 39 or later) "Custom Potentiometer" program in a computer. But either way, there are only two rules for changing the value of an existing linear pot:

1. Choose a linear pot with a value R1 greater than the custom value R you are looking for.

2. The closer in value R1 is to R, the more linear will be the resistance curve.

Customizing a Logarithmic Taper Pot

Due to the shape of the taper, this can be a frustrating exercise and mostly a matter of trial and error. About the only practical application I have found is shown by the broken line in fig. 3. By making R2 the same value as R1, R is one-half the value of R1, but the resistance curve becomes more linear. If we are looking for a custom log taper pot, we can also make one from a linear pot where R1 is approximately 9 × R. The effect is shown by curve G in fig. 5, where 10% of the resistance occurs at 50% of the wiper travel, which by definition almost makes it an audio taper.

Summary

If you are weary of control pots where most of the useful range is crowded near one end just because "standard" pots are not available in the values that should be used, then make your own custom pot. It sure beats using a "standard" pot and leaving the results to *potluck!*

Footnotes

1. Kirchhoff's First Law, *The 1997 ARRL Handbook for Radio Amateurs,* p. 5.4.

2. *Radiotron Designer's Handbook,* Wireless Press 1953, 38.3, p. 1356.

3. *Radiotron Designer's Handbook,* Wireless Press 1953, 14.7, p. 620.

4. HAMCALC is free software containing more than 200 amateur radio programs for MS-DOS or Windows, and requires a GWBASIC.EXE file in your root directory. To obtain the latest version on a 3½ inch floppy disk, send US$5.00 (US$6.00 if you want a disk containing GWBASIC.EXE included) check or money order to the author, at the address shown at the beginning of this article, to cover cost of materials and airmail. ■

In Part II, the conclusion, W8FX introduces us to other great minds whose work and dreams have brought us to where we are today. That little transceiver that we take for granted has a treasured history of less than 100 years.

Those Unsung Radio Maestros—Part II

BY KARL T. THURBER, JR.*, W8FX

Less than a hundred years ago, a number of people working independently seemed to come up with the same questions, problems, and solutions, all at about the same time. Their first halting steps fanned the imagination of countless others who could take the ideas and improve on them. It seems simple once you see it work, but it takes a true visionary to make it work the first time.

Popov: Did a Russian Invent Radio?

If American and Italian school children are taught that Marconi invented radio, Russian youngsters learn that the *real* inventor of radio was Alexander Stepanovich Popov (1859–1906). Indeed, he is widely acclaimed in Russia as the inventor of wireless telegraphy. Could it be true?

Actually, no *one person* "invented" radio as a discrete event, even though for over 100 years Marconi has been called "the inventor of radio," because he took the ideas and inventions of others and put them together in a practical form.

At almost the same time Marconi was conducting his wireless experiments beginning in 1894, the self-effacing Popov was doing roughly the same thing. Apparently, neither Marconi nor Popov was aware of the close similarity between their experiments. However, Marconi was an enthusiastic entrepreneur who rushed to spread news of his discovery and sell it to the world. Popov, by contrast, didn't care to profit from his discoveries.

Just who was this unsung Russian? Popov was a physicist, the son of a village priest. He received his early education in a seminary school to enter the priesthood. In 1877, though, his interests changed to mathematics and electrical engineering, and he entered the University of St. Petersburg, from which he graduated in 1883. Joining the faculty, he lectured in physics and mathematics. He also taught at the Navy's Torpedo School.

Learning of Hertz's work, in 1895 Popov built a device that could register electrical disturbances caused by lightning; he thought it could be used for receiving man-made signals. On May 7, 1895 Popov successfully transmitted, received, and deciphered the first wireless telegraph message from a Russian Navy ship 30 miles at sea in his laboratory in St. Petersburg. But the world wasn't told! The secretive Russian military probably saw Popov's creation as a new weapon and kept it a state secret after the initial May 7 announcement (later it was announced that May 7th would be celebrated as the "day of the radio"). In the West, however, Popov's 1895 feat was downplayed as not really being truly the "intelligible" transmission of radio waves, whereas Marconi's transmissions were proclaimed as being "intelligible"—a fine distinction, indeed, and symptomatic of the "not invented here" syndrome that is all too common in science.

In 1901 Popov returned to St. Petersburg as a professor, and later director, at the Electrotechnical Institute. He died five years later, on January 13, 1906 at the age of 46.

At the bottom line, Popov definitely was *an* inventor of radio, even if Marconi became known as *the* inventor of radio. Now that the Cold War is over, perhaps it's high time to recognize Marconi and Popov equally for their almost simultaneous discoveries in radio and electronics. What do *you* think?

David W. Sarnoff: From *Titanic* to Titan

David Sarnoff (1891–1971) was an eminent pioneer in the development of radio and TV. He ultimately became the chief executive of RCA and its National Broadcasting Corporation (NBC) subsidiary.

Sarnoff was born in Russia on February 27, 1871. After emigrating in 1900 to New York City, Sarnoff worked as a telegraph operator for the Marconi Wireless Telegraph Company of America, RCA's predecessor.

While Sarnoff couldn't claim he invented radio, he was close to many of the early events that shaped radio's real development. Sarnoff gained national recognition in 1912 as a Marconi Wireless operator by reporting to the public on the *Titanic's* sinking, and then staying at his New York station for 72 hours to help direct ships to the fatally wounded, rapidly sinking liner.

For years radio remained a communications medium devoted to sending and receiving messages. Radio's broadcasting potential was not realized until after World War I, although as early as 1916 Sarnoff envisioned a radio in every home. He later proposed designing what he called "radio music boxes," submitting his idea in 1916 to Marconi Wireless management. Five years later he won acceptance of radio when his broadcast of the Dempsey-Carpentier boxing match attracted an audience of about 300,000 amateur wireless operators. Radio broadcasting had come of age!

Created by General Electric in 1919 when the newly formed RCA acquired the Marconi interests, Sarnoff became RCA's general manager. There, foreseeing the need for interconnected station networks, he set up NBC in 1926 to stimulate RCA's radio sales. He rapidly rose through the ranks, becoming RCA's president in 1930 and its board chairman in 1947. A colonel in the U.S. Army Signal Corps since 1924, he was promoted to brigadier general during World War II and forevermore was "General Sarnoff." He served as RCA's chairman until just prior to his death in 1971.

A nose-to-the-grindstone workaholic, Sarnoff was responsible for the first American TV service, in 1936 arranging for

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FOR MORE INFORMATION

Listed here are journal and magazine articles and books you may find useful in expanding your knowledge of the historical topics in this article. Also included are names, addresses, telephone numbers, other contact information, and selected interesting Websites.

Suggested Readings: Journal and Magazine Articles

Beverage, H. H., "The Wave Antenna for 200-Meter Reception," *QST*, November 1922, pp. 7–15. (Reprinted in January 1982 *QST*.)

Demerseman, Pierre and Richard Foster, "The First Spark," *Antique Radio Classified*, June 1998, pp. 4–7.

"Hugo Gernsback—Founder," in the 50th anniversary special section of *Radio-Electronics*, October 1979, pp. 62–63.

Lisle, Larry, K9KZT. "Before Their Time," *Popular Electronics*, March 1998, pp. 45–46, 69.

McElroy, Gil, VE1PKD. "Remembering Hugo Gernsback," *QST*, February 1995, pp. 37–39.

Suggested Readings: Historical Radio Books

Appleby, Thomas. *Mahlon Loomis: Inventor of Radio*. The 1967 book is out of print; reprint is available from Svanholm Research.

DeSoto, Clinton. *200 Meters and Down: The Story of Amateur Radio*. Newington, CT: American Radio Relay League, 1936, 1981.

Douglas, Susan. *Inventing American Broadcasting: 1899–1922*. Baltimore: The Johns Hopkins University Press, 1987.

Fifty Years of ARRL: A Reprint of Historical Articles from the 1964 Issues of QST. Newington, CT: American Radio Relay League, 1965.

Jahnke, Debra A. and Katherine A. Fay, N1GZO. *From Spark to Space: A Pictorial Journey Through 75 Years of Amateur Radio*. Newington, CT: American Radio Relay League, 1989.

Lewis, Thomas S.W. *Empire of the Air: The Men Who Made Radio*. New York: HarperCollins Publishers, 1991.

Schulz, Walter J., K3OQF. *Wireless Antenna History: A Vertical Design Primer*. Cologne, Germany: Wilhelm Herbst Verlag, 1990.

Vassilatos, Gerry. *Lost Science*. Bayside, CA: Borderlands Sciences Research Foundation, 1998.

Names and Numbers

American Radio Relay League, 225 Main Street, Newington, CT 06111-1494; 1-888-277-5289. E-mail: <hq@arrl.org>. Web: <http://www.arrl.org>. Publishes *QST* magazine.

Borderlands Sciences Research Foundation, P.O. Box 220, Bayside, CA 95524-0220; 1-888-825-BSRF. E-mail: <info@borderlands.com>. Web: <http:www.borderlands.com>. Publishes the speculative Vassilatos book, *Lost Science*.

Svanholm Research, Attn: Johan K. V. Svanholm, N3RF, P.O. Box 81, Washington, DC 20044. Offers a reprint of the *Mahlon Loomis: Father of Radio* book ($25 plus $5 s/h). E-mail: <N3RF@aol.com>.

Selected Interesting Websites

Check out this sampling of Websites of interest on the Net. Many of them offer a sort of "multiplier effect" in that they also offer valuable links to other sites of historical interest:

- *100 Years of Radio Home Page (emphasis on Marconi)*: <http://www.alpcom.it/hamradio>
- *A Gallery of Electromagnetic Personalities*: <http://www.glue.umd.edu/~taylor/frame1.htm>
- *Biography.com (Site's Motto: "every life has a story")*: <http://www.biography.com>
- *Fessenden—The Archive Pages (Canadian Website)*: <http://www.kwarc.on.ca/archives.html>
- *Radio Station Grimeton (Swedish Website)*. <http://www.telemuseum.se/Grimeton/Grimeen.HTML>
- *Society of Wireless Pioneers (membership organization)*: <http://web.mountain.net/~carto/sowpinfo.htm>
- *The Web History of Telecommunications (German Website)*: <http://www-stall.rz.fht-esslingen.de/telehistory/welcome.html>

RCA to televise programs from its experimental TV station to 150 homes in the New York City area. Under his guidance, RCA developed the black-and-white-compatible color television system adopted by the Federal Communication Commission (FCC) in 1953.

Why do we consider Sarnoff to be an unsung maestro? Although he cut a high profile during his lifetime, today the memory of his contributions has faded because of the unkind fate of his beloved RCA, with which we was closely associated for almost his entire working life. RCA was a household word when Sarnoff died, but the company's bottom line fared poorly under the direction of his son, Robert, and successor CEOs.

Sadly, by 1990 RCA had lost its corporate independence. Sarnoff's RCA was acquired and dismantled by GE, representing a sort of return to its GE-based roots. As perhaps a final humiliation, the famed RCA logo on its Rockefeller Center headquarters building was replaced by a huge GE logo, a daily and graphic reminder that another radio era had passed.

Nathan Stubblefield: Another Father of Radio?

Nathan B. Stubblefield (1858–1928) of Murray, Kentucky was a rather obscure radio experimenter. But if you travel to the town square in Murray, you'll find a statue of Stubblefield inscribed with the words "Murray, Kentucky, Birthplace of Radio." Could it be that an eccentric Bluegrass farmer beat to the punch the likes of Tesla, Marconi, Popov, and others? If he did, that science is largely lost to us, but there's an interesting story to be told.

In 1892 Stubblefield demonstrated voice and music wireless transmissions, his goal being to develop a method of "general transmission of news of every description." Not only did he broadcast *signals,* he broadcast *voice and music.* However, the transmissions were over very short distances, and they apparently relied on induction rather than true "Hertzian waves."

Stubblefield demonstrated wireless again in 1898 to a distance of 500 yards. He devised a huge coil attached to an early telephone-like mouthpiece. By grounding his gear, he was able to communicate actual voice communications without wires.

Stubblefield also demonstrated a ship-to-shore broadcast on the Potomac River in Washington, D.C., in early 1902. Congress visited his 1902 demonstration. As a result, a bill was introduced to appropriate a large sum for development of his work (though the money apparently never was forthcoming). Ultimately, he received a patent for wireless telephone in 1908, although the issue ultimately wound up in court. Stubblefield lost.

The Kentuckian was very protective of his proprietary knowledge. He was so afraid that someone would steal his invention that he sheltered his "secret box" from everyone. He had been offered $500,000 for it, but turned it down because he felt it was worth much more. Following another demonstration in Washington in 1912, he became convinced that his invention was copied by others.

Nevertheless, Stubblefield's early demonstrations of a working wireless system occurred about a year before Tesla's lectures about radio. The question remains whether honors should go to Stubblefield.

The Kentucky farmer died of starvation, a penniless pauper in his home town, in 1928, after going into seclusion because of his failed attempts at acceptance. Today, a small roadside marker indicates his final resting place. The nearby Murray State University today houses Stubblefield's meager effects, and the museum has a model of his curious coil and phone apparatus.

Summary

This article profiled a number of important but mostly lesser-known visionaries and experimenters—unsung radio maestros—who either claim to have invented radio or contributed significantly to the development of radio communications. Relatively obscure but interesting and important personalities such as Alexanderson, Beverage, Collins, Gernsback, Fessenden, Jansky, Loomis, Maxim, Popov, Sarnoff, and Stubblefield were profiled. The contributions of each were indicated, as were significant and unusual aspects of their lives and times.

There are others we could mention besides those eleven—some even more obscure folks such as Amos E. Dolbear, David E. Hughes, Sir Oliver J. Lodge, J. W. Starr, Prof. Elihu Thomson, and a host of others whose names would be familiar to almost no one.

So when all is said and done, who *really* "invented" radio? The final answer may never be found. While we don't want to take credit away from luminaries such as Hertz, Marconi, Maxwell, Tesla, and the rest, our article simply made the point that many other people—often very obscure folks—had at least *something* to do with its invention and development, whether recognized or not. It may just have been that they were too far ahead of their time.

Looking for a good weekend project that will come in handy? Looking for an excuse to tour your local Home Depot and pick up a lot of great stuff? K8IHQ gives us the opportunity to do both, plus end up with a really neat dual-band antenna.

How To Build A 2 meter/70 cm Circular Quad

A Weekender's Plumber's Delight

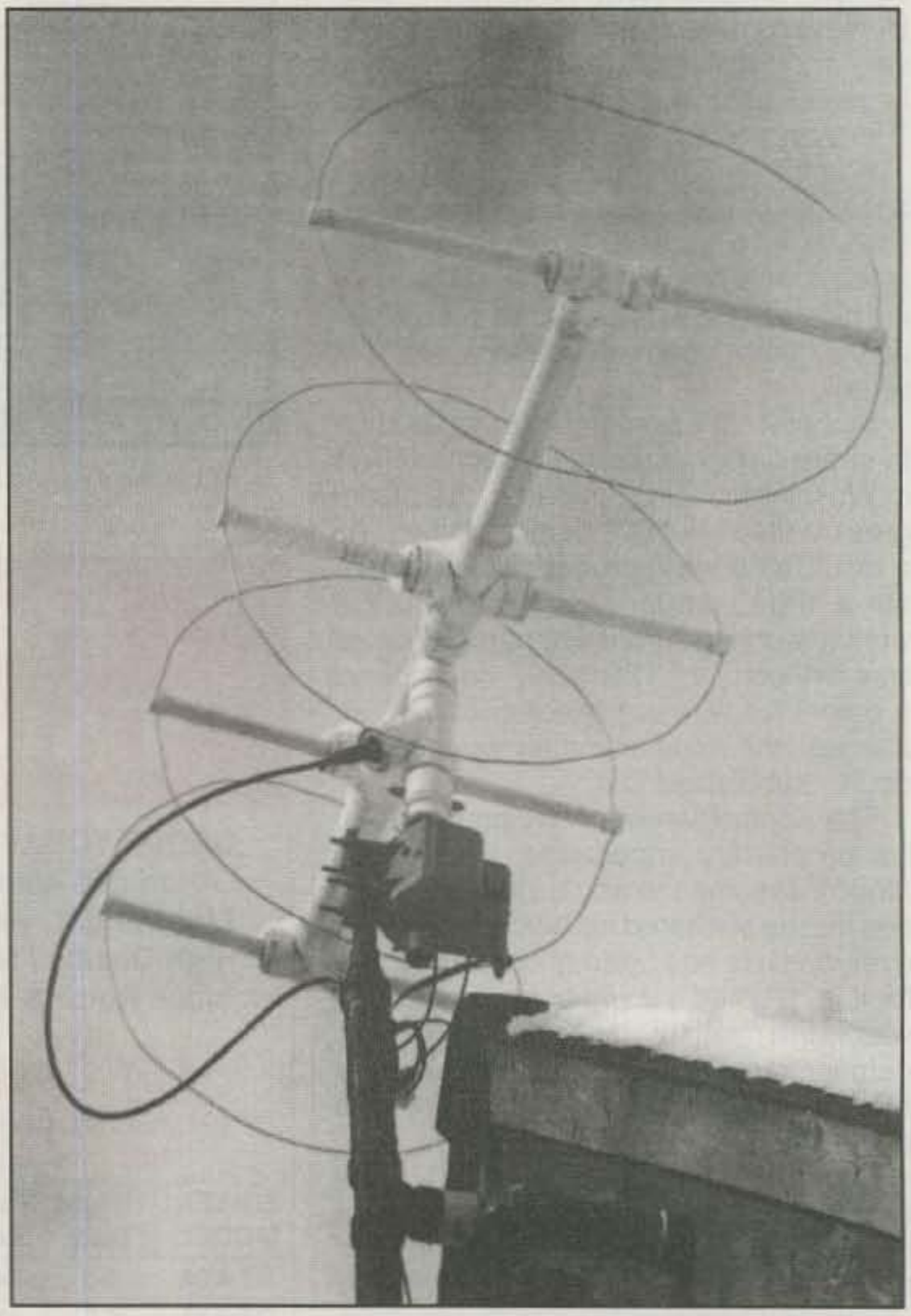
BY CARL MARKLE*, K8IHQ

With a little effort, this project can be fun and result in an antenna system for 145 MHz as well as 435 MHz without tricks, switches, or other bank-busting expenditures. Let's look at what can be done to solve the VHF/UHFwide-band, low-Q, short-boom, rugged, and low-cost system we might put together in a weekend or less.

Now, you may say, you do not have the expertise, sources, and general wherewithal to do something like this yourself. Well, contrary to your belief, almost anyone can accomplish this project regardless of age or lack of background. This antenna system is excellent for VHF/UHF DXing and without equal for FM repeaters within a 50 mile radius of a QTH if elevated about 25 feet in the air. My QTH is a cedar-log home with 25 foot above-ground gable ends, making it ideal for short-run coax length, and adequate height above ground. I use an old Alliance TV antenna rotor system, the mechanical type. However, any light-duty rotor will work fine. Your local RadioShack store still offers one at about $70.

Let's first look at the feed-line situation at your particular location. Since I use a Kenwood TS-780 2m/70cm transceiver with only 10 watts output on these two bands, it is especially important that I get the maximum power to the radiator—i.e., antenna system. Since I am using under 100 watts output, I have found that good RG6 satellite TV cable is excellent and inexpensive to purchase from your local electrical supply house at a price under 12 cents per foot. I chose to use PL259 and SO239 male/female coax connectors for this project, although type N military connectors could be used. By using a UG176 reducer for the PL259 male termination, a good weather-tight connection can be made without a problem. You must, however, grip down on the threaded end with a set of vice-grip pliers and drill out the hole dimension ever so slightly so as to accommodate coax cables such as RG8X and RG6. An alternative using type F connectors is outlined in fig. 3.

The length of coax at these frequencies is very important if adequate SWR control is expected from a no-tune solid-state transceiver. A 1.5:1 or less ratio is very important if adequate power is



The completed antenna is a mechanical marvel. Even with a bit of snow hanging on, you can visualize from this and the drawings how the antenna goes together.

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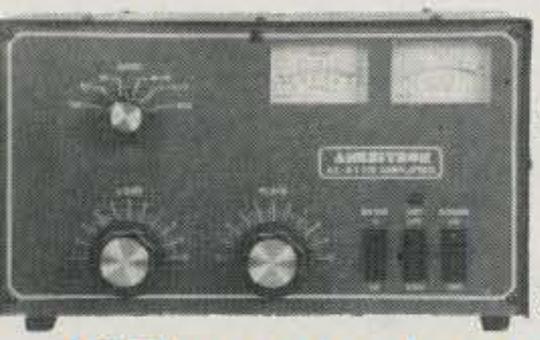


AL-811H
$795
Suggested Retail

AL-811
$649
Suggested Retail

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, poorly chosen 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.

AL-811 has three 811A tubes and gives 600 Watts output for only $649.

Kilowatt Amplifier

AL-80B
$1299
Suggested Retail

Full kilowatt PEP output from a whisper quiet compact desktop linear. Only 8½x14x15½ inches. Plugs into nearest 120 VAC outlet. All bands 160-15 Meters, 1000 Watts out on SSB, 850 watts out on CW, genuine Amperex 3-500ZG tube has graphite plate, nearly 70% efficiency, inrush current protection, multi-voltage transformer.

Near Legal Limit™ Amp

AL-572
$1395
Suggested Retail

New class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *65%* of price of full legal limit amps! Four rugged *Svetlana* Russian 572B tubes. Instant 3-second warm-up. Plugs into 120 VAC. Compact 8½Hx15½Dx14½W. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted Cross-Needle meters, multi-voltage transformer.

AMERITRON offers the best selection of legal limit amplifiers

AMERITRON's legal limit amplifiers use a super heavy duty Hypersil® power transformer capable of 2500 watts!

Ameritron's most powerful Linear

AL-1500
$2845
Suggested Retail

Ameritron's super powerful amplifier uses the herculean Eimac® 8877 ceramic tube. It's so powerful that 65 watts drive gives you the full legal output -- and it's just loafing because the power supply is capable of 2500 Watts PEP.

Ameritron's 3CX1200A7 linear Amp

AL-1200
$2295
Suggested Retail

Get ham radio's *toughest* tube with the Ameritron AL-1200 -- the Eimac 3CX1200A7. It has a 50 watt control grid dissipation. What makes the Ameritron AL-1200 stand out from other legal limit amplifiers? The answer: A super heavy duty power supply that loafs at full legal power -- it can deliver the power of more than 2500 watts PEP two tone output for a half hour.

Ameritron's dual 3-500 linear

AL-82
$2295
Suggested Retail

This linear gives you full legal output using a *pair* of 3-500s.

Most competing linears using 3-500s *can't* give you 1500 watts because their lightweight power supplies can't use these tubes to their full potential.

AMERITRON HF Linear Amps with Eimac™ 3CX800A7

AL-800H
$2395
Two tubes
1500 Watts plus

Suggested Retail

AL-800
$1695
Single tube
1250 Watts

AMERITRON's new 800/H amplifiers cover 160-15 Meters including WARC bands. The AL-800 has a single Eimac™ 3CX800A7 tube and produces 1250 Watts PEP. The AL-800H has two 3CX800A7s giving 1500 Watts plus.

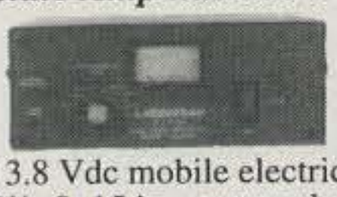
Both amps have an adjustable slug tuned input circuit, grid protection, ALC control that is front panel adjustable,vernier reduction drives, heavy duty 32 pound grain oriented silicone steel core transformers and high capacitance computer grade filter capacitors.

These amplifiers have multi-voltage operation (14 user selectable AC line voltage from 90-140; 200-250 VAC), quiet pressurized ventilation systems, dual illuminated Cross-Needle meters that read peak forward and reflected power, SWR, high voltage, grid current and plate current.

Vernier reduction drives make tuning adjustments smooth and easy. Ameritron's exclusive *Step-Start Inrush Protection*™ stops damage to your amplifier from inrush current. Ameritron amps feature an attractive Lexan front panel decal and superior, all metal construction -- it's built to last! Ultra compact desktop size is perfect for your operating station. 8½ x16½ x14¼".

AMERITRON no tune Solid State Amplifiers

Ameritron ALS-500M Mobile no tune Solid State Amp has 500W out, covers 1.5-22 MHz



ALS-500M
$799
Suggested Retail

Ideal Mobile amplifier -- uses 13.8 Vdc mobile electrical system, very compact 3½x9x15 in., extremely quiet, 500W output, 1.5-22 MHz coverage, instant bandswitching, no tuning, no warm up, no tubes, SWR protected.

Ameritron ALS-600 no tune Solid State base amp includes heavy duty power supply, 600 Watts out

ALS-600
$1299
Suggested Retail

No tuning, no fuss, no worries -- just turn it on and operate. *Includes* AC power supply, 600 W output, continuous 1.5-22 MHz coverage, instant bandswitching, *fully* SWR protected, extremely quiet, very compact. Amp is 6x9½x12 inches.

AMERITRON brings you the finest high power accessories!

RCS-8V Remote Coax Switch . . . $149

Replace 5 coax feedlines with a single coax. 1.2 SWR at 250 MHz. Useable to 450 MHz. 1kW at 50 MHz. **RCS-4, $139..** 4 position remote HF switch.

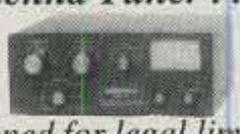
ADL-1500 Dummy Load with oil . . . $59.95

Oil cooled 50 ohm dummy load handles 1500 W for 5 minutes. SWR under 1.2 up to 30 MHz. Low SWR to 400 MHz.

ICP-120/240-$79

Stops power-up inrush current and absorbs momentary high voltage spikes to your amplifier. ICP-120 for 110-120V, ICP-240 for 220-240 V.

ATR-15 Legal Limit Antenna Tuner . . . $399



Designed for legal limit amplifiers! Covers 1.8-30 MHz, peak reading SWR/Wattmeter, 6 pos. antenna switch, 1:1 or 4:1 balun.

ARB-700/702 amp-to-radio interface . . 39.95

Protects your costly transceiver from damage by *keying line transients*, steady state current and excessive voltages.

QSK-5 Pin Diode T/R Switch . . . $349

Self-contained, connects externally to most HF amps. Handles 2.5 KW PEP, 2 KW CW. Six times faster than vacuum relay. 6x4x9½ in.

TP-100 Tuning Pulser lets you safely tune your amplifier . . . $49.95

Pulse tuning lets you *safely* tune up your amplifier for full power output and best linearity. Keeps average power to low safe level to prevent overheating, tube damage, power supply stress and premature component failure.

ADL-2500 2500 Watt fan cooled dry dummy load . . . $199.95

Whisper quiet fan. Handles any legal limit amplifier -- 2500 Watts average power for 1 minute on, ten off. 300 Watts continuous. SWR below 1.25 to 30 MHz and SWR below 1.4 to 60 MHz.

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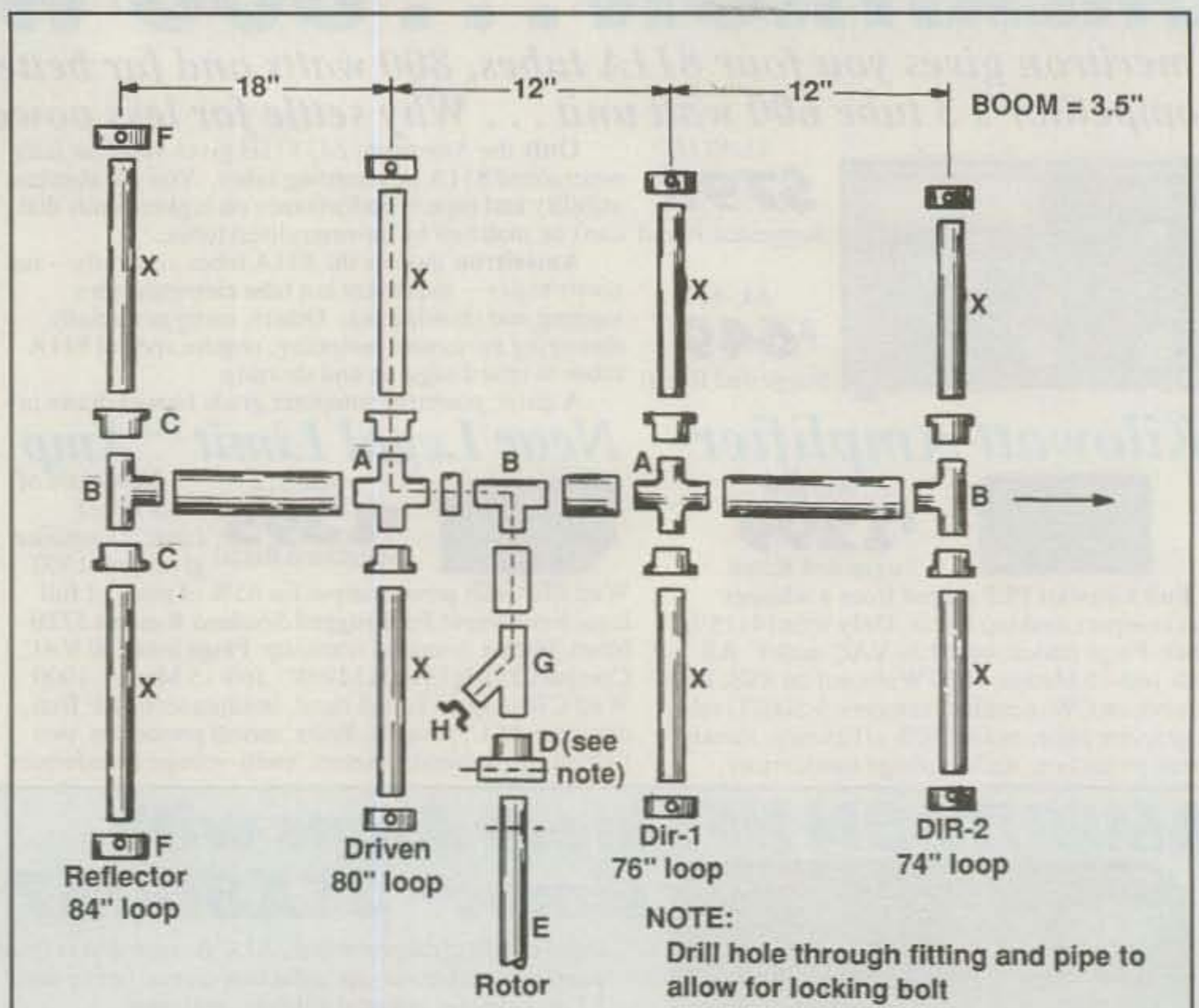

Bill of Materials

30 ft.	#14 AWG copper wire	$2.50
30 ft.	0.25 inch dia. milk white polyethylene	$2.50
10 ft.	1.5 inch dia. PVC-DWV pipe	$2.00
10 ft.	0.75 inch dia. PVC-DWV pipe	$2.00
A	(2) 1.5 × 1.5 inch PVC-DWV cross fittings	$4.00
B	(3) 1.5 × 1.5 inch PVC-DWV tee fittings	$1.50
C	(8) 1.5 × 0.75 inch reducer fittings	$4.00
D	(1) 1.5 inch PVC-DWV dishwasher coupling	$1.00
E	(1) 1 inch steel EMT electrical pipe (2 ft.)	$2.00
F	(8) 0.75 inch PVC cap fittings	$2.50
G	(1) 1.5 inch PVC-DWV "Y" fitting	$2.00
H	(1) 1.5 inch test plug	$.25
	(1) SO-239 (UHF) coax receptical	$1.00
Total		**less than $30.00**

Fig. 1– The overall mechanical assembly diagram for the dual-band circular quad. Dimensions shown as X are 3/4 inch PVC pipe, the length of which is determined by the loop diameter.

expected to reach the antenna system. The length of the coax must be determined as follows.

Use the formula as given:

$$L(\text{feet}) = 492/F\ (\text{MHz}) \times VF$$

Using this formula, you will be able to determine the correct electrical one-half wavelength long piece of cable. It will always be shorter than the free-air antenna element length. In the case of RG6 coax cable, the VF (velocity factor) is about 70%, so the one-half electrical length of coax at 145 MHz works out to be about 33 inches. Now that we know the length, we can use any odd multiple of that length for our transmission line—that is, one half, three halves, five halves, seven halves, etc. In my case, it worked out to be about 15 halves, or 40+ feet.

Now attach a PL259/UG176 connector to each end of the coax and check with an ohmmeter for continuity, center pin to center pin, and shield to shield. Then check from center pin to shield to ensure no shorting has taken place in the coax or connectors. Do not just assume everything is okay.

Next connect the coax between the transceiver and a 50 ohm dummy load to check the SWR. This match between the 50 ohm transceiver and 75 ohm coax and back again to a 50 ohm dummy load

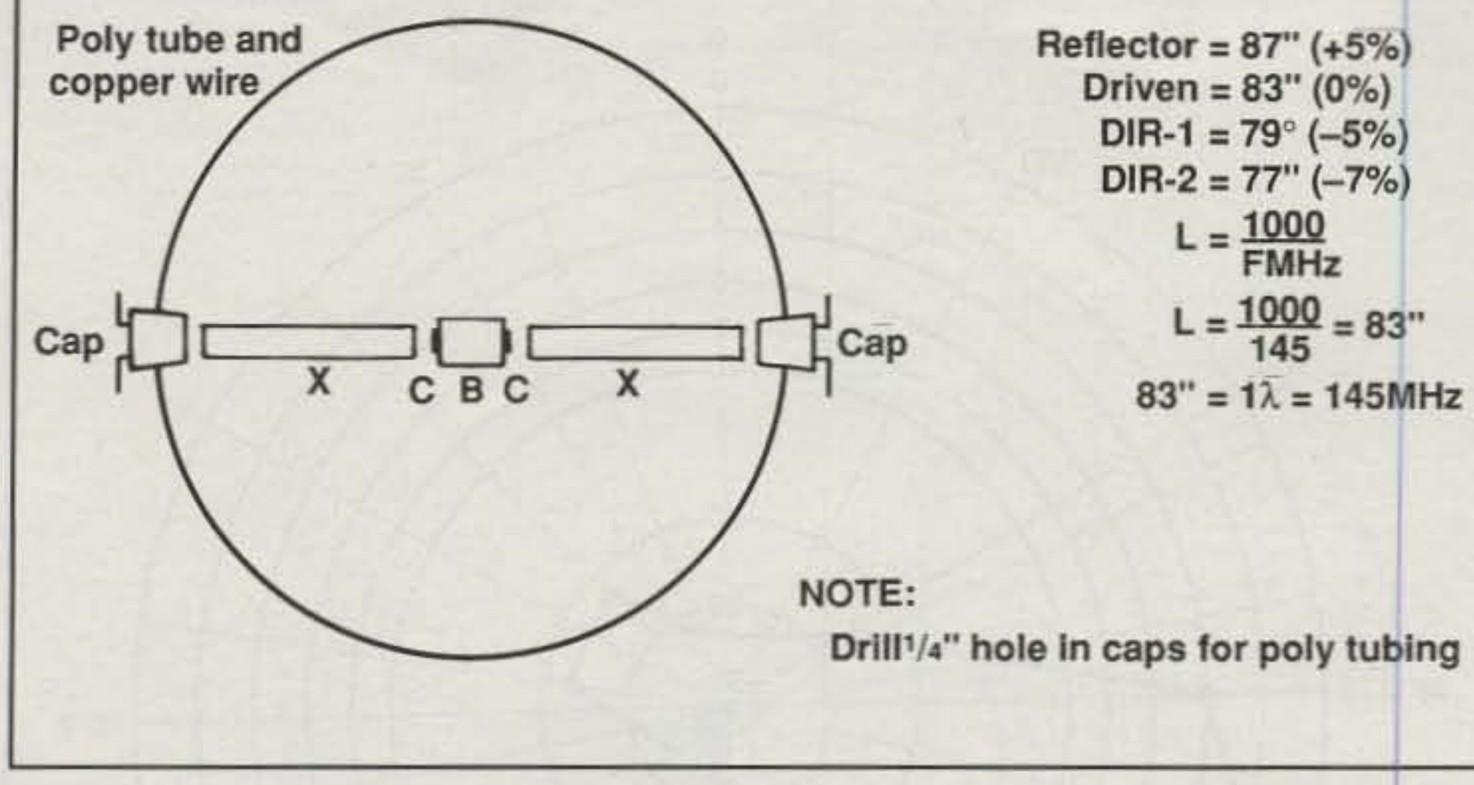

Fig. 2– Details of the loop construction.

should result in about a 1.5:1 SWR reading. This is adequate for the mismatch between 50 and 75 ohms. If you have a 75 ohm carbon resistor to use for a dummy load, use it for this check. Look at the power input and ensure it is below 10 watts. If you have a 2 meter SWR meter, the exact ratio will appear, as will the power level. Some folks do not have a 2m/70cm SWR meter. For the purists involved here, no attempt is being made to have exact matching. A note worthy of mention here is that if you choose to use 50 ohm cable versus the RG6, be aware of the loss of power at 435 MHz as well as the velocity factor involved.

Now quickly test the power output with the SWR/PWR meter between the transceiver and coax using a dummy load at the other end of the coax and record the power level. Place the SWR/PWR meter between the coax and dummy load and record the power. This will give you a true indication of power losses on the cable due to everything. Yes, it will reflect how efficient your transmission line is.

The next step is the installation of the 39 inch piece of RG59 used between the SO239 connector and the driven element. Run the cable through the PVC tubing when assembling the unit. Be sure to make a small loop of three or four turns at the element end, which will tend to act as an RF choke and tend to subdue RF radiation from the outer shield of the coax. I recommend the use of stainless steel screws in the mounting of the SO239 connector to the PVC test plug so as to resist rust. No sealant is to be used on the PVC system, since we want air to flow and condensation to drip out of the system. An air hole might be drilled on the lower lip of the test plug to allow any accumulated moisture to escape around the SO239 area. (See fig. 3.)

The theory of the system is that circular one wavelength elements provide more gain and lower noise figures than a Yagi one-half wavelength element would. It also provides for more overall gain with a shorter boom. And, the most important factor is the quad is low Q and therefore

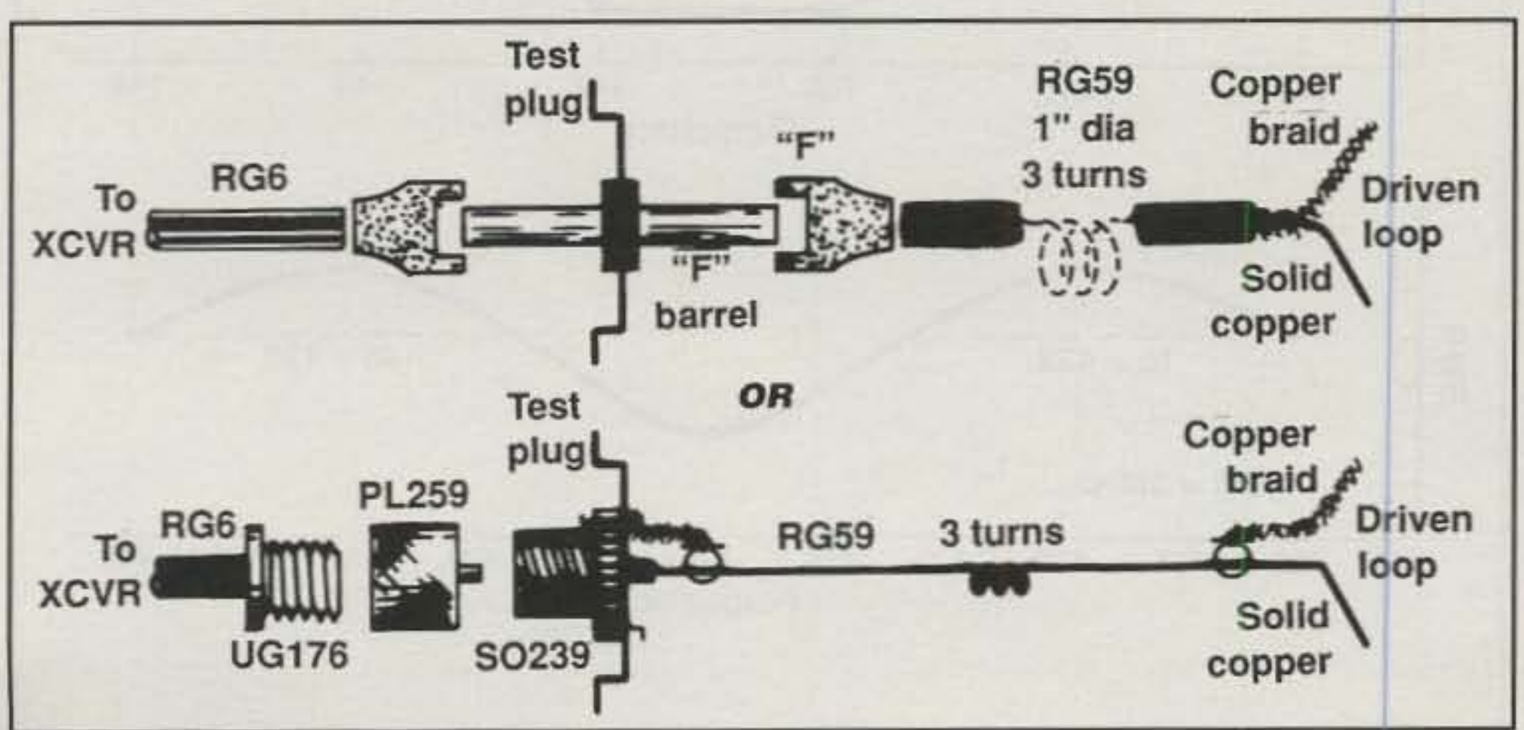

Fig. 3– Two methods for constructing the coaxial cable assembly.

inherently has a wider usable bandwidth and a lower noise figure than a Yagi. This is important when operating on the 2m/70 cm bands. The space between elements is optimized for the 2 meter band and works out to be a very nice wide-spaced ratio on the 70 cm band. The elements are one wavelength on 2 meters and three wavelengths on the 70 cm band. The three wavelength size gives additional gain on 70 cm, but no attention was given to this. Both of the bands receive a nominal 11 to 12 dBd gain figure. This is quite impressive for a 3.5 foot boom.

When assembling this system, make sure you dry fit the PVC fittings and test before final assembly. When positive results are achieved, mark each connection and one at a time pull apart, clean, and cement each connection. Marking these connections makes sure that proper assembly will take place. After the quarter inch holes have been drilled for the element, insert the milk-white poly tubing through the cap holes and position. Friction will hold the elements in their place. (You can also use clear silicon caulk on the outside of the tubing; this will ensure that the tubing will remain secure during bad weather and strong wind conditions.) Be sure that you feed the proper length of 14 AWG copper wire inside the tubebefore assembly. Do not solder the ends of the loop wires together. Leave the wire

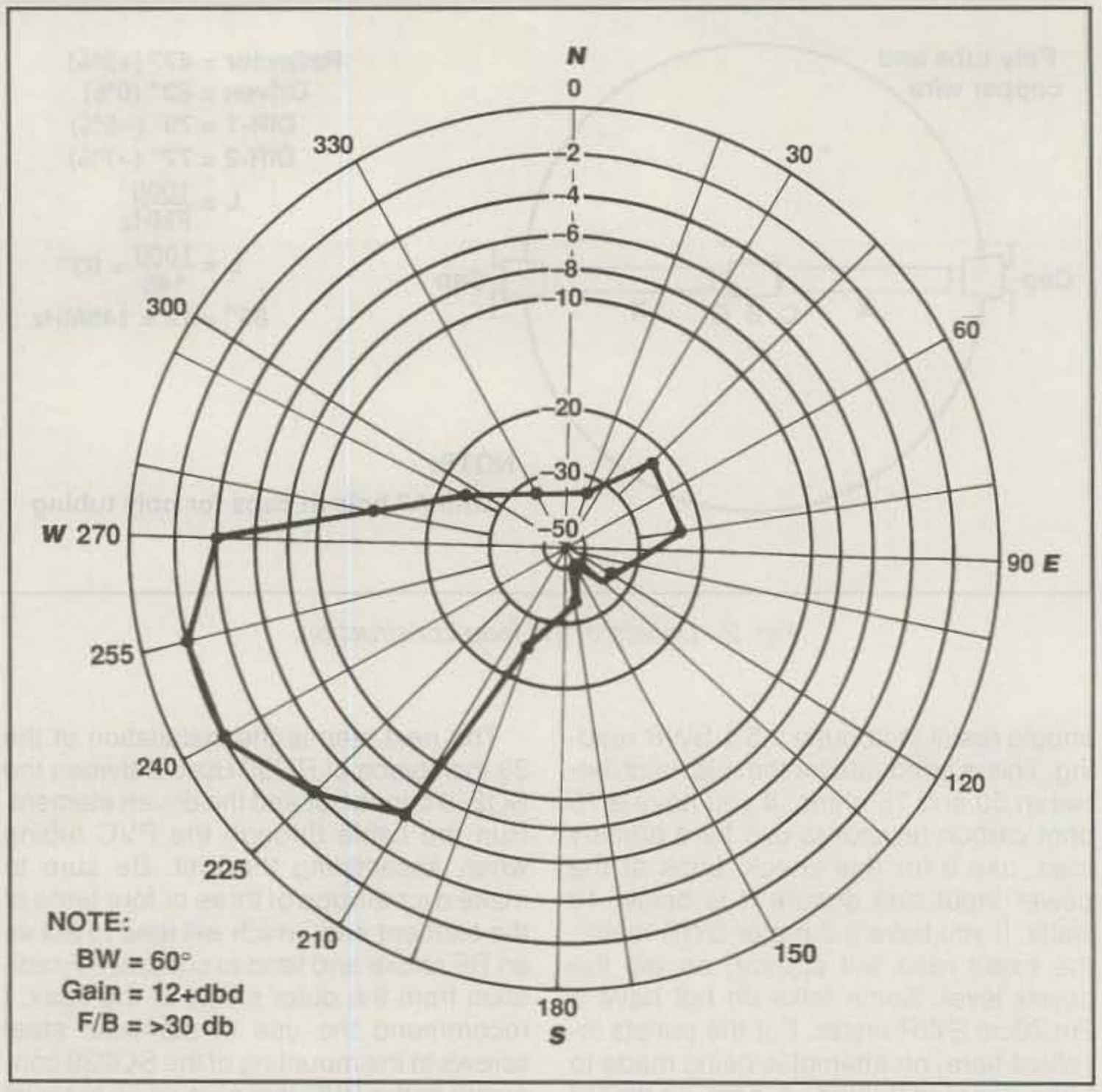

Fig. 4– The RF plot for the 4-element circular quad.

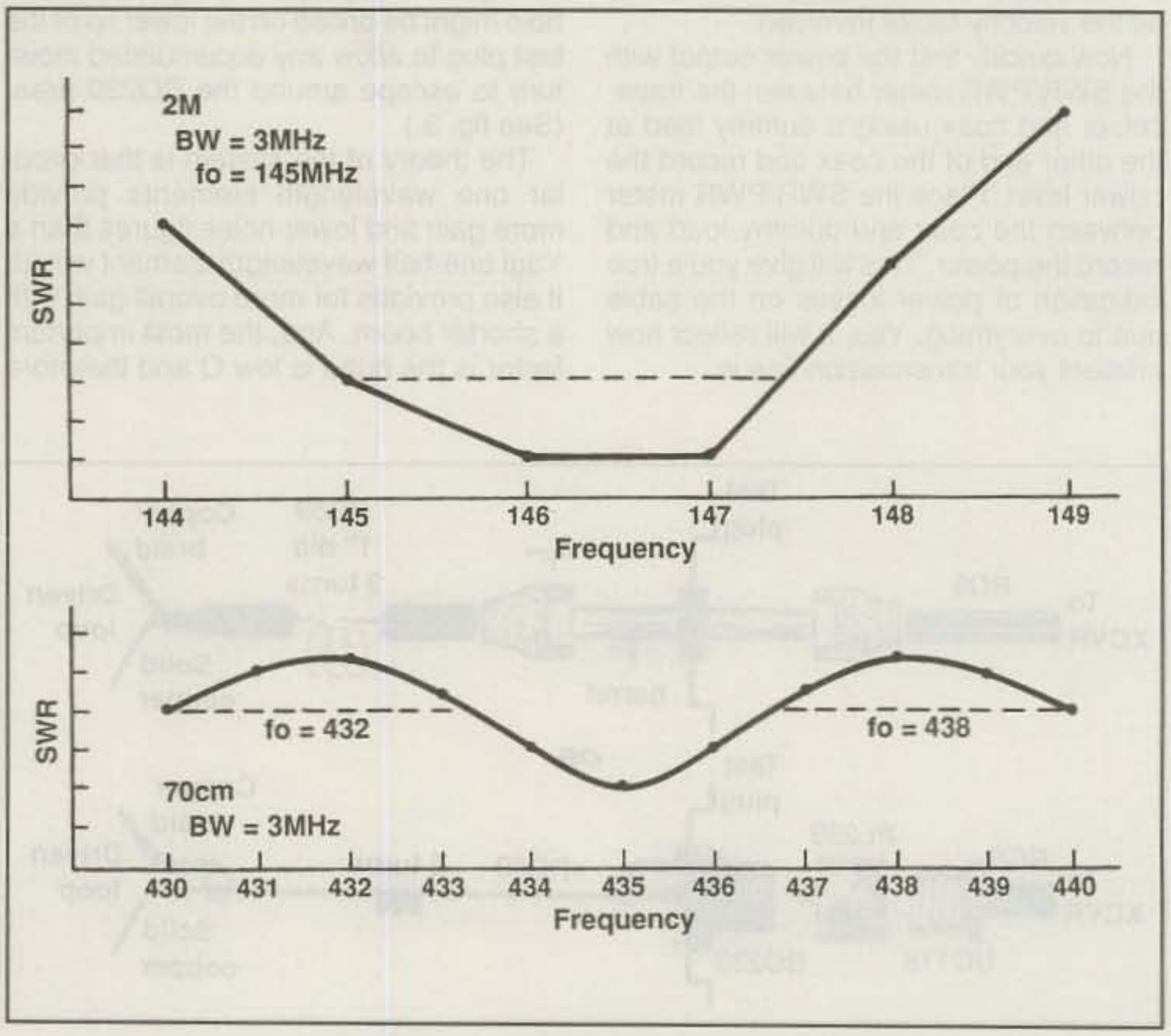

Fig. 5– The plot for SWR versus frequency showing the usable bandwidth.

ends protruding outside of the PVC caps. Bend the ends of the wire to secure. Solder the driven element to the coax directly. No matching or balancing is required, since it was found that any type of matching device resulted in high SWR or loss of received signal. Let's do what works! Attach the test plug into the Y PVC fitting using clear silicon caulk.

Element spacing is approximately 0.1 lambda between the driven element and the director elements at 145 MHz. The space is 0.15 lambda between the driven and reflector elements because it is where the best results were obtained and for no other reason. Again, no attempt was made to satisfy the critics or purists.

Refer to the fig. 1 assembly detail drawing to review the components and dimensions. Use good-quality components such as NIBCO® PVC and Oatley® primer and glue products. Do not paint these PVC parts; the sun's heat will destroy them due to thermal build up during the hot summer.

The proof of the pudding is in the test results. Once the one inch EMT electrical pipe has been installed and locked into position by a screw or bolt to the PVC antenna system and rotor system, the tests can begin. Pick a distant and relatively unused repeater on the 2 meter band or perhaps do your testing after midnight when the repeater is not being used. Rotate the antenna through the points of the compass every 10 degrees—that is to say, N, NE, E, SE, S and so forth. Record the transceiver S-meter strengths to determine the approximate front to back gains as well as front to side. The forward gain should be at least 11 dB, the front to back 30 dB, and the front to side over 40 dB. Ensure that this measurement is from a repeater located at least 30 miles away or more. Key it up and take a reading. Do not cause problems! If someone is using the repeater, that's even better. Just take readings at the compass points as mentioned above.

The dimensions for the copper wire elements are given in fig. 2. These lengths were used to optimize performance whether they meet a theoretical best length or not. Again, do what works!

The performance of the system at this QTH is given in fig. 4, the polar gain chart, and is the actual plot and signal strength given by the Kenwood TS-780 transceiver on its S-meter. SWR/PWR readings at this location are also given by the meter system on the TS-780 and are matched with a Heathkit HM-2102 SWR/PWR meter (2 meters) calibrated with a commercial-grade Bird® wattmeter and a dummy load.

All of the system components and their local prices are listed in the "Bill of Materials" list. The overall cost should not exceed $30—quite a bargain at today's inflated prices. Good luck, and good DX.■

MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Class D Audio Amplifiers

In the design of portable equipment it is always of prime importance to minimize current drain from the battery source. Battery life is paramount, and obviously the less current you draw, the longer you can operate. Solid-state circuitry is a far cry from the older vacuum-tube-based circuitry, but certain stages still take a toll on your power source regardless of what technology you use. One of the worst offenders is the audio output stage.

Those of you who experiment with audio power amplifiers are well aware of the fact that any linear (class A or class AB) amplifier stage always draws some current regardless of the level of audio delivered. Then, when actual audio is being amplified, current rises to fairly high levels during the time that the audio signal itself is present. This is most evident in an output stage where instantaneous peak power levels of an amp or more are possible even in low-power applications. All of this leads to power drains that can quickly shorten battery life. In an attempt to deal with this problem, portable equipment manufacturers are turning to an updated version of an almost 50-year-old technique—the switching, or class D, audio power amplifier. This type of circuit is capable of efficiencies of 90% or more, which can extend battery life by as much as 2.5 times compared to a standard linear circuit.

A class D amplifier in essence is a high-power pulse amplifier the pulse width of which is a function of the instantaneous peak voltage of the input signal. The amplitude of the pulse is either at Vcc or 0. There is no in-between linear region, so the output transistors are either fully conducting (saturated) or fully turned off. As a result, power dissipation is limited to the saturation voltage (usually less than 0.5 volts × the peak current) or, when turned off, zero. The reduced dissipation achieved by this technique also allows much smaller output transistors and more compact circuitry.

Fig. 1 is a simplified block diagram of such an amplifier. As you will note, audio is first amplified conventionally, as desired, by a simple gain stage which can have a balanced or unbalanced input. The output of this stage is then applied to one input of a voltage comparator. At the same time, a symmetrical triangular wave, at a

c/o CQ magazine

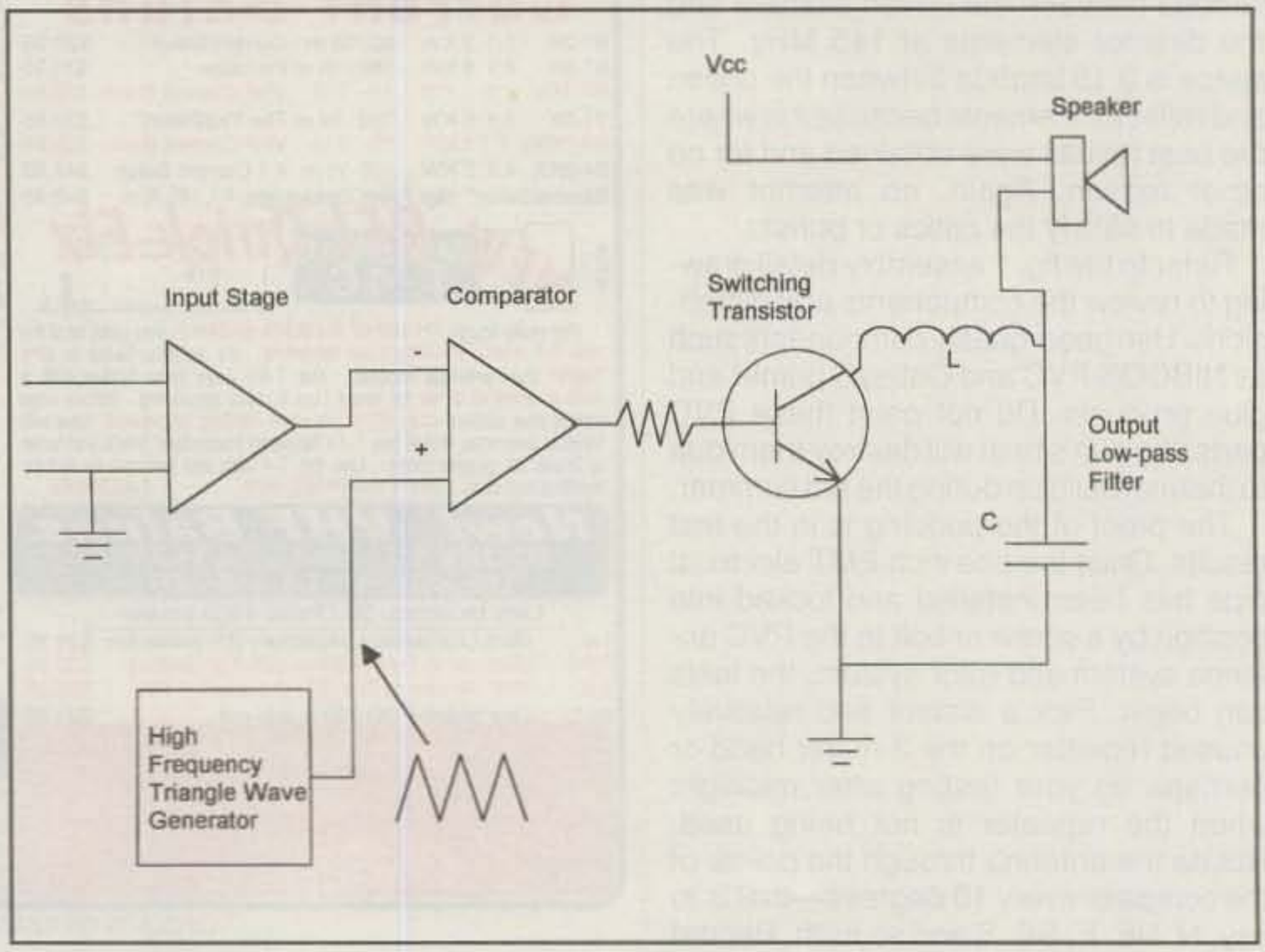

Fig. 1– Simplified block diagram of class D audio power amplifier.

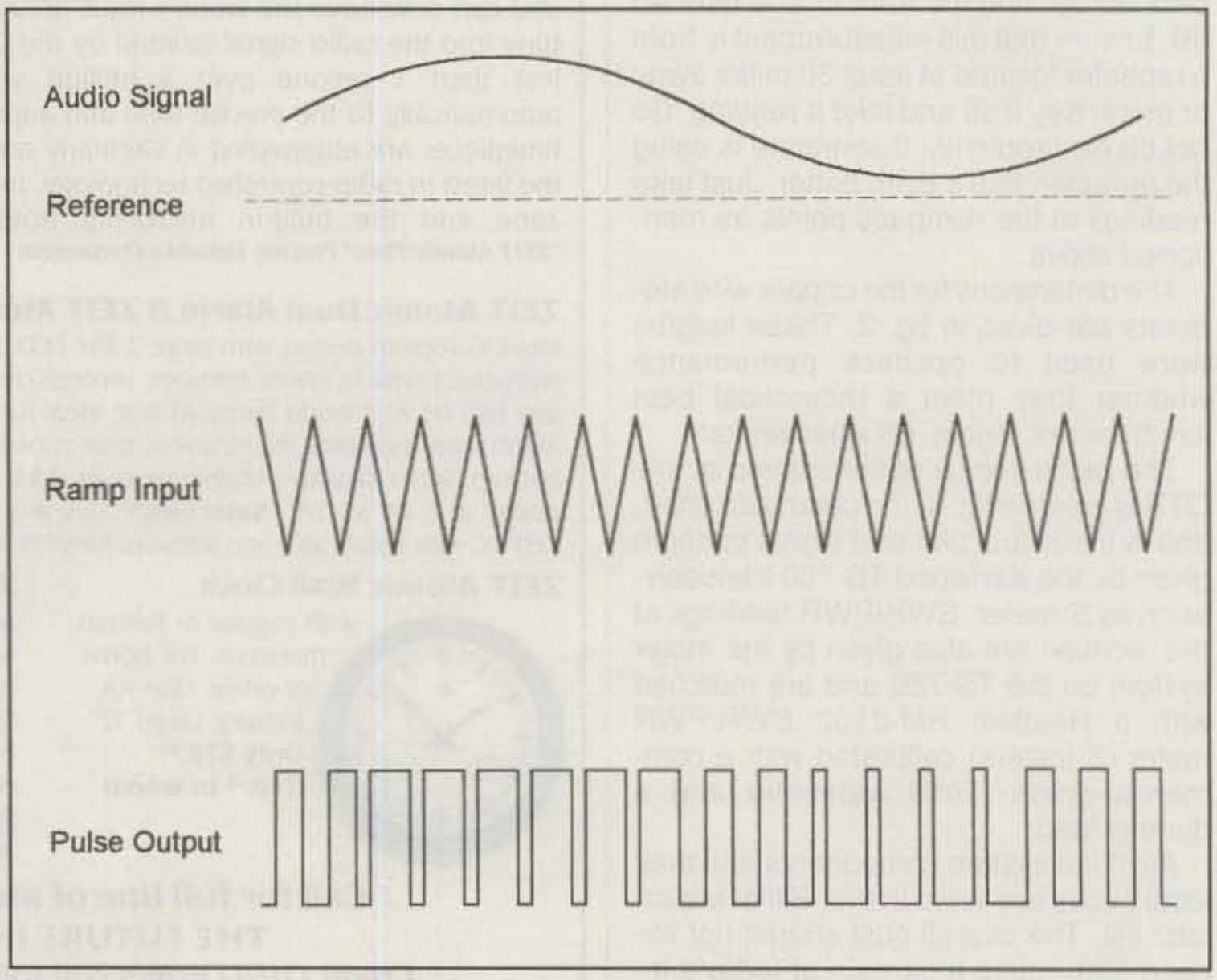

Fig. 2– Rough approximation of pulse width modulated signal.

frequency many times higher than the maximum frequency of the audio being amplified, is applied to the other input of the comparator. The result is a pulse-width modulated signal at the output of the comparator. The various (approximate) waveshapes for this operation are shown in fig. 2. Every time the instantaneous voltage of the triangular wave rises above the instantaneous voltage of the audio signal, the comparator turns on. When it drops below the audio level, the comparator turns off. The result is a pulse the width of which varies with the amplitude of the audio. As you will note from the diagram, the higher the audio voltage level, the wider the pulse.

When such a pulse is then applied to a power stage, shown as an NPN switching transistor in our block diagram, the transistor is forced into saturation every time the pulse is high. When the pulse drops to zero, the stage cuts off. A high-quality low-pass filter made up of several Ls and Cs filters out the high-frequency component to complete the circuit, and the result is an amplified version of the original signal. For such a circuit to operate properly, the "sampling" triangular wave must be very linear and accurate, the comparator must be also be accurate and fast, and the output power transistor (or power FET) must switch very rapidly. In addition, power supplies must be well regulated and the low-pass filter properly designed to eliminate any residual switching frequencies. As a point of reference, the typical switching frequency of such a circuit is between 350 kHz and 500 kHz for 20 kHz audio. Results in a properly designed circuit can be quite impressive. Distortion levels of less than 0.5% can be achieved, and one company (at least) advertises that a complete dual 10 watt rms stereo amplifier circuit can be built on a 1.5" × 1.25" PC board with no heat sink!

Specific details regarding the design of a class D amplifier are beyond the scope of this column. However, three companies offering class D products can be contacted on the Internet for further details:

Linfinity Microelectronics Inc. at <http://www.linfinity.com>

Apex Microtechnology at <http://www.apexmicrotech.com>

Texas Instruments Semiconductors at <http://www.ti.com>

All of these companies manufacture chips designed for class D operation and offer various application notes describing typical circuitry. No doubt many others also exist, but this list will at least get you started.

The next time you need a portable high-power audio amplifier, or at least to keep abreast of where technology is going, consider the class D approach. You may well be surprised.

73, Irwin, WA2NDM

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

The Delta for 9600 Baud

Once upon a time—and I mean a time long ago—we had something called CW. The fun of rising early in the morning, always before dawn, and firing up the old 6L6 (metal tube), the 807 rig, or the 304-TL was awe inspiring, to say the least. While the filaments of the tubes were going through their warm-up cycle, and mostly while the 866-A mercury vapor rectifiers were changing the mercury to a gaseous form, I would go milk the cows. Morning milking time was just enough time to do the feeding and milking and get back to the house with the bucket of fresh milk. While Mom was straining the milk and preparing breakfast, I would go to the rig and tune around the bands to find a CQ, or to make one of my own. In the late 1940s and early '50s there was always someone around to have a CW QSO with, and just enough time to make a good CW contact before I had to trek off to school at Hokes Bluff.

Notice that above I mentioned the 6L6 rig before I mentioned the 807 or the 304-TL. The reason for this order of tubes is mostly because it was the flow of power levels I went through as I progressed to more and more power. The 6L6 rig would provide somewhere between 15 and 25 watts of RF power. Later, as I was able to find a more suitable tube (the 807), I was able to apply more voltage and plate current and make upwards of 50 to 75 watts of RF.

The real challenge came when I would try to get through some very noisy conditions or QRM. This is when I really encountered problems. Sometimes I would hear a distant (DX) station and I'd try to get that state or country to add to my WAS (Worked All States) or WAC (Worked All Countries) collection, but alas, someone with a powerhouse would plant a "big foot" print on top of me and the DX contact became material for a dream.

That was until I got my first 304-TL. This was a new tube for me, but an old timer for many others. I built the 304-TL rig in stages. I used galvanized sheet metal for the foundation chassis of the final compartment. Did I ever have fun bonding the grounds to the sheet metal! I used one of the big "American Beauty" soldering irons to get enough "heat" to make the solder flow into a good electrical and mechanical connection. What? You don't know what

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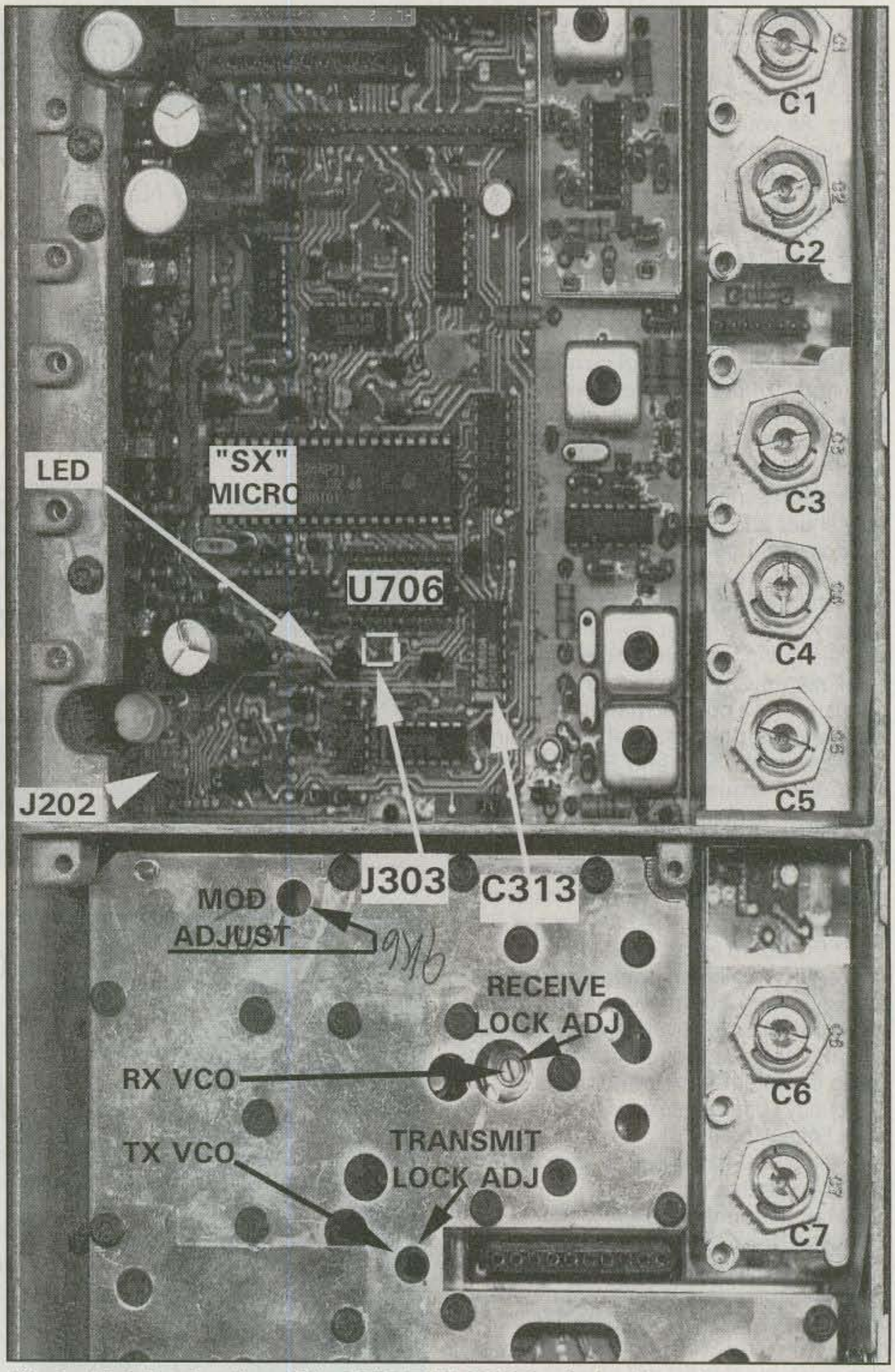

Fig. 1– Note the location of the 2212 EEPROM. Look closely at the top of the printed circuit board for a capacitor labeled C313. Lift one end or completely remove capacitor (6.8n) C313. Although there is a 9600 baud Data Input test point (J303), or staking pin located nearby C313, let's make all our input, output, and PTT connections at the bottom of the circuit board. Note also the location of J303. It is very close to C313, or just behind the EEPROM socket. J303 and J712 are located side by side. J303 is the pin nearest dual jumper pins J/P707 and nearest the edge of the PC board. These points should be clearly marked on top of the main PC board.

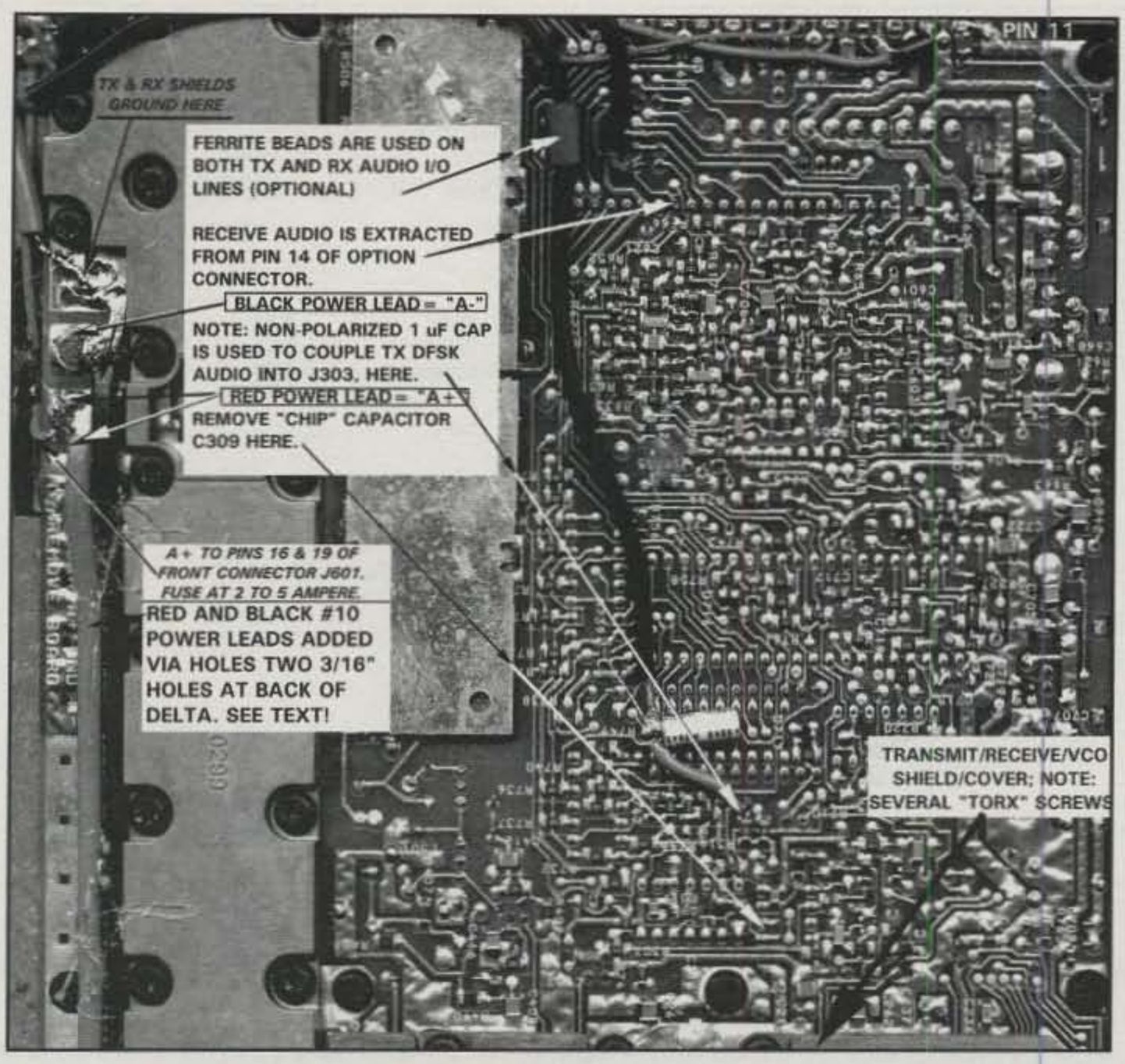

Fig. 2– In a few of the Deltas I've converted to 1200 and 9600 baud packet radio use, I came across a couple that would not VCO lock in transmit. If by chance you encounter this situation, then it will be necessary to turn the radio over. Remove all umpteen torx screws that hold the transmit/receive/VCO system board cover/shield in place. Locate the bottom end of L209 and install a tiny 10 pF cap across the coil from the high side to ground. Keep the leads as short as possible. If you can locate one, use a "chip" capacitor between 9 and 12 pF across L209.

an "American Beauty" soldering iron is? You know, it was one of the huge soldering irons with the 3/4 inch diameter, four-sided tapered tip that would make the lights in the house go dim when you plugged the beast into the AC wall outlet. No, you did *not* use an extension cord with this satanic wand!

A Pig on a Stick

The power transformer was the remnants of a *pole-pig* (utility pole transformer) that I bought from a local junk yard. The 2700-plus volts at, ummm, 1.5 amps, was more than enough for the DC required for the 304-TL.

Anyway, we finally completed the 304-TL rig, and I was never again at the bottom of the pile-up when it came to making a contact with a rare DX station. I recall how the 866-A gas-filled rectifiers would glow more blue as I keyed the 304-TL transmitter On and Off.

Other strange happenings also took place around the house. When Mom opened the oven door on the old wood stove, the oxide (rust) laden grates would somehow rattle in rhythm with my CW beat when I keyed the rig. Another tiny tid-bit of fun was the dimming of the house lights, and then my father shouting some strange language at me letting me know that he was up and about, and that it was time for me to get out of the house and on my way to school!

The Long and Short of It

The long and the short of it? Ever since that day I found that with enough power I could get from point "A" to station "B" without losing all the data in the CW contact. The link was assured, and that is why I'm continuing in the same direction that I eluded to in last month's column. There's "pow" power in the Delta!

Last month we described an easy way to customize (convert) the GE/Ericsson 110 watt Delta S/SX into a real kick-bootie packet radio power house. In one of the paragraphs of the June issue I mentioned that I would hold the information about converting the GE/Ericsson Delta into a 9600 baud powerhouse radio for a later issue. I understand that many readers took me at my word when I said, "that's fodder for another 'Packet User's Notebook' article." According to some reports and e-mails I'm receiving, many readers

took me at my word. I am now informed that "there will be a big rush to gather them [Deltas] up at Dayton" (this is being written in mid-April).

Just in case some readers didn't know or didn't read that paragraph, read on! The Delta was one of the first transceivers of its kind to implement 9600 baud digital "voice-guard." This feature alone makes it an easy candidate for use at 9600 baud.

A 9600 Baud Transceiver Powerhouse with a Punch

With the Delta S (narrow band) and with the SX micro installed, this radio will pull (tune) down to 145 MHz, and still huff and puff the full 110 (plus) watts RF power output. The modifications made to the Delta are similar to the mods we made last month for the 1200 baud version. With this in mind, it would be to your benefit to have both last month's *CQ* and this issue handy when you begin the conversion.

Although these modifications are similar, the I/O points are radically different. The good news is that where we usually have to add parts to make a mod to a transceiver for 9600 baud, this time we will "remove" a couple of parts. That's correct: You don't have to go search for and purchase specialized parts or filters for this modification. The Delta is a "natural" for 9600 baud operation.

Make sure the Delta is in good working condition (use the test cable/connector; see fig. 1 in the June issue) by testing it as described in last month's column. Then we can proceed.

Pluck out any channel guard (CG) PC board and dispose of it. The CG is located at the front of the Delta. On the right is a PC board with the solder traces exposed or facing up. Remove the four torx retaining screws, the CG PC board, and the "extender" PC board.

Next, using the drawing from last month, move the jumper (P609) at J609 to the left, or onto J608. The jumper then becomes P608. J608 is located directly below the Channel Guard™ PC board near the 10-pin inline receiver test socket, J602. All the jumpers and sockets should be clearly marked on top of the printed circuit board(s). If the radio was/is not equipped with Channel Guard, the jumper will already be in place on J608.

Program the 2212 EEPROM with your favorite 16 channels/frequencies you wish to use. If you plan to make it 9600 bauds only, then set channel one (1) as the priority frequency. Before removing the EEPROM from socket U706, observe the orientation of the IC 2212. Be sure the notch of the 2212 EEPROM is oriented correctly (the same) when you replace it into the socket at U706. After programming is complete, insert the EEPROM into the socket at U706.

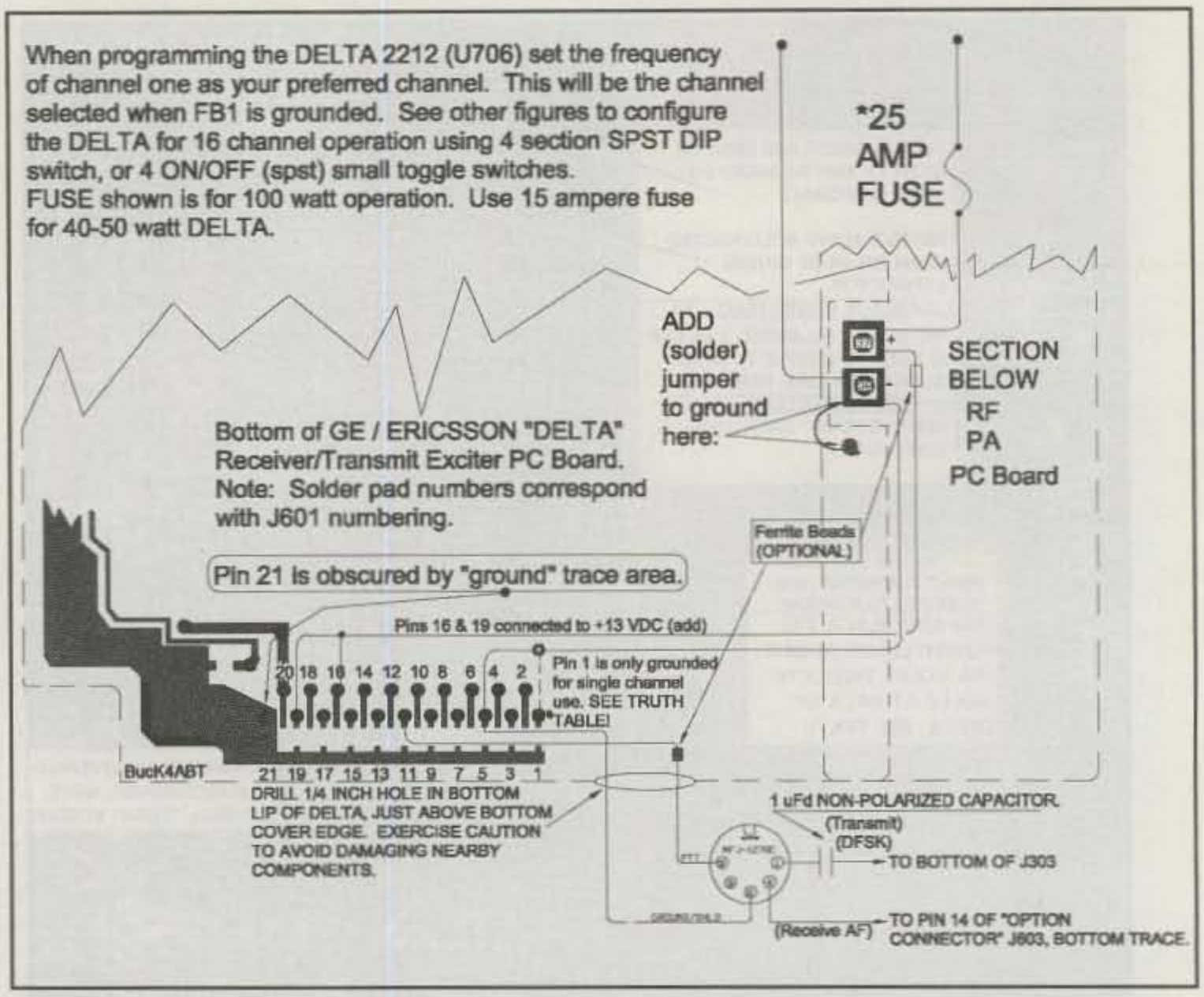

Fig. 3– Note in the drawing above we use a 1 µF "non-polarized" capacitor as the DFSK coupling into the modulated stage of the Delta. There's no need to use a larger value than 1 µFd, the reason being there is more than enough 9600 baud DFSK coming from every 9k6 baud TNC that I've used to drive the Delta to a full 3 kHz deviation—and then some!

Now it becomes necessary to tune the Delta as I described last month. Be sure the LED adjacent to J303 goes out in both transmit and receive. If the LED glows in either transmit or receive, this indicates that VCO "lock" has not happened. To lock the VCO in receive, it may be necessary to turn C220 in (CW) a few turns until it goes out.

If the LED is lit when the transmitter is keyed, then adjust L209 (CW) a few turns. In either case, be sure you have the DVM connected to test point J202 (see fig. 1). In both transmit and receive, the locked VCO voltage should be set between 2.7 and 5.5 volts. *Do not* allow the VCO locked voltage to exceed 6 volts.

Of the Deltas that I've converted for 1200 or 9600 baud packet radio use, I've come across a couple that would not VCO lock in transmit. If by some chance you encounter this situation, then it will be necessary to turn the radio over. Remove all umpteen torx screws that hold the transmit/receive/VCO system board cover/shield in place. Locate the bottom end of L209 and install a tiny 10 pF cap across the coil from the high side to ground. Keep the leads as short as possible. If you can locate one, use a "chip" capacitor between 9 and 12 pF across L209.

Inspect your work, especially where you did the soldering around L209. Ensure there are no shorts or unintended solder bridges across any traces. For the record, I test the radio before I replace the multitude of torx screws into the bottom shield for the transmit/receive/VCO system board, as this is where my Black & Decker electric screw-driver gets its workout.

Channel and Chop

No, we are not about to put "glass-packs" or lowering blocks on the Delta, but now that we have it "channeled," we're going to do a bit of chopping. Let's begin near the same place where we just installed the 2212 EEPROM. Look closely at the top of the printed circuit board for a capacitor labeled as C313. Lift one end or completely remove capacitor (6.8n) C313.

Although there is a 9600 baud Data Input test point (J303), or staking pin, located on top of the PC board, I made all my input, output, and PTT connections below (bottom) the circuit board. For the benefit of noting the location of J303, it is very close to C313, or just behind the EEPROM socket. J303 and J712 are located side by side. J303 is the pin nearest dual jumper pins J/P707 and nearest the edge of the PC board. Again, all these points should be clearly marked on top of the main PC board (see fig. 1).

While we are about the "chop'n" part of this exercise, let's go below (the PC board,

bottom) and remove another capacitor. This will be the second, final, or *last* component that we will remove from our Delta for the 9600 baud mod. Look at fig. 2 and locate the "chip" capacitor C309. This capacitor may have an identifier printed on the PC board identifying it as C309.

For this surgery, and if your eyes are as old as mine (over 60), have your magnifier in hand, and *carefully* remove C309. This chip capacitor is so small that it may stick to the tip of your soldering iron, and you may lose it in the maze of traces on the PC board. Once again, I emphasize: *Carefully remove C309!*

And While You Are in The Neighborhood . . .

While we are in the area where C309 was removed, identify the bottom of J303 that we mentioned earlier. This is the point into which we will feed the 9600 baud DFSK. If you are lucky enough to have an LBI-31505 (If you don't have the Delta manual, maybe you can copy a page or two from the manual at your local Ericsson dealer or service shop.), then locate the Transmit/Receive/Synthesizer drawing, sheet 5, Rev 1, or the page with the Audio Processor schematic, and note the "Data Input" point that is marked J303. The 9600 baud data is fed to pin 1 of the bi-directional switch U302A through a 10k resistor.

While you are in the neighborhood (on the drawing), you can also spot the two components we have removed: C309 and C313. C309 is marked "1n" and C313 is identified as a 6.8n capacitor. C313 is on top of the PC board, while C309 is the eye-strain, chip capacitor on the bottom (solder side) of the PC board. To make sure the feed point is isolated, or there is no DC connection, I use a 1 to 4 µF, non-polarized capacitor to couple the DFSK signal into the Delta. Ah, phooey . . . Let's keep the value at 1 µF, the reason being there is more than enough 9600 baud DFSK coming from every 9k6 baud TNC I've tried to drive the Delta to a full 3 kHz deviation.

I did say 3 kHz deviation—*no more, no less!* If you have to guess at it, then make it "less." The IFs of the receiving radio will handle 2.5 kHz swing at 9600 baud much easier than they will handle 3.5 kHz swing.

So far we have made the transmit data input and component mods. Now it's time to locate the point where we take the 9600 baud (receive) data out of the Delta. In fig. 3 I've drawn the area around the "option connector" J603. This is the connector from where the channel guard PC board was removed. Pin 14 of this connector is where we will extract the 9600 baud receive audio. Use fig. 1 to located the trace that leads to pin 14 of the "options connector" J603.

The Delta has ample 9600 baud audio to drive the receive portion of our 9600 baud TNC or node. With (almost) all the TNCs I've worked with (the MFJ-1270CQ Turbo, the Kantronics KPC-9612, and the PacComm NB-96), the results have been exceptional. I'm no longer beta-testing the PK-96, so I cannot offer any help to the PK-96 user.

Use fig. 3 to make the connections for the "Push-To-Talk" line. You will also use the same drawing to make the ground connections for pins 5 and 21 of J601. If you are using the GE (Ericsson) Delta as a single-channel node, you may also ground pin 1 of J601. For multi-channel use, you can leave pin 1 ungrounded and use the DIP switch arrangement of fig. 6 in last month's "Packet Users Notebook." This four-switch configuration will enable selection of the 16 channels you have programmed into the 2212 IC at U706.

The Proof is in The Final Tests

For more than 5 hours I ran "roll'n eighties" at 9600 baud without a glitch through the Delta and Phoenix radios. They were operating between my lab "test-bed" and one of the SEDAN node sites atop Smith Mountain, a distance of about 25 miles. My guess is that these two 9600 baud nodes would easily perform this well at twice the distance apart.

Yes, the Phoenix, next month—maybe. It too is a great performer when modified for 9600 baud. To date, these are the best-performing (amateur or commercial) radios I've modified for 9600 baud, and as you've already read in this column, I've converted and modified several for use at 9600 bps.

As I mentioned earlier, if you don't have a source for the Delta S with the wideband SX PROM, contact Bill Glahn, AD4YY, at New London Technology, 752 Alum Springs Road, Forest, VA 24551 (804-525-4171; fax 804-525-0078). Ask Bill about the Delta radio. He has a few!

My thanks to George Rose, W4GCE; Ben Jones, KB4MPX; Bill Glahn, AD4YY; and Pete Lascell, W4WWQ, for their contribution to this month's column. Until next month, HavFun Packeting!

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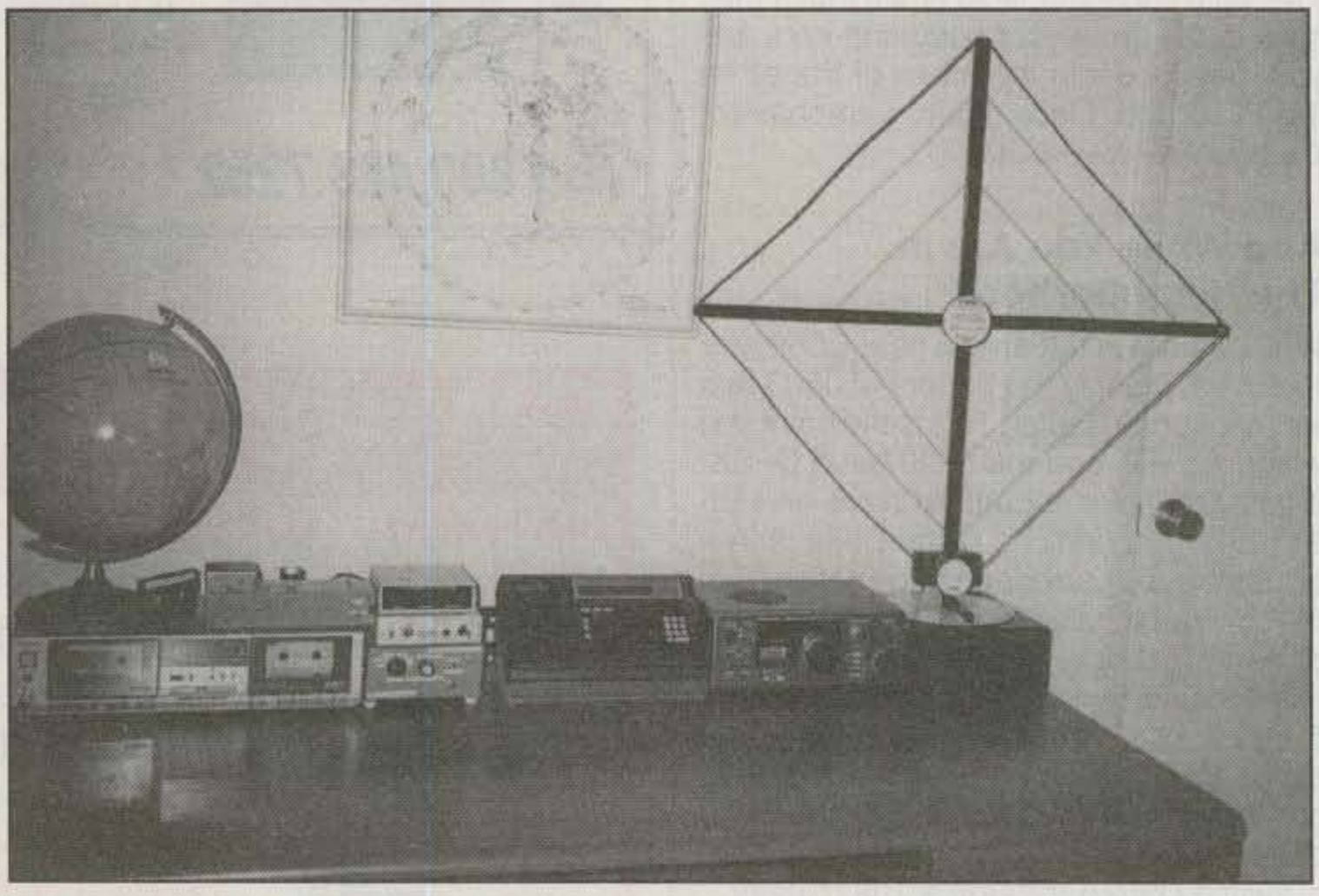
BY KARL T. THURBER, JR., W8FX

THE DIGITAL DIPOLE

FROM SOFTWARE THROUGH ANTENNAS FOR THE SHACK

July Junket '99

So, what's a junket? The word "junket" refers to a feast of merrymaking or a pleasure excursion, especially one that is undertaken at public expense. Well, this month's "Digital Dipole" column isn't at public expense, and it may not quite be a merrymaking feast. However, it should be a pleasurable excursion, as we examine the familiar antenna, software, and book staples of this column. Let's begin where we should, with antennas.



The RSM Model 108B Shortwave DX Loop Antenna is shown here in a typical indoor tabletop setting. The new receiving loop antenna is continuously tunable over 2.5 to 30 MHz and is designed to combat intermodulation (IM) distortion, overloading, images, and IF (intermediate frequency) feedthrough. The antenna includes a toroidal ferrite balun and is constructed of high-quality materials, using West System marine-quality epoxy. The antenna is finished with black marine polyurethane paint. See the text of this month's column for details. (Photo courtesy RSM Communications)

Antenna Notes

RSM Communications Model 108B Shortwave DX Loop Antenna. We have mentioned the activities of Ray and Marty Moore at RSM Communications several times previously, the firm being involved in producing authoritative, historical receiver and transmitter guides. To recall, Ray Moore, ex-K1DBR, is the author of *Communications Receivers, Fourth Edition.* It's an excellent guide to American communications receivers from the tube era, 1932–1981. The 136-page book covers all major manufacturers and some 750 receivers. It's $19.95 plus $3 s/h.

Ray also is the author of *Transmitters, Exciters, & Power Amplifiers.* This book covers 1930–1980, encompassing some 561 amateur HF-band, U.S.-made transmitters from 118 companies; there are some 470 photos showing most of the transmitting equipment described. There also is a short historical "transmitter development" section. The transmitter book is $21.95 plus $3 s/h.

Until recently we weren't aware of it, but Ray also has been designing loop antennas for his own use since 1946, and for commercial applications since 1993. He's now in the business of designing and selling high-performance receiving shortwave loop antennas for amateurs and serious DX listeners. These complement the previously available mediumwave and longwave loops.

The new, 23 inch square Model 108B Shortwave DX Loop Antenna (see photo) is intended for indoor use over the 2.5 to 30 MHz range. Most serious DX listeners are well aware of the benefits of receiving loop antennas, though many radio amateurs are not. It's often assumed by them that the benefits of the loop antenna can only be enjoyed up to about 5 MHz. However, loops can yield good performance to 30 MHz or more, especially when using an appropriate matching system and a low-impedance preamplifier.

You can use the loop passively, making it virtually immune to overload and intermodulation (IM) distortion. Or, you can use it as an active antenna system in conjunction with the new Model 301 Line Amplifier (you can switch the amp in or out).

The Model 108B is designed to pull in threshold-level signals under marginal conditions, while battling noise, interference, and overpowering unwanted signals—all of which can be difficult problems in dense urban settings. The unit's performance is attributed primarily to the high-Q selectivity the system adds ahead of the receiver, and because you can optimize both gain and matching over the entire frequency range. You can peak the antenna for gain and matching on any frequency between 2.5 and 30 MHz within 5 seconds. The switchable Model 301 preamp provides 30 dB gain, with a 50 ohm input and output impedance.

The Model 108B Shortwave DX Loop Antenna is $240 plus $15 s/h. Also available are accessories, including the Model 301 Line Amplifier ($99 plus $5 s/h), Model 201 Tripod ($75 plus $10 s/h), and several others. For more details, contact RSM Communications, P.O. Box 27, La Belle, FL 33975-0027 (941-675-2923).

ANTENEX® Catalog. ANTENEX® is a manufacturer of high-quality antennas and antenna systems, or "signal propagation systems," as they say. These primarily are rugged VHF and UHF models for business and commercial applications. Although most of their antennas are not designed specifically for amateur use, many of the antennas cover VHF/UHF amateur bands. Thus, they would be suitable for the discriminating user who is interested in premium-quality, rugged, highly survivable antennas.

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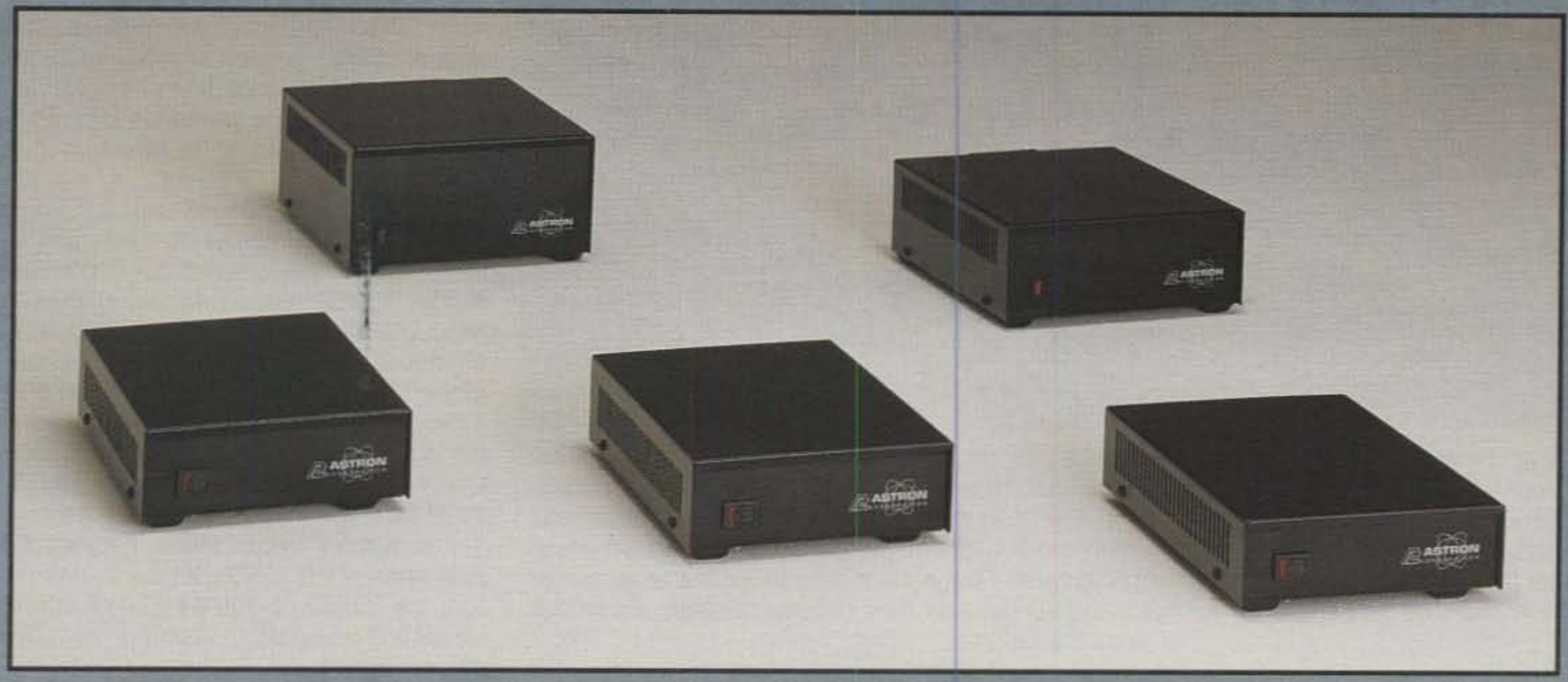

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SS-25	20	25	2 7/8 x 7 x 9 3/8	4.2
SS-30	25	30	3 3/4 x 7 x 9 5/8	5
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Fig. 1– World Watch, from Express Technologies Corporation, displays "real time" for locations throughout the world. You can customize the displays for your own location, time, and display needs, through the use of various maps, user defined cities, and map settings. An illuminated pattern in the center of the map delineates those areas of the world currently experiencing daylight. This pattern highlights the progress of the seasons and displays sunrises and sunsets as they happen. Details are in this month's column.

base; Yagi; dipole array; mobile; collinear; elevated feedpoint; wide- and dual-band; and other types of antennas. Various accessories also are offered, including "permanent hole," magnetic, trunk, and stud mounts; coaxial cable; coax connectors; and cellular products. Both user and dealer catalogs are available.

For more details, contact ANTENEX, 2000-205 Bloomingdale Road, Glendale Heights, IL 60139 (1-800-323-3757; e-mail: <sales@antenex.com>; Web: <http://www.antenex.com>).

C3I Antennas Price List. Several times previously we highlighted the amateur VHF and UHF antennas and accessories offered by Rutland Arrays. That firm was, of course, particularly well-known for the high-performance K1FO Yagis. Several years ago, the antennas offered by Rutland Arrays were "reintroduced" by C3I, of Warrenton, Virginia.

Presently, several VHF and UHF Yagis, stacking frames, power dividers, and antenna parts are offered by C3I's Sam Ruffin, KM4OI. A new pricelist outlines the products offered and also gives detailed electrical and mechanical specs for many of the firm's key antennas covering 50 to 1296 MHz. Data also are presented for several antennas scheduled to be available soon, including antennas for 902 and 1296 MHz.

For further information, contact C3I Antennas, 7197 North Starcrest, Warrenton, VA 20187 (1-800-445-7747; e-mail: <info@c3iusa.com>; Web: <http://www.c3iusa.com>).

Soft Stuff

The ARRL Handbook CD 3.0. For years we've always made sure that we had available at arm's length a copy of the most recent *ARRL Handbook for Radio Amateurs*—or at least, one no more than a year or so old. I'm a firm believer that *The ARRL Handbook* is a "must have" all-around electronic reference for just about every amateur's hamshack, whether he or she primarily is technically minded, an active operator, or a rank newcomer.

The familiar hardcopy *ARRL Handbook* still is available, of course, as it has been for over 75 years, and the ARRL has held the price line fairly well. The current, 76th edition is $32 plus $6 s/h. Its 30 chapters and nearly 1200 pages provide straightforward, comprehensive treatment of practically every mode and device amateurs put to practical use.

Now the online CD-ROM version is giving the hardcopy version a run for the money by those who like the many advantages of PC-based reference books. Previously, we noted the second (1998) V2.0 of *The ARRL Handbook CD* which sported a number of real enhancements that made it very easy to use. Now, the ARRL has issued *The 1999 ARRL Handbook CD* as V3.0.

The V3.0 CD-ROM continues adding significant improvements and enhancements. Key features of the new version include a very fast search engine to help you find information using key words or phrases, audio clips, tools to create book-

marks to return to often-used topics, zooming controls to see text and illustrations enlarged or reduced, and Windows® printing and Clipboard support. All project "template packages" are furnished on the CD-ROM. Companion utility software programs for filter design, transmission line analysis, and more are included.

The ARRL Handbook CD is $49.95 plus $7 s/h from The American Radio Relay League, 225 Main Street, Newington, CT 06111-1494 (1-888-277-5289; e-mail: <pubsales@arrl.org>; Web: <http://www.arrl.org/catalog>).

The ARRL Antenna Book CD 1.0. Besides the bedrock classic *ARRL Handbook,* which has excellent chapters devoted to antennas and related topics, there are about a dozen or so ARRL books oriented to antennas and transmission lines. The antenna centerpiece is, of course, *The ARRL Antenna Book,* an authoritative and practical source of information on modern antenna and transmission line theory and construction.

Last year, we profiled the newest edition off the press, the 18th Edition, edited by R. Dean Straw, N6BV. As we noted, the 728-page ($30 plus $5 s/h) book offers definitive coverage of antenna fundamentals, propagation, antenna system planning, transmission lines, Yagis, quads, low-frequency and multiband antennas, and much more. Also bundled with the book is a diskette with related software to support the text.

Now the ARRL has broken new ground with its introduction of *The ARRL Antenna Book CD 1.0.* The new CD-ROM contains the full text of the 18th Edition of *The ARRL Antenna Book,* as well as all of the drawings, tables, illustrations, and photographs that accompany the text. You can search, view, and print the text of the book, zoom in and out on the pages, and copy selected parts of pages to the Windows Clipboard. *The Antenna Book* companion software also is present on the CD-ROM.

Exclusive to the CD-ROM are over 70,000 pages of propagation tables, covering propagation from 144 locations around the world via the principal MF and HF bands. The new CD-ROM is $39.95 plus $6 s/h from the ARRL, contact information as provided above.

World Watch. The publisher's ads trumpet the jingle, "What in the world will they think of next?" Indeed, a very unique and impressive product I recently encountered was the World Watch™ Global Timepiece and Screen Saver for Windows®, a very practical software application for radio amateurs and SWLs.

The new product, from Express Technologies Corporation, displays "real time" for locations throughout the world. You can customize the displays for your own location, time, and display needs, through the use of various maps, user-defined cities, and map settings (fig. 1). An illuminated pattern in the center of the map delineates those areas of the world currently experiencing daylight. This pattern highlights the progress of the seasons and displays sunrises and sunsets as they happen.

Individual clocks digitally display and continually update local time for any location you select, and Daylight Savings Times adjust automatically. You have complete graphical control of World Watch for size and position of the window-defined display. A particularly nice bonus is that you can even use the World Watch application to create time-related screen savers for use in Microsoft® Windows® 95 and 98.

I was quite impressed with this on-screen clock application and utility, especially because of its amazing customizability and its many extra features. You can update the time online via an Internet or direct modem connection to atomic clock based accuracy, set up countdown clocks to various events, display an almost infinite variety of map types and styles, and even attach sound files to time events.

I'm even more impressed by the fact that V5.0 of the software, which I received for review, comes complete with a "real," well-written, 46-page hardcopy users manual—something of a rarity in today's software environment of README files, online help, or even no documentation. World Watch is $42.95 and, in my opinion, is well worth the price.

For more information, contact Express Technologies Corporation, 3753 Howard Hughes Parkway, Suite 200, Las Vegas, NV 89109 (1-800-654-9548; e-mail: <info@exptech.com>; on Web: <http://www.exptech.com>).

From the Bookshelf

Two New Computer Books from Macmillan. In several columns, we've noted the many excellent books Macmillan publishes that can help you become familiar with almost any aspect of PCs, software, and computing. Macmillan Publishing USA, with its large stable of trademarked imprints (Que, Sams Publishing, New Riders, etc.), still is introducing many Windows 98-related titles, some of which we already have mentioned in recent columns.

A very useful new release from Macmillan is *Windows 98 Hints & Hacks,* by Dean Andrews. The 399-page Que® book, priced at $19.99, is designed to instantly reward you through increased productivity and satisfaction with Windows 98. Designed for intermediate users, the book's four parts include tips you can use immediately to improve the Windows look and feel, productivity, system performance, and administration. I found that

each hint and hack provides real value, and is not just a list of obvious procedures. (Some of them involve making changes to the all-important Windows Registry. Be aware that you have to take great care in making changes directly to the Registry, an error in which can prevent your system from booting to Windows).

The same mail brought me Keith A. Powell's *The Waite Group's Windows 98 How-To*. This thick, 862-page book/CD-ROM combo is problem-solving based, being there to help you identify a problem, learn necessary techniques, and complete the steps needed to solve most any Windows 98 dilemma. It's designed to provide intermediate to advanced users practical workarounds and help trouble-shoot problems and enhance Windows performance. With the book is a CD-ROM that includes the Windows 98 Knowledge Base, a software vendors resource list, diagnostic software, a Windows glossary, and a considerable collection of Windows 98 shareware and freeware. The combo is $29.99.

The two books are available in local bookstores, or contact Macmillan Publishing USA, 201 West 103rd Street, Indianapolis, IN 46290-1097 (1-800-858-7674 for a free computer books catalog; e-mail: <info@mcp.com>; on Web: <http://www.mcp.com>).

Short Bursts

"Atomic" Clocks and the WWVB Upgrade. A recent home and hamshack trend lies in the direction of so-called "atomic" clocks. Despite the misnomer, I like them if for no other reason that they never have to be reset after suffering a local power failure. You know—no more wildly blinking displays in need of resetting when an afternoon thunderstorm causes a power outage!

Of course, the clocks, such as those offered by ZEIT Atomic Time, Oregon Scientific, and several others, are not really "atomic" in the strictest sense, but they indeed are unique and functional. You could call them "radio-controlled" or even smart "atomic-driven" clocks, because they're controlled by and synchronized with the National Institute of Standards and Technology (NIST) low-frequency standard time-and-frequency station WWVB in Ft. Collins, Colorado. This station's time is, in turn, derived from an assemblage of atomic clocks NIST uses.

The radio signal from WWVB is a 1 pulse-per-second binary-coded decimal (BCD) time code that's broadcast continuously on a 60 kHz carrier. The transmitted accuracy of WWVB normally is better than 1 part in 100 billion, and day-to-day deviations are less than 5 parts in 1000 billion, certainly "good enough for government work," as they say, and then some.

Largely because of the low frequency used, propagation effects are minor compared to those experienced with WWV and WWVH, so that the received accuracy of WWVB should be nearly as good as the transmitted accuracy. In fact, the BCD time code can be received and used with an accuracy of about 0.1 ms. The bottom line is that the clocks probably are the most accurate, reliable, and convenient timepieces you can buy for the hamshack.

Typically, the clocks feature fully-automatic, rapid synchronization, and time-setting via the 60 kHz radio signal from WWVB, using a built-in or outboard ferrite antenna. The clocks automatically compare the received time signal with the time actually shown by the clocks, and in case of a deviation they intelligently correct the time in accordance with the time signal they receive. Most such clocks have an alarm capability, and they also automatically adjust the setting from standard to Daylight Savings Time and back. Basically, all you need know to set the time is your local time zone.

The historical "fly in the ointment" has been a too-weak signal from WWVB in many parts of the country; a sufficiently strong signal is needed for the clocks to synchronize properly with the broadcast time signals. To remedy this problem, WWVB is going through a four-phase major upgrade to make its signal stronger across the USA.

According to Andrew Novick of NIST's Time and Frequency Division, in December 1997 WWVB was upgraded with a new transmitter and antenna system, raising power from 10 KW to 23 KW. Recently, another upgrade to 35–40 KW was completed that greatly increased the coverage area and received signal strength at most locations.More upgrades are in the works.

For detailed information on WWVB (as well as WWV and NIST) happenings, go to <http://boulder.nist.gov/timefreq>. A "virtual reality tour" of the WWV and WWVB facilities featuring various images, videos, and audio clips also is available at the Boulder site. Finally, you'll find technical details about the WWVB time code in the Low-Frequency Services—WWVB section of the online NIST Special Publication 432, NIST Time and Frequency Services. These details are on their Website at page <http://www.boulder.nist.gov/timefreq/pubs/sp432/sp432.htm>.

Wrap-Up

That's all for this time, gang. Next time, more "Digital Dipole" topics of current interest. See you then.

Overheard: You soon find out that your true friends are those rare people who ask how you are and then actually wait to hear your answer.

73, Karl, W8FX

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G500A ROTOR.....249.95m
MD100A8X MIC.....119.95m
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SP7 SPKR.....34.95f
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VXF1 FRS HT 89.95mw
VXF10 FSR HT 104.95mw
VXR5000VADC 2MR RPTR...1,099^{95}f
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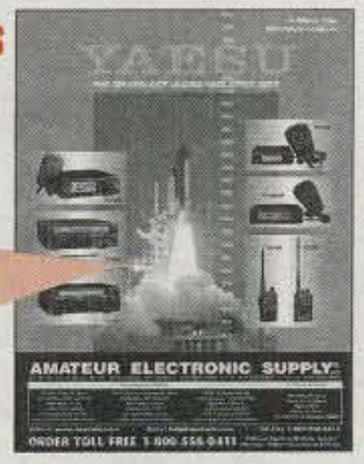

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BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

Tornadoes Strike Kansas, Oklahoma, Tennessee; Amateurs Aid

Approximately 15 tornadoes struck areas of Kansas on the evening of Monday, May 3, 1999. Most seriously affected were the areas of Hayesville and Wichita, where approximately ten deaths were reported.

Once again disaster struck Oklahoma City and once again amateur radio played a significant role in recovery. A little over four years after the Murrah Federal Building Bombing, Oklahoma Citians again felt the trauma of a disaster, this time a natural disaster. During the same evening as the Kansas tornadoes were active, a series of tornadoes tore throughout the state of Oklahoma. In all, approximately 45 tornadoes were spotted in Oklahoma during Monday afternoon and evening.

The most destructive tornado struck areas of south Oklahoma City, Moore, and Del City, destroying over 3000 homes and businesses in its path. At its peak, which occurred over Del City, the tornado packed winds estimated to be 318 mph, the highest speed ever recorded for a tornado in North America. This speed is the top speed of the Fujita scale, which was developed by University of Chicago professor Theodore Fujita in 1971 as a way of rating intensities of tornadoes. The scale rates tornadoes from F-0 to F-5, with the latter being categorized as having winds between 260 and 318 mph.

Prior to the touchdown of the tornadoes, amateur radio operators had been active in SKYWARN nets in both states, chasing the various tornadoes. Thanks to spotters from amateur radio and the local media, residents in some of the affected areas had upwards of a half hour's warning before the tornadoes struck.

Within Oklahoma City, after the local weather net was secured, Frank McCollom, N5FM, activated the Oklahoma City Salvation Army Team Emergency Radio Net (SATERN) on one of the local repeaters. At about the same time amateurs working out of the Oklahoma City Red Cross building activated their net to assist its operations. The immediate need was providing communications for those who were aiding victims of the tornado. As was the case in the Oklahoma City bombing, cellular telephone use became extremely restricted because of overuse. It fell on amateur radio to provide reliable communications in the vicinity of the disaster.

P.O. Box 73, Oklahoma City, OK 73101
(phone 405-528-6625; fax 405-528-0746)
e-mail: <n6cl@fuller.edu>

VHF Plus Calendar

July 4	Moderate EME condition
July 6	Last quarter Moon
July 10	Moon perigee
July 10-11	CQ WW VHF Contest (See June issue for details)
July 11	Moderate EME conditions
July 12	New Moon, highest declination
July 18	Moderate EME conditions
July 20	First quarter Moon
July 22	Moon apogee
July 23-25	Central States VHF Society Conference (See text for details)
July 25	Very poor EME conditions
July 26	Lowest Moon declination
July 28	Full Moon
July 29	*d-Aquarids* meteor shower predicted peak

**EME conditions courtesy W5LUU*

It was through such extensive reporting that lives were saved. While there were fatalities, most were attributed to people who were unable to get out of harm's way because of the enormity of the tornadoes.

Because of the extensive area affected, local emergency response was initially outstripped. Furthermore, because of the horrendous damage, access to the affected area was extremely restricted. The tornado's path cut across three of the city's major freeways, causing damage on them in its path. Because of the lack of emergency vehicles in the area, initial response was via private citizens carrying victims to local hospitals in their own vehicles, often in the beds of pickups on makeshift gurneys. It would be several hours after the tornado struck before the neighborhoods affected were secured by local law enforcement.

As triage centers began to be established around the perimeters of the disaster, victims were dropped off there. Depending on the severity of their injuries, they were treated at the triage location and sent away or transported to an area hospital. In all, in excess of 500 victims were treated at local hospitals, with a little under ten percent of them being admitted. As of this writing, 41 are known dead and 13 are still missing within Oklahoma.

In the aftermath, amateurs working with the Salvation Army provided communications for its personnel who were setting up canteens near the affected areas. Additionally, amateurs working with the Red Cross provided communications for its teams who were doing damage assessment within the affected areas. Furthermore, amateurs working on HF handled health and welfare traffic entering the affected areas.

There were many lessons learned in the aftermath of the bombing. Several of them were communications-related. The local phone companies learned how to respond to the intense demand for cellular telephone communications. One response to the tornado disaster was to set up miniature repeater sites within the affected areas so that persons using cell phones had access to them. As a result of having this cell phone access, amateur radio operators were not needed to provide communications for most of the Army's canteens. Therefore, even though there were nearly 30 canteens located throughout the areas, most of them were being serviced by cell phones. Even so, during the early recovery stage amateurs were still needed by both the Army and the Red Cross for logistical purposes.

Frank reported that he had many volunteer offers from out of the area. However, he reluctantly had to turn them down because there were not funds available to reimburse these amateurs for their expenses getting to the affected areas. Frank also reported offers of equipment but also declined them for a variety of reasons.

The aftermath of the tornadoes did reveal to the local amateurs some of their needs in order to respond better to such disasters. Most notably was the repeater situation. While Frank received offers for miniature repeaters, he declined them for two reasons. First, he determined that because of the widespread area of the disaster, these repeaters would not be effective for the overall area that needed to be covered. Second, he had no guarantee that the repeater pair authorized by the state's coordinating body for low-power repeaters would be available to him for the temporary use that he needed.

The repeater shortcoming revealed itself early on. Because a local repeater was experiencing input problems, the Salvation Army relied upon a backup repeater that was located in Edmond, a city north of Oklahoma City. Its coverage has been traditionally spotty in the south area of Oklahoma City. Because of this, amateurs working within the affected area often found that handhelds would not

make connection with the Edmond repeater, thereby limiting their usefulness. Instead, amateurs had to use their mobile radios, which kept them inside their cars, which, in turn, sometimes restricted their access to the affected areas.

In the aftermath of the tornado, the ARRL Public Information Officer for Oklahoma, Tom Webb, WA9AFM, reported the following: "Things were resolved very quickly—less than 24 hours. A goodly number of folks in the strike area had good warning and simply left the area and stayed with friends/family. There is some health/welfare traffic, but that dropped off dramatically. Again, things were resolved quickly; the shelters had adequate communications and the entry points, command posts, and triage areas were well equipped. Had some of the shelter areas been hit, it might have been a different story. I think folks learned from the bombing to stay off their cell phones unless necessary. As you would expect, Okies are rallying to the call; supplies and support are pouring in.

"At last estimate; about 3000 homes were destroyed. The insurance industry PIO types guess about 26,000 home damage claims will be filed, about 12,000 auto claims, and around 6000 miscellaneous claims."

Oklahoma City Area Hams' Homes Destroyed, Damaged

Among the amateurs who suffered property loss were two of the better known locals. Mac, K2GKK, and Judy, KA5BJS, MacDonald and Hal, KB1ZQ, and Linda, N1LPN, Miller. Mac and Judy's home was destroyed, and Hal and Linda suffered window damage and loss of their tower.

Mac, who was awarded the 1995 ARRL Oklahoma Section Ham of the Year Award for his outstanding contribution to the disaster work during the aftermath of the bombing, with Judy rode out the storm under a ladder and mattress inside their laundry room. He reported that for the nearly three minutes he was in the storm, it sounded like a B-52 at full-throttle. I asked him if the time it took for the storm to pass was because it stalled, and he replied that it was because the storm was that immense.

Mac stated that while he lost everything (his house, both cars, his trailer, and motorcycle were all damaged to a point of being totaled), he and Judy were fortunate to be alive. He reported that his tower was snapped off about two thirds of the way up and that his beams were in a neighbor's yard. He said that inside his house his amateur radio and stereo equipment seemed to be intact, but he did not know if they still worked.

Mac indicated that the outpouring of support was overwhelming. He said that even though he was "houseless" he was not homeless. He and Judy were invited to stay with Brad, KJØW, and Rosemary, KC5TVS, Nelson, an offer they accepted.

Hal and Linda also escaped serious injury from the tornado, although several windows were blown out of their home and their tower resembled a pretzel after the tornado had passed.

Tennessee Twisters!

The following is courtesy the "ARRL Letter": "With January's unusual tornadoes still fresh in their minds, amateur radio operators in Tennessee were ready to respond promptly when severe weather hit the Volunteer State May 5. At least four people died and several dozen were injured as a result of the storms. High winds blew down trees and power lines, tore roofs from buildings, and left rubble strewn about. Power was expected to be restored by May 7. Schools in metropolitan Nashville were closed May 6 because of the power outages.

"A SKYWARN net was activated to provide weather information to the National Weather Service office in Nashville. Funnel clouds were reported in eight Tennessee counties as two waves of storm activity traversed middle Tennessee. Amateur radio reports indicate a tornado may have

touched down in Gallatin, damaging an apartment complex and an office building; another reportedly touched down in Stewart County.

"The Nashville International Airport was closed for a time as the storms passed through. Some 100 aircraft were reported to have been damaged.

"Hams in unaffected counties activated emergency nets just in case. Hams in Montgomery County were asked to have mobile units ready to go to specific areas to check on flooding. In addition, the Red Cross asked hams there to stand by to assist. One operator was deployed to the local emergency operations center and another to the Red Cross. Hank Koebler, N3ORX, in Montgomery County, reports that 49 hams in all participated in the storm response to assist emergency management and the Red Cross."

How Can You help?

No doubt, some of you may be inclined to help in the aftermath of this disaster. For Oklahoma, the state has set up a toll-free number, 800-996-OKLA (6552).

Because the cleanup and rebuilding will take upwards of two years for some, you may be interested in going to Oklahoma or Kansas to assist in that process. If so, you can contact the United Methodist Committee on Relief (UMCOR), which will be coordinating its efforts through the Oklahoma United Methodist Church's Volunteers in Mission. Their toll-free number is 800-231-4166. You can also reach them via e-mail at <ira@okumc.org>. Teams of volunteers who will be working in communities for cleanup will be coordinated out of this office.

For Kansas, much of the cleanup will be coordinated through the Mennonite Church's Disaster Services. You can reach them by telephone at 316-662-1584 or e-mail at <Vernm@southwind.net>.

Information on cleanup in Tennessee was not known as of the deadline of this article.

What is SKYWARN?

As mentioned above, amateur spotters participated in tracking the tornadoes that roared across Kansas and Oklahoma. Perhaps the term SKYWARN is new to some who read this column. The SKYWARN program is a loose-knit organization that consists of over 180 groups around the country who assist the National Weather Service in spotting severe weather of any type. For the Arkansas, Kansas, and Texas areas, this type of severe weather usually takes the form of tornadoes or heavy thunderstorms, although in Texas, on occasion this has included hurricanes.

To become a storm spotter, you must attend a training session offered by the local SKYWARN organization. To find out more about your local organization, you can look up SKYWARN on its URL, <www.skywarn.net>.

Thanks in part to SKYWARN, weather spotting has significantly improved over the decades that have seen this volunteer augmentation of weather reports. Significant numbers of lives have been saved as a result of such advanced reporting of threatening weather. If you have an inclination to volunteer for something worthwhile in your hobby, being a storm spotter would certainly have the potential of fulfilling your desires.

Don Stoner, W6TNS, SK

A former fellow writer of this column, Don Stoner, W6TNS, became a Silent Key on May 4, 1999. Known as the man who conceived of Project OSCAR, Don was 67. He had been in ill health for some time. According to the "ARRL Letter," he reportedly suffered a ruptured aneurysm.

Quoting from the" ARRL Letter": "In 1960, Stoner, then living in Alta Loma, California, was the idea man behind Project OSCAR. *[The first time Don brought up the idea of an amateur radio satellite—i.e., OSCAR—was in his "Semiconductors" column in the April 1959 issue of* CQ.*—ed.]* Stoner outlined his concepts for an amateur radio space program in the February 1961 issue of *QST*

(see 'Project OSCAR—Something of the Future'). In his prophetic article, Stoner envisioned a two-phase project, the first to launch an orbiting VHF beacon transmitter into space, the second to launch an 'orbital repeater.' OSCAR 1 was launched December 12, 1961."

After successfully winning a lawsuit against the homeowners' CC&R's (conditions, covenants, and restrictions) of his condominium project, Stoner became a guru of sorts for amateurs battling restrictive covenants to install antennas. His recent time was spent advising other amateurs on how to achieve similar results.

Again quoting from the "ARRL Letter": "A Flint, Michigan native, Stoner developed an early interest in electronics, according to longtime friend Merle Parten, K6DC. Stoner's father, Lew, was W8IMS. Don Stoner went on to enjoy financial success in the commercial world. In the Citizens Band heyday, he was a manufacturer of CB transceivers. Later, he founded a company that developed systems to back up bank records and to telephone overdue accounts. He retired in 1989."

While Don was an ARRL member, he found serious disagreement with the League's direction concerning incentive licensing. As an alternative to the League, he formed the National Amateur Radio Association (NARA). Now defunct, the organization published the *Communicator* magazine, which retained authors who wrote for both *QST*, and *CQ* magazines. However, after Don lost interest in the organization, it failed to have staying power of its own.

As a former writer for this column, Don also will be remembered as *CQ*'s Novice editor, surplus columnist, and semiconductor columnist. Stoner also wrote the "In Theory" column in our sister publication, *CQ VHF* magazine, in 1996 and 1997.

I had two occasions to interact with Don. The first was indirectly when, as a writer for *CB* magazine, my editor, Leo Sands, asked me to review one of Don's SSB CB base-station transceivers. I found it to be a formidable entry into the foray of the CB craze that was hitting the country by storm in the late 1970s.

I later met Don at Dayton. He was then promoting NARA. When we met in person for the first time he immediately congratulated me on my work with the *QCWA Journal* and my writing this column. I really appreciated his graciousness and confident-boosting remarks.

His wife, Lucy, and two sons survive Don. Services were May 7 in Clearwater, Florida. Don will also be deeply missed by many in the amateur radio community, your columnist included.

Swords into Plowshares Amateur Radio Style

The following is from the AMSAT News Service: "Chris Jackson, G7UPN, reported to ANS that UoSAT-12—amateur radio's newest satellite—was successfully launched on April 21, 1999 from the Russian Baikonur Cosmodrome. The launch took place just before 05:00 UTC and according to Chris, confirmation of stage separation was first received, followed with orbit insertion of UoSAT-12 taking place at just over 14 minutes into the flight.

"The launch is the first mission for the former Soviet Union's arsenal of SS-18 ICBM missiles, all of which have to be destroyed or used for peaceful purposes under the START arms reduction treaty.

"UoSAT-12 is the latest amateur radio research satellite from the University of Surrey. The bird carries a number of imaging payloads, digital store-and-forward communications, and mode L/S transponders."

70 cm Band Plan Change Announced

At its May 1, 1999 Southern California 440–450 MHz Band Planning Meeting,

the Southern California Repeater and Remote Base Association (SCRRBA) approved a decision to change to 20 kHz channel spacing for the 70 cm ham band.

SCRRBA is a voluntary association of owners and operators of Amateur Radio Service fixed and mobile relay stations operating on the 29, 51, 420, 902, 1240 MHz and microwave frequency amateur bands. SCRRBA has provided frequency coordination for these activities since 1970. SCRRBA actively participates in the numerous FCC rule-making proceedings pertinent to our activities. SCRRBA maintains over 2300 frequency coordination records. These data represent the activities of approximately 600 relay-type amateur radio systems constructed by its members. Most of these systems operate on the UHF (420 MHz) and higher amateur frequency bands. Many more details of the meeting will have been posted on its homepage <www.scrrba.org> by the time you read this.

Talk on 2 Meters While Squelching Mosquitoes

At the Dayton Hamvention this past May Alinco unveiled its latest handheld, the DJ-195-T. The manufacturer claims that it has a unique feature—the ability to ward off mosquitoes. Stating that it uses conventional technology, the company claims that certain types of mosquitoes will be repelled by your use of the radio. One wonders if along with FCC approval, Alinco also had to receive FDA approval for this handheld model (Hi!).

Current Conferences

33rd Annual Central States VHF Conference Announcement. The following is from the Central States VHF Society: "The 33rd Annual CSVHF Society Conference will be held July 23, 24, and 25, 1999 at the Sheraton Four Points Hotel in Cedar Rapids, Iowa. Early arrivals Thursday evening will be treated to a picnic under the stars with a program and telescope viewing by the Cedar Astronomy Club. The formal conference activities will kick-off Friday morning with antenna gain measuring. A full slate of technical programs covering topics on DSP, receiver design, VHF Power Amplifiers, Aurora detection, EME dish construction, and much more will be offered for the next several days. The usual Noise Figure Measurement contest/clinic will be held for converters and pre-amplifiers above 50 MHz.

The CSVHF Society has a long tradition of entertaining the family members and this conference will be no exception. Bus tours to local area attractions capped with dinner and live theater on Friday evening. Meanwhile the hams will enjoy a lively VHF/UHF flea market at the hotel on Friday evening.

"The conference will culminate with a gala banquet on Saturday evening complete with extensive door prizes, awards, and an outstanding program on "The Galileo Mission to Jupiter" by Dr. Donald Gurnett, professor of Astronomy and Physics at the University of Iowa.

"Registration information should have been mailed to members in early June. Additional information (and registration for non-members) may be found at how to become a member of the CSVHF Society on the CSVHF Society home page <www.csvhfs.org> or by contacting the CSVHF Society President, Rod Blocksome, KØDAS, 690 Eastview Dr., Robins, Iowa 52328. Rod's e-mail address is: <k0das@csvhfs.org>.

First Cuba-U.S. PSK-31 QSO Reported

The following is from an e-mail message sent to me by Oscar Morales, CO2OJ: "Dean, W4WHN, and I made today (May 8, 1999) in the morning the first PSK31 QSO between Cuba and USA on 2 meters! I don't know if there have been any other international QSOs on VHF-PSK31, but at least we are sure that this one is the first between W4 and CO lands. Dean is located at EL94, 144 miles northeast of Habana City.

"A few minutes later I worked Joe, K9KNW, in EL95, at 180 miles from Habana. Dean and I were running *very* low power—less that 3 watts and the copy was perfect. I was not even beaming in his direction. My antenna was on EM48, but signals (on the screen!) were strong. Both QSOs took place on 144.190 MHz."

Current Meteor Showers

This month there are a number of minor showers. The most intense, the *delta-Aquarids*, is a southern latitude shower. It has produced in excess of 20 meteors per hour in the past. Its predicted peak is around 29 July at 0540 UTC.

The only northern latitude shower is the *alpha Cygnids*. It is supposed to peak around 20 July, but with a rate of only five meteors per hour.

Beginning around 17 July and lasting until approximately 14 August, you will see activity tied to the *Perseids* meteor shower. Its predicted peak is around 12 August. I will have more extensive coverage of this shower in next month's column.

Current Contests

The **1999 CQ Worldwide VHF Contest** is scheduled for 10–11 July. For complete rules, see June *CQ* magazine or my home page at <http://private.fuller.edu/~n6cl/hamradio.html>. Note that this is a different URL from the past. (Due to circumstances, the 1998 VHF Contest results will appear next month in *CQ.)*

Rare Grid to be Activated in Contest.

From Scott Leaf, VE7VDX, comes the following: "I will be activating extremely rare grid CO81 for the July CQ WW VHF Contest. I will be joined by VE7XDX for this arduous journey along a goat trail in the mountains where the only access point by road to this grid can be found after a 6-hour drive from our QTH near Vancouver. Due to the remoteness of this grid we will only be operating 50 MHz, as anything else is pointless. Our access point is just over the edge of the southern grid boundary near the east/west middle of the grid.

"Stations at or near these British Columbia cities may have a path to us: Kelowna, Kamloops, Merrit, and Penticton if they have a modicum of elevation. Also stations near Spokane, Washington may have success with us. We know that 99% of our QSOs will be by Es or Ms and with any luck Au, but we would really like to give some locals a crack at a rare grid, so listen hard for us."

New ARRL Contest VHF category added. The following is from the ARRL Letter: "The ARRL Awards Committee has voted to accept a Contest Advisory Committee recommendation for the addition of a Single Operator Low Power entry category for VHF contests, beginning with the January 2000 VHF Sweepstakes. The maximum power limits for the new Single Operator Low Power category will be: 50 MHz and 144 MHz, 200 W PEP maximum; 222 MHz and 432 MHz, 100 W PEP maximum; 902 MHz and above, 10 W PEP maximum. To qualify under the new category, a station must operate within the maximum power limitations on each band in which they participate. Certificates and awards will be developed for the new category according to the current awards structure. This rule will not affect the current Single Op QRP Portable category. The goal of the new category is to encourage greater participation among the large number of VHF/UHF contest enthusiasts, many of whom can be competitive at lower power levels. For more information, contact ARRL Contest Branch Manager Dan Henderson, N1ND, <n1nd@arrl.org>."

And Finally . . .

In the aftermath of the Oklahoma City tornado, your writer observed several people catching their words. Oftentimes the first words out of one's mouth were to say something about the Oklahoma City bombing. Indeed, for many of us residing in Oklahoma City, it was almost impossible to not reflect on the two disasters and the similarities and differences between the two.

In both situations, our hobby was there. In both situations, we provided commendable assistance to those who needed it. Amateur Radio Newsline's Bill Pasternak, WA6ITF, interviewed the FCC's new no-nonsense Riley Hollingsworth, K4ZDH, concerning any message he would have for amateurs in general. Riley reminded Bill that amateur radio has precarious claims to our frequency spectrum—that we constantly have to justify our existence. Certainly, our responses to emergencies go a long way in justifying our existence. However, we still have much further to go. With Riley's actions at the FCC, we are now getting some valuably needed help in ridding ourselves of some of our trouble spots. However, we are not replacing ourselves. We need to develop methods to recruit and retain new amateurs within our ranks.

Perhaps as you think of ideas you might want to pass them along to me. Better yet, implement them yourself and let me know of the successful results.

I will not be at Central States this year. This past June I was assigned to my own church, Sheridan Avenue UMC in Tulsa, Oklahoma, and I have decided to stay close to home during the first couple of months in my new position. Next year, however, look for us to make more of the VHF+ related conferences.

Until next month . . .

73, Joe, N6CL

1998 CQ WW CW Contest High-Claimed Scores

BY THE CQ WW CONTEST COMMITTEE
e-mail: <questions@cqww.com>

The following scores represent those logs received at CQ WW HQ. A list of all 1998 SSB callsigns with claimed category plus operator can be found at <http://www.cqww.com>. If you notice an error concerning your entry, please contact the CQ WW CC at the above e-mail address.

WORLD

All Band

P4ØE 15,058,752
EA8EA.....14,174,366
HC8N 13,874,600
P4ØW 13,642,200
CN8WW 12,321,537
C4A 10,618,830
3V8BB 10,164,945
A45XR.....9,455,824
6V6U 8,486,973
VP5GN.....8,371,140
K1ZM 7,993,089
S58A.....7,936,726
GIØKOW.....7,722,700
W1KM 7,698,382
W4AN.....7,590,240
3E1AA.....7,571,440
VE2/N6ZZ.....7,357,380
W9RE 7,200,270
PZ5JR 7,197,858
N2NT.....6,692,597
KQ2M 6,595,850
K1TO/4.....6,590,358
C4W 6,545,840
K3ZO 6,336,096
9M6NA 6,212,080
N2LT.....6,105,960
9M6AAC.....6,013,875
VP5M 5,881,238
ZS6EZ.....5,855,672
K1RU 5,764,000
FM5BH.....5,671,794
4N9BW.....5,656,790
6D2X 5,470,713
W1WEF.....5,399,984
GU6UW.....5,388,975
N4AF 5,366,980
JH5FXP.....5,309,935
G4BUO.....5,303,058
W3BGN.....5,300,290
VU2WAP.....5,255,394

28 MHz

ZW5B 2,121,395
LT1F 1,993,524
LU4FPZ.....1,150,920
ZY2DX.....1,028,370
H2ØA 1,008,950
HC2SL.....974,582
9HØA 929,832
GW3YDX.....807,840
G3MXJ 648,186
T99W 606,686
VA3RU 575,043
GW3WVG.....558,747
ZS6KR.....552,500
IQ4A 543,510
TU2MA 520,262
N4BP 507,465

21 MHz

5X1Z 1,507,155
9Y4VU 1,292,772
5B4AGC 1,260,336
ZV5A 1,133,018
CX5X 1,079,570
4O6A 912,390
K2SS/1 898,293
IR4T 841,995
P38M 809,250
WØUN 775,938
DL1IAO.....773,604
JA5DQH 744,546
SP5GRM 733,412
9M8YY.....727,367
GM4YXI.....722,729
4X/OL7D.....715,360

14 MHz

5NØ/OK1AUT.1,594,239
OHØZ 1,131,962
K2WK 1,076,330
DJ7AA 920,052
SN2B 917,308
LA9GX.....912,060
GM3POI 877,316
9A3GW.....876,040
OK1RF 865,361
9A7A 857,256
YT7A 847,788
IR2W 795,297
VR98BG 777,876
OH1F 744,775
YZ9A 743,900
YU1ZZ.....729,050
OM3NA.....690,604

7 MHz

9A9A 1,080,192
LZ5W 1,036,172
V8A 1,022,250
OT8T 925,310
9A5Y 891,054
OH9DX.....762,820
K8DX 706,482
S52O 701,092
S57AL.....697,164
Z39Z 659,488
SMØKCO.....645,272
S57DX.....634,092
W5UN 633,431
YU7NU.....618,585
UPØL 610,456

3.5 MHz

IH9/OL5Y.....757,380
5B4/EU1AA.....647,352
XJ1JF 608,388
S5ØA 522,611
SN3A 514,004
W1MK 441,320
4X4WN.....432,300
SP7GIQ.....399,415
K1LZ 327,228
HG5A 319,020
GMØGAV.....284,508
LA6YEA.....246,078
YL3IZ.....240,960
OH1MA.....240,828

1.8 MHz

VA1A 283,015
IR4T 203,401
9A5W 197,676
4X4NJ.....176,100
S5ØU 166,007
OM5ZW.....127,203
YZ6A 116,914
EA8ZS.....109,417
LY3BS 108,540
LX4B 108,090
ZF2LA.....98,028
HA8BE.....96,426
OK1RP 84,995
S57M 84,564
PAØCLN 81,782

Low Power

All Band

V26K 7,472,928
UAØJQ.....5,164,677
N5TJ 3,368,508
LY2BTA.....3,089,392
W2TZ 2,993,129
W3EF 2,823,172
XO7X 2,811,681
S59AA 2,807,950
HA1CW 2,717,539
T95A 2,676,440
LY3BA 2,648,155
DL2MEH.....2,513,722
YO3APJ.....2,488,999
KM1X 2,365,766
NA2U.....2,340,604
FG5EY.....2,283,700
K1VUT.....2,266,473
DKØMM 2,244,168
DL2HBX 2,174,550
YU7CB 2,147,772
9A2EU.....2,057,187
G3WGV.....2,057,106
RUØLL 1,932,570
WT1O 1,928,059
I3JSS.....1,902,980
GD4UOL.....1,844,280
JL1ARF 1,745,982
JEØUXR 1,724,624
EL2WW 1,710,710
ES1QD 1,625,130
S57J 1,617,228
EA8ASJ.....1,579,135
WO4O 1,538,905
SP2QCH.....1,532,440
K5KLA 1,525,076

28 MHz

CX5AO 1,010,850
WP2Z 852,776
LU5WW.....768,088
9A7R 610,218
NP3A 525,213
KP3L 507,518
9A1AA.....361,326
LW9DKB.....297,336
UP6F 274,890
LW7DX.....258,296
RZ9OU 246,330
LU1AEE.....243,179
WB4TDH 242,858
5N3CPR 241,110
SP3SUX 209,034
JR1BTG.....201,528
ER1OO.....200,954

21 MHz

9A6A 692,551
EA8NN 565,250
LU5FF 557,991
IK4DCT.....522,904
CT1BQH.....476,470
UA4LM 469,030
OH5BM.....411,777
YY4GLD 374,112
N4MO 353,320
N4CT 316,665
YB2UU 310,471
EI6FR 292,140
L5ØV 287,496
JH9KVF 284,208
GØMTN.....274,560
LU7AWP.....273,296
LZ3YY 272,290
S51TA 270,715

14 MHz

VK2APK 538,338
S58AL.....518,784
CX9AU 514,410
IT9XUC.....382,470
EA3BCM.....376,272
ES2RJ 351,780
JR4PMX/1 320,226
RU3HD 302,633
UA9BS.....289,814
DU3RCM.....262,647
RW4WM.....226,198
UP5F 213,934
JL1MUT.....199,950
UAØSAD.....180,597
JHØEPI.....164,835

7 MHz

EA8CN 558,620
HI3K 458,514
4L8A 377,352
LZ4ZP.....343,656
IQ7A 340,816
UAØCM.....291,625
JM2FCJ/9.....274,690
S54A 233,446
S53F 194,468
EA8NQ 192,864
YZ7ED.....191,986
LY2BM.....188,512
F/OK1EE 173,968
9H3YQ.....167,328
JG6MQI.....157,080
YZ1V 156,114
LY3JY.....154,707

3.5 MHz

TA3D 238,464
UA9JLJ.....205,326
UUØJM 189,756
RA9AE.....157,263
HA8IB.....137,709
UT7CC 125,300
HA8RH 123,500
HA7JJS 119,196
YU1CC 100,352
OK1FHI 93,195
UT3QW 91,596
S52GO 90,501
RW9AV.....88,506
RZ6FR.....87,696
CT1AOZ.....84,906

1.8 MHz

UU4JMG.....111,824
EU1AZ.....76,176
HA3MQ.....75,051
EI7IU 36,722
YU1RA 35,673
LY2OU.....31,008
UXØHA 29,445
RW9TA.....24,518
OM3WQQ.....18,960
OK1FFC 17,225
T94YT.....15,810
II2P 15,408
UA1TAN 15,264
OK2PWJ.....12,903
LA8WG.....11,352

QRP

All Band

HA2SX.....1,066,704
N6MU 868,886
LY2FE 844,984
N1TM 750,321
W3ZZ 746,837
K1RC 740,051
SM3CCT.....699,205
BMØQRP.....618,870
DL3KVR 594,452
N7IR 593,980
OE2S 583,440
NØKE/KH6.....568,016
JR4DAH 559,736
YU1LM 558,957
I1BAY 513,717
KV8S 503,750
IØZUT 485,010
OK2PP 470,586
GØOGN 468,741
N9CIQ 404,212

Assisted

All Band

K3WW 8,725,579
KI1G 6,991,124
K2NG.....6,783,056
WP3R 6,306,412
K2TW 6,009,258
KH2/N2NL 5,916,638
N3AD.....5,426,246
K1TI 5,282,493
RZ3BW.....5,272,722
W2UP.....5,140,500
KP2AD.....4,350,837
UT5UGR.....4,288,118
K5MA/1.....4,246,272
K2SX 4,194,968
K5KG/2.....4,122,109
M8Z 4,053,773
K3NZ 4,052,376
K2XA 3,873,280
DF3CB.....3,763,896
K1YR 3,496,893
YZ7AA.....3,282,020
RZ3AZ.....3,254,680
K2RD 3,249,112
W1NG 3,223,260
AB2E 3,119,280
K2NJ.....3,082,330
W1GD.....3,075,128
OK2FD 3,068,620
N2TX 3,003,620
N4XR 2,988,614
KD6WW.....2,866,500
K2ONP 2,837,430
DL7ON 2,836,560
XR1X 2,718,917

Multi-Operator Single Transmitter

K1AR 13,632,640
HG1S 11,642,400
EA6IB 11,515,192
TM2Y 11,442,408
N3RS.....11,032,000
K8AZ 10,777,586
RU1A 10,259,312
SQ6Z 10,042,524
AH2R 10,035,816
N2NU.....10,000,000
KL7Y 9,456,561
K1ZZ 9,362,514
RZ9AZA.....8,909,598
OM8A 8,880,795
LZ5Z 8,638,752
UD6M 8,636,085
8Q7DV.....8,436,930
DL2NBU 8,354,560
K8LX 8,324,154
D44BC.....8,239,084
RY9C 8,168,906
V63X 8,161,020
OK5W 8,070,576
OH7M 7,779,230
W9JA 7,397,950
ZM2K 7,343,490
OM3A 7,322,200
RKØCWW.....7,221,456
WXØB 7,094,261
JY9QJ.....6,910,563
VK9LX 6,862,414
NØNI 6,799,652
RM6A 6,724,462

Multi-Operator Multi-Transmitter

6Y2A 44,152,490

5V7A 38,243,511
TI1C 36,767,435
EA9EA.....33,995,476
A61AJ.....31,985,877
P3A 31,363,865
J6DX 31,118,976
VE3EJ 26,083,818
KC1XX.....25,516,020
W3LPL.....23,906,201
KH7R 23,277,408
K3LR 22,625,278
DFØHQ.....20,774,200
K1KI 20,097,924
OH2U 19,842,460
J3A 19,433,850
RW2F 18,880,101
SL3ZV 16,643,664
JA5BJC 16,181,072
K9NS 15,895,766
HG6N 15,377,445
K2LE 15,312,230

USA

All Band

K1ZM 7,993,089
W1KM 7,698,382
W4AN 7,590,240
W9RE 7,200,270
N2NT 6,692,597
KQ2M 6,595,850
K1TO/4 6,590,358
K3ZO 6,336,096
N2LT.....6,105,960
K1RU 5,764,000
W1WEF 5,399,984
N4AF 5,366,980
W3BGN 5,300,290
N2BA 5,072,522
KØDQ 4,957,800
WC4E 4,787,349
W6AX 4,698,000
W4RX 4,349,484
KØRF 4,294,368
K1AM 4,119,210
K1ZR 3,874,626
W4MR 3,843,700
W4PA 3,792,011
KC1F 3,681,782
W6RU 3,398,689
N4ZR 3,389,100
N2RM 3,325,920
K6LA 3,137,452
AA4S 3,111,480
W1UK 3,067,234
K5YAA.....3,062,300
N6AR/4.....3,042,014

28 MHz

N4BP 507,465
K4WX 468,013
K9IG 445,056
W6NL 404,754
W6YA 393,807
KD2I 392,886
K4EA 391,560
WB4OSN.....368,490
W9WI 359,464
K6DB 350,352
K7QQ 280,554
K4AMC.....270,680
K5SZ 249,615
AI2C/4 192,324
NA2X 143,429
NX7K 130,804

21 MHz

K2SS/1 898,293
WØUN 775,938
NN4T 666,930
W9LT/8 601,800
WØSD 535,340
N4PN 488,904
K4OAQ.....486,918
N8RR 357,416
W6PU/5 235,053
K7NPN 226,499
KC6X 217,950
N6ZB 197,340
W3AU 193,700
W9GIL.....135,954
WØRA 125,050
W8EQA/7 120,269

14 MHz

K2WK 1,076,330
W9OF 394,740
K2BA 355,005
W8UD 263,289
AD7U 159,354
W8TWA.....90,630
N4IJ 57,312
W6MVW 19,404

7 MHz

K8DX 706,482
W5UN 633,431
W3GG 410,250
KØOD 201,460
W6KP 170,730
W6YJ 139,872
W7CB/6 104,958
K9CJ 94,656
W9GXR 75,516
W6RCL.....46,779
W4DD 18,304
N6HY 11,300
ND8MS.....8,154

3.5 MHz

W1MK 441,320
K1LZ 327,228
WB9Z 136,617
K5NA 101,808
N2GC 81,507
N4SLR.....49,306
WØSF 35,550
W5EU 35,144
K8MD 33,384
W8AEF.....28,413

1.8 MHz

W8LRL 43,680
W4DR 25,481
W8UVZ.....22,698
W2VO 21,508
K1VW 14,384
K4TEA.....5,130
K3JJG.....4,840
KØCS 3,168
W9PNE.....2,040
N2KK/6.....1,875

Low Power
All Band

N5TJ 3,368,508
W2TZ 2,993,129
W3EF 2,823,172
KM1X 2,365,766
NA2U.....2,340,604
K1VUT.....2,266,473
WT1O 1,928,059
WO4O 1,538,905
K5KLA 1,525,076
WD5K 1,481,958
WB8YJF 1,472,253
W1EQ 1,466,244
NA4K 1,448,640
K1NO 1,414,762
N1WR 1,257,528
WK2G.....1,189,015
K1HT 1,136,178
W6JTI.....1,112,760
N5AW 1,110,417
N2TN 1,109,730
W4HR 1,108,485
K7ZA 1,104,774

28 MHz

WB4TDH 242,858
K2MFY 185,843
W3EP/1 167,040
N2OO 164,000
K2ACW.....158,085
W5ZO 128,148
K9WA 118,590
W6EUF.....63,690
K4WW 61,105
K4RO 52,688

21 MHz

N4MO 353,320
N4CT 316,665
K9RN/M.....213,705
AAØTY.....171,612
AF9DX.....129,332
W3CP 120,780
AE9F/6 113,870
NN9K 81,378
KN4Y 73,015
N4TZ/9 63,936

14 MHz

W8UMR.....113,088
WB2DVU.....110,448
K6CEO 23,408
N9WI 22,496
WT8P 18,232
N9GBB 8,800
AF8C 3,367
WBØB 2,378

7 MHz

N5DO 109,004
K4LDR.....62,700
W5CWQ 43,290

1.8 MHz

K9MK 2,449

QRP
All Band

N6MU 868,886
N1TM 750,321
W3ZZ 746,837
K1RC 740,051
N7IR 593,980
KV8S 503,750
N9CIQ 404,212
WA3NKO.....352,782
N5TW 248,400
AA1CA 244,790
K3WWP.....165,624
KRØI 117,392
NQ7X 65,130

Assisted
All Band

K3WW 8,725,579
KI1G 6,991,124
K2NG.....6,783,056
K2TW 6,009,258
N3AD.....5,426,246
K1TI 5,282,493
W2UP.....5,140,500
K5MA/1.....4,246,272
K2SX 4,194,968
K5KG/2.....4,122,109
K3NZ.....4,052,376
K2XA 3,873,280
K1YR 3,496,893
K2RD 3,249,112
W1NG 3,223,260
AB2E.....3,119,280
K2NJ.....3,082,330
W1GD.....3,075,128
N2TX 3,003,620
N4XR 2,988,614

Multi-Operator
Single Transmitter

K1AR 13,632,640
N3RS.....11,032,000
K8AZ 10,777,586
N2NU.....10,000,000
K1ZZ 9,362,514
K8LX 8,324,154
K3II.....8,111,174
W9JA 7,397,950
WXØB 7,094,261

N0NI 6,799,652
K3TUP.....6,245,338
KVØQ 5,959,650
AA2FB.....5,747,812
K2XR 5,059,193
N8RA 4,457,856
W2RE 4,222,130
N4RV 3,940,855
W6XR/2 3,923,088
W8ZA 3,822,528
N2MM.....3,821,208
K3PH.....3,289,068

Multi-Operator
Multi-Transmitter

KC1XX.....25,516,020
W3LPL.....23,906,201
K3LR 22,625,278
K1KI 20,097,924
K9NS 15,895,766
K2LE 15,312,230
WO1N 14,165,490
K8CC 14,048,777
W3PP 13,700,462
K1RX 13,510,986
K4VX/Ø.....12,375,545
W4MYA.....12,166,671
W8AV 11,997,012
WØAIH/9.....10,485,124
W3EA 10,050,948
W6BA 9,778,593
W7RM 8,626,769
K3II 8,111,174
W3MM.....8,072,580
KB1H 7,825,576

EUROPE

All Band

S58A 7,936,726
GIØKOW.....7,722,700
4N9BW.....5,656,790
GU6UW.....5,388,975
G4BUO.....5,303,058
GØIVZ.....5,140,685
DL4NAC 5,121,876
OH5LF.....5,039,298
OH1MM.....4,694,928
HA8FM 4,647,258
OM5M 4,623,393
CU2V 4,173,296
SP4Z 4,135,514
G4BJM 4,078,750
OZ1LO.....3,997,210
EA3NY.....3,812,700
LY5W 3,482,488
HA8JV 3,344,887

TM9C 3,312,800
3A/N9NC 3,133,750
EW8EW.....3,104,676
UA4HTT 3,011,344
RN6BY 2,966,848
OH6RX.....2,937,558
EN1I 2,922,178
UA4LU.....2,841,075
OH8LAE 2,481,124
9A1O 2,334,885
LY6M 2,314,536
UX5UO.....2,278,932
DK5PD 2,269,794

28 MHz

9HØA 929,832
GW3YDX.....807,840
G3MXJ 648,186
T99W 606,686
IQ4A 543,510
S53R 481,899
S51AY.....425,600
HG1W 415,386
9A2AJ.....387,002
LY2CI 378,512
YU1OL.....363,736
UR7VA 354,294
GØORH 345,960
LZ1NG.....342,626

21 MHz

4O6A 912,390
IR4T 841,995
DL1IAO.....773,604
SP5GRM 733,412
GM4YXI.....722,729
YU1KX.....641,580
OH1F 641,240
OM7M 621,528
DKØSR 557,221
S5ØK 551,490
US1E 544,824
IR9T 526,566
RU4PL.....460,404
G8G 458,180
SP9W 449,920
G3PJT 445,566
UR3QT 437,244
OH2BR.....408,630
SP3SLA.....401,319
Z31GB.....400,568

14 MHz

OHØZ 1,131,962
DJ7AA 920,052
SN2B 917,308
LA9GX.....912,060

GM3POI 877,316
9A3GW.....876,040
OK1RF 865,361
9A7A 857,256
YT7A 847,788
IR2W 795,297
OH1F 744,775
YZ9A 743,900
YU1ZZ.....729,050
OM3NA.....690,604
OH8LQ 660,824
SM2DMU.....633,114
HG5J 616,414

7 MHz

9A9A 1,080,192
LZ5W 1,036,172
OT8T 925,310
9A5Y 891,054
OH9DX.....762,820
S52O 701,092
S57AL.....697,164
Z39Z 659,488
SMØKCO.....645,272
S57DX.....634,092
YU7NU 618,585
DF4SA.....567,360
UY5ZZ.....565,947
S53O 527,472
HG9X 511,680

3.5 MHz

S5ØA 522,611
SN3A 514,004
SP7GIQ.....399,415
HG5A 319,020
GMØGAV.....284,508
LA6YEA.....246,078
YL3IZ.....240,960
OH1MA.....240,828
OK1CW.....234,000
YU1KR 225,456
G3WGN.....215,040
S51OI 204,049
GM4AFF.....198,440
II1H 175,430
SM5CEU 131,604
OH9BVM 125,419
OH9UFO 124,440

1.8 MHz

IR4T 203,401
9A5W 197,676
S5ØU 166,007
OM5ZW.....127,203
YZ6A 116,914
LY3BS.....108,540

LX4B 108,090
HA8BE.....96,426
OK1RP 84,995
S57M 84,564
PAØCLN 81,782
OE3GSA.....63,304
OH4MFA 63,054
RA4NW 61,560
OH7UE.....61,422

Low Power
All Band

LY2BTA.....3,089,392
S59AA 2,807,950
HA1CW 2,717,539
T95A 2,676,440
LY3BA 2,648,155
DL2MEH.....2,513,722
YO3APJ.....2,488,999
DKØMM 2,244,168
DL2HBX 2,174,550
YU7CB 2,147,772
9A2EU.....2,057,187
G3WGV 2,057,106
I3JSS.....1,902,980
GD4UOL.....1,844,280
ES1QD 1,625,130
S57J 1,617,228
SP2QCH.....1,532,440
OK1DSZ.....1,470,315
UY8IF 1,454,112
IK1RQQ.....1,430,805
OK1BA 1,260,996
F5TNI 1,250,452
SV1DKR.....1,215,324
RA1ACJ.....1,207,794
OK1HX 1,169,126
UA3ABJ.....1,154,232
DL3JAN.....1,140,909
SP6CYX 1,119,904
UA4WAN.....1,099,725
YO3FWC.....1,097,406
OH8BQT.....1,080,171
SP2EWQ.....1,076,480
YL2KA 1,070,272
G5LP 1,066,584
OK1PG.....1,050,525
S54X 1,028,352
9A9R 1,011,636

28 MHz

9A7R 610,218
9A1AA 361,326
SP3SUX 209,034
ER1OO.....200,954
EI8GP.....197,160
I1XPQ.....184,460

T99T 181,412
UX8IX.....162,900
9A7P 154,638
LZ2GS.....135,456
F5ITK.....131,175
YU1HA 129,536
DL7AU.....126,144
ON6NR.....119,126
DL7VMM 107,380

21 MHz

9A6A 692,551
IK4DCT.....522,904
CT1BQH.....476,470
UA4LM 469,030
OH5BM.....411,777
EI6FR 292,140
GØMTN.....274,560
LZ3YY 272,290
S51TA 270,715
OK2SBL 266,992
S59DBC 259,272
SP9BBH 256,736
SV1DPJ.....220,820
IT9AF.....208,956
SP2AVE 191,268

14 MHz

S58AL.....518,784
IT9XUC.....382,470
EA3BCM.....376,272
ES2RJ 351,780
RU3HD.....302,633
RW4WM.....226,198
YO3CTK.....136,974
UA3VCS.....131,610
EA4BL.....125,668
HA6KNX.....121,278
YL3FW 121,052
ON6CW.....118,600
MJØASP 109,800
RU4HH.....101,036
EW8DX.....92,763
9A5YA 90,060

7 MHz

LZ4ZP.....343,656
IQ7A 340,816
S54A 233,446
S53F 194,468
YZ7ED.....191,986
LY2BM.....188,512
F/OK1EE 173,968
9H3YQ.....167,328
YZ1V 156,114
LY3JY.....154,707
T92M 141,120
RW4PL.....139,916
LY2BLQ.....133,376
S54W 117,625
OK1FCA.....99,495

3.5 MHz

UUØJM 189,756
HA8IB.....137,709
UT7CC 125,300
HA8RH.....123,500
HA7JJS 119,196
YU1CC 100,352
OK1FHI 93,195
UT3QW 91,596
S52GO 90,501
RZ6FR.....87,696
CT1AOZ.....84,906
UT1FA.....76,500
S51RJ.....76,320
OK2HI.....74,646
SP9NLK.....74,480

1.8 MHz

UU4JMG.....111,824
EU1AZ.....76,176
HA3MQ.....75,051
EI7IU 36,722
YU1RA 35,673
LY2OU.....31,008

UXØHA 29,445
OM3WQQ.....18,960
OK1FFC 17,225
T94YT.....15,810
II2P 15,408
UA1TAN 15,264
OK2PWJ.....12,903
LA8WG.....11,352

QRP
All Band

HA2SX.....1,066,704
LY2FE 844,984
SM3CCT.....699,205
DL3KVR 594,452
OE2S 583,440
YU1LM 558,957
I1BAY 513,717
IØZUT 485,010
OK2PP 470,586
GØOGN 468,741
S59D 399,946
HA7YS.....397,320
F5NZY 364,180
UR9MM 354,744
EA7AAW 258,070

Assisted
All Band

RZ3BW.....5,272,722
UT5UGR.....4,288,118
M8Z 4,053,773
DF3CB.....3,763,896
YZ7AA.....3,282,020
RZ3AZ.....3,254,680
OK2FD 3,068,620
DL7ON 2,836,560
SM3EVR.....2,616,768
S56A 2,017,370
OL6X 1,999,161
OK1FDY 1,715,147
DL2ZAE.....1,591,708
UA1QV 1,481,724
DJ5BV 1,249,668

Multi-Operator
Single Transmitter

HG1S 11,642,400
EA6IB 11,515,192
TM2Y 11,442,408
RU1A 10,259,312
SQ6Z 10,042,524
OM8A 8,880,795
LZ5Z 8,638,752
UD6M 8,636,085
DL2NBU 8,354,560
OK5W 8,070,576
OH7M 7,779,230
OM3A 7,322,200
RM6A 6,724,462
II3T 6,539,232
PI4COM.....6,531,928
LA8W 6,394,754
DJ6QT 6,008,860
S5ØG 5,992,812
EA5BY.....5,664,774
OL3A 5,578,380
PI4CC.....5,133,590
IO2A 5,113,056

Multi-Operator
Multi-Transmitter

DFØHQ.....20,774,200
OH2U 19,842,460
RW2F 18,880,101
SL3ZV 16,643,664
HG6N 15,377,445
DLØCS.....14,497,036
EA4ML.....14,378,385
LY5A 13,339,200
LY7A 9,178,275
DLØKF.....8,706,048
J45T 5,234,229
OZ5W 4,951,910
OZ5WQ.....4,766,184
OL7W 4,140,696
OH1AJ.....2,836,62

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

North Korea

The renowned DXer Martti Laine, OH2BH, who first activated North Korea in 1995, briefly appeared on the air early on April 21 from North Korea signing **P51BH**. According to the ARRL DXCC Desk, Laine showed up on 20 meter CW around 0530 UTC, then shifted to 14.195 SSB at around 0640 UTC, and later went to 21.295 on SSB. The short operation ended just before 0800 UTC.

"Countless DXers have been eagerly waiting for activation of North Korea," said Laine in a press statement. "This country is the rarest of them all—for good reason." North Korea remains isolated from the rest of the world, and visits are allowed only for special purposes. Transmitting by radio from North Korea has been, and still is, a highly sensitive issue, he added.

Laine's visit—his sixth to North Korea—was not intended to be a full-blown DXpedition, however, but another in a series of what he calls "DX missionary efforts." The objective was to introduce the concept of amateur radio to those who have the power to decide its future in North Korea.

"It was a preliminary exercise," said DX Advisory Committee Chairman Wayne Mills, N7NG. "The on-air operation was a bonus." Mills said the trip was intended primarily to pave the way for future amateur operation from North Korea, and things went as well as or even better than expected. "It fulfilled all expectations," Mills said.

The amateur radio gear Laine used will remain in North Korea. "The antennas were left right there together with the Yaesu FT-847 equipment," Laine said in a posting to DX reflectors after he'd returned to Beijing. "It is just a matter of switching the power on—when the time is ripe—to allow North Korea to join the ranks of amateur radio."

During his brief stint from P5, Laine made 263 contacts, working mostly Europe and Japan, as well as 9K2HN and some West Coast US stations. He made only a handful of P5 contacts in 1995.

The DXCC Desk advises those who might have missed this short opportunity not to worry. "Intermediate steps of this kind are always needed, and at best, they may lead to more activations," said ARRL Membership Services Manager Bill Kennamer, K5FUV.

Several minutes of audio from the P51BH operation may be heard on 9K2HN's home page: <http://www.qsl.net/9k2hn>.

Laine says documentation for the P51BH operation will be sent to the ARRL shortly, and QSL cards will be released from his OH2BH Finland address "as soon as possible." Martti himself posted a wrap-up report soon after his return to his base in Beijing:

Greetings from North Korea: **P51BH** was a genuine station.

As I said in the book *[Where Do We Go Next?]*, for those who believe, all the good things will come. And that happened to 263 happy DXers throughout the world.

I have just returned from my sixth visit to North Korea, with many cherished friendships and many totally new. It is just amazing how friendly those people are and how much they enjoy life in spite of their needs in many areas.

As planned, I arrived there on April 20, with departure set for Thursday, April 22. From the site I was located at, it was an 8-hour drive from the closest airport on bumpy roads. So, out of the three days, I spent my fair share in a 4WD vehicle, seeing the landscape of this mysterious land.

While discussing the future of amateur radio in a longer term perspective, an immediate allowance was made to test the equipment and show the people present the boring content carried by our DX contacts—but carried for a good cause. I am most grateful to those who shared their excitement with us by saying hello to my friends in North Korea (thanks to W6OSP, KH7RS, SM3EVR, and WH6CZD).

The operating was done on the telecom center premises, with North Koreans climbing a 150 ft. tower to hoist the antennas. . . . The telecom facilities were located a 60-minute or so drive from the guesthouse, and access to the facility was obviously only during office hours.

Many would ask this fundamental question: Why was it not pre-announced and why was only a limited amount of specific information released? First, during these several years of DX missionary efforts, it has become obvious that if you are able to work on a project in peace, the best overall results will be achieved.

Many major efforts are typically hampered by competing forces who have a hard time accepting the success of others. It was only a few years ago that North Korea was just about to hit the airwaves when one competing body launched an attack to undermine a potentially successful endeavor.

Although the current DXCC rules (Rule 12) provide specific protection against that kind of behavior, it is still an issue that we all would like to eliminate from our true promotional schemes designed to further the cause of amateur radio in our dealings with the authorities of countries of intense DX interest.

The operating was done between 1436–1640 Korean time. First JA QSO was JA2DO, Europe OH5MBF, Oceania KH6WU, and the United States W6WKE. The operation covered 14 MHz CW and SSB plus 21 MHz SSB.

Best regards from sunny Beijing.—Martti J. Laine, OH2BH/BY1.

Martti Laine, OH2BH, operated from North Korea as P51BH.

The Korean peninsula was a Japanese colony for most of the first half of this century. Japan formally annexed Korea in 1910, but had controlled the country for the previous 15 years. When Japan surrendered at the end of WW II, 50 years ago, the Korean peninsula was divided at the 38th parallel between the occupying forces of the USSR and the US. United Nations attempts to unify the divided country failed, and in 1948 the Republic of Korea (what we call South Korea) was established. The Democratic People's Republic of Korea (North Korea) was established a month later. The Korean War, still under a state of cease-fire, failed to resolve which government was the legitimate ruler of the peninsula.

Since its founding, North Korea has been under the iron fist of Marshall Kim Il Sung, and more recently, his son, Kim Jong Il. The Communist country is almost completely socialized and suffers from trade and budget deficits and food shortages. North and South Korea finally abandoned demands that each was the only true government of the peninsula in 1991, and both countries were then admitted to the UN.

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← *Vlad Babic, T97V, is active on 6 meters as well as HF.*

Peter, ON6TT, operates as 9U5CW. ↓

At this point, separate DXCC status for North Korea by reason of government was obvious. A formal petition for same from some northern California DXers was subsequently approved in 1991. North Korea awaited only an accredited operation to be added to the DXCC countries list.

Romeo Stepanenko, 3W3RR, announced plans to operate from North Korea and came on the air as **P5RS7**. However, detailed analysis of his accreditation documentation revealed that this operation actually took place in the part of eastern Russia that borders North Korea. The DXCC desk declined this operation for DXCC credit. Thus, North Korea retained its status as a "pending" country.

In May 1995 Martti Laine, OH2BH, and Olli Rissanen, OHØXX, made an on-the-air demonstration of amateur radio to telecommunications officials in North Korea, under the callsign of **P5/OH2AM**. During this brief demonstration, the two Finnish DXers made 19 contacts with 16 different stations, mostly with Japanese DXers. The total operating time was less than one-half hour.

While the demonstration was part of a long-term effort to introduce amateur radio to North Korea, Martti took advantage of official operating permission to submit the documentation to the ARRL for possible accreditation. Such a move would put North Korea onto the current DXCC entity list. Martti has a long history of adding New Ones to the DXCC list, and North Korea was the latest in his efforts.

The WPX Program

SSB

2701 ..... KØNO
2702 ..... JA9FO
2703 ..... DS4BBL

CW

3004 ..... DL1RMY
3005 ..... AD4UI
3006 ..... S58U
3007 ..... F5LPY

Mixed

1832 ..... HB9BPV
1833 ..... RAØFU
1834 ..... OH6NVC

CW: 350 F5LPY, DJ2XF, RU3DG. 400 DL6UAA, F5LPY, DJ2XP, RU3DE. 450 DL6UAA, F5LPY, DJ2XP. 500 DL6UAA, F5LPY, DJ2XP, WA2VQV. 550 DL6UAA, DJ2XP. 600 DL6UAA, DJ2XP. 650 DL6UAA, DJ2XP. 700 DL6UAA, DJ2XP. 750 AA1KS, DL6UAA, DJ2XP, K6UXO. 800 DJ2XP. 850 DJ2XP. 900 F5YJ, DJ2XP. 950 DJ2XP. 1000 DJ2XP. 1050 DJ2XP. 1100 DJ2XP. 1150 DJ2XP. 1200 DJ2XP. 1250 DJ2XP. 1300 DJ2XP. 1350 DJ2XP. 1400 DJ2XP. 1450 DJ2XP. 1500 DJ2XP. 1550 DJ2XP. 1600 DJ2XP. 1650 DJ2XP. 1700 DJ2XP. 1750 DJ2XP. 2350 W8UMR.

SSB: 350 KØNO, JA9FO, DS4BBL. 400 KJØFO, JA9FO, DS4BBL. 450 JA9FO, DS4BBL, DL4VBS, UA1ZKF. 500 JA9FO, DS4BBL, DL4VBS. 550 DS4BBL. 600 DS4BBL. 700 JR6SVM. 750 JR6SVM. 800 JR6SVM. 850 JR6SVM. 900 JR6SVM. 950 JR6SVM. 1000 JR6SVM. 1100 AA1KS. 1250 KWØU. 1300 KWØU. 1450 LU5DV. 1500 LU5DV.

Mixed: 450 RAØFU, OH6NVQ. 500 RAØFU, OH6NVQ. 550 RAØFU. 600 RAØFU. 650 RAØFU. 700 RAØFU. 750 AK7O, RAØFU, K6UXO. 800 AK7O, RAØFU. 850 RAØFU. 900 RAØFU. 950 RAØFU. 1000 RAØFU. 1050 RAØFU. 1100 RAØFU. 1150 RAØFU. 1200 RAØFU. 1250 RAØFU. 1300 RAØFU. 1350 RAØFU, OE1-0140. 1400 RAØFU. 1450 RAØFU. 1500 AA1KS, RAØFU. 1550 JA7FFN. 1800 I1-21171. 2500 W8UMR. 2550 N4UH. 4200 F2YT.

10 meters: RAØFU
Asia: DL6UAA, UA1ZKF
Africa: JR6SVM
So. America: RAØFU
Europe: UA1ZKF
Oceania: I2EAY, LU5DV

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, W1CU, 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, ABØP, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4ØØ3, W5AWT, KBØG, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YBØTK, K9QFR, 9A2NA, W4UW, NXØI, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DEØDAQ, IQWXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, F6HMJ, HB9DDZ, WØULU, K9XR, JAØSU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, KØIFL, WT3W, IN3NJB, S5ØA, IK1GPG, AA6WJ, W3AP. OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, KØDEQ, KUØA, DJ1YH, OE6CLD, VR2UW, 9A9R, UAØFZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, N5UR, VE3XN, DL3RK, OKMP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BU, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SMØDJZ, DK5AD, W3ARK, LA7JO, SMØAJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DEØDXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4ØØ3, 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, DL1EY, KØDEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U.

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 USA.

5 Band WAZ

As of May 9, 1999, 492 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

ON7DR W9CH
W9WAQ F5OZF

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)	OE1ZL, 199 (1)
AA4KT, 199 (26)	W6DN, 199 (17)
W4LI, 199 (26)	W3NO, 199 (26)
K7UR, 199 (34)	K4UTE, 199 (18)
WØPGI, 199 (26)	K5RT, 199 (23)
W2YY, 199 (26)	UT5UGR, 199 (10)
VE7AHA, 199 (34)	K4PI, 199 (23)
IK8BQE, 199 (31)	HB9DDZ, 199 (31)
JA2IVK,199 (34 on 40)	UA3AGW, 198 (1, 12)
K1ST, 199 (26)	EA5BCK, 198 (27, 39)
ABØP, 199 (23)	G3KDB, 198 (1, 12)
KL7Y, 199 (34)	KG9N, 198 (18, 22)
NN7X, 199 (34)	KM2P, 198 (22, 26)
OE6MKG, 199 (31)	DKØEE, 198 (19,31)
HA8IB, 199 (2 on 15)	KØSR, 198 (22, 23)
IK1AOD, 199 (1)	K3NW, 198 (23, 26)
DF3CB, 199 (1)	UA4PO, 198 (1, 2)
F6CPO, 199 (1)	JA1DM, 198 (2, 40)
W6SR, 199 (37)	9A5I, 198 (1, 16)
W3UR, 199 (23)	K4ZW, 198 (18, 23)
KC7V, 199 (34)	OH2VZ, 198 (1, 31)
GM3YOR, 199 (31)	RAØFA, 198 (2 on10,15)
VO1FB, 199 (19)	LA7FD, 198 (3, 4)
KZ4V, 199 (26)	K5PC, 198 (18, 23)
N4CH, 199 (18 on 10)	NT5C, 198 (18, 23 on 40)

The following have qualified for the basic 5 Band

ON7DR, 200 zones	K5JP, 160 zones
F5OZF, 200 zones	ND5S, 159 zones
LA7FD, 198 zones	

WAZ Award:
Endorsements:
1088 Stations have attained the 150 Zone level as of

W9WAQ, 200 zones	NT5C, 198 zones
W9CH, 200 zones	K5PC, 198 zones
K4PI, 199 zones	K4IQJ, 195 zones
UT5UGR, 199 zones	VE5KX/WØ, 190 zones
HB9DDZ, 199 zones	K5MC, 181 zones

May 9, 1999.
****PLEASE NOTE: Due to supplier increases, effective September 1, 1998 cost of the 5 Band WAZ Plaque is now $80 ($100 if airmail shipping is requested).**

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.

In July 1995 the P5/OH2AM documents were approved for DXCC credit. This added North Korea to the current DXCC list. This action caused significant effects in the DX community. First, all those DXers who had finally earned #1 Honor Roll status were now bumped back a notch. Several hundred DXers at the top of the Honor Roll now found themselves lacking one country. Plus a few hundred more DXers were knocked off the Honor Roll all together, as they were now ten countries from working them all, rather than nine, and thus off the Honor Roll.

When the 1995 demonstration was not

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 330 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement sticker s is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

CW

K2TQC 330	EA2IA 329	K8PV 327	4N7ZZ 326	DL3DXX 324	IT9ZGY 320	N4AH 315	VE9RJ 309	KH6CF 300
K2FL 330	K2JLA 329	W4QB 327	DJ2PJ 326	N6AR 324	HA5NK 319	AA2X 314	9A2AJ 309	YV5ANT 299
K6JG 330	W7OM 329	K9MM 327	WB5MTV 326	IT9VDQ 324	K2JF 319	WB4UBD 313	HB9DDZ 307	KØHQW 299
K2OWE 330	KZ4V 329	F3AT 327	W4LI 325	W6SR 323	K6CU 318	N1HN 313	WG5G/QRPp 307	K9FYZ 297
N4JF 330	WØHZ 329	I1JQJ 327	K9IW 325	VE7CNE 323	VE7DX 318	YU1AB 312	W4UW 307	LU3DSI 295
K9BWQ 330	K4CEB 329	W7CNL 327	I5XIM 325	IT9QDS 323	N6AV 318	K9DDO 312	CT1YH 305	KB8O 292
K1MEM 330	W4OEL 329	I4LCK 327	WA8DXA 325	K5UO 322	VE7DX 318	W3II 312	W7IIT 305	DJ1YH 288
K2ENT 330	N7RO 329	N5FG 327	N5FW 325	KA7T 322	I2EOW 318	YU1AB 312	CT1YH 305	YU7FW 286
K6LEB 330	F3TH 328	I4EAT 327	IK2ILH 325	KUØS 322	G3KMQ 317	K1VHS 311	KE5PO 304	EA3BHK 282
W2UE 330	K6GJ 328	DL8CM 327	9A2AA 325	ON4QX 321	NØFW 317	K7JS 311	G2FFO 303	YC2OK 280
W6DN 330	PAØXPQ 328	W1WAI 327	OK1MP 325	KA5TQF 321	LA7JO 316	WA8YTM 311	IKØADY 302	EA2CIN 278
N7FU 330	WØIZ 327	K4IQJ 326	W8XD 324	K9QVB 321	N5HB 316	N6AW 311	K1FK 302	PY4WS 276
N4MM 330	SM6CST 327	NC9T 326	K8LJG 324	HA5DA 321	K4JLD 316	OH3NM 310	N4OT 301	KF8UN 276
G4BWP 330	W2FXA 327	IT9TQH 326	K4CN 324	N4CH 320	K8JJC 315	OZ5UR 310	W6YQ 300	G3DPX 275
K3UA 329	N4KG 327	WA4IUM 326						

SSB

K4MZU 330	K1UO 329	WD8MGQ 327	W9SS 325	KC8EU 323	LU1JDL 320	WS9V 316	DK5WQ 305	N6CFQ 290
K2TQC 330	W7FP 329	I1EEW 327	WA4IUM 325	VE4ACY 323	KF8VW 320	W5NW 315	EA5OL 305	WZ3E 290
K2FL 330	K9BWQ 329	IØZV 327	VE3GMT 325	W2FGY 323	G4ADD 320	KV2S 315	WB2AQC 305	WG7A 290
EA2IA 330	VE3MRS 329	SV1ADG 327	W4EEE 325	YV5CWO 323	I4WZK 320	WA9RCQ 315	K6CF 304	IK2PZG 289
W6EUF 330	N5FG 329	VE3XN 327	KE4VU 325	I8KCI 323	I4SAT 320	N3ARK 315	KC4FW 304	VK3IR 289
K2JLA 330	WS9V 329	K9MM 327	WA4WTG 325	VE4AT 323	K6BZ 320	K7TCL 315	EA5GMB 304	KF7VC 288
K6JG 330	ZL1AGO 329	DL8CM 327	WD8PUG 325	KD5ZM 323	EA3EQT 320	I4CSP 315	EA3CWK 303	OK1AWZ 287
K6GJ 330	I8KCI 329	KE4VU 327	W2CC 325	KA5TTC 323	KØFP 320	WB8ZRV 314	EA3BT 303	IK2DUW 287
N4MM 330	4Z4DX 329	I1JQJ 327	PT2TF 325	KB2MY 323	KE3A 320	NØAMI 313	YC2OK 303	EA5GMB 287
K2ENT 330	N4CH 329	K9PP 327	KM2P 325	EA3BKI 323	N4CSF 320	OH5KL 313	WB2NQT 303	TU2QW 286
N4JF 330	KØKG 329	OZ5EV 327	N5FW 325	K8YVI 322	NI5D 320	WDØDMN 313	CT1YH 302	NM5O 285
VE1YX 330	WØYDB 329	CT1EEB 327	K9HDZ 325	K9HQM 322	N4HK 320	K9YY 313	W5GZI 302	EA1AYN 285
K5TVC 330	LA7JO 328	W4QB 326	WA3HUP 325	KC5P 322	DL3DXX 320	W9IL 313	N5QDE 302	VE7HAM 285
K6YRA 330	OE2EGL 328	WB4UBD 326	YV1CLM 325	WW1N 322	AE5DX 320	W1LQQ 313	KD4YT 302	IK2HBX 284
YU1AB 330	KZ4V 328	W2FXA 326	N6AW 325	W6SHY 322	WA4DAN 319	KD5ZD 312	RA2YA 301	KE6CF 283
PY4OY 330	K4JLD 328	K8PV 326	ZP5JCY 325	W3AZD 322	KI3L 319	N5HB 312	W2LZX 301	KK4TR 283
XE1L 330	I2EOW 328	NC9T 326	WB3DNA 325	CE7ZK 322	XE1MD 319	IN3ANE 311	N3RX 301	K7HG 283
W7OM 330	W4NKI 328	K5UO 326	XE1AE 325	LU7HJM 322	KB1JU 319	F1OZF 311	YT7TY 300	YC3OSE 282
K4MQG 330	PAØXPQ 328	W6SR 326	KE5PO 325	K5NP 322	PY2DBU 319	EI6FR 311	W5OXA 300	WN6J 281
I4LCK 330	VK4LC 328	W4LI 326	TI2CC 325	KB8O 322	IØSGF 319	YZ7AA 311	K3LC 300	CP2DL 281
VE3MR 330	VE2WY 328	WDØBNC 326	K1HDO 325	YV1JV 322	KF8UN 319	GM4XLU 311	WA4ZZ 300	YU1TR 280
K7LAY 330	VE2PJ 328	N4KG 326	YV5IVB 325	VE4ROY 321	W2FKF 319	KA5RNH 310	YV4VN 299	KN4RI 280
W7BOK 330	W2JZK 328	VE2GHZ 326	KD8IW 325	XE1CI 321	F6BFI 319	I2MQP 310	LU3HBO 299	WD9ACQ 280
4N7ZZ 330	DL9OH 328	KA3HXO 325	W8KS 325	LZ1HA 321	N6RJY 319	HA6NF 310	WB6GFJ 299	OA4EI 280
IK1GPG 330	W6BCQ 327	KF7SH 325	N2VW 325	WA5HWB 321	ON5KL 319	KF7RU 310	KJ9N 298	KK5UY 280
IK8CNT 330	VE7DX 327	YV5AIP 325	IKØIOL 325	TI2JJP 321	AA4AH 318	AB4IQ 310	KB5WQ 295	WØIKD 279
K5OVC 330	AA6BB 327	K9IW 325	YU1HA 325	W8AXI 321	KF5AR 318	W4WX 310	SV1RK 295	EA3CWT 278
DJ9ZB 330	SM6CST 327	WA4JTI 325	N6AR 324	W6MFC 321	I8IYW 318	EA5RJ 309	YT1AT 294	LU5EWO 278
W6DN 330	W3GG 327	YV1AJ 325	W4UW 324	EA8TE 321	WA8YTM 318	CT1EEN 309	IT9VDQ 293	EA3CWT 278
NØFW 330	I4EAT 327	YV1KZ 325	I8LEL 324	W5XQ 320	KX5V 318	EA5KY 308	KJ5LJ 293	9A9R 277
N7RO 330	W4UNP 327	DL6KG 325	IT9ZGY 324	KA5TQF 320	CE1YI 318	EA3CB 308	TI2LTA 292	K3LC 277
KZ2P 330	F9RM 327	9A2AA 325	K6LEB 324	W7ULC 320	K4JDJ 318	EA3BHK 307	K2EEK 292	VE2DRN 277
EA4DO 330	OZ3SK 327	OK1MP 325	IK1GPG 324	TI2HP 320	ZL1BOQ 318	VE3CKP 307	W6WL 291	KC6AWX 276
ZL3NS 330	CX4HS 327	WB3CQN 325	VE7WJ 324	WØULU 320	K9QVB 318	N6AV 306	YB1RED 291	SV2CWY 276
OE3WWB 330	K7JS 327	I2QMU 325	AI8S 324	KB1HC 320	WA6DTG 317	TI2TEB 306	DJ2UU 291	F5NBX 275
XE1VIC 330	DU9RG 327	KB4HU 325	AC7DX 324	OA4QV 320	EA1JG 317	VE3DLR 306	4X6DK 291	VE2AJT 275
K9FYZ 330	IT9TQH 327	KC4MJ 325	KØHQW 324	OE6CLD 320	N5HSF 316	W3YEY 306	WA3KKO 290	US1IDX 275
K3UA 329	IT9TGO 327	CX2CB 325	K2JF 324	W5RUK 320	K6RO 316	XE1MDX 305	OE7KWT 290	Z31JA 275

RTTY

K2ENT 325	WB4UBD 309	K3UA 301	G4BWP 287	W4QB 280	W4EEU 280	YC2OK 280	KE5PO 274	PAØXPQ 272
W2JGR 316	NI4H 305	I1JQJ 289	EA5FKI 284					

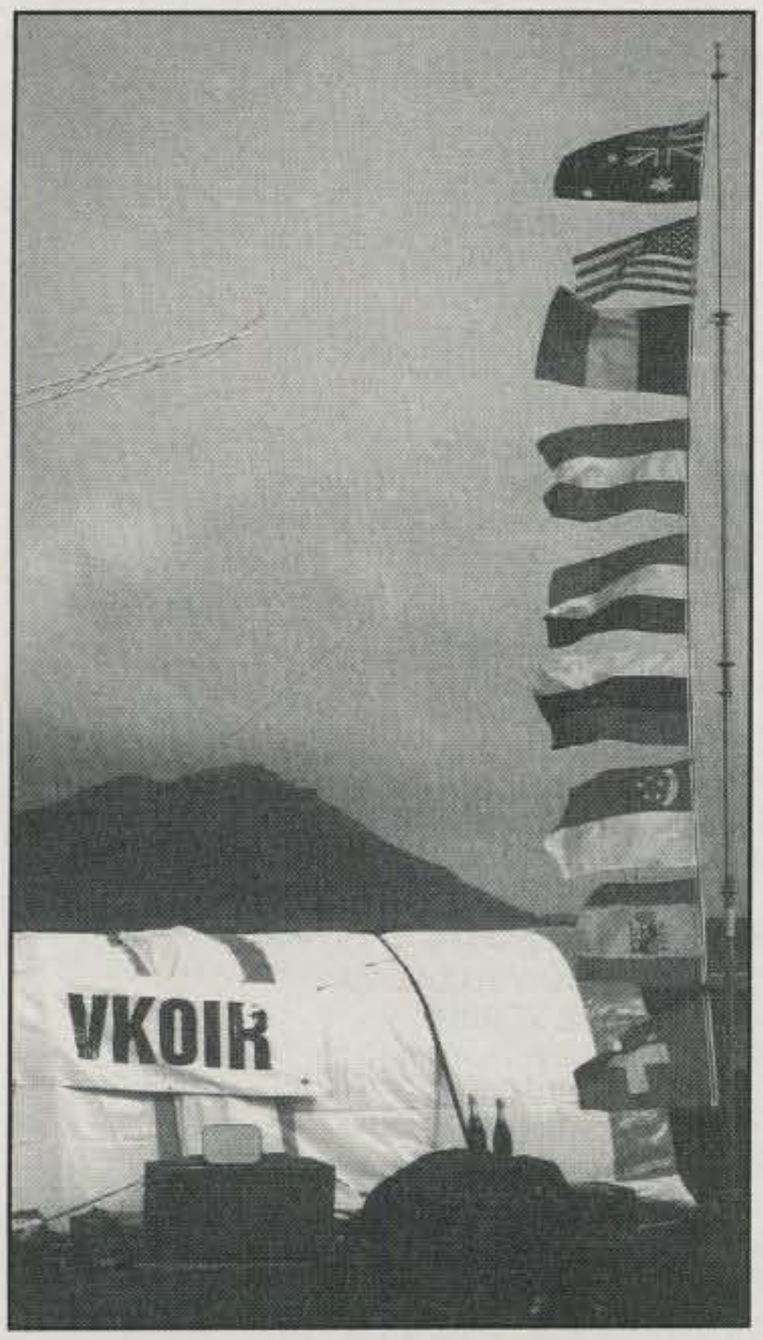
immediately followed by a larger operation, DXers began to grumble. Some complained that an operation that made so few contacts should never have been accepted for DXCC credit. However, Bill Kennamer, K5FUV, of the DXCC desk pointed out that other operations with fewer contacts had been approved for DXCC credit, including a Heard Island operation.

Other DXers argued that since this operation was for demonstration purposes and did not mark the beginning of real amateur radio in North Korea, it should not count for DXCC credit. They pointed to the ZA1A Albania operation as the way a first-time (or at least first-time in many years) DXpedition should be conducted.

While these arguments had some merit, they were not enough to convince the DXCC desk to change its mind about the P5/OH2AM credit. North Korea remained on the DXCC, topping *everyone's* Most Wanted list.

The situation peaked at the 1999 International DX Convention in Fresno, where a west-coast DXer circulated a petition to have North Korea removed from the DXCC list until at least 10% of active DXers had worked the new entity. (This would be about 600–700 DXers, based on the ARRL annual DXCC list.) While the petition did not receive wide-spread support, the mere fact that it was being openly circulated showed the extent of the unrest of DXers' feelings about North Korea, four years after the P5/OH2AM operation.

The recent **P51BH** will not satisfy demand for North Korea. Not all of the lucky 263 DXers who worked the station will be in a position to move up to #1 or back onto the Honor Roll, but many will be. The number of contacts represents closer to five percent of active DXers, not up to the level requested in the petition that was being pushed at Fresno.



The VKØIR Heard Island operation was a good example of the DX rule that good things come to those who wait.

However, the important point of the P51BH operation is that it shows progress. Consider that the Korean conflict is more than 50 years old, and other signs of North Korea moving in step with the rest of the world are non-existent. The fact that Martti was able to get on the air at all, and operate for a few hours, is a very positive indicator. Probably not tomorrow nor next week, but someday, someday relatively soon, North Korea will be available to all DXers. Then we can go back to worrying about Bhutan. . . .

The P51BH operation is a great lesson for new DXers. Not all countries are workable at any given time. For logistical or political reasons, some countries are simply off limits at any given time. However, one of the most important attributes of a true DXer is patience. You can't work every DXCC entity in a given year, or even in a given five-year period. But if you hang in there, keep well informed, pay attention to what's on the air, and work everything you hear, you will eventually find yourself on the Honor Roll. If you don't make any major mistakes, you can even find yourself on the top of the Honor Roll.

Such an honor doesn't come without a price. While perhaps the most frustrating of all DX obstacles to overcome, the passage of time is an important part of DXing at the top level. This means having faith that eventually, someday, that rare one you need to get on the Honor Roll *will* come on the air. Thanks to P51BH, 263 DXers had their faith rewarded. The rest of us (your editor included) will have to wait for the next North Korea operation. Yes, there will be another operation. Just have faith.

The WAZ Program

Single Band WAZ

15 Meter SSB

522 .....N4PQX

15 Meter CW

275.....JF2UPM 276.....K5MC

17 Meter CW

25.....OH3YI

20 Meter SSB

1042 .....JL7BRH 1044.....KF2ZO
1043 .....W6ND 1045 .....KKØDX

30 Meter CW

27 .....K9FD 29 .....OH3YI
28 .....W1WAI

40 Meter SSB

89.....DK5AD

160 Meter WAZ

137.....new all 40 zones OZ7YY
138.....new all 40 zones OH3YI
128.....36 zones endorsement.....EA6NB

All Band WAZ

SSB

4475.....XE2NLD 4480 .....5A1A
4476.....JM1FUW 4481 .....W7YW
4477 .....G3LOJ 4482.....WB4MOG
4478 .....N1RT 4483.....N2BYM
4479 .....JK4UOQ 4484 .....WB2ZTH

CW/Phone

7842.....YO2CMI 7845 .....W7YW
7843.....K1JN 7846.....AH7A
7844.....GMØKWL 7847 .....WB2ZTH

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.

DX News

Charlie, K4VUD, has a new callsign in Nepal—**9N7UD**. Visitors to Nepal will now receive a 9N7 prefix.

The **"DX News Sheet"** ("DXNS") formerly published by the Radio Society of Great Britain has ceased publication. The "DXNS" was founded in 1962 by CQ DX Hall of Famer Geoff Watts, BRS 3129. (Geoff never held an amateur license.) This was the first of the DX bulletins, and for many years was considered one of the top two such publications in the DX world.

CQ DX Awards Program

SSB

2270.....K9FYZ
2271.....KK5UY
2272.....DS4BBL

CW

989.....OK2PKY

SSB Endorsements

320.....ZL3NS/330
320.....OE3WWB/330
320.....KØKG/329
320.....W2JZK/328
320.....VE2PJ/328
320.....VE2GHZ/326
320.....OE7SEL/325
320.....W6MFC/321
320.....KB1HC/320
320.....K6BZ/320
310.....W2FKF/319
310.....PY2DBU/319
310.....ZL1BOQ/318
275.....KK5UY/280

CW Endorsements

320.....N4MM/330
320.....G4BWP/330
320.....W4OEL/329
320.....W1WAI/327
300.....W4UW/307
275.....G3DPX/275

RTTY Endorsements

300.....N4MM/330
275.....G4BWP/289

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 each plus SASE. Updates not involving the issuance of a sticker are free. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 330 active countries. Please make all checks payable to the award manager.

The RSGB took over publication of the "DXNS" after Geoff retired in 1982. Increasing printing and postage costs, as well as the wide availability of DX information for free on the Internet, contributed to the demise of the "DXNS."

Scottish DXers may mark the formation of their first Parliament in 300 years by substituting **2S** for the GM prefix until the end of July. QSL to the corresponding GM callsign.

The West Island ARC of Montreal, Canada plans an operation from St. Paul Island as **CY9CWI** July 21–28. On CW try 1830, 3505, 7005, 10105, 14010, 18080, 21010, and 28010 kHz. On SSB watch 3780, 3860, 7065, 7230, 14265, 18125, 21305, 24935, 28395, and 50130 kHz. They will be active in the IOTA contest July 24-25. QSL to the club: VE2CWI West Island ARC, P.O. Box 884, Dorval, Quebec H9R 4Z6, Canada.

DX news is provided by "The Daily DX," a daily electronic DX newsletter. Subscriptions to "The Daily DX" are $28 for 6 months (25 weeks), or $49 for 12 months (50 weeks). Send check or money order to "The Daily DX," 3025 Hobbs Road, Glenwood, Maryland 21738-9728 US.

DX Conventions

The Pacific Northwest DX Convention will be held July 30–Aug. 1 at the Monarch Hotel in Portland, Oregon. The sponsor this year is the Willamette Valley DX Club, which has a web page at <qsl.net/wvDXc>. In addition to the usual DX programs, the convention will offer QSL card checking for DXCC, pick-up of W7 bureau cards, and more. To register, contact the club at it web site or via convention chairman Al Rovner, K7AR, at <K7AR@qsl.net>. This is one of the best of the regional DX conventions and is a good time.

The eighth annual New Orleans International DX Convention will be August 27-28 at the Royal Sonesta Hotel in the historic French Quarter in New Orleans. Save the dates. More info next month.

QSL News

Mario Lovric (ex-DL1FDV) is now DJ2MX. He handles cards for **T94DO, T94DX, VK4SK, 4N4MX,** and **DL/4N4MX**. His new address is Am Oelberg 11, 61231 Bad Nauheim, Germany. He notes that US$1 is not enough for airmail postage back to the US. Send US$2 or one IRC. Cards received without sufficient postage for airmail return will be answered via the bureau system.

Mike, K5ZM, reports receiving cards for **VP5Z**. He is not the manager. These cards should go to Joe, W5ASP.

The Golist has a new web site and some new features. Visit it at <www.itis.net/golist/>.

73, Chod, VP2ML

QSL INFORMATION

3B9R to N7LVD
3D2AA to VK2KN
3D2HI to JA1KJW
3D2KZ to JA8VE
3D2SH to JA1JQY
3D2TK to JA3MCA
5N9CEN to IV3VBM
7J1YAJ to JH1AJT
8Q7QQ to HB9QQ
9K2F to 9K2RA
9N1UD to K4VUD
9N7UD to K4VUD
A41KJ to N5FTR
CE3/NE4Z to AJ4Y
CU3AV to KB5IPQ
D25L to PA1AW
D2GG to CT1GG
DX1DX to DU1SAN
EK6CC to N8BGD
EK7DX to F5LGQ
EP3HR to I2MQP
EX8W to UA3AGS
EY9/RA3OO to DJ1SKO
GS2MP to ZS5BBO
H2T to 5B4HF
HD2RG to HC2RG
HG1S to HA1KSA
HH2/KBØQNS to KB5IPQ
HH2/N3SIY to NØJT
HL9JF to KB5IPQ
HR2A to KB5IPQ
HR2KOS to KB5IPQ
HR2RDJ to KB5IPQ
J28DB to F4AAQ
J37LK to KB5IPQ
KH2/N4GFO to KB5IPQ
KL7IYD to KB5IPQ
L44D to LU4DFH
L75CB to LU4AA
LTØH to LU3HY
LZ9A to LZ2CC
M8T to G4PIQ
OHØKCB to OH3KCB
OHØR to OH2TA
OL6X to OK1DIG
R1FJL to UA3AGS
RA9DX to SP7LZD
RA9YN to DL6DK
RW2F to DK4VW
RZ3Q to N2UCK
SN2B to SP2FAX
SU3AM to DL1FCM
T22JY to JA1JQY
T22KJ to JA1KJW
T22VE to JA8VE
T88DX to JI3DLI
V31RA to WB7AXP
VKØTS to VK1AUS
VQ9DX to AA5DX
VY1JA to KB5IPQ
XE1/NP2AQ to W3HNK
XE2UVB to KB5IPQ
XX9TSS to JK2PNY
YI1SEA to WA3HUP
YI9CW to SP5APT
YN4/WK6O to KB5IPQ
YN4ZUJ to KB5IPQ
YS1ZV to KB5IPQ
ZS6/PA3DZN to PA1AW
ZZ7Z to PR7AR
5H3RK to Ralph Karhammar, P.O. Box 9274, Dar es Salaam, Tanzania
5N8LRG to George Fahel, P.O. Box 335, Kano, Nigeria
9G5DX to Kazuo Takasaki, 410-110-807, Hazawa, Kanagawa-ku, Yokohama 221-0863, Japan

9H1XT to John Scicluna, Dar tal-Hena, Orlando Zabbar st. Xghajra ZBR08, Malta
9K2/KM5FY to Joda C. Taylor, Unit 69000, Box 23, APO AE 09880
BA8SA to C. C. Chao, 202-1-20-2 Xin-Yin Group, Kunming 650233, China
BD7JG to Jian, P.O. Box 1711, Guangzhou 510600, China
BPØRIW to Teruji Hosokai, 3095 Yanokuchi, Inagi City, Tokyo 206-0812, Japan
BV3/JAØID to Teruji Hosokai, 3095 Yanokuchi, Inagi City, Tokyo 206-0812, Japan
BV5CM to Randy, P.O. Box 378, Chang Hua, Taiwan
BV7FD to Huang Ping-Fu, P.O. Box 4, Fongshan City, Kaohsiung, Taiwan
C31UA to Carles Munoz Hilpke, Hotel Festa Brava, Carrer Llacuna, 7, Andorra la Vella, Andorra
CU3BL to Simoes CM de Alem, 16 Terra Cha, P-9700-703 Angra Do Heroismo, Terceira, Acores, Portugal
CU7AA to Altino da Costa Goulart, Rua Principe Alberto do Monaco, 18, P-9900 Horta, Faial, Acores, Portugal
DS1DHP to Seung Kuk Lee, Da-301 Oh-sung Villa 544-6, Shin-Chun Dong, Shi-Hung City, Kyunggi-Do 429-020, Korea
DS2AXU to Sang Yong Yun, P.O. Box 80, Pyong Taek 450-600, Korea
DS2HUM to Hwa Soo Kim, Nam-Inchon P.O. Box 340, Inchon City 405-600, Korea
DS2KKM to Chul Jin Kim, Nam-Inchon P.O. Box 340, Inchon City 405-600, Korea
DS4NKC to Sung-No Lee, Smaik APT 605, Samchun Dong1Ga, Wansan Gu, Chonju, Chonbuk 560-291, Korea
DS4NSE to Chung Ki Yon, 107-305 Seoho Apt., 153-12 Nawun-dong, Kunsan, Chonbuk-do 573-350, Korea
DS5RNM to Joonha Lee, Kyeungnam Town 9-1005, 113, Hwangkum-Dong, Suseong-Ku, Taegu 706-040, Korea
DS5SIJ to Young-Kwan Bak, P.O. Box 4, Waegwan, Waegwan-Up, Chilgok Gun, Kyoung Buk, Korea
DS5SYF to Tai Sik-Choi, 1-15 Dae Do Dong, Pohang 790-140, Korea
DS5TXN to Dae Sik Kim, 301, Jogyo-Dong, Youngchun-City, Kyungbuk 770-120, Korea
DS5UCP to Wang Jae Lee, 102-1201, Ssangyong-APT, Yongheung-Dong, Buk-ku, Pohang 791-170, Korea
DS5VUP to Eun Hee Kim, 102-1201, Ssangyong-APT, Yongheung-Dong, Buk-ku, Pohang 791-170, Korea
DS5VXK to Yoon Chun Hae, 103-807, DongSeo Youngnam APT., GuAm-Dong, Puk-Ku, Taegu 702-280, Korea
DS5WQT to Jun Won Ahn, P.O. Box 8, YongJu 750-600, Korea
DS5WSA to Jong-Jik Jeong, P.O. Box 4, Ponghwa 755-800, Korea
DS5WUW to Lee Jeum Suk, 103-807, DongSeo Youngnam APT., GuAm-Dong, Puk-Ku, Taegu 702-280, Korea
DS5WUX to Yoon Young Ouk, 103-807, DongSeo Youngnam APT., GuAm-Dong, Puk-Ku, Taegu 702-280, Korea
DU1IMA to Rey Lachica, P.O. Box 394, Puerto Princesa City, Palawan 5300, Philippines
DU3BBY to Robert V. Del Rosario, P.O. Box 52890, Angeles City Main Postal Office, 2009 Pampanga, Philippines
E21EIC to Chalermpol Muangamphun, P.O. Box 1090, Kasetsart, Bangkok 10903, Thailand
E21IZC to Wichyein Tretrantipvikul, 716/26 Soi Watjannai Bangkorlhamp, Bangkok 10120, Thailand
E21NPZ to Tinkon Khongkaew, 59/166 Phetkasem 94, Bangkok 10160, Thailand
FG5FU to Rony Serin, Saint Robert Road, F-97123 Baillif, France
HD1J to Keith Clukey, P.O. Box 17-17-691, Quito, Ecuador
HI3HN to Nikolaus Henning, P.O. Box 119, Santiago, Dominican Republic
HLØB to Amateur Radio Club, Kwangwoon University, 447-1 Weolgye-Dong, Nowon-Gu, Seoul 139-701, Korea
HL1ISR to Myung-Jae Park, 293-17, Pyungchang-Dong, Chongro-Ku, Seoul 100, Korea
HL1LTZ to Hong Sung Song, 1034-5, Sadang-Dong, Dongjack-Ku, Seoul 156-091, Korea
HL1MSE to In Kol Yu, Shibum APT 16-23, 50, Yoido-Dong, Youngdeungpo-Ku, Seoul 150-010, Korea
HL1MSF to Woo Jeong Nam, Shibum APT 16-23, 50, Yoido-Dong, Youngdeungpo-Ku, Seoul 150-010, Korea
HL1ORP to Hyun Sun Oh, 226-6, Seongnae-2Dong, Kangdong-Ku, Seoul 134-032, Korea
HL2DJW to Choi Kyu-Bum, Bongyang 1-Ri, Jeongseon-Eup, Kangwon-Do 233-800, Korea
HL2DKL to Park Dong-Suk, Bongyang 1-Ri, Jeongseon-Eup, Kangwon-Do 233-800, Korea
HL2IGU to Ahn Kwang Phil, M. D., 526-2 Ganseok-Dong, Namdong-gu, Inchon 405-230, Korea
HL2LMW to Moon Bok Gwi, #1007-104, Jukong APT, 550, Eunhaeng-2dong, Jungwon-ku, Seongnam 462-152, Korea
HL2WA to Lee Dong Kyu, #1007-104, Jukong APT, 550, Eunhaeng-2dong, Jungwon-ku, Seongnam 462-152, Korea
HL3ADI to Bae Jeong-Ho, P.O. Box 50, Taejon 300-600, Korea
HL3ENE to H. K. Shin, P.O. Box 73, Chung-Buk 380-600, Korea
HL3QPZ to Cho Sung-Hun, C. P.O. Box 35, Chonan, Chungnam, Korea
HL4GGS to Byung Kwon Kim, 102-70, Kumam2Dong, Jeonju 560-182, Korea
HL4XM to Jae-Ha Kim, P.O. Box 211, Kwangju 501-600, Korea
HL5AEX to Bak, P.O. Box 97, Kyongju-City 780-600, Korea
HL5AP to Byong-Joo Cho, P.O. Box 4, Haeundae, Pusan 612-600, Korea
HL5BTF to Yun-Hee Kim, 304-1406 Jugong APT, Danggam 3-dong, Jin-Goo, Pusan 614-103, Korea
HL5FOP to Ray, P.O. Box 97, Kyongju-City 780-600, Korea
HL5FXP to Gag-Hyeon Won, P.O. Box 1049, Kumi, Kyeong-Buk 730-600, Korea
HL5KY to Yun-Jae Joe, 304-1406 Jugong APT, Danggam 3-dong, Jin-Goo, Pusan 614-103, Korea
HL5NAE to Lee Byung Bok, P.O. Box 71, Taegu 701-600, Korea
HL5NUX to Joon-Sig Kang, P.O. Box 1049, Kumi, Kyeong-Buk 730-600, Korea
HL5YI to Chae Sang Su, Dong Myung Technical High School (Electrical Dept.), Yong Dang Dong, Nam Gu, Pusan 608-080, Korea
K7DBV/HR3 Gene A. Williamson, 2160 Fairway Loop, Eugene, OR 97401 to
HR5AAP to Angel Alfonzo Paz, Santa Barbara, S. B., Honduras
HSØXNO to Isared Jindanon, 287/59 Moo 2, Vangthonglang, Bangkapi, Bangkok 10310, Thailand
HS1CKC to Winit Kongprasert, 49/203 Jangwattana Road, Prakket, Nontaburi 11120, Thailand
HS1NGR to Chartchai Varavisudthsarakul, P.O. Box 20, Langsuan, Chumphon 86110, Thailand
HS4BPQ to Prayong Dungnoei, P.O. Box 26, Narathiwat 96000, Thailand
HS6NDK to Sonthaya Phanthanyakij, 201/1 M. 3 Nakhonderd, Srinakhon, Sukhothai 64180, Thailand
HS8AS to Radio Amateur Society of Suratthani, P.O. Box 66, Suratthani 84000, Thailand
HS9EQY to Nongyao Wongmongkoldej, P.O. Box 33, Muang Trang 92000, Thailand
J43PTR to Radio Amateur Association of West Peloponese, P.O. Box 12, GR-260 03 Patra, Greece
J6/K3LP to David Collingham, 13422 Autumn Crest Court, Mt. Airy, MD 21771
JT1BE to R. Timur-Ochir, P.O. Box 639, Ulanbator 13, Mongolia, via Japan
LX1SP to Schartz Louis, 3, rue du Nord, L-4469 Soleuvre, Luxembourg
P29KPH to Peter Holliday, S. I. L., P.O. Box 384, Ukarumpa, EHP 444, Papua New Guinea
SV1CID to Konstantinos Bakolitsas, Papastratou 42, GR-301 00 Agrinion, Greece
SV1CQN to Kostas Karakostas, Anapafseos 4, GR-301 00 Agrinion, Greece
SV1MF to Markos, 28 Evagelistrias str., GR-185 32 Piraeus, Greece
SV1PS to George Roiniotis, P.O. Box 3564, GR-102 10 Athens, Greece
SV3BSF to Nikos Karkavelias, P.O. Box 1161, GR-261 10 Patra, Greece
SV5DZX to George Karaiskos, P.O. Box 73, GR-852 00 Kalymnos, Greece
SV8JE to Chris Plessas, G. Doriza 3, GR-281 00 Argostoli, Greece
T3ØED to Fr. Steve Dives MSC, P.O. Box 1354, Suva, Fiji
T32LN to Tekinaiti Kaiteie, Ronton Village, Kiritimati Island, Kiribati
TG9RF to Rodolfo Chenal Luna, 2a Av. 3-47, Colonia Ribera del Rio, San Miguel Petsas, Guatemala
TI2SSI to Luis Gustavo Saborio Sanchez, P.O. Box 456, 2300 Curridabat, Costa Rica
V51HK to Karl-Heinz Kohler, P.O. Box 11184, 9000 Windhoek, Namibia
VP2V/K3MD to John Thompson, 1047 Treasure Lake, DuBois, PA 15801
VR2BG to Brett Graham, P.O. Box 12727, Hong Kong, China
VR2JC to The Hong Kong Japanese Club, 38th Floor, Hennessy Centre, 500 Hennessy Road, Causeway Bay, Hong Kong, China
VR2KF to Kazuhiko Fujita, G. P.O. Box 4724, Hong Kong, China
VU2/W9NGA to Don Bergmark, 56 Grandin Drive, Flemington, NJ 08822
VU2ABE to Abie Kenneth Alexander, G. P.O. Box 73, Shillong 793 001, India
VU2DPI to Dilip Kumar Padhi, Hotel Sujata, Sambalpur 768 001, India
VU2NIL to B. K. Chattopadhyay, Plot No. 301, Hijli Cooperative Development Society, Kharagpur 721 306, India
VU2SHO to S. N. Shukla, H. No. 1559, Phase 3B2, S. A. S. Nagar 160 059, India
VU3DJQ to C. K. Raman, G-167/S-2, Dilshad Colony, New Delhi 110 095, India
YB2LAB to H. Budhiono, P.O. Box 123, Purwodadi 58111, Indonesia
YB8FI to Rudy Yanto Siriat, P.O. Box 1636, Bandung 40016, Indonesia
YC6LYS to Lily Suryani, P.O. Box 1603, Medan 20001, Indonesia
ZP7EK to Erwin Kaatz, P.O. Box 51, Villarica, Paraguay

The table of QSL managers is courtesy of John Shelton, K1XN, editor of The Golist, P.O. Box 3071, Paris TN 38242 (phone 901-641-0109; e-mail: <golist@wk.net>).

Announcing:

The 1999 CQ/RJ World-Wide RTTY DX Contest

Starts 0000 UTC Saturday Ends 2400 UTC Sunday
September 25–26, 1999

I. **Announcing:** The 12th annual CQ/RJ WW RTTY DX Contest.

II. **Objective:** For amateurs around the world to contact other amateurs in as many *CQ* Zones and countries as possible using the digital modes.

III. **Contest Period:** 0000 UTC September 25 to 2400 UTC September 26, 1999.

Note: The total contest period is 48 hours. **All stations and operator classes may operate the entire 48-hour period;** there are **no required off time periods** for any entries.

Note the following operator classes.

IV. **Operator Classes:** There is a **High Power** category (greater than 150 watts) and a **Low Power** category (less than 150 watts). **Only** Single Operator **All Band** and **Multi-Op Single Transmitter** entries are eligible to enter the **High** or **Low Power** category. Enter one or the other, and so note on your log. Single Band entries, Single Operator Assisted, and Multi-Multi entries are **not** eligible to enter the High or Low Power category.

1. **Single Operator, All Band and Single Band.** One person performs all operating and logging functions. Use of spotting nets, DX Alert Packet systems, telephone,the internet, etc., is *not* permitted.

2. **Single Operator Assisted, All Band Only.** One person performs all operating and logging functions. The use of DX spotting nets or any other form of DX alerting assistance **is** allowed. The operator can change bands at any time. Single operator stations are allowed only one transmitted signal at any given time.

3. **Multi-Operator, Single Transmitter.** All band entry only. More than one person operates, logs, checks for duplicates, use of a spotting net, etc.

(a) Only one (1) transmitter and one (1) band permitted during the same time period (defined as ten [10] minutes). Once the station has begun operation on a given band, it *must* stay on that band for 10 minutes; listening time counts as operating time.

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

4. **Multi-Operator, Multi-Transmitter.** All band entry only. No limit to the number of transmitters, but only one (1) signal per band permitted.

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

V. **Entry Categories:** Single Operators may enter as (a) All Band High Power or Low Power; (b) Single Band; or (c) Single Operator Assisted All Band.

Multi-Operators may enter as (a) Multi-Op Single Transmitter, High Power or Low Power, All Band; or (b) Multi-Op Multi-Transmitter, All Band.

VI. **Modes:** Contacts may be made using Baudot, ASCII, AMTOR, PACTOR (FEC & ARQ), CLOVER, and Packet (no unattended operation or contacts through gateways or digipeaters).

VII. **Bands:** 80, 40, 20, 15, and 10 meters.

VIII. **Valid Contacts:** A given station may be contacted only **once** per band regardless of the digital *mode* employed. Additional contacts are allowed with the same station on each of the other bands as well.

IX. **Exchange:** Stations within the 48 continental United States and the 13 Canadian areas must transmit RST, State or VE area, and *CQ* Zone number. All other stations must transmit RST and *CQ* Zone number.

X. **Countries:** The ARRL and WAE country lists will be used.

Note: The USA and Canada count as country multipliers. *Example:* The first US State and Canadian area you work not only count as a multiplier for the state or area, but also count as a country multiplier for each band.

XI. **QSO Points:** One (1) QSO point for contacts within your own country. Two (2) QSO points for contacts outside your own country but within your own continent. Three (3) QSO points for contacts outside your own continent.

XII. **Multiplier Points:** One (1) multiplier point for each US state (48) and each Canadian area (13) on each band. One (1) multiplier point for each DX country in the ARRL and/or WAE lists on each band. *Note:* KL7 and KH6 are country multipliers *only* and *not* state multipliers. One (1) multiplier point for each *CQ* Zone worked on each band. Maximum of 40 Zones per band.

Note: Canadian areas are VO1, VO2, VE1 NB, VE1 NS, VE1 PEI, VE2, VE3, VE4, VE5, VE6, VE7, VE8 NWT, and VY Yukon.

XIII. **Final Score:** Total QSO points times the total multipliers equals the total claimed score.

XIV. **Contest entries and logging instructions:** CQ WW RTTY DX logs and forms should be used to facilitate scoring and checking. All logs **must** show:

1. Times in UTC.

2. All sent and received exchanges are to be logged (callsign, RST, Zone, country, State/VE, points claimed).

3. Indicate State/VE area, Zone, and Country Multiplier only the *first* time they are worked on *each band.*

4. Use a separate log sheet for *each band.*

5. A check list of duplicate contacts for *each band* (dupe sheet). Logs must be checked for duplicate contacts, correct QSO points, and multipliers. Submitted logs must show duplicate contacts clearly marked.

6. A *multiplier* check sheet for each band.

7. An overall *summary sheet* showing total QSOs, Points, Zones, Countries, and States/VE areas worked.

8. Each entry must be accompanied by a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

Contest forms are available from *CQ* and the Contest Directors. Please include a large SASE with two units of US first-class postage or IRCs.

9. **Disks:** Logs may be sent on disk. Clearly label the outside of the disk with the call, file names, and type of program. All disks **must** be accompanied by a printed summary sheet, **not** the entire log.

10. **E-mail:** Low Power logs may be sent to <K1RY@contesting.com>; High Power may be sent to <K5DJ@contesting.com>.

XV. **Disqualifications:** Operating in an unsportsmanlike manner, manipulating scores or times to achieve a score advantage, or failure to omit duplicate contacts which would reduce the overall score more than 2% are grounds for disqualification. The use of non-amateur means such as telephones, telegrams, the internet, etc., to elicit contacts or multipliers **during** the contest is unsportsmanlike, and the entry is subject to disqualification. Actions and decisions of the Contest Committee are official and final.

XVI. **Awards:** Plaques will be awarded to the first-place finishers in each of the operator classes. Certificates will be awarded to sec-

ond and third places. Certificates will be awarded to the first-place finishers in each DXCC country. In countries or sections where returns justify, certificates may be awarded to second and third place. All scores will be published. To be eligible for an award, a Single Operator station must operate a minimum of 12 hours, and a Multi-Operator station a minimum of 18 hours. A Single Band entry is eligible for a single band award *only*. If a log contains more than one band, it will be judged an an all band entry, unless specified otherwise. All certificates and plaques will be issued to the licensee of the station used.

XVII. **Deadline:** All entries must be postmarked **no later** than December 1, 1999. An extension may be given if requested. **Low Power logs** should be mailed to: Roy Gould, K1RY, CQ WW RTTY DX Contest Director, P.O. Box DX, Stow, MA 01775 USA (e-mail: K1RY@contesting.com). **High Power logs** should be mailed to Ron Stailey, K5DJ, Co-Contest Director, 504 Dove Haven Drive, Round Rock, TX 78664-5926 USA (e-mail: K5DJ@contesting.com).

XVIII. **Plaques (Donors):** Single Operator and Multi-Operator All Band plaques are awarded to the high scorer, either High Power or Low Power, whichever is highest.

Single Operator, All Band, High Power
World—Dunestar Systems
North America—TG9VT Memorial by K1RY & W2JGR
South America—Donated in the name of Elmers worldwide who help new amateurs get started
Europe—HAL Communications Corp.
Oceania—HamStuff by W7NN
Asia—N5JJ Memorial
Africa—Phil Duff, NA4M
United States—John Devoldere, ON4UN

Single Operator, All Band, Low Power
World—Amateur Radio Trader
North America—Dick Stevens, N1RCT
South America—Jim Hollenback, NK6L
Europe—Don Hill, AA5AU
Asia—Bruce D. Lee, KD6WW
Oceania—Dave Barr, K2YG
Africa—Bill Gallier, W4WX
USA—The New RTTY Journal

Single Operator Assisted
World—*CQ* Magazine
North America—Jeff Bouvier, K1AM
Europe—The New RTTY Journal
Asia—Kazuaki Ohya, JH1HRJ
South America—Great Lakes DX and Contest Club
USA—RTTY by WF1B
Other Continents—Open

Single Operator, Single Band
3.5 MHz—Neal Campbell, K3NC/ON9CNC
7.0 MHz—Tri-County DX Association
14 MHz—Kunihiko Fujii, JH1QDB
21 MHz—Denis Catalano, WD4KXB & Mike Trowbridge, KA4RRU
28 MHz—Open

Multi-Operator, Single Transmitter, High Power
World—Amateur Radio Trader
North America—open
USA—WriteLog Contest Software for Windows (by Ron Stailey, K5DJ)
Europe—Ron Stailey, K5DJ & Wayne Matlock, K7WM

Multi-Operator, Single Transmitter, Low Power
World—HAL Communications Corp.
North America—Don Hill, AA5AU & Eddie Schneider, GØAZT
USA—Platinum Coast Amateur Radio Society
Europe—Euraf Communications, Benin (by Peter Schulze, TY1PS)
Other Continents—Open

Multi-Operator, Multi-Transmitter
World—*CQ* Magazine
North America—The New RTTY Journal
Europe—The W3LPL RTTY Contest Group
Continents—Open

There are many plaques looking for sponsors: High Power, Low Power, Single Band, a specific country, Multi-Op by continent, etc. If you are interested, contact , Ron Stailey, K5DJ, 504 Dove Haven Drive, Round Rock, TX 78664 (e-mail: K5DJ@contesting.com).

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Is There Ever Enough Log Checking?

July's Contest Tip of the Month

As I complete this month's column, I'm about to head out for my annual trek to the Dayton Hamvention. Aside from the usual social benefits of hanging out with my fellow contesters, I'm reminded again that one of the best ways to improve one's contest results is to learn from others. Whether it's at Dayton or a local club meeting, you'll never know how the "other guy" does it unless you ask. There's a lot of experience and brainpower out there in contest-land. And nobody has learned it all. I submit that anyone can benefit from the experiences of others. However, it begins with a little self-initiative. Make the effort to get some free advice this summer. Whether it's antenna theory or identifying the right kind of operating chair to buy, someone will have an answer (or at least an opinion) to your question. The contest e-mail reflectors and club Web sites are a great source to try this out. But you'll never know unless you make the first move. Give it a try!

CALENDAR OF EVENTS

Jun. 26-27	ARRL Field Day
July 1	RAC Canada Day Contest
July 3-4	Venezuela SSB DX Contest
July 4-5	Michigan QRP Club July 4th CW Sprint
July 10-11	**1999 CQ WW VHF Contest**
July 10-11	IARU HF Championship
July 11	QRP ARCI Summer Homebrew Sprint
July 17-18	SEANET CW Contest
July 17-18	North American RTTY QSO Party
July 18	Colombian Independence Contest
July 24-25	Venezuela CW DX Contest
July 24-25	IOTA Contest
July 24-25	Russian RTTY Contest
Jly 31-Ag.1	Georgia QSO Party
Aug. 1	YO DX Contest
Aug. 7-8	North American CW QSO Party
Aug. 7-8	WAE CW Contest
Aug. 7-8	Maryland/DC QSO Party
Aug. 14-15	SEANET SSB Contest
Aug. 21-22	New Jersey QSO Party
Aug. 21-22	North American SSB QSO Party
Aug. 21-22	SARTG WW RTTY Contest
Aug. 28-29	Hawaii QSO Party
Sept. 4-5	All Asian SSB Contest
Sept 5	North American CW Sprint
Sept. 11-12	WAE SSB Contest
Sept. 12	North American SSB Sprint
Sept 25-26	**CQ WW RTTY DX Contest**
Oct. 30-31	**CQ WW SSB DX Contest**
Nov. 27-28	**CQ WW CW DX Contest**

There still may be a few of us left. We're the contest operators who used to operate in years past with huge alphanumeric sheets in front of us that were affectionately known as dupe sheets. It's hard to believe that the average contesters used to spend hours after a contest manually cross-tabulating their logs in an attempt to remove duplicate contacts (now a few spend that time reviewing contest audio tapes—ARGH!).

I remember the old days of contest reporting on 3830 when the fellows would report their scores minus an assumed percentage for duplicates because no one really knew their actual claimed score. And, of course, we used to copy those claimed scores diligently because Internet reporting wasn't even a gleam in someone's eyes. Another example was my first trip to operate a DX contest overseas. It was at HI8XWP with K1DG in tow. Can you imagine hand-duping 8000+ QSOs? Can you begin to count the hours it took to do that? I still have those dupe sheets as a testament to days past.

With the ubiquity of society's PCs now in nearly every amateur's technology arsenal as well, antiquated tools such as the paper dupe sheet are items of the past. However, they raise their ugly heads this month to remind us that the task of log checking is not a new phenomenon, but has been with us for a very long time.

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e-mail: K1AR@contesting.com

Unlike today's computerized era, there once was a time when contesters routinely lost QSOs in checking because they left in a few unintentional duplicate contacts in their submitted log. This is just one small example of the long-standing task of log checking that's been in place for decades. You can see it in the history of the CQ WW Contest Committee, for example, where references are made to the responsibilities of checking logs back in the late '50s by CQ Contest Hall of Fame member Frank Anzalone, W1WY.

In recent years technology has made its mark on both the sport of contesting operating itself and the task of adjudicating the results. Technology's impact on contest operating has been widely discussed in this column and many other places. In fact, I hope to publish the results of this year's contest survey on this very subject in next month's column.

It shouldn't be surprising that we are witnessing the same trend in log checking as well. The question to ask is "Can there be a point when the task of log checking has reached its limit?" Put another way, can we ever over-check logs?

If you're an aficionado of the various Internet e-mail reflectors, you'll have noticed that this very subject is generating almost as much e-mail traffic as individuals actually talking about the sport itself. Why is that so? I think it's obvious to most. Contesters work hard to make QSOs, not so much by the process of saying you're 59NH, but in the effort taken to build a station that gets you to that point in the first place. It shouldn't seem strange, then, that we focus on any task that seemingly reduces the results of that labor.

Let's move forward by identifying a key assumption that occupies most log checker's minds. The reality is that log checkers do not set out on a punitive path to punish the scores of competitors. In fact, they really only have one mission: to identify the real score of a given log submission based on the analysis of who actually made it into each other's log and whether or not they copied exchange information that's mandated by the rules. The process mirrors itself in other phases of life. If you're a teacher, you grade exams. If you're a supervisor, you review critical memos before they are distributed. If you're a police investigator, you gather the facts and reconstruct the key elements of a crime scene.

The fact is that as long as the objective of log checking remains pure, I can see little reason to slow down progress in improving the completeness of the task. It just makes sense.

A log-checking tactic that has raised the eyebrows of more than just the casual operator is the use of penalties or additional scoring reductions for logging errors. Depending on the contest, these reductions can be as much as 2 or 3 additional removed QSOs for every error. Obviously, this can have a dramatic impact on a log's final score. And, it's probably a fair question to wonder why penalties are added to the log-checking mix.

You have to begin by remembering the objective of the log-checking process—to determine the real score of a log submission that's based on who was actually worked, not what was claimed. Like it or not, there is direct correlation between the quality of log checking, its punitive effect, and the attention contest participants place on accuracy. Those of us who have been around the block a while can remember when K1KI showed up at the ARRL

contest desk. Within a few months, everyone was paying attention to logging accuracy. Why? It was because someone was minding the adjudicator's store. The same is happening again now that N1ND is in charge at 225 Main Street. This not to say that the contest community lacks ethics. It's simply a law of nature that logs tend to be more accurate when they are known to be "really checked" vs. when they are not. While it's fair to say that there are diminishing returns to penalizing mistakes (i.e., a reduction ratio of 5:1 would be extreme by nearly anyone's standards), it's equally reasonable to assume that log accuracy generally will improve if a participant knows the downside of errors is meaningful. And if you're the type who has a low error rate, the best advice one can give is to keep doing what you're doing.

Anyone who has had experience in checking contest logs knows that it's a thankless job. You're the referee who is constantly being yelled at by the fans for making the bad call (pardon the contest pun!). And you're rarely thanked for doing a good job. Why do volunteers (in some cases) put up with this nonsense? Sure, there's some ego fulfillment involved here. However, it's fundamentally based on their passion for fairness in contest reporting. One's sloppy logging practice should not be rewarded in the same way a careful operator manages his efforts. As long as the goal of equality and fairness for all entrants remains intact, there is no reasonable limit to what contest adjudicators should do. I welcome your thoughts!

Closing Remarks

Well, that's all for this month. The response to this year's contest survey has been tremendous, especially when W4AN posted the content on his Web site <www.contesting.com>. I guess it makes sense that responses to a technology survey would have their roots in technology. I hope to publish the final results in the next month or so. Be sure to check it out.

As usual, please submit your contest announcements to me no later than August 1st for inclusion in the October issue of *CQ*.

73, John, K1AR

Venezuelan Contest

SSB: July 3–4 CW: July 24–25
0000Z Sat. to 2400Z Sun.

This is the 38th annual contest celebrating Venezuela's independence. It's a worldwide-type contest, so do not confine your activity to working YVs only. Working other DX is encouraged. Use all bands, 80–10 meters (no WARC bands).

Classes: Single Operator, Single and All Band, and Multi-Operator, Single and Multi-Transmitter. (No limit to transmitters, but only one signal per band.)

Exchange: RS(T) and QSO number (e.g., 59001).

Points: Contacts between stations in the same country count as 1 point. QSOs between stations in different countries but the same continent are 3 points. QSOs between stations on different continents are 5 points.

Multiplier: One for each YV call area, and one for each different country worked on each band (including your own).

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

Awards: A plaque will be awarded to the highest scorer in each operating class. Certificates will be distributed to stations making more than 20% of the next highest score.

Use a separate log sheet for each band. Each YV call area (9) and each country (DXCC list) should be indicated in a separate column only the first time they are worked on each band.

Include a summary sheet showing the scoring, your name and address in block letters, and the usual signed declaration that all contest rules and regulations for amateur radio in the country of the contestant have been observed.

Mailing deadline is September 30th for SSB entries and October 31st for CW. They go to: Radio Club Venezolano, Concurso Independencia, P.O. Box 2285, Caracas, 1010-A, Venezuela.

CQ WW VHF Contest
1800Z Sat. to 2100Z Sun., July 10–11

Be sure to review the full set of rules found in the June issue of *CQ*. Mail your logs directly to the Contest Director: Joe Lynch, N6CL, CQ VHF Contest Chairman, P.O. Box 73, Oklahoma City, OK 73101. Please be sure to mark VHF Contest Logs on the envelope.

IARU HF Championship
1200Z Sat. to 1200Z Sun., July 10–11

This is the 14th annual IARU World HF Championship. All six bands, 10 through 160 meters, and the full 24 hours may be used by both single and multiple-operator stations. (No WARC bands.)

Categories: Single Operator, CW only, phone only and mixed modes. Multi-Operator, Single Transmitter, mixed mode only. Stations must remain on a band for at least 10 minutes. (Exception: Only IARU member-society HQ stations may operate simultaneously on more than one band with one transmitter on each band/mode.)

Exchange: RS(T) and ITU zone. HQ stations: RS(T) and official society abbreviation.

Points: Contacts within own zone or with an HQ station count as 1 point. Contacts within own continent but different zone are 3 points and 5 points with different continents.

Multiplier: Total number of ITU zones plus IARU member-society HQ stations and IARU officials worked on each frequency band, with IARU officials representing a maximum of four multipliers per band: AC, R1, R2 and R3. (Note: HQ stations and IARU officials do not count for zone multipliers.)

Final Score: Total QSO points from all bands times the total multiplier.

Awards: Certificates will be awarded to the top scorer in each category, state, ITU zone, and DXCC country. In addition, achievement awards will be issued to those making at least 250 QSOs or having a multiplier of 50 or more.

Entries with more than 500 QSOs are required to include a dupe sheet with log. A three QSO reduction will be assessed for each duplicate QSO for which credit has been taken. Disqualification may occur if the overall score is reduced by 2% or more. You may submit your contest entry electronically. It is recommended that you check out the ARRL's web site at <www.arrl.org> for more detailed infor-

mation. A large SASE with 2 IRCs (or equivalent) will get you official forms and an ITU zone/prefix/continent map. Mailing deadline for entries is August 11th to: IARU HQ, Box 310905, Newington, CT 06131-0905.

North American QSO Party RTTY Contest

1800Z Sat. to 0600Z Sun., July 17–18

The object of this one is to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period. North American stations are defined by the rules of the CQ WW DX Contests with the addition of KH6.

Classes: Single Operator and Multi-Operator, Two Transmitters. Multi-operator stations shall keep a separate log for each transmitter and must have at least 10 minutes between band changes. Use of helpers or spotting nets by single operator entries is not permitted. Single operator entrants may only have one transmitted signal at a time. Output power must be limited to 150 watts for eligible entries. Multi-operator stations may operate for the entire 12-hour period. Single operator stations may operate 10 out of 12 hours. Off-times must be at least 30 minutes in length and clearly marked in the log.

Bands: 80–10 meters only (no WARC bands). You may work a station once per band. Suggested frequencies are 3585, 7085, 14085, 21085, and 28085. Try 10 meters at 1900Z and 2000Z, 15 meters at 1930Z and 2030Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the sum of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian call areas (VE1–VE8, VO1, VO2, VY1, and VY2) and other North American countries. Do not count USA, Canada, KH6, or KL7 as countries. Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of five single operator stations (two minimum) as a single entry unit. **Pre-contest Requirement:** To qualify as a team entry, you must register the name, callsign of each operator, and callsign of the station operated should the operator be a guest at a station other than his own (e.g., N4RJ op. by W4AN). Teams must be registered with K5DJ.

Penalties: For each unmarked duplicate QSO, you lose that contact plus an additional three contacts; for each QSO for which you are not in the other station's log, you lose that QSO plus an additional one contact; and for each QSO for which the log data is incorrectly copied in any respect, you lose that contact. Entries with score reductions greater than 5% will be disqualified.

Awards: Trophies will be awarded for the high score in each of the following categories: Single Operator (W6OTC sponsor) and Multi-Operator (WF1B sponsor). Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each state, province, and North American country.

Send all entries to Ron Stailey, K5DJ, 504 Dove Haven Drive, Round Rock, TX 78664-5926. Entries must be postmarked no later than 30 days after the party to be eligible for awards. Logs may be submitted on disk in the form of MS-DOS compatible ASCII files or .BIN format from WF1B's logging program or via e-mail to <K5DJ@easy.com>.

Russian RTTY WW Contest

0000Z Sat. to 2400Z Sun., July 24–25

This one is sponsored by the Russian

Central Radio Club (RCRC), Ulyanovsk State Technical University (USTU), and the Ulyanovsk Signal DX Club (SDXC) and is open to RTTY enthusiasts around the world on 80–10 meters.

Classes: Single Operator, All Band/Single Band; Multi-Operator, All Band; SWL. Single ops allowed only 36 hours operation. There are no restrictions on length of rest periods.

Exchange: RST + CQ Zone. Russian stations send RST + 2 letters to identify their oblast.

Multipliers: Count each DXCC country and each Russian oblast on each band (band multipliers). Note: CQ zones do not count as multipliers.

Scoring: Credit 5 points for QSOs with on your continent, 10 points for QSOs outside of your continent. Final score is the total QSO points times total multipliers. SWL rules apply as above.

Use separate log sheets for each band. Logs must include: Band, date, and time in UTC, callsign, exchange sent and received, country multiplier, and claimed points. Entries with more than 100 QSOs must submit duplicate check sheets. Multiple operator station should include names and callsigns of all operators. All logs must be send no later than September 1st. Send your logs to: Russian RTTY WW Contest Manager, Yuri Katyutin, UA4LCQ, P.O. Box 1200, Ulyanovsk, 432035 Russia or via e-mail to: <ua4lcq@ulstu.ru>.

Georgia QSO Party

1800Z Sat. to 0359Z Sun., Jul. 31-Aug. 1
1400Z to 2359Z Sun., Aug. 1

Sponsored by the South East Contest Club and Southeastern DX Club, this traditional QSO Party is designed for amateurs outside of the state of Georgia to make contact with as many Georgia stations as possible. Georgia stations work everyone. All stations may operate the full 20 hours on SSB and CW.

Classes: Single Operator; Multi-Operator: Multi-Single, Multi-Multi; Rover, Novice/Technician. Three power output categories for all categories: QRP 5 watts output or less; Low Power 150 watts output or less; High Power more than 150 watts output. Logs not showing power output category will be listed as high power.

Exchange: Georgia stations send signal report and county. Non-Georgia W/VE stations (including KH6/KL7) send signal report and state or VE multiplier area. DX stations (including KH2/KP4, etc.) send signal report and "DX" or country abbreviation.

Scoring: *For Georgia stations*—50 states (including GA), Canada: NS, NB, PEI, NF (VO1, VO2), QC, ON, MB, SK, AB, BC, NW (VE8, VY1, VYØ). DX counts for QSO points, but not for multipliers. A multiplier can be counted once per mode. The maximum is 61 per mode or a total of 122. *For non-Georgia stations*—Georgia counties per mode (a maximum of 159 per mode). Georgia mobile and portable stations that change counties are considered to be a new station and may be contacted again for point and multiplier credit. Final score is total QSOs times total multipliers.

Frequencies: CW 3.545, 3.685, 7.045, 7.110, 14.045, 21.045, 21.110, 28.045, 28.110. Phone 3.850, 7.225, 14.250, 21.300. 28.450. Look for SSB activity on the hour and CW on the half hour. No 160 meter, WARC band, or VHF band QSOs count for the contest.

Awards: Certificates will be awarded to top scorers in each category from each Georgia county, state, Canadian multiplier area, and DXCC country. Second-place certificates may be awarded where the number of entrants justifies it in the opinion of the contest committee. Endorsements or separate certificates will also be awarded for: the high Georgia scorer in each category, high non-Georgia scorer in each category, high scorer outside North America in each category, the Georgia station who contacts the most Georgia counties regardless of mode, the Georgia station in each category who makes the most QSOs, the non-Georgia station who makes the most QSOs, and the non-Georgia station who has the highest multiplier total (most Georgia counties worked on two modes combined).

Entries must be postmarked no later than August 31, 1999. Any logs other than check logs with over 100 QSOs are encouraged to be submitted in computer readable (ASCII) format. Any entrants who submit paper logs with more than 100 contacts must also include dupe sheets. You may submit your contest logs via e-mail to: <k4ea@contesting.com>. Send your summary sheet file and your log file following the ARRL Suggested Standard File Format. Also, you may submit your logs on diskettes, IBM compatible, MS-DOS formatted, 3.5 inch. The log information must be in an ASCII file. Contest logs (paper or diskette) may be submitted via postal mail to: Neal B. Sulmeyer, K4EA, 530 Old Doss Drive, Canton, GA 30114-8057 USA.

Entry forms and a list of county abbreviations are available at the SECC Web site: <http://www.contesting.com/secc/>. Entry forms may be requested by mail. Send a business-sized SASE to: John Laney, K4BAI, P.O. Box 421, Columbus, GA 31902-0421 USA. ■

BY TED MELINOSKY, K1BV

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

Jake Freeman, W5DMH, earned All-Counties #957 on September 24, 1998. Here is his story.

"I was licensed in October 1977 with XYL Jeanette, WDSDMG (now a SK). Our Elmer was Tom Gates, WBSMAH (now ABSG). My radio was an HW 101. Later I got a Sugar Bear 220; it was one of the last amps that came with 10 meters. Both were kits. I used these until I moved to Texas in early 1980. I still have both of them sitting on the shelf above my radio.

"My antenna was a cut-down 11 meter 3-element Radio Shack beam. I was in the Air Force, stationed at England AFB, Alexandria, LA. The antenna was mounted on a 15 foot section of water pipe. I had it anchored with three guy wires. I was living in base housing in a two-story four-plex. My shack was upstairs, which put the radio and myself 4 feet above the antenna. One day I hit one of the guy wires with the lawn mower. Two guy wires will not hold an antenna upright. This took me off the air for several days while I straightened out my aluminum pipe. However, it did survive the fall, and all my neighbors (non-hams) got a good laugh.

"I chased paper on the 10-10 circuit to start with (#20448). I completed WAS #30,738 on February 27, 1979 (10 meter SSB) and completed 10-10 WAS #177 on March 15, 1979. I chased DX for a while. Then I finished #11,871 on July 21, 1981 (mostly 10 meters).

"When I retired from the Air Force in January 1980, I moved to Texas. I drove a truck for a construction company for about 13 years. Working sun up to sun down does not leave much time for radio operation. Ken, WB5AKI (now a SK), lived about a half block down the street from me. He finally convinced me, after about ten years, that I should start County Hunting. He helped me order a set of Hustler antennas for mobile operation. However, before I received them Ken became a Silent Key. This left me to blunder along on my own. It did not take long for the County Hunters to get me straightened out. Of course, I am still learning things.

"My QTH is pretty much in the center of Texas. Needless to say, my hardest state was Texas. N2TPH and N4CD helped me greatly along the way, with about 200 counties. N4CD gave me my last county (Hunt, Texas) for the whole nine yards. It was a 2-2 contact on 20 meters. Then we dropped down to 40 meters. There he was a solid 5-5 or 5-7. I was so excited I couldn't remember which. It didn't matter, because it was for the 20 meter contact.

"Many County Hunters helped me along my four-year trek. As everyone knows, County Hunting is a team effort. I would like to personally shake everyone's hand and thank them. I have met a few of them. They did not look like I expected them to, but you know how that goes.

"There were a few times when I nearly quit hunting counties, mostly when the sunspot cycle got so low. I would go for spells over a week when I didn't hear a mobile running. Most of the time I didn't hear very many fixed stations either. Whenever I got really down and discouraged, I could always listen to W9GPC's quiet, calming voice and go away feeling a lot better.

"I was issued USA-CA #957 on the September 24, 1998, All SSB and Mobile. I started my second time around the next day. I think when I do the fifth time around, I will use only left-handed mobiles!

"On December 30,1998 I received my new Vanity Call, W5DMH. I wanted to keep the DMH, and also I wanted a call that looked like an amateur callsign."—73, Jake, W5DMH

65 Glebe Road, Spofford, NH 03462-4411
e-mail: k1bv@top.monad.net

USA-CA Special Honor Roll

Atlantic Amateur Association K2JG
USA-CA All Counties #971
April 14, 1999

USA-CA Honor Roll

500
N9LEC.....3072
UX2MM 3073
K2JG 3074

1000
UX2MM 1508
K2JG 1509

1500
YU7GMN.....1256
K2JG 1257

2000
K2JG 1156

2500
KD9ZP.....1079
K2JG 1080
W8OP.....1081

3000
K2JG 988

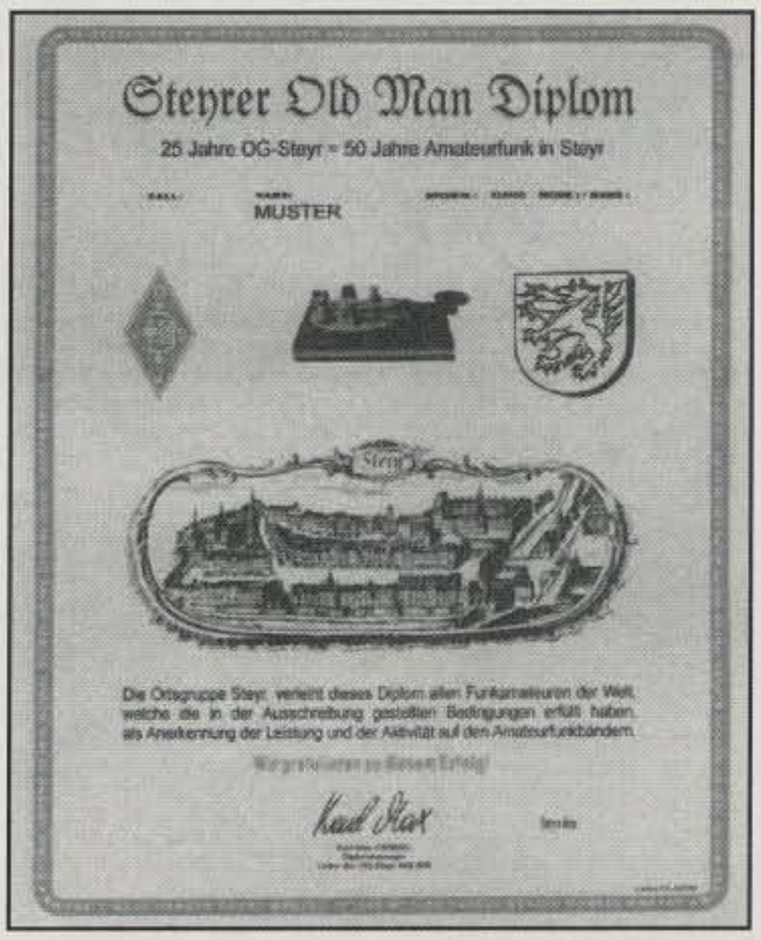
The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from *CQ* Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. 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 March 1, 1997. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 65 Glebe Road, Spofford, NH 03462-4411 USA. DX stations must include extra postage for airmail reply.

DX Awards Available

Austria: Steyrer Old Man Diploma. I understand that the following Austrian award is a "permanent" one, even though it honors the 50th anniversary of the re-establishment of amateur radio in Steyr (and probably all of Austria) several years after the end of World War II.

Lesser known awards such as this can be a challenge. Here are a few tips. Look at the point values. For non-European stations, it looks like the best bet to be able to earn it would be to make the needed contacts on CW. That way, it will take just 5 contacts at 10 points each. But when you're on SSB, it's a lot easier to ask the station for the best way to work additional stations in Steyr, or to see if they can switch to CW to exchange signal reports. You might also ask that station if they know of any period of time when members will be encouraged to be active for award hunters. Note that possession of cards is not needed, and all you have to do is submit a listing.

This award is issued on the occasion of the anniversary of 50 years of amateur activity in the city of Steyr. SWL okay. Work stations in Steyr on or after May 1, 1999. All bands and modes may be used. Fifty (50) points must be earned by contacting



The Steyrer Old Man Diploma issued in commemoration of 50 years of amateur radio activity in the city of Styr, Austria.

The Kamenney Pojas Award, part of the Russian "Upiter" series of awards.

The Ural Samotsvety Award, also one of the Russian "Upiter" awards.

Steyr stations or even by receiving SWL cards where the SWL call starts with OE509. Each phone contact counts 5 points, but CW and VHF contacts count 10 points. Each station may be worked only one time. Endorsements for a single band or mode are available upon request. Send an extract of your log and the fee of DM15 or $US10 to: Karl Max, OE5MXL, Am Dachsberg 16/1, A-4400 Steyr, Austria.

Valid Steyr station list: OE5-AA, AKN, AN, APW, BBO, BHC, BS, CAM, CNM, DEM, FBL, FMP, GA, GL, GSP, HA, HIL, HTN, HXM, HYL, IMP, JWM, KAM, KEN, KPM, LJM, LNL, MG, MHO, MJL, MKM, MXL, NNN, NSL, NXL, PDL, PWL, PV, RI, RTN, SGL, SRN, TRL, UDM, UGM, UY, VOL, VWL, YEO, YVN. OE1YKU, OE3IIM, OE1GSW, ZS5LB. Club station OE5XSP counts double points.

Russia: "Upiter" Club Series. The Russian award scene has undergone quite a reduction in scale in the past few years. The "Upiter" series has survived, however, and a recent letter from them provided samples of the current series. The awards are roughly executed but quite colorful. Their costs have been dramatically reduced to only a few IRCs.

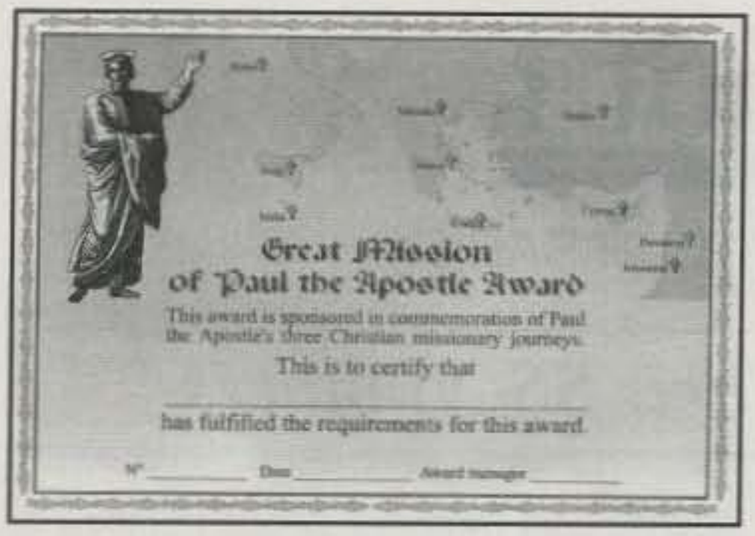
General Requirements: Fee for each award is 6 IRCs. Contacts must be after 1 January 1988. GCR accepted. SWL okay. No mode or band restrictions. Apply to: Vlad Koroljov, UA9CVQ, Club "Upiter," P.O. Box 86, Nizhnij Tagil, Russia 622022.

Kamenney Pojas Award. Contact 10 stations in Oblast 154 (UA9C, UA9D). On 160 meters, only two needed; on VHF, just one QSO. Same station may be contacted on different bands or modes for credit.

Ural Samotsvety Award. Contact 14 different stations which by using the last letter of their calls spells "Ural Samotsvety." At least one of these must be a station from Oblast 154 (UA9C, UA9D).

Georgia: The Georgia Award. This award is an extremely beautiful multi-colored certificate. It's in the form of an intricate scroll-type map with symbols representing the arts, crafts, agriculture, and industry of this little known ancient country on the east end of the Black Sea. The requirements are fairly stiff, due to the rarity of contacts with the country, but its very

The Georgia Award is a beautiful full-color award certificate in its original form.



From the Ukraine comes the Great Mission of Paul the Apostle Award.

For the Worked All Texas Award, Texas counties may be contacted on five levels.

large size and well-executed design make it worth going after. Note that the sponsor has made arrangements with KE1HZ to act as intermediary in handling applications and mailing the award.

Contact Georgian stations on any bands or mode since 1 Jan. 1994. Requirements for CW, SSB, digital, or mixed modes are:

Europe/Asia—need 10 contacts.

Other continents—need 5 contacts.

Requirements for other digital modes:

Europe/Asia—need 2 contacts.

Other continents—need 1 contact.

Repeated QSOs with the same station are allowed if made on different bands or modes. SWL okay. GCR list and fee of $US10 (but no charge if you are handicapped/invalid) to: Shalve Beridze, 4 Libr, Zubalashvilis-50, 380008 Tbilisi, Georgia; *or* to Larry Wilson, KE1HZ, 175 Mulberry Street, Claremont, NH 03743. It is strongly suggested you apply to KE1HZ due to mail problems with fees.

Ukraine: Great Mission of Paul the Apostle Award. There are relatively few DX awards with a religious theme. Victor Ganin, UU5JFY, has designed a handsome certificate that ties together a requirement to contact DX countries of the Mediterranean area with an early Christian motif. Note that the applications are to be sent to a German address to avoid "problems," as Victor puts it so politely.

This award was created to commemorate the Christian Apostle Paul's three missionary journeys through countries in the first century. Earn the award by contacting each of the 10 cities and countries which are documented in Paul's journeys. These are Crete (SV9), Cyprus (5B4), Damascus, Syria (YK), Greece (SV), Jerusalem, Israel (4X), Lebanon (OD), Malta (9H), Rome, Italy (I), Sicily (IT), and Turkey (TA). All bands and modes may be used. There are no time restrictions. SWL okay. GCR list and fee of $US5 or 10 IRCs should be sent to Victor Ganin, UU5JFY, via: Hermann Warneke, Feuerwehrstr. 11, D-28857 Syke, Germany.

USA: Worked All Texas Award

Texas has the largest number of counties of any US state. It makes a lot of sense to do this in steps. I like awards such as this, since they allow you to get the certificate right away and give you a real goal for future operating. You have an added incentive to contact additional Texas stations and ask them what county they're in. It's a good conversation opener. You also have a reason to enter the state QSO parties to increase your totals. And of course, monitoring 14056 and 14336 bring their own rewards, Texas included!

Contact Texas counties in five different levels. No time limitations. All bands and modes may be used. No use of repeaters. The number of counties for each level are:

I—50 counties

II—100 counties

III—150 counties

IV —200 counties

V—All 254 counties

The sponsor requests that you use a special application, which is available for an SASE or may be downloaded at the club page at <http://www.tarc.org>. Holders of the USA-CA All Counties award automatically qualify for the highest level of the award. Just submit your USA-CA award number with the date that the award was achieved. The fee for this special qualification is the basic charge as shown below. GCR is accepted, but requires *three* non-family licensed amateurs. Provide list and fee of $US5 for basic certificate. Each seal for higher endorsements is $US2. Apply to: Worked All Texas Award, c/o Temple Amateur Radio Club, P.O. Box 616, Temple, TX 76503.

URL of the Month

The Russian Robinson Club sponsors an interesting series of awards for contacting Russian Antarctic Bases, Russian Arctic stations, Russian islands, contacts with Franz Josef Land, and Russian Maritime Mobile stations. They use DL6FZG as an intermediary for stations outside of Russia. He has publicized the rules for the series on his www page: <http://www.pc.mdlink.de/dl6zfg/rrc_ae.htm>.

Remember, I'd still like to receive samples of awards and their rules from your club or organization!

73, Ted, K1BV

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

FCC Wants Ham Operators to Register Their SS Numbers

On Friday, April 23rd, the FCC issued a Fact Sheet (No. 206-U) entitled "Registration of Social Security Numbers in the Universal Licensing System for Amateur Radio Operators."

As part of its development of the Universal Licensing System (ULS), the Wireless Telecommunications Bureau is in the process of converting the existing Amateur Radio Service database of radio amateurs to the ULS. The ULS is an integrated database and automated processing system that will facilitate electronic filing of applications and electronic access to licensing information. In short, ULS looks toward consolidating, revising, and streamlining the license application process for all radio services licensed by the Wireless Telecommunications Bureau (WTB), including the Personal, Commercial, and Amateur Radio Services.

Starting this fall, the Amateur Service will no longer use the Form 610 application form. Instead, it will use a new FCC Form 605 and its accompanying schedule Form "D."

Previously, wireless applicants and licensees for the various licenses and permits issued by WTB used a myriad of forms, and the information provided on these applications was collected in separate databases, each for a different group of services. Although in some instances these forms could be filed electronically, many of the existing systems did not accommodate electronic filing, instead requiring information to be submitted on paper and then manually keyed into the database by FCC staff.

The Wireless Bureau has already begun the phased-in transition of licensing data for each of the existing wireless services from their present databases to ULS, after which all future licensing activity in each service will be in ULS. The FCC anticipates that ULS will be fully operational in all wireless services by the fall of 1999. The Amateur Service is one of the last services to come under the ULS, since it has already been filing electronically for some time.

National Volunteer Examiner Coordinator, P.O. Box 565101, Dallas, TX 75356-5101 (telephone 817-461-6443 e-mail <fmaia@cwixmail.com>)

ULS will also enhance the availability of licensing information to the public, which will for the first time have access to all publicly available wireless licensing information on-line over the Internet.

The FCC has taken steps to protect both system integrity and the confidentiality of information pertaining to applicants and licensees. To ensure the integrity of the licensing process, the FCC has initiated a registration process in which wireless applicants and licensees can register their Taxpayer Identification Numbers (TINs), self-assign a password, and then associate all of their callsigns with the registration ID. All electronic filing transactions will occur on the FCC's wide area network through a direct connection so that application data will not be transmitted on the Internet, which is less secure. Once data has been entered into ULS, sensitive data such as Social Security Numbers (SSN) will not be accessible to the public.

To take full advantage of the features of ULS, including electronic filing, each user must register with the ULS. The Fact Sheet provides information on the registration process.

What is ULS Registration?

Registration is the process of identifying yourself and your callsigns (if applicable) to the ULS. By placing this information in the ULS, it can automatically be retrieved each time you file an application with the FCC. You do not need to hold an FCC license in order to register with the ULS.

Do I have to register to use ULS? Yes, only registered users can file applications in ULS. If you are not registered in ULS, you will not be able to electronically file an application. Additionally, any manually filed application and any application filed by the Volunteer Examiner Coordinator (VEC) on your behalf will be dismissed.

Note: First-time applicants for an FCC license must also register prior to filing an application in ULS.

What do I get when I register? Registration offers users a number of benefits, including:

- Ability to successfully file applications
- Electronic filing of license renewal applications
- Electronic update of administrative license data (address, phone number, e-mail address, etc.)

In addition, you will receive a nine-character Licensee Identification Number when you register. This number will begin with the letter "L" and be followed by eight digits. (See the "What security measures are you taking to keep my Social Security Number private?" section for more information).

When do I have to register? You can register at any time. However, you do not need to register until the first time you intend to file an application after the current Amateur Radio Service database is converted to ULS. At that time, you must be registered prior to submitting any application in ULS. For most amateur radio operators, this will be when you modify your license (i.e., change your address, name, or callsign, or upgrade your class of operator license).

Also, if you are registered in ULS, you will not need to provide your Social Security Number to the VEC (see the "Do I have to provide my Social Security Number to the VEC?" section).

A Public Notice will be issued by the FCC prior to converting the current amateur radio service database to ULS. This Public Notice will contain additional information regarding registration and licensing using ULS. It also will serve as notice of when the Commission will begin licensing the Amateur Radio Service using ULS.

What information do I have to provide? You must provide your Social Security Number, as well as your name, mailing address, phone number, and any callsign for which you are licensed, regardless of radio service (for example, if you have an Amateur Service license and a license in one of the Private Land Mobile Radio services, you need to provide the callsign for both licenses). You may also provide a fax number and e-mail address. The fax number and e-mail address provided for registration will not be available to the public.

In addition, if you register electronically, you will need to enter a personal identifier and select a password. Your Social Security Number and password are needed to access ULS for electronic application filing.

Why are you collecting Social Se-

curity Numbers? The Debt Collection Improvement Act of 1996 requires all Federal agencies to collect Taxpayer Identification Numbers from all persons doing business with the agency. This includes all applicants for and recipients of a license. For amateur radio operators, their Taxpayer Identification Number is their Social Security Number (see the "What if I don't have a Social Security Number?" section for more information).

ULS uses your Social Security Number as a unique identifier. The Social Security Number, along with your password, will provide access to the electronic filing features of ULS.

What if I don't have a Social Security Number? If you are eligible for a Social Security Number, you must obtain one before using ULS. In general, all U.S. citizens and nationals and individuals admitted for permanent residence in the U.S. are eligible for a Social Security Number. For more information, contact the Social Security Administration at <www.ssa.gov> or by calling 1-800-772-1213 (TTY 1-800-325-0778).

If you are not eligible for a Social Security Number, you may be eligible for an IRS individual taxpayer identification number (ITIN). In general, if you are a nonresident alien who must file a U.S. tax return or can be named on someone else's U.S. tax return, you are eligible for an IRS individual taxpayer identification number. For more information, contact the Internal Revenue Service at <www.irs.ustreas.gov> or by calling 1-800-829-1040 inside the U.S. or 1-215-516-ITIN outside the U.S.

Note: The ULS Report and Order eliminated the requirement for aliens to obtain a reciprocal permit for an alien amateur licensee to be the control operator of an amateur radio station at a place the FCC regulates the amateur service. Such reciprocal operating privileges are now authorized by rule. Thus, aliens operating under the authority of section 97.107 of the FCC's rules (47 C.F.R. §97.107) do not need to register with the ULS.

If you are not eligible for a Social Security Number or an ITIN, contact the ULS Technical Support Staff at 202-414-1250 for assistance.

What security measures are you taking to keep my Social Security Number private? The Commission has taken several steps to ensure the privacy of your Social Security Number:

• Electronic registration on the Internet is accomplished using their secure web server, or for an additional measure of security, you can register by connecting directly to the FCC's wide-area network.

• Once registered, your Social Security Number will not be disclosed to the public. Instead, the ULS will generate a Licensee Identification Number to represent your Social Security Number. When retrieving queries, this Licensee Identification Number will appear on applications and licenses in any place where your Social Security Number would normally appear.

Do I have to provide my Social Security Number to the VEC? No. For applications that the VEC is required to file on your behalf, you will have the option of providing either your Social Security Number or your Licensee Identification Number to the VEC. We are making this option available to amateur radio operators in response to the numerous comments received from the VECs and amateur service licensees. To take advantage of this option, you must be registered in the ULS and know your Licensee Identification Number.

How do I register? There are two ways to register for the ULS, electronically and manually.

• *Electronic Filing:*

Internet—Point your web browser to <www.fcc.gov/wtb/uls> and click on the "TIN/Call Sign Registration button."

Wide-Area-Network (Extranet)—Establish a direct connection to the FCC's wide-area-network by using the "Dial-up Networking" utility of Windows 95/98 to call 1-800-844-2784. Once this connection is established, launch your web browser, point it to <wtbwww05.fcc.gov/ wtb/uls>, and click on the "TIN/Call Sign Registration" button. For more information on establishing a dial-up connection to the ULS, read the material provided in the "ULS Information Center" section of the ULS home page <www.fcc.gov/wtb/uls>.

• *Manual Filing:*

You can file a paper application using FCC Form 606 (TIN Registration Form). This form can be obtained using one of the following methods:

By downloading it from the web at <www.fcc.gov/formpage.html>.

By calling the FCC's Forms Distribution Center at 1-800-418-FORM (3676).

FCC Form 606 can be faxed (717-338-2693) or mailed back to the Commission:
Federal Communications Commission
Information Technology Division
Attention: Kathy McLucas
1270 Fairfield Road
Gettysburg, PA 17325-7245

I registered manually. How do I get my password? If you registered manually, you will need to call the ULS Technical Support Staff at 202-414-1250 to obtain a password. Once obtained, you can only change your password online using the TIN/Call Sign Registration utility. (See the "How to Register" section for information on how to access this utility.)

I registered manually. How do I get my Licensee Identification Number? If you registered manually, the ULS still issued you a Licensee Identification Number. After the Amateur Radio Service is converted to ULS, you can obtain this number by using the system's license search tool to search for your callsign. The search result will show your Licensee Identification Number. Information on how to connect to the ULS can be found on the ULS home page <www.fcc.gov/wtb/uls>.

Where can I get more information? The FCC provides several resources for information on ULS:

On the World Wide Web at <www.fcc.gov/wtb/uls>

E-mail at <ulscomm@fcc.gov>

Technical Support Staff at 202-414-1250

General information 1-888-CALLFCC (1-888-225-5322), then select option 2.

73, Fred, W5YI

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Cycle 23 Less Intense Than Expected

The following e-mail is typical of several that I have received recently: "George, I am wondering what is going on with this current sunspot cycle. It seems to be playing *dead.* Is it over and on its way down, or are there better things still yet to come? . . . What is going on here? 73, Cecil Williams, NW8F"

Despite early predictions of the world's solar experts that Cycle 23 would reach near record intensity, it has to date been considerably less intense than expected.

In September 1996 the world's solar experts convened at the NOAA Space Environment Center (SEC) in Boulder, Colorado to assess the probable course for Cycle 23. The scientists concluded that the new cycle would be an exceptionally high one, in all probability exceeding Cycle 22's peak of 159, which was the third most intense cycle in the more than 200 years that sunspot records have been kept. (See *CQ,* March 1997, page 98). The panel of experts met again during September 1997 in Sunspot, New Mexico to assess the initial progress of Cycle 23. They reaffirmed their findings of the previous year, again concluding that Cycle 23 would be an exceptionally intense one peaking at an expected maximum SSN of 160, with a statistical range between 130 and 190. (See *CQ,* March 1998, page 93). However, 29 months after the start of Cycle 23, its rise has not lived up to these expectations.

Cycle 23 at Month 29

May 1996 marked the mathematical beginning of Cycle 23, with a 12-month running smoothed sunspot (SSN) count of 8. The latest smoothed count of 69 is centered on September 1998, the 29th month of Cycle 23.

Table I compares the smooth sunspot number at month 29 for Cycle 23 with that of Cycle 22, and with the average value for Cycles 10 through 22.

Despite the expectations of the world's solar experts, Cycle 23 is far less intense than was Cycle 22 at month 29 (69 vs. 142). Cycle 23's progress to date is even somewhat less intense than the average behavior of Cycles 10 to 22 at the 29th month (69 vs. 80).

Based on this analysis one might conclude that Cycle 23 will not be an exceptionally intense cycle, but will be a more or less average one. The Royal Observatory of Belgium has lowered their predictions for the remainder of Cycle 23 by approximately 25%. They are presently calling for an expected SSN of 89 (instead of 118) centered on July l999, and a cycle peak to occur during January 2000 with a count of 102 instead of 132.

While disappointing, this is not really bad news. Instead of the *great* HF conditions that were expected with the early predictions of near record intensity for Cycle 23, we will have to settle for the *good* conditions associated with an average solar cycle.

The discrepancy between the intense cycle predicted by the experts and the observed to date average behavior of Cycle 23 again illustrates how much remains for science to learn about the sun and the development of a successful quantitative, theoretical model of the sunspot cycle.

Dr. Pierre Cugnon, keeper of the world's official sunspot records at the Royal Observatory of Belgium, continues to report wide variations in the reported sunspot counts observed daily. During March, a high count of 102 was reported on the 3rd, with a low count of 27 observed on the 27th. This is a change between Very High solar activity and Low activity within the same month, with corresponding wide variations in observed HF propagation conditions. The mean value for March was 69. This results in a 12-month running sunspot number, upon which the cycle is based, of 69, centered on September 1998. This is an increase of only one number from the previous month.

There was a corresponding increase in the level of 10.7 cm solar flux as measured at Canada's Dominion Radio Astrophysical Observatory located at Penticton, BC. A mean level of 125 was reported for March 1999. This results in a smoothed value of 127 centered on September 1998.

A smoothed sunspot number on the order of 90 is forecast for July 1999, with an expected smoothed level of 147 for the corresponding 10.7 cm solar flux.

Cycle 23 continues to increase but at considerably less intensity than was expected earlier.

Errata

In the May column the web page for the Norwegian DX Listeners Club was cited as an excellent source of solar, geomagnetic, and ionospheric data, but its URL address was incorrectly given. The correct address is: <http://www.dxdc.com>. The site is also linked to my web page at: <http://www.gjainc.com>.

July Propagation

Fifteen, 17, and 20 meters are expected to share honors for optimum DX propagation during July. Good-to-excellent openings are forecast for 15 and 17 meters throughout much of the daylight hours, and to some areas into the early evening hours as well. Conditions will favor north-south openings and openings to tropical areas. Some openings should also be

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for July 1999

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 2, 4, 11-12, 25, 31	**A**	**A**	**B**	**C**
High Normal: 1, 3, 7, 13-15, 24, 29-30	**A**	**B**	**C**	**C-D**
Low Normal: 8, 16-18, 20-23 26-28	**B**	**C-B**	**C-D**	**D-E**
Below Normal: 5, 9-10, 19	**C**	**C-D**	**D-E**	**E**
Disturbed: 6	**C-D**	**D**	**E**	**E**

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S6, with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the 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 path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be good (B) on July 1st, excellent (A) on the 2nd, good (B) on the 3rd, excellent (A) on the 4th, fair-to-poor (C-D) on the 5th, etc.

Cycle	SSN at 29th month	Peak SSN
23	69	—
22	142	159
10–22	80	119

Table I–Comparison of 12-month running smoothed sunspot number at 29th month for Cycles 23, 22, and the average of Cycles 10–22.

11307 Clara Street, Silver Spring, MD 20902
e-mail: <george@gjainc.com>

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 80 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.

CQ Short-Skip Propagation Charts
July & August 1999
Local Daylight Savings Time At Path Mid-Point

Band Meter	Distance Between Stations (Miles)			
	50-250	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	08-10 (0-1)* 10-14 (0-3)* 14-18 (0-1)* 18-22 (0-2)* 22-08 (0-1)*	08-10 (1)* 10-14 (3)* 14-18 (1-2)* 18-22 (2-3)* 22-08 (1)*	08-10 (1-0)* 10-14 (3-1)* 14-18 (2-1)* 18-20 (3-2) 20-22 (3-1)* 22-08 (1-0)*
15	*Nil*	08-10 (0-2)* 10-14 (0-3)* 14-18 (0-2)* 18-20 (0-3)* 20-22 (0-2)* 22-08 (0-1)*	08-10 (2)* 10-14 (3)* 14-18 (2)* 18-20 (3)* 20-22 (2)* 22-00 (1-2)* 00-08 (1)	08-10 (2)* 10-14 (3)* 14-18 (2-3) 18-20 (3-4) 20-22 (2-3) 22-00 (2) 00-08 (1-0)
20	10-01 (0-1)*	07-10 (0-2)* 10-18 (1-4)* 18-22 (1-3)* 22-00 (1-2)* 00-07 (0-1)*	07-10 (2-4) 10-18 (4) 18-22 (3-4)* 22-00 (2-4)* 00-02 (1-3)* 02-07 (1-2)*	08-10 (4) 10-16 (4-3) 16-00 (4) 00-02 (3) 02-07 (2) 07-08 (4-3)
40	08-10 (2-4)* 10-15 (3-4) 15-20 (4) 20-22 (2-4) 22-00 (1-3) 00-08 (1-2)*	08-10 (4) 10-12 (4-3) 12-17 (4-2) 17-18 (4-3) 18-22 (4) 22-02 (3-4) 02-05 (2-4) 05-08 (2-3)	09-10 (4-1) 10-12 (3-1) 12-17 (2-1) 17-18 (3-1) 18-21 (4-3) 21-05 (4) 05-06 (3-4) 06-08 (3) 08-09 (4-2)	09-18 (1-0) 18-19 (3-0) 19-20 (3-1) 20-21 (3-2) 21-22 (4-3) 22-06 (4) 06-07 (3-2) 07-08 (3-1) 08-09 (2-0)
80	06-12 (4) 12-16 (4-3) 16-00 (4) 00-06 (3-4)	07-08 (4-2) 08-10 (4-1) 10-12 (4-0) 12-16 (3-0) 16-18 (4-1) 18-20 (4-2) 20-22 (4-3) 22-07 (4)	07-08 (2-1) 08-10 (1-0) 10-16 (0) 16-18 (1-0) 18-19 (2-0) 19-20 (2-1) 20-21 (3-1) 21-22 (3-2) 22-05 (4) 05-06 (4-3) 06-07 (4-2)	07-19 (0) 19-20 (1-0) 20-21 (1-0) 21-22 (2-1) 22-04 (4-3) 04-05 (4-2) 05-06 (3-1) 06-07 (1-0)
160	18-19 (0-1) 19-20 (1) 20-22 (3-2)	19-20 (1-0) 20-21 (2-0) 21-22 (2-1)	21-22 (1) 22-01 (2-1) 01-04 (2)	21-23 (1-0) 23-01 (1) 01-06 (2-1)
	22-00 (4-3) 00-06 (4) 06-08 (3-2) 08-09 (1) 09-10 (1-0) 10-18 (0)	22-00 (3-2) 00-04 (4-2) 04-06 (4-3) 06-08 (2-1) 08-09 (0-1) 09-19 (0)	04-06 (3-2) 06-07 (1) 07-08 (1-0) 08-21 (0)	06-07 (1-0) 07-21 (0)

* *Predominantly sporadic-E openings.*

HAWAII
July & August 1999
Openings Given in Hawaiian Standard Time

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	13-16 (1)	06-09 (1) 09-12 (2) 12-16 (3) 16-18 (2) 18-20 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-06 (2) 06-08 (1)	18-20 (1) 20-00 (2) 00-02 (1) 21-00 (1)**
Central USA	12-14 (1) 14-16 (2) 16-17 (1)	05-06 (1) 06-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-20 (2) 20-21 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (4) 04-06 (3)	20-21 (1) 21-22 (2) 22-01 (3) 01-02 (2) 02-03 (1) 20-22 (1)** 22-00 (2)** 00-02 (1)**
Western USA	10-12 (1) 12-14 (2) 14-18 (3) 18-20 (2) 20-21 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	05-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-22 (4) 22-00 (3) 00-05 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 19-20 (1)** 20-22 (2)** 22-02 (3)** 02-03 (2)** 03-04 (1)**

ALASKA
July & August 1999
Openings Given in Hawaiian Standard Time

To:	*10 Meters*	*15 Meters*	*20 Meters*	*40/80 Meters*
Eastern USA	NIL	21-00 (1) 00-02 (2) 02-03 (1)	12-15 (1) 22-00 (1) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1)	07-10 (1)
Central USA	NIL	20-00 (1) 00-03 (2) 03-05 (1)	13-16 (1) 22-00 (1) 00-03 (2) 03-06 (3) 06-07 (2) 07-09 (1)	08-12 (1)
Western USA	01-04 (1)	17-22 (1) 22-00 (2) 00-02 (3) 02-04 (4) 04-05 (2) 05-06 (1)	13-14 (1) 14-15 (2) 15-19 (3) 19-01 (2) 01-03 (3) 03-06 (4) 06-08 (3) 08-09 (2) 09-11 (1)	07-09 (1) 09-12 (2) 12-13 (1) 09-12 (1)**

***Indicates best time for 80 meter openings. Openings on 160 meters are most likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.*
#See explanation in "How To Use Short-Skip Charts."
Note: The Alaska and Hawaii Propagation Charts are intended for distances greater than 1300 miles. For shorter openings, use the preceding Short-Skip Propagation Chart.

possible to Africa and Europe, particularly when the bands peak during the late afternoon and early evening.

Twenty meters is expected to remain open to one area of the world or another just about around the clock. Although DX openings should be possible at almost any hour, optimum worldwide conditions are forecast for the early evening hours, during the hours of darkness, and for about an hour or two after local sunrise. Exceptionally strong signal levels are likely to occur during the hours of darkness.

Although a seasonal decrease is expected in 10 and 12 meter DX during July and the summer months, some good DX openings still should be possible during the daytime hours of July. Best bets are for openings on north-south paths to the Caribbean and Central and South America, but occasional openings should also be possible to Africa and Australasia. Expect both bands to peak during the late afternoon hours.

During the hours of darkness also look for some good DX openings on 30 and 40 meters, but seasonally high static levels may often make this band very noisy. High static levels are also likely to dampen DX openings on 80 meters, but some should be possible during the hours of darkness. Not many DX openings are expected on 160 during July because of seasonally high levels of static and increased solar absorption in the northern hemisphere.

Check last month's column for comprehensive band-by-band DX propagation predictions for July.

Short-Skip Openings

This month's column contains Short-Skip Charts for July and August 1999. Optimum short-skip conditions on most bands are expected during July, mainly as a result of the seasonal peak expected in sporadic-*E* propagation. During the daylight hours considerable short-skip openings are forecast for 10, 12, and 15 meters over distances ranging between approximately 500 and 1300 miles, with some double-hop openings extending out to as much as 2300 miles. Excellent short-skip openings on 20 and 17 meters, ranging between approximately 250 and 2300 miles, are expected almost around the clock, with conditions expected to peak during the late morning hours and again during the late afternoon and early evening.

Good daytime short-skip openings can be expected on 30 and 40 meters ranging between approximately 100 and 600 miles. Excellent nighttime openings should be possible on these bands for distances between 250 and 2300 miles. Good 80 meter short-skip openings are forecast for the daylight hours up to distances of about 300 miles, with the range extending out to 2300 miles during the hours of darkness. While no 160 meter short-skip openings are expected during the daylight hours, some openings should be possible during the hours of darkness for distances up to approximately 1300 miles. When static levels are low, 160 meter nighttime openings may extend considerably beyond this range.

VHF Ionospheric Openings

With a seasonal peak expected in sporadic-*E* propagation, look for frequent short-skip openings on the 6 meter band. Most openings should fall within the 600 to 1300 mile range, but some may be as long as 2300 miles, and others may be somewhat shorter than 600 miles. The best tlmes for these openings are a few hours before noon and again during the early evening hours, although they can take place at any time of the day or night. During many 6 meter sporadic-*E* short-skip openings, signal levels may reach exceptionally strong levels. Be sure to check the 2 meter band during intense 6 meter openings. Generally, 2 meter short-skip openings can take place when the shortest skip heard on 6 meters is on the order of 600 miles or less. Two meter openings, when they occur, are likely to range in distance between 1000 and 1300 miles.

Chances are good for meteor-type ionospheric openings on the VHF bands during the last days of July. A major meteor shower, the *Delta Aquarids,* should take place between the 28th and 31st.

Although not expected to reach peak intensity until mid-August, the *Perseids,* another major meteor shower, is expected to begin during the last days of July and should provide some openings on the VHF bands.

Considerably fewer trans-equatorial (TE) openings are expected on 6 meters during July, but some may still be possible from locations in the southern tier states. The best time to check for TE openings to South America should be between 8 and 11 PM local daylight time.

Some VHF short-skip openings may be possible during July as a result of auroral ionization. The best dates to look for such openings are shown as Disturbed or Below Normal in the Last-Minute Forecast at the beginning of this column.

73, George, W3ASK

CQ SHOWCASE

Svetlana SV300B Power Triode

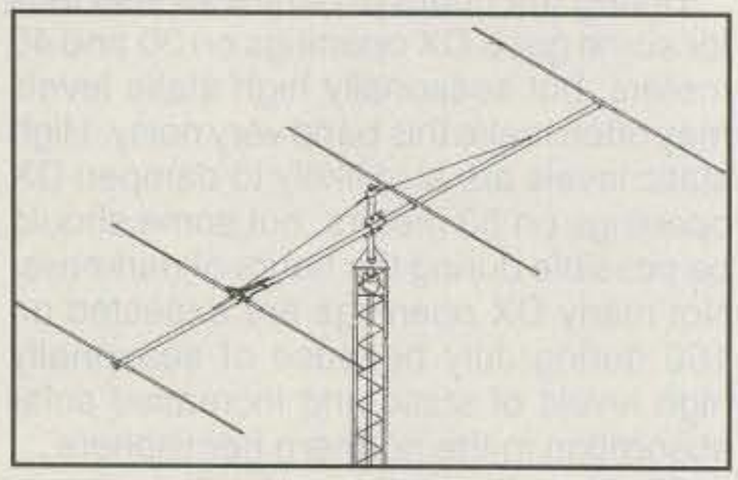
Svetlana Electron Devices has announced the new SV300B power triode, which is available as a single tube or as a Svetlana Tested and Matched (STM) pair. The new packaging includes a "Passport" which specifies measured transconductance performance for each individual tube. Features include close duplicate of original version; thicker glass envelope increasing ruggedness; carbonized, high-purity nickel plate that is an exact duplicate of the original; filament oxide coating; gold-plated control grid; barium getter and improved vacuum processing, and deluxe packaging.

For more information, contact Svetlana Electron Devices, 8200 South Memorial Pkwy., Huntsville, AL 35802 (256-882-1344; fax 256-880-8077; web: <www.svetlana.com>), or circle number 101 on the reader service card.

Bird RF Components Short-Form Catalog

Bird Electronics Corp. has released the third in their recent series of short-form catalogs. The 20-page Bird RF Components Catalog and Applications Guide describes the company's complete line of RF loads and attenuators, ranging from very low power, convection-cooled designs, up to and including Bird's highest power forced-air, self-contained, and water-cooled models. Several new products have been added, including very low VSWR forced-air and oil-dielectric loads for digital broadcast; SA and ST Series square loads and attenuators; 1000 watt convection-cooled loads and attenuators; 0.5 watt, 18 GHz convection-cooled attenuators; FFI-series attenuators with interchangeable connectors; and resistive divider/combiners and couplers.

Copies can be ordered by contacting Bird Electronic Corp., 30303 Aurora Rd., Cleveland, OH 44139 (phone 440-248-1200; fax 440-248-5426; e-mail: <sales@bird-electronic.com>; web: <http://www.bird-electronic.com>), or circle number 103 on the reader service card.



M² DX Series Antennas

The 20M4DX is the first in the new M² DX Series of mid-sized, UPS shippable HF antennas for all bands from 20 to 10 meters. The antennas were computer designed and verified with NEC, and according to M², a very clean pattern makes the 20M4DX ideal for stacking (3 dB of stacked gain).

The 17M3 is computer optimized from ground up for gain and pattern on 17 meters. The boom sections are 2" OD × 0.58" wall 6063-T832 aluminum tubing.

The 15M4DX, 12M4DX, and 10M4DX were designed for low wind area, but are rugged and lightweight. The antennas are great for stacking, M² says. All are suited for performance on both CW and phone.

For more information on the DX Series, contact M², 7560 N. Del Mar Ave., Fresno, CA 93711 (phone 559-432-8873; fax 559-432-3059), or circle number 102 on the reader service card.

Hamsure Insurance Available

Hamsure's WB9CZR has announced that the company will now accept applications for property insurance on repeaters, either individual or club owned, without the necessity of requiring collateral premiums. Coverage is all risks (full surge and lightning protection). For more information, call 800-988-7702.

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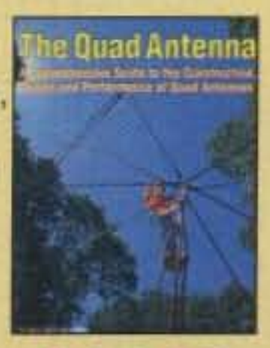

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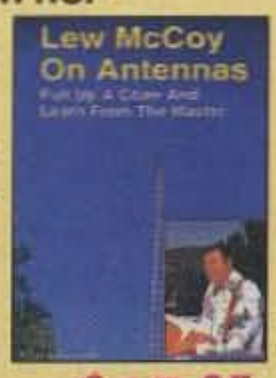

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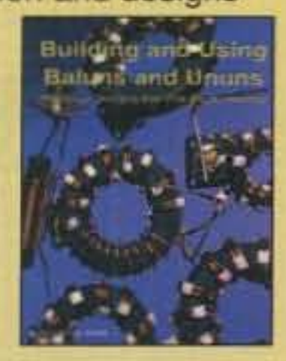

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(continued on page 95)

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WANTED: ICOM IC-970. Must be in mint condition, non-smoker. Also looking for ICOM UX-R96 and UX-97 plug-in modules for the ICOM IC-970. Randy Ballard, N5WV, 903-687-3002.

SECRET TUNE-UP REPORTS: How-to information for CB and Ham rigs. Send $2.00 refundable. Box 9071, Erie, PA 16505.

KENWOOD TS520S $350, TS530S $475, TS830S $550. YAESU FT901DM $500. K1BW, 413-538-7861.

OHIO: The 1999 TSRAC WHEELING/MARTINS FERRY HAMFEST has changed locations and date! Will be held Sunday, August 8th, 8 AM to 3 PM at Red Mens Picnic Grounds, County Road 4, Martins Ferry, OH. Many exclusives at low rates ($2 admission includes FREE fleamarket parking/setup). Refreshments. Under-cover tables each with its own electricity. Security-fenced hamfest. Children 12 free. Talk-in 146.91. Send for details/map/info to TSRAC, 2011 St. Hwy. 250, Adena, OH 43901 (phone 740-546-3930; e-mail: <k8an@aol.com>).

RF TRANSISTORS AND TUBES: MRF454, MRF455, MRF422, SD1446, 2SC2879, 2SC2312, 2SC2166, 2SC1969, 2SC2904, 2SB754, SAV17, TA7222AP. 3-500ZG, 3CX3000A7, 4CX250B, 572B, 6146W. WESTGATE 800-213-4563.

Advertiser's Index *(cont'd)*

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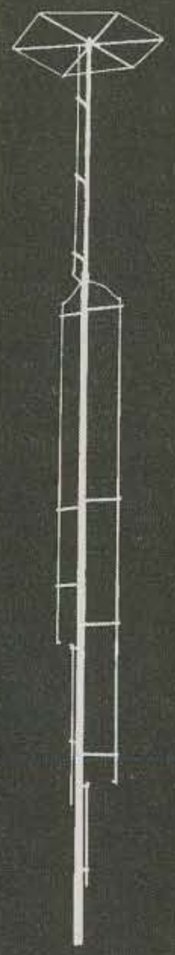
GAP: The Perfect Antenna

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."

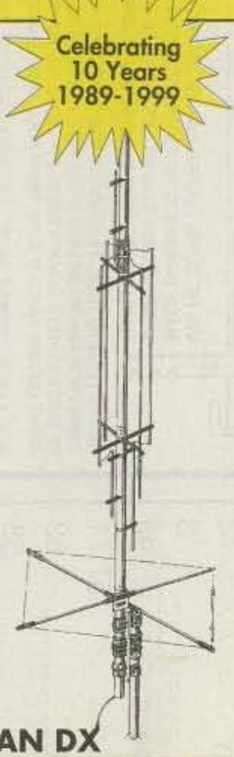
73–"This is a real DX antenna, much quieter than other verticals."

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."

Celebrating 10 Years 1989-1999



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'	$279
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$289
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$319
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

GAP ANTENNA PRODUCTS INC.
99 N. Willow Street
Fellsmere, FL 32948

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Another Engineering Breakthrough from Yaesu : the FT-90R! Big Power, Big Performance, Micro-Miniature Size!

Actual Size

Features

- Frequency Coverage:
  RX : 100~230 MHz, 300~530 MHz,
  810~999.975 MHz (Cellular Blocked)
  TX : 144-146 MHz or 144-148 MHz (144 MHz)
  430-440 MHz or 430-450 MHz (430 MHz)
- 50 Watts Power Output (430 MHz: 35W)
- Ultra Compact: 100 mm x 30 mm x 138 mm WHD (3.9" x 1.2" x 5.4")
- AM Aircraft Receive
- Built-In CTCSS/DCS Encoder/Decoders
- Selectable TX Power: HIGH (50W), MID1 (20W), MID2 (10W) and LOW (5W)
- Programmable VFO Steps: 5/10/12.5/15/20/25/50 kHz per Step
- 186 Memories with 7-Character Alpha/Numeric Labels
- Direct Keypad Frequency Entry via MH-36A6J DTMF Microphone
- Smart Search™ Automatic Memory Loading
- Programmable Front Panel/Microphone Key Functions
- Battery Voltage Meter
- Auto-Range Transponder System (ARTS™)
- TX Time-Out Timer (TOT)
- Automatic Power-Off Battery Saver (APO)
- Remote-Head Operation using Optional YSK-90 Separation Kit
- 16-Digit 8-Memory DTMF Autodialer (requires MH-36A6J Mic)
- ADMS Windows™ PC Programmable
- Automatic Repeater Shift
- 1200/9600 bps Packet Compatible
- RF-Level Squelch for Quiet Monitoring of Busy Channels
- DCS Code # Search
- Versatile Scanning Features
- Priority Channel Monitoring
- Menu for Feature Customization
- Adjustable Display Brightness and Contrast
- Aluminum Diecast Chassis with Cooling Fan

MICRO COMMANDER

FT-90R

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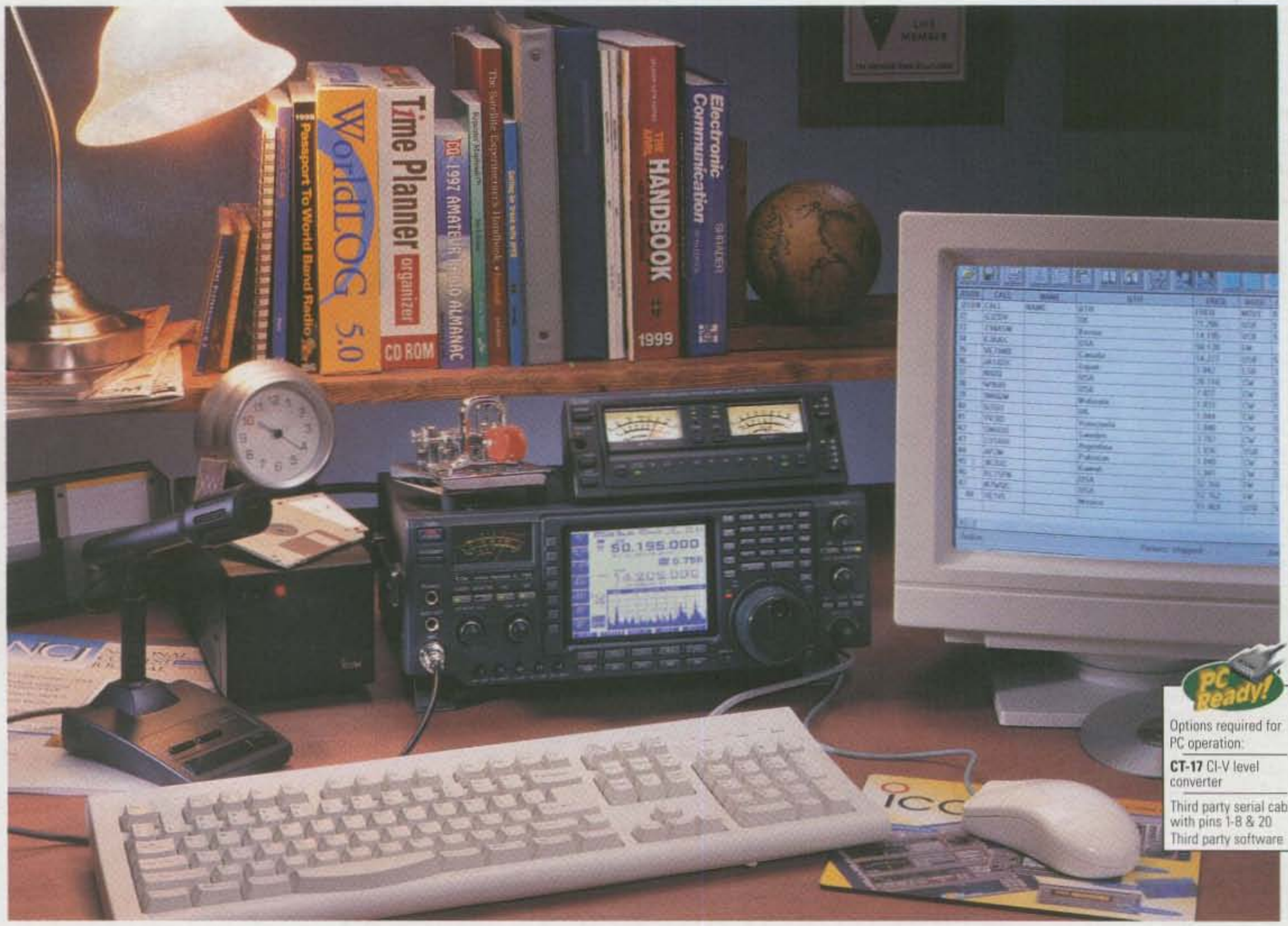
Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details.

U.S. version includes MH-36A6J DTMF Microphone.

Look Closely. It's a 1kW Contest Station

ICOM IC-756 & IC-PW1: All Mode, HF / 6M, Desktop Size



"TRANSPARENT" OPERATION

Set the entire, compact 'PW1 right on a desktop, or remote the 'PW1 body to a nearby location. The best in solid state makes for powerful performance and low maintenance.

13.8 (w) x 10.6 (h) x 14.9 (d) in
350 (w) x 269 (h) x 378 (d) mm
55 lb, 2 oz / 25 kg

IC-756 AND IC-PW1: A FULL GALLON HF / 6M DESKTOP STATION THAT'LL REALLY TAKE YOU PLACES

You and ICOM create the competitive edge with this 100% duty cycle desktop station. The IC-756 is a contester's dream, with IF-DSP, quad conversion Rx, dual watch, memory keyer, spectrum scope, and much more.

Control your contest frequency with the IC-PW1. This 1 kW powerhouse sports a remotable control head, auto antenna tuner, simultaneous multi-variable analog metering, 4 antenna connectors, and, of course, much more.

ISO 9001 SGS

ICOM Connect 2000

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