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Amateur Radio

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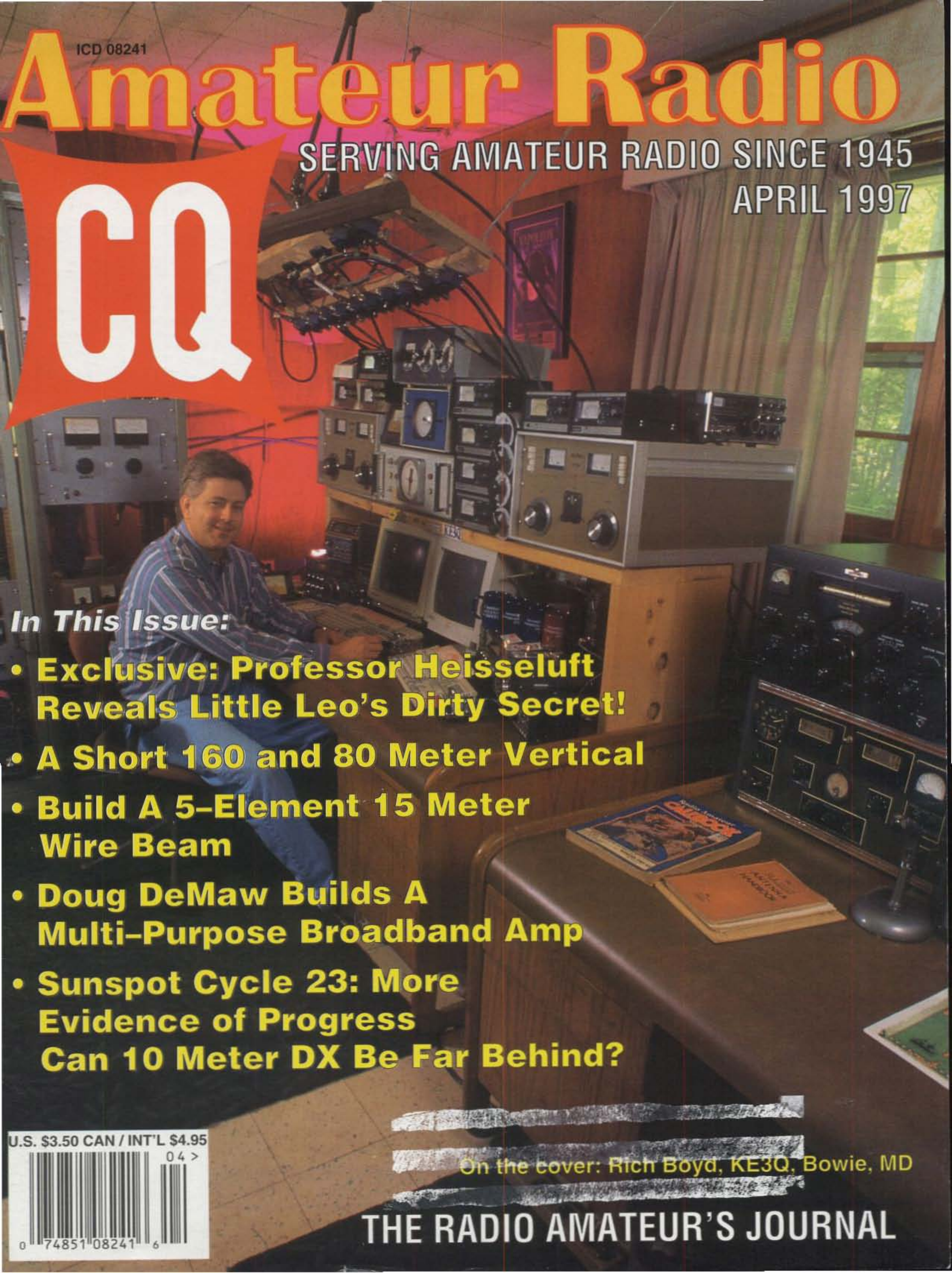
APRIL 1997

CQ



In This Issue:

- **Exclusive: Professor Heisseluft Reveals Little Leo's Dirty Secret!**
- **A Short 160 and 80 Meter Vertical**
- **Build A 5-Element 15 Meter Wire Beam**
- **Doug DeMaw Builds A Multi-Purpose Broadband Amp**
- **Sunspot Cycle 23: More Evidence of Progress Can 10 Meter DX Be Far Behind?**

U.S. $3.50 CAN / INT'L $4.95
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On the cover: Rich Boyd, KE3Q, Bowie, MD

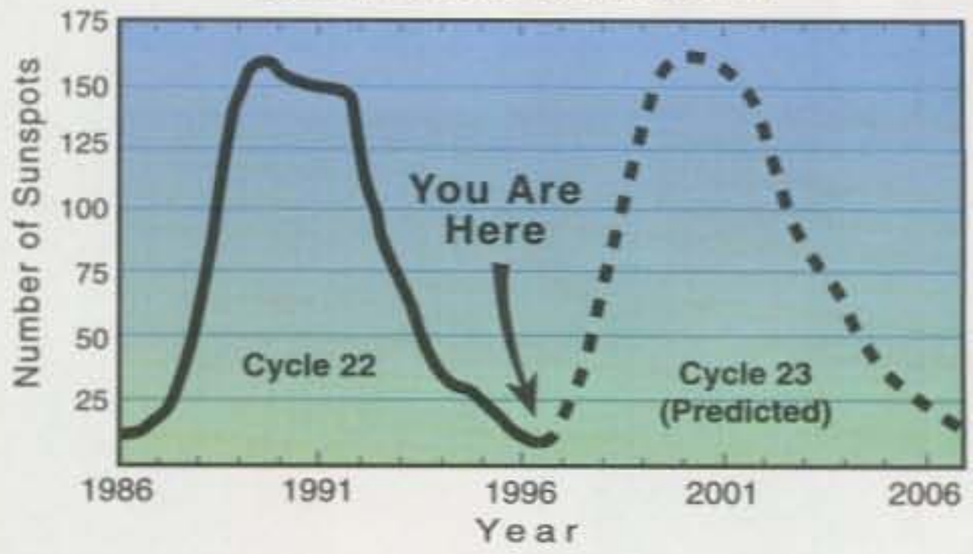
THE RADIO AMATEUR'S JOURNAL

R7000

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

The cold winter of low sunspots is thawing. The solar flux will soon begin it's steady climb. Cycle 23 begins Now - and Now is the time to start your station upgrades. As each month passes, DX will find it's way from 20 to 17 to 15 to 12 to 10 meters. Don't miss the action. The best operating conditions are just ahead.

SOLAR CYCLES 22 AND 23



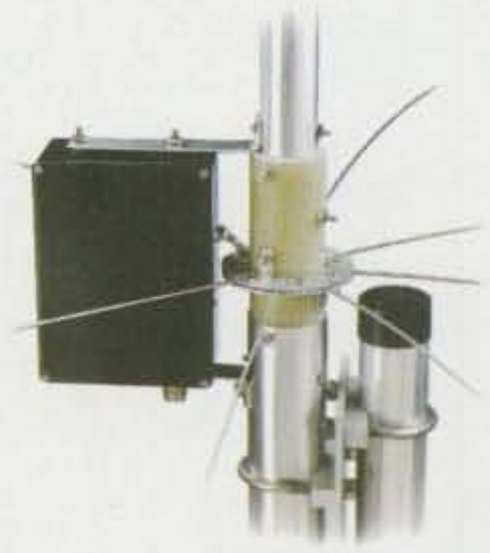
AL6063 Cover Design
The cover completes the LC circuit of the trap. The beauty is in the simplicity; these elegant trap covers make stable capacitance and higher power handling possible.

Controlled Inductance Traps
Cushcraft holds the trap inductance within close tolerance so there's less tuning and outstanding in-weather performance.

All Materials
are either stainless steel, aluminum, or high impact plastic.

Double Wall Tubing
makes up the lower three sections. This 0.116 inches of wall insures top performance in winds up to 80 mph.

Mounting Hardware
is extra rugged and makes installation easy on any 1-3/4" to 2-1/8" OD mast.



• EXPANDABLE TO 80M
Transform your R7000 into a R7000+ by adding 80 meters with the R80 kit (trap, tubing, guy & ground wire)

• RELIABLE
New trap design is stable in all conditions

• EASY INSTALLATION
For typical use, tuning is not needed after installation

• AUTO BAND CHANGING
To any band from 10 through 40m (80m with R80 kit)

• SLIM SILHOUETTE
Gain favor of family and neighbors with the slim, smooth profile of our new trap design.

Be ready for the coming sunspot cycle!

"I bought the R7000 specifically for our Barren Islands IOTA trip. It worked FANTASTIC. I think it is one of, if not the, best built antennas I've ever seen. We experienced 75 mph winds on the island and we kind of expected the antenna to buckle in the wind ... it didn't. Amazing!" N6IV/KL7

"What a fantastic DXpedition antenna. Tnx for a quality product." NL7TB

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

If you'd like to know more about the R7000 and R7000+, check it out at http://www.cushcraft.com. We'll even show you what's inside the black box and tell you how it works. Or get an R7000 brochure from your dealer anywhere in the world, hamsales@cushcraft.com, or by contacting our ham sales department.

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Freedom from High Prices!

New Alinco DJ-S41T UHF "pocket radio" A great radio for under $150!

The fun new radio everyone's talking about!

- Fits in pocket or purse, uses 3 AA cells
- 21 memories
- Large backlit display
- TX+RX range: 425~449.995 MHz
- CTCSS encode PLUS European tone burst
- "Swing Away" flex antenna resists loss and breakage
- Easy to program, easy to operate–one page operating manual!
- Use with speaker mic, headset, vox mic
- Big audio from a little radio
- Great for repeater, simplex or use through cross-band units!
- A great gift for the other hams in your life!

New DR-140T 2 meter mobile/base with alphanumeric display–under $289!

A full-featured FM mobile with many "extras"

- 51 memory channels
- Alphanumeric display up to 7 characters per memory
- Aircraft (AM) receive and extended FM receive
- MARS/CAP capability
- Scanning functions
- Cable cloning features
- CTCSS encode PLUS European Tone Bursts

Alinco has introduced three new radios that allow you to own great equipment with advanced features at very "down-to-earth" prices. Before buying ANY new radio, you owe it to yourself to check out these value leaders from Alinco.

DR-605T full 2 meter/70 cm FM dual-band capabilities at a "super-low" price

The reviews are in and the DR-605T is a hit!

- Get more UHF–TX 430 MHz~449.995 MHz
- Can be used for FM satellite contacts!
- 102 memory channels (51 for each band)
- Cross band repeat feature
- MARS/CAP capability
- Extended receive on both bands
- Internal duplexer saves even more money!
- CTCSS encode PLUS European Tone Bursts
- Cloning capability
- 9600 bps packet ready
- Scanning functions

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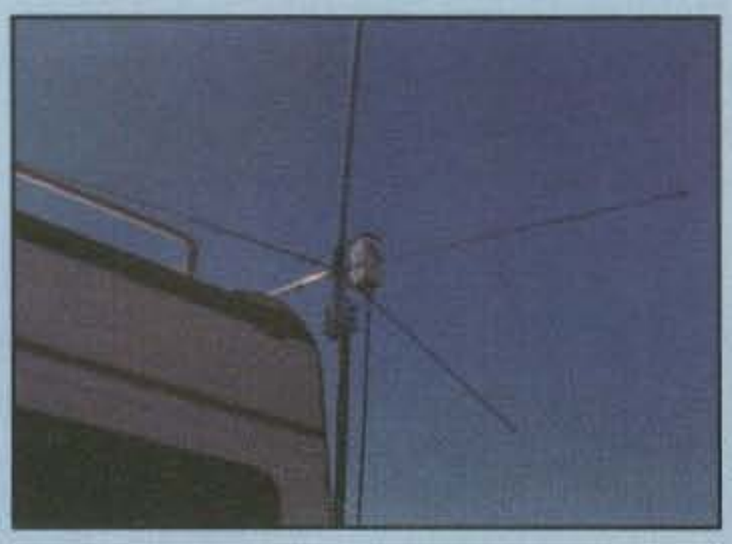
CQ Amateur Radio

APRIL 1997 VOL. 53, NO. 4



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Features

Departments

ON THE COVER: Now why do I get the feeling that this is the way Amy Boyd, N3MIL, wife of Rich Boyd, KE3Q, would like the station to look all the time? The truth is that it's been gussied up just a bit for the arrival of *CQ* Staff Photographer Larry Mulvehill. The Bowie, Maryland QTH is about 30 minutes due east of the White House, and sports a pretty enviable antenna farm currently consisting of a 160 ft. tower with 6 el. on 10, and 2 el. on 40, and a 120 footer with 6 el. on 20 and 8 el. on 15. Eighty and 160 are covered by inverted Vees, one off each tower. Two 200 ft. towers are on the way up for stacked 3 el. 40's and a high 20 Yagi. Now the really enviable part is that Rich has about 7000 ft. more tower on the property waiting for the right application! Ask him about it some day. The station is a mix of Yaesu, Kenwood, and Drake transceivers, and in addition to the pair of Alpha 77's, has six monoband amps, five of which sport 4-1000A's and were homebrewed by N2FB, the sixth being a converted Henry industrial sputtering amplifier. The classic gear consists of an early Collins 74A-4, and a Hallicrafters SX-101, HT-32, HT-33 setup, all ready for use on those cold, snowy evenings when you could use a little extra heat in the shack. Rich is president of the famed Potomac Valley Radio Club, is a self-employed professional journalist, and has held a Ham ticket for the last 32 years. (Photo by Larry Mulvehill, WB2ZPI)

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

NEW! HF + 6M Version

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

The TS-570D and TS-570S offer the world's first CW AUTO TUNE feature which enables automatic zero-beating for CW operation. The RCP-2 Radio Control Program also allows the HF operator to design and program multiple radios with custom settings while conveniently saving them to a PC file for future use. Advanced Kenwood design and features coupled with traditional Kenwood HF performance make the TS-570D/570S a masterpiece that you can proudly operate. If you have been waiting for a new DSP HF radio with performance at an affordable price, wait no more.

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

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

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

Preset auto antenna tuner with 18 sub-bands from 1.8 MHz - 30 MHz and memory for both antenna ports.

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

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

10-key direct frequency entry

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

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

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

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

TS-570D / TS-570S

HF Transceiver **HF + 6M Transceiver**

"New"

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

On 6M too!
- √ **DSP**
- √ **100 Watts**
- √ **Preset Auto Antenna Tuner**

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Meets ISO Manufacturing Quality System

RCP-2 software allows you to build different radios on screen and save all your functions and settings to a file for future use.

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ZERO BIAS

AN EDITORIAL

When I wrote the editorial for February dispelling my gorge of its e-mail contents, I expected a drubbing via the post office from some irate readers explaining the error of my ways. These days e-mail, and everything associated with computers, has become a sacred cow among amateurs, an obsession almost as strong, but not quite, as Morse code. If we were to believe all of the computer activity talked about—the grid-lock situation on AOL, and the sheer speed and alacrity with which zillions of files of data can be transferred in the twinkling fractional part of a nanosecond—then it's just as possible to show up at Dayton this year and find 30,000-plus people all wearing tell-tale wrist supports to ease their carpal-tunnel syndrome.

Obviously, that's not the case. On a Friday shortly after the February issue came out, I went home after a particularly harrowing day. Among the mail I sorted through was a letter with a name and return address I didn't recognize. The first thing I saw as I opened the envelope was call letters following the still unfamiliar name. Immediately I thought it was from an irate reader, which would have put the cap on a miserable day. The letter, which was cogent and organized, had the power to instantly ameliorate the cares of the day. Yes, it was from a reader who had read my editorial and agreed with it. However, his letter was far more than a vehicle to massage my ego and make me feel better. He had read and understood my editorial, and in fact, had reached the same conclusion much earlier than I did. One paragraph in his letter stood out, and I'd like to quote it:

"Many of the greatest minds in history composed their most important work in the form of a personal letter. Can you imagine if Descartes, Blaise Pascal, and Aurelius Augustinus, to name a few, unaware of the impact on future history their letters would have, had opted, had it been available, to send e-mail instead!"

Well, that particular Friday, Kevin DiPeri, AA2CB, made my day. I was pleased that he had read my editorial, understood what I wrote, and took the time to share his views with me. I had reached at least one person. *(For the full contents of the letter, see "Our Readers Say," on page 10 of this issue.)*

Over the next few weeks I expected to receive the negative side, which to date hasn't materialized. Instead, there has been a tremendous response from readers who agree with what I wrote.

Yes, there is a definite need, place, and function for e-mail, as well as any other computer function you can think of. My own personal feeling is that it shouldn't be a place to spew out an endless torrent of pure id, nor to advertise to the multitudes just how screwed up you really are. If anything, the use of these technologies will increase over the years, and probably there even are newer and brighter (and certainly faster) communications vehicles ahead. My concern is not that this will supplant the traditional view of amateur radio, nor is it my dislike for having my time wasted trying to make sense out of drivel. My concern is probably more philosophical in that even though a person has the ability to manipulate very exotic, if not incomprehensible, technology, it doesn't seem to follow that the resultant "product" is either real or relevant to anything in real life.

With the advances in technology moving at a pace that makes just about everyone an appliance operator rather than an innovator, ease of manipulation rather than content becomes the end product. The ability to read, to synthesize ideas, to write declarative sentences, and to express one's thoughts in a meaningful way seems to be losing ground in favor of more speed in processing more information. No, it's not the technology; it's the technocrat. Being able to access a spell check or grammar check does not make one literate; it just makes one facile in using the wrong word spelled correctly. Having a number of people—any number—able to do this at will does not make accepted or correct word usage.

This in a way relates to the state of amateur radio—where it's been and where it's likely to go. For the median-age-plus amateur (those licensed before Incentive Licensing), amateur radio was strongly related to one's imagination. Most came out of a radio tradition in early childhood. Radio programs, serials, and the power of the spoken word sparked all of us growing up. The lore, magic, and romantic qualities of amateur radio were only logical extensions of that experience. Everything was fraught with meaning and possibility, coupled with a history of service to country and community. It was those comfortable, naive days when messages were sent and received using those yellow ARRL message pads.

The Incentive Licensing fiasco proved that all bets were off. The rules could be changed mid-stream and nothing would ever be the same again, all for reasons that no one could successfully articulate. Naiveté was now coupled with a sense of paranoia, and everything became a "plot" by one group or another to do away with amateur radio or ruin it for the "real" hams. A lot of us still are sort of paranoid, still believe in plots, and still firmly believe that the "real" amateur radio is well on the road to perdition. It's almost as if we have to go back in time to the glorious days of thermionic emission valves (tubes), AM, homebrewing, and all those things prior to Incentive Licensing in order to regain the true essence of amateur radio.

The true essence becomes something new people have to adhere to, swear allegiance to, and promulgate, while the rest of us who are enlightened to the truth move on. We who have lived through it, like the measles, don't have to repeat the experience. We have speed and motility in moving a phenomenal number of letters and words, which sometimes are coherent, at magnitudes faster than 20 words per minute. Today, pure id, plots, diatribes, and petty hatreds can be shared faster than a firing synapse. Technology is truly a wonderful thing, but I'm reminded of something a Swiss writer, Max Frisch, said about 40 years ago: "Technology . . . the knack of so arranging the world that we don't have to experience it." These days that would become an admonition to stop and smell the roses once in a while, really listen to a human voice, read a book, and yes, break out that old manual telegraph key for the tactile pleasure of it.

While each of us might profess to know what the real amateur radio is like and composed of, each of us exercises dominion over that thought and space by virtue of an On/Off switch. We might get in each other's face, so to speak, over contests and DXpeditions invading that "space," but it's generally of short duration and goes away. To some, that is madness, signifying nothing but sound and fury and endless signal reports. We opt to participate or not. It certainly isn't a prime requisite for having our license. There is no obligation to take part in any aspect of our hobby, although most of us find something that we like and pursue at our own pace. Amateur radio as a hobby or service (whatever you're comfortable calling it) is designed to expand time with a sense of enjoyment and fulfillment for those hours spent not working for a living, not interacting with family or community, or not doing other things which might also be important or meaningful.

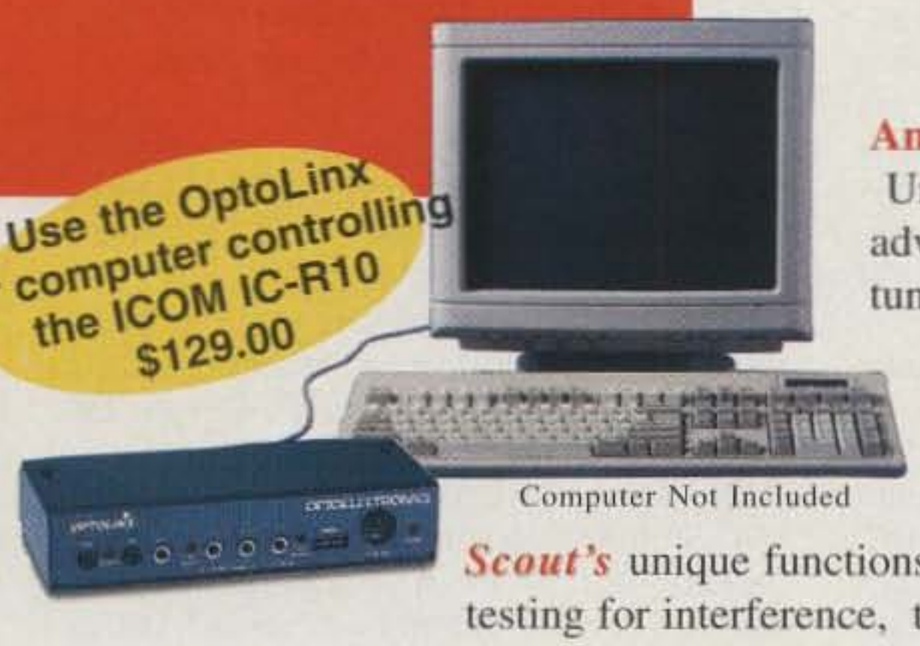
I appreciate all the (regular) mail I've received from readers who also have shared with me their views on e-mail. I especially enjoyed the humorous touch Murph, VE3ERP, added to his cover letter accompanying a new article. His last paragraph stated, "I was going to send you this material by e-mail, but after reading your editorial in the February issue, I decided to "[type it], address the envelope, put a stamp on it, and walk it to the local post office!" Well, Murph, if you think it's worth the effort, so do I.

73, Alan, K2EEK

iCan Reaction Tune Another Receiver!

Reaction Tune the NEW ICOM IC-R10

Use the OptoLinx for computer controlling the ICOM IC-R10 $129.00



Computer Not Included

Another radio to tune, another reason to purchase the *Scout*.

Until now the AOR AR8000/2700 were the only hand held scanners to take advantage of the ***Scout's*** Patented Reaction Tune function. The Scout can now tune the new ICOM IC-R10 hand held scanner (shown below). Connection is easy: No modifications required - No custom cables to buy - Just plug and play.

Scanner hobbyists and communication professionals benefit from the ***Scout's*** unique functions. Whether you're searching for new frequencies in your neighborhood, or testing for interference, the ***Scout*** is the ultimate communications tool.

Armed with a 400 frequency memory register, the ***Scout*** does not record duplicate frequencies, instead it coordinates repeated frequencies into a hit register storing up to 255 hits per frequency. Attach it to your belt and begin your day, the ***Scout*** will alert you when a signal is received by its beeper or vibrator function.

You won't miss a thing with Reaction Tune. The ***Scout's*** CI-V compatible output allows it to interface to the AOR AR2700/AR8000, ICOM R7000, R7100, R8500, R9000 and now the new IC-R10 (shown oposite). The ***Scout*** captures the frequency, then sends the serial data to the receiver and tunes the scanner to the frequency for instant monitoring in less than one second. Recorded frequencies can be downloaded to a PC using the optional OptoLinx universal interface •

SPECIFICATIONS

- 10MHz - 1.4GHz frequency coverage
- Stores and records 400 frequencies in memory with 255 hits for each
- Interface to a PC for frequency download using optional OptoLinx PC interface
- Distinctive beeps indicate frequency hits, pager style vibrator for discreet recording
- Automatic EL backlight for night operation
- 16 segment RF signal strength bargraph
- Frequencies are automatically saved when unit is turned off
- Reaction Tune the ICOM R7000, R7100, R8500, R9000, IC-R10, and AOR AR2700, AR8000, and the Radio Shack Pro 2005/6 using the Optoelectronics OS456, Radio Shack Pro 2035/42 using the Optoelectronics OS535

$449 Includes Scout, DB32 Antenna, CC30 Case & Spectrum CD

Scout with ICOM IC-R10
Mono Cable required (shown)

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ANNOUNCEMENTS

• **1997 Dara FM Zip Contest** – Contest periods are 2 to 6 PM local time on the following Sundays: April 6, June 8, Aug. 10, Oct. 5, and Nov. 30, 1997. Work as many stations in as many different Zip codes as possible using simplex frequencies on the 144, 222, 440 MHz bands. Mode is FM phone. Reports go to Marvin Force, KB8MVU, 603 Ohio Ave., Troy, OH 45373-2152. Awards will be given. *(They are also considering 6 meter and 10 meter FM and request comments.—ed.)*

• **MARC 50th Anniversary** – The Meriden (Connecticut) ARC is celebrating its 50th anniversary in 1997. MARC, one of the rare memorial stations, has been assigned the call W1NRG by the FCC. Activities and exhibitions are planned during the year. For further information, contact the Meriden Amateur Radio Club, P.O. Box 583, Meriden, CT 06450.

• **The following Special Events will take place during April:**

N1QZA/N1SNB, from National Boys and Girls Club week, Manchester, New Hampshire; Manchester Boys and Girls Club ARC; 1900Z April 10 to 2300Z April 12; N1QZA SSB on 7.240 and 14.250 kHz; N1SNB CW on 7.035 and 14.035 kHz. For certificate/QSL, send to Jeff Demers, N1SNB, 287 Holt Ave., Manchester, NH 03109-4734.

K2VOA, and members of the Piscataway (New Jersey) ARC, will operate their annual Special Event commemorating the Voice of America Relay station, WBOU, by operating under the club call K2VOA, with members of the club using their own callsigns signing /VOA, from 0000Z April 5 through 2400Z April 6 on CW Novice portions of 80, 40, 15, 10 meters; RTTY portions of 40 and 20 meters; phone lower third of the General portion of the bands on 75, 40, 20, 15, and Novice 10 meters. For certificate send #10 (9×12 for unfolded) SASE (2 units first-class postage) with QSL to PARC, Attn: VOA, P.O. Box 1233, Piscataway, NJ 08854.

K3DN/1, from Rhode Island, Warminster ARC; 0400Z April 19th to 0400Z April 20 and 1300– 2200Z April 20th; in the General portions of 40 and 75, 20, or 15 meters (up 25 kHz ± from the lower end); CW on demand; if conditions permit possibly on 160 or the Novice portion of 10 meters; and on the even hours in the Novice CW bands. For more info or to make skeds, contact W3GAD c/o <docw@voicenet. com>. Updates on the operating schedule will be posted on the WARC homepage at <www.resuba.com/warc>. For a QSL send an SASE to K3DN/RI c/o Warminster ARC, P.O. Box 113, Warminster, PA 18974.

W4NJA, from the 13th annual American Quilter's Society Show and Contest, Paducah, Kentucky; April 24–27; Paducah ARA; on 3.950, 7.250, 14.300, 21.400, and 28.400. For a QSL send your QSL to PARA, P.O. Box 2306, Paducah, KY 42002-2306 (e-mail www address <207.87.199.1>).

W4UCJ, from the 76th annual Rose Festival, Thomasville, Georgia; Thomasville Amateur Radio Club; 1700–2300Z April 25 and 1100–2000Z April 26; lower portion of the General 80, 40, 20, and 15 meter phone subbands and Novice 10 meter phone subband. For a certificate send QSL and 9×12 SASE to TARC/Rose Festival Station, P.O. Box 251, Thomasville, GA 31799.

WA4TFZ, from Charlottesville, Virginia Dogwood Festival; Albemarle ARC; 2300Z April 18 through 2300Z April 20; in the General portion of 10 meters. For QSL send QSL and SASE to Bill Bearden, KC4TQF, 237 Falling Rock Drive, Stuarts Draft, VA 24477.

W7PU, from Green Valley, Arizona, to commemorate the closing of all Titan 2 missile sites in the U.S; 1800Z April 12 to 2100Z April 13; phone 3.870, 7.270, 14.270, 21.370, 28.370; CW 40 kHz up from band edge; also 145.290. For certificate send QSL and 8 × 12 SASE to GVARC, 601 N. La Canada, Green Valley, AZ 85614.

XK1 special callsign prefix, from Truro ARC 50th anniversary, Truro, Nova Scotia, Canada; April 6–19. A special QSL will be issued. For more information, contact Dawn MacKay, VE1MAK, 52 Spruce Dr., Truro, Nova Scotia, Canada B2N 4X6 (phone 902-893-3908, or e-mail <dawn.mackay@nsac.ns.ca>).

• **The following hamfests, etc., are slated for April and late March:**

Mar. 29, **Amateur Radio Club of Parker County, TX 9th Annual Hamfest**, Texas Army National Guard Armory, Weatherford, Texas. Contact Allen Griffith, KB5UNY, 1260 Wallis Rd., Aledo, TX 76008 (817-441-9114). (Exams.)

Apr. 2, **10-70 Repeater Assn. Annual Electronic Auction**, 7:30 PM at the VFW, Clifton, New Jersey. Call the 10-70 hotline at 201-445-5172.

Apr. 4, **1997 Southeastern VHF Society Conference**, the Atlanta Marriott Northwest Windy Hill, between Atlanta and Marietta, Georgia. Contact Tad Danley, NZ3I, 2045 Amber Creek Dr., Buford, GA 30519 (770-513-9252; or <tad.danley@nextel.com>).

Apr. 4–5, **6th Annual Sand Mountain Hamfest**, Albertville Recreation Center, Albertville, Alabama. Contact Buddy Smith, KC4URL, 205-593-2516, or write to Marshall County ARC, P.O. Box 2811, Albertville, AL 35950. (Exams Saturday at 9 AM.)

Apr. 5, **North Country, NH ARC/LARK 4th Annual Fleamarket**, Twin Mountain Hall, Twin Mountain, New Hampshire. Contact Richard Force, WB1ASL, 12 Cottage St., Lancaster, NH 03584 (603-788-4428; or <bhabooks@together.net>). (Exams.)

Apr. 5, **Longmont, CO ARC Hamfest/Swapfest**, Boulder County Fairgrounds, Longmont, Colorado. Contact Jim Deeming, at phone 303-651-7764, or e-mail him at <jwdeeming@ compuserve.com>. (Exams.)

Apr. 5, **Radio Amateur Society of Nor-**

wich, CT Ham Radio Auction, Waterford Senior Center, Waterford, Connecticut (10 AM). Bring gear to sell. Call Tony, AA1JN, 860-859-0162.

Apr. 5, **Lawton Ft. Sill, OK ARC 51st Hamfest & Computer Fair**, Comanche Country Fairgrounds, Lawton, Oklahoma. Contact Bob Morford, KA5YED, 1415 NW 33rd St., Lawton, OK 73505 (405-355-6120 or 405-353-8074).

Apr. 5, **Columbus, IN ARC 14th Annual Hamfest**, Bartholomew County 4-H Fair Grounds Community Bldg., State Road 11, SW of Columbus, Indiana. Contact Marion Winterberg, WD9HTN, 11941 W. Sawmill Rd., Columbus, IN 47201-8000 (812-342-4670; or <winterbe@hsonline.net>).

Apr. 5–6, **1997 Greater Baltimore Hamboree & Computerfest**, Timonium Fairgrounds, Timonium, Maryland. Call 410-HAM-FEST (outside Maryland call 1-800-HAM-FEST). (Exams.)

Apr. 6, **Framingham, MA Fleamarket & VEC Session**, Framingham High School, Framingham, Massachusetts, Contact Martin Bayes, AA1ON, FARA, P.O. Box 3005, Framingham, MA 01705 (508-435-0564). (Exams; for info call Dick Marshall, K1KTK, 508-877-0563.)

Apr. 11–12, **North Mississippi Hamfest & Computer Expo '97**, Mississippi Building, Tupelo Furniture Market Complex, Tupelo, Mississippi. Contact Jack Ellis, KI5QV, Rt. 4 Box 198-B, Tupelo, MS 38801 (601-842-7255). (Exams.)

Apr. 12, **Portland, ME Amateur Wireless Assn. Hemfest & Electronics Fleamarket**, University of Southern Maine Sullivan Gymnasium, Portland, Maine. Call Martin Feeney, K1OYB, 207-839-5072 (e-mail <rlockard@worldnet.att.net> (MJFeeney); or Ron Levere, KA1FI, 207-846-9090 (e-mail <levere@usm.maine.edu>).

Apr.13, **Madison, WI Swapfest**, Dane County Expo Center's Exhibition Hall, Madison, Wisconsin. Contact Madison Area Repeater Assn., P.O. Box 8890, Madison, WI 53708-8890 (608-245-8890).

Apr. 13, **Raleigh, NC ARS 25th Hamfest & Computer Fair**, Jim Graham Bldg, NCS Fairgrounds, Raleigh, North Carolina. Contact Ronnie Reams, WA4MJF, 3509 Rolesville Rd., Wendell, NC 27591 (919-217-0263). (Exams; call AA4MY, 919-847-8512.)

Apr. 13, **Southington, CT ARA Fleamarket**, Southington High School, Southington, Connecticut. Call Chet, KA1ILH, 860-628-9346. (Exams preregistration only; for confirmation send an SASE to Southington ARA, P.O. Box 873, Southington, CT 06489.)

Apr. 18–19, **All Arkansas Family Hamfest**, Sherwood Forest Convention Center, Sherwood, Arkansas. Contact J. C. Smith, N5RXS, 501-568-7982.

Apr. 19, **S.M.A.R.T. 5th Annual Swapfest**, Goochland County Fairgrounds, Goochland, Virginia. Contact Buddy Travis, KA4NNN, 540-894-0406. (Exams at noon.)

Apr. 20, **Flea at MIT**, Albany & Main Streets, Cambridge, Massachusetts. Call Nick, KA1MQV, 617-253-3776.

Apr. 20, **Gastonia, NC Area ARC Hamfest**, Karyae Park, Gastonia, North Carolina. Contact GAARC, P.O. Box 85, Iron Station, NC. Contact Keith, WW4N, 704-484-8505 days, 704-739-2961 evenings; e-mail <HKQ@shelby.net>.

Apr. 20, **1997 ARRL Delaware State Convention**, Nur Temple, New Castle, Delaware. Contact Hal Frantz, KA3TWG, 302-798-7270, or <hfrantz@magpage.com> or <http://www.mag page.com/penndel>.

Apr. 20, **Canfield, OH 13th Annual Hamfest**, Canfield Fairgrounds, Canfield, Ohio. Contact Don Stoddard, N8LNE, 42 S. Whitney Ave., Youngstown, OH 44509 (330-793-7072).

Apr. 25–26, **Hamboree 19/Iowa State Convention**, Marina Inn, South Sioux City, Nebraska. Contact Mike Nickolaus, NFØN, 316 East 32nd St., South Sioux City, NE 68776 (402-494-6070; e-mail <menicko@avalon.net> or packet at <NFØN@NFØN.NE.USA.NA>).

Apr. 26, **Albuquerque, NM Tailgate Swapfest/Fleamarket**, St. Paul's United Methodist parking lot, Albuquerque, New Mexico. Contact Chuck Opdyke, KC5GA, 505-858-0306.

Apr. 26, **Cherryville, NJ Hamfest**, Warren County Farmers Fairground, Harmony, New Jersey. Contact Charlie Kosman, WB2NQV, 908-788-4080. (Exams, call WB2NQV for information and to preregister.)

Apr. 26, **West Greenwich, RI Hamfest**, West View Inn, West Greenwich, Rhode Island. Contact Bill May, WA1WM, 20 Montana Ave., Coventry, RI 02816 (401-822-0520). (Exams at 1 PM, walk-ins.)

Apr. 26, **Valley of the Moon ARC W6AJF ARRL Hamfest**, Sonoma Developmental Center, Glen Ellen, California. Call Darrel, WD6BOR, 707-996-4494. (Exams, walk-ins registration begins 9 AM, exams 10 AM.)

Apr. 27, **Mt. Beacon Hamfest**, John Jay High School, Fishkill, New York. Contact Ken Akasofu, KL7JCQ, 316 Titusville Road, Poughkeepsie, NY 12603-2944 (914-485-9617; fax 914-485-2402; e-mail <ken.akasofu@bbs.mhv.net>). (Exams.)

Apr. 27, **SMARTSFEST 97**, Canterbury Park, Shakopee, Minnesota. Call Tim, 612-474-9232.

Apr. 27, **Moultrie ARK 35th Annual Hamfest**, Moultrie/Douglas County Fairgrounds, Arthur, Illinois. Contact M.A.R.K., P.O. Box 91, Lovington, IL 61937, or call 217-543-2178 days, 217-873-5287 evenings.

Apr. 27, **Athens, OH County Hamfest**, Athens Recreation Center, Athens, Ohio. Contact John Cornwell, NC8V, 15100 E. Scatter Ridge Rd., Athens, OH 45701 (614-593-6474; <ab075@seorf. ohiou.edu>). ■

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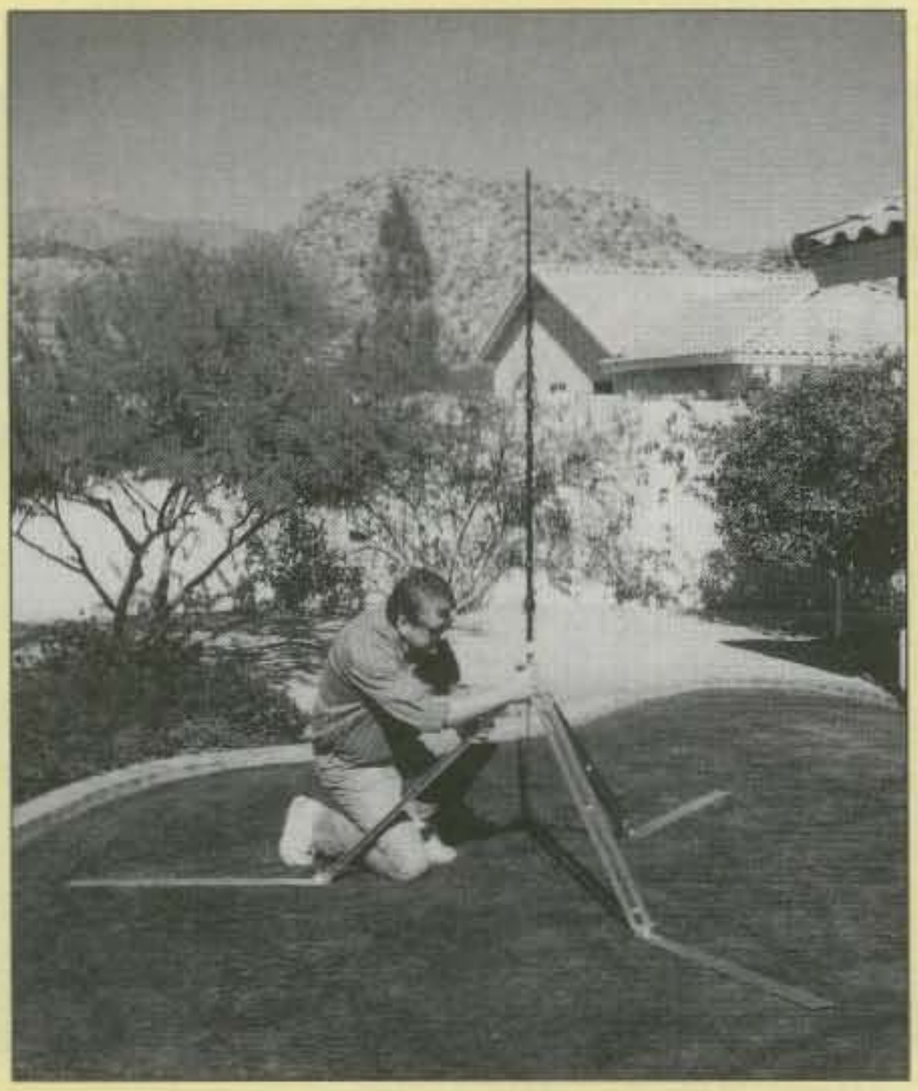

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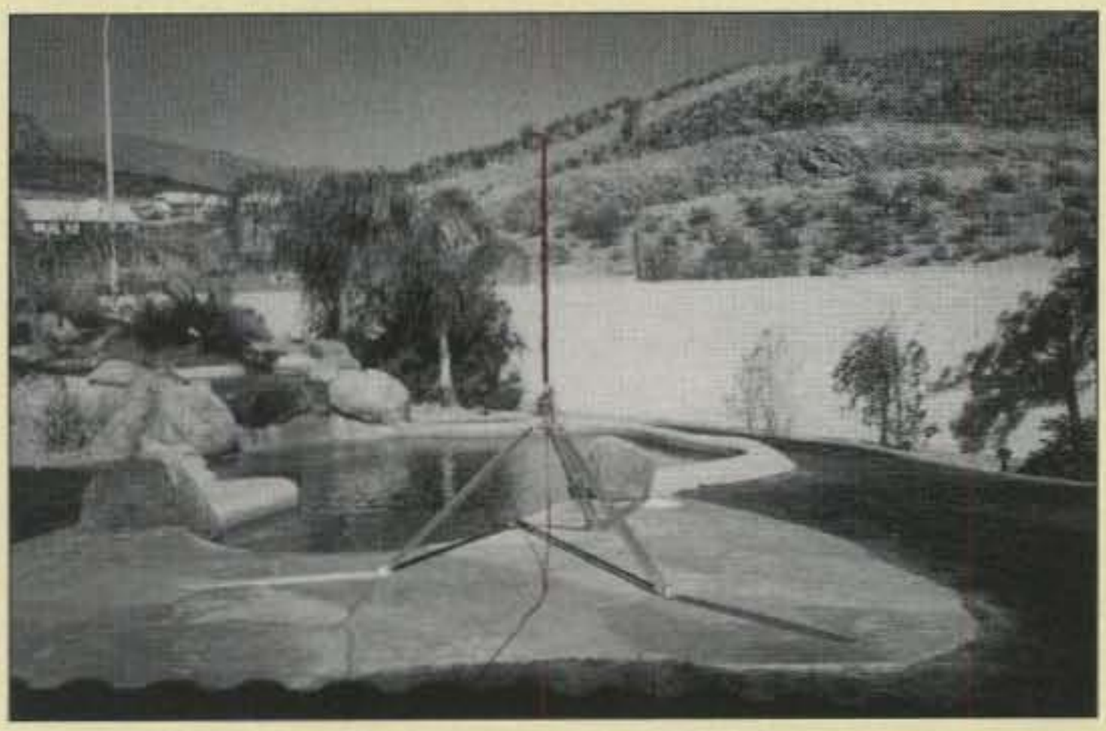

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OUR READERS SAY

The Credit Goes To Fleming

Editor, *CQ:*

I was somewhat astounded by the "Washington Readout" column ("Greenwich Mean Time and the Prime Meridian") in the February issue of *CQ*, specifically the following statement: "Credit for the establishment of international time really belongs to the 21st President of the United States. At the specific request of President Chester Arthur, the International Meridian Conference was convened in Washington, DC on November 1, 1984 *(sic)*."

I will pass over the 100-year error, but I cannot let the assignment of credit go unchallenged when the man responsible for the whole idea of international time zones was a Canadian, Sir Sandford Fleming. The complete history of this development was written up by Thelma C. Landon in *Canadian Geographic* Magazine of February/March 1990. This article is several pages long, but I can summarize the essentials.

Fleming, a Scot who emigrated to Canada in 1845, became a surveyor whose achievements included laying out a plan for the new City of Toronto, surveying for new railroad lines, and even designing the first Canadian postage stamp. However, railroad engineering became his first love, and he made his name as Chief Engineer of the Intercolonial Railway, and from 1871 on, of the transcontinental line, which became the Canadian Pacific Railway, completed in 1882.

Stemming from his railroad experience, in 1879 he presented a paper to the Royal Canadian Institute in Toronto proposing 24 world time zones of 15 degrees each, which was first adopted for North America at a meeting in 1883 in Chicago of Canadian and American railway managers. The Governor-General of Canada sent copies of his papers to governments and scientific organizations around the world, setting off a flurry of international conferences culminating in the 1884 Washington International Prime Meridian Conference.

Whatever else President Arthur did (if anything), he can't take the credit for standard time zones even if he may have lent his august presence as chairman of the conference.

I realize that Canadian history is a total mystery to the citizens of W/K land (as no doubt yours is also to many graduates of a deteriorating educational system in both countries), but we do have a record of substantial achievement in many disciplines which we will stubbornly defend.

Ivor Nixon, VE3IHN
Carrying Place, ON, Canada

Perhaps A Secure Tomorrow

Editor, *CQ:*

One hundred and fifty years ago the Russian liberal thinker Alexander Herzen wrote that what he feared most was a "Genghis Khan with the telegraph." When Lenin seized power in Petrograd in 1917, his first objectives were the seat of government—and the telegraph office.

When, several years ago, "Incentivised Licensing" defined the course of amateur radio, it became the central control and essence of the hobby—using telegraphy and high-speed code tests to decide operating privileges. This totalitarian control with its enormous ability to manipulate amateur radio has become increasingly static. However, opening shots in a war over who gets to dominate the hobby were fired in recent months. At issue is, who shall control international rules and regulations for amateur radio—specifically, Morse code testing. Those organizations who believe they are the icons of order, or each country?

With sphincter-tightening apprehension pro-code advocates are lobbying and bullying the international community, warning of chaos and a possible collapse of amateur operations if Morse code testing requirements are removed as a *treaty* obligation. These mutterings hint that the established foundation of the hobby will be eroded if each country is allowed to set their own code testing standards—absurd. Each country does that already. The real concern is that some democratic society may not want a code test for any class of license.

We must move away from the mental virus that Morse code is the basis that defines an amateur radio operator—as we moved, 60 years ago, from crank-starting a Model-T Ford to today's fuel-efficient cars. Pro-code organizations and media pundits who support the closed-shop mentality of limiting participation need to stop whining with nostalgia for a vanished world, implying that without a Morse code treaty requirement amateur radio will turn into a disaster. Denmark recognized the need to change and in July 1996 reduced license classes from five to three and code testing to 5 wpm for any class of license (once again the Danes lead the way) without a disaster occurring.

Have we become so accustomed to our freedoms being worn away by self-serving interest groups that we can no longer allow any other country to choose their own course of action? The value of democracy lies in its freedom to choose. Amateur radio operates as a microcosm of society, and if it wishes to be a communications participant, and continue free use of spectrum and all the valuable progeny of that gift, it must change. The dynamic future of this hobby depends on integrating tomorrow's technology with today's abilities.

If ever there was a case for social justice, eliminating international Morse code *treaty* requirements tops the list. I strongly urge each of you to write to the IARU FASC, c/o IARU International Secretariat, POB 310905, Newington, CT 06131-0905, supporting the removal of Article S25.5 at WRC99 as a *treaty* obligation of administrations and put the fun back into amateur radio. Then, perhaps, we can have a secure tomorrow for the hobby.

Guy A. Matzinger, KB7PNQ
Cheney, WA

My Two Cents

Editor, *CQ:*

I always enjoy reading your editorials in *CQ*. I have never responded to one until now, though. Your editorial in the February issue struck a nerve. I also share your concern with the way e-mail and the computer are changing our society. Let me tell you my own story.

Ever since I was a child I have always loved to read books. I learned to read on my mother's lap at a very young age. We read together out loud the entire classic *Ivanhoe* by Sir Walter Scott. That was a special part of my childhood. As I progressed through school, the reading and comprehension skills I learned at home without question gave me an edge over my peers.

When the age of the personal computer dawned, I jumped in. I had all the latest and greatest machines, software, etc. I thought it was all so great. It seemed to complement my ham radio hobby so well. And e-mail was so convenient to use. I could keep in touch with all my friends and acquaintances without spending money on stamps and stationery.

But something clicked in my head one day. I was sitting in the shack not really doing anything. I looked around the room at the bookcases filled with the many books I had collected over the years, and I was overcome by a great sadness. It occurred to me that I had not picked up a book in over a year. I had neglected my letter writing to the point where I was not sure when I had written last to anyone.

I took stock of myself and determined to make some changes. I sold three of my four computers, and now have only the one that I use for packet and to *write letters* on. I canceled my on-line service, and I no longer send or receive e-mail from anyone. If I have a need or desire to communicate with someone, I write them a letter.

Judging from what I read in your editorial, I think you can appreciate how I feel. I think people appreciate and respect the content more in a personal letter. I know when I receive a letter from someone I feel excited that someone would think of me so highly as to take the trouble to write and mail a letter to me. Many times now I even pick up a pencil or pen and write a letter in my own hand if it is very personal in nature. Much can be said for this also, but I think you get the idea.

Many of the greatest minds in history composed their most important work in the form of the personal letter. Can you imagine if Descartes, Blaise Pascal, and Aurelius Augustinus, to name a few, unaware of the impact on future history their letters would have, had opted, had it been available, to send e-mail instead!

The computer can be a powerful tool. But it must be used intelligently. It is not the holy shrine that some people have turned it into.

I see the current goal of most PTAs is to put computers at the reach of all students in our grammar schools. They feel this will enhance a child's education. I disagree! Children must learn, and *practice,* reading and writing. They must learn how to use reference materials and the card files in the local library. They should become familiar with the encyclopedia and develop skills with respect to where to find the information they need. My 17-year-old daughter can use Word Perfect and Lotus 1-2-3, but she becomes frustrated if she has to look up a word in the dictionary! This is the type of student our educators are creating. It is a dangerous direction in which our school systems are heading.

The skills of reading comprehension and the ability to transfer thoughts and ideas onto paper

(Continued on page 115)

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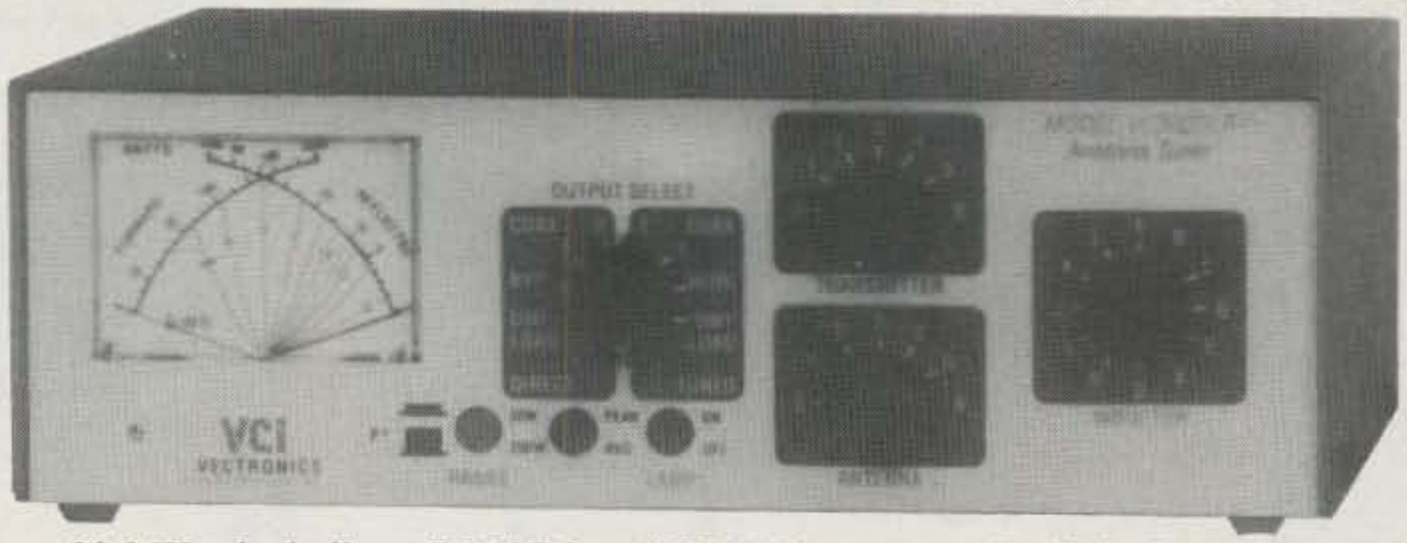

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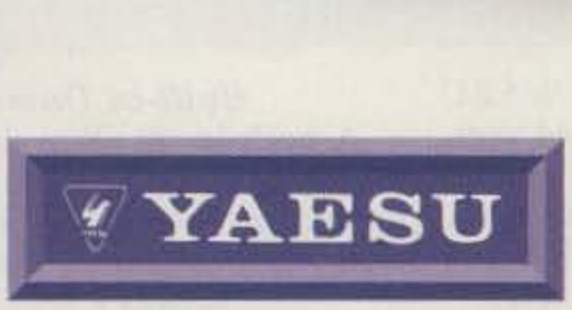

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CQ Exposé!

Little LEO's Dirty Secret

There's one little problem that the companies proposing to launch Low Earth Orbit (LEO) satellites don't want you to know about.

BY PROFESSOR EMIL HEISSELUFT*
LAUTON INSTITUTE
GROSSMAUL-AN DER DONAU, AUSTRIA

*Proposals to use our two most heavily populated VHF bands (2 meters and 3/4 meter) for LEO satellite operations still are "on the table," and they can be revived as soon as frequency sharing studies between the Mobile Satellite and Amateur Services are completed. But wait! Prof. Heisseluft has discovered a more compelling reason for arguing against the use of LEO communications constellations, not only in our bands but anywhere in the spectrum. In fact, his arguments have nothing to do whatsoever with spectrum utilization. What the good professor has to say will astound you! And it surely will cause the U.S. Government as well as other governments worldwide to go back to the drawing board on the use of the low Earth orbit for **any** application involving large constellations of satellites. —Alan, K2EEK*

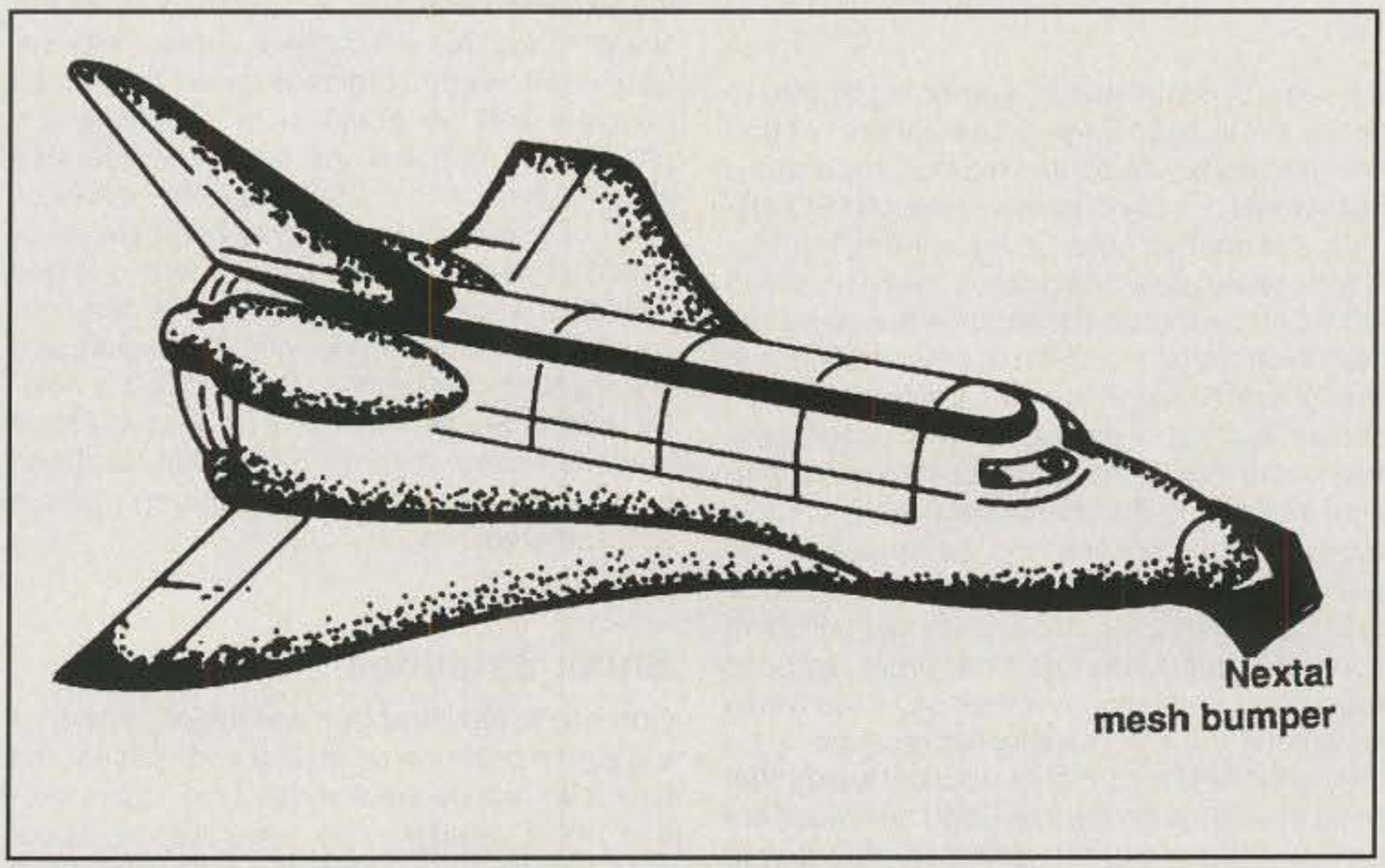

Fig. 1– Third-generation Shuttle equipped with advanced Nextel mesh bumper for spaceborne debris in the low-Earth orbital sphere.

During 1996 the Amateur service was put on the defensive by several U.S.-based companies that proposed to launch constellations of Low Earth Orbit (LEO) satellites that would operate in the very-high-frequency (VHF) and ultra-high-frequency (UHF) bands. Specifically, these companies proposed in a national telecommunications forum that frequencies in the amateur 2 and 3/4 meter bands be allocated to their satellite service on a shared basis with the Amateur service. The hue and cry that went up from amateurs across the country served to sensitize the Federal Communications Commission (FCC) and other agencies to the needs of your community and, specifically, to the importance of these bands to your mobile and public-service communications requirements. Regardless, the proposal to use the 2 and 3/4 meter bands still awaits action in the United States as the U.S. and other countries around the world prepare for the 1997 ITU World Radiocommunication Conference, WRC-97, to be held in Geneva, Switzerland.

Overlooked in the entire matter, however, is a fact that could spell the death of the LEO concept. It is:

*There is a significant risk that the deployment of Low Earth Orbit (LEO) communication satellite constellations could trigger a "chain reaction" that would result in a virtual explosion in the space debris population close to Earth. Not only could this shut down the use of low Earth orbits, but also it could jeopardize **all** space missions that involve a transit of the near-Earth orbital sphere!*

The potential for such a catastrophic event has been known to exist for many years. However, it apparently has either been ignored or swept under the rug in the race to establish LEO-based satellite communications networks. Furthermore, based on studies at the Lauton Institute as well as in military laboratories in your country, the threat for LEO satellites to do irreparable harm to the near-Earth space environment never has been greater.

Space Debris

Debris in the near-Earth orbital sphere, which is located at roughly 700 to 800 altitude *(roughly 420 to 480 miles—ed.)* has been accumulating since the launch of Sputnik in 1958. Today, in addition to satellites used for weather observation, military surveillance, and other applications, this sphere contains a large amount of debris that was created as a byproduct of earlier space missions. This "junk" is characterized by objects traveling at a variety of speeds and in virtually all directions. Polar regions, in particular, represent the greatest threat to stability in the low-Earth orbital sphere. Here, many objects that are traveling in opposite directions routinely pass close to one another, and so the probability for collision is high!

Early in this decade the American Mobile Satellite Corporation (AMSC)[1] presented an

Professor Heisseluft currently is in Europe consulting with the European Space Agency on its efforts to genetically engineer future-generation bacteria-size space probes. Correspondence may conveniently be directed to the professor c/o CQ.

Fig. 2– The Lauton Institute's Genetic Engineering Research Center (GERC) was the first laboratory to produce a fully functional bacteria-size space probe. The satellite shown here has been magnified 10,000 times.

overview of completed and on-going studies of debris in the near-Earth orbital sphere. At that time it already was postulated that there was a substantial risk of collision between a LEO satellite and another object in the sphere. Further, it was postulated that such a collision would create an explosion in the debris population by setting off a chain reaction of other collisions in the sphere. Should this occur, the sphere would contain a cloud of debris that would inhibit the use of the low-Earth orbit and that would present a barrier to the unimpeded transit of rockets through the sphere. And, as if these effects are not bad enough, the "settling" of debris due to the Earth's gravity field and atmospheric friction would pull debris into lower orbits, creating even more problems. Amateur satellites would be among the objects affected most because they usually transit highly elliptical orbits that bring them through the low-Earth orbital sphere on their path around the world. At the least, your satellites would suffer minor collisions with space dust (as did a Shuttle on a mission last year) which might cause minor damage, say, to a solar panel. At the worst, your satellites could be severely damaged or even demolished by a collision with space debris. Oh, dear friends, these are not comforting thoughts!

Avoiding Collisions

The proponents of LEO communication constellations know that their satellites have the potential to create a catastrophic explosion in the debris population of the near-Earth orbit. They have gone to great length to engineer space traffic control systems that they say will prevent their satellites from colliding with one another (again, this is especially critical in the polar regions). While such systems might work to prevent satellite-to-satellite collisions, however, they will be totally ineffectual at preventing collisions between their satellites and other objects (especially space junk) in the low-Earth orbital sphere.

Clearly, other solutions to protect spacecraft will be required, regardless of where in the near-Earth orbital sphere a satellite travels. One of these "solutions" may involve the development of mesh screens that will "capture" space-borne junk before it can seriously damage a satellite.

Mesh Screens

The use of mesh screens to protect satellites in near-Earth orbits was first proposed by Schpílküs and Heisseluft[2], and later was evaluated by many investigators, including Hörz, *et al.*[3], in your country. Basically, the concept involves the installation of bumpers, or passive shields, on spacecraft to protect against the consequences of collisions between the spacecraft and hypervelocity projectiles (i.e., manmade orbital debris and natural micrometeoroids). Thick shields, obviously, provide significantly greater protection against most cratering events, while thin shields will leave the spacecraft vulnerable to collisional fragmentation. Clearly, there are tradeoffs to be made between the size and mass of the bumper to be used on any given spacecraft, the "launch penalty" incurred by having to orbit heavier objects, and the expected size and impact velocity of the space debris that will come in contact with the spacecraft. Early studies showed that mesh bumpers can be effective in mitigating the effects of a collision. As such, considerable attention has been paid of late to the development of lightweight collisional bumpers comprised of five or ten meshes. These designs have been shown to be more effective than continuous foils in the comminution, dispersion, and deceleration of impactors. Fig. 1 shows a next-generation Shuttle outfitted with a mesh shield made of Nextel, a ceramic fiber that has been found to be very effective in reducing multiple shock interactions.

Small Satellites

One way to significantly lower the probability of a collision between a satellite and spaceborne junk is to reduce the size (i.e., the "cross section") of a satellite. The less cross-sectional area a satellite presents to the debris cloud, the lower are the chances of a collision. For this reason NASA and other space agencies worldwide are in the process of developing small satellites to replace satellites now in orbit, some of which are the size of a compact car! For example, writing in *Popular Mechanics*[4], J. Wilson notes that the Spacecraft Engineering Section of the Jet Propulsion Laboratory is investigating applications of second-generation microspacecraft technology that could result in the development of satellites that are no larger than a toaster and that weigh 11 pounds or less. If all goes well, NASA plans to have these "toasters" in space by 2010. But even smaller satellites are in the wings. Engineers at the Johnson Space Center in Houston, Texas, USA, are testing prototypes of space probes they call "pixelsats." No larger than the size of your fingernail, they would be released by the thousands, with each capable of sending back a small piece of information (e.g., a pixel of an image). The pixels received from the individual "pixelsats" then would be reassembled on Earth to yield the complete picture of the object televisied.

Finally, I am proud to announce that the Genetic Engineering and Research Center (GERC[5, 6, 7]) at the Lauton Institute is experimenting with nanotechnology satellites. The intent is to manipulate molecules to form transistors and connecting wires in such a way as to build a space probe the size of bacteria. Because of competition in this area from IBM and various university research laboratories, I am not at liberty to discuss our research in detail. However, I have provided a photograph of our first successful attempt to create a bacteria-size space probe so that you can see how far we have progressed (see fig. 2).

Conclusion

The amount of spaceborne debris in the near-Earth orbit now is so great that the launching of one or more LEO satellite constellations could lead to a catastrophic collision between a LEO satellite and debris in the low-Earth orbital sphere.[8] The resulting collision products, in turn, could trigger a chain reaction that would result in the complete distruction of all satellites in low-Earth orbit. Not only would this sphere no longer be available for LEO satellites, but also any attempt to penetrate the sphere—which now would be loaded with a massive quantity of dispersed junk—probably would result in the distruction of a rocket and/or Shuttle as well as its cargo. The control of LEO satellites, especially near the Earth's poles, is but one way to prevent accidental collisions.

Regardless, satellites must be made more immune to such collisions. One means by which to do this involves the use of mesh screens on future-generation satellites. The use of smaller and smaller satellites also provides a solution in that smaller satellites present a significantly lower cross section to the debris cloud than do today's large satellites.

Footnotes

1. *Reply of AMSC,* FCC General Docket No. 89-554, Technical Appendix, at 4-6, Exhibit 5, January 8, 1991.

2. "Debris Bumpering Concepts," Schpílküs, I., and E. Heisseluft, *J. Impact Phys.*, vol. XL, No. 4, April 1957.

3. *Impact Experiments into Multiple-Mesh Targets: Concept Development of a Lightweight Collisional Bumper,* Hörz, F., M. J. Cintala, R. P. Bernhard, F. Cardenas, W. Davidson, G. Haynes, T. H. See, J. Winkler, and B. Gray, NASA Technical Memorandum 104764, March 1993.

4. Wilson, J., editor/writer, *Popular Mechanics,* September 1996, p. 15.

(For additional information on the work at the Institute's Genetic Engineering and Research Center, see references 5–7 below.)

5. Heisseluft, E., "How To Stay at the Top of the DXCC Honor Roll Until You Reach At Least Age 100," *CQ,* April 1996.

6. Heisseluft, E., "The Threat To Molecular Electronics from Microbes Produced by Genetic Engineering," *CQ,* April 1982.

7. Heisseluft, E., and J. Ostermond-Tor, "Fundamental Principles Behind the Use of Genetic Engineering To Create New Life Forms," Lauton Institute Report LI-1-71.

8. "Cosmic Rays, Junk Pose Danger to Space Station, Scientists Say," *The Washington Post,* January 9, 1997, p. A9. ■

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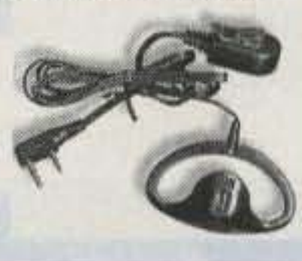

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The Hy-Gain DX77 Vertical

BY LEW McCOY*, W1ICP

The DX77 is a newcomer to the antenna line of Hy-Gain, a division of Telex, Inc. The antenna covers 40 through 10 meters. I received the antenna shortly before Field Day in 1996, so I thought that would be a good chance to give it a complete workout.

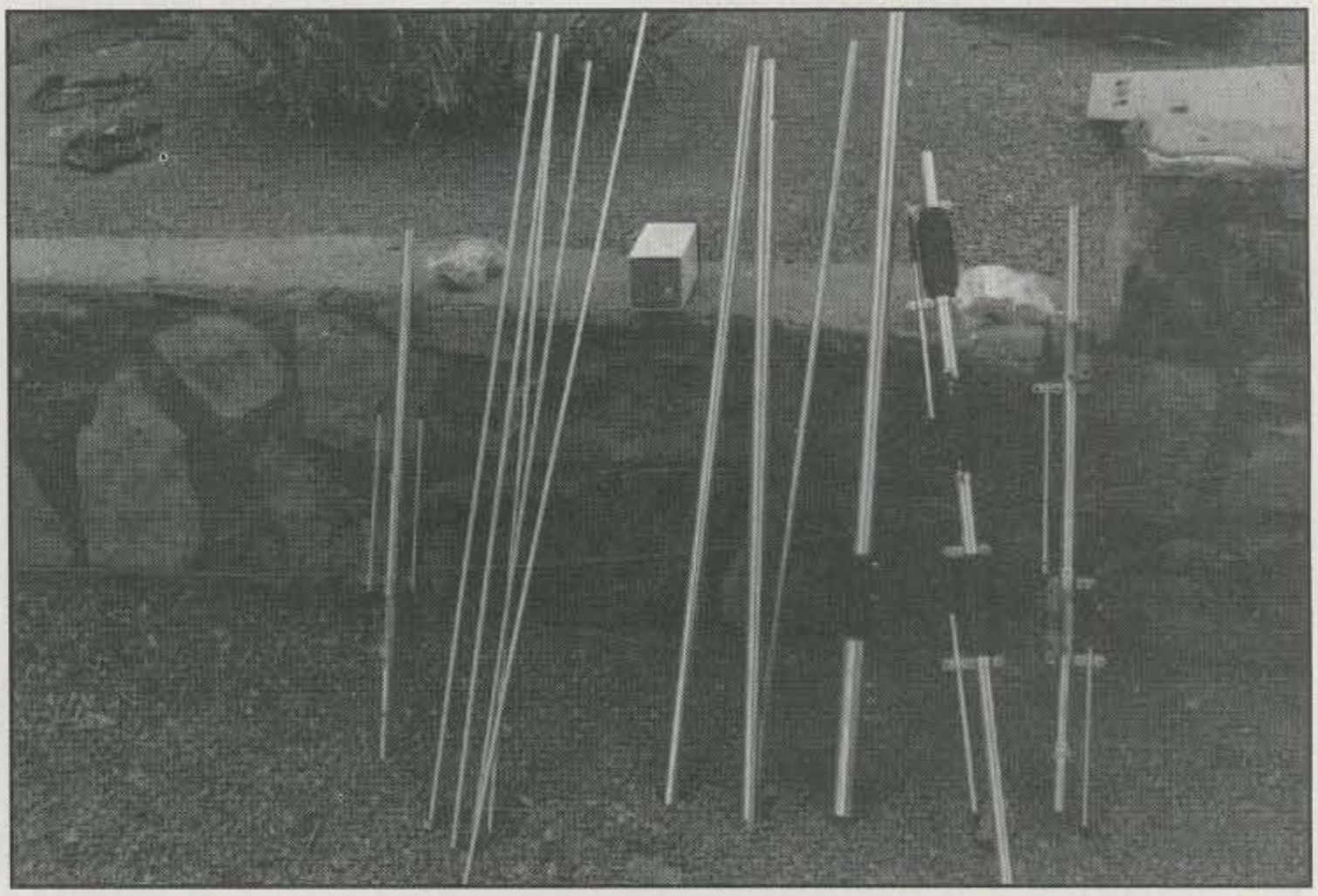
The antenna is a vertical, 29 feet high, and has its own ground system; no extra radials are needed. Hy-Gain refers to the antenna as an off-center-fed system and says it is based on an off-center-fed dipole, sometimes called a Windom. I believe this description was arrived at by feeding the antenna using the ground radial system as one half the antenna with the vertical portion the other half. One thing is for certain: This design makes an excellent antenna, as does the trap design.

The antenna covers 40 through 10 meters with a very respectable bandwidth—more about that in a moment. I was very impressed with the traps in this antenna.

If I may digress for a moment, I have been involved with testing, designing, and working with trap antennas since their inception back in l953. The first trap antenna article appeared in *QST* at that time, and it was a well-designed antenna. Those original trap coils actually were made of aluminum tubing that was formed into coils, with capacitors added to complete the trap. I also learned early on that for a trap antenna to have low losses and be most effective, it must be "air wound" and not surrounded by metal. Technically, a trap circuit in an antenna must have a very high Q factor for the trap to effectively divorce one band from another.

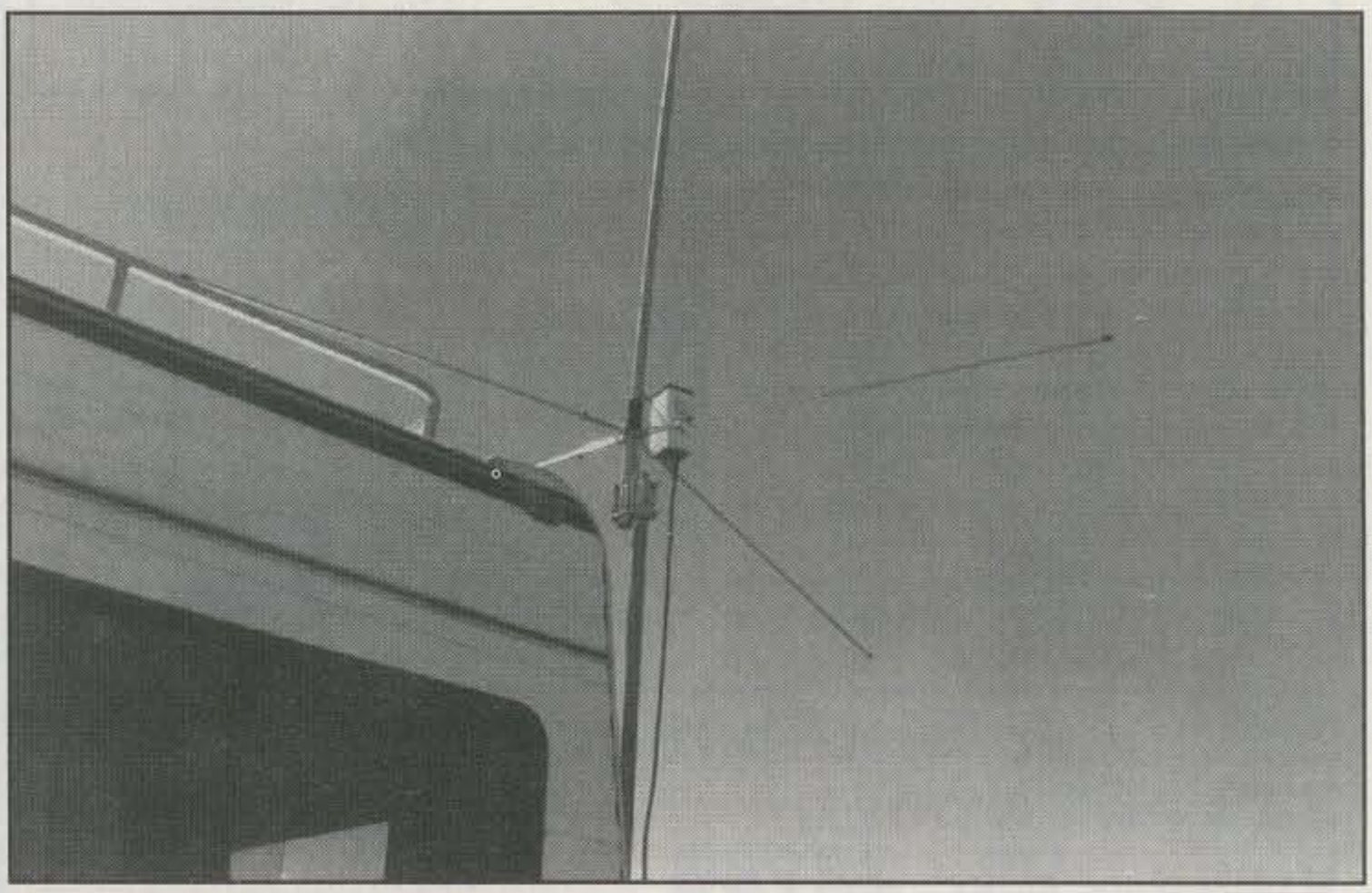
A common problem arose with manufactured trap antennas simply because early traps could not keep out rain or moisture. The moisture destroyed the Q, hampering the performance of the antenna. Performance really suffered. Manufacturers therefore actually shielded their traps in metal enclosures simply to make the prospective buyer happier. This method has been carried on since 1953. The inherent problem with this design is that the Q of a coil is destroyed by the near vicinity of a metal enclosure, making the trap a real lossy device.

The Hy-Gain DX77 vertical is a complete departure in trap design in that there is no metal enclosure around the traps. These were designed with maximum efficiency in mind, and it really shows in performance.



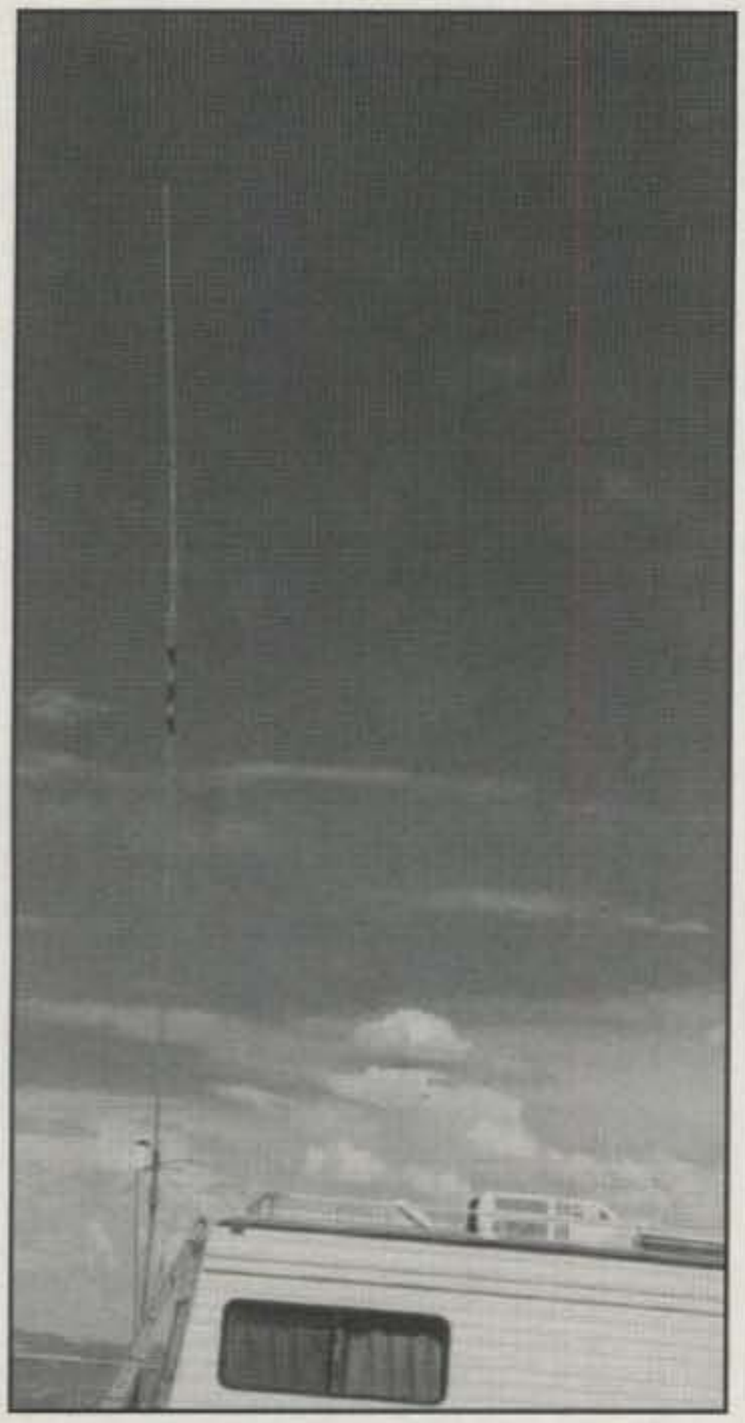
Here is the antenna before assembly as it comes out of the box. Assembly time was about one hour by myself. The directions are very good and well illustrated.

The DX77 has six traps—one for each of the bands from 40 meters on down to 10, and this of course includes the WARC bands. There are four radials installed at the bottom, each of which is 5 feet long.



This shows the base assembly and ground radials with the antenna mounted on a supporting mast.

*Technical Editor, CQ, 1500 West Idaho St., Silver City, NM 88061
e-mail: mccoy@zianet.com



Here's the DX77 up in the air on the back roof of my RV. Installed on the RV, the antenna performed as well as or much better than when I had the antenna mounted on the deck. It produced almost all first-call contacts.

The complete vertical weighs 25 pounds and has a wind area of 1.9 square feet. It is rated for 60 mph winds if it is erected unguyed. (That's the way I installed mine.)

An extremely nice feature is that the bottom mount is hinged so that the antenna can be tilted over if desired. That was important in my case, as you will see. The bottom of the antenna is slipped over and clamped to a mounting pipe (not furnished) that is anywhere from 1.75 to 2.125 inches in diameter.

For my initial tests I installed the antenna on a deck at my house. I was mainly concerned with the bandwidth (standing-wave ratio) across each of the bands. I have included the SWR curves that come with the antenna (fig. 1). My tests verified these figures. In fact, I had a slightly better curve on some of the bands. I should point out that many modern transceivers will accept an antenna load of up to 3 to 1 SWR before shutting down. I found I could cover all the bands without any other adjustments with a couple of different transceivers.

At my home station I have a beam up at 50 feet, and it covers the same bands

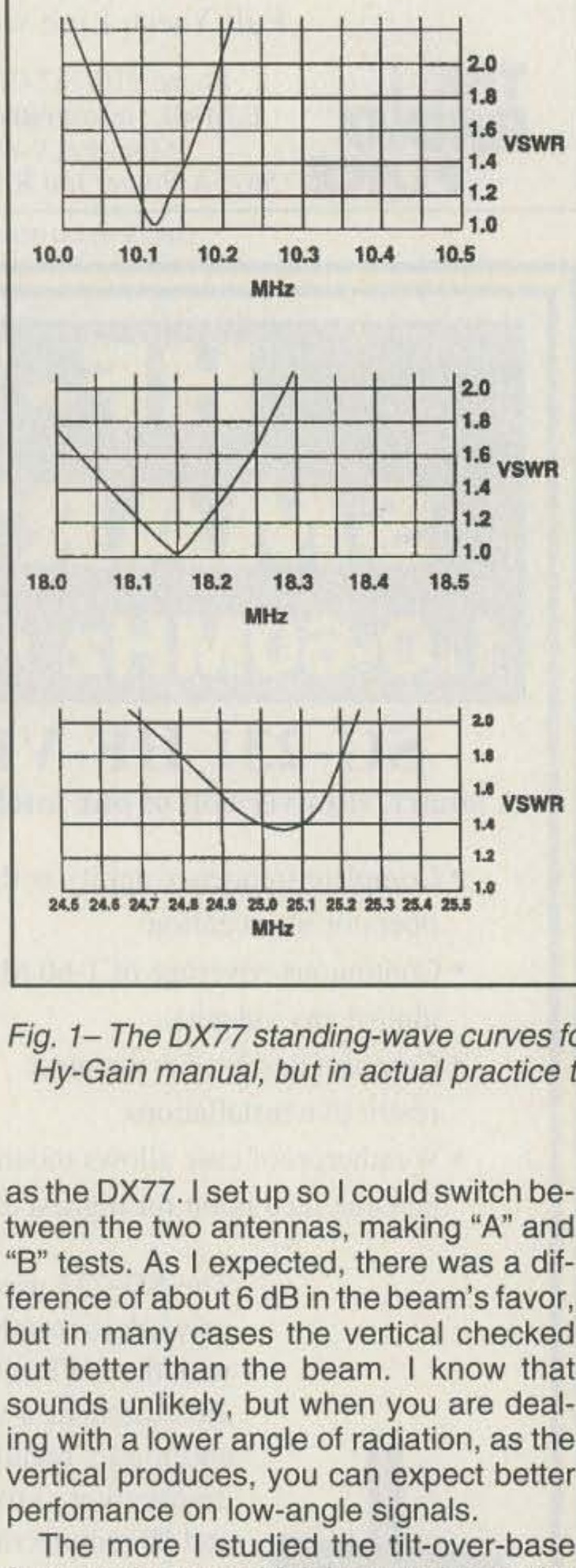


Fig. 1– The DX77 standing-wave curves for the various bands. This was taken from the Hy-Gain manual, but in actual practice the antenna I tested performed even better.

as the DX77. I set up so I could switch between the two antennas, making "A" and "B" tests. As I expected, there was a difference of about 6 dB in the beam's favor, but in many cases the vertical checked out better than the beam. I know that sounds unlikely, but when you are dealing with a lower angle of radiation, as the vertical produces, you can expect better perfomance on low-angle signals.

The more I studied the tilt-over-base feature, the more I felt I wanted to try the antenna on my RV. I have a 30 foot Allegro motor home. On the rear ladder I mounted the mast pipe with a couple of U bolts, and then took the assembled DX77 up to the roof of the motor home. With the help of another amateur, we slipped the base of the vertical over the pipe and secured it. I tilted the vertical over so that it lay along the roof. I then drove to Field Day!

I ran about 100 watts to the antenna and produced what I considered to be a fairly good score for myself. Here, however, was my surprise. I had taken along a Transmatch, fortunately, and when conditions slowed down on the higher bands, I used the tuner to go on 80 and 160! I can't say the vertical was a world beater on these bands, but I had no trouble making contacts. A 29 foot vertical on 80 or 160 may not be a great antenna, but it certainly is a good antenna.

There are a lot of RVer amateurs on the road who could make good use of a system such as this. It's simple and clean and gets the job done. For contest work I'm thinking of making an inverted top-loaded antenna for 80 and 160 using the DX77. All I need to do is clip a No. 14 wire on the top of the vertical, slope it down to the front of the RV, and install my top (bottom) loading coil and top hat down there. I know it would work.

Getting back to the basic DX77, I was very impressed with the mechanical work and performance of this very fine antenna. On a scale of 1 to 10 for trap verticals, I would certainly rate this a solid 10.

The DX77's list price is $412.95, and it is manufactured by Hy-Gain/Telex, Inc., 8601 E. Cornhusker Highway, Lincoln, NE 68507. ■

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RCS-8V, DC-UHF 5 KW Coax Switch. Replace 5 coax feedlines with one with this Remote Coax switch. Weatherproof box mounts outdoors on your tower or mast. Attractive control unit sits on your operating desk. Low SWR to 250 MHz. Usable to 450 MHz. Low loss. Rated at 5 KW to 30 MHz, 1 KW at 150 MHz. **RCS-8VN, $159.00** with "N" connectors.

RCS-4, $134.00, 4 position HF switch. Similar to RCS-8V. No control cable needed. Handles 1500 watts continuous.

RCS-4
$139
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$349 QSK-5 Suggested Retail

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CIRCLE 148 ON READER SERVICE CARD

There's still plenty of life left on the low bands. N4PC shows us how to get a simple and easy-to-build vertical antenna up by next weekend.

A Short, Two-Band Vertical For 160 and 80 Meters

BY PAUL CARR*, N4PC

I feel many in the amateur radio fraternity are missing out on enjoyable QSOS because they think they don't have the room for antennas for the low bands. I've had many requests for antennas that will work on 160 meters, and when I question the caller, it seems many can place a G5RV antenna at about 45 feet. Their comments always end with "Can you help?"

Well, there's the challenge for me—design an antenna that will work on 160 meters and will be no longer than a G5RV and no higher than 45 feet. Another thing that comes to mind when you mention a vertical is the omni-present question about a field of radials. This antenna doesn't require a single radial and it still works. Is it the perfect antenna? No, but perhaps it's optimum for your needs. Read on.

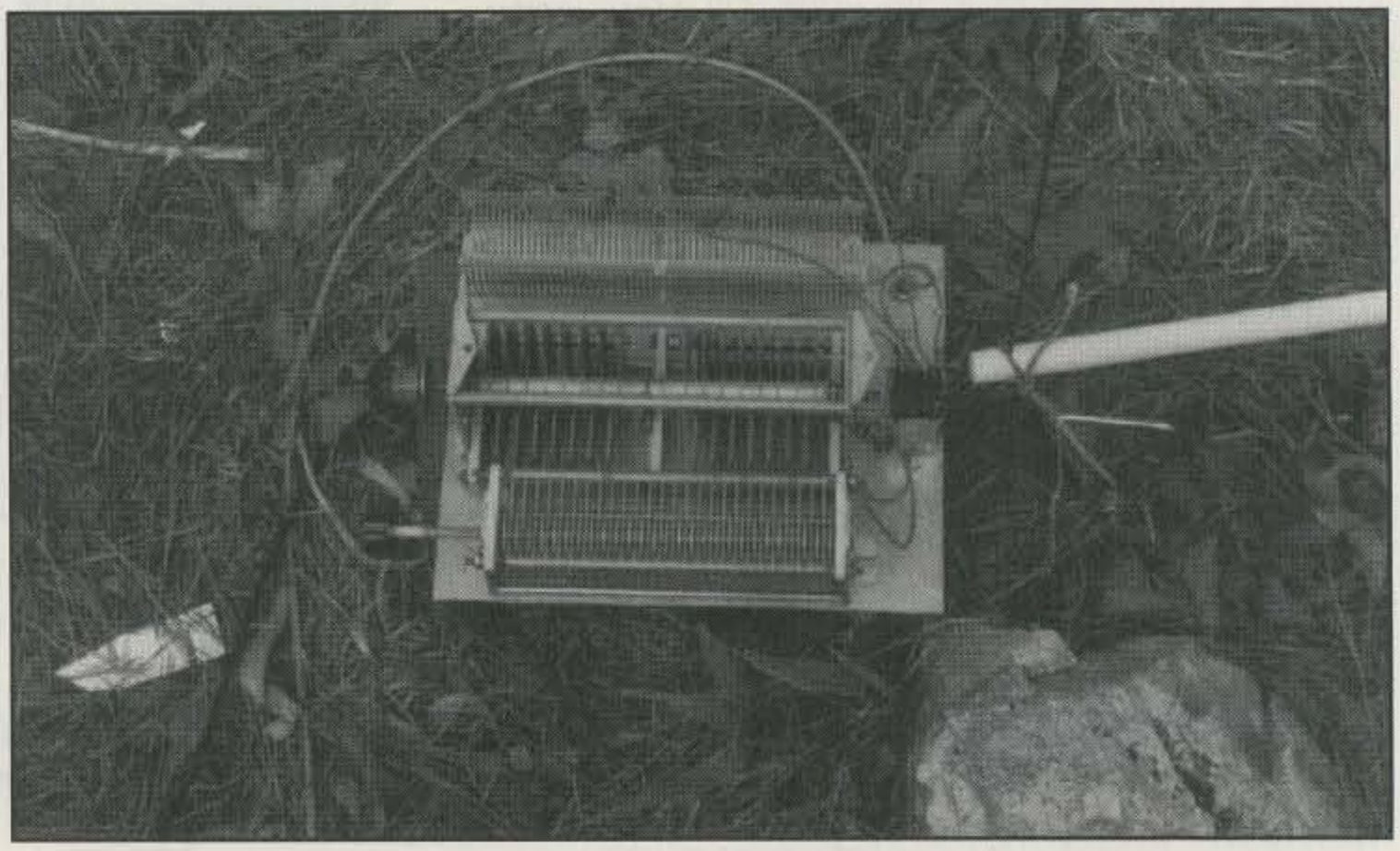
Background

I began my research by consulting *The Amateur Radio Vertical Antenna Handbook* by Capt. Paul Lee, N6PL. This is a very good reference book for those who are interested in designing vertical antennas. Chapter 4 of this book is entitled "Short Vertical Antenna Considerations." Two antennas caught my eye.

The first was the *folded unipole.* The folded unipole is basically one half of a folded dipole with the lower half being replaced by a ground plane. If this antenna is shortened and loaded by a capacity hat, the resulting antenna has a radiation resistance less than the theoretical 150 ohms for a full-size unipole antenna, but the resulting reactive component is positive. That means the reactive component can be cancelled by using a series capacitor instead of an inductor, which has more loss. Perhaps this concept could be used in the final design.

Another antenna in Chapter 4 also piqued my interest. It is called the Type UG, which was developed by John H. Mullaney and Associates. It was devised to improve the feed-point impedance and bandwidth characteristics of some of the low-frequency "inverted L" or "T" configurations. One diagram showed three vertical wires top-loaded with a horizontal wire. The dimensions were about what I was looking for, so it was time for the second phase of my research—the computer analysis.

*97 West Point Road, Jacksonville, AL 36265



The coil, capacitor, and relay are mounted on an aluminum plate. The tuning unit sits off the ground on a few bricks to keep moisture out.

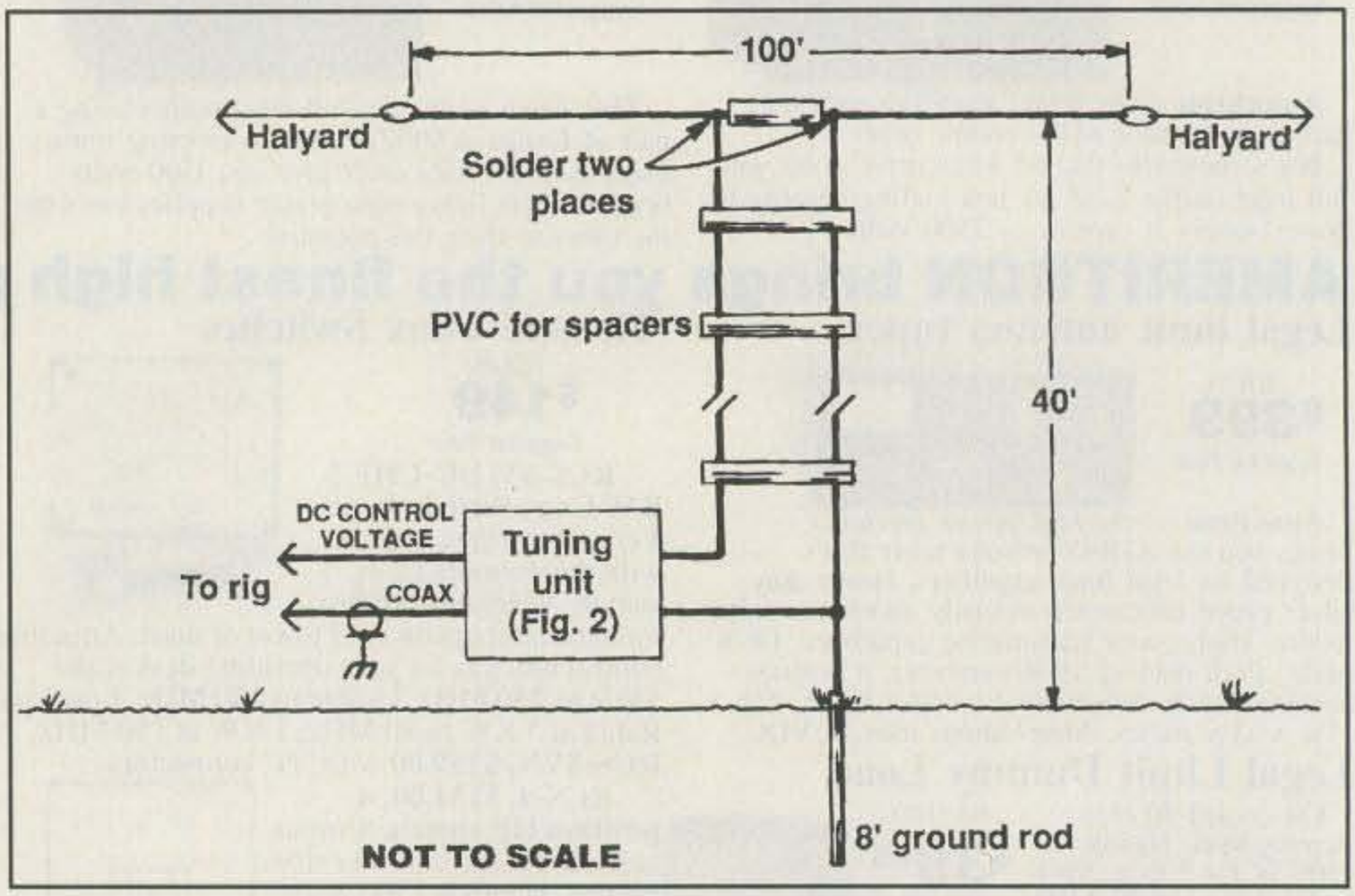


Fig. 1– Details of the 160 and 80 meter vertical antenna as described in the text.

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Turn your mobile, base or handheld into 160 Watt powerhouses and talk further, longer, clearer . . . All modes: FM, SSB, CW . . . Superb GaAsFET preamp . . . Overdrive, high SWR, Over-temperature protection . . . Remote controllable . . .

B-5016-G
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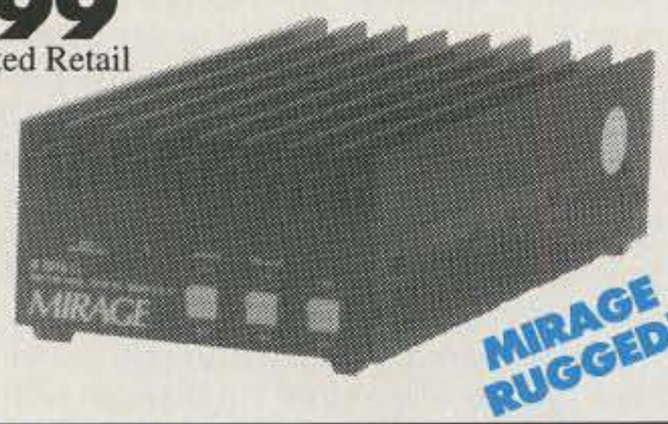

Power Curve -- typical B-5016-G output power								
Watts Out	*130*	*135*	*140*	*145*	*150*	*155*	*160*	*165*
Watts In	*20*	*25*	*30*	*35*	*40*	*45*	*50*	*55*

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

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

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

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

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

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

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

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

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

More 160 Watt, 2 Meter Amplifiers . . .

B-2516-G, $299. For 10 to 35 watt mobile or base stations. 160 watts out for 25 watts in.

B-1016-G, $379. MIRAGE's most popular *dual purpose* HT *or* mobile/base amplifier. 160 watts out/10 W in. For 0.2-15 watt transceivers.

B-1016-G Great for ICOM IC-706!

B-215-G, $379. MIRAGE's most popular *handheld* amp. 150 watts out/2 watts in; 160 watts out/3½ W in. For 0.25 to 5 watt handhelds.

100 Watts for 2 Meter HTs

B-310-G
$199
Suggested Retail
MIRAGE RUGGED!

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***
- ***Reverse polarity protection/SWR Protection***
- ***FREE mobile bracket*** • ***Auto T/R switch***
- ***FREE handheld BNC to B-310-G cable***
- ***Ultra-compact 4¾x1¾x7¾ inches, 2½ pounds***
- ***One year MIRAGE warranty***

Boost *your 2 Meter handheld to 100 Watts!* Ultra-compact all mode B-310-G amp is perfect for *all* handhelds up to 8 watts and multimode SSB/CW FM 2 Meter rigs. *Great for ICOM IC-706!*

35 Watts for 2 Meter HTs

B-34-G
$99
Suggested Retail

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

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

MIRAGE RUGGED!

35 watts, FM only . . . $79

B-34, $79. 35 watts out for 2 watts in. Like B-34-G, FM only, less preamp, mobile bracket. 3⅛x1¾x4¼ inches.

MIRAGE Dual Band 144/440 MHz Amp

BD-35
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Suggested Retail

MIRAGE RUGGED!

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

- ***45 Watts on 2 Meters/35W on 440 MHz***
- ***Auto Band Selection*** • ***Auto T/R switch***
- ***Full Duplex Operation*** • ***5x1¾x5 inches***
- ***FREE mobile bracket*** • ***"On Air" LEDs***
- ***Single Connector for dual band radios and antennas***
- ***Reverse polarity protection***
- ***Works with all FM handhelds to 7 watts***
- ***One year MIRAGE warranty***

Add this Mirage *dual band* amp and boost your handheld to a *powerful* mobile or base -- 45 watts on 2 Meters or 35 watts on 440 MHz! **Mirage's** exclusive *FullDuplexAmp*™ lets you talk on one band and listen on the other band at the same time -- *just like a telephone conversation.* (Requires compatible HT).

6 Meter Amplifier (50-54 MHz)

FCC Type Accepted

The A-1015-G, $389, is the *world's most popular* all mode FM/SSB/CW 6 Meter amplifier. 150 watts out for 10 in. For 1 to 15 watt transceivers.

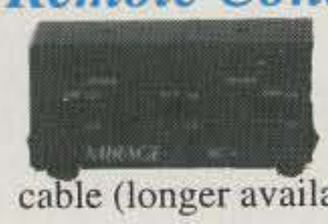
70cm Amplifiers (420-450 MHz)

D-3010-N, $365, -- 100 W out/30 in. For 5 to 45 watt *mobile/base*. **D-1010-N, $395**, 100 W out/10 in. *Dual purpose* -- for handhelds or mobile/base. **D-26-N, $269**, 60 W out/2 in, for *handhelds*.

Amateur TV Amps

Industry standard ATV amps -- **D-1010-ATVN, $414**, 82 watts PEP out / 10 in. **D-100-ATVN, $414**, 82 watts PEP out/2 in. (without sync compression).

Remote Control Head for Amps



RC-1, $45, remote controls most MIRAGE amps. Power On/Off, preamp On/Off, switch for SSB/FM. 18 foot cable (longer available). 1¾x3¾x2½ inches.

Repeater Amps

11 models -- continuous duty all modeFM/SSB/CW repeater amps for 6, 2, 1 1/4 Meters, 70cm, 450 MHz ATV.

Low noise GaAsFET preamps

High gain *ultra low noise* GaAsFET preamps for receiving weak signals. Selectable gain prevents receiver intermod. 15 to 22 dB gain. Less than 0.8 dB noise figure. Automatic RF switching up to 160 Watts. **Choose** In-*Shack* model or *Mast-Mount* (includes remote control) model to reduce loss. Rugged die-cast enclosure.

Frequency (MHz)	*In Shack $139*	*Mast Mount $195*
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50-54	KP-1/6M	KP-2/6M
144-148	KP-1/2M	KP-2/2M
220-225	KP-1/220	KP-2/220
430-450	KP-1/440	KP-2/440

1¼ Meter Amps (223-225 MHz)

Choose from 10 models -- 20 to 220 watts out for 2 to 50 watts in. $129 to $655.

Commercial Amps ($199 to $395)

FCC Type Accepted

Commercial amps for 150 - 174, 450-470 MHz and VHF marine bands, 70 -130 watts out.

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Read SWR directly andForward/ Reverse, Peak/Average power. Remote Coupler. 1.8-30, 50-200, 420-450, 1260-1300 MHz band models.

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CIRCLE 136 ON READER SERVICE CARD

The Computer Design Phase

As a starting point for my computer analysis I chose a "TEE" configuration using two vertical wires and a horizontal wire to act as a "capacity hat," with an initial vertical height of 45 feet and a horizontal length of 100 feet. The predicted impedance for this arrangement was 182 + J1321 for 1.85 MHz and 80 + J586 for 3.8 MHz. After a few iterations I arrived at my final choice for length and height. With a vertical height of 40 feet and a horizontal length of 100 feet, the predicted impedance for 1.85 MHz was 52 + J817 and for 3.8 MHz it was 52 + J546. This would provide a convenient way to match the antenna on both bands. A series capacitor could be used to cancel the reactive component on 3.8 MHz, and an additional capacitor could be switched in parallel to compensate for the reactance on 1.85 MHz. Now it was time to measure the wire and "smell the solder smoke."

Construction and Installation

I cut a single piece of #14 gauge wire for the horizontal capacity hat and two pieces of the same type wire for the vertical elements. I chose 1/2 inch PVC water pipe for use as spacers to maintain uniform distance between the vertical wires. I cut the first piece of PVC to a length of 12 inches, routed the horizontal wire through this pipe, and centered this spacer on the capacity hat. I cut five additional sections of pipe to a length of 13 inches each. I measured 1/2 inch from the ends and drilled holes just large enough to allow the vertical wires to pass through. I soldered the vertical wires to either side of the wire routed through the center spacer. The vertical wires were then routed through these spacers, and the spacers held in place by small cable ties. An insulator was placed at each end of the horizontal capacity hat. This allows the use of halyards to pull the antenna into the air. I next installed an 8 foot ground rod where the base of the antenna was to be placed. The antenna was now ready for installation.

If you've read any of my previous antenna articles, you're aware that I'm blessed with a good selection of tall southern pines around my house. I chose three convenient trees as support for the antenna. I placed elastic shock cords at the ends of the halyards to maintain constant tension on the antenna during windy conditions. I then raised the antenna into the air and attached the end of one of the vertical wires to the ground rod. Now on to the testing phase.

Initial Testing

I used an MFJ-259 SWR analyzer and a small broadcast variable capacitor for the initial test. The idea was to place the capacitor in series with the driven element and tune the capacitor for minimum SWR. When I performed this test, I did get a very pronounced dip on both 75 and 160 meters, but it was 1.8:1 to 2:1 instead of the 1:1 I had hoped for. Why the difference? I realized that the computer analysis programs calculate the impedance of a ground-mounted vertical with respect to perfect ground, and of course my ground was far from perfect. The additional resistance I was measuring was due to ground loss. It seemed I was going to need something such as an "L" network instead of a simple series capacitor. Back to the junk box.

The Tuning Network

I decided to use a single, tapped inductor and two capacitors. I also found a relay with 10 amp contacts to switch the inductor tap and the capacitors. The concept of the matching network was very simple. I would use one of the capacitors and a particular tap on 75 meters and switch a different tap point and parallel capacitor for 160 meters. The relay could be wired so that when power is supplied to the relay from the shack, the tuning unit will do the necessary switching at the base of the antenna.

I chose a flat piece of aluminum on which to mount the components. Be sure to use standard high-RF-voltage techniques when mounting the components. **Remember, if you intend to use high power on this unit, considerable voltages will be developed.** Test the unit on your workbench to assure yourself that everything is working properly before installation at the antenna. If all is well, the unit is ready for mounting at the antenna. Don't forget: Some type of protection is necessary for the tuning unit. I chose a plastic refrigerator container to keep the unit dry.

Final Tuning

I moved the unit back to the base of the antenna and supported it on a couple of bricks. I con-

A plastic refrigerator container provides the weatherproofing for the tuner. To the right you can see the bottom PVC rung of the antenna.

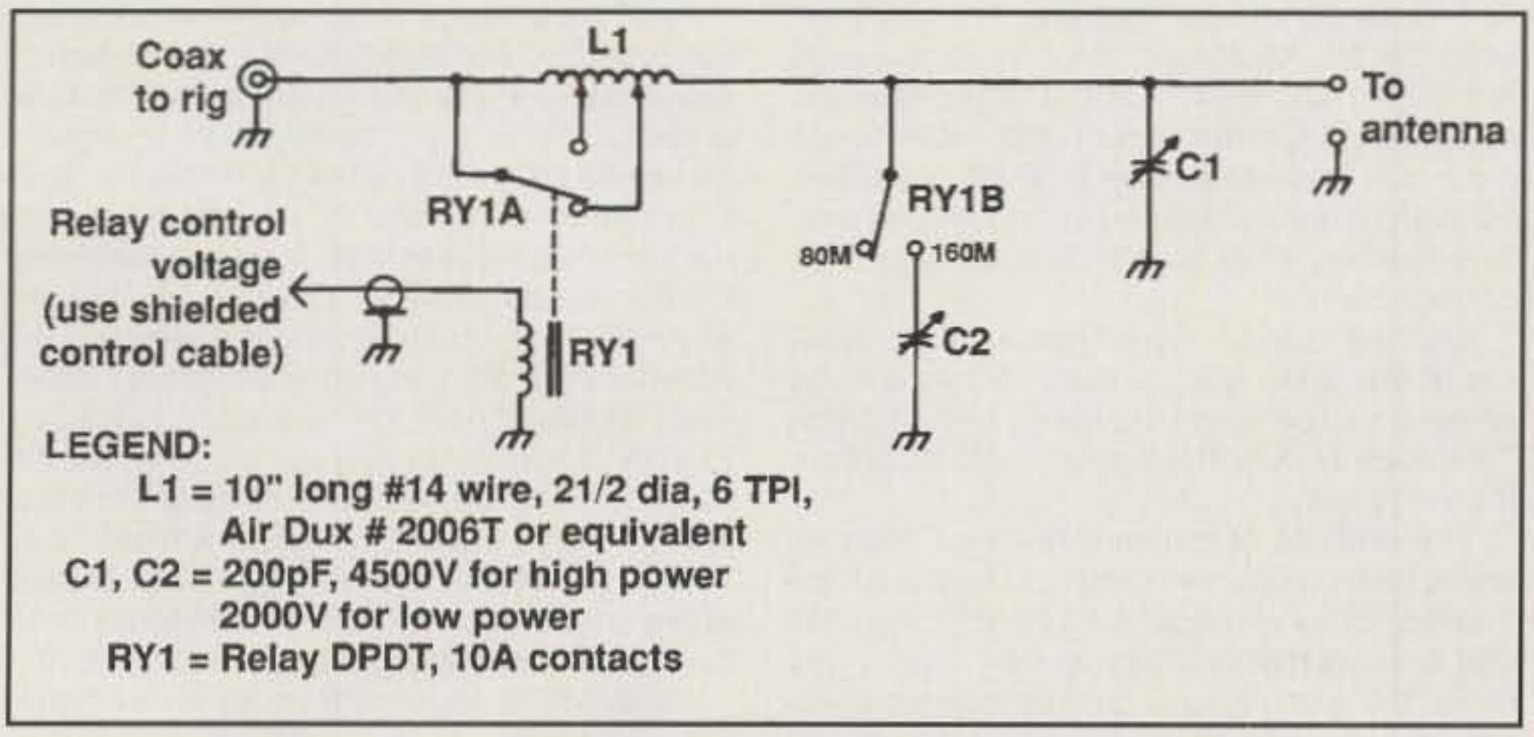

Fig. 2– Schematic diagram and parts list for the switchable antenna tuner.

nected a shielded cable from the relay control line to a 12 volt power supply in the shack and a short piece of coaxial cable to the MFJ-259. Next I tuned the unit for 75 meters. Remember, in order to reduce the SWR on a transmission line, two elements must be varied. Pick a tap point on the coil and vary the capacitor for minimum SWR. If the results are not the magic 1:1, move the coil tap about two turns and vary the capacitor again. If the SWR shows improvement, you have gone the wrong way. Continue this procedure until you have obtained the lowest SWR on your favorite part of the band.

Next switch the tuning unit to 160 meters. Without disturbing the coil tap and capacitor settings established for 75 meters, choose a trial tap point on the coil and repeat the tuning procedure for 160 meters. The tuning procedure is considerably easier to accomplish than it is to write about. On 75 meters I obtained a bandwidth of about 100 kHz, and on 160 meters the bandwidth was 60 kHz. These measurements were made with the MFJ-259 at the end of 100 feet of RG8-X coax. The measurements depend on local conditions, so your results may vary.

Results

Everyone is always excited about a new antenna, and this was the case for me. I waited until almost dark and tuned to the 75 meter DX window. My first two contacts were with stations in Germany. This is not rare DX, but I enjoyed the contacts anyway. On 160 meters I received reports that were about 10 dB stronger than I had been receiving. All this and no RF ground.

Afterthoughts

You may think it very strange to build a vertical antenna without a single radial in the ground, but one of my objectives was to determine what could be expected with such a simple installation. I'm sure the results would be greatly increased if a good RF ground were constructed using 50 to 100 radials. However, I feel that are three schools of thought: You can dream of the perfect conditions and stay off the air, you can build the antenna and add radials as time and money permit, or you can build a simple system and start having many enjoyable QSOs. The choice is yours! ■

Seeing isn't always believing, but sometimes it is. XE2AHT presents the astounding results of his experiments.

The Visible RF Theorem

BY SEWELL YOCUM*, XE2AHT

Years ago, when I worked at the RF Labs up in Massachusetts, I became interested in amateur radio. I managed to learn the code and obtained a license. The problem was, however, I was only interested in the technical side of the hobby, and I was always building RF amplifiers—small ones, big ones, and then bigger ones. I didn't actually start to do much operating until I discovered the thrill of working DX. I then quickly realized that power was not the answer, but having the right antenna was the way to go. I designed and built many antennas, always trying to get the best pattern and the lowest angle of radiation. I spent years trying to achieve the lowest and best angle, and while I did well, I did not, until later, achieve my objective.

Early on I realized that the ideal way to design a beam and to test it would be if I could actually "see" the RF field that was emanating from my antenna. Field strength meters are fine, but they did not give me the answers I was looking for. The problem would be solved, of course, by having some way of making the radio waves visible. RF is in that part of the spectrum invisible to the naked eye, but I figured there must be some way to lick this obstacle.

I spent a great deal of time studying the ways and means of accomplishing my objective. Of course, as I have pointed out, radiated RF is not in the visible light spectrum. Therefore, how to make it visible or how to view the actual RF field became the problem. I finally built an amplifier based on the principles of amplitude modulation. My idea was to try to follow amplitude modulation thinking, in that with AM, the voice signal is imposed on the RF signal, giving modulation to the resulting signal. How could I use this idea to introduce color to be sent out along with the RF? If I could apply color to the RF field, it should become visible. I realized that if I could find the right combination of materials, I could get it to work.

I know this all sounds ludicrous, but after all, people laughed at Edison—and quite frequently, I might add. A philosopher once said whatever the mind can imagine or conjure up, such an idea could be made to work—or something like that. I started on this project long before television came along, let alone color television.

I was fortunate enough to be on Long Island, New York in the early 1950s when the first color televisions were made by RCA, CBS, and others. The government was trying to decide which system would be best and would become the standard. Just to deviate a little, it is worth recalling that incident, because it all applied to the Visible RF Theorem. One company used a huge rotating disk in front of the television screen. The dish rotated at a sync rate associated with the transmission of the picture. There were three primary-color "windows" on the rotating dish. The three primary windows provided excellent color TV, but it was cumbersome. As I recall, there was actually a 10 inch TV set used, but the resulting cabinet was really huge in order to accommodate the large, spinning color wheel. On the other hand, RCA had a three-gun projection tube built into their set. Each of the guns contained a primary color, and they meshed at the face of the tube to provide correct color.

With the rotating-wheel type, all of the viewers at this affair quickly realized that a huge wheel would be needed to cover, say, a 27 inch TV screen, making the system impractical from the very start.

The process of transmitting color information is both complicated and simple, but suffice it to say, color is transmitted via RF. The idea that it was a matter of conversion stuck in my mind, the same as we convert signals in receivers. However, this had to be approached in a completely different manner. In my basic research I realized that I might use optical conversions—in other words, magic glasses. In prior years I had ground lenses and prisms in making telescopes, going even so far as grinding a huge 12 inch diameter reflector. I understood optics fairly well. I ground several lenses that could take care of optical transitions and shifts. It was a good thing that I did, because my final results—and they were sort of a success—were achieved with a combination of signal injection into the final amplifier plus special optics to be able to see the resultant RF waves.

My approach was to make a light generator oscillator that operated in the light portion of the spectrum, and then to use mixers that would combine this with the RF spectrum to produce a visible pattern. I spent several years on this project, making super-high-frequency oscillators. I had to make countless changes and kept encountering problems, but I was not to be denied. As the philosopher said, what the mind can image it can also conceive.

One major decision was to choose a basic frequency to use for my initial experiments. If I succeeded, I would need to have a portable system, so I decided on 2 meters. This band proved to be easier in my design of mixing signals. Also it was feasible in case I succeeded in my experiments to use 2 meters, because quite simply, it would be easier to control ground and metal obstructions that would foul up any visible pattern. This would mean I could control ground reflections and avoid nearby metal objects affecting the true pattern of the antenna. Once I succeeded, it would be a fairly simple matter to test the equipment on the high-frequency bands, 20 through 10, and later l60 and 80.

And I did succeed. After countless construction modules, I finally reached a point where a pale blue aura was being transmitted from the antenna! I remember the day—rather, night—that it worked. I had finished this particular oscillator that morning, and via my elaborate connections had my amplifier being modulated by the light oscillator/output. But alas, I did not see anything at all from the antenna, which I had installed in my laboratory (my lab was in a basement so I could have the necessary darkness). Frankly, I was extremely disappointed to the point of giving up, because I thought this last test would be successful. I just walked away from my tests that morning greatly disgusted and discouraged. My wife and daughter tried to console me, but nothing seemed to work.

I decided to go for a drive up in the mountains to try to get my mind off my failures. Towards evening the sun was getting low in the sky and was hitting my windshield, almost blinding me. I reached into my glove compartment and got out a pair of sun glasses. These glasses were a part of my early experience in the optics side of my visible RF work, and they were made of a special crystal quartz I had obtained from a dealer in South America—through amateur radio, as a matter of fact. In any event, I headed back home late that afternoon and left the glasses on when I entered the house. My wife looked at me and said, "Did the glasses help in your experiment?" not knowing that I had worn them strictly for driving in the sun. I slapped myself on the forehead and dashed downstairs to my lab, leaving the glasses on. I turned on my amplifier.

Lo and behold! I could observe a faint blue field being radiated from the antenna across the basement. Eureka! I had won!

My antenna was a 3-element 2 meter beam, and I carefully examined the field of light coming from the antenna. As expected, the radiation was much stronger from the front of the antenna. There really wasn't what could be called a major lobe as one sees in computer drawings of beams, but it definitely showed a stronger area of blue light from the front of the

*Punta Ballo, Trua De La Posta, Vienta Cinq, Gamesa Losta Calle 73, Sud Baha, Keeno, Mexico

antenna than from the sides, with a small amount emanating from the back. I practically screamed for my wife and daughter to come downstairs to see my results. They certainly oohed and ahhed at my demonstration. I rotated the antenna for them, and it was strange to see the radiation from the beam change as I rotated it.

I was so excited! I realized that I had really achieved a major breakthrough in science. My wife jokingly said she would buy me a tuxedo as a present so I could go to Sweden to accept a Nobel prize! I have no idea if other people have accomplished this feat, as I have never read or heard of it before.

I quickly fed my light oscillator/amplifier output into my low-band rig to get it set up for that night. There was to be no moon, and I did not feel that street lights would affect the output too much. I had several antennas I could test, and I'm sure you will be interested in my results. I only wish that I could have continued my tests past those first few days, but I'm sure you will agree with the reasons why I had to stop.

Before reaching a conclusion, however, let me tell you what I discovered. I had three antennas on 160. One was a simple, straightforward, 160 meter, half-wavelength dipole fed in the center with 50 ohm coax; the antenna was about 60 feet high. My other two were vertical antennas: one was a quarter wave fed at the bottom, typical vertical style, and my other was a sloper off my tower fed at the top. (The sloper had always been the best performer for many technical reasons.) Here are my results:

1. *Half-wave dipole.* The color emanating from this antenna showed most power or strongest field going straight up, with very little power being radiated out at any of the lower angles. Most radiation was above 80 degrees! In fact, I used an elevation compass and could find no radiation whatsoever below, say, 65 degrees. This antenna was a cloud warmer, to say the least, and had proven so in its performance.

2. *Bottom-fed vertical.* This was interesting because the vertical was not far from power lines and some other metal structures, or to put it in plain language—ground clutter. There was much distortion of the pattern, and while the primary field was fairly low, it was not what the antenna books nor experts said it would be.

3. *The sloper.* Here was an antenna that proved the old adage that most of the radiation is from the high current point. This feed point was up 60 feet, and it certainly proved the old adage, the higher the better. That main pattern was definitely below 45 degrees, as had already been proven in performance.

So much for 160. I had a buddy who lived close by and who had been following my experiments. He had up a five-band quad that used a single feed line. The antenna had always worked fairly well, but the visible RF test really showed up on this multiband beam. Twenty meters had a nice-looking pattern. Surprisingly, there was a good main area of radiation to the front as was expected, but there were also several light-pattern offshoots that didn't seem to belong. Believe it or not, we climbed up the tower (It was near midnight!) and changed the feed to just the 20 meter quad. The pattern changed remarkably. It became an RF field that looked similar to a modern computer pattern in that there were none of those strange lobes. Also, as I had expected from my antenna studies (the fact that 10 and 20 meters had similar feed impedances), I was sure that one antenna would affect the other, and it did. On 10 meters the pattern looked like a wounded duck. When we fed the 10 meter portion by itself, the pattern cleaned up with a good forward lobe and respectable front-to-back.

As the days went by, I made changes in the glasses and found that I could actually see different colors from the antennas. However, the pale blue was predominant. In fact, I could tell if I had harmonics, parasitics, etc., by studying the pattern. Also, I could actually see or detect the patterns in the broad daylight, but nowhere near as well as at night. It must have been about a month after I had begun testing, when disaster struck!

One morning a van drove up to my house. I noticed that it had United States Government markings on the side. Two men got out; they obviously were agents of some type. They were both big men and looked like tackles from the Dallas Cowboys. From the bulge under their coats it was obvious that they were armed. Frankly, I was a little apprehensive.

They didn't waste any time, but told me that I was experimenting in strictly forbidden territory. They insisted on seeing my equipment. I wasn't exactly frightened, let's just say uncomfortable. I refused to take them downstairs and asked them to leave. They said they had the authority to arrest me and take me with them unless I cooperated. Well, I'm sure old enough to know that discretion is the better part of valor, so I finally relented and took them downstairs. They looked over everything, and there was no doubt that they were extremely impressed. They then dropped the bomb on me. They said that it was in the national interest to drop my experiments (which frankly I thought was a crock!). They proceeded to hand me some paperwork which laid down some strict guidelines that I was to follow, and then took all my equipment. I was really fuming, but I realized it would not do me any good to complain. However, if they read this now—well, tough. I've left the good old USA and am out of their reach.

When I was young (and I am very far from young now), someone said never get mad—get even. I always found that was good advice. I will be very honest and tell you that I would have liked to pass along the technical details of the equipment. It is really simple to build such a unit. Those two government men asked me if they had all my papers and test results. Of course I lied and told them they had everything. They didn't! The really important information I had stored in a safe deposit box in another area.

I have an observation worth passing on. Don't depend too much on computer antenna readouts. Computers cannot take into consideration all the factors that can affect the patterns. In other words, if one puts junk into a computer, one gets junk out—and that's a fact.

I moved to Mexico for safety's sake. And most important, I made a very good deal with a Japanese antenna and electronics firm that also makes an excellent transceiver. They are going to be building and marketing the system both in a single multiband unit and also built into one of their popular transceivers. Just think of the advantages of such a rig: You actually will be able to see how your antenna is radiating. The models will be out soon. They told me it would be sometime after April 1, 1997, probably in time for the Dayton Hamvention. Look for their ads in this and upcoming issues of *CQ*. They promised. ■

This is one of those articles you'll want to save for future reference. Its simple, concise language is easy to understand, and the information will become second nature with a little application.

The HF Bands

A Beginner's East Coast Guide

BY LAMAR RAY*, W9LT

Okay, you received your license towards the tail-end of the last cycle and you're living in the doldrums waiting to hear some of those exotic signals people talk about. The new cycle has started, and at some point down the road you'll be able to work plenty of DX, expecially if you know where to look. W9LT presents a very interesting discussion on band-by-band conditions, what to expect, and where to look. If you're a newcomer to amateur radio or getting back into the hobby, this will give you a terrific overview of what's happening on what band at what time. —K2EEK

Not long ago at work we started an informal radio club with about 15 participants. Several were licensed; most were not. At almost every gathering questions were asked as to at what time, and on which HF band, could they expect propagation to (you fill in the city or country). Each such question usually was followed with one as to how reliable the communications would be with a (you fill in the blank) simple antenna.

Our first Field Day activity solved few of the questions, and in fact, seemed to generate new ones. As a result, this information is presented hoping to shed some light on these very, very complex questions without getting technical, or giving any of the reasoning; it is based only on almost 50 years of operation on the HF bands. Because of the tremendous day-to-day, season-to-season, and year-to-year variations, there is no way such a summary can be accurate. However, this should serve as a useful guide as to what might be typical for operation from the eastern USA. (Perhaps some enterprising West Coast person will help out with thoughts for that region.)

Interpreting The Information

First, a few comments about antennas. The information presented here should be applicable to relatively simple antennas—good horizontal dipoles, Zepps, Windoms, G5RV's, etc., in the 30 to 60 foot height range, and good vertical ground planes mostly in the clear with 6 or more ground radials. Generally speaking, the horizontal antennas will favor US and Canadian contacts due to their comparatively higher angles of radiation, while the verticals will favor the greater distances for DX contacts due to their lower angles. However, big antennas bring big results. The propagation information for big systems becomes overwhelming when considering long-path openings, etc.

Many things affect propagation, not the least of which are the season of the year and the 11-year cycle of sunspot activity. Both of these affect the level of ionization in the ionosphere hour-by-hour, season-by-season, and year-by-year. Within these vastly different sets of conditions you can expect to hear about the same areas, at about the same time of day, with somewhat the same signal strengths, day-after-day during a given season in a given year. Exceptions of poor conditions lasting several days resulting from solar and earth magnetic disturbances are common.

Since the ionization follows the intensity of the sun, we can get a good idea of what to expect by thinking of the hour hand of a 12-hour clock. Try to imagine that hand being about 90° wide. (On good days it may seem as wide as 180°, while on bad days only 30°.) Now try to imagine the back (lagging) edge of that hand starting at north when the sun rises, rotating clockwise hour-by-hour until the front (leading) edge arrives back at north as the sun sets. Fundamentally, you now have the propagation as you might find it on 10 or 15 meters.

Fig. 1(A) shows roughly what to expect on 10 or 15 meters during periods of good conditions from about 8 AM to about 11 AM, fig. 1(B) from about 11 AM to 2 PM, and so on. For 160, 80, and 40 meters the same general pattern follows the darkness clock, with (A) being about 8 PM to 11 PM, (B) from about 11 PM to 2 AM, etc. Keep in mind the transitions are smooth, and this only represents the average situation.

Twenty meters is frequently a special case. During the periods of lowest sunspot activity it behaves much like the 10 and 15 meter example; at other times it seems to behave like all of the above, or with both the daylight and darkness patterns superimposed. Finally, keep in mind that we will be in the low, though rising, part of the sunspot cycle for the next few years.

80 and 160 Meters

USA and Canada

- These frequently will be the best nighttime bands for chatting with other US and Canadian amateurs.
- Daylight to sunset signals will be very good out to about 150 miles. Not much will be heard beyond that distance.
- About an hour before sunset the signals will lengthen out to about 150 to 1000 miles, starting first to the east, and then they will follow the sunset line westward. In the last few hours before sunrise there should be fair openings to the West Coast. Summertime QRN (static) may be a significant problem at night.

DX

- These are not normally considered DX bands, but many DX contacts can be made with "good ears" and lots of patience.
- Most non-Western Hemisphere stations are limited to only 3.5 to 3.8 MHz (or less) on 80 meters. (Japan, for example, has 3.500 to 3.575, 3.747 to 3.754, and 3.791 to 3.805.) Almost everyone has at least 3.500 to 3.550 for CW; all the rest for phone operation gets very confusing. It is common practice to transmit on one frequency while listening to the DX on another, except in the range of 3.750 to 3.825 MHz, where transceive is generally used. On 160 meters the situation is no better, except that 1.830 to 1.840 is normally reserved for DX contacts, both phone and CW.
- During the summer, QRN (static) from both near and distant thunder storms makes operation difficult much of the time.
- The bands open to Europe at about dark with signals peaking then and at European sunrise (11 PM to 1 AM).
- African and South American signals will come through from about 9 PM until 2 AM for Africa, and until about 4 AM for South America.
- The Caribbean and Mexico should be available roughly all night.

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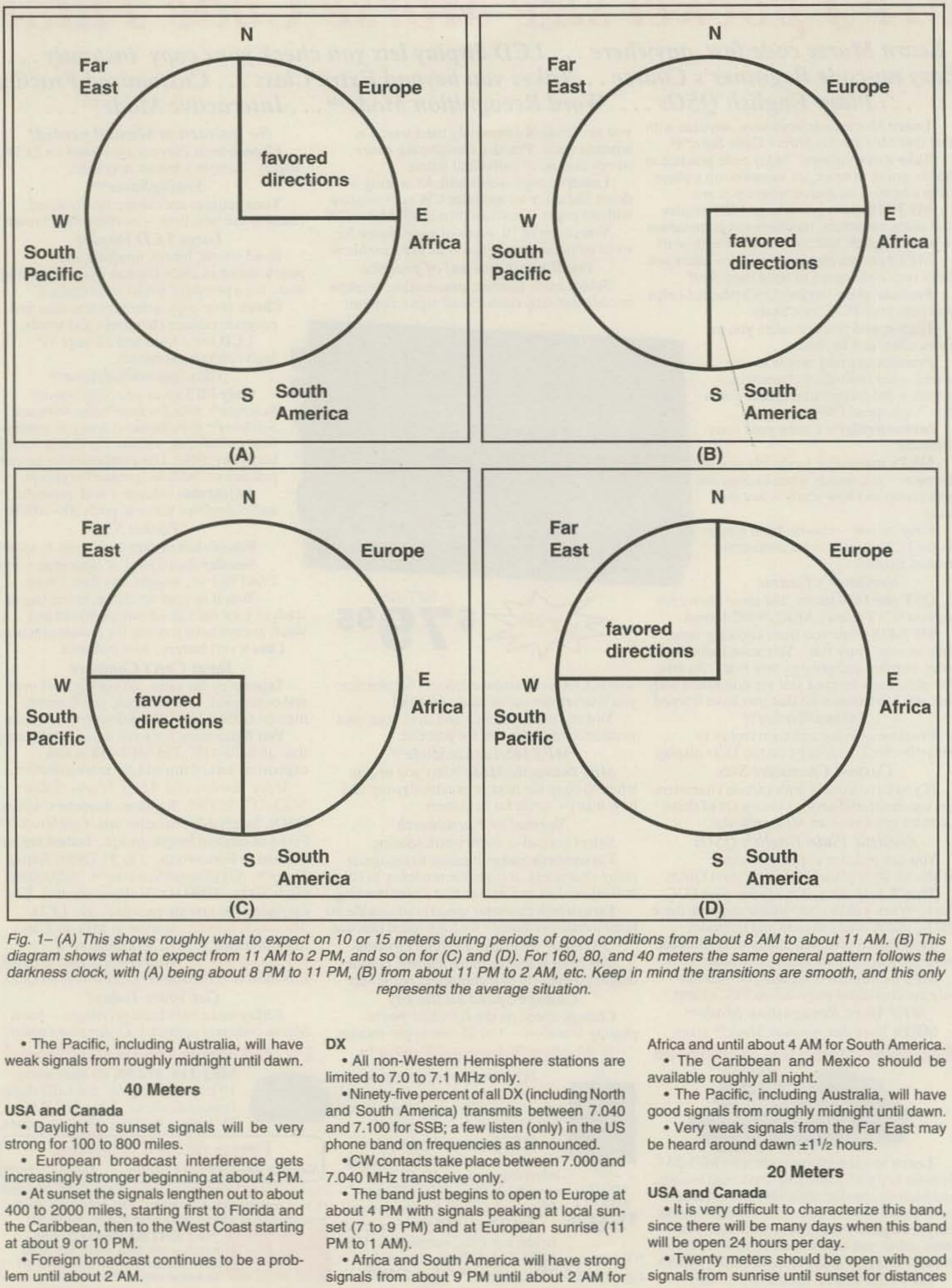

Fig. 1– (A) This shows roughly what to expect on 10 or 15 meters during periods of good conditions from about 8 AM to about 11 AM. (B) This diagram shows what to expect from 11 AM to 2 PM, and so on for (C) and (D). For 160, 80, and 40 meters the same general pattern follows the darkness clock, with (A) being about 8 PM to 11 PM, (B) from about 11 PM to 2 AM, etc. Keep in mind the transitions are smooth, and this only represents the average situation.

• The Pacific, including Australia, will have weak signals from roughly midnight until dawn.

40 Meters

USA and Canada

• Daylight to sunset signals will be very strong for 100 to 800 miles.

• European broadcast interference gets increasingly stronger beginning at about 4 PM.

• At sunset the signals lengthen out to about 400 to 2000 miles, starting first to Florida and the Caribbean, then to the West Coast starting at about 9 or 10 PM.

• Foreign broadcast continues to be a problem until about 2 AM.

DX

• All non-Western Hemisphere stations are limited to 7.0 to 7.1 MHz only.

• Ninety-five percent of all DX (including North and South America) transmits between 7.040 and 7.100 for SSB; a few listen (only) in the US phone band on frequencies as announced.

• CW contacts take place between 7.000 and 7.040 MHz transceive only.

• The band just begins to open to Europe at about 4 PM with signals peaking at local sunset (7 to 9 PM) and at European sunrise (11 PM to 1 AM).

• Africa and South America will have strong signals from about 9 PM until about 2 AM for Africa and until about 4 AM for South America.

• The Caribbean and Mexico should be available roughly all night.

• The Pacific, including Australia, will have good signals from roughly midnight until dawn.

• Very weak signals from the Far East may be heard around dawn ±1½ hours.

20 Meters

USA and Canada

• It is very difficult to characterize this band, since there will be many days when this band will be open 24 hours per day.

• Twenty meters should be open with good signals from sunrise until sunset for distances

of about 400 to 1000 miles. Weak signals may be available during the nighttime.

• During the nighttime, strong signals should be heard from the West Coast. Weak signals may be available during the daytime.

• During the low part of the sunspot cycle, short skip could show up at almost any time. If this occurs (rarely), signals will be very strong, and limited to small areas of 200 to 400 miles in diameter, which may be anywhere from 150 to 500 miles distant. The most probable time for an opening is around sunset, but it can occur at almost anytime.

DX

• Again, it is very difficult to characterize this band, since it frequently will be open for DX 24 hours per day. In fact, within an hour of sunrise and of sunset the band may be open to all parts of the world at the same time, all with strong signals! Overall, this is the most reliable DX band. However, because of its excellent behavior, the level of QRM here is also very, very high.

• Generally, 20 meters behaves more nearly like 40 meters during the high part of the sunspot cycle (Europe strongest in the evening/Far East strongest in the morning), and more nearly like 15 meters during the low part (Europe strongest in the morning/Far East strongest in the evening).

• Generally, DX signals will be rather weak during the middle of the day and night, except good DX signals will be heard at the sunrise and sunset times of the individual DX stations.

15 Meters/High Sunspot Cycle

USA and Canada

• During the high part of the sunspot cycle, there will be some days during the summer when only poor band openings will occur. During the winter months, it should be extremely reliable.

• Normally, during the winter the band should open to the south (Florida) first at sunrise, and then finally to Texas, New Mexico, Arizona, and the West Coast at about 9 or 10 AM. (Do not expect to hear stations closer than about 1000 miles.) The band may remain open until an hour or two after dark.

• Normally, during the summer the band will be less reliable than in winter. Again, it will open to the south (Florida, Mississippi, Texas) shortly after sunrise and stay open until possibly 8 PM. The West Coast openings will not be very reliable.

• During this part of the sunspot cycle, short skip may show up during the summer. If this occurs (possibly 10% of the days), signals will be very strong, limited to small areas of 300 to 400 miles in diameter, which may be any where from 200 to 800 miles distant. The most probable time for an opening is around sunset, but it can occur at almost anytime.

DX

• During the high part of the sunspot cycle, this will be one of the best DX bands during the winter months, second only to 10 meters. On good days it will remain open to some parts of the world 24 hours per day. During the summer months, DX openings will be spotty and the signal strengths will be fair at best.

• Normally, during the winter the band should open briefly to the southeast (Caribbean and southern Africa) first at daybreak, and then, about a half hour later, to Europe with the southeast path diminishing. About an hour and a half after daybreak the band will open to central Asia and stay open for about three hours. On good days this same Asian opening will provide openings to the Far East. The band may remain open to Europe and northern Africa until sunset.

• From about 11 AM until about 9 PM the band should be open for southern Africa and South America with excellent signals.

• The band should open to the Pacific starting with the close-in islands (Hawaii, etc.) at about noon, and should remain open to the west until the Australians fade out at about 10 PM.

• Openings to the Far East will start at about 5 PM and will continue until about 10 PM. Openings to Alaska will start about one or two hours earlier. Openings to central Asia will last about three hours beginning at about 6 PM.

• During the summer, conditions will be spotty, but roughly as in winter.

15 Meters/Low Sunspot Cycle

USA and Canada

• During the low part of the sunspot cycle, there will be some days during the summer when this band will only open very poorly. During the winter months, it should be quite reliable with a few bad days now and then.

• Normally, during the winter the band should open to the south (Florida) first at sunrise, and then finally to Texas, New Mexico, Arizona, and the West Coast at about 10 AM. (Do not expect to hear stations closer than about 1000 miles.) The band may remain open until an hour or two after dark.

• Normally, during the summer the band openings will be limited to the south (Florida, Mississippi, Texas), opening first at about 9 or 10 AM, and staying open until possibly 5 or 6 PM. On about half of the days there will be fair openings to the West Coast.

• During this part of the sunspot cycle, short skip may show up during the summer. If this occurs (possibly 20% of the days), signals will be very strong, limited to small areas of 300 to 400 miles in diameter, which may be anywhere from 200 to 800 miles distant. The most probable time for an opening is around sunset, but it can occur at almost anytime.

DX

• During the low part of the sunspot cycle, this will be one of the best DX bands during the winter months. During the summer months, DX openings will only be fair at best.

• Normally, during the winter the band should open briefly to the southeast (Caribbean and southern Africa) first at daybreak, and then, about a half hour later, to Europe with the southeast path diminishing. About an hour and a half after daybreak the band may open to central Asia and stay open for about three hours. The band may remain open to Europe and northern Africa until sunset.

• From about 11 AM until about 9 PM the band should be open for southern Africa and South America with very good signals.

• The band should open to the Pacific starting with the close-in islands (Hawaii, etc.) at about noon, and should remain open to the west until the Australians fade out at about 10 PM.

• Openings to the Far East will start at about 5 PM and will continue until about 10 PM. Openings to Alaska will start about one or two hours earlier. Openings to central Asia will last about three hours beginning at about 7 PM.

• During the summer, conditions will be very

spotty, but roughly as in winter. However, the openings to Europe, northern Africa, Alaska, and the Far East will be there only about 70% of the time.

10 Meters/High Sunspot Cycle

USA and Canada

• During the high part of the sunspot cycle, this will be an excellent, reliable band. Low-power stations will put out surprisingly large signals.

• Normally, during the winter the band should open to the south (Florida) first at sunrise, and then finally to Texas, New Mexico, Arizona, and the West Coast at about 10 AM. The band may remain open to the west until an hour or two after dark.

• Normally, during the summer the band openings will be limited to the south (Florida, Mississippi, Texas), opening first at about 9 or 10 AM and staying open until possibly 5 or 6 PM. There may be a few fair openings to the West Coast.

• During this part of the sunspot cycle, short skip may show up during the summer. If this occurs (possibly 20% of the days), signals will be very strong, limited to small areas of 400 to 500 miles in diameter, which may be anywhere from 300 to 1000 miles distant. The most probable time for an opening is around sunset, but it can occur at almost anytime.

DX

• During the high part of the sunspot cycle, this will be by far the best DX band of all during the winter months.

• Normally, during the winter the band should open briefly to the southeast (Caribbean and southern Africa) first at daybreak, and then, about a half hour later, to Europe with the southeast path diminishing. About an hour and a half after daybreak the band may open to central Asia and stay open for about two hours. The band may remain open to Europe and northern Africa until about 3 PM.

• From about 11 AM until about 7 PM the band should be open for southern Africa and South America with very good signals.

• The band should open to the Pacific starting with the close-in islands (Hawaii, etc.) at about noon, and should remain open to the west until the Australians fade out at about 9 PM.

• Openings to the Far East will start at about 5 PM and will continue until 8 or 9 PM. Openings to Alaska will start about one or two hours earlier. Openings to central Asia will last about two hours beginning at about 6:30 PM.

• During the summer, conditions will be very spotty, but roughly as in winter, but with only a few weak openings to Europe, northern Africa, Alaska, or the Far East.

10 Meters/Low Sunspot Cycle

USA and Canada

• During the low part of the sunspot cycle, there will be many days when this band simply will not provide any openings.

• Normally, during the winter the band should open to the south (Florida) first at about 9 or 10 AM, and then finally to the West Coast at about noon. The band may remain open until about dark.

• Normally, during the summer the band openings will be limited to the south (Florida, Mississippi, Texas), opening first at about 9 or 10 AM and staying open until possibly 5 or 6 PM.

• During this part of the sunspot cycle, short skip may show up at almost anytime. If this occurs (possibly 20% of the days), signals will be very strong, limited to small areas of 400 to 500 miles in diameter, which may be anywhere from 300 to 1000 miles distant. The most probable time for an opening is around sunset, but it can occur at almost anytime.

DX

• Again during the low part of the sunspot cycle, there will be many days when this band simply will not provide any openings.

• Normally, during the winter the band should open briefly to the southeast (Caribbean and southern Africa) first at about 8 or 9 AM, and then, about a half hour later, to Europe with the southeast path diminishing. The band may remain open to Europe and northern Africa until about 2 PM.

• From about 11 AM until about 5 PM the band should be open for southern Africa and South America with very good signals.

• The band should open to the Pacific starting with the close-in islands (Hawaii, etc.) at about 2 PM, and should remain open to the west until the Australians fade out about an hour after sunset.

• Openings to Alaska, and possibly the Far East, may occur at sunset ±1 hour.

• During the summer, conditions will be very spotty, but roughly as in winter except no openings to Europe, northern Africa, Pacific, Alaska, or the Far East are to be expected.

Summary

The above information by design is general in nature, and the reader need not immediately know all of the theory behind it. One thing it points out is the most useful DX operating aid—a watch or clock. In generalized terms, most propagation paths are predictable and involve the time of day. You might want to use the information to check out a few bands during several times of the day to confirm this. It's easy, it's fun, and there's lots of DX to work. ■

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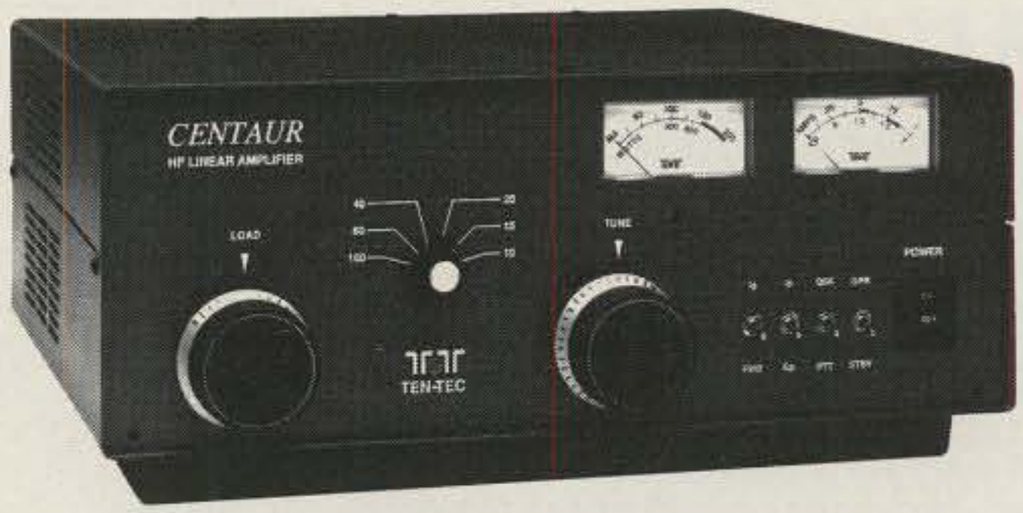

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Do you want a beam? Are there a few things lacking in your plan, such as a tower and the necessary bucks to complete it? Well, NZ5A may have just the answer for a lot of us.

The Yard Yagi

A Fixed 5-Element Wire Beam for 15 Meters

BY ROBERT S. LOGAN*, NZ5A

When I was invited to be a guest operator during a DX contest at N3BB's super-station in the dry, scrubby, cedar-covered hills south of Austin, I heard New Caledonia for the first time. My mind's eye pictured an operator in mufti, sweating with great dignity in the jungle somewhere, or an Albert Schweitzer maybe, puffing on a pipe between QSOs, taking a few hours off from his healing craft and methodically working the world. On this end the vision included several tired, middle-aged boys on the edge in central Texas in a small room stuffed with redundant radios, the room set off from the garage, and the garage itself laced with cables snaking up the cedar-covered hill to a nest of towers set in granite.

In a word, to me the mere sound of *New Caledonia* was romantic. And to be truthful, hearing it stirred up a little jealousy in me because in 30 years of hamming at *my* various stations, I had never heard a single FK8—not in Denver, St. Louis, Chicago, or in Dhahran as HZ1AB, or at 4U1ITU in Geneva during a wonderful week of business and pleasure at a younger age.

The jealousy, mild as it was, continued until a few weekends ago on a Sunday afternoon of another DX contest, as I tied down the last wire on the antenna described here and ran upstairs from the backyard to check the final SWR. I turned on the TS-520 and boom! There was an FK8 right on the frequency where I had left the rig the day before. I thought, what the heck, I'd give him a call and see how the thing worked. He came back on the first call, gave me a second or so of his time, and then ran off a long string of sixes. I couldn't believe it: The Yard Yagi worked like a champ, or more precisely, like a plaque winner.

I couldn't leave. The tools on the patio table would have to wait to be picked up later. I just sat there for half an hour, switching back and forth between my inverted-V dipole and this new beam, watching the S-meter go from below S3 to S7 and above. I was hearing nothing but background noise on one and New Caledonia booming in from the other, very clear, very steady, very Schweitzer.

After sitting there for half an hour, I realized that jealousy of naturally good DXers can be eased a little bit by human endeavor, but romance, thank goodness, is a permanent blessing of amateur radio's charisma. The Yard Yagi may bring a little romance back into the operation of little-pistol stations adrift in a jungle of restrictive covenants that seem to limit DXing opportunities.

*13242 Kerrville Folkway, Austin, TX 78729

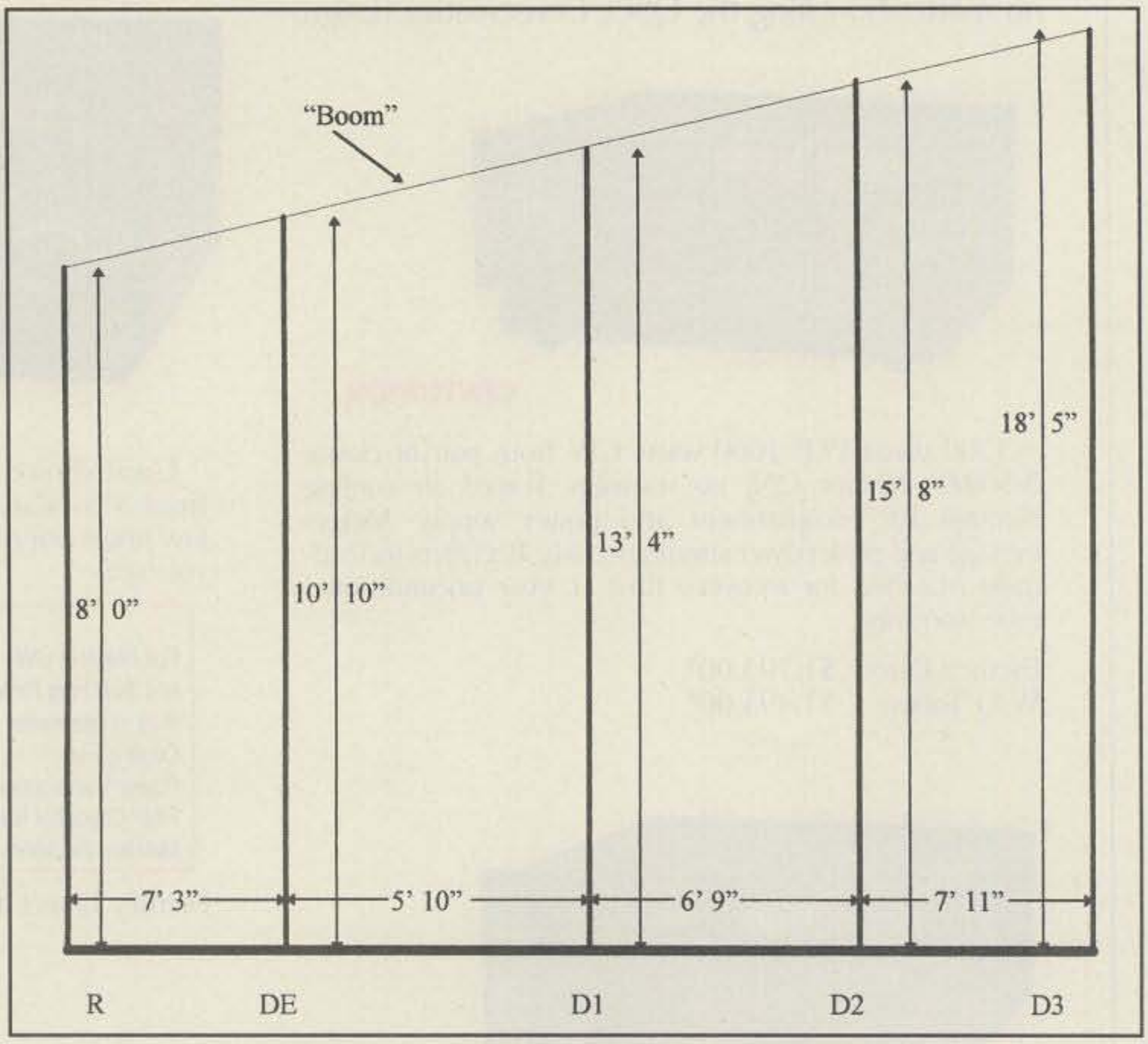

Fig. 1– Side elevation view of the Yard Yagi showing horizontal and vertical placement of the elements. The angle of 20 degrees is not drawn to scale.

The Yard Yagi

The Yard Yagi is a five-element, optimum-spaced fixed wire beam for 15 meters. In my case, the beam is tilted upward at a 20-degree angle and pointed at a heading of 245 degrees, giving about 10 dB of gain toward the South Pacific and Australia/New Zealand from my home in central Texas. The upward tilt seems to add "punch" to the signal.

The tilt of 20 degrees also happens to support my other habit of radio astronomy and Jupiter monitoring. At this angle, for radio astronomy, the beam points approximately to the plane of the ecliptic, given the theoretical half-power points of the vertical beamwidth (that is, the E plane) of the antenna. For amateur radio the angle seems to make up for the lack of height, for no beam the highest point of which is 18 feet should be able to work New

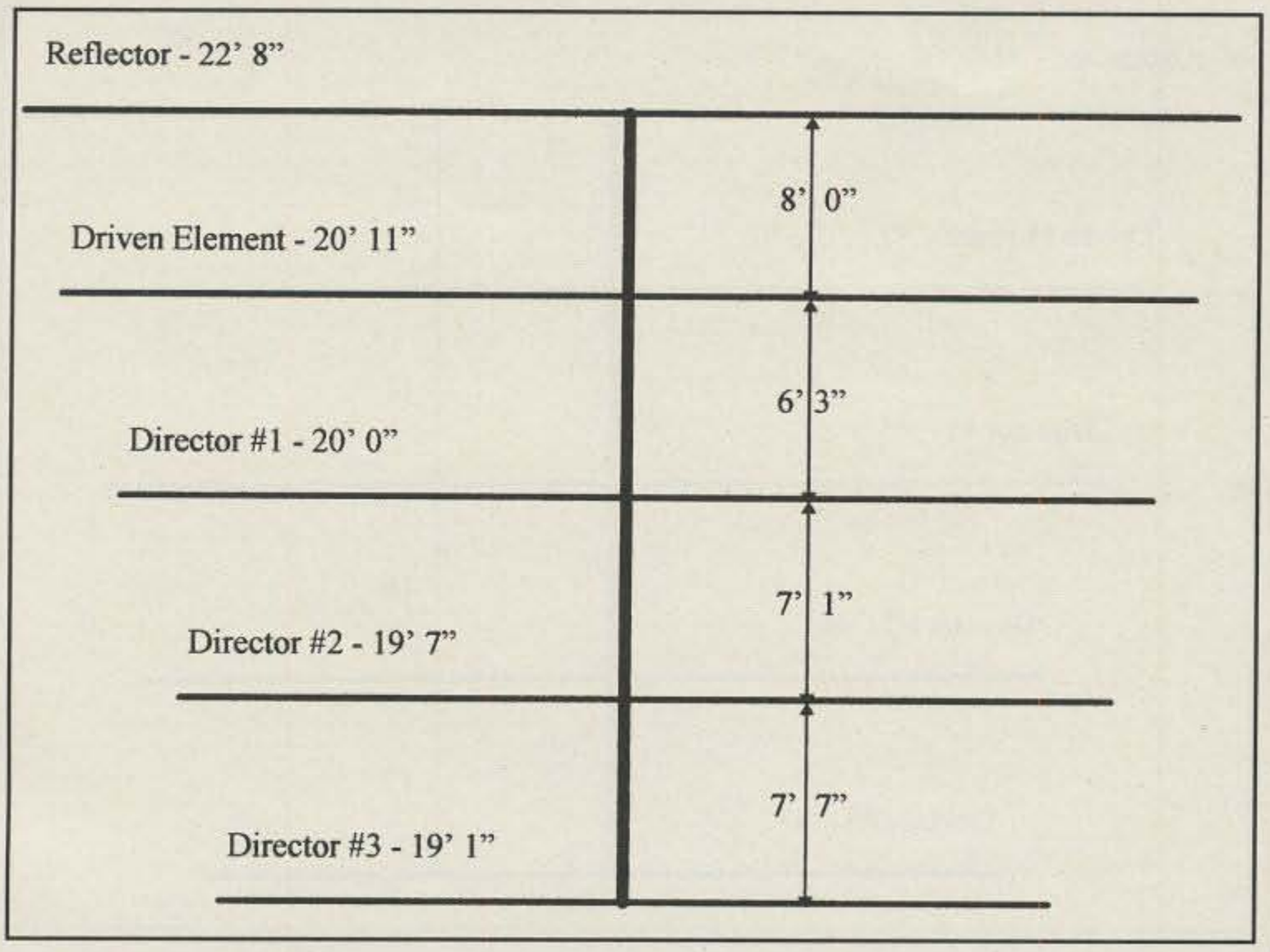

Fig. 2– Top-down view of the Yard Yagi showing element lengths and spacings in feet for 21.010 MHz. The elements and boom are not drawn to scale.

Caledonia and others in that area with such ease while running only 5 watts.

Other angles may work better or worse, but I did not experiment with that characteristic. It seems to me, logically, that any tilt angle should be no greater than 45 degrees, because ballistically speaking, that angle gives the longest throw for a given charge. However, artillery theory may have little to do with RF.

At my location the Yard Yagi is designed and constructed so the reflector is 8 feet off the ground and the No. 22 black wire elements march up step-by-step in a smooth angle to the third director at a little over 18 feet in height. The complete antenna is high enough on the reflector end to avoid getting tangled in someone's windpipe, but low enough at the last director to be below the roof level of my two-story house.

With trees in front and back yards, all a neighborhood vigilante can see from the street, if it's the right time of season and in just the right sunlight, are nicely painted wooden poles on the fence. I'll wrap climbing vines around the poles on some future weekend and call it a trellis, in case anyone should ask.

Design

Bearing and Direction. The first step in the design process is to understand the layout of your yard in terms of available supports and bearing. In my case, I knew that my west side yard measured 24 feet from fence to house and that a beam between the two supports would yield a generally south to southwest major lobe.

I then took a bearing on the North Star at night, and using the house plot and a simple hardware-store compass, I laid out more exactly where the fence line and side of the house pointed. It turned out that a beam between the two supports would be aimed at 245 degrees—right at all those exotic calls of the South Pacific and off Australia's northern coast. I concluded that a beam in the side yard on the west side of my house could probably yield good results and interesting times.

Element Lengths and Spacings. A side elevation view of the Yard Yagi showing vertical height and horizontal placement of the five elements is given in fig. 1. A top-down view with element lengths and spacings in feet for 21.010 MHz is shown in fig. 2. The antenna is cut for that low a frequency because I like to work DX CW at the low end of the band and monitor Jupiter emissions at 20.990 MHz.

For those who want to scale the antenna to other frequencies or bands, fig. 3 shows another top-down view of element lengths and spacings with dimensions in wavelengths. For example, to scale the antenna to 20 meters, divide 934 by the frequency on which you wish to operate and multiply the resulting length by the decimal wavelengths shown in the figure for the various elements and spacings.

As an illustration, let's calculate the length of a driven element for a Yard Yagi cut to 14.025 MHz. One wavelength at 14.025 MHz is:

$$1 \text{ wavelength} = 934/f \rightarrow 934/14.025 = 66.6'$$

A driven element for the Yard Yagi at the same frequency is:

$$DE = .47 \text{ wavelength} \rightarrow 66.6' \times .47 = 31.3'$$
or 31'4"

Remaining elements and spacings can be calculated in similar fashion. Remember to convert final calculations to inches by multiplying the decimal portion of the number by 12 and rounding to the nearest whole number. In the above example, for instance, 31.3' becomes 31'4".

Vertical Heights and Horizontal Spacing of Supports. Once all dimensions of the antenna are calculated, lay out a simple drawing showing the physical heights and horizontal spacings of element supports of the antenna as it will be placed in your actual location.

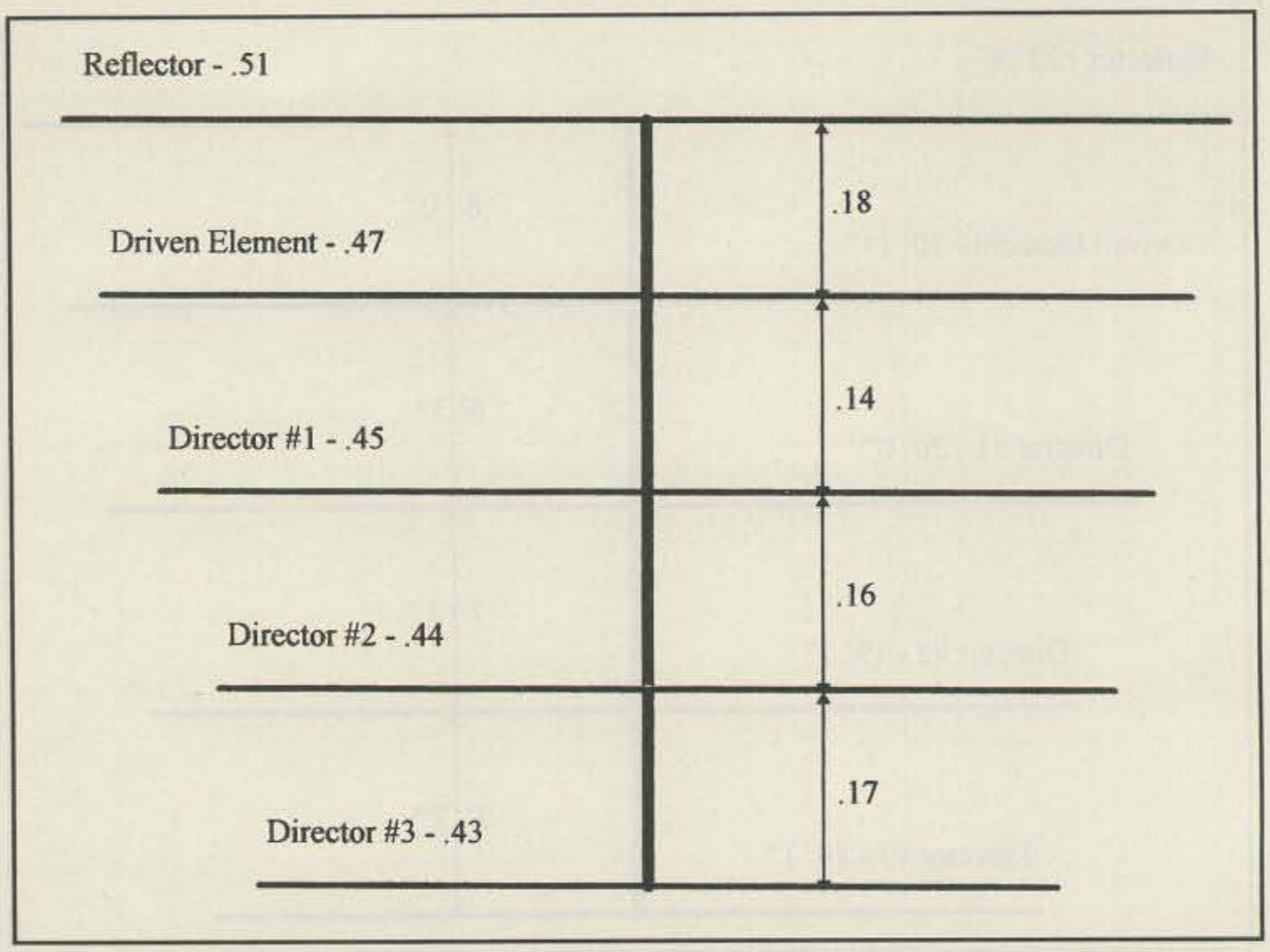

Fig. 3– Top-down view of the Yard Yagi showing element lengths and spacings in wavelengths. One full wavelength equals 934/design frequency. The elements and boom are not drawn to scale.

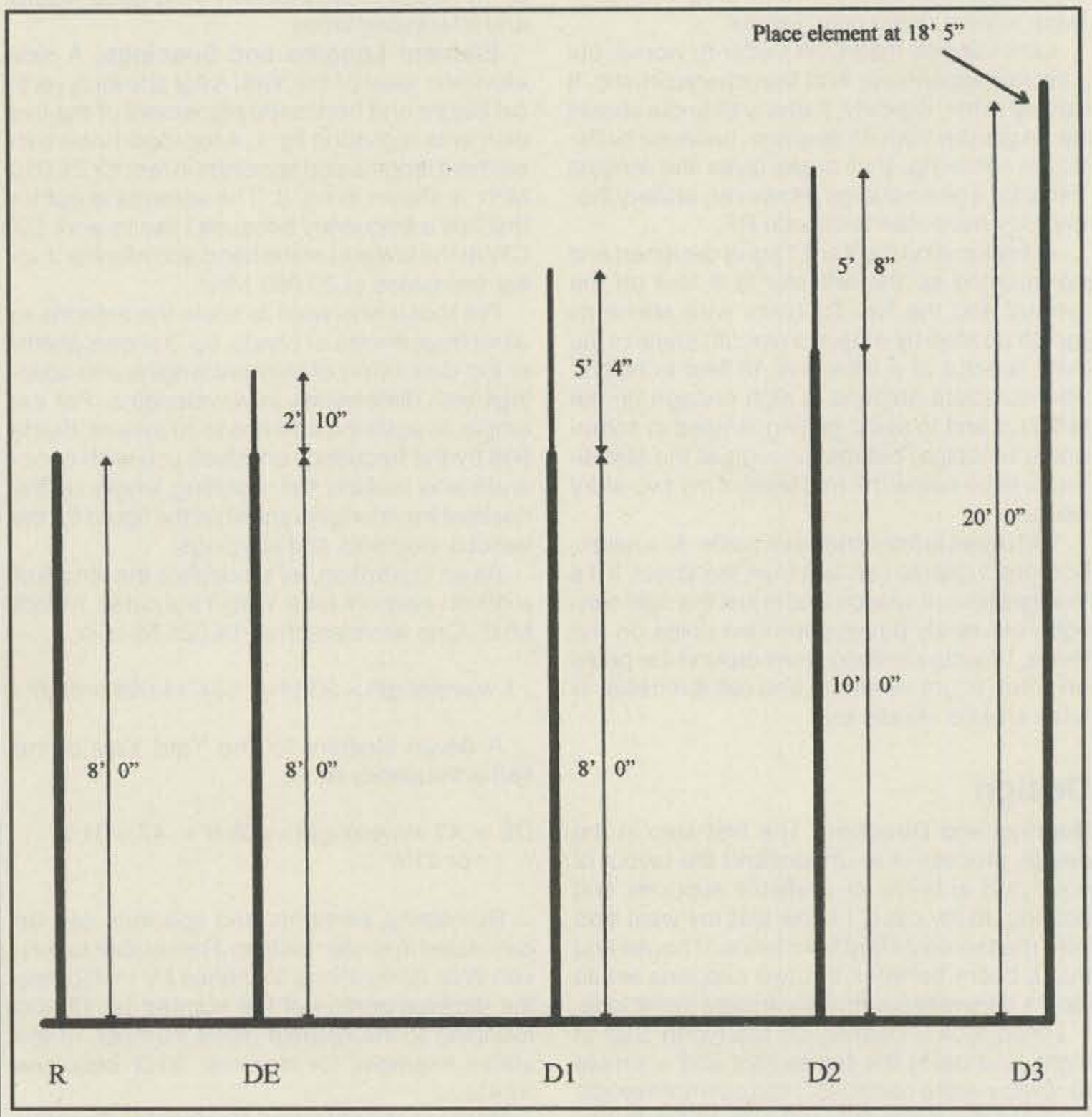

Fig. 4– Physical construction of element supports. The Reflector support is a single 2 × 4 × 8', while the Driven Element and Director #1 are 2 × 4 × 8' topped by a 1 × 2 × 8' cut to the lengths shown. Director #2 is a 2 × 4 × 10' topped by a 1 × 2 × 8' of appropriate length. Director #3 is a 20' length of cyclone rail fencing or two 10' TV antenna masts. The other ends of the elements are tied to eyehooks in the side of the house at the same heights and spacings as the supports.

The Reflector Baseline. Begin by setting the reflector baseline vertically and horizontally. Mark a point for the reflector and draw out the vertical and horizontal lines intersecting the point. With an architect's scale, mark off the vertical line to 8 feet or whatever height is convenient for your location. This is the height of the reflector from ground. The bottom point of the vertical line from the reflector becomes "ground level" for the remainder of the antenna. Extend the "ground level" line the length of your paper. If you don't have an architect's scale, you can substitute a regular ruler and do a little interpolation to determine element lengths and spacing. For example, you may decide that 1 inch on the ruler will stand for 2 feet of antenna length or spacing or height. Then 2 inches on the ruler indicates 4 feet, 2.5 inches indicates 5 feet, and so on.

Boom Length and Element Spacing. Next, using a protractor, mark a point at 20 degrees or whatever tilt angle you wish to set from the reflector point, and then draw a line through the reflector point and the angle point you just marked. This line becomes the "boom" of the Yard Yagi. Again with an architect's scale, mark off the distance of each element along the "boom" according to the element spacings calculated above. There should be five points, including the reflector, spaced on the "boom"; these represent the five elements.

Vertical Height and Horizontal Spacing of Supports. Next drop a vertical line from each element to the ground line. These vertical lines indicate the vertical height of the element supports, and at the intersection with the ground line, the horizontal distance along the ground for each support. With an architect's scale, measure the distance along the ground line from the reflector to the driven element and convert the measurement to feet. Continue marking off distances from the driven element through Director #3.

Be sure to measure the distance between supports along the *ground line*, not on the boom. Since the boom is tilted, it represents the hypotenuse of a triangle, and the distances between elements on the boom are longer than distances between supports on the ground. If you dropped vertical lines from the elements to the ground line, you should have proper spacings, because after all, the supports are set on horizontal ground, not tilted in the air, as Pythagoras might have noted long ago if he had been an amateur tinkerer.

There! You now have the electrical and physical characteristics for a fixed, optimum-spaced 5-element wire Yagi with significant gain and directivity, including substantial front-to-back ratio. All that's left to do is to build it according to the dimensions.

Construction

Measuring Ground Differential. There is a difference between the ground level at the foundation of a house and the ground level away from the house—say, at the fence. Landscapers introduce that differential on purpose so rainwater and sprinkler water drain from the house. Therefore, remember to measure the difference between ground level at the house (if you use a house as one tie-off point, as I did) and ground level of the fence (if you use a fence as the other tie-off point), and then add that difference to the lengths of the supports nailed to the fence.

I had to add 18 inches to the support heights

at the fence, since ground level at the house was that much higher than at the fence! Of course, being acutely aware of all that surrounds me at all times, I came to realize ground differential as a fundamental scientific phenomenon only *after* I had securely nailed the first two element supports to the fence and pulled the elements tight. The wire slanted up from the fence to the eyehooks on the house—thus, discovery of the ground differential! The ground differential at your location may vary.

Constructing Element Supports. The supports on the fence for all elements but Director #3 consist of various lengths of 1" × 2" pine furring strips and 2" × 4" pine boards, each 8 feet long, assembled in combinations as shown in fig. 4. For Director #3, a 20 foot length of cyclone fence railing is used as a support, since the combination of furring strips and pine boards at that height was not as stable as it should have been during strong thunderstorms and wind. If you are not near a hardware store that sells fencing supplies, two 10 foot sections of lightweight TV antenna masting from your nearest hardware or discount department store will provide an equally stable support. Remember to add the ground differential to the final calculated height of the fence supports. Since it will almost certainly vary from one place to another, the ground differential is not shown in fig. 4.

Once the wooden supports are cut to the correct lengths and nailed or screwed together in the correct combinations of total lengths, paint them with good-quality exterior primer and paint. Choose a color that blends in with your surroundings.

The final step in the assembly of supports is to drill 1/4 inch holes at the appropriate place on top of the furring strips and through the cyclone-fence railing. These holes allow the wire elements to be passed through them and tightened from ground level. The other ends of the elements will be tied to stainless-steel eyehooks screwed into the side of the house at calculated heights and spacings.

Preparing The Elements. The elements should be cut to the lengths given in fig. 2, or as calculated for your desired frequency. The driven element is a conventional split dipole fed with 50 ohm coax. No matching network or device is required for this configuration of Yagi. All other elements are single, continuous lengths of wire. I used No. 22 black wire for the elements, but any other wire size able to support itself without breaking is sufficient. Wire of No. 26 or 28 gauge is likely to break from falling branches, flying birds, or plain stress or fatigue, so try to avoid very thin wire. No. 22 black wire seemed to be a nice compromise between invisibility and strength.

Attach an insulator to the end of each element, feeding the element through the inside hole of the insulator and soldering the wire back on itself in a loop. Tie off a long "tail" to the outside hole of each insulator. These tails will be used to pull the elements tight and center them horizontally between the house and the fence, or whatever supports you choose.

Assembling The Yard Yagi. By now you should have constructed the supports and have them lying in the yard where you will assemble the Yard Yagi. Also, you should have prepared the elements and marked them so that when you reach for Director #1, that is, in fact, what your hand will find.

The first step in the assembly process is to screw the eyehooks in the wall of the house at the correct heights and spacings as shown in fig. 1, or as you calculated. Next, thread one long tail on the end of an insulator for each element through the appropriate eyehook and temporarily tie off the end to a stake on the ground so the tail and the element with it will not pull through the eyehook when you raise the other end of the element. Then thread the tail on the other insulator through the hole of the support assembled for the element and temporarily secure it to the bottom of the support. Leave the wire elements loose between the supports, letting them droop considerably in the middle, if necessary. You will tighten and center them later.

Remember to match the reflector with the reflector support, the driven element with the driven element support, and so on. It is easy to mix them up in the excitement of building! The smaller the tilt angle of the beam, the more one element support will resemble another, especially on the ground, because height differences among them will be smaller.

With the elements threaded through the holes in the eyehooks and supports, it is now time to raise the supports and nail them to the fence.

Begin with the driven element, since it must be centered between the house and the fence, and all other elements will be centered in line with it. Nail the driven-element support in place, and pull the tails tied to each end insulator so that the center insulator is centered between the eyehook on the house and the support on the fence. Tie off the tails securely at the bottom of the support and at the house.

Once the opposite ends of the driven element are about the same distance from the fence and the house so that the feedpoint is centered between them, raise the next element. Since you measured the horizontal distances along the fence for each support and marked a place for each one, the process can be completed very quickly.

Performance

Technically, the beam seems to perform as designed. SWR at the design frequency is 1.2 to 1. It rises slowly to about 1.5 at the top of the band with no matching device at all.

As for communication, the Yard Yagi works very well at my location. Although 15 meters is not open as frequently as one might desire, I can work about anyone I can hear. The beamwidth is quite sharp. Although stations on the fringe of the beamwidth are about the same strength on the beam as my dipole, stations much outside the Caribbean, northern South America, and southern California are stronger on the dipole than the beam.

For stations within the beamwidth, the difference in signal strength between the inverted-V dipole at 25 feet and the Yard Yagi at 18 feet at its highest point is never less than 3 S-units and is often as much as 4 to 5 S-units in favor of the beam.

I make no claim that the Yard Yagi produces 15 to 20 dB gain, as the increase in S-units would indicate. That large a difference is due to factors other than gain, as I know from extensive QRP antenna building and testing. For example, you can switch between a vertical and a dipole and quite often get as much as 20 dB difference in strength of a particular signal. The difference is due to the angle of arrival and the degree of polarization of the particular signal being received. So in addition to the normal gain that one gets from a beam antenna of a specific configuration, I think the fact that the Yard Yagi is tilted has much to do with its final overall "gain" over a simple dipole.

I can't wait to hear stations in Europe on the long path and work them! For a gain antenna that costs only a little wire, a little wood, and five eyehooks, the Yard Yagi is certainly an outstanding performer.

Now if I could just find a little land somewhere outside Austin with live oaks about 20 or 30 feet tall growing in a rough circle, a clear meadow between them and a little shack in the meadow, a little table in the shack with a nice radio on it, and my hand on that radio feeding switchable Yard Yagis—well, that sounds like another plaque winner to me! ■

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MODEL RM-35M

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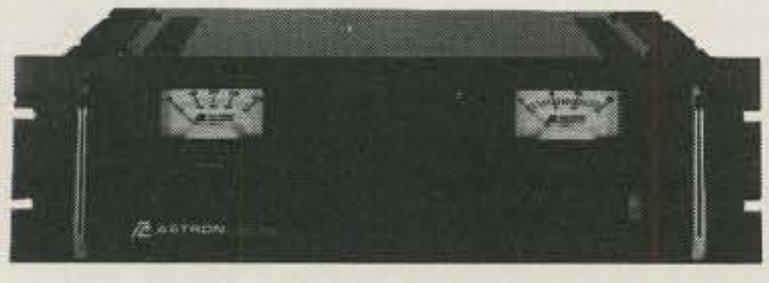
MODEL	Colors Gray	Colors Black	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H × W × D	Shipping Wt. [lbs]
SL-11A	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11R-MC		•	7	11	5¾ × 7¼ × 9¾	13
SL-11R-GE	•		7	11	5¾ × 7 × 9¾	13
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13
SL-11R-EFJ		•	7	11	5⅛ × 7¼ × 9¾	13
SL-11MG		•	7	11	5⅛ × 7¹⁄₁₈ × 9¾	13
SL-15R	•	•	12	15	2⅝ × 7 × 9¾	13
SL-15R-GE	•		12	15	5⅛ × 7⅝ × 9¾	14
SL-15R-RA		•	12	15	4¾ × 7¼ × 9¾	14
SL-15R-EFJ		•	12	15	5⅛ × 7¹⁄₁₈ × 9¾	14

RS-L SERIES

- POWER SUPPLIES WITH BUILT IN CIGARETTE LIGHTER RECEPTACLE

MODEL		Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H × W × D	Shipping Wt. [lbs]
RS-4L	•	3	4	3½ × 6⅛ × 7¼	6
RS-5L	•	4	5	3½ × 6⅛ × 7¼	7

RM SERIES



MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

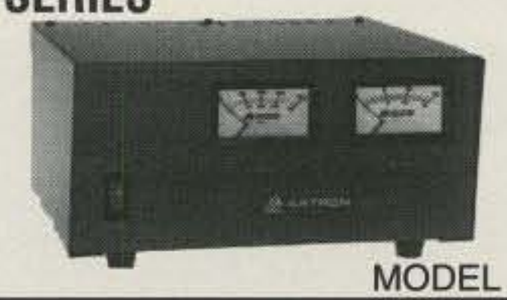
MODEL	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H × W × D	Shipping Wt. [lbs]
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H × W × D	Shipping Wt. [lbs]
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

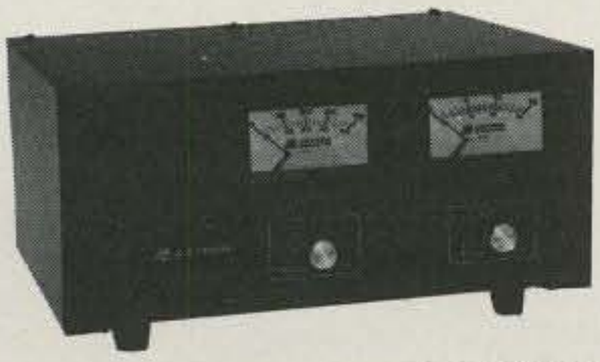
RS-M SERIES



MODEL RS-35M

MODEL	Continuous Duty [Amps]	ICS* [Amps]	Size [IN] H × W × D	Shipping Wt. [lbs]
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 1	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

VS-M AND VRM-M SERIES



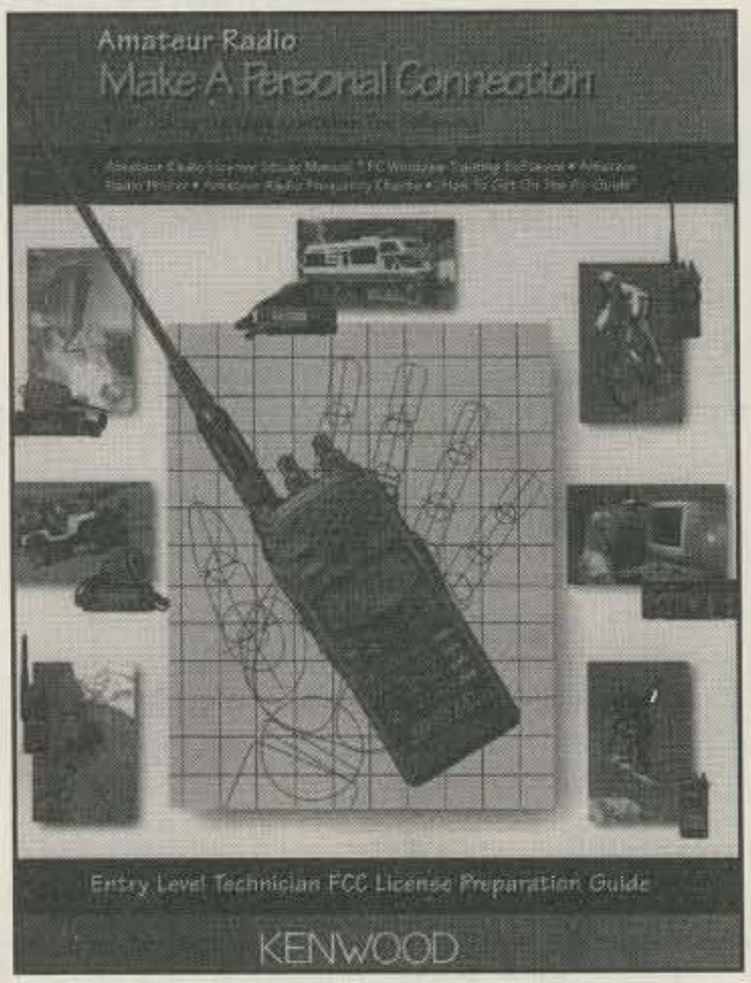
MODEL VS-35M

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty [Amps] @13.8VDC	@10VDC	@5VDC	ICS* [Amps] @13.8V	Size [IN] H × W × D	Shipping Wt. [lbs]
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
VS-70M	57	34	16	70	6 × 13¾ × 12½	48
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

ICS - Intermittent Communication Service (50% Duty Cycle 5 min. on 5 min. off)

SHOWCASE



No-Code Tech Self-Study Package From Kenwood

A new self-study package, "Make A Personal Connection," for the Technician FCC license is currently available from Kenwood. Included in the package is EZ-PASS, a PC Windows-based training program covering sample tests and the complete question pool for the No-Code Technician exam; questions are followed by the correct answer and an easy-to-understand explanation. There's also a license study manual, the *Technician Exam Review Guide*, which supports the software with information on operating rules and electronics theory. An amateur radio primer, *How To Get On The Air Guide*, and color-coded amateur radio frequency charts are included to help you prepare to quickly pass the test and get on the air. You also receive information on how to get a copy of the FCC Part 97 and a membership application to join the ARRL.

"Make A Personal Connection" is available in Windows 95 and DOS versions. For more information, contact Kenwood Communications Corp., P.O. Box 22745, Long Beach, CA 90801-5745, call customer support at 310-639-5300, visit their World Wide Web site at <http://www.kenwood.net> (news and products) or ftp to <ftp://ftp.kenwood.net> (bulletins).

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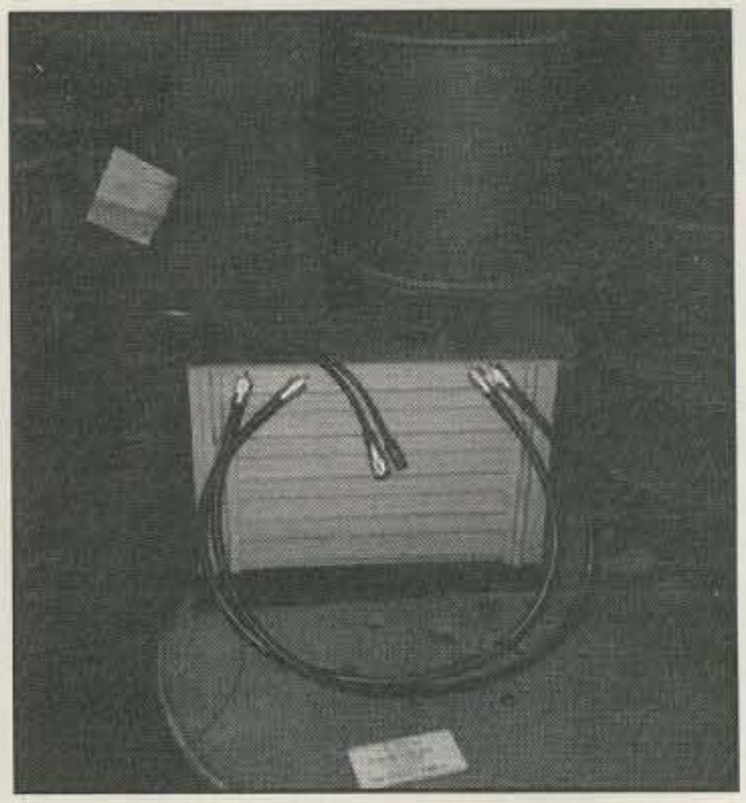
CABLE X-PERTS, Inc. carries 3 and 6 ft. jumpers of 9913 flexible DBL shield low-loss, RG213/U MIL-SPEC type and RG8/U foam 95% BRD. PL259 connectors are installed. The 3 ft. 9913 flexible is $9.00. The 6 ft. 9913 flexible is $10.00. The 3 ft. RG/213/U or RG8/U is $8.00. The 6 ft. RG213/U or RG8/U is $9.00. Same as above, except one end is male "N" and other end is PL259, add $2.00. With male "N" connectors on both ends, add $4.00. For an HT— 6 ft. RG8 mini with a PL259 to male BNC, $7.95 each. All connectors are Silver, Teflon, Gold Tip. Each termination is soldered, Hi-Pot tested (kV) and continuity checked. Irradiated Polyolefin heat-shrink tubing is applied for added coax/connector protection. Custom RF terminations are also available.



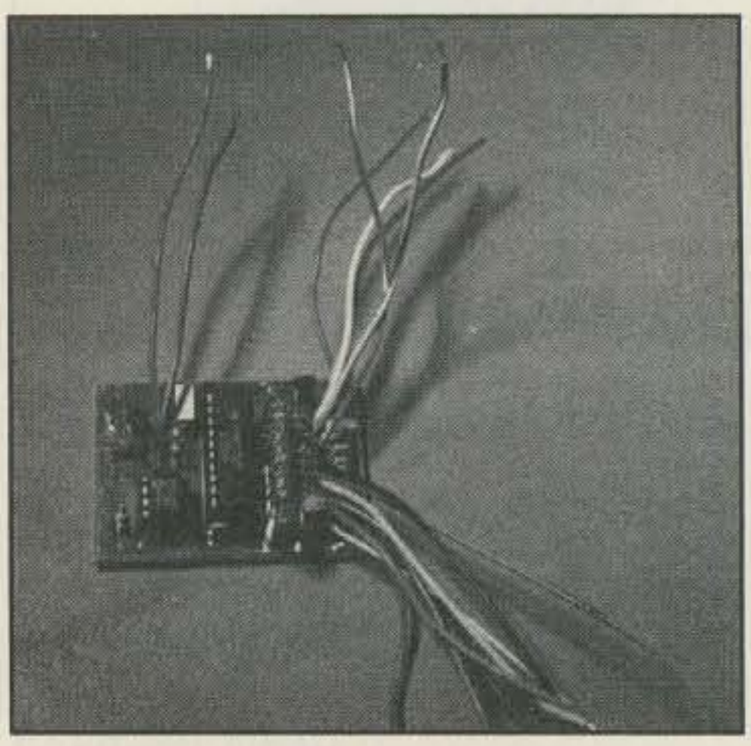
For more information, contact CABLE X-PERTS, Inc., 416 Diens Drive, Wheeling, IL 60090 (phone 847-520-3003; fax 847-520-3444; e-mail <cxp@ix.netcom.com>), or circle number 101 on the reader service card.

WB9KZY "Island" Keyer Kit From Milestone Technologies

Milestone Technologies is now offering Chuck Olson's board kit for a new iambic memory keyer. The "Island" has four separate memories for a total of 500 characters. It can be configured to use less than a microamp of current when idling, has straight-key input, a side-tone oscillator with selectable audio pitch, and speeds from 7 to 48 wpm. It will tell you (in Morse code) what speed is currently set. The keyer is physically small enough (1.5" × 2") and has low enough current drain, that it can be mounted inside the smallest of QRP transceivers. Actual power requirements will depend on a number of options.

The kit includes the circuit board and all board-mounted components in a typical configuration. You supply two pots, three jacks, seven push-buttons, and a battery holder, all available from a neighborhood parts store; or you can order an optional hardware pack.

The "Island" can be purchased for $21.95 plus $2.00 for first-class mail handling, or $5.00 priority mail (Colorado residents must add

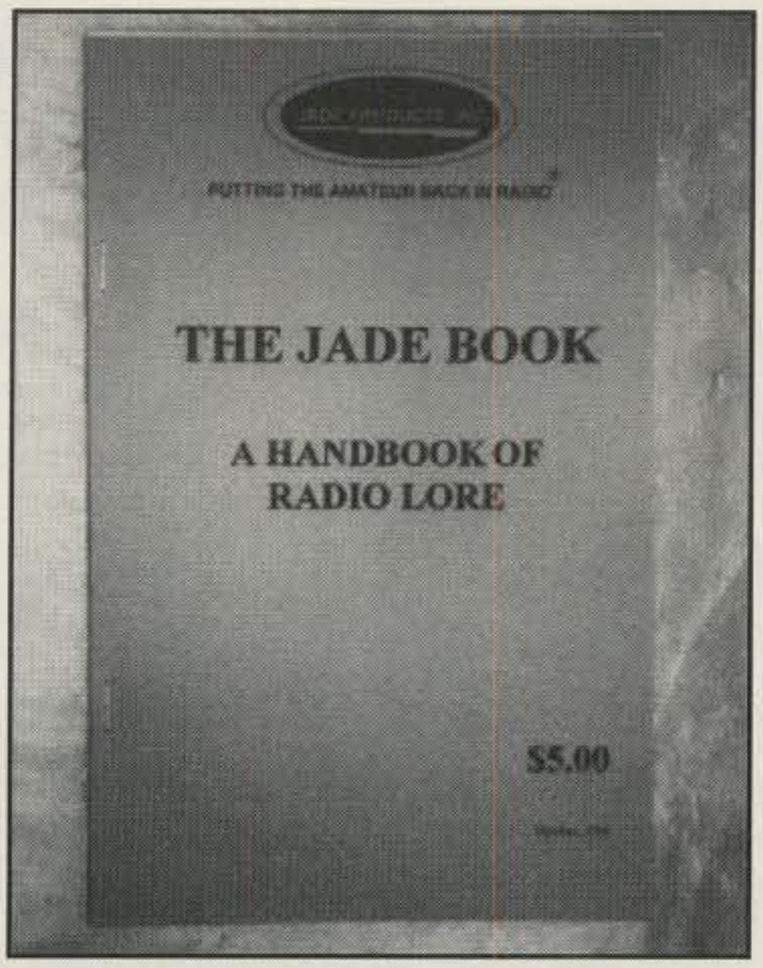


sales tax). The optional hardware pack can be purchased for an additional $12. Milestone will supply the hardware—the two pots with knobs; 7 pushbuttons; jacks for paddle, straight key and output; speaker, and wiring diagram. There's no additional shipping charge if you order the hardware pack with the keyer kit.

For further information about the "Island" Keyer Kit, contact Marshall Emm, AAØXI, at 303-752-3382; or write to him at Milestone Technologies, 3140 S. Peoria St., Unit K-156, Aurora, CO 80014-3155, or circle number 102 on the reader service card. Orders call 800-238-8205. E-mail can be addressed to Marshall via CompuServe (75230,1405); or Internet <aa0xi@mtechnologies.com>. For the Milestone Web site, including on-line ordering and images of the "Island" Keyer, connect to <http://www.mtechnologies.com/mthome>.

Jade Releases *The Jade Book*

The Jade Book is a compilation of information, hard-to-find engineering data, humor, and folklore. In addition, newsletter articles, parts of Jade Products manuals, and sections of letters answering commonly asked questions are included. Need to know the length correction for inside radius of bends, or the signal level measurement conversion formula? Would you like to analyze your antenna using simple instruments? All this and much more is included in *The Jade Book*, which is available from Jade Products, Inc. for $5 with order or $6 post paid. For more information contact them at 603-329-6995; or write to Jade Products, Inc., P.O. Box 368, East Hampstead, NH 03826-0368; or e-mail <djade@hampstead.k12.nh.us>; or circle number 104 on the reader service card. Orders call 1-800-JADE-PRO (523-3776); or e-mail <http://www.hampstead.k12.nh.us/~djade/index. html>.



Radio Protection from Ameritron

Ameritron's ARB-700 interface box protects a radio from keying line voltage or current related damage. This completely solid-state interface is designed to replace conventional reed relay buffer systems and has no moving parts.

The ARB-7000 fully protects transceivers that use conventional amplifier control lines that pull low, and works with receivers designed to supply positive output voltage to activate external amplifiers. The interface box will not affect amplifier switching times or produce unwanted noise since there are no mechanical contacts.

Ameritron's ARB-700 can be used with any amplifier relay voltage up to 200 volts positive, while handling amplifier relay control currents up to 200 ma. The ARB-700 requires the radio to sink only 2 ma of current, and limits voltage applied to the transceiver to values as low as three volts.

For more information, contact Ameritron at 116 Willow Road, Starkville, MS 39759 (phone 601-323-8211; fax 601-323-6551; or internet <http://www.ameritron.com>), or circle number 105 on the reader service card.

(Continued on page 89)

BY DAVE INGRAM, K4TWJ

WORLD OF IDEAS

A LOOK AT THE WORLD AROUND US

Memory Lane? Just Follow The Sucrets® Trail!

Okay, gang, are you ready for another jolly good blast of old-time radio fun? Well, it's right here, right now, it's priced low, and the memories rekindled are endless! Our doorway to yesteryear opens again, the yellow-brick road reappears, and *shazaam!* We're on our way back to the golden age of radio!

The year was 1967. The HF bands were loaded with DX, and on-the-air activities were booming with excitement. Traditional amateur setups such as Johnson transmitters and National or Hammarlund receivers were being upstaged by new-style transceivers made by big-name manufacturers such as Collins, Drake, Galaxy, and SBE.

A captivating array of neat little fun rigs also graced that romantic era. Topping the list was Ten-Tec's famous Argonaut (now a classic valued at more than its original cost), followed by its inexpensive little brother, the Power Mite. (They have totally disappeared from existence today.) In the far corner of my mind I also remember a unique crystal-controlled transmitter

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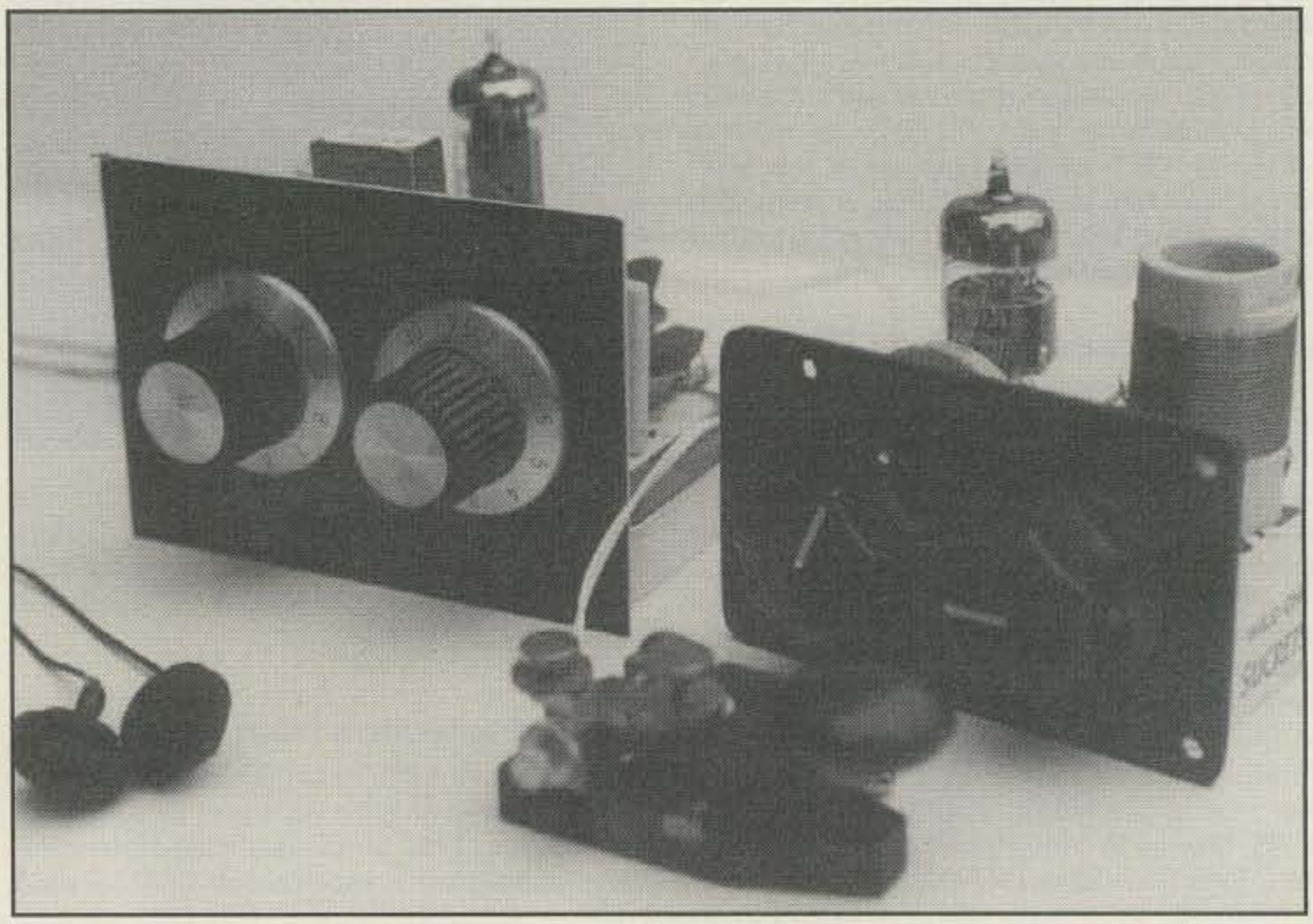

Fig. 1– Our 1997 rendition of the ever-popular Sucrets® box twins. The transmitter on the left features VXO control, and the receiver on the right hauls in authentic era DX. The key is one of my favorite miniatures. Now this is hamming in style! Note: The transmitter's tank coil is not visible, as the photo was taken during assembly (clear days for good photography in my outdoor studio are rare during mid-winter!).

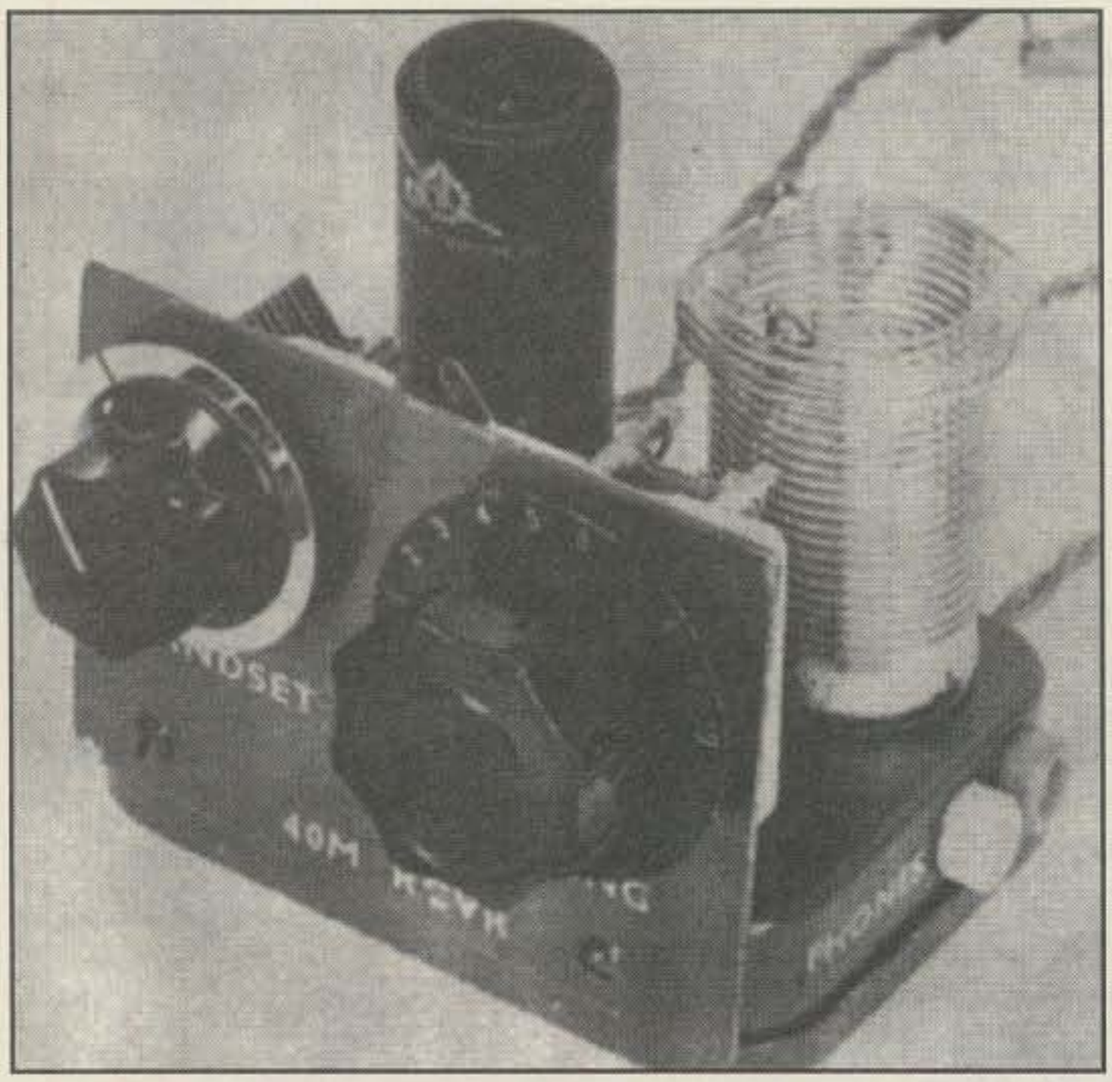

Fig. 2– Front view of the original Sucrets® box receiver. The left dial tunes 5.5 to 12.5 MHz, and the right dial is bandspread. This picture (and figs. 3 and 4) is a copy of the original 1967 photo, so pardon the lack of fine detail.

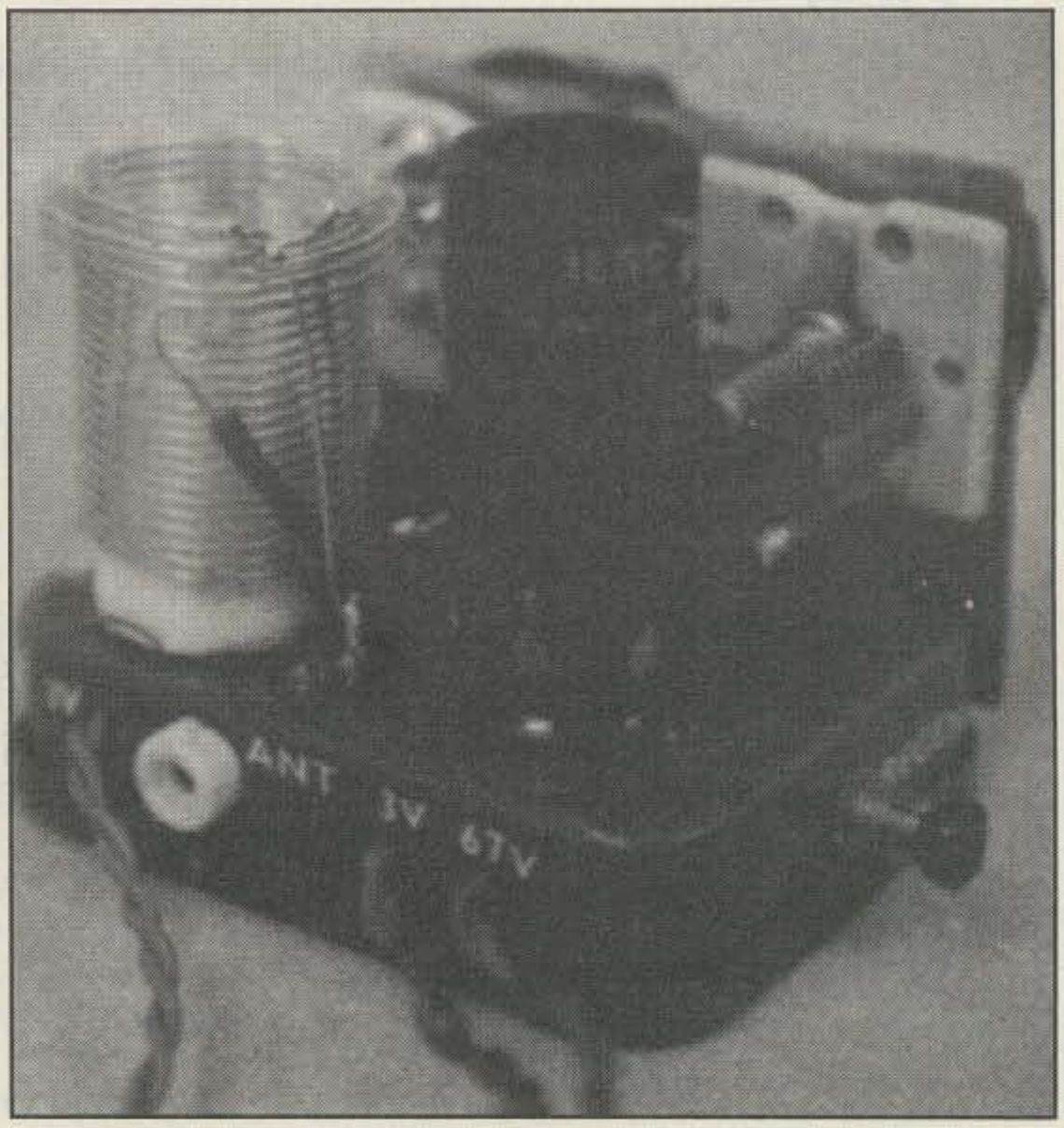

Fig. 3– Rear view of the Sucrets® box Wee Ceiver.

and receiving converter unit for mobile use made by Transcom. Exact details of that gem are now foggy, but I recall the unit worked CW and pumped out a good 10 or 15 watt signal. What a delight it would be to use that rig mobile on 30 meters today! Alas, they too seem to have disappeared and been lost in the annals of time.

Another special treat from that tender age can still be recaptured today, however, and at ultra-low cost. I'm referring to the dear little Sucrets® box "Wee Ceiver" described by Byron Weaver, WB2HAL, right here in *CQ* precisely 30 years ago (October 1967, to be exact). It was a gem that captured hearts near and far, and has remained familiar to all over the years. In fact, *CQ*'s Editor, Alan Dorhoffer, tingled our memories of the Wee Ceiver last year with his "Zero Bias" comments about Sucrets® switching from tin to plastic boxes. Quick, gang! Check the back of your medicine cabinet and rescue that tin!

Possibly I have again been sniffing the ether (or simply am high on nostalgia), but I seem to recall a mating Sucrets® box transmitter appearing in another (now lost) issue of *CQ*. Convinced that the combo will make a real rock-and-roll QRP rig today, I am proud to share my results of resurrection with readers this month. Build one or both of the little delights and have a ball recapturing the romance of the '60s! If you go for the gusto like I did, you should emerge with an all-battery-powered QRP setup similar to that shown in fig. 1. We must move fast to squeeze in all the details, so let's get rolling!

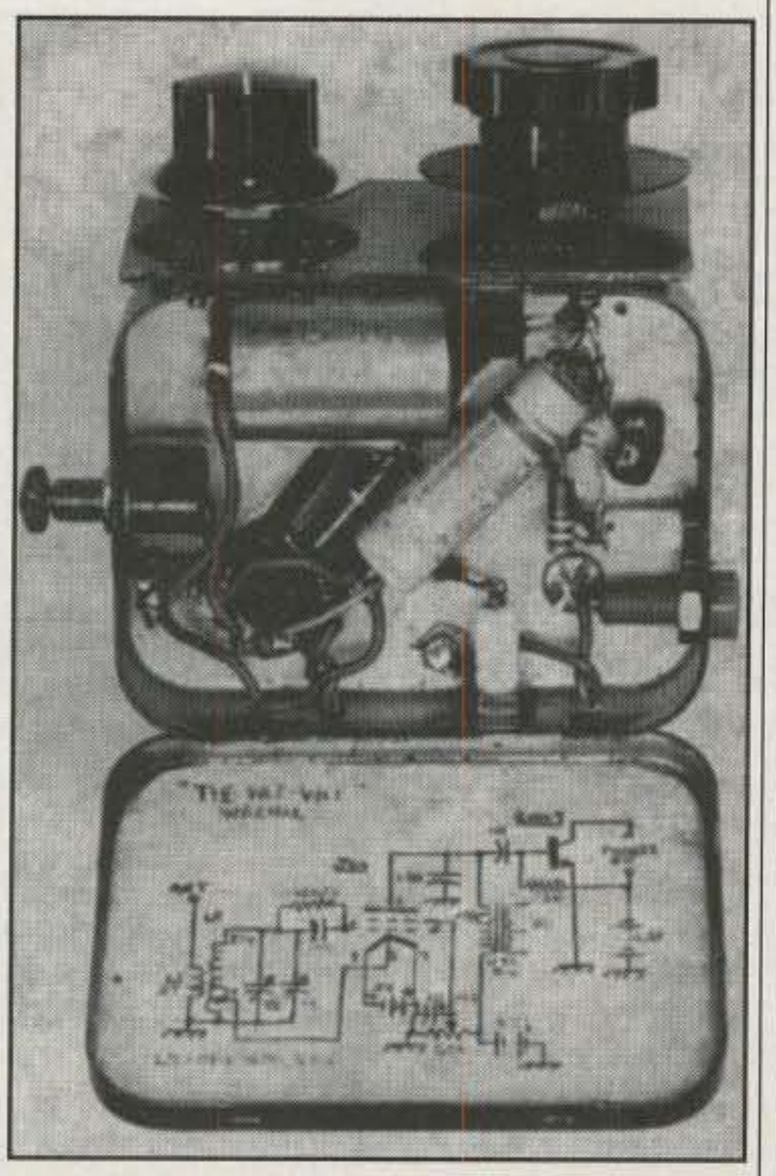

Fig. 4– A peek inside the Sucrets® box reveals the tasteful layout of components. Note the miniature regeneration pot mounted on the left.

The Wee Ceiver

Copies of the original Sucrets®-chassis Wee Ceiver are shown in figs. 2, 3, and 4, and its original circuit diagram is shown in fig. 5. As Weaver said in his article, do not let the little receiver's size and simplicity fool you. It's sensitive, loud (with earphones, that is), tunes 5.5 to 12.5 MHz, and runs many hours on readily available batteries. A miniature 3V4 tube, as used in many portable "beach radios" of the '50s and '60s, is employed as a regenerative detector (the 50K ohm potentiometer sets regeneration), and a 2N107 stage provides audio amplification. A 22-turn section of B&W #3015 coil stock (1 inch diameter, 16 turns per inch, tapped 1 turn from the ground end) forms L2. Antenna cou-

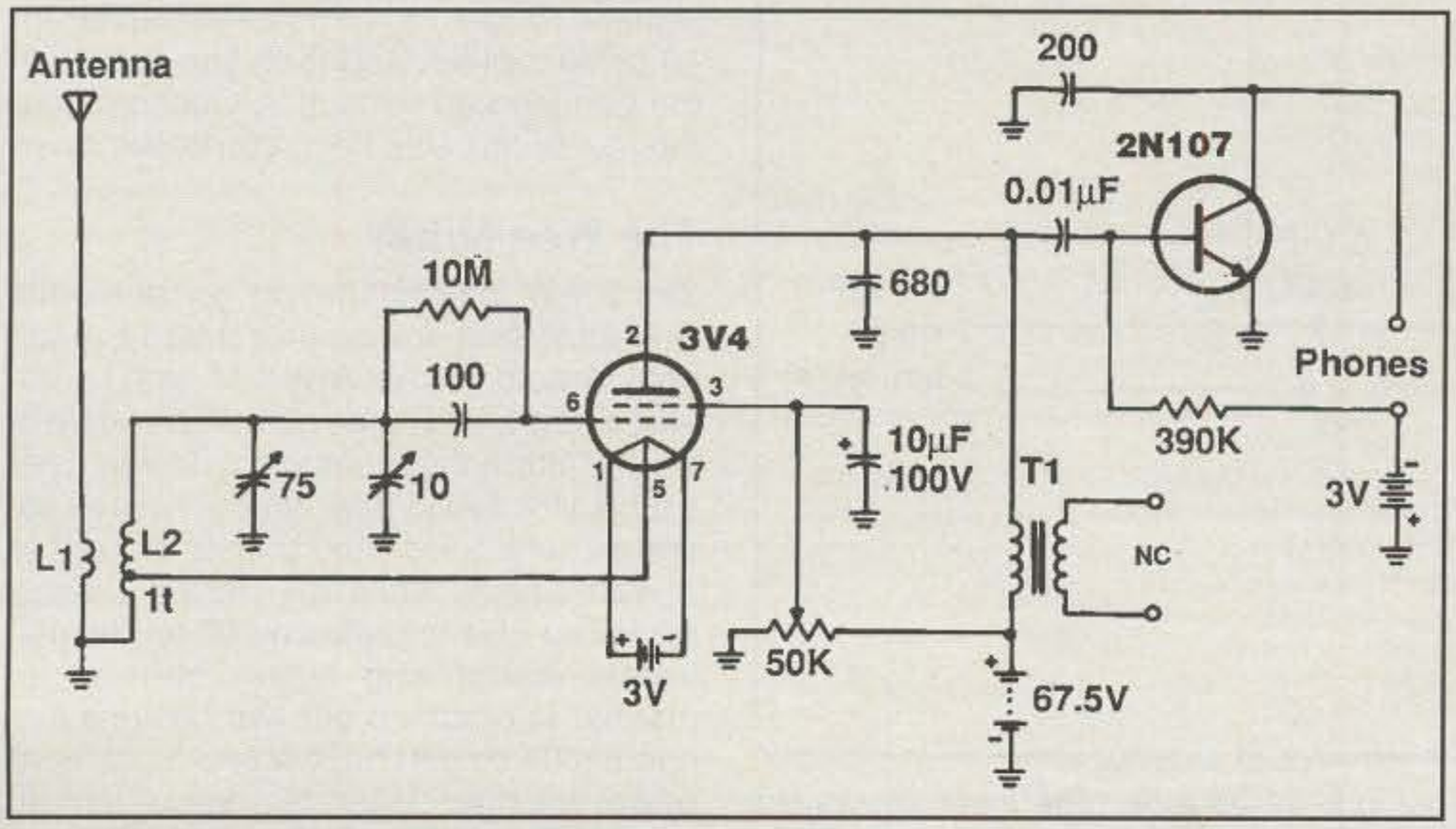

Fig. 5– Circuit diagram of the original Sucrets® Wee Ceiver. All capacitor values are in pFd unless otherwise marked and all resistors are 1/4 watt. (Additional details are in the text.)

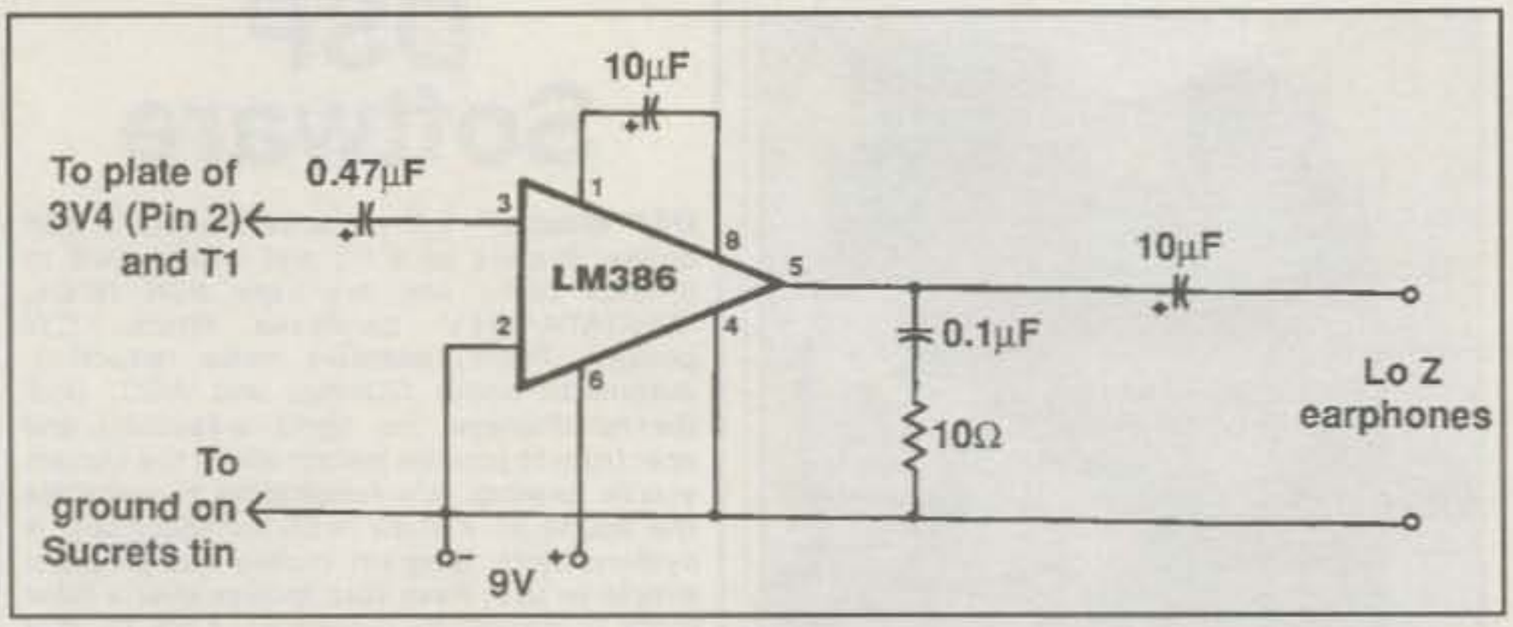

Fig. 6– Alternate and/or modern-day substitute audio amplifier circuit for the Sucrets® receiver. The LM386 circuit requires a minimum number of parts, but really pumps out the audio.

pling coil L1 is 3 turns of leftover 3015 coil stock straightened and rewound for a larger diameter and then positioned over L2 using plastic spacers glued to L2's spacers. Finding B&W stock today is challenging, so I wound my own coil using a hamfest-acquired 1 inch diameter form and No. 20 enamel-coated wire. A 1 inch diameter pill bottle works equally as well. You can mount it using a long screw and a 1 inch spacer, or super-glue it to the Sucrets® box, as desired. Since enameled wire is insulated, L1 can be wound directly over L2. After assembly and checkout, you might experiment with the exact position of L1 for optimum receiver sensitivity.

Exercise loving care when drilling holes in the Sucrets® box to pass coil wires, the tube socket, screws to attach the front panel, etc. The tin is thin and easily bent. Also, do not panic if you botch up your one and only Sucrets® box. A direct substitute for the box is available from grocery and variety stores nationwide—the Altoids mint tin. Yes, and it's filled with zesty peppermint candy rather than lozenges for sore throats. Look closely at fig. 1, and you will see my Wee Ceiver is built on a Sucrets® box, while the Wee Mitter is built on an Altoids box.

A miniature bandset capacitor is mounted directly in front of the 3V4 tube, and the bandspread capacitor is mounted in front of the coil. If you cannot find a 10 pFd variable, you can homebrew one by removing all except two stator and one rotor plate from a larger value capacitor. Use the old "gently twist and pry out like an Army dentist" technique. If necessary, a miniature 100 pFd variable can also be cut down to 75 pFd by removing a few plates. The worst that could happen is moving the tuning range up or down 1 MHz, which is no problem. The receiver will still cover 40 and 30 meters.

Since the secondary winding of T1 is not used, any small interstage or audio output transformer with a high-impedance (10 to 18K ohm) primary winding can be used. Alternately, an 18K ohm resistor can be substituted for the transformer. A slight decrease in volume will result, but that can be overcome, as we presently will discuss.

The original Wee Ceiver used a 2N107 amplifier driving a pair of high-impedance/5K ohm earphones (both of which are a mite scarce today). I elected to substitute an LM386 circuit driving a pair of regular 4 ohm earbuds, as shown in fig. 6. The LM386 exhibits high gain and more than compensates for using an 18K ohm resistor in lieu of a transformer in the tube's plate circuit. If you prefer going all original, however, check with Mouser Electronics (1-800-346-6873) for a 2N107 and Antique Electronic Supply (602-820-5411) for a pair of high-impedance "cans."

A pair of series-wired C cells for the filament and 5 to 8 series-wired 9 volt batteries (45 to 72 volts total) for a plate supply plus another 9 volt battery for the LM386 make a good battery pack for the Wee Ceiver. A 3 by 5 inch card file box is handy for housing the pack.

Operation of the Wee Ceiver is a cinch. Just connect an antenna (even an 18 foot wire or window screen works well), connect phones and batteries, and allow a few seconds for warmup. Advance the regeneration control just enough for a hiss in the phones and a beat tone for copying CW signals. Adjust the bandset capacitor for 40 or 30 meters, and then fine-tune with the bandspread capacitor. Once you get the feel of this little tyke, you'll love it!

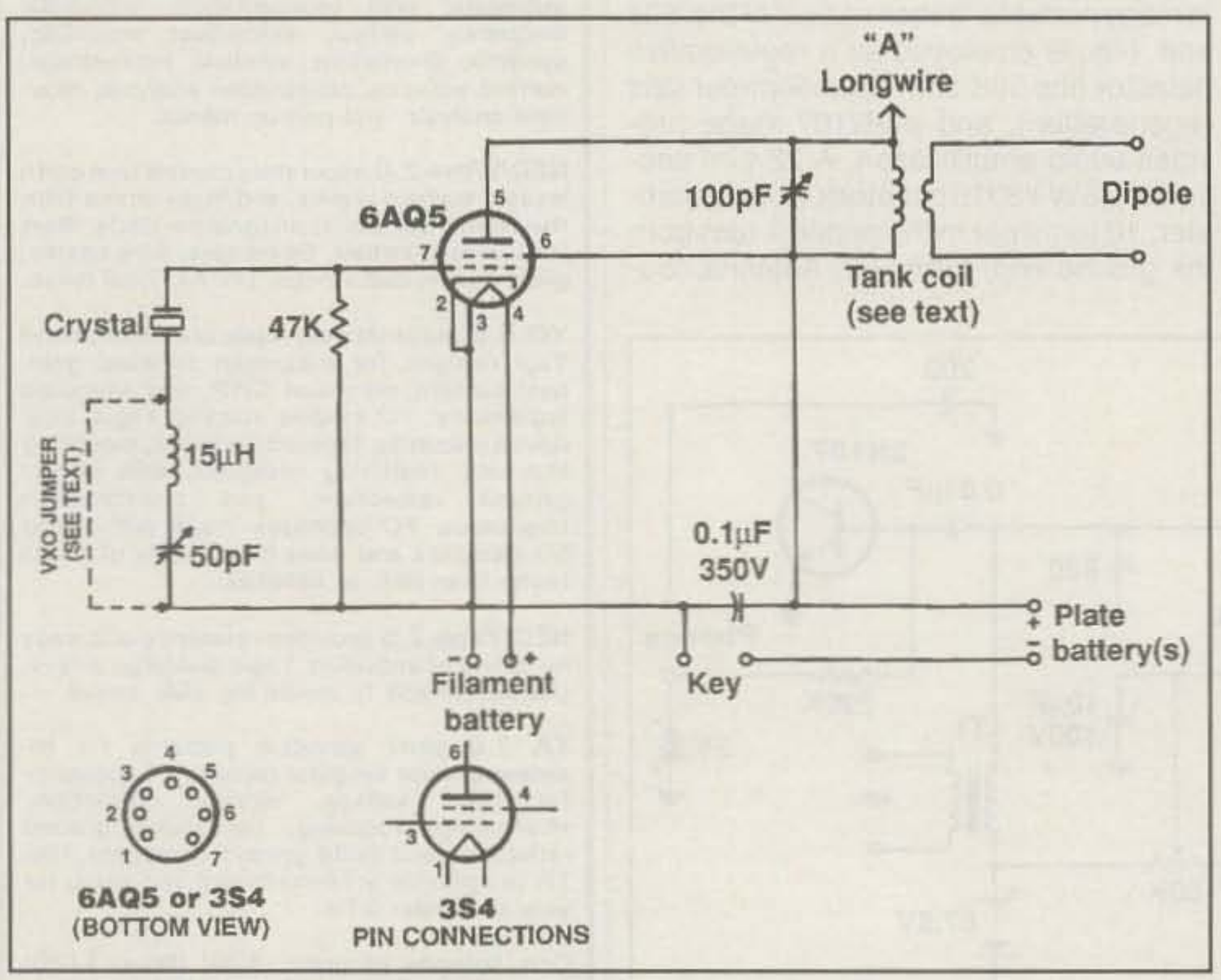

Fig. 7– Circuit diagram of the Wee Mitter using a 6AQ5 tube. The inset shows the tube socket wiring changes for using a 3S4 tube. For no-miss success, get the transmitter working smoothly before adding the VXO inductor and trimmer in series with the crystal. (Additional notes are in the text.)

The Wee Mitter

Since the information on an authentic Sucrets® box transmitter wasn't available, Arnold Sayre, W8WVM, and I compared notes and came up with a couple of worthy alternatives. Arnold's design uses a stout little 6AQ5 tube which requires liberal battery "juice" and pumps out a 2 to 4 watt signal, while my design uses a miniature 3S4 to produce 500 to 750 milliwatts output with lighter battery demands. I combined our two designs into one circuit so you have a choice of more power or longer battery life. A 6 volt lantern battery and 15 to 20 series-wired 9 volt batteries (whew!) will get a 6AQ5 perking in fine style. Two series-wired 1.5 volt C

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cells and 8 to 10 series-wired 9 volt batteries are perfect for powering a 3S4. A set of batteries should give approximately five hours on-the-air operating time with a 6AQ5 or 15 hours with a 3S4. Pin connections differ between the two tube types, so make your selection before wiring the tube socket.

Our versatile little Wee Mitter is shown on the left in fig. 1, and its circuit diagram is shown in fig. 7. Striving for simplicity and effectiveness, a basic oscillator design with a series-fed tank circuit is utilized. Staying in line with the Wee Ceiver, the tank coil is also wound on a 1 inch diameter pill bottle using number 20 or 18 enameled wire. Wind 26 turns to make a 40 meter coil, or 20 turns to make a 30 meter coil. A similar coil of 6 to 8 turns wound over the center section of the tank coil can be used for connecting a dipole, or you can forego the antenna coupling coil and connect a longwire directly to point "A" on the tank circuit. Position transmit and receive antennas away from, and at right angles to, each other, and the little twins can be used full break-in style.

The plate tuning capacitor for either band is a miniature 100 pFd item. The one I used was slightly too long for mounting in front of the coil, so I mounted it on the right and positioned the tank coil beside it and behind the front panel. That arrangement works fine, as a tiny 50 pFd VXO trimmer capacitor is mounted behind the large knob on the front panel's left side.

The ability to move plus or minus 2 or 3 kHz from a crystal's frequency is very important to success with QRP, so I added a 15 microHenry inductor and 50 pFd trimmer to make a simple VXO. Small 15 uHy inductors are available from Mouser Electronics. Slightly larger size inductors are made by Ohmite and are available through electronic parts stores nationwide. Keep this VXOing idea in mind, as it can be used with other crystal-controlled rigs to make a limited-range VFO. When assembling the Wee Mitter, I heartily encourage first jumping/shorting out the VXO inductor and trimmer until proper transmitter operation is confirmed. If a problem arises after removing the jumper, you then know exactly where to check.

Fig. 8– Big-time nostalgia supreme! Mac, WA8ZNX, runs this beautiful Ranger and National today, and it works just like it did in the 1960s—great!

Tune-up and operation of the transmitter are a snap. Simply use a field strength meter or SWR bridge as a visual indicator and tune the tank capacitor for maximum output consistent with clean keying. Alternately, disconnect the antenna cable from your big rig, switch on its attenuator, and use the S-meter for monitoring signal strength.

Conclusion

Do our little Sucrets® rigs turn good QSOs on the air today? You bet, although a couple of hours of "updating" may be necessary to clear all the nostalgic memories from the grids of original-era tubes. When first fired up, for example, the receiver was still copying Don Miller's 1967 CQs as 1G5A from Geyser Reef and the transmitter pounced on him for an immediate QSO. Good Golly Miss Molly! The rig is now acclimated to 1997, and it's chasing long-path DX on 30 like crazy.

Our trip down memory lane would not be complete without a modern view of how the other half (QRO) lives. Your attention is thus directed to the photo of C. MacNeill, WA8ZNX, and his big-time Ranger/National station shown in fig. 8. Mac set up this classic pair at the checkout stand of his used book store in Berkley, Michigan and enjoys a few minutes of hamming during slack times. You only live once, so go for the gusto!

That's all this time, gang. We're out of space. Watch for another blowout column next time, keep on working 30 meters, and I'll meet you there!

73, Dave, K4TWJ

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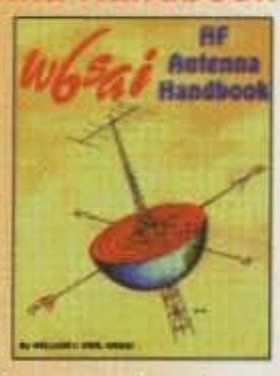

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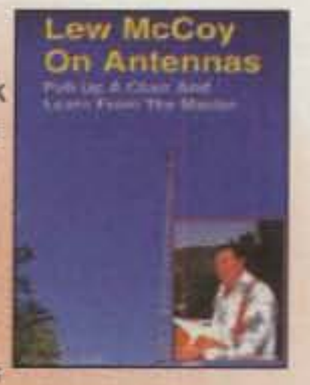

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BY IRWIN MATH, WA2NDM

MATH'S NOTES

WHAT'S NEW AND HOW TO USE IT

A Primer on Optical Communications—Part IV

Last month we completed construction of an optical receiver. Now it is time to investigate "optical antenna" techniques so that our equipment can be converted into a true communications device.

The purpose of an optical antenna, obviously, is the same as that of its RF counterpart—namely, to "launch" the signal from the transmitter into the air and to then receive it at the receiver. Due to the ultrashort wavelength of light, however, it is very easy to produce narrow output beams. As a result, whip and ground-plane omni-directional radiators or long-wire/dipole-type configurations normally are not used. In fact, they often are more complex to implement at these wavelengths. Highly directional, beam-producing optical antennas are the norm. Just look at a flashlight! The term "optical antenna" therefore primarily refers to a group of techniques employed to direct (and collect) the light in a relatively tight beam.

Fig. 1 is a diagram of the approximate radiation pattern produced by the LED (by itself) used in last month's transmitter. You will notice that the light from such an emitter diverges at a fairly high angle (which can be anywhere from about 25 to 50 or more degrees). After only a few feet or so the field intensity of the milliwatt radiating LED drops off very quickly. This is the main reason why TV remote controls have an operating range of only 20 to 30 feet. Obviously, some method is needed to steer the majority of the output in the direction we wish if a practical communications link is to be implemented.

The most common scheme for directing light from an LED is by the use of a simple double-convex (or magnifying) lens placed in front of the LED. The correct position of this lens is based on the focal length of the lens, as we will see shortly. The focal length of any lens can be found by producing an image of a distant point, such as a light bulb, on a white paper or cardboard screen with the lens as shown in fig. 2. The distance from the lens to the image is the focal length. The point at which the image falls is called the "focal point." Note that at the focal point there is an image (inverted) of the source of the light. When one uses a magnifying lens as a "burning lens," the hot spot (which is the focal point) is a tiny image of the sun. If you try this, be careful. The

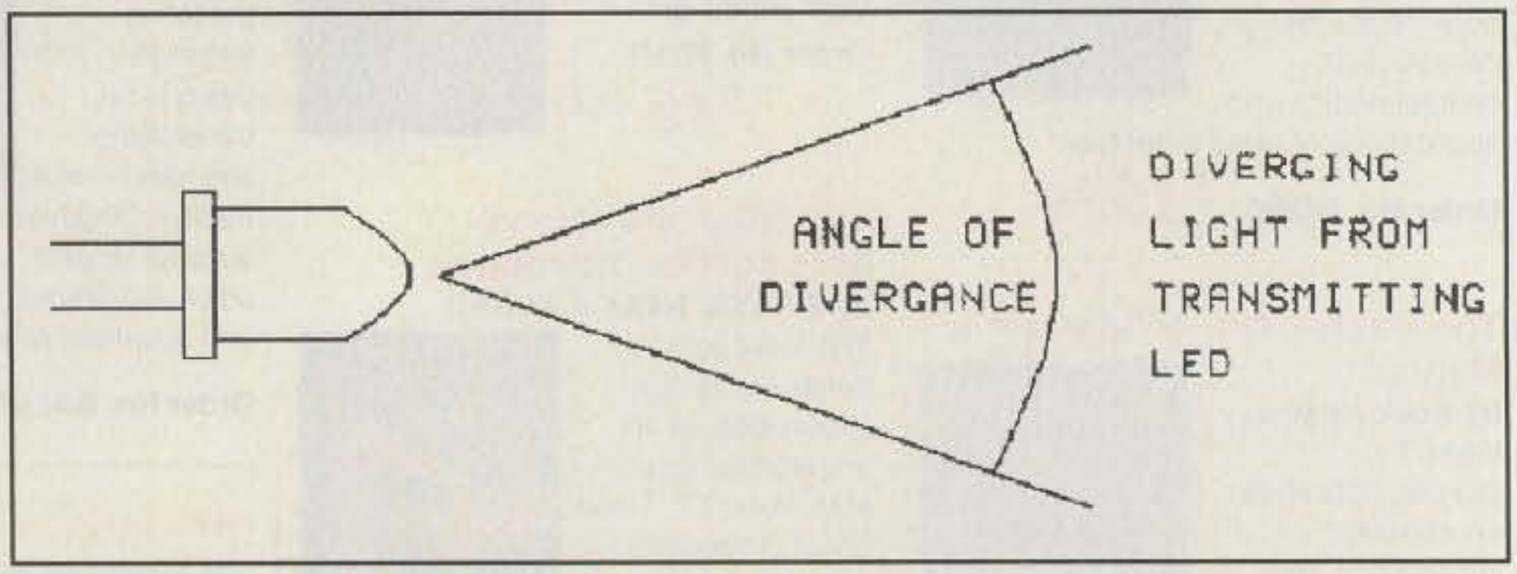

Fig. 1– Typical divergence of light from an LED.

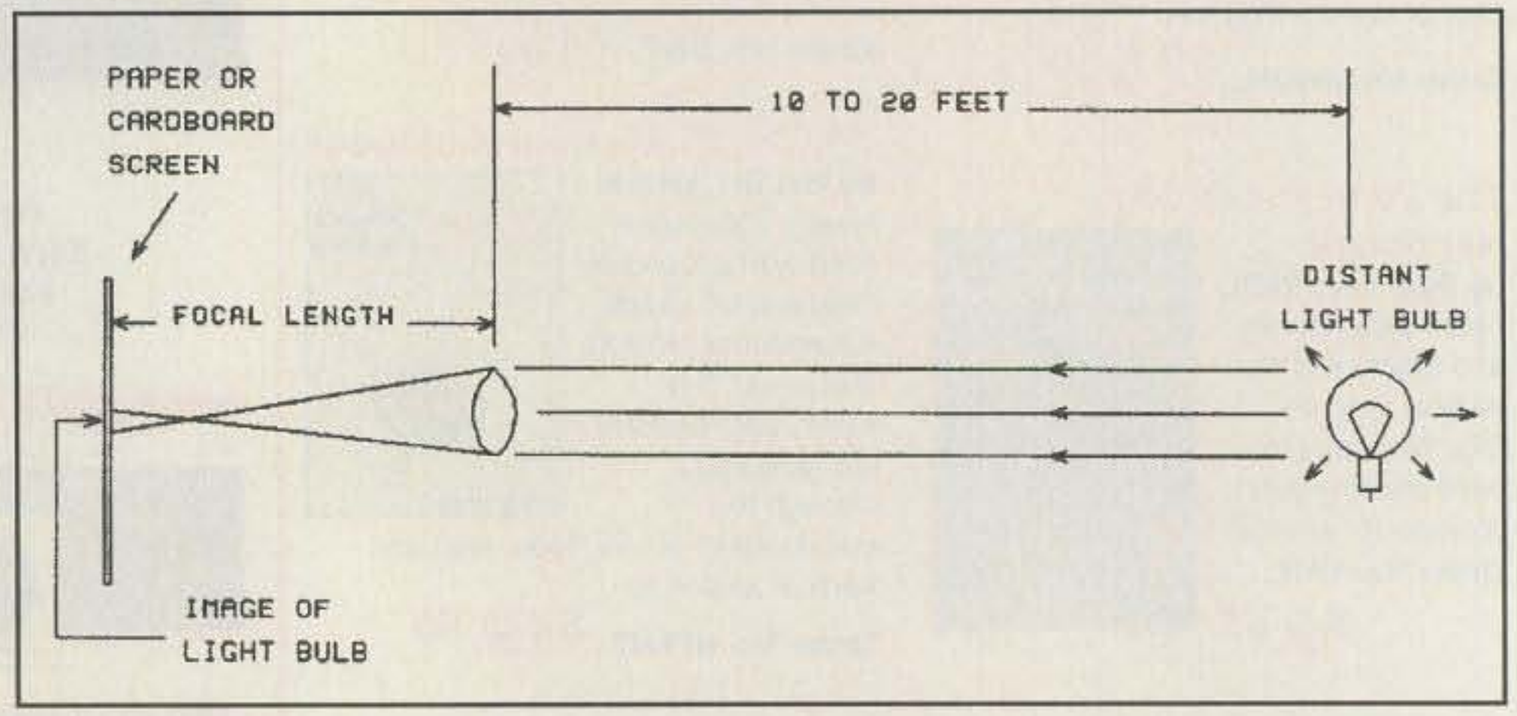

Fig. 2– Method for finding the focal length of a lens.

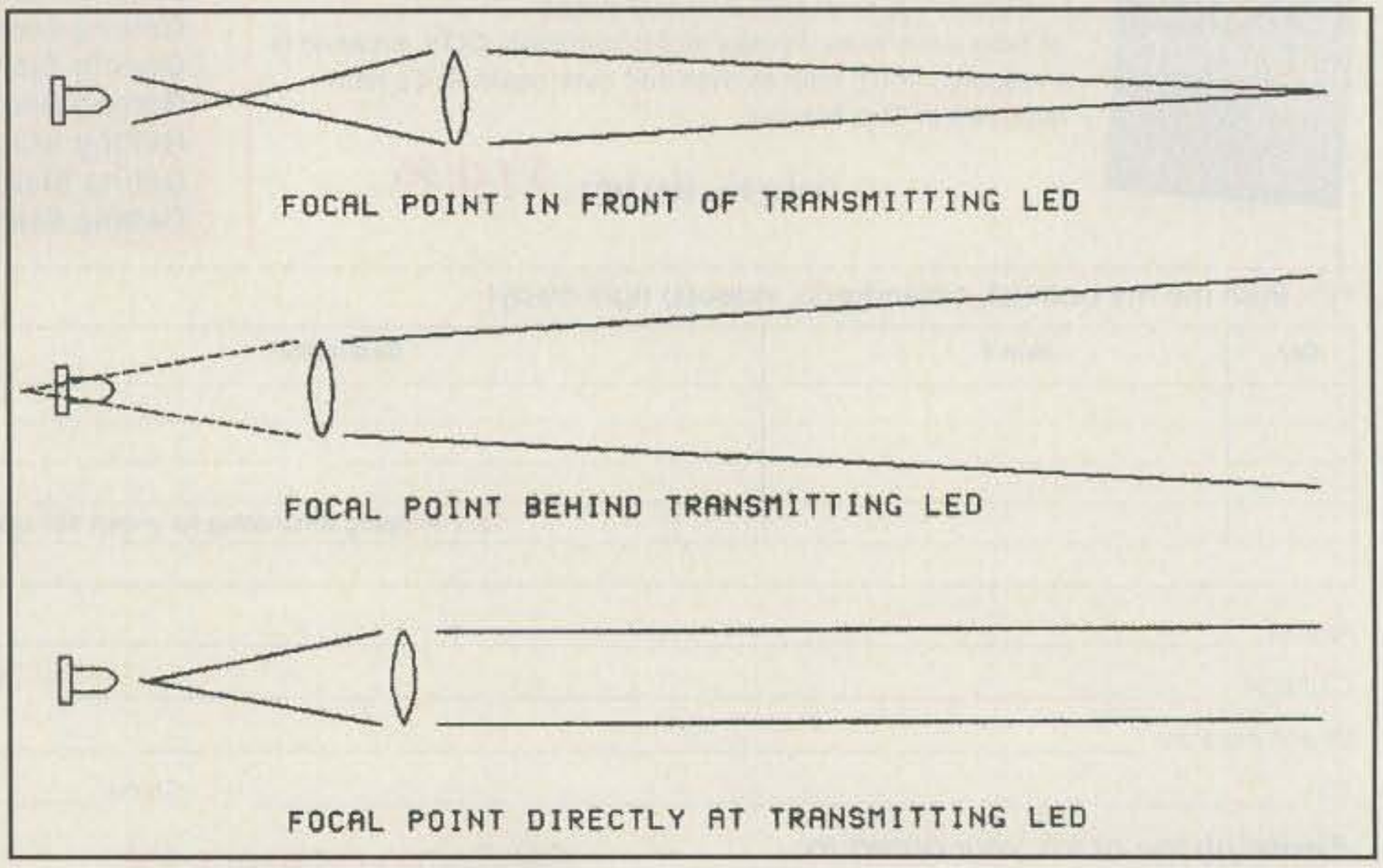

Fig. 3– Various possible lens/LED locations.

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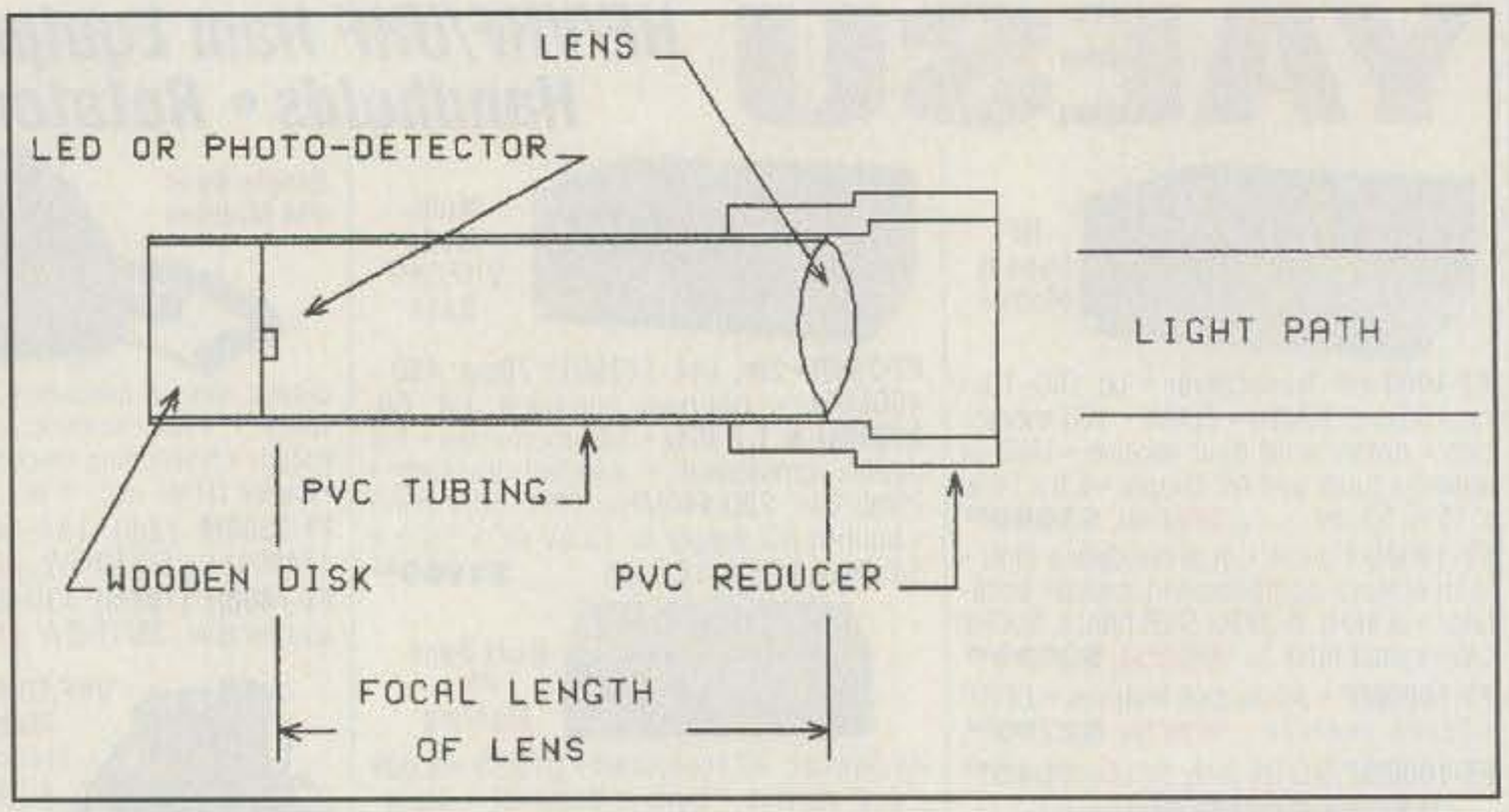

Fig. 4– Simple transmit or receive lens assembly.

sun's image can be hot enough to start paper burning!

Once the focal length is known, there are three possible positions such a lens can have in relation to the LED. These are shown in fig. 3. If the lens is placed so that its focal point falls in front of the LED, the light will converge into a point (image) at some distance in front of the lens. If the lens is placed so that its focal point falls behind the lens, then the light will diverge (spread) and the result will be even worse than with the LED alone. However, if the lens is placed so that its focal point lies directly at the light-emitting surface of the LED, a collimated (parallel) beam of light will result. Although this beam will not be perfectly parallel (a discussion of why is beyond the scope of this investigation), it certainly will suffice for our preliminary experiments. In addition, if the transmitting lens has a long focal length, the degree of collimation will be small. Furthermore, the larger the diameter of the lens, the more light it will collect from the LED. A further discussion of collimation and the detailed use of lenses can be found in any good physics textbook.

At the receiving end of an optical communications link the idea is to collect as

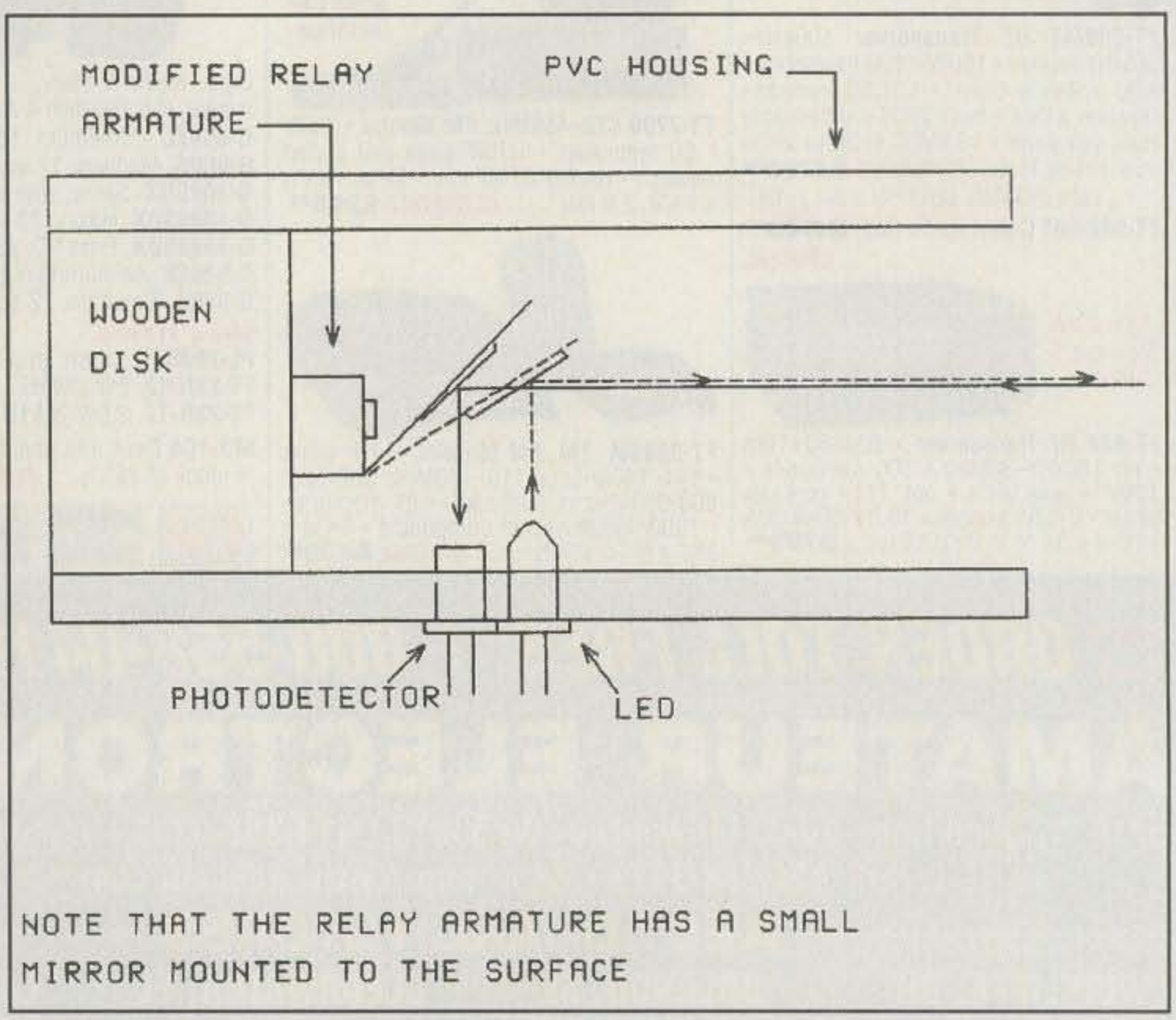

Fig. 5– Method for switching from transmit to receive.

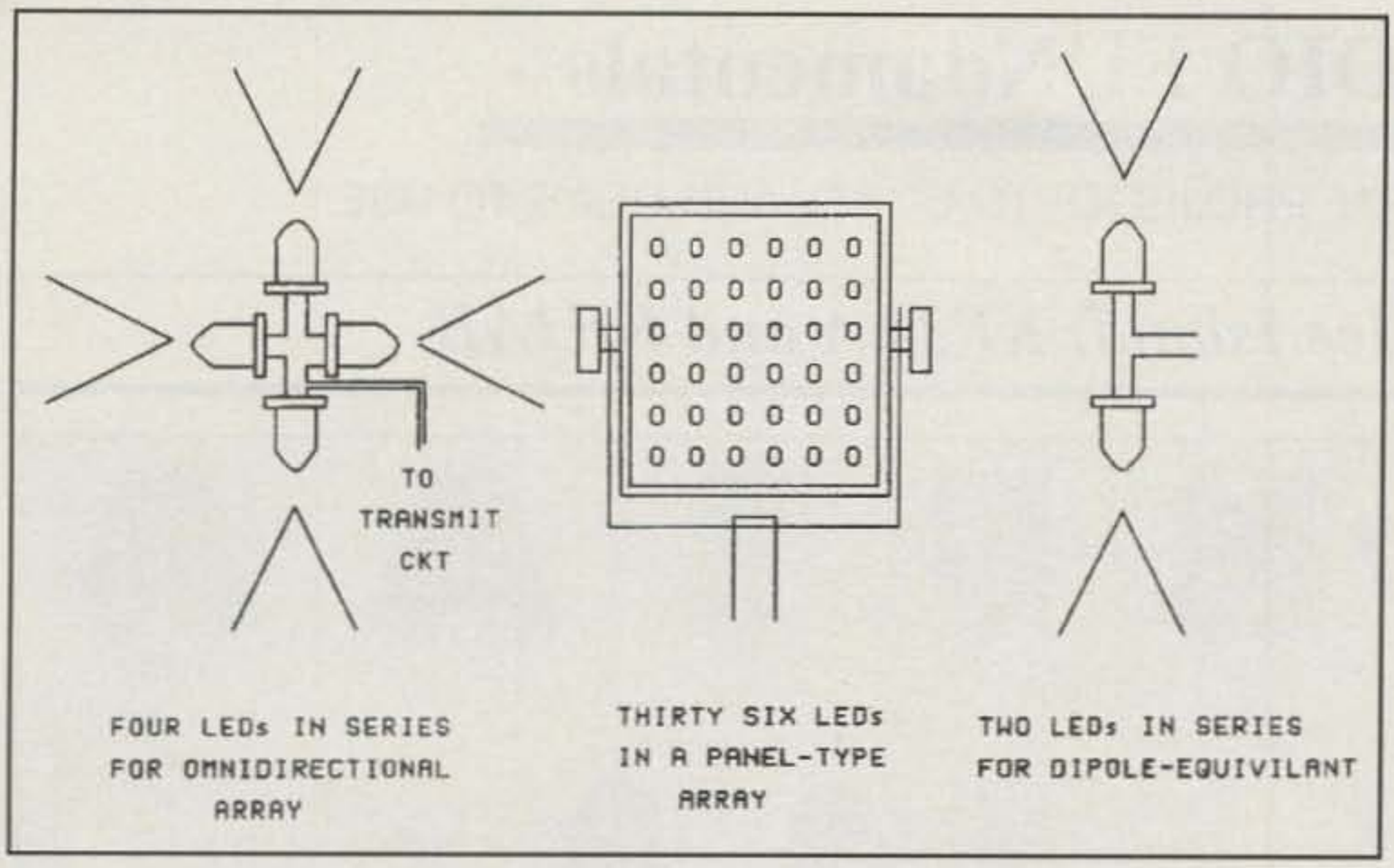

Fig. 6– Various possible optical antennas.

much of the transmitted light as possible and focus it onto the photo-detector. As in the case of the transmitter, this also requires that the photo-detector be located at the focal point of the lens used and that the lens be as large as possible to collect the maximum amount of light. Since both of these requirements for lenses are essentially the same, it is not unreasonable to use the same lens for both transmitting and receiving. After all, in RF we usually use the same antenna for both.

Fig. 4 describes the simplest way to implement a lens-based system. With this scheme you will need two assemblies: one for transmitting and one for receiving. Both are mounted in PVC pipe with the optical emitter and detectors mounted to wooden or plastic disks that can slide in the tubing for fine adjustments. A PVC reducer is used as a sun shade on one end for a finished "professional" look. A PVC end cap can also be used to protect the photo-elements after adjustment.

To align the transmitting lens assembly, slide the wooden block to the approximate focal point of the lens being used. Turn on the transmitter (lighting the LED) and arrange one of the receivers at least 10 feet away on the optical axis of the system. First adjust everything so that you have some measurable output from the first stage of the receiver. An oscilloscope connected to the output of the stage should be used to make this measurement. Now carefully slide the wooden disk back and forth until maximum voltage is measured. When this is accomplished by means of set-screws in the PVC tube, or with a small dab of glue, secure the wooden disk into place.

If you have the patience and skill, you might wish to attempt the scheme shown in fig. 5. Here only one lens assembly is used and a mirror, mounted to the moving armature of a solenoid or relay, directs the optical path to a photo-detector or LED as required. When building this sort of assembly, alignment is critical to get everything optimized. However, the convenience of a single antenna is worth it. If you do attempt such an "antenna," use a long-focal-length lens and one with a diameter as large as you can reasonably afford for best results. I have seen some 4 inch diameter plastic lenses sold as inexpensive "reading glasses" that would be ideal. You might also wish to request the Edmund Scientific Company catalog (call 609-573-6250), which is chock full of lenses, mirrors, and the like. Similar schemes can be implemented with mirrors, telescopes, or whatever else your imagination can come up with.

For those who wish to experiment with omni-directional optical antennas or dipole-equivalents, you can connect several LEDs in series, or even implement arrays of LEDs. Fig. 6 shows various suggestions. In a future column, if interest is there, we will be pleased to continue this series, offering circuitry for using laser diodes as emitters and even describing modulation techniques other than simple AM. If you come up with equipment that is easily reproducible, I will be glad to comment and pass it on to other readers. Write to me with your suggestions.

With regard to the field of fiber-optic communication, much of the information contained in the prior three columns is almost directly applicable. In fact, for the most part, only the light-emitting and detecting schemes really change very much. Next month, in the concluding portion of this series, we will take a closer look at this technology.

This concludes the initial description of the field of free-space optical communications as slanted toward the amateur radio experimenter. I sincerely hope it has sparked the imagination of at least a few of my readers. Although communicating with light employs frequencies that are magnitudes beyond the RF spectrum that we are used to, the possibilities are enormous. This is a new technology just waiting for innovation. Get out the old soldering iron (and lens cleaners) and show the world that the amateur community and "Yankee Ingenuity" are not dead yet!

73, Irwin, WA2NDM

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RADIO FUNdamentals

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

Fletcher Ice Island: KF3AA and KF3AB

The Arctic has held a fatal fascination for adventurers, freebooters, and con men ever since the early explorations of the Elizabethan mariner, Martin Frobisher. Frobisher, friend of Sir Francis Drake, was the first to seek the fabulous North West Passage to Cathay that may not have existed except in the minds of chairbound dreamers.

Since the 16th century explorers have been attracted to the frozen Arctic. They have searched for the fabulous passage from the Atlantic to the Pacific along the coast of North America, and also for the North Pole. Many of these remarkable men suffered and died in their obsession. Others became instant heroes, while still others turned out to be mountebanks.

Robert Peary, an American explorer, was one of the most bizarre, eccentric, and controversial individuals to stand in history as an Arctic adventurer. His famous feud with Dr. Frederick Cook as to who reached the North Pole first was a hot subject at the turn of the century. One of his "discoveries" was the fabulous Crocker Land located somewhere to the west of Ellesmere Island.

It is possible that Crocker Land was a floating ice island—a huge, flat object that slowly moved about the frozen Arctic Polar Basin. Early explorers such as Peary and Cook apparently thought they were ice-covered islands. They were much larger than ice floes, flatter, and seemed to be permanent features of the Arctic. They were not.

Fig. 1– Operators Jim Hanrahan, W2PGG, and Dick Neher, W6HIK, at KF3AA in April 1953.

"Target One"

On August 14, 1946 during a routine Arctic flight, a plane of the 46th Strategic Photo Reconnaissance Squadron based near Anchorage, Alaska, suddenly noted a huge object on its radar scope—some 200 square miles in size—at 76 degrees north, 160 degrees west. This was about 300 miles north of Point Barrow, Alaska. The discovery created considerable excitement in Washington. The object was classified secret and designated as Target One (T-1).

The discovery at first was thought to be a new, undiscovered island, but subsequent sightings showed the position of the object had changed. Visual observations on clear days revealed that T-1 was a flat, tabular ice island floating free in the Arctic Ocean.

During the next three years T-1 was followed by visual observations or by radar, and by 1949 it was noted that it had moved over 1500 miles from its first reported position.

The potential scientific and military value of the ice island was realized, and finally in May 1950 Lt. Col. Joe Fletcher, commanding officer of the 58th Strategic Weather Reconnaissance Squadron organized an aerial search for other ice islands during the routine weather missions from Alaska to the North Pole. After a few months a second ice island, about 300 miles in area, was discovered; it was named T-2. Finally in July 1950, radar photographs revealed the existence of a third ice island located near 75 degrees north and 173 degrees west. It was about 4½ by 9 miles in size. This was designated T-3.

48 Campbell Lane, Menlo Park, CA 94025

Ice Island T-3

The surface of T-3 resembled the corrugations of a tin roof. It was rough, but possibly acceptable for landing of a suitably equipped aircraft. It was estimated that T-3 drifted at a rate of 1.3 miles per day in a clockwise motion about the North Pole, following the general trend of the currents in this part of the Polar Basin.

The Royal Canadian Air Force, as a result of the interest in the islands, made a search of their photo archives of the Arctic and found records of over 20 ice islands varying in size from a quarter mile square to 7 or 8 miles across.

In early Arctic literature reference is made to "ice islands." However, many of these discoveries were merely floes, the distinction between the two forms of ice not being very clear to the layman. Size, thickness, composition, and point of origin had a lot to do with it. In any event, the so-called islands seem to have originated as broken-off sections of the large glacier on the northwest coast of Ellesmere Island.

Island T-3 was a 40.5-square-mile platform originating from the Ward Hunt Ice Shelf at Disraeli Fiord, Ellesmere Island. It was a military and scientific asset for 25 years before work was terminated in the mid-70s.

Project Icicle

General "Hap" Arnold stated in 1946 that "the first line of the nation's defense lies now to the north, between America and that attack which will surely come from over the Pole." The Alaska Air Command was charged with the responsibility for a vital part in the defense of the arctic approach to North America, extending its range of operation into the heart of the Polar Basin. The ice islands (T-1, T-2, and T-3) fell within this scope.

Experiments were conducted with ski-equipped C-47s to see if they could land on the polar pack ice. These operations confirmed that aircraft could land on the floating islands. Ice island T-3 was selected as a suitable base of operations, to be entirely supported by a continuing air lift from Alaska.

On March 19, 1952 a small contingent of USAF personnel in a ski-equipped C-47 successfully landed on T-3, close to the North Pole, under the leadership of Col. Joe Fletcher. The installation was known as "Fletcher's Ice Island," and by 1954 it had grown into a secure and well-equipped base manned by scientists and USAF personnel.

Ice Island on The Air!

The original landing party was equipped only with military-type URC-4 VHF transceivers (121.5 and 243 MHz), sufficient only to talk to the supply and observation planes that visited T-3. The weather was so cold (–40 degrees F plus wind-chill factor) that the transceiver batteries froze after a few minutes of operation. As a result, two transceivers were commonly used, alternately removed one at a time, and then returned to the operator's fur-lined parka. For emergencies a hand-cranked "Gibson Girl" radio that transmitted on 500 and 8280 kHz was available.

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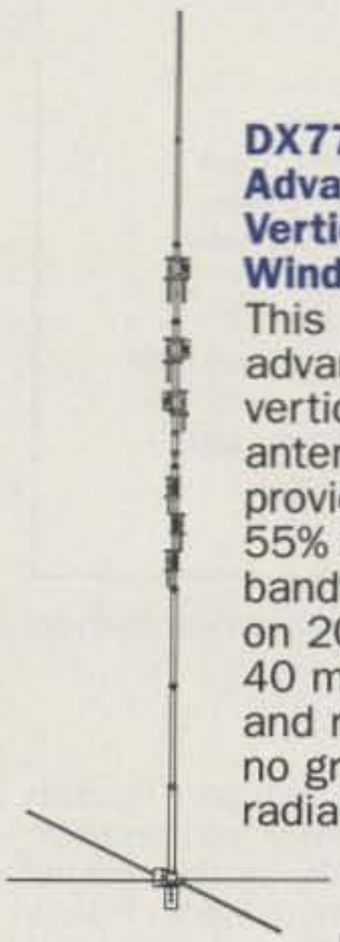

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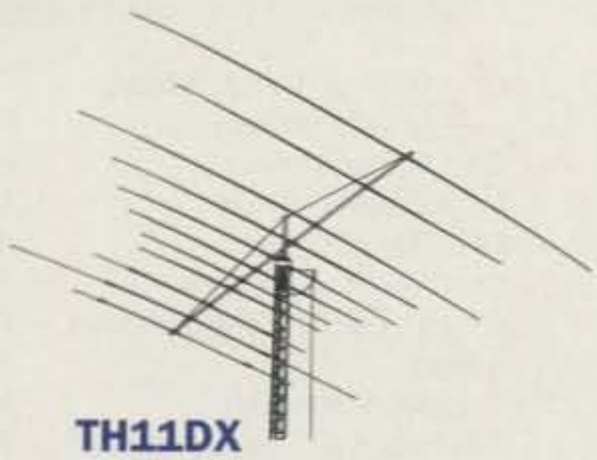

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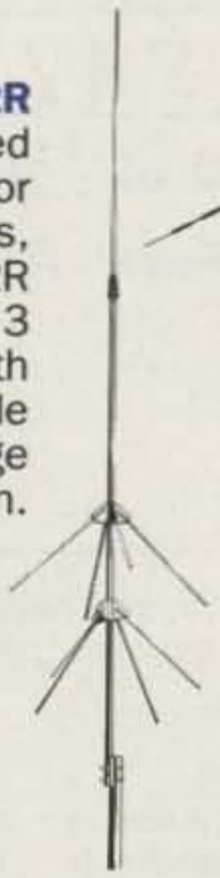

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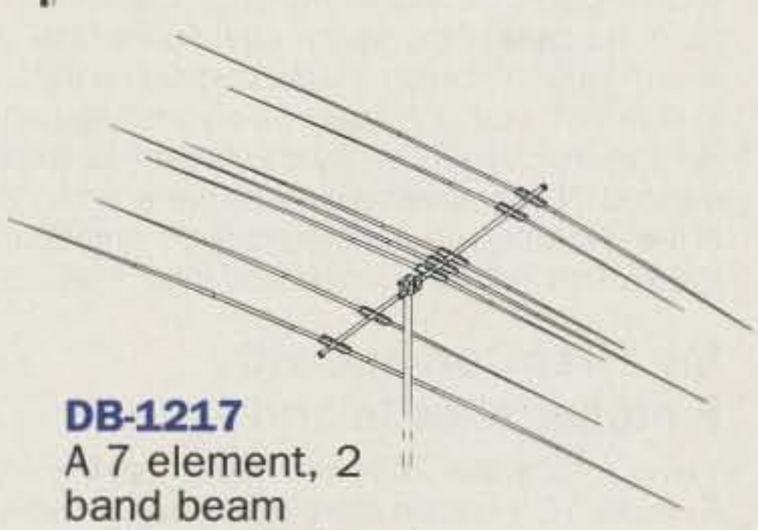

DB-1217
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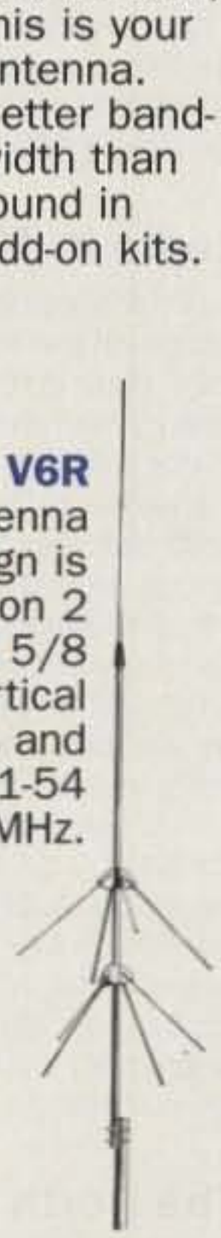

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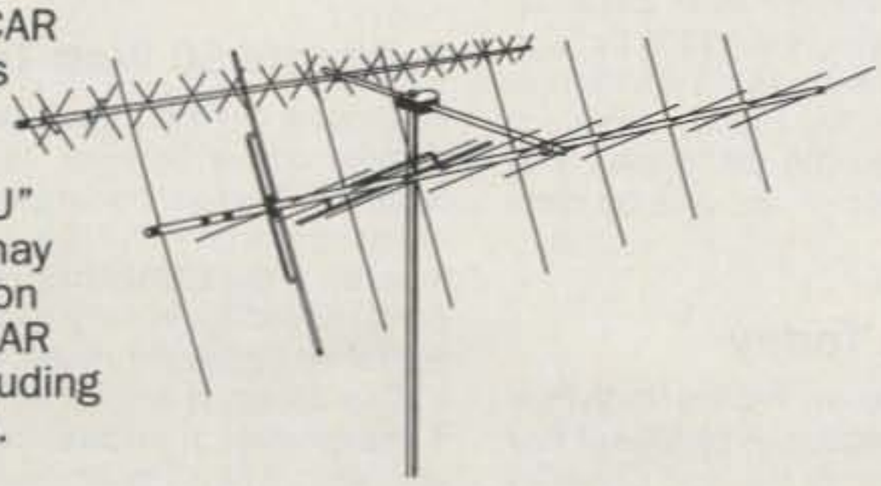

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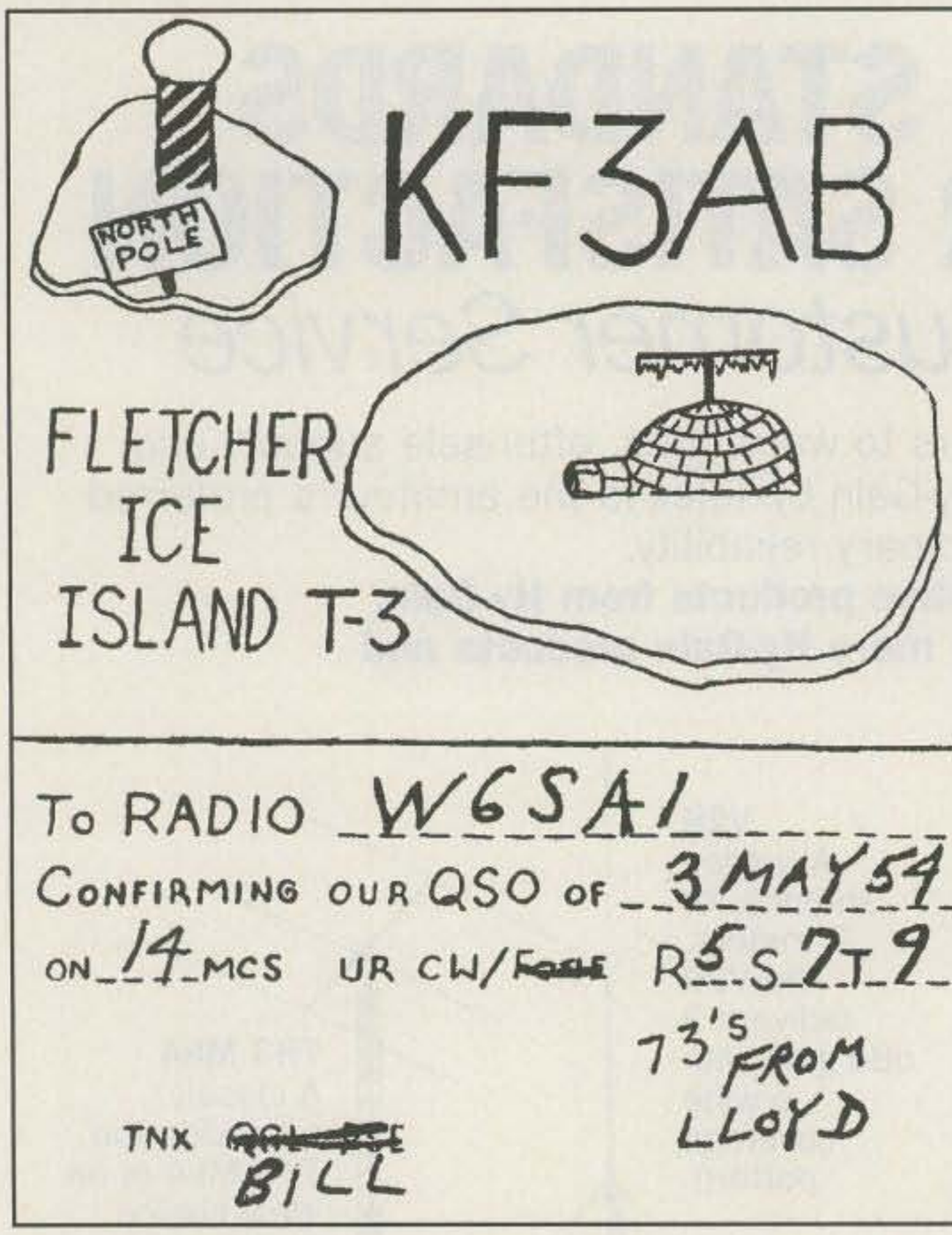

Fig. 2– Operator "Lloyd" at KF3AB in 1954. The original QSL is a photo of a poster nailed to a plywood panel!

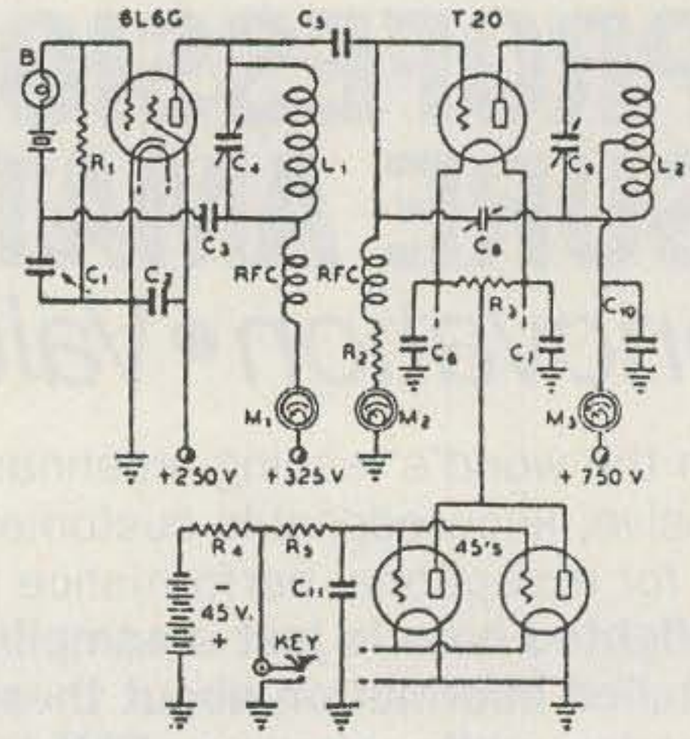

FIGURE 3. WIRING DIAGRAM OF THE SIMPLE 50 WATT TRANSMITTER

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C^3—.002 µFd mica
C^4—50 µµFd midget
C^5—.001 µFd mica
C^6, C^7—.01 µFd tubular
C^8—8 µµFd double-spaced midget (2000 V spacing)
C^9—50µµFd double-spaced midget (2000 V spacing)
C^{10}—.004 µFd mica, 1000 V
C^{11}—.001 µFd mica
R^1—100,000 ohms, 1 watt
R^2—5000 ohms, 10 watts
R^3—75 ohms c.t., 10 watts
R^4—5 meg., 1 watt
R^5—10 meg., 1 watt
RFC—Midget 2.5 mH, RF chokes
B—6.3 V, 150 mA dial lamp
L^1, L^2—See coil table
M^1, M^2, M^3—See text

Fig. 3– Circuit of 1938-style 50 watt transmitter with vacuum-tube keyer.

Eventually the camp grew in size, a runway was prepared, and C-54 transport planes supplied the base. Among the equipment landed was a communication shelter containing a BC-610 (a 500 watt HF transmitter) and several HF communication receivers. Antennas were erected. The temptation was too great, and one of the operators, an amateur no doubt, tuned up the BC-610 in the 20 meter band (figs. 1 and 2).

My First Contact with Fletcher's Ice Island

I was tuning the 20 meter band looking for European DX on the morning of May 3, 1954. According to my log, conditions were mediocre. I was just about to pull the switch when I heard a very loud CW signal calling CQ and signing KF3AB. (KF3AA and KF3AB were apparently calls assigned to T-3 by USAF MARS.) Where was he? There was no legal "KF" amateur prefix as far as I knew. I swung my beam about and found he came in directly from the north.

When he signed, I called him, but he came back to a Canadian. After a short contact and a QRZ? he came back to me. His name was Lloyd and his QTH was near the North Pole on a floating ice island! Absurd! No doubt a bootlegger on the other side of town!

KF3AB was authentic, though. The station was on the air for a few months and then eventually disappeared. Fletcher's Ice Island (which was the motif for the movie *Ice Station Zebra*) drew public attention, with articles about it in *Life* magazine. However, interest was short and the ice island gradually faded from public view. Was it dismantled? The age of satellites was dawning, and more information could be obtained from an observation satellite circling the globe than from an obscure observation post in the dangerous and frigid Arctic basin. All that was left, in my mind, was a QSL from Fletcher's Ice Island, giving me an S7 report on a long-ago day in 1954.

Radio in The Arctic

Fletcher's Ice Island was not the first polar radio station on the air. The Soviets were leaders in polar exploration since before the turn of the century. An early polar radio was UPOL, a Soviet base on a large floe. It gained notoriety in amateur radio circles through the exploits of radio operator Ernst Krenkel, who was on the rescue ship *Cheluskin* (RAEM), which saved the polar explorers from an icy death as the floe disintegrated beneath them. Krenkel received RAEM as his personal amateur radio call after the war and was very active on the bands for many years.

Extensive polar activity by the Soviets was apparent from the number of polar bases on the amateur bands during the 1950s through the '80s. A few Canadians using the VE8 prefix were also on the air, but military interest in ice islands lagged and the arctic area was extensively explored for oil deposits by commercial interests.

The North Pole Today

It is ironic, no doubt, to know that the North Pole is now a hot tourist attraction. A handful of tour operators organize trips to the North Pole by dog team, ski, or aircraft. In addition, a Russian icebreaker sails from Murmansk, complete with sauna and American chefs, visiting various polar islands before stopping at the North Pole to celebrate with champagne and a barbecue on the ice. Several intrepid explorers have successfully trekked to the North Pole, using amateur radio to maintain contact with their base.

So occasionally turn your beam northward and scan the bands, particularly 20 meters. You might be suprised at what you hear. The love affair with the North Pole and the North West Passage is not over.

(For more information on ice islands and T-3 in particular, I refer you to the book *North,* by Dr. Kaare Rodal of the Norwegian Polar Institute, Harper Brothers, publishers (1953). It is now out of print, but possibly is available at used book stores. Another valuable Polar reference is *The Arctic Grail,* by Pierre Berton, Penguin Books (1988). *Across the Top of the World,* by David Fisher, Random House (1992), describes the North Pole trip on a Soviet nuclear ice breaker.

A Simple 50 Watt Transmitter

In a recent column I described a two-tube superheterodyne receiver for the newcomer (circa 1937). Here's a simple two-tube, 50 watt transmitter to go with it (fig. 3). This design was featured in the 1938 edition of the *Radio Handbook*, edited by Woody Smith, W6BCX, and published by the old *Radio* magazine.

This design is unique for that period in that it incorporates a vacuum-tube keyer for CW operation. A 6L6G beam power tube is used as

6L6G—T-20 C.W. SET COIL DATA		
Coil Band	6L6G Coil	T-20 Coil
20	7 1/2 turns	12 turns
	#20 d.c.c.	1 1/2" diam.
	1 1/2" diam.	1 3/4" long
	1 1/4" long	c.t.
40	15 1/2 turns	24 turns
	#20 d.c.c.	1 5/8" diam.
	1 1/2" diam.	1 3/4" long
	1 1/2" long	c.t.
80	30 turns	38 turns
	#20 d.c.c.	1 5/8" diam.
	1 1/2" long	1 3/4" long
	1 1/2" long	c.t.

Fig. 4– Coil data for 80, 40, and 20 meters.

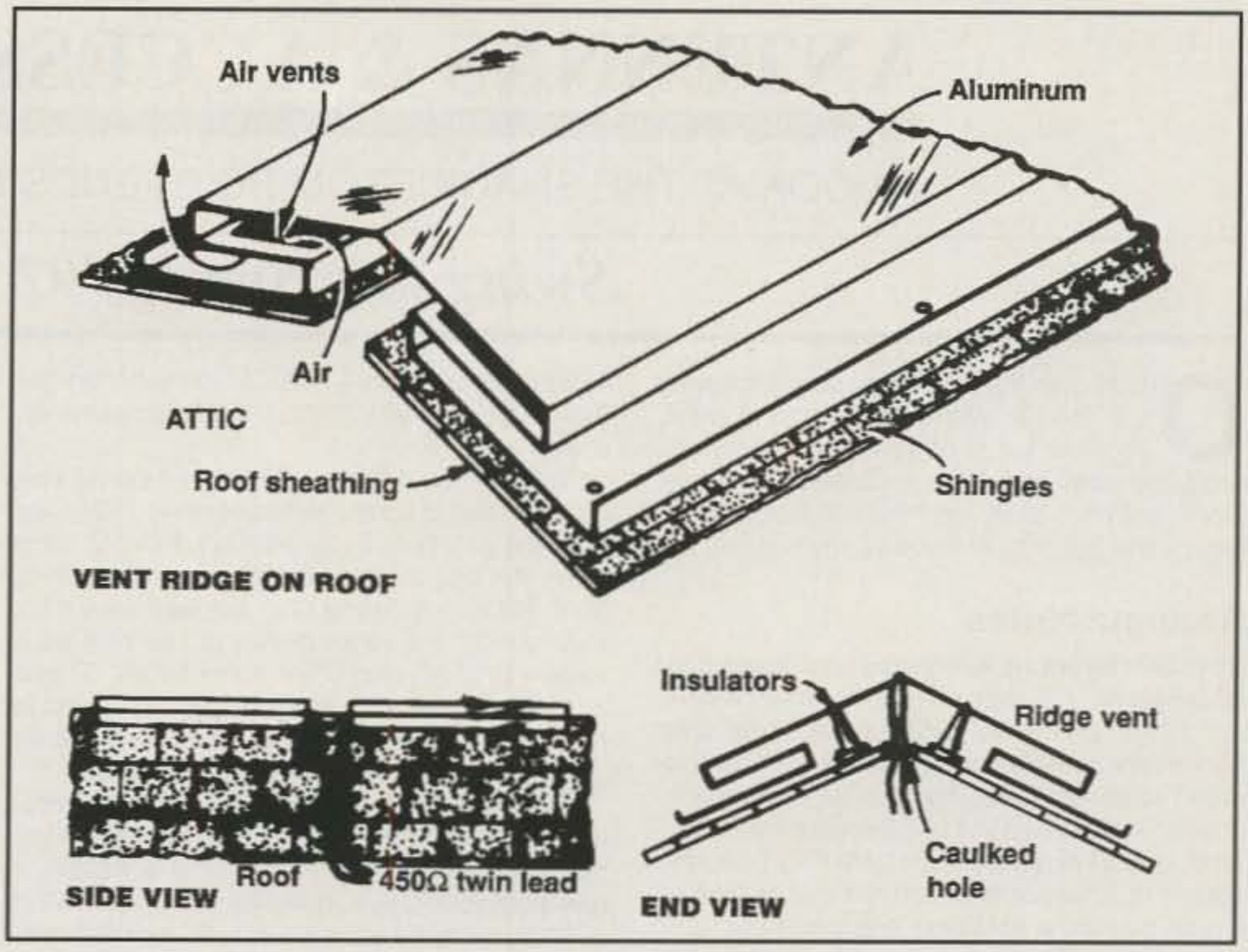


Fig. 5– Vent-ridge antenna vent is raised and mounted on insulators.

a regenerative crystal oscillator which provides up to 10 watts power on the crystal fundamental frequency as well as the second harmonic. Thus, two-band operation is possible with one crystal for the 80 and 40 meter bands. For 20 meter operation the T-20 triode amplifier is operated as a doubler.

Two type 45 tubes in parallel serve as the keyer. They are biased to cutoff with a 45 volt battery. The bias is removed from the 45s by the operator's key, the tubes conduct, and the transmitter is on the air.

Plug-in coils are used in both stages, with winding data given in the chart (fig. 4). The T-20 stage is designed to be link-coupled to the antenna, or antenna tuner.

Three meters are used, one each for oscillator and amplifier plate current and amplifier grid current. Plate current of the oscillator is about 50 mA, amplifier grid current is about 20 mA, and the plate current of the T-20 about 75 mA. One 0–100 mA meter may be used by incorporating closed-circuit jacks where meters are shown in the illustration.

Neutralization of the T-20 and tune-up procedures are covered in most old handbooks; an Old Timer could tune up this rig by memory. Power input is about 50 watts, allowing for the voltage drop across the keyer tubes.

Danger! High Voltage!

Warning! Newcomers not used to working with high voltage are warned that **lethal voltages are used in this circuit.** Old Timers remember the advice of using only one hand to adjust the transmitter, keeping the other hand in a pocket so that they won't get a hand-to-hand jolt, which could pass directly through the heart. Amazingly, in the 1930s amateurs routinely used high-voltage equipment, yet the cases of electrocution were few and far between.

I remember getting "bit" by a 250 volt supply, hand-to-hand, as I foolishly picked it up when it was running. It was on a metal chassis and I inadvertently touched the high-voltage filter capacitor terminal with one hand! Crash! I felt as if a mule had kicked me in the chest! I dropped the supply and fell to the floor. The room spun about me and I passed out for a few seconds. When I recovered, both arms were sore, my heart was beating wildly, and my chest was aching. The power supply was in ruins. It was an expensive and dangerous lesson!

6L6Gs and 45s are not hard to find at swapmeets or tube dealers. The T-20, however, is rare. Luckily, it is merely a version of the tried-and-true 210. A suitable replacement is the military surplus VT-25. Or, if you can liberate a 210, it will do the job, as will an 801A or HY-25. Your choice.

On the Air With a 1937 Transmitter?

A word of caution; This transmitter has no TVI prevention circuits. The T-20 stage (especially on 20 meters) is a prolific source of harmonics. I'd say a breadboard version of this old and popular circuit is made to be seen, not heard. If you put it on the air, you probably will be dismayed at what it does to television reception! It is a nostalgic rig, and I admit it would be fun to make a QSO with it! Tempt me not.

The W4EHU Invisible Antenna

Don, W4EHU, designed an invisible antenna utilizing the ridge vent that is used on many homes in the south. The ridge vent is made of sheet metal and runs the length of the roof. It is designed to allow warm attic air to vent to the outside without letting rain into the house.

The vent is cut in half to form a center-fed antenna. Exact length is not important, as the station tuning unit (ATU) will resonate the antenna to the operating frequency. A 450 ohm ladder-line feeder is connected to the sections and is brought down into the home via the air vent (fig. 5).

As with any center-fed random-length antenna, some cut-and-try may be necessary to get things operating properly. A SWR meter is a must. The 450 ohm line is converted to a coax termination by means of a 4-to-1 balun located at the shack. Adjust line length and ATU for lowest SWR at the transceiver and you are all set to radiate! (Line-length adjustment is helpful, as changing length alters the feedpoint impedance of the system, and many ATUs—especially those with ferrite-core baluns—are sensitive to feedpoint impedance.) Good luck!

73, Bill, W6SAI

BY KARL T. THURBER, JR., W8FX

ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Swing into Spring '97

Once again the refreshing scent of spring is in the air. With that thought in mind, we'll first focus on some new antennas and accessories products while saving room for more "software stuff" and the like before closing out the column. Are you ready?

Antenna Notes

Directive Systems Antennas and Down East Microwave. You may recall that in the November 1996 column we highlighted Down East Microwave, noting that the company had relocated to Frenchtown, New Jersey. They continue to sell a broad line of RF products for VHF, UHF, and SHF amateurs, where they now specialize in amateur and commercial antennas, linear power amplifiers, preamplifiers, and transverters. The firm also distributes products made by others and stocks a variety of microwave components.

A few months ago we received a Directive Systems catalog from proprietor Dave Olean, K1WHS, which fully describes his antenna products under the Directive Systems name. The small southwestern Maine company specializes in VHF, UHF, and microwave antennas. In fact, Dave notes, when Down East Microwave moved to New Jersey in 1995, Directive Systems took over the manufacture of antennas and antenna accessories; all amps, preamps, and transverters are available from the Frenchtown, New Jersey address.

Dave offers a free, eight-page catalog and price list. It's available from Directive Systems, RR #1, Box 282, Dixon Rd., Lebanon, ME 04027 (207-658-7758). (You also can get a Down East Microwave catalog by contacting Down East Microwave, Inc., 954 Rt. 519, Frenchtown, NJ 08825 [908-996-3584].)

Palomar Engineers Mobile Antenna. Jack Althouse, K6NY, Palomar Engineers proprietor, sent me information regarding a new mobile antenna he imports. To my knowledge, it's the first amateur radio mobile antenna that he has offered.

The AN-7 mobile antenna is for the 75, 40, 20, 15, 10, 6, and 2 meter bands. The new, slimline antenna was developed by Antronic, a major South African manufacturer of commercial and amateur antennas. It's been in use in the rugged bush country for years and now is available in the U.S. for the first time.

The antenna's fiberglass base section is 4 feet long, and it sports a spring-protected, 3 foot whip on top. You change bands by selecting taps on the helical base coil, which is wound on the 1 inch diameter fiberglass rod and covered with three coats of dark green polyurethane. The tap covers are chrome plated. According to Jack, the antenna weighs only 2 pounds, and it presents a very small wind-loading area.

For more information on the AN-7 and a catalog, contact Palomar Engineers, P.O. Box 462222, Escondido, CA 92046 (telephone 619-747-3343; Internet <75353.2175@compuserve.com>).

News from Antenna Mart. In several columns, most recently in September 1995, we featured products from Bill Wall, KC4UZ, who owns the Loganville, Georgia based Antenna Mart. Bill and Antenna Mart are well-known for their quads and other antennas, as well as a variety of quad and other accessories. These include spreaders, booms, hubs, gamma matches, RF switches, gin poles, and other products to whet the interest of builders.

In a recent note Bill enclosed his new catalog, which unlike the typical, dryly written antenna catalog is quite conversational in nature. It gives details of his acquisition of Antenna Mart in 1989, current and newly introduced products, and plans for additional products for the future. His interesting catalog also includes a smattering of antenna (and especially quad) history and theory, suggested designs, and a variety of performance factors.

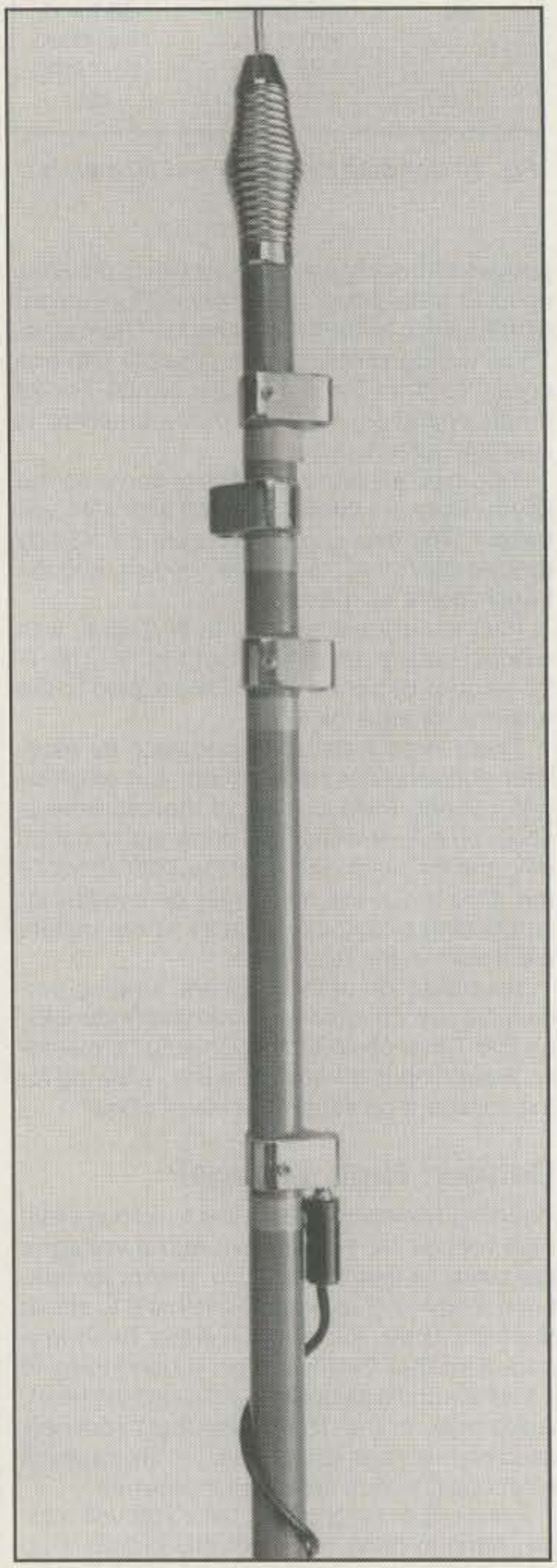
Some new Antenna Mart products include several lines of 2 and 6 meter, as well as 440 MHz, quads; four-square 40 and 80 meter phased vertical arrays; linear loaded, shortened 40 and 80 meter quads; a tower-leg insulation kit for vertical phased arrays; a new drive for his remote RF switches; and more. Bill says future plans include a new station switch, an antenna tuner, and a very heavy-duty rotator for large arrays.

Bill's catalog and fact sheets run to about 20 pages; he asks $2 U.S. ($4 foreign) for them, but he offers a $5 refund on your first order. Contact Antenna Mart, P.O. Box 699, Loganville, GA 30249 (770-466-4353).

Texas BugCatcher/GLA Systems Update. In the August 1992 and October 1993 columns we described the Texas BugCatchers. These are husky HF multi-band mobile antennas by Henry Allen, WB5TYD, and he offers through his firm, GLA Systems. They're center loaded, and you can custom configure them mechanically and electrically over the range 3–30 MHz; several loading coils covering 10 through 160 meters are available. The BugCatchers are offered with a variety of masts, whips, matching coils, mounts, quick disconnects, coil clips, whip adapters, corona balls, and other customizing components.

Later, in April 1995, we discussed the Texas Twister, a motor-driven HF mobile antenna you can tune remotely over 3.5 to 28 MHz using a 60 inch whip, making the full length of the antenna about 9 feet. Patterned after Don Johnson, W6AAQ's classic DK3 mobile antenna, the Texas Twister is built around a 1.8 inch diameter coil, fitted to the inside diameter of a 2 inch aluminum tube which is driven in and out of the tube by an electric motor.

In a recent 15-page GLA Systems catalog I see that Henry has dubbed his enterprise "The Antenna Farm." He includes a generous selection of other manufacturers' antennas and



The slimline Palomar Engineers AN-7 mobile antenna is for the 75, 40, 20, 15, 10, 6, and 2 meter bands. The antenna was developed by Antronic in South Africa. The antenna's fiberglass base section is 4 feet long with a spring-protected 3 foot whip on top. You change bands by selecting taps on the helical base coil, which is wound on the 1 inch diameter fiberglass rod and covered with three coats of dark-green polyurethane. The antenna weighs only two pounds and presents a very small wind-loading area. (Photo courtesy Palomar Engineers)

289 Poplar Drive, Millbrook, AL 36054

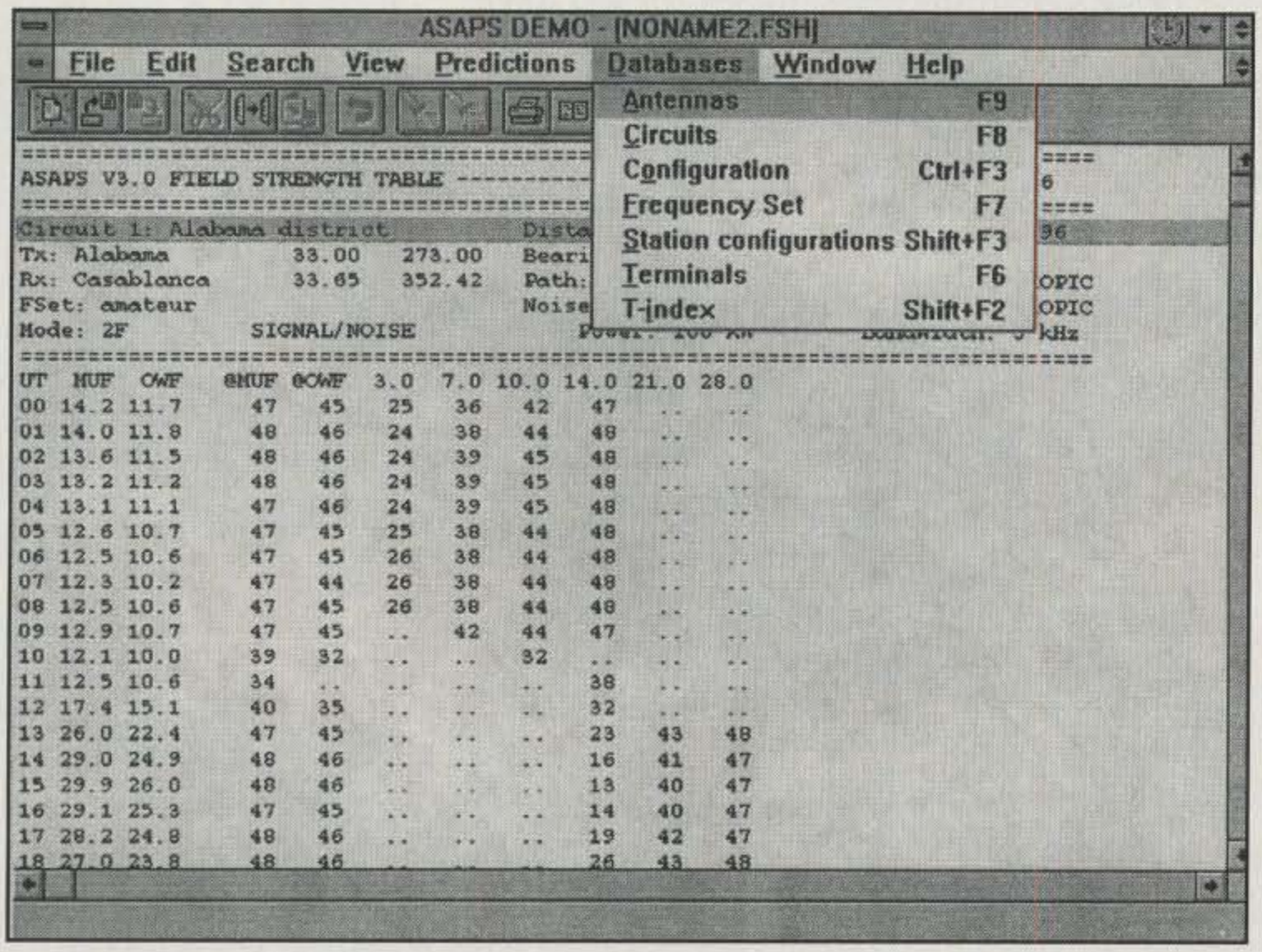


Fig 1– Now ASAPS is available in a graphically oriented Windows version, Advanced Stand Alone Prediction System for Windows™. Building on the features of its DOS-based sibling, the program allows for predictions over any HF circuit in the world. It includes management databases for antenna types, circuits, frequency sets, station configurations, terminals, and T-indices. (See the text of this month's column for program details.)

antenna accessories, including products from Comet, Transel Technologies, NCG Company, and Vectronics™.

Products offered include a variety of single- and multi-band base-station, repeater, mobile, and portable HF, VHF, and UHF antennas; scanner antennas; antenna mounts; duplexers; SWR/power meters; speaker mics and mini-speakers; coaxial cable and coax connectors; and other accessories. Four pages of loading coils and other accessories for the Texas BugCatcher and Texas Twister are included in the catalog.

For a free antenna catalog, contact GLA Systems, P.O. Box 425, Caddo Mills, TX 75135 (1-800-LUV-BUG-1 [1-800-588-2841]).

Software Stuff

ASAPS for Windows. Computer-based propagation prediction programs, with their reliance on proven algorithms and access to near-real time propagation data, have much to offer the aggressive contester and DXer. There are several good propagation programs you can use to supplement the predictions that appear in the propagation charts in George Jacobs, W3ASK's *CQ*'s "Propagation" column. For our part, in past columns we have noted several commercial programs, including MINIPROP Plus™, IONSOUND PRO™, CAPMAN, ASAPS, SKYCOM, and others.

In April 1994 we described the DOS-based ASAPS, the well-regarded, top-end Australian propagation forecasting software. ASAPS (Advanced Stand Alone Prediction System) is a government-sponsored program produced by IPS Radio and Space Services of the Australian Department of Administrative Services. Jacques d'Avignon, VE3VIA, is the North American distributor.

To recall, the DOS-based ASAPS we described allows the sophisticated prediction of HF communications conditions, being based on an ionospheric model developed by the Australian IPS and the CCIR (the International Radio Consultative Committee). It allows you to enter a number of prediction input details for optimum accuracy. You can name communications circuits, make long- and short-path predictions, and use custom frequency sets, to name but a few capabilities.

Now ASAPS is available in a graphically oriented Windows version, Advanced Stand Alone Prediction System for Windows™. Building on its DOS-based sibling, the program (fig. 1) allows predictions for any HF circuit. It includes management databases for antenna types, circuits, frequency sets, station configurations, terminals, and "T-indices"; a variety of reports, including special GRAFEX tabular and graphical predictions, as well as field-strength predictions; your choice of solar/ionospheric indices (including sunspot number, 10.7 cm flux, and the sophisticated IPS-calculated ionospheric T-indices); a comprehensive online user guide, and more.

The special T-indices are updated monthly through the IPS monthly *Solar and Geophysical Summary;* if you purchase ASAPS, you get a one-year subscription to the summary. Besides providing the T-index, it also summarizes solar, ionospheric, and geophysical activity over the past month.

The price of ASAPS for Windows ($275 U.S. plus $10 s/h to North America) reflects the program's sophistication and its primarily professional market, so it may be a bit pricey for casual amateur use. But if you like working with top-of-the-line professional software that you can customize your way, the program may be right for you.

Ultra Compact Dual Band Handheld **FT-50RD**

One tough little dual bander!

Features

- Frequency Coverage
  Wide Band Receive
  RX: 76-200 MHz, 300-540 MHz, 590-999 MHz*
  TX: 144-148 MHz, 430-450 MHz
- AM Aircraft Receive
- MIL-STD 810 Rating
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- Direct FM
- High Audio Output
- ADMS-1C Windows™ PC Programmable
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  Receive Battery Saver (RBS)
  Selectable Power Output (SPO)
  Transmit Battery Saver (TBS)
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"Easy to operate, small, great price!"

"Yaesu did it again!"

US MILITARY APPROVED MIL-SPEC 810

The foremost in top-performing, durable, dual band handhelds now includes the FTT-12 DTMF keypad with CTCSS enc/dec, DCS enc/dec, DVRS and paging/coded squelch. Manufactured to rigid commercial grade standards, the FT-50RD is the only amateur dual band HT to achieve a MIL-STD 810 rating. Already a winner; the deluxe keypad makes this stand-out HT even better! Water-resistant construction uses weather-proof gaskets to seal major internal components against the corrosive action of dust and moisture. And, the rugged FT-50RD withstands shock and vibration, so throw it in with your gear!

Exclusive features set the FT-50RD apart, too. Wide Band Receive includes 76-200 MHz (VHF), 300-540 (UHF), and 590-999 MHz*. Dual Watch checks sub-band activity while receiving on another frequency, then when a signal is detected, shifts operation to that frequency. Digital Battery Voltage displays current operating battery voltage. Digital Coded Squelch (DCS) silently monitors busy channels. Auto Range Transpond System™ (ARTS™) uses DCS to allow two radios to track one another. And, the FT-50RD is ADMS-1C Windows™ PC programming compatible, too. To round out the FT-50RD, it has four battery savers, and super loud audio—remarkable in an HT this size.

A reliable companion where ever you go, the FT-50RD is one tough little dual bander with all the features you want!

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Ultra Compact Handhelds
VHF or UHF. Similar to FT-50RD including MIL-STD 810, and other exclusive features.

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FT-1000MP
Revolutionary All-Mode HF Transceiver with EDSP™

•Enhanced Digital Signal Processing (EDSP™) Noise Reducer, RX/TX waveform Contour shaping control, Digital Notch plus IF Notch, Digital CW Narrow Filters, Microphone Equalization • Shuttle Jog™ Tuning Enhancement • Directional Tuning Scale for CW/Digital Modes and Clarifier Offset Display • Selectable Antenna Jacks • Programmable Tuning Steps • 100W PO • Dual In-band Receive with Separate S-meters • Built-in Collins® SSB Mechanical Filter • CW Electronic Keyer with two Key jacks • CW Spot • Automatic Antenna Tuner • 100-117, 200-234V AC and 13.5V DC power inputs • DC version available • 99 Memories.

FT-1000/D
Elite-Class All-Mode HF Transceiver

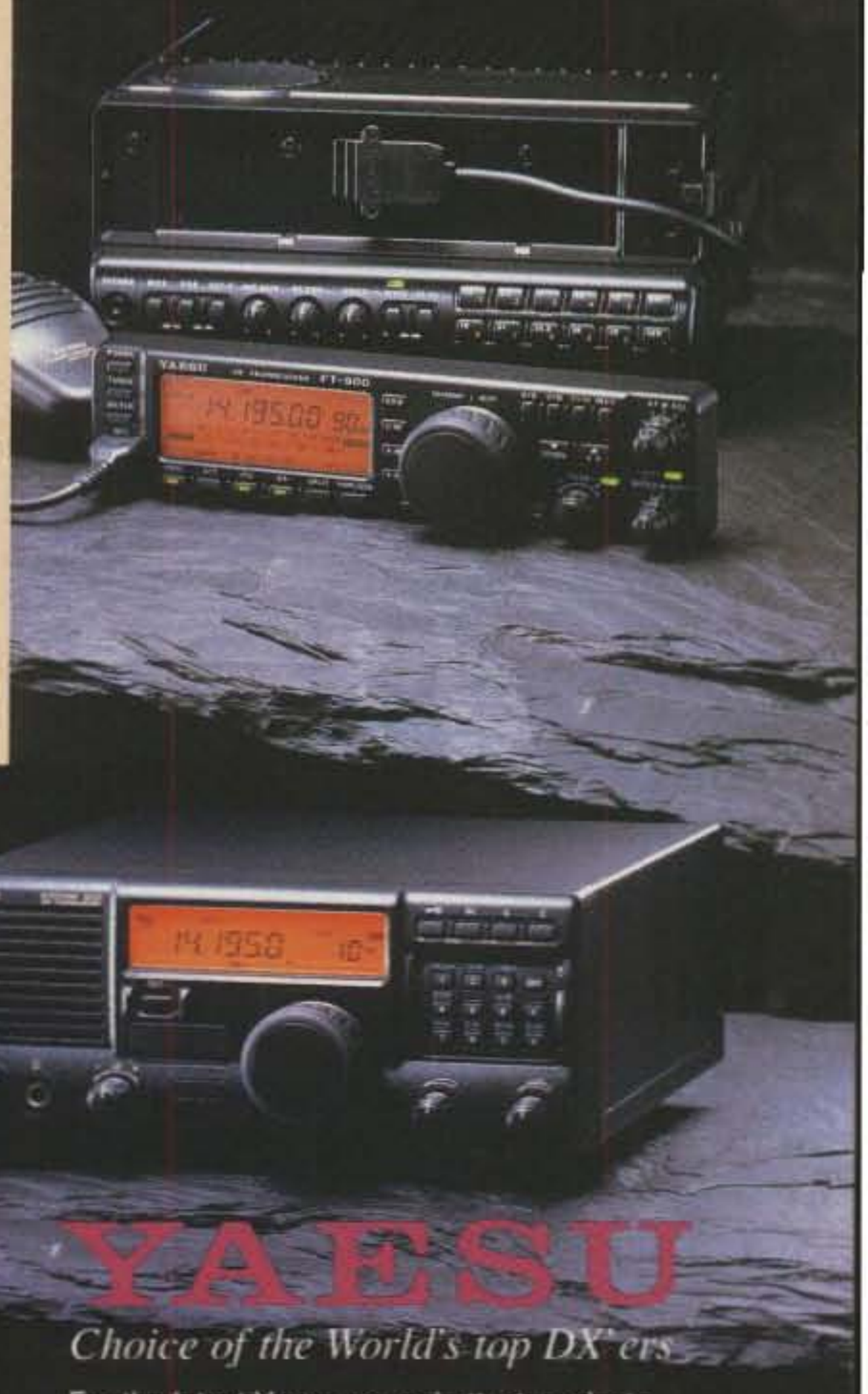
• 200W PO • Dual Receive • 108 dB dynamic range • Cascaded IF Filters • Direct Digital Synthesis (DDS) • IF Width/Shift/Notch • CW Spot • CW Audio Peaking Filter • CW Electronic Keyer with two Key jacks • IF Noise Blanker • Automatic Antenna Tuner • RF Speech Processor • Front panel RX Antenna selector switch • Two large fly-wheel-weighted tuning knobs • 99 Memories.

FT-990
High Performance All-Mode HF Transceiver

• Outstanding Cost-Performance • Dual VFOs with Direct Digital Synthesis (DDS) • Band Stacking VFO System • Dual SCAF Filter • Automatic Antenna Tuner • Front Panel RX Antenna Selection • RF Frequency-Shifted Speech Processor • CW Spot/Pitch Control/Electronic Keyer • IF Noise Blanker • IF Shift/Notch • DC Version Available • 90 Memories.

FT-900C/AT
Deluxe Compact HF Transceiver

• Detachable Front Panel Design • 100W PO • Built-in Collins® SSB Mechanical Filter • Automatic Antenna Tuner • IF Shift/Notch • Keypad Frequency Entry • Duct Flow Cooling System • Digital Metering • Adjustable CTCSS Tones • 100 Memories.



FT-840
High Performance Compact HF Transceiver

• High Receiver Dynamic Range • Dual Band Stacking VFOs with Direct Digital Synthesis (DDS) • 100W PO • IF Shift • IF Noise Blanker • Digital Mode Interface • CW-Reverse feature • Adjustable Repeater CTCSS Tones • Optional (External) Automatic Antenna Tuner • 100 Memories.

FT-600
Multi-Purpose HF SSB Transceiver

Frequency Range: RX: 50 kHz - 30 MHz; TX: 160-10M • 100W PO • MIL-STD 810 Rating • Alphanumeric Omni-Glow™ LCD Display • Keypad Frequency Entry • Optional CW (500 Hz) and AM (6 kHz) filters available • Dual Watch • Front-mounted Speaker with High Audio Output • PC Programmable • 100 Memories (in 4 banks of 25).

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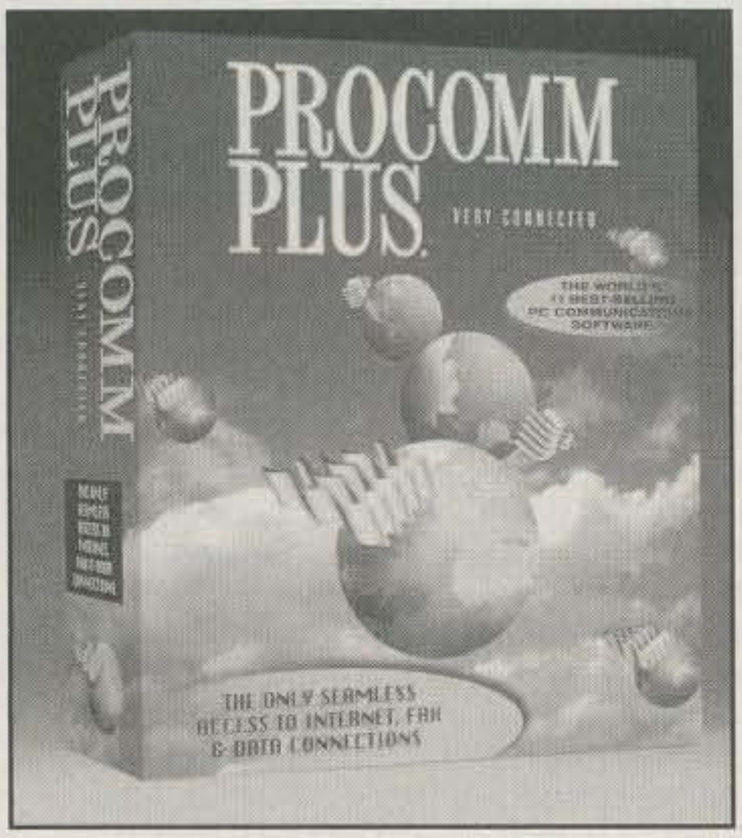


With the introduction of Procomm Plus for Windows 95, the company (now part of Quarterdeck Corporation) claims that it's now the most comprehensive "32-bit communications solution" you can find. The communications software package also includes the new Procomm Remote application, which lets you access applications and files from your PC, at home, in the office, or on the road. (Photo courtesy Quarterdeck Corporation)

For details, contact Jacques d'Avignon, VE3VIA, 965 Lincoln Drive, Kingston, ON Canada K7M 4Z3 (telephone 613-634-1519; Internet <monitor@limestone.kosone.com>). Also check out the "down under" ASAPS web page at <http://www.ips.gov.au/asaps>.

Note: If you're interested in learning more about what's "under the hood," there's an interesting technical discussion of the DOS-based ASAPS and the IPS T-indices, as well as several competitive propagation prediction programs, in chapter six of *The NEW Shortwave Propagation Handbook,* by George Jacobs, W3ASK, Ted Cohen, N4XX, and Bob Rose, K6GKU. It's available from CQ Books for $19.95 plus s/h.

Radio Manager. Don't let anyone try to tell you that all Switzerland produces is money and chocolate. The Swiss-based shoc Radio Manager is a sophisticated, Windows-based database software package to control your supported receiver, transceiver, and modulation decoder. The comprehensive radio control program is for shortwave listeners (SWLs) primarily, although it can be used to control a transceiver or transmitter.

Radio Manager provides radio monitoring, search, station identification, and spectrum analysis. Together with a receiver and decoder, the package is a powerful listening and monitoring tool. Some key features include automatic station identification, scanning, memory management, spectrum and frequency display, and transmitter/receiver/transceiver and decoder control.

The software makes it possible to search the large included database using criteria such as name of station, callsign, modulation type, country, language, type of transmission, time, and other criteria. Stations fulfilling the search criteria are displayed in a window; you can set the receiver and decoder to them with a mouse click. While the software can control the receiver, it normally still is under complete operator control; the controls still are accessible and can be used at any time. The software's databases are continuously updated and include broadcast, utility, and VHF/UHF/satellite listings.

The shoc Radio Manager is offered in three main versions: economic, standard, and professional. For details, pricing, and availability contact shoc, Weiherhof 10, CH-8604 Volketswil, Switzerland (Internet <100526.1752@compuserve.com>; or check out their Web page at <http://ourworld.compuserve.com/homepages/shoc>).

K6STI RF Field Calculation Software. There's a great deal of discussion these days about RF exposure, the effects on humans, and the recent furor over the update of FCC RF safety guidelines applicable to radio amateurs. The new guidelines place a premium on operators learning whether the operation of their station could result in their exposure to excessive RF radiation.

Brian Beezley, K6STI, the author of antenna-modeling programs Antenna Optimizer (AO) and Yagi Optimizer (YO), offers a free version of his AO program that calculates electric and magnetic near fields. The NF 6.5 Near-Field Analyzer is a stripped-down version of the AO 6.5 antenna analysis software, which is intended for evaluation of near fields for RF hazard analysis.

Brian notes that you should use NF near-field calculations only to obtain a general understanding of the way near fields vary with different antenna heights and configurations. Thus, you shouldn't rely on the numerical results for final judgments about personal safety. He assumes no liability; the user assumes all risk in defining antenna structures, correctly modeling them, interpreting results, and rendering RF hazard judgments.

The NF software is available on a *no-support basis,* meaning you shouldn't contact Brian for assistance. You're on your own if you download it from any of several Internet FTP (File Transfer Protocol) sites. I found NF.ZIP, a 245.8K "zipped" file, at several FTP sites, including these five locations:

<ftp.barc.org/pub/hamradio/arrl/bbs/programs>

<ftp.cdrom.com/.16/ham_oak/arrl/bbs/programs>

<ftp.funet.fi/pub/ham/arrl/bbs/programs>

<ftp.hzeeland.nl/pub2/hamradio/funet/arrl/bbs/programs>

<ftp.n6nd.mil/HamRadio>

You'll need one of the popular unzipping programs to make the compressed file usable. After unzipping the zipped file, check out Brian's accompanying READ.ME file for more information.

The full version of AO 6.5 and information on other antenna design and modeling programs is available from Brian Beezley, K6STI, 3532 Linda Vista Dr., San Marcos, CA 92069 (619-599-4962 from 0700-1800 Pacific time; or Internet <k6sti@n2.net>).

Tip: Do you often find it difficult to locate a particular file on the Internet? Now is a good time to point out that I found the FTP sites above by using a little-known but superb "search engine." FTP Search, located in Trondheim, Norway, is a Web-based tool that searches not Web sites (like most other Internet search engines) but *FTP* sites instead. It's great for finding sites that have that public domain or shareware software program you're looking for. You can search in several different ways. You'll find it at <http://ftpsearch.ntnu.no/ftpsearch>.

Procomm Plus for Windows 95. In last September's column I reviewed Procomm Plus for Windows 3.0 from Datastorm Technologies. Procomm has been a favorite of landline communications mavens (and many radio amateurs) since the mid-1980s, when PC communications was in its infancy. Version 3.0 added a complete suite of Internet-access programs. While the whole product has been "spiffed up" in a number of ways, the main enhancements were to the connection (dialing) directory and the program's built-in FAX capabilities, in addition to the new Internet tools.

With the new Procomm Plus for Windows 95, the company (now part of Quarterdeck Corporation) claims that it's the most comprehensive "32-bit communications solution" you can find. Fax, file transfers, terminal emulation, Internet tools, and a new remote-control application are accessible and launchable from within a single interface. The 32-bit, Windows 95 compatible architecture lets you take advantage of advanced techniques such as "long file names," multi-threading, and the ActiveX technology.

The new Procomm Remote, a part of the Procomm Plus package, instantly lets you access applications and files from your PC at home, in the office, or on the road. In addition, Quarterdeck has included the Microsoft Internet Explorer browser, replacing the less-powerful Web Zeppelin browser found in Version 3.0.

The new package includes an improved fax manager and viewer; data communications with 36 terminal emulations and 11 file transfer protocols; a new mail editor; a built-in graphics viewer; a QWK mail viewer and RIPscrip terminal emulation for enhanced communications with BBSs; and the ASPECT scripting language for automating routine tasks.

Procomm Plus for Windows 95 is $179, although it's available widely "on the street" for much less. For more information, contact Quarterdeck Corporation, P.O. Box 1471, Columbia, MO 65205 (phone 1-800-315-3282; Internet <www.quarterdeck.com>).

From The Bookshelf

Pemberton Press Books and Online User Magazine. Having been bitten by the "online bug" about a decade ago, and bitten again last year by the "Internet bug," I was happy to find a treasure trove of information in the many books and several magazines published by Online, Inc. The firm specializes in all aspects of productive online experiences, particularly searching for information—always a problem for most users, myself included.

I'm especially impressed with one of their magazines, *Online User,* which is subtitled "a practical magazine for knowledge workers." In each bimonthly issue I find numerous online tips and techniques that prove invaluable—so much so that shortly after receiving the magazine I'm seated at my PC checking out the latest online dope in the issue. Subs are $24 per year; some industry professionals may qualify for a free subscription.

Pemberton Press, which is Online, Inc.'s book imprint, publishes an interesting catalog of their magazines, books, and conference and expo activities. Some examples of the titles in their catalog include *The Online Deskbook,* by Mary Ellen Bates, an essential desk reference for online and Internet searchers; *Secrets of*

Faxes, file transfers, terminal emulation, Internet tools, and a new remote-control application are all accessible and launchable from within a single interface in Procomm Plus for Windows 95. The 32-bit, Windows 95 compatible architecture lets you take advantage of advanced techniques, "long file names," multi-threading, and the ActiveX technology. The industry-standard Internet Explorer Web browser now is included in the package to help you browse the Net. (Photo courtesy Quarterdeck Corporation)

the Super Searchers and *Secrets of the Super Net Searchers*, by Reva Basch; *The Online 100*, by Mick O'Leary; and *Finding Images Online*, by Paula Berinstein.

For more info and a catalog, contact Online, Inc./Pemberton Press, 462 Danbury Road, Wilton, CT 06897-2126 (telephone 1-800-248-8466; Internet <http://www.onlineinc.com>).

1997 NRC Publications Center Catalog. Although I've been a licensed radio amateur since 1954, in many respects I'm a shortwave listener (SWL) and BCB (broadcast band) DXer at heart. The National Radio Club (NRC), founded in 1933 and reportedly the largest mediumwave (MW) DX club, is one of the major MW listener organizations. The club publishes *DX News* for members.

Of special interest to me, NRC issues an annual catalog of their products and publications that you'll find invaluable if you're a MW DXer, whether you're a club member or not. From this partial list you can see that MW DXers are real fans of loops and Beverages: *Beverage and Longwire Antennas Design and Theory, Loop Antenna Design and Theory, Antenna Reference Manuals (Volumes 1 and 2), NRC Distance and Bearing Handbook, AM Radio Log, NRC Night Pattern Book, FM Atlas, Getting Started in Medium Wave DX'ing*, and others. Also available are DXer accessories and aids, article reprints, and audiotapes.

For a 1997 catalog, contact the National Radio Club Publications Center, P.O. Box 164, Mannsville, NY 13661-0164. The catalog also is online at <http://alpha.wcoil.com:80/~gnbc>.

Letters

Once more we're almost out of space. Before wrapping it up this month, we'd like to acknowledge a few of the folks who have written, faxed, e-mailed, phoned, or otherwise corresponded with your columnist recently. A tip of the hat goes to Barry Travis, N4FNZ; Park Kyu-ho, HL2DUS; Keith Baker, KB1SF; Dwayne Kincaid, WD8OYG; Bill Wall, KC4UZ; and John Hedtke, KD7WS. Thanks, gang.

Short Bursts

Understanding Data Loss. If you're dependent on your home or hamshack PC, do you live in fear of the day when its hard disk crashes (as it almost certainly will some day)? I know I do. Thus, I read with interest of a comprehensive report on computer data loss that was compiled by Ontrack Data Recovery, a portion of which we're summarizing and reprinting with permission of Ontrack's Janet Hance.

As Ontrack's report notes, data loss is one of computing's most misunderstood concepts. When it occurs, you're suddenly unable to access a file (or many files) and are suspended in a state of confusion and panic. You wonder: Where did my data go, and how do I get it back? What caused the data loss? What could I have done to prevent it? (Does this scenario sound familiar?)

This confusion isn't surprising, and it happens to the best of us. Very little information has been made public about data loss, and the information that does exist is inconsistent. Ontrack believes that due to the mixed messages they receive, users find it difficult to properly evaluate their data loss situations and make educated decisions to recover from them.

Ontrack points out that confusion especially arises because the industry often presents "lost data" as data that has been *permanently* destroyed, with no hope for recovery. In reality, Ontrack's findings reveal that about 75 percent of lost data can be retrieved. While data

All Your Favorite Amateur Accessories...

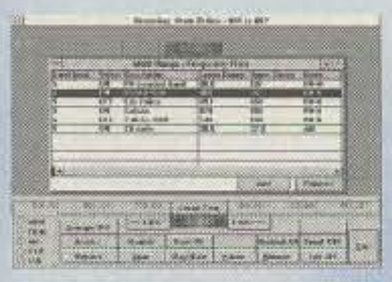
SDU 5000 Spectral Display

Imagine seeing stations 5MHz above and below your receiving frequency. Usually the transmissions are short, perhaps 1 or 2 seconds. What are the chances of you being tuned to the exact frequency at the instant of transmission? Very slim. With an SDU you can watch for stations to pop up over a 10MHz window, then zero in. By pushing just one button the Spectral Display Unit adds a new dimension to the signal interception hobby. The SDU 5000 offers features unheard of only a year ago.

- Frequency coverage up to 10MHz
- Resolution: 5 or 30kHz selectable
- Display - 3.1" HQM Simple matrix color LCD
- Screen refresh 2/s
- Input: 10.7MHz
- Composite video out
- Video output NTSC or Pal display, on TV or record on VCR
- Full computer control
- Instant receiver set from cursor via RS232
- User friendly Menu driven system
- SDU5000 is designed to work with the AR5000, AR3000A (modified with 10.7MHz output) ICOM R7000, R7100, 8500, 9000 & any other 10.7MHz out receiver using RS232 link with or without a computer.

Spectrum Analysis on your PC!

With the addition of AOR's SDU-5000, Spectrum Analyzer and this NEW WINDOW's software, any radio that has a 10.7IF output will give you full computer controllable spectrum analysis. Plus, with these radios, you can have complete computerized control of receive frequency, spectrum bandwidth (up to 10.7MHz per sweep), and receive mode: AOR - AR5000, AR3000A (requires mod for IF output ICOM - R7000, R7100, R9000, R8500



Features: *Indicates for above listed radios only

- Variable Bandwidth (up to 10.7MHz) *
- Variable Peak readout
- Automatic scanning of programmable ranges (up to 100 available) *
- Instant readout of frequency of any place on PC's display
- Instant change of center frequency with a simple mouse click. *
- Audio alert of frequency signal Peak
- Recording of incoming spectrum data to disk for later "playback"
- Variable "threshold" direct readout of all peaks on display
- Signal Averaging, PLUS our exclusive "VARI-COLOR" analysis.

Minimum Requirements:

- IBM compatible PC with 4 meg RAM, Windows 3.1 or later version, 4 Meg hard disk space. AOR's SDU-5000 and a radio with 10.7 IF output.

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Daiwa's hi-tech, super efficient designs yield higher output capacity in rugged, compact packages.

MODEL	PS304	PS50TM
VOLTAGE	1-15	9-15
CURRENT (max)	30	5.2
CURRENT (CONT)	24	4.2
SIZE (INCHES)	6.8 x 6 x 9.5	5.3 x 3.4 x 3
WEIGHT (LBS.)	19.6	4.2

Cross Needle Meters

From the originator of the cross needle meter, Daiwa offers models to suit every application, band and power level...

	CN101
Frequency Range (up to)	1.8-150MHz
Power Rating	15/150/1.5kW
CONN.	UHF
MIN SWR	<4W

Coaxial Switches

Professionally engineered cavity construction from the originator of the cavity type coaxial switch.

Frequency Range (up to)	CS201
Power Rating	600MHz/1Ghz
VSWR	2.5kW PEP - 1kW CW
Insertion Loss	Below 0.12
Isolation	Less than 0.2dB
Output Port	60dB, 600Mhz
	2

NEW Earmics from LOWE

LEP-300

This earphone is designed to fit comfortably to one ear, the band behind the ear holding it securely in place.

LEP-400

The earphone part of the LEP 400 is a light weight miniature speaker with response tailored for the audio communications bandwidth. Mounted on a plastic hanger that fits around the back of the ear.

LEP-500 series

This device is available with the correct plug and electrical configuration for Motorola (LEP 500M), .Yaesu/Icom (LEP 500Y), or Kenwood (LEP 500K) handy radios.

LEP-600T

The transmit switch is mounted in a small plastic housing which is fitted with a metal spring clip for attaching to a suitable point on the operator's clothing such as tie, lapel, etc. to the earphone.

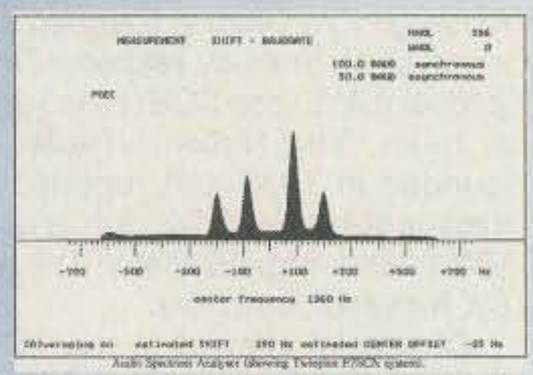
COPYCAT-PRO

Discover the revolutionary COMPUTER CONTROL PROGRAM for the M-7000 and M-8000, Let COPYCAT free you FOREVER from remembering all those buttons and keys. COPYCAT does it all! Simple "PULL-DOWN" menus control all functions. No more looking through complicated manuals or searching for buttons. ALL commands are in plain English. *PLUS* COPYCAT has a fully edit-able text buffer, with cut & paste. Save/load/edit/print files. PROGRAMMABLE macros and much more. COPYCAT supports ALL the above unit within ONE program. Simply select your units from COPYCAT's EASY-TO-USE menu and GO! NEW COPYCAT-PRO FEATURES:

- Control BOTH your TNC and radio simultaneously! Send commands to TNC and at same time, send frequency and mode to radio!
- NEW! Multiple pop-up windows for HELP, frequency files, and text editor. Instantly go between any of three windows with single keystrokes.
- Supports ALL SCANCAT frequency file formats, or create you own!
- New, easier, "Plain English" MACRO language for control of all radio and TNC functions.
- RADIO SUPPORT for most AOR, JRC, KENWOOD, ICOM, YAESU, plus LOWE's HF-150 and Watkins Johnson's HF-1000.

Hoka Code 3 Gold

"The most advanced Digital Signal Processing program for analysis and decoding of HF data communications!"



Code 3 Gold makes decoding easy for the novice and expert. Unlike the CW/RTTY decoders, Code 3 is an exclusive auto classification that tells you what you are listening to (30 + modes) and automatically sets you up to start decoding. Automatic analysis and oscilloscope functions are both selectable from almost anywhere in the program. The six Main Menu screens make moving around the Code 3 Gold program a snap. Code 3 is the most sophisticated and encompassing decoder available. The 26 standard modes include:

- Morse • ARQ6-90/98 • FEC-A FEC100A/FEC101 • RTTY/BAudot/Murray • SI-ARQ/ARQ-S
- FEC-S • FEC1000 Simplex • Sitor CCIR 625/476-4 • SWED-ARQ-ARQ-SWE
- Sports info 300 baud • ARQ - Navtex • ARQ-E/ARQ1000 Duplex • AX25 Packet
- ARQ-N-ARQ1000 • Hellscreiber-Synch/Asynch • Facsimile all RPM (up to Duplex Variant)
- Sitor • RAW (Normal Sitor16 gray shades at 1024 x
- ARQ-E3-CCIR519 but without Synch.768 pixels Variant • ARQ6-70 • Autospec - Mk's I and II
- POL-ARQ 100 Baud • Baudot F788N • DUP-ARQ Artrac Duplex ARQ • Pacto • Twinplex
- TDM242/ARQ-M2/4-242 • WEFAX • ASCII
- TDM342/ARQ-M2/4Package includes: Code 3 Gold software, audio-digital converter and RS232 cable, all ready to go!
- Requirements: IBM compatible, MSDOS with 640kB of Ram, CGA or better monitor.

Available options:

Option 3 Piccolo	Option 4 Coquelet	Option 5 4 special	Option 8
ARQ & FEC systems: TORQ-10/11, ROU-FEC/RUM-FEC. HC-ARQ (ICRC) and HNG-FEC	SYNOP decoder		

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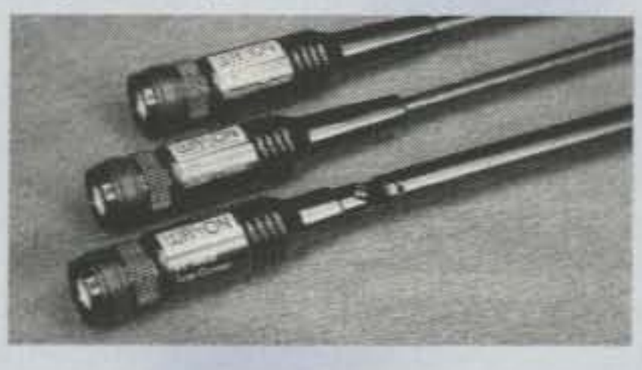
Watson Scanning Aerials have been designed to bring you the very best reception possible. High quality engineering and ergonomic design ensure that Watson Scanning Aerials are the natural replacement for those seeking to extend their receiver's range. All models cover 25MHz-1900MHz & are fitted with BNC connectors.



WSM-1900

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

WHX-7000 Dual Bander

For handheld receivers & transceivers. 144/430MHz transmit and receive. Flexible helical, 8.5" long and fitted BNC plug

W-901

"Air Gainer"
108-137MHz (transmit) and 225-400MHz receive antenna. Flexible helical, 21cms long and fitted BNC plug.

WSM-270

2m/70cms antenna. 29mm micro-magnetic base, 2.75m of coax, BNC connector, 50 watts max.

WATSON

WEP-300

8 Ohm n- 3.5mm plug. Fits firmly over ear, lead length 1.5m "k" model has 2.5mm plug.

WEP-400

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

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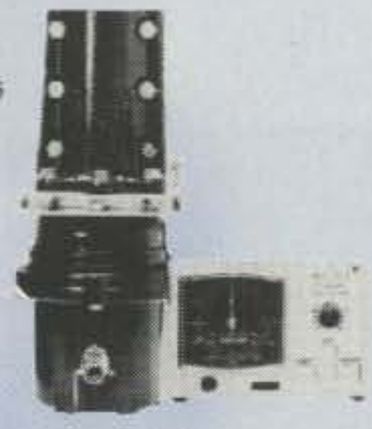
105TSX

Designed for VHF/UHF and lighter HF beams. Competitive in price and is a runaway for quality and specs.

1300MSAX

$GD^2$1800kgm^2
1300MSAX is designed for larger antenna arrays and has forged steel gears that withstand large external forces. Double gear and twin drive design, plus powerful patented braking function. Preset and computer control. 100Volt motor for low power loss over long control cable runs. Compare to HDR300 & Yaesu G2800SDX.

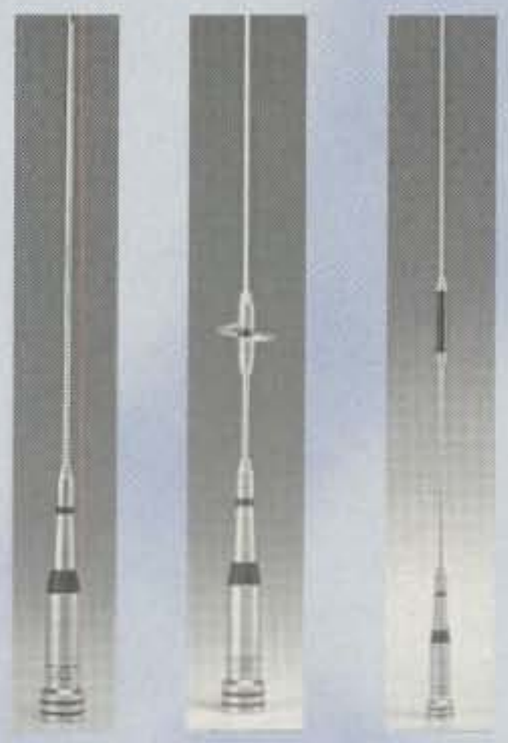


747SRX/ 750FXX

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

SIRIO High Performance Line

Now you can have the best antennas for Amateur, Commercial, Marine and Cellular available anywhere in the world



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

HP2070H: VHF 1/2 wave/UHF 3/5 wave, 0 dBd VHF/ 3.8 dBd UHF, GOLD/TEFLON UHF conn,. 40 inch. long

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

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

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

HP7000: UHF 1 X 5/8 wave, 3.2dBd - 5.35dBi, 440-450MHz, GOLD/TEFLON UHF conn., 18.5 inch. long

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"At your fingertips" convenience for handhelds and cellular phones. Quick, easy "no holes" mounting using your car air vents. Flexible gripper arms hug your radio yet allows quick, easy release.

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Nite Glow Rings and low, mid, high LED's light the night for easy multiple HT & accessory connections to your cig lighter. Three foot cord allows mounting almost anywhere in your vehicle.

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EDCO

may be inaccessible to typical PC users, experts have the ability to recover it using specialized techniques and tools.

In conducting its study, Ontrack engineers collected data-loss-related information by examining more than 50,000 hard drives and other data storage devices containing data that was inaccessible to users. Using proprietary tools developed over a nine year period, the company's engineers diagnosed and determined the cause of each data-loss situation.

Ontrack engineers developed the report that grew out of this massive data collection effort to take some of the mystery out of data loss. By examining data-loss causes and offering data-loss prevention tips and recovery advice, the study offers the information you need to adequately assess your data-loss situation while maximizing your chances for recovery.

Their report, "The Ontrack Data Recovery Lab Report—Understanding Data Loss," had three key findings. They were:

1. Despite technological advances in the reliability of magnetic storage media, the incidence of data loss continues to rise, due in part to the amount of critical data being stored.

2. Five leading causes of data loss were revealed. Each of these causes was identified by specific symptoms and has a unique set of recovery options, which were profiled in the report. The five leading causes, ranked by percentage of occurrence, were hardware or system malfunction 44%; human error 32%; software program malfunction 14%; viruses 7%; natural disasters 3%;

3. Data is recoverable in 75% of data-loss situations.

What does all this mean for PC users? Probably the most important part of the report is the list of the "top ten data protection tips" Ontrack offers:

1. You should back up data and test restore capabilities on a regular basis. Be sure to *verify* that the correct data actually is backed up. (More than 80% of Ontrack's customers back up their data, but many fail to verify their restore capability.)

2. Keep your computer in a dry, controlled environment that is as clean and dust-free as possible. Set up your computer in an area with very little traffic to ensure that it isn't bumped.

3. Only entrust your data to someone who has the training and expertise to properly maintain and repair it.

4. Use diagnostic and repair utilities with caution. Never use file recovery software if you suspect an electrical or mechanical drive failure.

5. Use antivirus software and update it at least four times per year. Why? Although viruses account for only 7% of all data losses, they're increasing in number and severity.

6. Check all incoming programs and diskettes for viruses. This includes packaged software, software carried in by others, and stuff you download by modem from bulletin board systems (BBSs) or the Internet.

7. Never attempt to operate a visibly damaged hard drive, and don't use any storage device that has been exposed to heat, moisture, or soot.

8. Don't shake or remove the covers on hard drives or tapes.

9. Use a UPS (Uninterruptible Power Supply) for proper power-line protection and conditioning.

10. Immediately turn off your PC if it begins making an unusual noise. Further operation may damage it severely.

One additional point I would add after discussion with an Ontrack engineer is that if you suffer apparent data loss, you shouldn't necessarily assume that all your data is gone forever when a mechanical problem or virus hits. There may or may not be total data destruction.

In many cases, readily available software utilities (such as The Norton Utilities) or commercial data recovery services, such as Ontrack and others, can help you get your data back. This means you *shouldn't* immediately reformat your hard drive and start over. Be absolutely certain the data is really gone before you reformat and reinitialize your system.

Note: You can write or call Ontrack for a hardcopy of the full report, or you can view or download it from Ontrack's Web site at <http://www.ontrack.com>; it's in the Data Recovery section. Contact Ontrack Data Recovery, a subsidiary of Ontrack Computer Systems, Inc., 6321 Bury Drive, Eden Prairie, MN 53346 (1-800-872-2599).

Looking Back Five

Okay, so now you know what the column is like for April 1997. But what was "hot" in April 1992? That column was "Special Delivery," and it was devoted largely to catching up with reader mail accumulated over the first few months of 1992.

In that column we conducted a forum on a variety of antenna and software topics. We heard from Bill Mollenhauer, N2FZ; Mike Zane, K6URI; Asa B. Wilson, KFØLT; Mike D. Thompson, Sr.; Robert A. Hogan, N5TSF; Ray Burke, VE1JET; and Bob Armbruster, KB2MY.

We also profiled the Aztec RF baluns; several Sommer beams and a new vertical antenna; and antennas and accessories from Lakeview Co. Turning to software, we discussed a pair of DOS-based programs, RighTime and TimeSet, to automatically set your PC's clock; PXDB: Prefix DataBase, for the CQ WPX Award; DISKPIX, a PC utility that graphically displays the state of all your hard drives; FastBack Plus 3.0, a DOS-based backup utility; and the DESQview 386 and QEMM-386 combo, memory management and task switching utilities for 80386-based PCs.

Wrap-Up

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

Overheard: I learned long ago that opportunities really are never lost; *someone* will be there to take the one you miss.

73, Karl, W8FX

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DAYTON hamvention®

May 16, 17, 18, 1997 ■ Hara Arena, Dayton Ohio

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- Ticket requests that are received **AFTER** the deadline will be processed and **HELD** for pick-up at the Hamvention Office at the Conference Center entrance beginning Thursday, May 15 at 8:00 a.m.

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  Flea market spaces are sold IN ADVANCE ONLY. No spaces sold at gate!

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FAXMail: (Outgoing) You must have a touch tone phone and call *from your Fax machine.* Set your Fax to manual send/receive, then call (937) 276-6934 and listen for voice instructions.

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	Quantity		
Admission (valid all 3 days)	_____	@ $13.00*	= $ _____
Grand Banquet	_____	@ $25.00**	= $ _____
Alternate Activities			
Saturday Luncheon	_____	@ $10.00	= $ _____
Sunday Luncheon	_____	@ $10.00	= $ _____
Credit Card Service Charge	_____	@ $1.25/ticket	= $ _____
		Total	$ _____

* $15.00 at door **$30.00 at door, if available

❑ ❑

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BY DOUG DeMAW, W1FB

DOUG'S DESK

CONSTRUCTION PROJECTS, TECHNIQUES, AND THEORY

A Multi-Purpose Broadband Amplifier

Would you like to amplify the output of a signal generator for various circuit development and testing procedures? Low-power signal sources need to be amplified at times in order to obtain sufficient waveform deflection when using an oscilloscope. A broadband amplifier is useful for this purpose.

I use a surplus military URM-25 signal generator in my lab. Although it puts out a fairly robust signal, there are times when substantially greater output power is required. The thought occurred to me that the URM-25 could serve as the frequency control for a 1 watt broadband system that I could use for testing solid-state RF power amplifiers, antennas, and Transmatches. This would eliminate the need for taking my HF-band transceiver to the lab or into the field. This article describes the system I developed for boosting the power from a crystal oscillator, VFO, or signal generator. The amplifier system will produce up to 1 watt of output power from 1 MHz to 50 MHz. It will, in fact, work satisfactorily down to approximately 200 kHz with reduced output power.

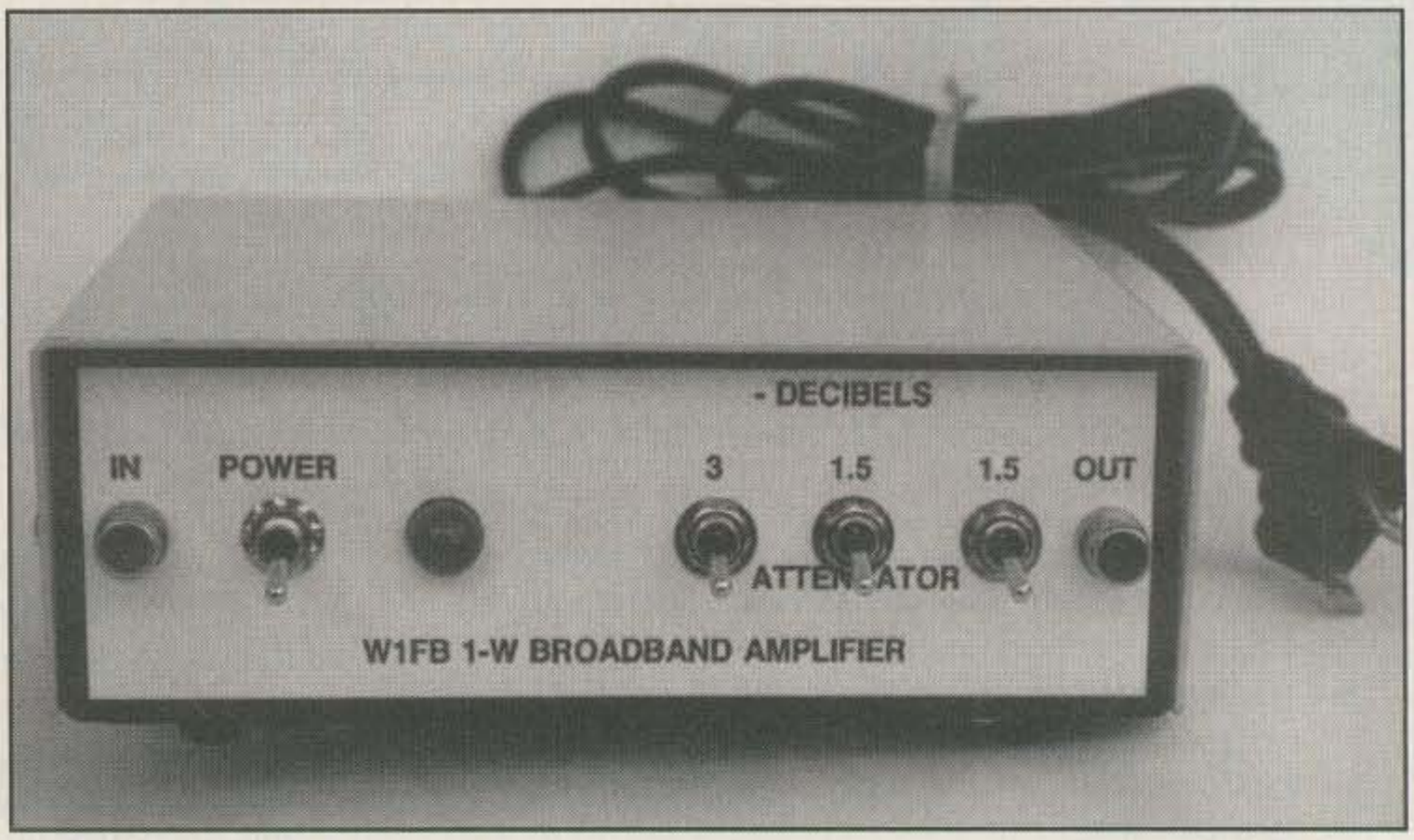

Photo A– The completed W1FB 1 watt broadband amplifier.

The Basic Amplifier

Fig. 1 shows the circuit I use as the core of the system. I developed this amplifier some years ago for inclusion in the second edition of *W1FB's QRP Notebook*.[1] The circuit uses three low-level, fed-back RF amplifiers to drive a 2N3866 power stage. All four stages operate in class A linear service. This contributes to relatively clean output waveforms without RF filtering if the input waveform is a sine wave. Overdriving the amplifier strip will, of course, cause distortion and square waves.

With the feedback arrangement shown in fig. 1 the input of each stage has a 50 ohm characteristic. The outputs of Q1, Q2, Q3, and Q4 exhibit a 200 ohm impedance. This makes it convenient to use 4:1 broadband transformers for interstage and output coupling. The feedback constants were developed some years ago by my colleague, Wes Hayward, W7ZOI. He used 15 µH RF chokes rather than broadband transformers in the collector supply lines. Direct coupling with capacitors was employed between stages.

R13 may be eliminated by jumpering

P.O. Box 250, Luther, MI 49656

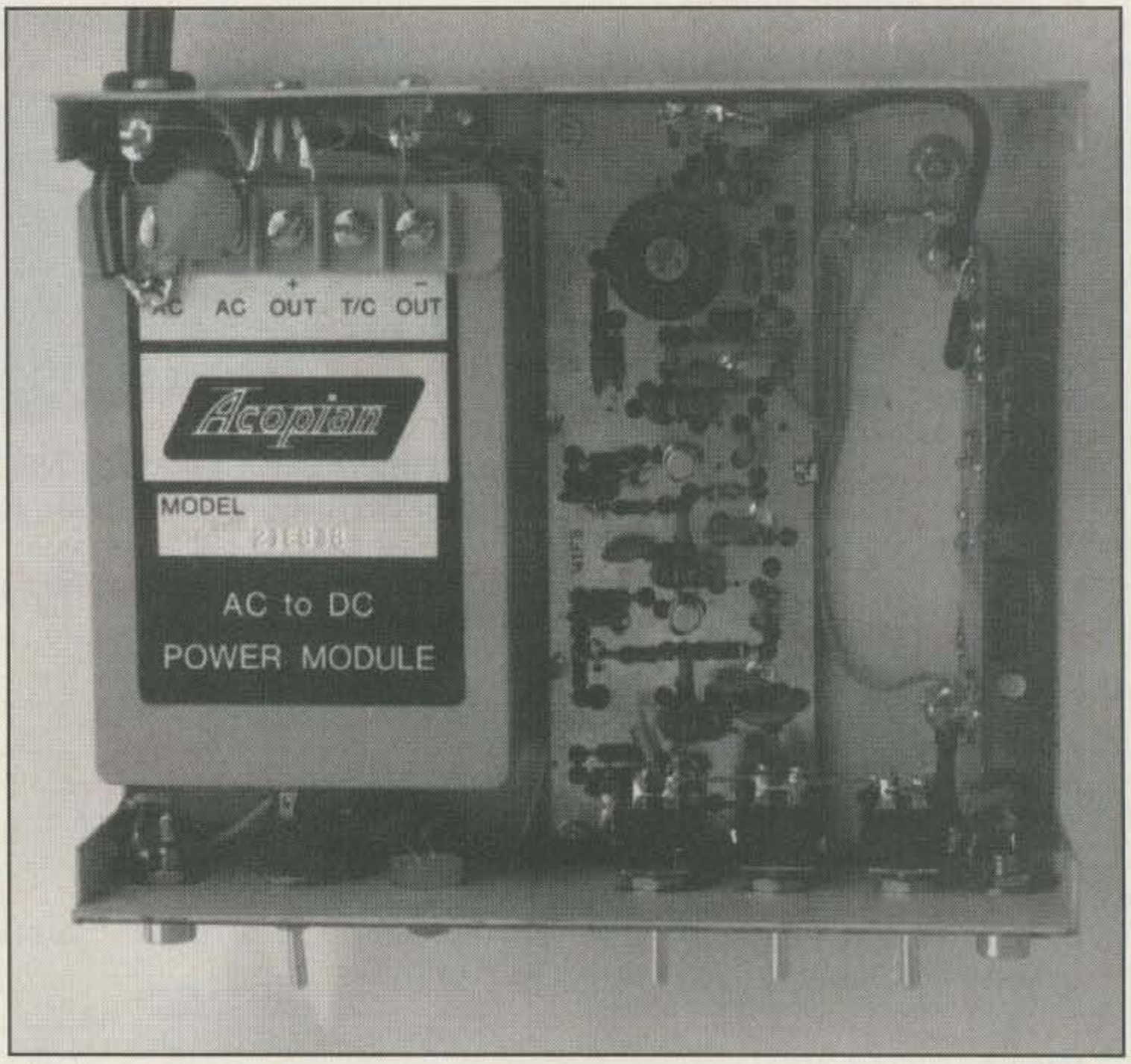

Photo B– Interior view of the assembled broadband amplifier. The power supply is at the left. At the far right, mounted vertically, is the fig. 3 amplifier. The fig. 1 amplifier strip is seen at the center of the photo.

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1

2

3

4

5


6


97

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99


93

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If ordering by fax: please include your name and address; credit card number and the name, size color and item code of the products you want.
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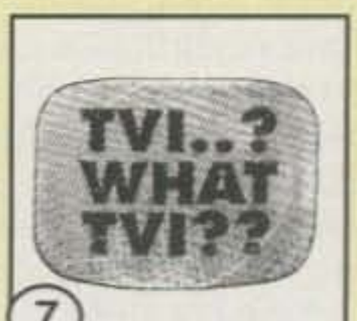
Payment Methods: We accept personal checks and money orders (U.S. funds only). We also accept Visa, MasterCard, Discover, and American Express.
Shipping and handling charges are as follows: $2.00 s/h for orders under $20.00, for orders of $20.00 to $50.00 add $4.00, **Free** shipping on orders of over $50.00.
Sales Tax: NY State residents add applicable sales tax.

T Shirt Sizes come in L, XL and XXL (add $2.00 for XXL)



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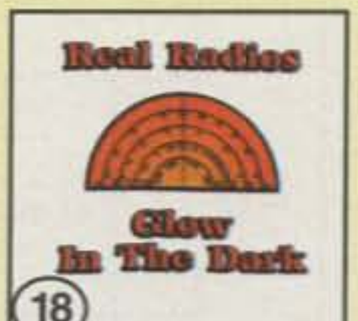

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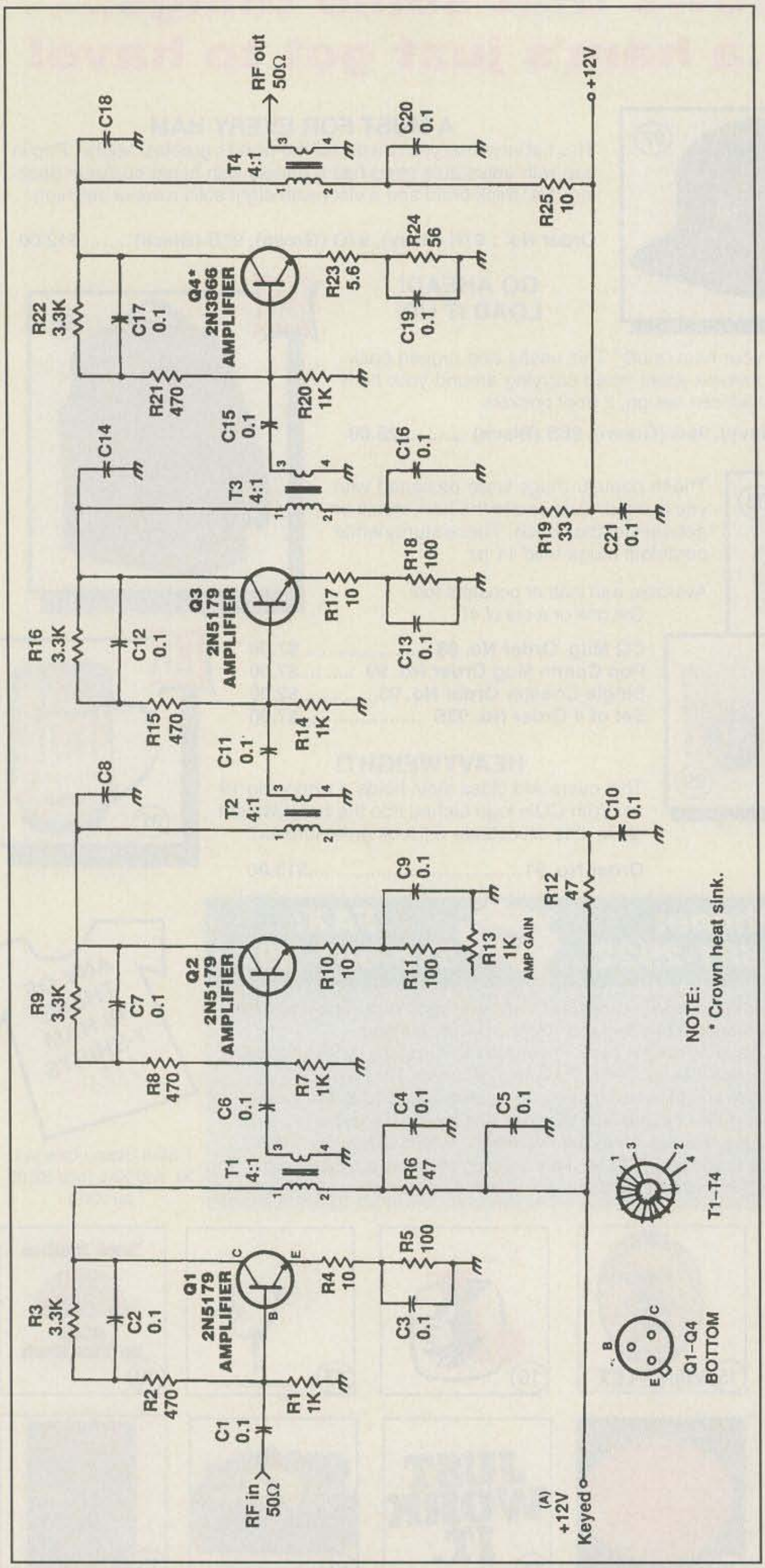


Fig. 1– Schematic diagram of the 0.5 watt, 40 dB broadband linear amplifier for use from 1 to 50 MHz. Capacitors are in µF (see text). Resistors are 1/4 watt carbon or carbon film. T1, T2, and T3 have 12 primary turns of No. 26 enam. wire on Amidon FT-37-43 (850 µi) toroid cores.4 Secondaries have 6 turns of No. 26 enam. wire. T4 has 12 turns of No. 24 enam. wire on an Amidon FT-50-43 toroid. Secondary has 6 turns of No. 24 enam. wire. R13, if used (see text), is a panel-mounted 1K ohm linear-taper carbon control. C8, C14, and C18 are not used in this application (see text).

the PC-board pads to allow R11 to be grounded directly. I chose to do this so that the step attenuator in fig. 2 could be used at the input of the amplifier strip. Amplifier gain for the fig. 1 circuit is 40 dB or greater.

Q1, Q2, and Q3 are 2N5179 CATV transistors. These were chosen because of their high f_T rating. Devices such as the 2N2222A, 2N3904, and 2N4401 may be used in the first three stages, but gain and upper frequency performance may be degraded slightly. Q4 was chosen because of its relatively high f_T rating. Other TO-5 transistors with equivalent f_T and power ratings may be used at Q4. T1, T2, T3, and T4 are conventional broadband transformers. Slightly better efficiency can be obtained by using transmission-line transformers at these circuit points.

Q4 draws nearly 100 mA of current when biased as shown. This requires a heat sink for transistor protection. I used a husky Thermalloy No. 2215B heat sink on Q4, and on Q1 of fig. 3. This heat sink has two halves that screw together with the TO-5 device inside. They have become difficult to find. Two AAVID press-on finned heat sinks (Mouser part No. 532-323005B00[2]) may be used. A thin layer of epoxy cement is required between the two finned heat sinks to hold them together. Only one of these units will fit over a TO-5 transistor, so they need to be stacked as described.

Small "matchhead" type capacitors are best for all circuit points where 0.1 µF units are specified. They have small bodies and provide efficient bypassing and coupling to aid amplifier stability. Physically small disc ceramic capacitors may be used.

Capacitors C8, C14, and C18 are used only when it is desired to roll off the upper frequency response of the fig. 1 amplifier for special applications. The values chosen will depend upon the desired upper frequency roll off.

Attenuator

Fig. 2 shows the three-section attenuator I use ahead of the fig. 1 circuit. It is de-

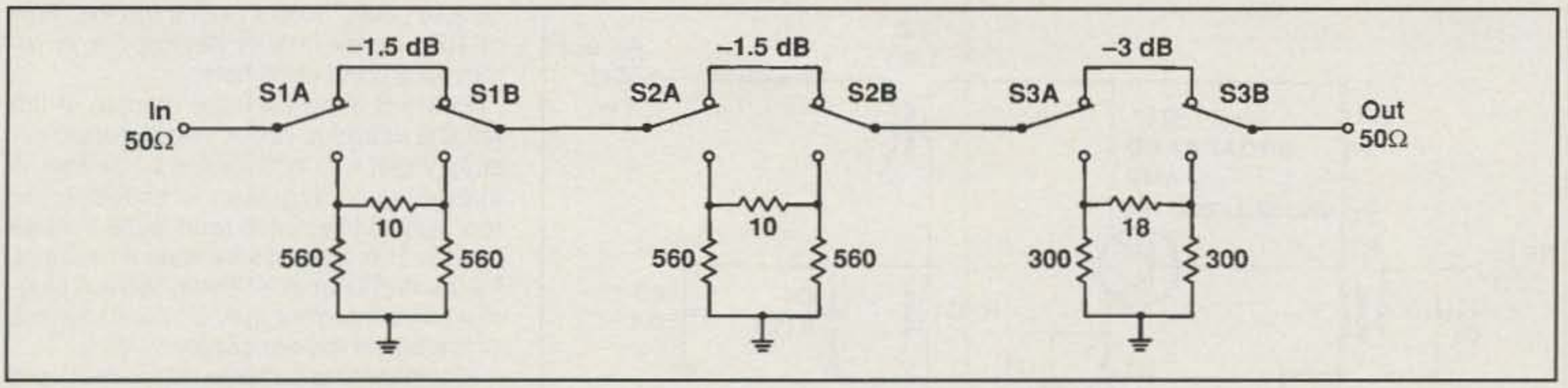


Fig. 2– A three-section step attenuator that uses miniature DPDT toggle switches. Resistors are 1/4 watt, 5% carbon film units.

signed for 50 ohms. S1 and S2 each provide 1.5 dB of attenuation. S3 offers an additional 3 dB of attenuation. With S1 and S2 engaged, the attenuation is 3 dB. When all three switches are engaged, the attenuation is 6 dB. The engagement of S1 and S3 results in 4.5 dB of attenuation. The attenuator is useful when the signal fed to the fig. 1 amplifier is too powerful to allow undistorted amplifier output. Miniature DPDT toggle switches are used. DPDT slide switches may be substituted.

The Final Amplifier

Q1 of fig. 3 boosts the amplified signal to 1 watt. Although Q4 of fig. 1 is capable of doing this, the four-stage strip would need to be driven rather hard, thereby causing waveform distortion. The add-on amplifier solves this problem. It operates class A and is biased for 90 mA of resting collector current.

A 2N3553 or 2SC799 transistor is suitable for use at Q1 of fig. 3. TO-5 transistors with equivalent characteristics may be substituted. A large heat sink is necessary, as mentioned earlier, because of the high value of resting collector current. Note that the input transformer is arranged for a 1:4 step up (50 to 200 ohms) to the base of Q1.

Output Filtering

Simple half-wave, 50 ohm LC, low-pass filters may be connected to at the amplifier output port when it is desired to minimize harmonic currents. For most applications and for casual testing purposes it is unnecessary to filter the RF output. Better filtering can be realized when using 5- or 7-element Butterworth low-pass or bandpass filters. Complete information about filter design may be found in *The ARRL Handbook.*

Construction Notes

The PC board for the fig. 1 amplifier strip is available from a vendor.[3] A double-sided board is used to ensure circuit stability. The ground conductor on the etched side of the board should be bonded to the

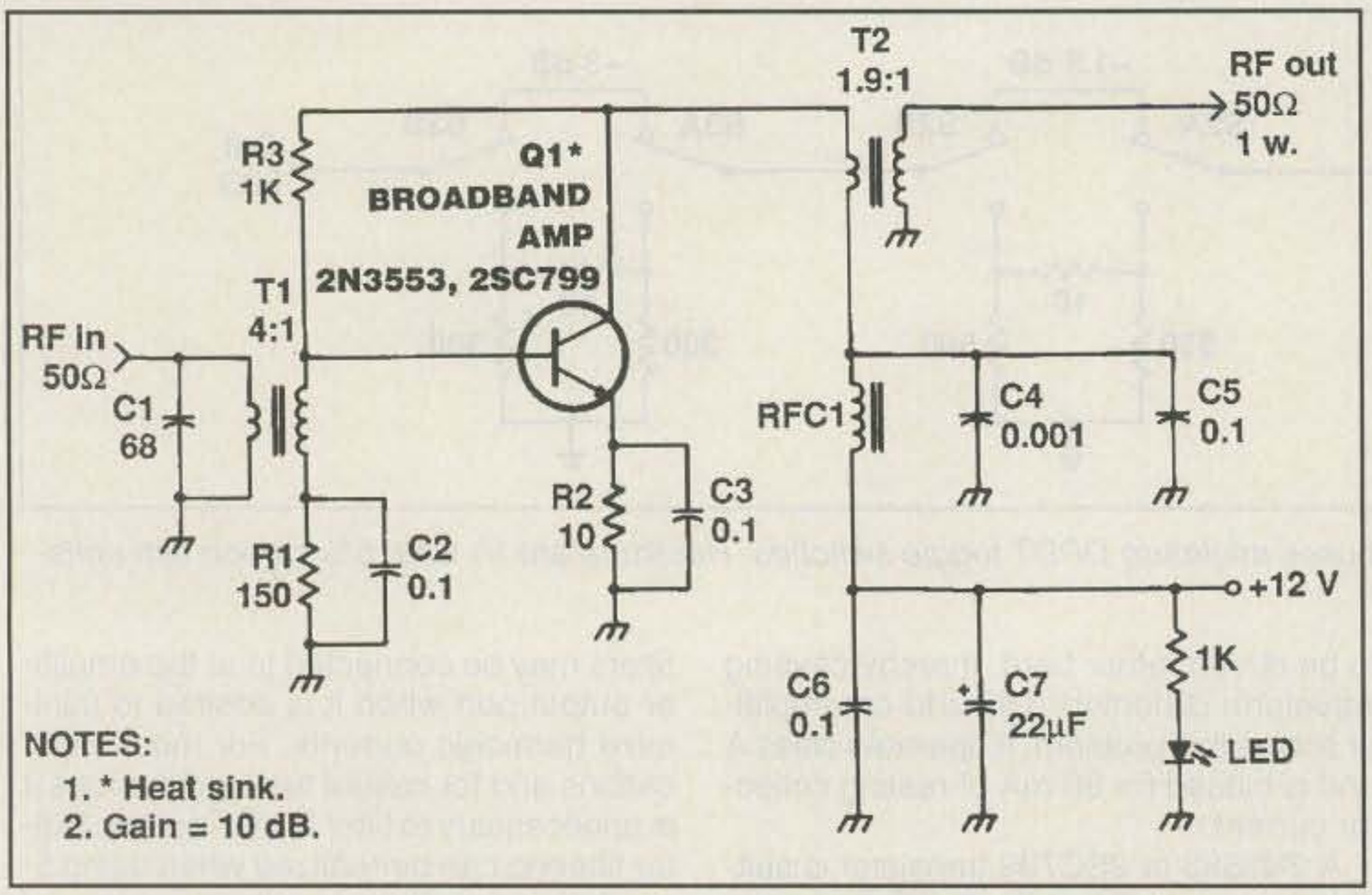


Fig. 3– An add-on linear amplifier for use with the fig. 1 circuit to produce 1 watt of output power. C1 is located on the etched side of the PC board. C7 is a 22 µF, 16 volt electrolytic or tantalum capacitor. Resistors are 1/4 watt carbon. RFC1 contains 12 turns of No. 26 enam. wire on an Amidon FT-37-43 toroid. T1 (see text) has 12 turns of No. 26 enamel wire on an Amidon FT-37-43 toroid. The primary has 6 turns of No. 26 enam. wire. T2 uses 8 turns of No. 26 enam. wire through an Amidon BN-43202 balun core or it can be wound on an Amidon FT-50-43 toroid. The secondary has 6 turns of No. 26 enam. wire.

component-side ground plane at six or more points. Half-inch strips of solder wick may be bent into a U shape and soldered to both sides of the PC board along its outer perimeter. Connections that are made through the PC board, and soldered on each side, do not permit the free flow of RF energy unless the copper is removed around each hole.

Photo B shows a large module at the left. It is a surplus +20 volt regulated power supply that was obtained at a hamfest. A three-terminal regulator is bolted to the rear wall of the box to reduce the voltage to +12. The cabinet serves as a heat sink for the regulator. A +12 volt, 500 mA plug-in wall transformer may be used in place of the built-in power supply.

Scale etching patterns for the main and add-on amplifier boards are presented in fig. 4. Parts placement guides for both boards are given in fig. 5.

The RF connections between the amplifier boards, the attenuator, and the input and output jacks are made with miniature RG-174 coaxial line. The shield braid should be grounded at each end of each cable. RCA phono jacks are used for the input and output ports of this amplifier. BNC jacks would be a better choice for maintaining a 50 ohm characteristic at the upper frequency range of the unit.

This amplifier is housed in a 2"H × 5½"W × 6"D metal box that once contained an A/B switch for selecting two computer printers. It cost $1.00 at an amateur radio fleamarket. A similar box can be made inexpensively from sections of PC board.

The panel face was created with my computer while using WordPerfect 6.0. A

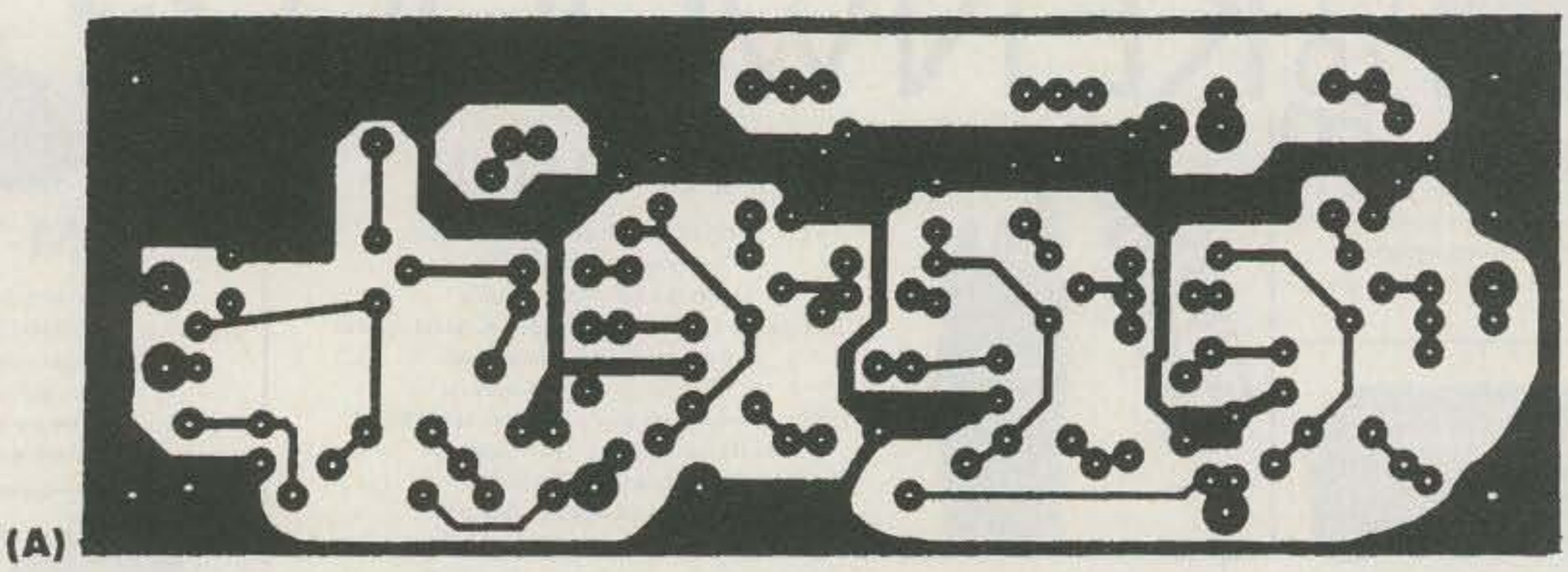


Fig. 4– Scale etching patterns for the two broadband amplifier PC boards. Board A is viewed from the etched side. Board B is seen from the component side to facilitate the use of Tech-200 or Press-N-Peel PnP Blue film, which requires a mirror image for the etching artwork.

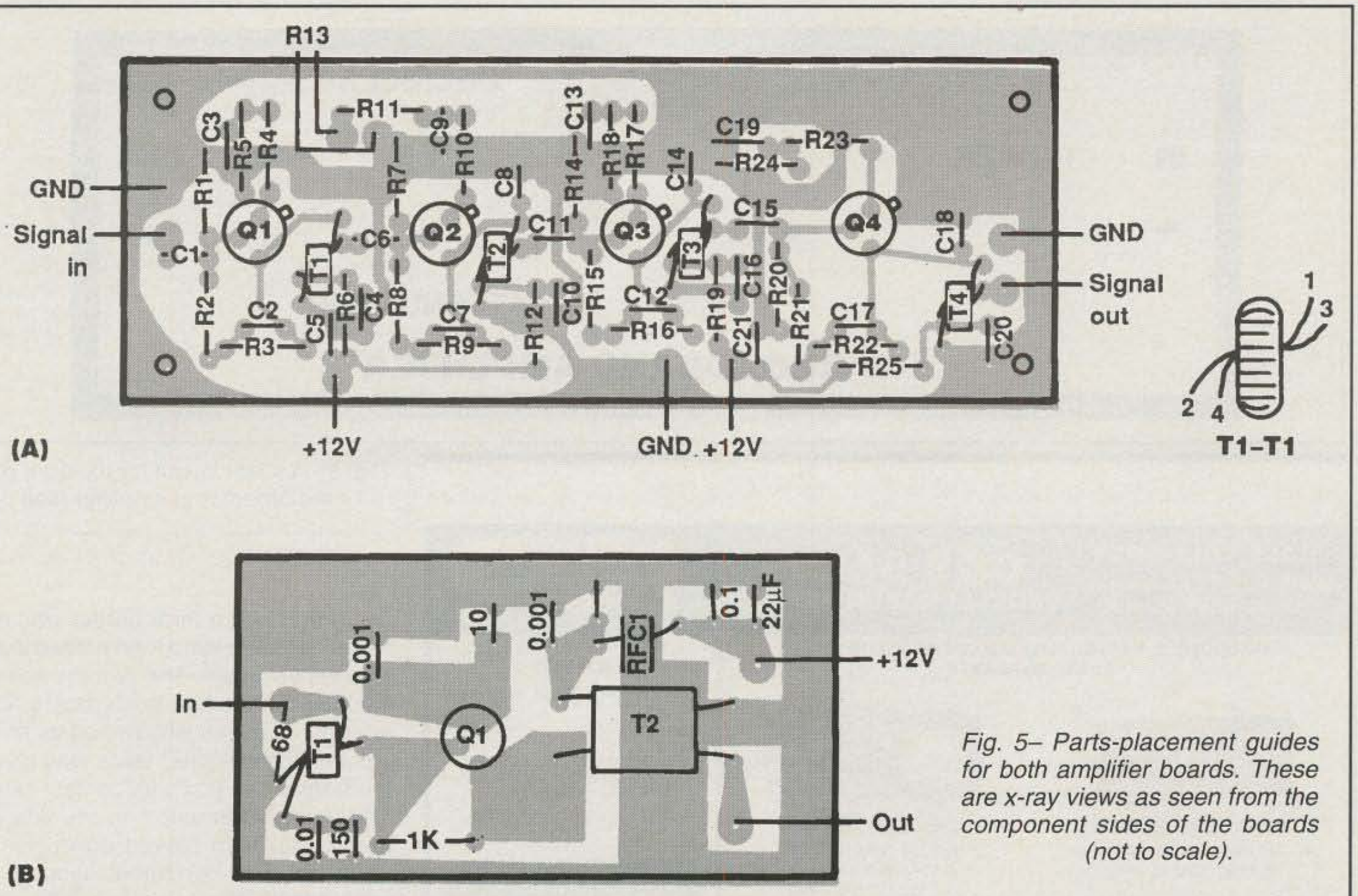


Fig. 5– Parts-placement guides for both amplifier boards. These are x-ray views as seen from the component sides of the boards (not to scale).

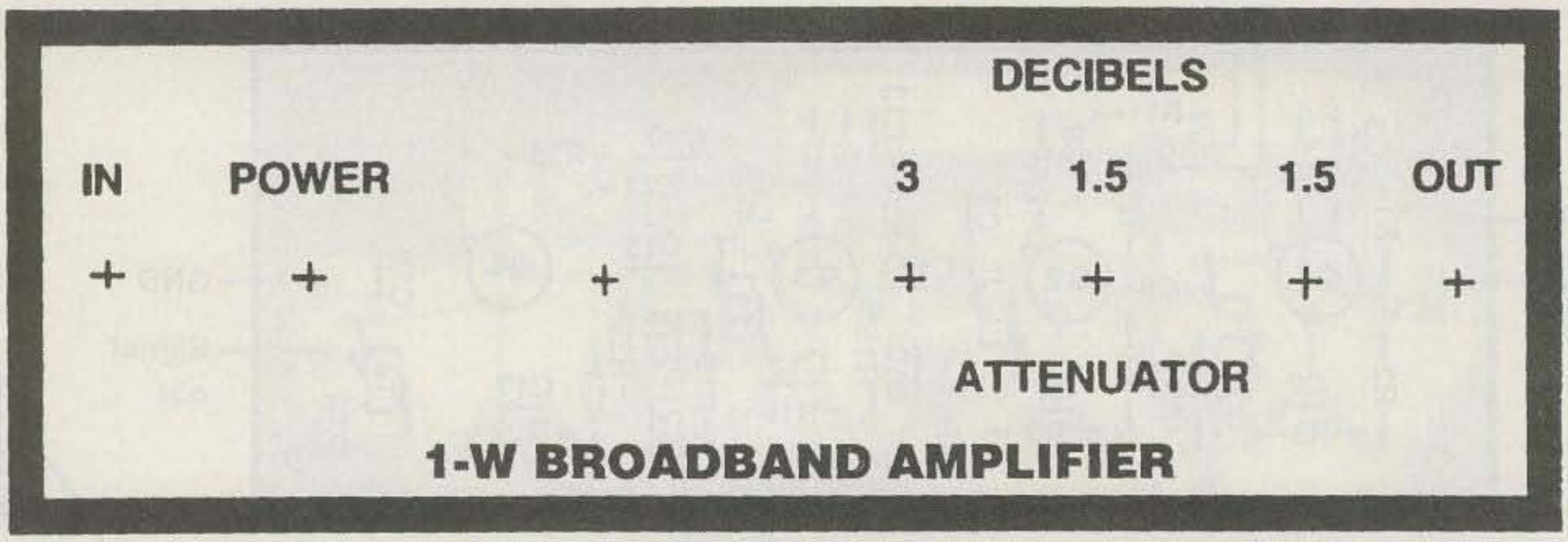


Fig. 6– A scale layout for the front panel of the broadband amplifier (see text).

figure box with a thick border was made first. The labels were then printed in boldface Helve 1 font. The pattern was photocopied onto white posterboard, cut to size, and sprayed with two coats of clear lacquer. The finished piece was glued to the front of the box with contact cement. The word "Attenuator" in the title-page photo has been moved down from the switches. The corrected layout is presented in fig. 6.

Final Comments

The fig. 1 circuit could be used as part of an amateur HF transmitter. Since it is a broadband linear amplifier, it requires no band switching. It is suitable for AM, CW, and SSB applications. It can be used also as a 1/2 watt QRP transmitter if excited with a crystal oscillator or VFO. A low-pass filter should be used at the amplifier output if this is done. The combined fig. 1 and fig. 2 circuits can be used in a like manner for 1 watt QRP operation. For CW operation it is necessary to key the +12 volt lines to Q1 and Q2 of fig. 1. QRPp operation can be realized by utilizing the attenuators at the amplifier input port.

Footnotes

1. Available from The ARRL, 225 Main Street, Newington, CT 06111, or ARRL book dealers.

2. Mouser Electronics, Inc., 2401 Hwy. 287 N., Mansfield, TX 76063-4827 (phone 1-800-346-6873 to order or for a catalog).

3. FAR Circuits, 18N640 Field Court, Dundee, IL 60118 (708-426-2431). Cost $3.50 plus $1.50 s&h.

4. Amidon Associates, Inc., 250 Briggs Ave., Costa Mesa, CA 92626 (phone 714-850-4660 to order or for a catalog).

73, Doug, W1FB

BY BILL WELSH, W6DDB

BILL'S BASICS

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Radio Frequency Interference To Car Electronic Systems

This article contains some good information about radio frequency interference to the electronic systems in modern automobiles. Information requests were sent to each company that sells cars in the United States. Some companies did not respond to my letters. Most of the replies I did receive were not very useful. Their responses are summarized briefly in this article.

BMW. There is no effective way that BMW can ascertain whether or not operation of a mobile amateur radio station will compromise the correct functioning of electronic systems installed by BMW. Such possible interference effects are not tested by BMW. Warranty coverage is void if non-BMW-approved accessories cause damage.

Chevrolet. A 6-page pamphlet is available detailing recommended installation tips for amateur radio equipment. The title of this pamphlet is "Radio Telephone/Mobile Radio Installation Guidelines." It is available from the Electronic Compatibility Department, EMC Building 40, General Motors Proving Ground, Milford, MI 48042-2001.

Chrysler. The installation of non-Chrysler equipment may void coverage of any damage caused by the operation of such equipment. Certain vehicles are manufactured with radio frequency interference suppression installed in them. RFI-resistant modules are available to help minimize interference problems.

Honda. Honda vehicles have shielded and grounded electronic control units. Other vehicle components use resistors plus RFI reduction components. They have not issued any service bulletins regarding the reduction of RF interference to the proper operation of the vehicles. They recommend following the installation instructions provided by the equipment manufacturer. Any damage or problem caused to the car by installation and/or operation of amateur radio equipment would not fall under Honda's new-car limited warranty.

Isuzu. Amateur radio mobile operation tests have not been conducted. The operation of such equipment may result in damage that is not covered by the warranty.

Mercedes-Benz. The 6-page MBNA 54/35 Service Information Bulletin covers the installation of aftermarket (customer installed) electrical accessories. Maximum RF output power levels of 10, 50, and 100 watts are recommended below 30 MHz, 30 to 500 MHz, and above 500 MHz, respectively. Antennas and equipment must be installed securely. Mountings should be able to support at least 30 times the weight of the item being installed. Such items should be located where they cannot interfere with control of the vehicle. Any distraction should be minimized. Use heavy-gauge input wiring with as few bends as possible. Always fuse both input power lines. The antenna must have a low-impedance connection to an adequate-size ground plane. Mount the antenna as far away from electrical control modules as is possible. Use the shortest possible length of a well-shielded, high-quality coaxial cable with no sharp bend in it. Adjust the antenna to obtain the lowest possible standing wave ratio. Amateur radio operation is included in the electromagnetic interference and compatibility testing conducted by the parent Mercedes-Benz Company in Germany. Many of the engineers conducting these tests are amateur radio operators. The pamphlet may be available from your local Mercedes-Benz dealer. If not, it can be requested by writing to One Mercedes Drive, P.O. Box 350, Montvale, NJ 07645-0350.

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

The Mirage B-310-G two meter amplifier.

Mitsubishi. The operation of such customer-installed equipment will not result in voiding of the warranty. However, if such equipment causes part damage, repair costs are not covered.

Oldsmobile. They do not recommend operating a transceiver at more than 50 watts output power. To get answers to specific questions, call the RFI Division of General Motors at 313-685-6150.

Pontiac. The installation and operation of amateur radio equipment does not impact vehicle warranty. RFI immunity is tested extensively and user-installed two-way radio equipment should cause minimal interaction with vehicle systems.

Porsche. Technical Bulletin 9003 is a 4-page pamphlet entitled "Telephone Use and Installation." Tom Hiser (Owner Relations Representative) advised me that the information in this bulletin also applies to the installation of radio equipment. The Porsche address is 100 West Liberty Street, Reno, NV 89520-3911. However, the installation of such equipment in Porsche vehicles is not recommended.

Suzuki. Their written response states that they do not have information related to the installation and operation of such equipment.

Toyota. Installation of two-way radio equipment should not cause problems if the following conditions are met: (1) The antenna is installed as far away from electronic control modules and other sensors/computers as is possible. Related cabling must be at least 8 inches away from such sensitive devices. (2) Antenna and power cabling is separated as far as possible from vehicle wiring harnesses. Crossings between such cabling and vehicle harnesses should be as close as possible to being at right angles. (3) Antenna standing-wave ratio is minimized. (4) Maximum output

Kenya Posts & Telecommunications issued Kenya's first Novice license on June 13, 1996. Fourteen-year-old Anand Raicha of Kisumu became a part of the history of amateur radio in Kenya when he was issued the call 5Z4RAN. A student at Kisumu Academy, Anand is very active in the Interact Club as well as a member of the Scouts movement, and took part in JOTA 1994 and 1995. The son of Max Raicha, 5Z4MR, Anand had been a shortwave listener for a long time, and when the proposal of the Novice license was made by the Radio Society of Kenya, he was among the first few to start preparing for the exam.

power does not exceed 100 watts. (5) Use only unmodified FCC type-approved equipment.

Volkswagen. Extensive tests indicate that low- to medium-power amateur radio emissions should not cause problems. VW America and VW Wolfsburg are available to help amateurs resolve any problems which may arise.

Summary. It is hoped that the information in this article is of some help to many readers. It seems that amateurs should insist on more detailed information from some of the automobile manufacturers.

Two Meter Amplifier

The Mirage B-310-G provides 50 to 100 watts of output power with just 1/2 to 4 watts of input drive power. This rugged amplifier is 4 3/4" × 1 3/4" × 7 3/4" and it weighs just 2 1/2 pounds. This unit amplifies code, FM, and SSB signals. It is an excellent choice for use with handheld units with up to 8 watts output, as well as multimode 2 meter rigs such as the ICOM 706 transceiver.

A low-noise receive preamplifier provides 15 decibels of gain, enabling clear reception of weak signals. Built-in SWR protection prevents the possibility of damage due to one's antenna whipping around in strong winds. Reverse-polarity protection eliminates the danger of damage due to connecting input DC power incorrectly. The input power requirement is just 15 amps from a 12 to 15 VDC supply. A whisper-quiet fan and a specially designed cabinet quickly expel unwanted heat.

Amplifier features include an automatic RF-sense transmit/receive switch, a remote keying jack, and power LEDs. Pushbutton controls are used to select the operating mode and to turn the input power and the preamplifier on and off.

This amplifier comes with several no-extra-charge accessories. One item is a 3 foot long coaxial cable used to connect your handheld transceiver to the B-310-G Amplifier. A mobile mounting bracket with mounting screws is included. Four rubber mounting feet are provided with mounting screws for use by people who intend to use the amplifier in a home location. The accompanying 10-page instruction manual is easy to understand. A spare fuse is also supplied.

This unit is priced at $199 with a one-year warranty. Additional information is available from Mirage Communications Equipment, 921 Louisville Road, Starkville, MS 39759 (phone 1-800-647-1800; fax 601-323-6551).

I found this unit easy to install both in my car and my shack. Performance is excellent.

The Edison Bulb

A previous column mentioned the availability of a 5" × 7" replica of the wall plaque originally used to let people know they did not need to use a match to light an electric light bulb. It reads, "This room is equipped with Edison electric light. Do not attempt to light with match. Simply turn key on wall by the door." The plaque has a nice satin, brass-look finish.

A functional reproduction of the original carbon-filament Edison electric lamp is now available to add another touch of nostalgia to one's shack. This 60 watt (nominal power) light bulb has a standard brass screw base.

Each item sells for $9.95 (first-class domestic mailing) or $10.95 (domestic UPS delivery). Deliveries to Canadian addresses cost $1.50 and $2.00 more, respectively.

Both items are sold by Grove Enterprises, P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902.

Operating From Foreign Countries

We seem to be getting close to the point where American amateurs will be allowed to operate in many foreign countries with very little difficulty in obtaining official permission for such operation. The European Conference of Postal and Telecommunications Administrations (referred to as CEPT) currently permits amateurs in 22 countries to make use of these operating privileges. The Inter-American Convention on an International Amateur Radio Permit (referred to as CITEL/Amateur Convention) is the other treaty we hope will soon enable American amateurs to operate in many additional countries.

Until these agreements are finalized, the ARRL's foreign licensing expert remains the best source of information regarding such operation in foreign countries.

AM Broadcast Band Expansion

Approximately 700 stations have applied for FCC authorization to broadcast in the 1605 to

1705 kHz expansion portion of the amplitude modulation broadcast band. This band extension exists in radio sets installed in vehicles during the past several years. It appears that the FCC is about ready to start authorizing AM broadcasting in this extended band segment.

Shortwave Listening Guides

Some amateurs supplement their operating activities with a bit of shortwave listening. There are several publications available which provide programming and frequency data. The *World Radio and Television Handbook* is a superb source of such information. However, changes do occur and they are not shown in books until some time has passed. Marbian Productions has offered to send a selection of current shortwave stations' program schedules to anyone who requests it. There is no charge related to this worldwide shortwave data. Their address is P.O. Box 1051 (H), Pointe Claire, Quebec, Canada H9S 4H9. Remember that mail to Canada costs a little more than domestic postage.

Chart of Operating Privileges

Alinco is offering a heavy-duty, two-sided chart which shows HF, VHF, and UHF operating privileges available to each class of amateur licensee. It is about 9" × 3" and can be requested by writing to Alinco Electronics, Inc., 438 Amapola Avenue, Suite 130, Torrance, CA 90501.

Spectrum Wall Chart

The U.S. Government Printing Office is selling their 1996 Spectrum Wall Chart (item number 003-000-00652-2) for $3.25. The address is U.S.G.P.O., Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954 (phone 202-512-1800; fax 202-512-2250).

Current Totals of American Amateurs By License Class

Current (1997) domestic callbooks show that we have 715,462 American licenses issued. The adoption of the 10-year license term masks the number of drop-outs who would otherwise reduce the stated total.

The breakdown per license class is as follows. *(Note that Code-Free Technicians are not separated herein from the original Technicians who passed the Element 2 five wpm code test and the Element 3 Technician/General written test.)*: 235,640 Technician; 126,978 General; 113,240 Advanced; 90,173 Novice; 73,064 Extra; 71,681 Technician-Plus; 4,534 Club; and 152 Military.

The states with the highest percentages of amateurs are: California 15.23%; Florida 6.04%; Texas 5.96%; New York 5.13%; Ohio 4.49%.

Pitcairn Island Amateur Radio Postage Stamps

Pitcairn Island is the home of the decendents of the *HMS Bounty* mutineers. One dozen of the 50 inhabitants are amateur radio operators. Andrew Young, VR6AY, became Pitcairn Island's first amateur in 1938. Pitcairn Island issued four amateur radio postage stamps last September. A 20 cent stamp lists the callsigns of the island's club members. A pair of $1.50 stamps shows VR6IM handling medical assistance via radio. Andrew Young, VR6AY, is depicted on a $2.50 stamp. 73, Bill, W6DDB

BY JOE LYNCH, N6CL

VHF PLUS

ALL ABOUT THE WORLD ABOVE HF

Are Amateurs More Prone To Auto Accidents?

VHF PLUS CALENDAR

April 4	Moon perigee.
April 4–5	Southeastern VHF Society Conference. *(See last month's column for details.)*
April 6	Very good EME conditions.
April 7	New Moon.
April 12	Highest moon declination.
April 12–13	Second weekend, DUBUS/REF EME Contest. *(See text for details.)*
April 13	Poor EME conditions.
April 14	First quarter moon. 144 MHz ARRL Spring Sprint. *(See text for details.)*
April 20	Moderate EME conditions.
April 17	Moon apogee.
April 22	*Lyrids* Meteor Shower predicted peak. Full moon. 222 MHz ARRL Spring Sprint. *(See text for details.)*
April 27	Lowest moon declination. Very Poor EME conditions.
April 29	Last quarter moon.
April 30	432 MHz ARRL Spring Sprint. *(See text for details.)*

**EME conditions courtesy W5LUU.*

From the time that the automobile became a popular mode of transportation (way before any of our times), amateurs have been trying to figure out how to put a radio into one. Nowadays, what amateur radio operator does *not* have a radio in his or her car?

Within the weak-signal community, Rover operation has become increasingly popular, not only as a contest entry, but also as a way to get out and round up a few contacts and for a time be very popular. Let's face it: Rover operation is kind of a cheap way to get the DX thrill!

While I have written in general both in this column and in my book, *The VHF "How To" Book*, about being safe in your car, before now I haven't written about the specific issue of the *safety* of operating a radio while driving.

What brings me to do so now is an article published in the February 13, 1997 issue of the *New England Journal of Medicine*. In the article entitled "Association between Cellular-Telephone Calls and Motor Vehicle Collisions," authors Donald A. Redelmeier and Robert J. Tibshirani studied 699 drivers who had cellular telephones and who were involved in auto accidents resulting in substantial property damage but no personal injury to see if there was a direct correlation between operating a cellular telephone and operating an automobile.

As part of their method of examination, each person's cellular-telephone calls on the day of the collision and during the previous week were analyzed through the use of detailed billing records. They discovered that a total of 26,798 cellular-telephone calls were made during the 14-month study period.

The findings were astounding! Among them was people who operate cellular-telephones while operating an automobile were *four times* as likely to be involved in an accident as people who were not operating a cellular-telephone. This statistic is on par with driving drunk!

The article also pointed out that it was not the operating of the cellular telephone that was at fault because they found that there was no significant difference between those who operated a handheld phone and those who operated hands-free. The significance was in what the operators were doing with their brains at the time of the accident. They were *not* concentrating on their driving.

In an "ABC Evening News" report highlighting the *NEJM* article, Medical Reporter Dr. Timothy Johnson pointed out that the operators of two vehicles traveling at each other a half-mile apart at 60 mph have only 3/4 of a second to make a decision to move out of the way, and that is if either operator of the vehicles is paying attention—which is not likely the case of someone coming at someone else in his or her lane!

P.O. Box 73, Oklahoma City, OK 73101
(phone 405-528-6625; fax 405-528-0746)
Internet jlynch@post.cis.smu.edu
Compuserve 72124.2734@compuserv.com

As a part of his report, Dr. Johnson interviewed a couple who had been involved in a head-on collision in which the driver of the other vehicle was clearly operating a cellular telephone at the time of the accident. The couple received multiple injuries, with the man suffering permanent partial paralysis of a leg.

The one redeeming feature of the report was that the article didn't recommend banning the use of cellular telephones, because 39 percent of the time they were used by the motorists to phone in the accidents after they were involved in them!

So what does this have to do with us? Plenty! We too operate a radio (after all, we do know that a cellular telephone is a radio) while we drive. We too are not as fully attentive to our driving as we should be while we are hamming and driving down the road. By definition, "fully attentive" means you are fully concentrating on your driving with both hands on the wheel.

By clear inference, considering the results of the *NEJM* article, we can claim similar statistics to what were cited in it. We need to be aware of this danger both to ourselves and to those around us on the road. When we operate a radio while in motion, we clearly increase the risk for us to be in an accident and potentially involve others, as was graphically illustrated in the "ABC Evening News" report.

My Own Experience

I have a confession to make. I'm preaching (I can use that word because I'm in seminary) to myself as much, if not more, than to anybody else. Let me tell you why.

On my way to a Field Day site last year I was traveling on the Turner Turnpike between Oklahoma City and Tulsa, Oklahoma. I was in a construction zone, traveling the posted speed limit. I was listening to 40 meters CW, having made a QSO a few minutes earlier.

A front-on gust of wind hit my van and caused me to overcorrect my steering (I drive a full-size conversion van). When I did so, I steered into a construction cone which was placed too close to the lane (it actually was inside the lane in which I was driving). When I hit the cone, I hit it at such an angle that I blew the right front tire. That caused me to lose control of the van, radically steering it back and forth until I hit the center wall separating the east- and west-bound lanes of the turnpike. That wall was constructed to keep out-of-control drivers like me from going into the oncoming lanes and being hit or hitting oncoming traffic. The wall did its job!

I bounced off the wall, spinning around counter-clockwise, coming to rest in the lane under construction (the right lane). Fortunately, I was not hurt, nor were there any other vehicles involved in the accident. Unfortunately, I lost the use of my van for several weeks while I had it repaired—at a cost out of my pocket of over $1700 just for the damage to the van. I had additional costs of renting a car and flying back and forth to school in Dallas, all of which could more than paid for a new ICOM IC 756!

I have to say that in light of the *NEJM* article, I probably was not devoting my full attention to my driving. I'm sure that others of us would also admit at least to close calls, if not to having been in an accident because of the same reason.

Based upon my experience and the *NEJM* article, I strongly urge all of us to be much more conscious of our use of our radios while in motion. In particular, I strongly recommend that when we operate as Rovers, especially in unfamiliar territory, if we are alone, we should stay off the radio until we get into our location. In fact, I urge you who are contemplating a Rover operation, even for a contest, to have a designated driver—who does no operating—be part of your team (which could increase your number to three). While it is not spelled out in the rules of the ARRL contests, this is permitted. I know this because several years ago I queried

Billy Lunt, KR1R, who said that he had no problem with this arrangement. Insofar as the CQ VHF contest is concerned, it is clearly allowed and spelled out in the rules. Above all, please be as safe as possible!

Do I take my own advice? Each week I drive 3½ hours back and forth between Oklahoma City and Dallas while I am attending seminary in Dallas. I do try to follow my own advice. Even so, that stretch of road can become very boring, and the radio is a distraction to the boredom. Nevertheless, now I operate much less often while I am underway. When I do operate on the road, I am much more aware of who and what is around me.

They say that experience is the best teacher. I hope that my experience is all the teaching that any of the rest of us might need.

Communicating Via Tropospheric and Other Types of Scatter Propagation

Recently, a lot of discussion has taken place on the Internet concerning propagation via tropospheric enhancement. Because of this and the almost annual occurrence of tropo propagation from here in Texas to Florida and the Caribbean and other areas of the country this time of year, I decided to cover this form of propagation in this month's column.

It's early morning and you step out onto the front porch. You are immediately confronted with another oppressively humid day. You turn on your handheld and listen to the various repeater frequencies in your area. You accidentally tune to a non-local frequency and are surprised to hear signals. You listen closely and determine that the repeater signal is coming from a distance, possibly as far away as 100 miles. The signals you are hearing are being propagated via a tropospheric enhancement.

Tropospheric enhancement can occur any time there's a temperature inversion. Generally, summer is the best time for them. Temperature inversions can occur any time one air system is overrun by another. As a result of this overrun, signals are trapped relatively close to the ground and are propagated over greater than normal distances, usually around 350–400 miles, but occasionally as far as 1000 miles.

Tropospheric propagation can also happen over water. The distance covered may be in excess of 2000 miles. When tropo occurs over water, it travels through a duct, like a tube. This tube has been described as a runaway hose moving in slow motion. Operators who have experienced this ducted communication report increasing and decreasing signal strength as the "end" of the tube moves from their location to another and back again.

The maximum usable frequency (MUF) and lowest optimal frequency (LOF) of this phenomenon behave quite differently from HF propagation. When tropospheric propagation makes its initial appearance, it may first affect the 70 cm amateur band. Sometimes the signals are heard first on the 23 cm amateur band, with the MUF of the propagation increasing to as high as the 5 cm amateur band. However, an event like this is extremely rare.

Amateurs have been aware of tropospheric enhancement for a very long time. Experiments on 60 MHz in 1934 by Dr. C. F. Brooks, who used the experimental station W1XW at the Blue Hill Observatory near Boston, and Ross Hull, located at West Hartford, Connecticut, made amateur radio operators aware of this form of propagation. However, it wasn't until 1957 that John Chambers, W6NLZ, and Tommy Thomas, KH6UK, conducted experiments based on airline pilots' reports of being able to hear the Honolulu tower once in the air after take-off from a west coast airport.

These two tropo pioneers made their first contact on 2 meters on July 8, 1957 and set the next record on June 22, 1959—this time on 125 cm. Paul Leib, KH6HME, in Hawaii, and Jack Henry, N6XQ, operating from Baja, California, later stretched out the distances for contacts on these bands.

It wasn't until July 18, 1979 that a contact was made on 70 cm. Louis Anciaux, then WB6NMT, now KG6UH, who then lived on a ridge of Point Loma, in San Diego, had an excellent view of the Pacific Ocean. When he heard the 70 cm beacon located on the side of the Mauna Loa volcano, he called Paul Leib, KH6HME, on the phone. He then had to wait five hours for Paul to get off work and up to the site in order to complete the first contact.

Five years later the first contacts were made on yet another VHF+ band. This time, on June 24, 1984, Chip Angle, N6CA, heard the 23 cm beacon on Mauna Loa that he had built and sent to Paul a few years earlier. Chip alerted Paul and made plans to drive to Palos Verdes. Meanwhile, Paul made his way up the side of Mauna Loa. The two made contact with relative ease.

In 1991 Paul and Chip were at it again. On July 28th, Chip, again operating from Palos Verdes, made contacts on the 9 and 5 cm amateur bands. Most recently (August 23, 1993) these two once again completed a record-setting contact over the Pacific Ocean—this time on the 33 cm amateur band.

Records were also being set between Australia and New Zealand using the same phenomenon over water. However, no contacts have been completed to date on 13 cm, or on frequencies above 5 cm, although attempts are being made between California and Hawaii, and between Australia and New Zealand.

Over-land records have also been set. As recently as September 16, 1993, Al Ward, WB5LUA, and Tom Whitted, WA8WZG, completed a 952 mile contact on 2304 MHz, setting an over-land distance record for that band.

During the 1992 September VHF QSO Party Sam Whitley, K5SW, worked the W2SZ contest group on 222 MHz, thereby stretching the over-land distance for that band out past the 1200 mile mark.

How to Tell When to Operate: Besides stepping outside and noticing that the weather is "stuffy," how else can you determine that tropospheric propagation conditions exist? First, listen on the bands for distant beacons. If you hear these beacons, the band is open. You can also determine that conditions exist by checking the weather map. If you're sitting in the middle of a high-pressure area that's being closed in upon by a low-pressure area, chances are good that you'll be experiencing tropospheric enhancement.

When tracked over a 24 hour period, tropospheric enhancement seems best during the early morning hours just after sunrise. During these early morning hours conditions occur that refract VHF+ frequency signals along the surface of the Earth. Tropospheric conditions can return after sundown when the air is being cooled by the absence of the sun.

Another way to determine if there are tropo openings is to listen for a DX station on your local repeater. As the former ARRL Oklahoma Section Manager, I've traveled to many hamfests and club meetings throughout the state. On one such trip to Lawton I was listening to the local 146.82 MHz repeater at around 9 AM, when a couple of Texas operators checked in and reported that our operators were breaking into their repeater. Being the VHF+ weak-signal operator I am, I immediately tuned my radio to 144.200 MHz and started calling CQ. I was first called by Howard Hallman, WD5DJT, who couldn't quite get a fix on me and kept asking me to repeat my grid locator. Thinking that I could help him copy me, I called CQ again, this time repeating my grid locator several times. This time I was answered by Pat Rose, W5OZI, in EM00, nearly 400 miles away! We both were quite startled to make the contact because I was running only 25 watts into a SQLOOP antenna. By the time I completed the contact with Pat, Howard had gotten a fix on me and called again. We completed our contact just before tropo conditions deteriorated.

Over the years that I've been writing my *CQ* column, I have received many reports of tropo-induced contacts. Sometimes signals are very weak and sometimes they are very intense. On some of these occasions operators have experimented with reducing power to the absolute minimum their station will run.

At times these conditions will last for days. At other times you can watch as the conditions track across a portion of the country. One morning I found that the Chicago area was into Oklahoma City on 70 cm. By late morning conditions had deteriorated and there were no signals into Oklahoma City. However, to the east in Tulsa things were just getting started.

Even though Oklahoma City was excluded, for the next three days conditions provided openings between Tulsa and to the east and northeast. While operators in Oklahoma City could hear the Tulsa stations working the DX, they couldn't hear the other end of the QSOs.

Tropospheric propagation can even be tricky in your own neighborhood. A couple of years ago Glenn Bishop, WN5J, was enjoying an opening that extended up to 23 cm. Glenn is located at an elevation of 1800 feet above sea level (ASL). I'm located about 12 miles away at around 1000 feet ASL. I couldn't hear the stations Glenn was working because I was below the propagation.

Nevertheless, most of the time tropospheric enhancement operation is a fairly easy way to work those close-in grid locators (and an occasional long-haul DX contact). It requires no special protocol or equipment. Just listen for the presence of conditions and join in.

Scatter Propagation: Six meters is never really dead!

What's that you say? There are no signals on the band. How can the band be open? VHF+ operators discovered long ago that faint propagation exists at all times on these bands. Using scatter propagation you can work distances up to 1200 miles on a regular basis. Most of the time signals are just below the noise. However, if you're diligent, you can pick out enough information to make a complete contact with a distant station. While not much is known about this form of propagation, it is used on 6 and 2 meters to make otherwise improbable contacts.

While it's preferable to have a well-equipped station and lots of power for 6 meter scatter work, it is possible to make contacts with just a 150 watt brick. However, you need to be in a quiet location, free from manmade noise sources. You also need a good set of ears and the ability to null out the band noise. Finally, you need lots of patience. It will take some time to complete the contact, snatching bits and pieces of propagation from the ether.

On 2 meters scatter work takes considerably more power, an even larger antenna, and more patience. Nevertheless, it can be done.

Another form of 6 meter scatter propagation occurs when signals are bounced back from an ionized F_2 layer. Sometimes an F_2 layer is so intense that signals hitting it at just the right angle are refracted back to the source. Operators trying to work South America have sometimes noticed that the signal hits the first F-layer, bounces back to Earth on the Gulf of Mexico or the Caribbean, and then scatters back across the surface of the Earth to its source. I've heard this form of propagation on the HF bands and 6 meters. The signals are weak and take on a bassy and sometimes watery sound.

Tropo scatter is another form of propagation. Tropospheric scatter differs from tropospheric bending or ducting as described above, because in those forms the signal seems to be held in place as it passes along the path of propagation. With tropo scatter propagation the signal seems to be bouncing off clouds of ionized air in the troposphere. These signals are described as being weaker than tropo duct or inver-

sion-induced propagation and more watery sounding.

"Rain scatter" is another type of scatter propagation. Found on 23 cm and above, rain scatter is most noteworthy on frequencies with wavelengths short enough to be affected by the size of raindrops. Experiments conducted on 10 GHz in the rain have shown that each operator, by pointing his or her antenna at a rain squall, could hear the other station via the signal being propagated by refraction off the raindrops.

Lightning scatter is related to rain scatter, and is a very dangerous and extremely unreliable form of propagation. Operation via this mode relies on the refraction of a signal off the ionized air left by a lightning strike. In order to use this form of propagation, you must be in the middle of a thunderstorm. Operation via lightning scatter is a good way to get into the Silent Key column.

Current Contests

DUBUS/REF: Bowing to pressure from EMEers who felt that the weekend of 22–23 March was not conducive to good propagation, at the last minute (and too late for our publication deadline) DUBUS changed the date of the first leg of their contest to 15–16 March for 144 and 1296 MHz. The second for 432, 2300 MHz, and up remains 12–13 April. The rules for the contest were published in last month's column.

ARRL Spring Sprints: The following are the rules for the ARRL Spring Sprints courtesy of the ARRL home page.

Object: To work as many amateur stations in as many 2 degree by 1 degree grid locators as possible using authorized amateur frequencies on the 50, 144, 222, 432, 902, 1296, and 2304 MHz bands.

Contest Period: The 144 MHz Sprint will be from 7 PM until 11 PM local time on Monday, April 14, 1997. The 222 MHz Sprint will be from 7 PM until 11 PM Tuesday, April 22, 1997. The 432 MHz Sprint will be from 7 PM until 11 PM local time Wednesday, April 30, 1997. The 50 MHz Sprint will be held from 2300Z Saturday, May 17 until 0300Z Sunday, May 18, 1997. The 902 MHz, 1296, and 2304 MHz Sprints will each be held on Saturday, May 10, 1997. The 902 MHz, 1296 MHz Sprint, and 2304 MHz Sprint will run from 6 AM until 1 PM local time; you may operate any five consecutive hours during this time period. These Sprints are separate, but run concurrently.

Exchange: Grid-square locator (see April, 1994 *QST*, page 86). Example: W1AW in Newington, Connecticut would send FN31. Exchange of signal report is optional.

Scoring: (A) QSO Points—Count one point for each complete QSO. (B) Multiplier—The total number of different grid locators worked. Each 2 degree by 1 degree grid locator counts as one multiplier. (C) Final score—Multiply QSO points by multipliers. Each Sprint is scored separately.

Reporting: Entries must be postmarked before 30 days after the contests. No late entries can be accepted. Official entry forms, available from ARRL HQ in the ARRL Contest Yearbook, are recommended. The results will be listed in *NCJ*. Contest forms can also be found on the ARRL's home page.

Current Conferences

The Southeastern VHF Society plans to hold its Inaugural Conference in Marrietta, Georgia, April 4–5, 1997. Complete information was published in last month's column. In case you missed it, you can also get complete information by checking their home page at <www.akorn.net/~ae6e/svhfs> or by contacting Jim Worsham, WA4KXY, 1997 Conference Chairman, at his e-mail address: <jimworsham@bellsouth.net>.

Current Meteor Showers

The *Lyrids* meteor shower is predicted to peak at around 0300 UTC on 22 April. This is a north-south shower, producing at its peak around 10–15 meteors per hour. Other minor showers and their predicted peaks this month include *April Piscids* (0700 UTC, 20 April); *pi-Puppids* (1400 UTC, 23 April); and *delta-Piscids* (0700 UTC, 24 April). The above information is courtesy the International Meteor Organization and their home page at <http://www.imo.net>.

ARRL Committee Proposes Sweeping License Changes

The following is from the January 31, 1997 "ARRL Letter": ARRL members are being invited to add their ideas, comments, and recom-

mendations to those of the ARRL WRC-99 Planning Committee, which has suggested sweeping—and potentially controversial—changes to the amateur radio licensing structure in the US. On the table for open discussion and debate are proposals that include: elimination of the Novice license; creation of a new Intermediate license to replace the Technician Plus; expanded HF privileges for Intermediate licensees, including phone on 160, 75, and 15 meters; a 10 wpm General CW test (with more stringent testing standards for all CW exams); and expanded phone privileges for General-class and higher licensees.

Details of the plan, discussed during the recent ARRL Board of Directors meeting in Albuquerque, New Mexico, appeared in March *QST*. The Board says it seeks comments from members to ensure that before any plan goes forward, it enjoys broad support from the amateur community. The Board will not act on the issue at least until its July meeting.

After its research revealed that as many as three Novices in four are inactive, the committee concluded that the Novice license is no longer useful. Although the committee would end the Novice license, its plan provides current Novices with an easy means to upgrade (via an open-book test) to the new Intermediate class license, which would replace the current Technician Plus. All present Tech Plus licensees would become Intermediate licensees. The Basic license would supplant the Technician license, now the hobby's most-popular entry-level ticket, with no changes in privileges.

In addition, the committee's plan would phase out the current Novice and Tech Plus bands on 80, 40, and 15 meters and replace them with new Intermediate-class allocations. The committee's consensus plan for Intermediate-class licensees calls for new CW bands on 80, 40, and 15 meters starting 25 kHz up from the lower band edge, digital and phone-band privileges on 75 and 15 meters, and a 50 kHz phone or CW segment at the top end of 160 meters, plus expanded Novice and Tech Plus CW and phone allocations on 10 meters.

According to the proposal, Intermediate CW bands would be 3525 to 3700 kHz, 7025 to 7050 kHz, 21025 to 21150 kHz, and 28050 to 28300 kHz. Digital operation was suggested for 3600 to 3625, 21100 to 21125, and 28100 to 28189 kHz. Phone privileges would include 1950 to 2000, 3900 to 4000, 21350 to 21450, SSB from 28300 to 28500, and FM from 29500 to 29700 kHz. Transmitter power for Intermediate-class licensees would be limited to 200 watts PEP output (other licensees using these bands would not be limited to 200 watts).

General class and higher amateurs also would benefit from the plan, if it's adopted according to the committee's outlines. General class amateurs would get additional phone privileges of 3800 to 3850, 7200 to 7225, and 21250 to 21300 kHz; Advanced class amateurs would add 3725 to 3775, 7125 to 7150, and 21175 to 21225 kHz; and Extra class amateurs would also have 3700 to 3750, 7125 to 7150, and 21150 to 21200 kHz.

With the exception of 40 meters, where Novice and Tech Plus licensees already have privileges, the committee suggested no changes on the hobby's narrowest and most crowded bands—including 20 meters and the narrow WARC bands at 30, 17, and 12 meters.

The Intermediate CW test would be 5 words per minute (the same as the current Tech Plus requirement), but the committee proposed that the General class CW requirement be set at 10 wpm. There still would be no additional CW exam for the Advanced ticket, nor would there be any change in the 20 wpm requirement for the Extra. Exams for all classes would include a return to a sending test and the requirement for one minute of solid copy during a five-minute test,instead of the current method that tests on the content of the CW text.

Right now these major changes are only in the talking stage. "Let us be very clear about this," said ARRL Executive Vice President David Sumner, K1ZZ, who characterized the committee's proposals as a starting point for discussion, not a done deal. "The changes are not ARRL policy; nothing has been proposed to, or by, the FCC, and the ARRL Board is committed to making no decision before its July 1997 meeting." Sumner said there is no timetable to complete the process. Only after there is an opportunity for in-depth consideration and discussion by the membership will the ARRL Board consider taking the next step—to approach the FCC with a rulemaking proposal, a process that automatically invites additional comments and suggestions.

Between the time they received March *QST* and May, members are asked to voice their opinions on the committee's suggestions to their directors, whose postal and e-mail addresses are listed on page 10 of *QST*. All suggestions and comments—positive and negative—are welcome.

Newsline VHF-Related Items

The following stories have previously aired on "Amateur Radio Newsline." They appear here courtesy of Bill Pasternak, WA6ITF, and "Amateur Radio Newsline."

The following is from January 17, 1997 "Newsline." **Tower Falls and Takes Repeater Off Air**: A 2 meter repeater serving a large part of southern Wisconsin was knocked off the air after the collapse of a 660 foot broadcast tower December 31st.

New Year's Eve is frequently celebrated with plenty of racket, but the noise near a southern Wisconsin ski resort the last evening of 1996 was anything but welcome. The sound was that of radio station WOLX's tower crashing to the ground after it became overloaded with ice. The tower was located near the Devil's Head Ski Resort, north of Madison. The collapse also knocked the 146.88 MHz Baraboo repeater off the air.

The system is operated by the Central Wisconsin Repeater Association. Its loss was a blow to radio amateurs active in emergency communications. Ray Meyer, N9PBY, says the repeater was used for the South Central Wisconsin Skywarn Net and as a hub for forwarding emergency information to the National Weather Service.

The system also provided reliable coverage for travelers across southern Wisconsin, including a large part of the interstate corridor between Chicago and Minneapolis. The tower fell at about 6:30 PM. No one was hurt, but station employee Glenn Disney and his family, who live on the property, had quite a scare.

Disney says he and his wife heard several huge chunks of ice crashing to the ground. He rushed his family to the basement and heard what he calls "an earth-shattering sound."

The radio station plans to operate temporarily, using a 60 foot tower. As of this article's deadline, there's no word on when the Baraboo repeater will be able to return to service. WOLX's station manager says it could be six months before a permanent replacement tower is installed. *(Via Newsline, N9PBY, K9ZZ)*

SETI-AMSAT Affiliation: AMSAT North America has approved a request from the SETI League Inc. for the two organizations to affiliate. The SETI League was formed several years ago to coordinate a privately funded scientific search for extraterrestrial intelligence.

Dr. H. Paul Schuch, N6TX, is the Executive Director of the SETI League. He says that his group can make technical contributions to AMSAT in the area of microwave communication. AMSAT North America's Executive Vice President Keith Baker, KB1SF, is also pleased. Baker says that AMSAT and the SETI League share a common objective that involves many radio amateurs in scientific exploration, research and development.

Both AMSAT North America and the SETI

League are not-for-profit educational and scientific organizations. AMSAT has some 7000 members, while the SETI League has about 400. *(Via AMSAT, SETI League, ARRL Letter.)*

The following is from the January 31, 1997 "Newsline" Broadcast: **Hamvention Coordination Forum:** The National Frequency Coordinators Council has announced that it will hold a repeater coordinators forum at next month's 1997 Dayton Hamvention. It will take place at 11:15 AM on Saturday, May 17, at Hara Arena in Dayton, Ohio.

The forum will be open to all amateurs interested in repeater coordination. The NFCC Board says it will publish an agenda prior to the meeting. It adds that it hopes to have the kinks worked out of the membership process by the time the Hamvention rolls around. This is to permit recognized coordinators who are not members to sign up at the same time. *(Via NFCC.)*

And Finally . . .

Well, here I go again, preaching the same sermon that I have preached in this column before. Yet, I think I have to say it again. We amateur radio operators need each other! Desperately!

It was two years ago this month that Oklahoma City and this nation suffered the worst terrorist attack in its history. I previously have reported here how amateurs came forward and volunteered their assistance—in droves. It was one of amateur radio's finest hours.

It did not matter what our specialty was. Some of us are satellite operators; some weak signal; some ATV; some packet. The vast majority are FM users. We all worked together toward the common end, that of supplying communications to those agencies who needed it during the aftermath of the bombing.

Not a day goes by when there aren't several postings on various listserves on the Internet, complaining about members of this specialty interfering with operations of members of some other specialty. There is even talk of a petition that would ask the FCC to protect more segments of certain bands from interference from fellow amateur radio operators.

My friends, more rules are not going to work! What will work will take time. What will work is education, and that is education at the grassroots level—not from the League down. (More on this later in this article.)

Why is education so important? It is because with education we tell others in our hobby about our specialty. We explain to them why it is necessary to honor the band plans which give us our protected spectrum. Education also recruits others into our type of operation. This latter point is the key to so much of the problems we have.

Let's take for example the issue of FMers encroaching into SSB portions of the band. You rarely hear anyone with a wide signal operating in the middle of 20 meters or 40 meters or 75 meters. Why? Because these bands are so well utilized. If we were populating our weak-signal SSB portions of the band as much as the HF bands, FMers would not be able to operate, nor would they be interested in operating, their mode in "our" part of the band.

Let's get back to the League. Somehow we seem to think that the ARRL is the answer to all of our problems. Then, when the League doesn't do it our way, we complain and call them names! What does that solve? It is our responsibility to do the educating, not some organization several hundred miles away from us.

When was the last time you put on a forum on your specialty? Before I started seminary, I was much more active in our hobby. I got out to many club meetings across the state of Oklahoma and occasionally into Arkansas and Texas. Because most of my constituency in Oklahoma knew that I was both their section manager and *CQ*'s VHF editor, I often was called on to speak on both the League and my interest in the hobby when I visited clubs—which I really enjoyed doing. I can't tell you how uplifting it was for me to see lights come on in new amateurs' eyes as they contemplated the possibility of exploring new modes of operation.

I have also said here in past issues of *CQ* that the Internet is a two-edged sword. It's opened up for us communications possibilities never before imagined. However, on the other edge of the sword, it's also drawn many potential new recruits away from our hobby. The FCC, the League, and W5YI VEs all report downward trends in new licenses and upgrades. Let's face it: Presently we are in a stagnant mode. Because of this, it is up to us to protect what we have from any further erosion—and we *cannot* do it by fighting amongst ourselves.

To reiterate: We all desperately need each other. Let's figure out how we can work *together* for the betterment of all of us in the hobby.

End of sermon. You can say "Amen!" if you wish, or you can get off your pew and do something! Until next month . . .

73, Joe, N6CL

BY BUCK ROGERS, K4ABT

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

An Ounce of Prevention

Looking ahead to springtime is something we all like to do after the blasts of winter. Once again we will be able to do the normal chores for which spring allows us the time and climate. There are other facets of the "spring cleanup" also. That special quad antenna we built during the winter can now be erected. The broken elements on the HF antenna can be repaired after the ice load took it apart during the big ice storm. But what about all the equipment in the shack? Aren't we going to preserve it as well?

Besides the routine chores that come with spring, there are other forces at work, too. Beginning with spring, there are numerous thunderstorms that begin to show their strength and "electric" personalities. And that leads us to . . .

Grounding and Equipment Protection

Having been with Ericsson Communications for several years now, I've made it a point to upgrade the grounding and lightning protection specs as the trends change and as new and better lightning protection devices are introduced to the world of RF and telecommunications. Over the last two decades, I've written several books on the subject of data and RF communications. In some of them I talked about grounding and equipment protection. Some authors look at grounding as a topic that everyone already knows or as some kind of taboo world of strange magic. Neither of these thought processes could be further from the truth.

Grounding and lightning protection is a science in itself. No amateur radio operator should ever be caught without this kind of protection. In the world of RF communications if there is an antenna connected to a device, it should be protected. If there is a power line connected to a device, it should be protected. If there is a phone line connected to a device, *it should be protected!*

211 Luenburg Drive, Evington, VA 24550
e-mail: buck4abt@inmind.com

At What Price?

Let's think about this question for a moment. During the last decade you've bought several pieces of valuable amateur equipment. For the VHF/UHF transceiver you paid over $600. Then you upgraded your license and went right out and bought that $2000 HF transceiver. Not stopping there, although you already had the tower and VHF/UHF antennas in which you had invested more than $1000, you added an HF tribander, sending the total amateur radio equipment investment to above $5000.

Some of us may have two and four times that amount invested in our hobby. (If you won't tell the YL, I won't either. YLs, same for the OM; just tell him it was a good deal that you bought at a garage sale. Hi!). Then we balk at the thought of installing a hundred dollars worth of ground protection!

Somewhere we lost our sense of values. Did you make sure the amateur gear is covered on the home-owner's policy? Did you get a "rider" to cover the computer and associated (amateur radio) equipment? Did you add that new piece of gear to that "Ham Radio" coverage bought through the club organization last year? Either you stay careless, or get real!

Time For Action

Let's do it! Let's build a ground system, then let's add the protection devices that may save us a bundle. There is always the chance that lightning will do a real number on us even though we've taken the best precautions against its menacing force. Even with the best ground system installed, there are times when a direct hit will still cause some damage, but the better the ground system, the less damage will be caused.

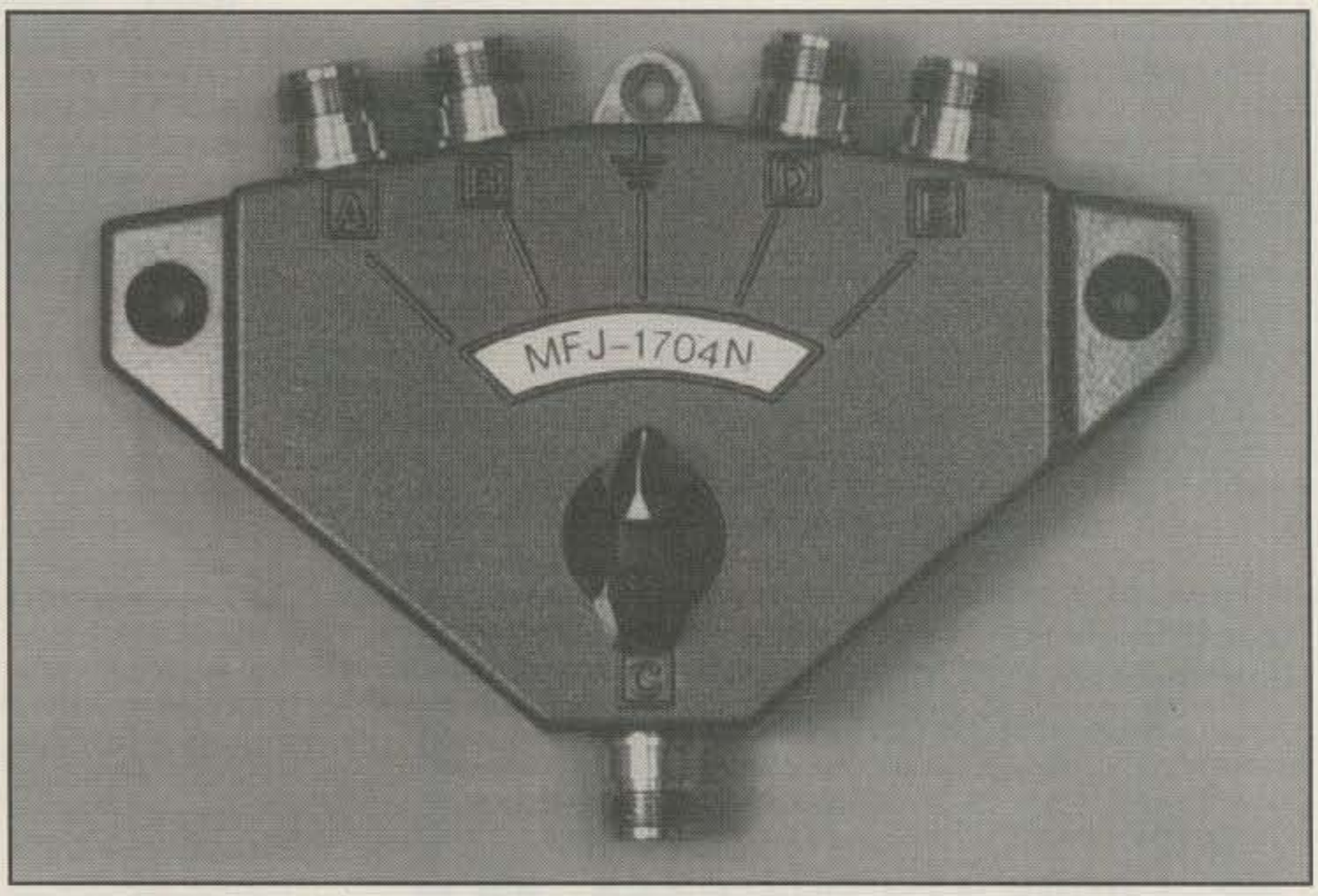
All our precious amateur equipment with external connections is susceptible to electrical damage from a variety of energy sources. These electrical connections provide a path for excess energy to damage sensitive circuits.

Electronic components are inherently vulnerable to damage from manmade and natural high-voltage and high-energy sources such as electrostatic discharge, lightning, and other electromagnetic pulses. As higher density and higher speed devices are introduced, device sizes decrease. The level of voltage and energy required to destroy components then also decreases.

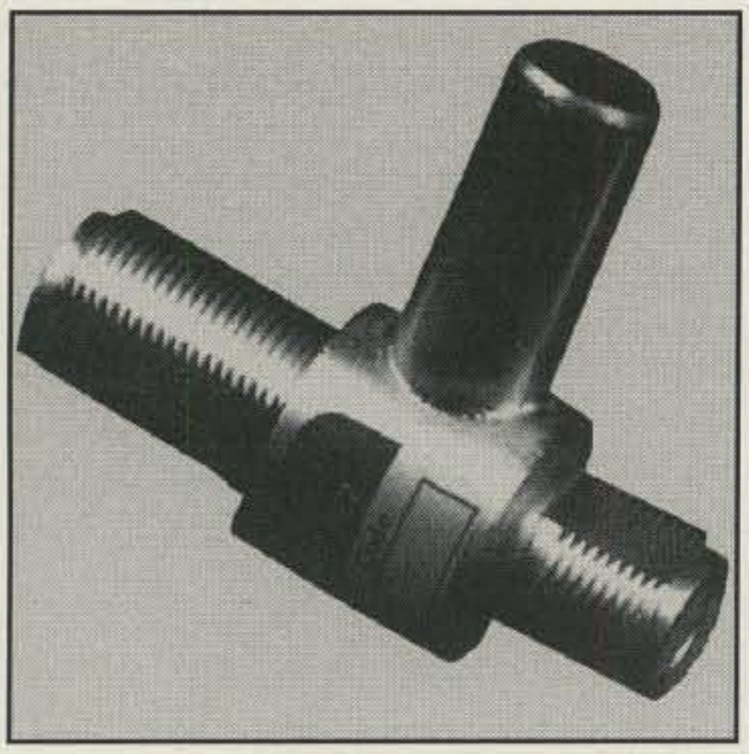
The Parameters

Lightning can couple into our station via the coax, the power line, or on the ground conduc-

Gas discharge tubes (GDTs) sense voltage. When high voltages or spikes occur, the GDT clamps the transient to ground. This one is made by NexTek; it covers from DC to 2.5 GHz.



The MFJ-1704 antenna coaxial switch, with four ports out, is a quick and easy way of removing the antenna from equipment during storms.



The quarter-wave stub is designed to allow the desired radio frequency to pass unattenuated, while shunting transient voltages to ground. The stub makes a dependable transient ground path that offers excellent protection for RF operational frequencies to above 5 GHz.

tors themselves. In some cases damaging voltages can enter through building structural members. Lightning current usually flows simutaneously into grounding systems, through the coaxial port protector, and in the power and ground wiring system. Predicting the origin of the transient voltages and the paths of current flow can be difficult.

Effective protectors therefore must stop transients originating from either side of the protector. Some coaxial protectors do not provide bi-directional transient limiting. It is also important that all conductive connections share a common ground to achieve effective transient protection. Remember, for complete protection of equipment all power and other wiring interfaces should be protected.

Two Schools of Thought

The gas discharge tube (GDT). Some protectors contain a replaceable gas discharge tube or protector element (see photo). These GDTs sense voltage, and when high voltages or spikes occur, the GDT clamps the transient to ground. The GDT provides high transient current capability, and excellent clamping action, in less than one microsecond.

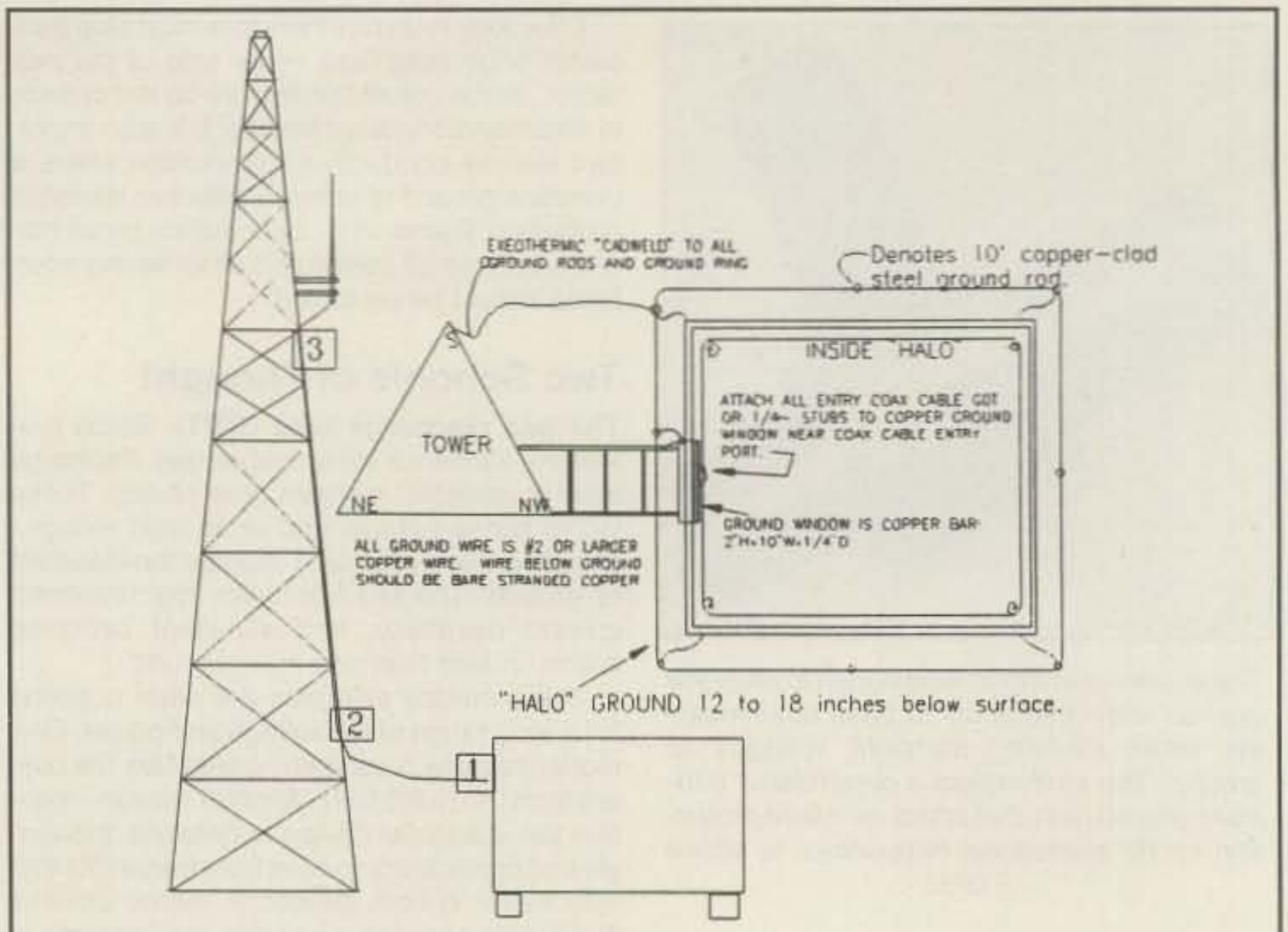
The protector elements are often supplied for a wide range of RF voltage and power. One model made by a company called NexTek covers from DC to 2.5 GHz. Another reason I mention this particular device is because this single unit protects equipment from transients that may travel in both directions. Some devices that employ capacitor isolation may operate in a narrow bandwidth and provide only half the needed protection.

The antenna coaxial switch. There is another device that you will find indispensable in the shack. The antenna coaxial switch with multiple ports makes for a quick and easy method of removing the antenna from equipment during storms and threatening weather. One such switch (with four ports out) is the MFJ-1704 (see photo). The MFJ-1704 also has a gas discharge tube built into the switch. Adding to the protective features of the MFJ-1704 is a separate switch position which places the antenna directly to ground when set to the "ground" detent.

The quarter-wave stub, or shorted stub. Another device that is popular with Andrew, NexTek, Northern Technologies, and other ground protection device vendors is the quarter-wave stub. The QWS is usually a frequency-dependent, quarter-wave shorted stub between the center conductor and the shield of the coax installed near the entry port to the shack or communications room (see photo). This device is designed so as to allow the desired radio frequency to pass unattenuated, while shunting transient voltages to ground. The stub makes a dependable transient ground path that offers excellent protection for RF operational frequencies to above 5 GHz.

The Ground Bar or "Ground Window"

All connections within the shack or communications room should be connected to a common point near the coax entry port. This "common" point is also referred to as a "ground window." A ground window is made of copper, usually about 1/4 inch thick by 2 inches high, and 10 to 12 inches wide. We use noncorrosive bolts and nuts to attach our grounds, or we use a "no-oxidation" compound to prevent oxidation (chemical action) between the two metal connections. In this way we are able to preserve the integrity of all grounds and maintain



(1) Attach ground at entry point to building.
(2) Attach ground to shield when coax begins vertical run upward.
(3) Attach ground to coax shield at top of vertical run before coax bends away from the tower. Keep all bends smooth—no sharp bends. This also applies to ground leads.

Fig. 1– An "ideal" shack ground system. Remember to preserve the integrity of the grounds; connect "all" grounds together.

some relationship to the external ground system (see fig. 1).

Unless we have built our shack atop a chunk of granite, we should try to achieve a ground as near perfect as possible. Perfect? Of course, I'm talking about a ground resistance below (better than) 5 ohms. In another installment of this column I'll take you through the use of the "meggar" or the use of a ground test instrument. For now, however, we have taken the first steps to protect our precious equipment—equipment that someday could be called on to help save lives or property in times of disaster, when all other modes of communication are out or have taken a direct hit from lightning!

Glossary of Packet Terms

This month we continue to provide definitions of some of the terms used in packet radio. Last month we covered "A" through "C." Let's see how much ground we can cover this month.

Data: Multiple units of information. Singular is "datum."

Data Circuit: Packet radio communications channels provided specifically for the exchange of data, as compared to voice or other information forms.

Data Communications Equipment (DCE): The device or TNC which provides signal conversion so that data communications can be established, maintained, and discontinued. Some DCE are controlled through local or remote software commands. Standards-body term for devices that perform signal conversion at the extremities of a data circuit. A data set (modem) or a CSU are common examples of a DCE. *(Compare to DTE; see below.)*

Data Rate: The basic rate at which data is transferred on a circuit. Often referred to as "baud rate." A more correct statement is bits per second, or bps. *(See baud, bps.)*

Data Terminal Equipment (DTE): The standards-body term for a computer, user terminal, work station, or personal computer used for data communications. Data Terminal Equipment is another name for the computer used to send and receive data in digital form at its comport (I/O) port to and from a terminal node controller (TNC).

DB-9P and DB-9S: Electronics Industries Association's recommended connector for use with RS-422A standard.

DB25P and DB25S: The connectors which will support all 25 of the RS-232 signals. Recommended by the EIA.

Dedicated Link: A point-to-point link between two dedicated ports for the exclusive use of those ports or nodes or for the use of stations passing through the network, using those two nodes.

Destination Field: Location in a message header that contains the address of the station for which the message is destined.

Deviation: The deviation of an FM radio is the maximum change or shift in the carrier frequency during modulation. It is usually expressed as peak deviation in kiloHertz.

Diddle: A term used to describe the AFSK tone shifting in some nodes and TNCs.

Digicom 64: A software-controlled modem package designed to emulate a TNC on a Commodore 64 computer.

Digipeater: A store-and-forward "digital repeater" which will receive and transmit a data packet on the same frequency. All amateur packet stations are capable of digital repeating in a simplex environment.

Digital Signaling: Using techniques that transmit information as a series of discontinu-

ous pulsed signals in a pattern representative of the inputted signals; requiring reconstitution at the receiver; capable of being regenerated to minimize noise contribution in transmission. (In contrast to analog.)

Diode Matrix: The device used to interface several TheNET nodes to enable communications over their RS-232 ports. When more than two TNCs are used at a node site, the diode matrix is required for cross-connection and internode linking.

DIP (Dual In-line Package): As applied to sub-miniature switches and monolithic integrated circuits.

Discriminator: In an FM radio the discriminator is the circuit that derives audio from the IF signal. After the discriminator the FM receiver will change the audio to remove white noise.

Downlink: A circuit from a node to a user, initiated by the node on command from a distant user.

DSP (Digital Signal Processing): A modern technique of analyzing analog signals by converting the analog signal to a digital form and processing it with a specialized computer circuit.

Dumb Terminal: A data communications euphemism indicating a DTE with no processing capability. The data equivalent of a KSR teleprinter.

Duplex: Two-way transmission. Duplex means two channel. A full duplex signal consists of two separate channels. Both ends of the radio circuit need to have a separate receiver and transmitter such that the receiver on each end can hear the other station's transmitter regardless of the state of the local transmitter.

Duplex Digipeater: Similar to a simplex digipeater, except that different receive and transmit frequencies are used. (Compare to a full-duplex real-time repeater, which repeats the received data at exactly the same time.)

DWAIT (Digipeat WAIT): A delay in sending a packet automatically inserted by a TNC when originating a packet. The delay starts when a packet is ready to be sent, after the channel becomes clear. A digipeated packet is sent without this delay. Used as a collision avoidance system when digipeaters are in use.

DxCluster: A server used by HF operators to pass information about contacts. This software, originally written by AK1A, also operates as a database of HF-related information. A key feature of the DxCluster software is DxClusters may share contact information in real time.

Dynamic Rerouting: In a network where redundancy exists in the backbone from one city to another, some types of network software allow for the network to recover automatically from backbone hardware failure by rerouting traffic through the redundant link. This is called "dynamic rerouting," as it can adjust dynamically to a changing network.

EOC (Emergency Operations Center): A term used by state governments for a state or county government owned facility where emergency services and radio equipment are co-located. The EOC provides for rapid deployment and coordination related to emergency communications and associated drills.

Earth Station (Ground Station): A microwave radio transmitting and receiving station working with communications satellites.

Echo: A signal that has been reflected or otherwise returned with sufficient magnitude and delay to be perceived at the far end of the circuit.

Electronic Mail: A feature of LANs for transmission of computer-generated messages within a closed community of users on the LAN.

EPROM (Erasable Programmable Read Only Memory): This is an integrated circuit (IC) which is used in computers, including TNCs, to permanently hold a computer program. In TNCs all of the program is located in one EPROM. EPROMs are erasable using ultraviolet light for between 2 and 40 minutes. EPROMs have a small lens in their top which exposes the internal electronics. The EPROM used for the X-1J4 is usually a 27C512.

False Route: In a network using NetROM, TheNET, and TheNET X-1J4 software the node routing is generated automatically by the nodes themselves. If improperly managed, it is quite possible for routing to be discovered and used by the nodes such that DX propagation paths are treated as real paths. In this case a route may be created in the routing table that depends on "Lift" or enhanced propagation conditions. When the lift disappears (mostly during daylight hours), the nodes will helplessly be trying the "false route." This condition is preventable in a TheNET system by manually controlling the route tables to specify valid routes to neighbor nodes.

FBBS: (Also FBB BBS.) An increasingly popular amateur BBS software written by by Jean-Paul, F6FBB, and others.

FCC (Federal Communications Commission): A board of President-appointed commissioners empowered to regulate interstate and international communications and all uses of radio in the United States. It operates under the Communications Act of 1934 and several more recent laws, and disseminates its own regulations interpreting those laws, as Title 47 of the Code of Federal Regulations (CFR 47, 47CFR).

FCS (Frame Check Sequence): A 16 bit (2 byte) number included with each frame in the packet used for error checking.

FEC (Forward Error Correction): A technique of error correction in which packets or AMTOR groups combine the data from two or more transmissions to yield less errors. In AMTOR FEC mode the data is sent twice and the receiving station(s) record all known characters without resorting to an ARQ ACK/NAK transmission.

Firmware: Permanent or semipermanent control coding, built into a software-operated computer device, that operates an application program, instruction set, operating routine, or other user-oriented instructions to a computer; often resident in a ROM (Read Only Memory) chip to simplify installation.

Flag: In data transmission, an indicator of an expected event such as the beginning or end of a block of data. In CCITT standards for X.25 networks, the 8-bit character 01111110 has been uniquely established with the name "Flag" to be used at the beginning and end of a block.

Flow Control: The process that starts and stops terminal output to prevent loss of characters or data by the receiving device. The ASCII control characters X-ON and X-OFF (Ctrl-Q and Ctrl-S) are frequently used examples. They are sent in reverse direction as an instruction for the sender to hold or continue (software handshaking).

FM (Frequency Modulation): A method of transferring data or voice information over a carrier signal. FM is achieved by changing the frequency of the carrier in proportion to the wave form of the superimposed audio signal, be it voice or data. In most FM voice applications the FM deviation is set to 5 kHz or less. In packet or digital FM communications the deviation is set between 3 and 3.5 kHz.

FRACK (FRame ACKnowledge delay): The time after a packet is transmitted by a TNC before the TNC decides that a frame acknowledge is not going to occur. At that point the TNC performs backoff (some TNCs + TCP/IP) and a retry. FRACK is calculated based on the number of digipeaters that you specify in your connect command.

Frame: In AX.25 packet radio communications a group of bits or characters sent serially, employing a logical unit of information between data link layer entities, which contains its own control information for addressing and error checking (example: MAXFrame).

Frequency: The number of complete cycles of an event (in communications typically an alternating current signal) per unit of time; usually expressed by means of the unit "Hertz," named after Heinrich Hertz, an early German investigator of the properties of high-frequency alternating current waves.

FSK (Frequency Shift Keying): A method of digital modulation where the carrier is switched between two distinct frequencies. This is the technique used on HF packet.

FTP (File Transport Protocol): This is a part of TCP/IP which allows a user of a TCP/IP host to request or send files from another TCP/IP station.

Summary

That's as much room as we have for this month. Next month we'll continue with the glossary, plus provide more packet information of note. Until then, Happy Packeting, and be sure to visit the Packet Radio Home Pages on the internet at <www.sedan.org>. 73, Buck, K4ABT

Upstate South Carolina Hamfest

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

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

Showcase *(from page 39)*

The Kitano Key

The Kitano Key is an iambic key which uses up and down motion from the fingers instead of lateral motion as is typical of a paddle. It may also be used as a straight key. It is rugged, does not "walk" on a desk, is lightweight (10 oz.), is solid brass, and measures 3.5" × 2" × 1.5". Two models are offered: one with a spring tension wheel (KK2; $85 plus $7 s&h) and one without (KK1; $55 plus $7 s&h). The KK2 is recommended for mobile use. The KK1 can be retrofit with the spring tension wheel. Each key is serially number for the collector, and they come with a 30-day guarantee.

For more information, contact the Kitano Key Company, Kit Raymond, N2LMC, 619 Cherry valley Rd., Princeton, NJ 08540 (609-924-0145), or circle number 106 on the reader service card.

Pocket-Size Morse Code Tutor™ From MFJ Enterprises

MFJ Enterprises, Inc. now has a pocket-size Morse Code Tutor that will help beginners learn Morse code. The MFJ-418 follows the ARRL/VEC format and can take beginners from knowing zero code all the way to solid copy. The Morse Code Tutor teaches individual letters, numbers and prosign sets first, and gradually combines previously learned sets with new sets to reinforce what was already learned. If you have trouble with certain characters, you can custom build and save a set of problem characters for extra practice. You can also practice copying realistic on-the-air style, plain English QSOs.

MFJ's Word Recognition Mode™ gives hundreds of commonly used words in amateur radio, allowing you to practice recognizing entire words instead of individual letters. The MFJ-418 allows you to choose letter, number, punctuation, prosign or code test sets, random callsigns, random words, QSOs, combination sets; or you can make up your own practice sessions.

The Interactive Mode™ lets you decide when to copy the next or previous group and how many. You can select normal or Farnsworth spacing. Farnsworth makes it easier to recognize entire characters and is adjustable from 10 to 60 words per minute. You can also use fixed length or more realistic random length groups. There are up to 8 characters per group setting. You can change speed while practicing. The speed of the Morse Code Tutor can be adjusted from 3 to 55 words per minute.

MFJ also offers SilkySmoothSidetone™ and SettingSaver™. SettingSaver automatically saves your individual custom-made settings. SilkySmoothSidetone give you TruTone™ sinewave and SoftStart™ dots and dashes, allowing you to concentrate on learning code without the distraction of harsh keyclicks. You can use earphones for private listening or built-in speaker for group practice.

The MFJ-418 measures 2.25" × 3.75" × 1" and weighs less than 5 ounces. The Morse Code Tutor requires a 9 volt battery (not included). For more information, contact your nearest dealer, or MFJ Enterprises, Inc. at 300 Industrial Park Road, Mississippi State, MS 39762 (phone 601-323-5869; fax 601-323-6551; Web site <http://mfjenterprises.com>), or circle number 103 on the reader service card. To order call toll-free 1-800-647-1800.

BY JOHN DORR, K1AR

CONTEST CALENDAR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Contesting For Newcomers!

April's Contest Tip of the Month

Here's an often-overlooked "transaction" in building contest scores: Share your contest operating plans with your significant other! While it may be risky to cross that chasm, the likelihood of arranging that "trip to Mom's" may increase substantially, leaving you unencumbered to focus on your score, not making amends. After 20+ years of contesting (and nearly as many wedding anniversaries), I've learned that I'm still the only one in my family who knows what's really happening during the last full weekend of October.

Although the final results of the 1996 Contest Survey are not complete, it's already clear that one topic needing more coverage in all contest writing is help for the newcomer. As is the case in most of life's endeavors, the experienced enthusiast often takes for granted his or her hard-earned knowledge. Contest operators are no exception. This month I want you to place yourself in the shoes of a new contester. In fact, many of you may already be there!

I began my contesting career by operating the Novice Roundup in 1970. To this day, I will never forget the combined exhilaration and confusion from that single operating event. I remember studying the rules and trying to make sense with a series of phrases and colloquialisms such as contest exchange, multipliers, off-times, and QSO points, to name a few. As I stumbled through the event, I wished there was someone I could ask who would tell me more about what I was doing.

As I've discovered in the surveys of the past few years (and the current one is no exception), contesters are at the risk of extinction unless we identify, train, and motivate a new and enthusiast group to replace the aging lot of current pros. If you are an experienced contester, this month's column may not be especially useful to you. However, sharing contesting fundamentals should be one of your basic charters. I encourage you to use these words to facilitate your own campaign to bring youth into our fold. If you're new to the sport, read on and let the games begin!

Some Basic Fundamentals

The logical first question is "What is a contest?" Contesting's beginnings took place nearly 70 years ago. The concept was originally developed in an attempt to improve the operating ability of amateurs around the world and further the state of the art. Those goals are not only admirable, but reflect many of the same tenets to which we subscribe today.

8 Anchor Lane, Mt. Sinai, NY 11766-1200
e-mail K1AR@contesting.com
Compuserve ID: 71301,424

Calendar of Events

Mar.	**29-30**	**CQ WW WPX SSB Contest**
Mar.	31	Low Power Spring Sprint
Apr.	1	Poisson d'Avril Contest
Apr.	5-6	MARAC SSB County Hunters Contest
Apr.	5-6	Italian YLRC Int'l Contest
Apr.	5-6	SP DX Contest
Apr.	5-6	EA RTTY Contest
Apr.	10-12	DX-NA CW YL Contest
Apr.	11-13	Japan Int'l HF CW DX Contest
Apr.	19	European SSB Sprint
Apr.	19-20	YU DX Contest
Apr.	19-21	Michigan QSO Party
Apr.	24-26	DX-YL Int'l HF SSB Contest
Apr.	26-27	Helvetia (HB9) Contest
Apr.	26-27	Nebraska QSO Party
May	3-4	ARI International DX Contest
May	3-4	Massachusetts QSO Party
May	3-4	Connecticut QSO Party
May	3-4	Ten-Ten Spring CW QSO party
May	17	European CW Sprint
May	**24-25**	**CQ WW WPX CW Contest**

To the novice contester, a contest is nothing more than a scheduled operating event designed to encourage amateurs to contact as many other amateurs as possible over a fixed period of time and frequency spectrum. These events range from domestic affairs to those employing a worldwide scope, such as the CQ World-Wide. You've probably noticed the litany of contest sponsorships in this column and other publications.

Contest operating ability and knowledge is an acquired skill that only comes from experience. While many operators have "instinctive proficiency" (i.e., the capability to copy fast CW, good hearing, etc.), the fastest way to increase your skill set is to meet other contesters and dive right into the fray.

Unfortunately, contests and contesters can also be intimidating. On CW, there are seemingly hundreds of stations sending at least 200 wpm. When listening to SSB, you find world-class experts working each other at rates of 5000 QSOs per hour. The new competitor says, "That's not an environment for me!" The key is to remember that each and every station you hear in a contest started right where you are today. The champions of the '90s were the newcomers of the '70s.

One of the best attributes of contest operating is its applicability to amateur radio operation overall. Nobody will ever complain about a skilled contest operator managing a natural disaster on the radio. A first-rate contester is a dream when that rare island comes on the air.

Let's take a minute to review some basic contest operating points:

1. Always sign your entire callsign when calling another station.

2. Accuracy is more important than speed. However, try to say/send the minimum amount of information necessary to complete a valid QSO as defined by the rules.

3. Practice, practice, practice. Not every contest is a "free-for-all." Many competitions are low key and offer a more subdued environment to hone your operating skills.

4. Practice your operating skills outside of contests. There's no substitute for improved CW skills and good ears on SSB.

5. Never give up or feel dismayed. Success in contesting is always a relative term. Most competing stations will never win. Those having the most fun compete against their previous accomplishments or a variety of other personal goals.

Are contests only for big stations?

Although contest operating can be intimidating, the answer is absolutely not! The key to contesting is establishing a goal for yourself. As I've said many times, there are only a few winners out of the thousands who participate in any given contest. Your goals can range from beating last year's score to improving your code speed. If contests were only for big stations, there wouldn't be contests; there just aren't enough big stations to go around.

What type of radio/options should I be using?

After recently reading through an amateur radio product catalog I received in the mail, I found myself being subjected to information overload. For a relatively small marketplace, there sure are a large number of products we can purchase. Although I'm not going to endorse a specific radio manufacturer, there are some basics you should look for in the "right radio." These include:

- Solid-state tune-up
- Digital displays
- Computer interface (RS-232)
- Selectable filtering options
- Reputation
- RIT/XIT
- DSP
- Dual VFOs
- Selectable attenuation

The advantages of the above are probably worthy of a separate column one day. Like most consumer purchases, it is easy to get caught up in the feature/function war between manufacturers. Don't forget that there is nothing better than good old-fashioned word of mouth, especially if you can get it from an experienced contest operator.

A second consideration in equipment has arisen in recent years—the computer. While operating in the ARRL DX Contest just a few months ago, I marveled at the maze of Pentium computers, TNCs, keyboards, displays, cables, and other "amateur" support equipment. The guidelines for computers in amateur radio should parallel the same requirements for any home system. A contest station without a computer is only slightly less inept than one without antennas!

The final area to contemplate is the myriad of accessories (mostly homebrew) that help define a contest station. Consider issues such as audio and antenna switching, remote access to station functions, etc. We'll look into this area in more depth in a future column.

What about antennas?

Antennas are a good addition to a contest station, and I recommend that everyone use them! All kidding aside, antenna-selection decisions are determined by several factors such as money, time, and/or real estate. The guidelines for choosing antennas should be no different for a contest station than for any other amateur setup. After all, whether you are interested in contesting, DXing, or just casual ragchewing, the usual goal is to have the best signal possible.

For years contesters have led the field in antenna innovation. Although most amateurs have limited resources to play in the mega-station field, a simple setup with a 60 foot tower, tribander for 10/15/20, 2-element "shortie" 40, and a few strategically placed dipoles can do amazing things. Another alternative is to focus on a single band and place all your efforts in that direction.

Don't forget that there are remarkable accomplishments that can be gained with wire antennas. For example, Phil, KT3Y, has done extremely well from his modest station with "wire-only" antennas. A pass through the *ARRL Antenna Handbook* (and other publications) will not only educate, but also will provide low-cost alternatives to the newcomer.

How do I choose my operating category?

Choosing an operating category begins by reading the rules and understanding your options. I am an advocate of multi-operator entries for the "novice" contester. If you are fortunate enough to latch onto an experienced contester, so much the better.

In recent years, the growth of packet radio (and resultant single-operator-assisted categories) has led me to believe that operating with packet spotting assistance is probably the most fun for a new contester from a small station. You have the combined advantage of making lots of interesting QSOs while honing your natural skills. It makes your entre into contesting significantly less lonely. Simply put, it's fun!

How can I maximize my score from a small station?

Most of the strategic skill in contest operating fundamentally can be based on common sense. Unfortunately, not everyone has the opportunity to operate from a contest "superstation." The vast majority of competitors use tribanders and dipoles. The question is: Can I have fun with that kind of setup and how can I make the most of it?

For most people, contesting is a sport that allows us to operate and "see what we can do." The issue of maximizing your score begins with an honest assessment of your station's strengths and weaknesses.If you are using a dipole on 40 meters, it is going to be difficult to compete in the world of large beams at the low end of the band. However, running up and down the band calling people can be very productive. Second, selection of operating times is key. If you have limited operating time, try to choose a schedule that matches the times when conditions are optimum for peak rates (i.e., 15/10 meters in the morning for Europe).

The advent of computers has assisted tremendously our ability to track progress during a contest. It may seem obvious, but always be sure to work the easy stuff! I remember a CQ WW where I forgot to work a Zone 3 (California) on 40 meters.

Operating from smaller stations actually forces you to be a better operator. It requires that you be more clever in signing your callsign in pile-ups (brute force just doesn't work). A strategic callsign placement during a lull in a pile often pays off! More important, the small station can still be very effective during the peak times of activity. My advice is to use your VFO liberally. And when you feel there is the opportunity to run stations, stay high in the band and avoid the "big guns."

Where can I get more info about contests?

Depending on your geographic location, there are a number of active contest clubs around the world that are interested in gaining new members. I, for example, belong to the Yankee Clipper Contest Club, which is located in the northeast part of the U.S. A fairly complete list of contacts can be found in *CQ*'s *1997 Amateur Radio Almanac.* The ARRL contest branch can help you with more information.

CQ Contest magazine and *The National Contest Journal* are excellent reading resources exclusively focused on contesting. Not only are there interesting articles and features, they can be useful to help identify specific contesters who would be more than willing to answer questions and provide direction to the

new operator. *CQ Contest* runs a regular feature for newcomers which includes a list of station owners looking to host new operators.

Contesting's Confusing Terms

The experienced contester uses a different vernacular. I discover this time after time when a non-amateur looks at my column and undertakes the impossible task of understanding the subject. What follows is hardly a complete list, but it is a beginning step toward unleashing the confusion that comes from our jargon.

Broken QSOs: Contest QSOs that have been proven to be illegitimate during the post-contest log-checking process. This type of contact occurs when a callsign or a portion of the exchange is copied incorrectly. It is rare to not find occurrences of this type in most contest logs (new or experienced operators).

Check Sheet: Antiquated by the advent of computer logging, this is a "paper method" for tracking stations that you have already worked in real-time. The use of a check sheet (in lieu of computers) can help you avoid wasted time working stations that you have already worked.

Club Competition: Contest clubs are not only a way to lead and encourage new operators in contesting, but result in "mini-competitions" between themselves. You will often see the cumulative scores of club members appearing in results of contests such as the CQ World-Wide, ARRL DX, or ARRL Sweepstakes.

Disqualification: Most contest entries are closely scrutinized and subject to disqualification as with nearly any other competitive sport. Runners of the 100 yard dash, for example, can be disqualified after their second false start. New contest operators should not operate with fear of contesting. Most disqualification criteria are designed to identify flagrant abuse of the rules and/or sloppy operating. Each contest usually defines its own disqualification criteria which should be reviewed before the beginning of the contest.

Duplicates: Contest rules and regulations are generally very specific regarding the accuracy of log submissions. For example, a basic contest QSO is not considered valid unless the minimum information (i.e., contest exchange) is transferred between stations. When a station is worked more than once on a single band (or on any other band in some contests such as the ARRL Sweepstakes), it is considered a duplicate QSO and must be removed from the contest log prior to final submission.

Exchange: The exchange is a pre-determined information set required by the rules to be interchanged between participating contest stations. Contests vary in the content of this requirement. Some common examples include RS(T) + QSO Number (i.e., 599001); RS(T) + CQ Zone; RS(T) + QTH (DXCC Country, State, County, ARRL Section), etc. This information, in addition to the callsign, is the basic information required to claim a valid contest QSO.

High-Claimed Scores: Many contest sponsors publish a list of high-scoring stations in each major category soon after the contest. This does not reflect the contest's final results. High-claimed scores are designed to provide an early indication of the contest's top scores prior to log checking.

Multi-Operator: This is one of the operating classifications in contesting. The most familiar form of multi-operator events is the ARRL Field Day. Multi-operator stations can use a single transmitter (i.e., "multi-single" class) or multiple simultaneous transmitters (i.e., "multi-multi").

Multiplier: The multiplier in a contest is one of the mechanisms used to compute the competitors' final score. The actual definition of a multiplier varies by contest. In the CQ WW, multipliers are DXCC countries and CQ Zones. Other contests use U.S. States or Counties, ITU Zones, ARRL Sections, etc. The final score of a contest operation is usually derived from multiplying the total number of complete QSOs times your total multiplier (see QSO points).

Operating Period: All contests specify a certain amount of operating time. The major DX contests are usually scheduled for 48 hours. Many others limit total operating time to a subset of this period. In addition, when you take a break, you are often required by the rules to use a minimum time for this activity. Refer to individual contest rules for more details.

Operating Frequencies: In order to reduce QRM across an entire band, many contest sponsors suggest certain frequencies for contest operation in their event. This is especially true for specialty events such as State QSO Parties. This practice is usually not practical for major events such as the CQ World-Wide due to their high participation level.

QSO Points: Many contest rules attempt to apply a "weighting factor" to QSOs when computing final scores. For example, a valid QSO within your continent may only be worth 1 point, while contacts with other continents are worth 3 points. Generally, the final score of a contest log is computed by adding all of your QSO points together and multiplying them by the total multiplier (see multiplier definition). Refer to various contest rules for further examples.

Rate: The rate measurement is a method of evaluating the speed with which you are entering contest QSOs into your log. It is often used as a measurement of your performance and helps guide the decision-making process for band/mode selection at any point in time. Rates are usually measured on an hourly basis (i.e., 60 QSOs/hour).

Run: This is an operating technique characterized by a contest station remaining on a single frequency for a sustained period of time working other stations that respond to the call "CQ Contest." Contest runs can range from a few minutes to several hours in which the operator can log 300+ stations per hour in extreme cases. Although larger contest stations are more likely to experience this operating environment, smaller operations can often enjoy this style of operating for short periods of time.

"Search and Pounce": This method of operating is the opposite of the run. It is characterized by tuning up and down the band looking for new stations to work. This is a common mode of operation when the contest is slowing down or conditions are poor. Smaller stations use this operating method more frequently, as they sometimes lack the "horsepower" to sustain long stretches of contest runs.

Single Operator: This is the operating category in which you operate by yourself (as opposed to multi-operator). In recent years, there have been changes to this class, such as QRP and assisted (i.e., using packet radio/2 meters as a way to help find needed multipliers).

Spotting: With the advent of packet radio, more and more contesters are using this technology to identify or spot rare stations for other competitors. Spotting is common among contest club groups and other packet users.

Final Comments

Well, we've certainly covered a lot of ground this month. I hope this information was useful in two ways: (1) To whet the appetite of the new contester by conveying knowledge of the sport, and (2) to motivate the experienced operator to share his or her insight with others.

Although I had the best of intentions to publish the final results of my 1996 Contest Survey this month, my work schedule got the best of me. (I'm thankful that at least someone invented the laptop computer!) Most of the labor-intensive tabulating work is complete, however. The results will be worth the wait—I promise!

Please remember to provide any submissions for the June column to me by April 1. More and more of you are catching on, but as you can imagine, you can really help my workload (and accuracy!) by submitting your contest announcements on disk (using practically any data format) or via electronic mail.

73, John, K1AR

42nd Annual Poisson d'Avril Contest

0000–1954Z Tues., Apr. 1

Sponsored by the French organization Legion International des Radio Professionels et Amateurs et Les Omelettes avec Oignons et Fromage, this is the 42nd running of this classic. The purpose is to promote the humorous use of amateur radio for international goodwill.

Eligibility: All present regularly issued licensees, friends, or other licensed stations.

Exchange: RS(T), serial number (actually any number you want), QTH (yours or any one you choose), and birthday (yours).

Scoring: Stations may be worked on all bands as many times as possible, but only once per QSO. Count one point for each station heard, worked, or imagined. Bonus points may be claimed for working any amateur whose picture appears on the cover of an amateur radio magazine or Wheaties box. Extra bonus points for making at least one QSO without using commercial, generator, nuclear, fossil fuel, battery, solar, chemical, biological, thermoelectric, or similar power sources. Other arbitrary bonus points may be claimed.

Multipliers: Every station worked or heard counts as a multiplier, but only once per QSO. Exception—stations in the District of Columbia do not count as multipliers unless they have flown aboard the Space Shuttle. Stations contacted while on board the Space Shuttle also count as DC.

Frequencies: Most activity is expected on 20 CW and 75 SSB. CW—1825, 3579.545, 7025, 10025, 14025, 18025, 21025, 24025, 28025; SSB—1850, 3799, 3830, 7095, 14220, 14256, 14313, 21200.5, 28888; SSTV, RTTY, AM/FM, Packet, AMTOR, CONDOR—usual frequencies; Telepathy—Vulcan digital protocol.

Entry Categories: Single-operator unassisted, single-operator assisted, single-operator incapable, single-operator improbable, multi-operator incompatible, living-legend, just-fooling-around, hell-bent-for-a-trophy, QRP, QRPp, QRO, and *really* QRO. Logs may be submitted on computer disk in anything *except* the standard ARRL format; 1 GB optical R/W drive with warranty in factory-sealed box preferred. All entries must include a signed declaration that the rules of the contest have been obeyed at least once.

Club Competition: Any club may submit an aggregate score. The winning club will be announced at the Greater Enon Amateur Radio-Vention and Kitefly (GEARVAKf) in Dayton, Ohio in May. Clubs may claim any known participant as a member without the usual meeting attendance requirement. ARRL affiliation is not necessary, nor is the existence of an actual club. We're easy.

Awards: There is an extensive awards program for this contest. Really extensive—no kidding. The actual awards are too numerous to list, but if you are a winner you will be notified by a uniformed U.S. Government employee. Members of the P d'A Contest Committee are ineligible for awards other than first place. Awards will be given based on score, entry creativity, and amount of cash enclosed with the log. The decisions of the judges are arbitrary and final.

Deadline: Logs must be postmarked by April 15, 1997. Extensions of up to 5 years may be granted upon request. All logs go to P d'A Contest Committee, 144 Kendall Pond Road, Windham, NH 03087. Include an SASE and substantial compensation for results.

EA RTTY Contest

1600Z Sat., to 1600Z Sun., Apr. 5–6

This is the 1997 edition of the Spanish RTTY Contest sponsored by U.R.E. It is open to participants worldwide on 80–10 meters.

Classes: Single operator, all bands and single band, multi-single, and SWL.

Exchange: Signal report and Spanish Province (for EA stations). All others substitute CQ Zone for Province.

Scoring: For non-EA stations—on 10–20 meters, credit 1 point for contacts in your continent, 2 points for QSOs outside your continent. On 40 and 80 meters, triple your QSO points (i.e., 3 within your continent). QSOs between stations in the same country are only valid for multiplier credit and have no QSO point value.

Multipliers: Credit EA provinces (maximum 52) and DXCC countries worked per band.

Final Score: Multiply total QSO points times multiplier.

Awards: Certificates and plaques are available to winners of each operating category.

Send entries by May 15th to: EA RTTY Contest, c/o EA1MV, Antonio Alcolado, P.O. Box 240, 09400 Aranda de Duero (Burgos), Spain.

Polish "SP" DX Contest

1500Z Apr. 5 to 1500Z Apr. 6

Sponsored by the Polski Zwiagek Krotkofalowcow (PZK), this one is on CW and SSB and is held the first weekend of April, generating high operating activity by the SPs. Contest operation is on all bands 160 through 10 meters (no WARC bands).

Classes: Single operator, single and all band (CW, SSB, or mixed mode); multi-operator, single transmitter (all band, both modes only); and SWL.

Exchange: Signal report plus a three-digit serial number. SP stations substitute their two-letter province abbreviation for the number.

Multiplier: Count the total number of Polish provinces worked (maximum of 49).

Scoring: Three points per QSO times the number of Polish provinces worked.

Awards: Certificates will be awarded to the high scorers in each class per country.

All logs must be received no later than April 30th. Send entries to: Polski Zwiazek Krotkofalowcow, Contest Committee, P.O. Box 320, 00-950, Warszawa, Poland.

MARAC County Hunters SSB Contest

0000Z Sat. Apr. 5 to 2400Z Sun. Apr. 6

The Mobile Amateur Radio Awards Club is sponsoring the 26th running of this event. Mobile and fixed operation from every county in the United States is welcome. Mobiles and portables may be worked each time they change counties or bands.

Exchange: RS(T), U.S. county and state (province/country for others).

Scoring: One point for fixed stations; 15 points for mobiles; US/VE contacts with DX countries are worth 5 points. Final score is computed by the total QSO points times the total number of U.S. counties worked.

Frequencies: 3880, 7240, 14270, 21340, 28340 kHz. Fixed stations should operate above the suggested frequencies to allow more freedom for mobiles to operate on clear frequencies.

Awards: Certificates will be awarded to winning fixed stations in each state/province/country, and mobiles in each state operating in three or more counties with a minimum of ten QSOs per county. MARAC plaques to the highest scoring first- and second-place mobile stations in the U.S., North American fixed station, and DX station.

Completed logs, summary sheets, and check sheets must be received by May 8th and go to: Alan Fischer, K8CW, 259 West Cook Rd., Mansfield, OH 44907. Enclose a #10 SASE and two units of postage with your entry for a copy of the final results.

Japan Int'l DX CW Contest (High Band)

2300Z Fri. to 2300Z Sun., Apr. 11–13

The object of this one is for amateurs around the world to work as many JA stations in as many JA prefectures as possible. It is sponsored by *Five-Nine* magazine. The maximum operating period is 30 hours (except for JAs, who can use the full 48 hour period), with off periods longer than 60 minutes. This is the high-band edition (others editions will follow in subsequent months), and operation is limited to 20–10 meters.

Classes: Single operator high power, low power, all band, single band; and multi-operator, marine mobile.

Exchange: JA—RST and prefecture number (1-50). Others—RST and CQ Zone.

Scoring: 20 and 15 meters—1 point per QSO; 10 meters—2 points. Multipliers are total prefectures worked per band (DXCC countries for JA). Final score is total QSO points times multiplier.

Awards: Plaques and awards will be sent to the winners in each class around the world. A special contest award will be offered to anyone working all Japanese prefectures during the contest period.

All logs must be postmarked no later than May 31st and should be sent to: JIDX LFCW Contest, c/o *Five-Nine* magazine, P.O. Box 59, Kamata, Tokyo, 144 Japan. Contest results will

be sent to anyone who includes one IRC and an SAE.

Michigan QSO Party

1800Z Sat. Apr. 19 to 0300Z Sun. Apr. 20
1100Z Sun. Apr. 20 to 0200Z Mon. Apr. 21

Co-sponsored by the Hazel Park ARC and the Eastern Michigan ARC, this popular QSO party is back with a new date! Participation is open to everyone.

Classes: Single Operator, multi-operator, and mobile.

Exchange: MI stations—RS(T), QSO number, and county (83 maximum). Non-MI stations—RS(T), QSO number, and US state, VE province, or DXCC country.

Scoring: Credit one point per QSO for SSB contacts; two points for CW. Stations may be worked once per band/mode. Final score is calculated by multiplying total QSO points times multiplier. QSOs with club stations K8EPV and W8JXU count 5 additional points each.

Frequencies: CW—1810, 3540, 3725, 7035, 7125, 14035, 21035, 21125, and 28025 kHz. SSB—1855, 3905, 7280, 14280, 21380, 28380 kHz. VHF—50125, 145025, 146550 kHz. Try 160 meters after dark on the even hours.

Awards: A wide variety of plaques and certificates are available to category winners.

Mail final logs by May 31, 1997 to: Michigan QSO Party (EMARC), P.O. Box 611230, Port Huron, MI 48061-1230. Logs may be e-mailed to <k8dd@contesting.com>. Attach an ASCII file <call>.prn or <call>.log and <call>.sum summary sheet. Include $1.00 (U.S.) with your log for a copy of the results, and to help defray the costs of mailing, printing, handling, etc.

YU DX Contest

1200Z Sat. Apr. 19 to 1200Z Sun. Apr. 20

The Yugoslav Amateur-Radio Association (SRJ) and the Yugoslav DX Club (YUDXC) invite amateurs around the world to participate in the 1997 YU DX Contest.

Classes: Single op (SSB only, CW only, mixed modes), and multi-single (the standard 10-minute rule applies to this category).

Exchange: RS(T) and ITU zone.

Scoring: QSOs with your ITU zone—1 point; QSOs with stations in your continent but different ITU zone—3 points; all others—5 points. Contacts are permitted with the same station on both modes.

Multiplier: ITU Zones and Yugoslav prefixes per band.

Final Scoring: Total QSO points times the total sum of multipliers worked per band.

Awards: Winning trophy cups will be awarded to the top YU and non-YU log. Certificates will be awarded to geographic area winners.

All entries must be postmarked no later than 30 days after the contest. Logs should be sent to: YU DX Contest, P.O. Box 48, 11001 Beograd, Yugoslavia.

YLRL DX to North America YL Contest

CW: Apr. 10–12 SSB: Apr. 24–26
1400Z Wednesday to 0200Z Friday

This is another popular YLRL sponsored contest open only to licensed women operators around the world.

Classes: Single operator only.

Exchange: QSO number, RS(T), and ARRL section/country. Entries in log must also show time, band, date, and transmitter power.

Frequencies: CW—3540–3570, 7040–7070, 14040–14070, 21120–21150, 28180–28210 kHz. SSB—3940–3970, 7240–7290, 14250–14280, 21380–21410, 28280–28410 kHz.

Scoring: Phone and CW are entirely separate contests. DX YLs, including Alaska and Hawaii, may contact the North American Continent. A station may be counted as one point and worked once per band for credit. Multiply the number of QSOs by your total multiplier (sections/countries) for final score. You may apply a bonus multiplier of 1.5 if less than 150 watts is used at all times during the contest.

Awards: Various cups and plaques will be awarded to the category winners. In addition, certificates will be provided to all second- and third-place winners.

Logs are due 30 days after the conclusion of each contest. Mail logs to: Nancy Hall, KC4IYD, P.O. Box 775, N. Olmsted, OH 44070-0775.

Swiss Helvetia Contest

1300Z Sat., Apr. 26 to 1300Z Sun., Apr. 27

This is a good chance to build up your Canton total for the Swiss Helvetia Award, which requires confirmation from all 26 Cantons.

Classes: Single op (high power or QRP), multi-single, SWL. All entries are mixed-mode only.

Frequencies: Use 1.8–28 MHz (no WARC bands) on both phone and CW.

Exchange: RS(T) plus a 3-digit serial number. Swiss stations will also include a two-letter abbreviation for their Canton.

Scoring: Only contacts with Swiss stations count. Each contact with an HB station is worth 3 points. You may only work a station once per band regardless of the mode.

Multiplier: The sum of the Cantons worked on each band (26 per band).

Final Score: Calculate your final score by multiplying your total QSO points by the sum of Cantons worked.

Awards: Certificates will be awarded to the top scorers in each country and each USA and VE call area.

Logging: Indicate a Canton in a separate column for each band the first time it is worked. Check your log for duplicates and include a summary sheet showing the scoring and your name and mailing address in block letters. Also include the usual signed declaration.

The mailing deadline for contest logs is May 31st. All logs are to be sent to: Nick Zinsstag, HB9DDZ, Salmendorfli 8, CH-5084, Rheinsulz, Switzerland.

Nebraska QSO Party

1700Z Sat. Apr. 26 to 1700Z Sun. Apr. 27

Help complete your 5BWAS by operating in this popular QSO party. This contest is for single operators only, with operation allowed on all non-WARC HF bands, 160-10 meters. All operating modes are permitted.

Classes: Single operator, multi-single, mobile, Novice/Tech, and club competition (three logs minimum).

Exchange: NE stations—RS(T) plus county (93 maximum). Non-NE stations—RS(T) plus U.S. state, VE province, or DXCC country.

Scoring: Credit one point per QSO for SSB contacts; two points for CW. Final score is calculated by multiplying total QSO points times multiplier.

Frequencies: CW—1805 kHz and 80 kHz up from lower band edge. SSB—1815, 3880, 7280, 14280, 21380, 28380, 146460 kHz. Novices operate 10 kHz up from lower band edge and 28380 kHz.

Awards: Five plaques are available for category winners in Nebraska, U.S., and overseas, as well as Novice/Tech/Tech-Plus stations. Certificates will also be awarded as appropriate.

Logs and a signed summary sheet must be postmarked no later than May 31st. Send all entries to: Nebraska QSO Party, P.O. Box 375, Elkhorn, NE 68022-0375. Enclose a #10 SASE for final results.

BY NORM VAN RAAY, WA3RTY

AWARDS

NEWS OF CERTIFICATE AND AWARD COLLECTING

Recently we have received numerous requests for a complete list of USA-CA All Counties Award holders. As a result,later on in the column this month we feature a list of all our past USA-CA All Counties Holders. An up-to-date listing is always available on the County Hunter Web Page at <http://www. delvech.com>. This page, with its wealth of information for County Hunters, is maintained by Don Flynn, K3IMC, and Mark Behrens, W4GP. They are doing a fine job, and I recommend that if you have access to the World Wide Web, you drop in on them from time to time. They are always updating the information.

Awards Issued

USA-CA 500: Gene T. Shcumat, UA9AB, #2956; C. Eugene Pearson, AA8MI, #2957; Gerd Uhlig, DL7VOG, #2958; David Selbert, KA2BOK, #2959; John R. Thompson, K6OHM, #2960.

USA-CA 1000: Nancy Walker, AA3DP, #1331; David Selbert, KA2BOK, #1332; John R. Thompson, K6OHM, #1333.

USA-CA 1500: Nancy Walker, AA3DP, #1194; David Selbert, KA2BOK, #1195; John R. Thompson, K6OHM, #1196.

USA-CA 2000: David Selbert, KA2BOK, #1099; John R. Thompson, K6OHM, #1100.

USA-CA 2500: David Selbert, KA2BOK, #1027; John R. Thompson, K6OHM, #1028.

USA-CA 3000: David Selbert, KA2BOK, #934; John R. Thompson, K6OHM, #935.

Awards Available

The Scottish Activity Century Award. The GMDX Group is reintroducing the Scottish Activity weekend to be held starting at 0001Z April 19th and lasting until 2400Z April 20th. It will be held the third weekend in April each year with the aim of encouraging activity by all radio amateurs in Scotland and to provide a worldwide interest in making contacts with Scottish amateurs. Activity is encouraged on all amateur bands by individual Class A licensees as well as Novice and club stations using their GM, GS, MN, MS or 2M prefixes as appropriate. A certificate, the Scottish Activity Century Award, is proposed for stations/SWLs for contacts made/logged during the event. Requirements are as follows:

Scottish participants: Contacts with overseas stations count 2 points per station per band. Contacts with UK/Eire stations count 1 point per station per band. Contacts with Scottish stations count 0 points. Novice participant contacts—points times multiplier of 2.

All other participants: Contacts with GM/MM prefixes count 1 point per band. Contacts with OS/MS prefixes count 5 points per band. Contacts with 2M prefixes count 10 points per band. Novice participant contacts—points times multiplier of 2.

SWL participants: On a heard basis for logging stations in contact with Scottish stations as above. (Note: No more than three loggings, including the same Scottish station allowed in any one hour period.)

The Basic Award requires 100 points; Silver Award 150 points; and Gold Award 200 points. Award fee is 3.00 pounds, US$5.00, or 10 IRCs. Send logs and application fees to Drew Givens, GM3YOR, 3 Murray Place, Gourock, Scotland.

Descendant of Chinggis Khaan International Radio Club Awards. The radio club is offering these awards to honor Chinggis Khaan, founder of the United Mongolian Empire, and his successors. The awards are available to all licensed radio amateurs and SWLs. They must be earned by separate contacts or reports made on or after March 30, 1968. QSLs are not required. Just send a GCR list signed by a local amateur radio society official or two licensed radio amateurs (SWLs okay).

The awards are issued for different modes and bands (160, 80, 40, 30, 20, 17, 15, 12, and 10 meters). The three award classes are:

Chinggis's Chronicle Award. Chinggis Khaan (1162–1227) was the founder of the United Mongolian Empire and ruled 22 years. He lived 66 years. Earn 66 points from the country list (see below).

Ugedei's Chronicle Award. Ugedei Khaan (1186-1241) was the third son of Chinggis Khaan and successor to the Mongolian Empire. He ruled 13 years and lived 56 years. Earn 56 points from the country list.

Hubilai's Chronicle. Hubilai Khaan (1215–1294) was the grandson of Chinggis Khaan and the successor who ruled 40 years. He lived 80 years. Earn 80 points from the country list.

Country List (all countries count as 4 points, except Mongolia, which counts as 10 points): Afghanistan, Armenia, Austria, Azerbaijan, Bulgaria, PR China, Czech Rep., Georgia, Germany, Hungary, India, Iran, Iraq, Italy, Japan, Korea, Kazakhistan, Kirgyzia, Philippines, Poland, Romania, Russia, Tataria, Turkey, Turkmenistan, Ukraine, Uzbekistan, Vietnam, and Mongolia.

The Chinggis's Chronicle Award offered by the Descendant of Chinggis Khaan International Radio Club.

SPECIAL HONOR ROLL

David Selbert, KA2BOK
USA-CA All Counties #918
February 2, 1997

John R. Thompson, K6OHM
USA-CA All Counties #919
February 4, 1997

HONOR ROLL

500

UA9AB	2956
AA8MI	2957
DL7VOG	2958
KA2BOK	2959
K6OHM	2960

1000

AA3DP	1331
KA2BOK	1332
K6OHM	1333

1500

AA3DP	1194
KA2BOK	1195
K6OHM	1196

2000

KA2BOK	1099
K6OHM	1100

2500

KA2BOK	1027
K6OHM	1028

3000

KA2BOK	934
K6OHM	935

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. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

Box 76, Pleasant Mount, PA 18453
e-mail wa3rty@epix.net

USA-CA ALL COUNTIES AWARD HOLDERS

(as of February 1997)

1. K9EAB 1965-08-15
2. WØBK 1965-11-09
3. K8CIR 1966-10-10
4. W2QHH 1967-10-04
5. WØBL 1967-10-13
6. WØGYM 1968-04-04
7. K1QZV 1968-11-02
8. K8IWI 1969-05-02
9. K8KOM 1969-05-13
10. NS9Y 1969-05-21
11. WAØEVO 1969-06-26
12. W2JWK 1969-08-14
13. K4LSP 1969-08-29
14. W8UMR 1969-09-13
15. N4PN 1969-10-01
16. W7KOI 1969-10-07
17. K1CXP 1970-01-02
18. K5DRF 1970-01-16
19. WA4BMC 1970-01-21
20. K4AUL 1970-01-22
21. WA3HGV 1970-01-30
22. W6HVU 1970-03-04
23. W1EQ 1970-03-23
24. K8BHG 1970-03-25
25. W8DCD 1970-04-06
26. W8DCH 1970-04-06
27. WØKZZ 1970-04-06
28. W7LUQ 1970-04-09
29. WA7IRD 1970-04-09
30. W4NXD 1970-04-14
31. K7WQJ 1970-04-27
32. WØSJE 1970-05-28
33. NJØC 1970-06-08
34. WB2SJQ 1970-06-29
35. W6DIX 1970-07-23
36. K7ZJP 1970-07-26
37. N4XE 1970-08-22
38. W2OST 1970-08-23
39. W5TQE 1970-09-12
40. N4GLV 1970-10-05
41. WA4YQC 1970-10-06
42. WAØSHE 1970-10-12
43. W4KA 1970-10-13
44. W7KBC 1970-10-15
45. K5KDG 1970-10-26
46. K4ISE 1970-10-28
47. WA8NDL 1970-11-03
48. W4GGU 1970-11-18
49. W5VD 1970-12-15
50. K1WQU 1970-12-25
51. W6JHV 1971-02-24
52. ZL1KG 1971-03-03
53. NFØN 1971-03-17
54. K7NN 1971-04-01
55. WAØSBR 1971-04-22
56. K2OO 1971-05-25
57. W4LXI 1971-05-29
58. K5RPC 1971-06-05
59. W9UZC 1971-06-09
60. W8MJG 1971-06-30
61. WAØJRZ 1971-07-27
62. N2BL 1971-08-20
63. WA9FZR 1971-08-24
64. W3JZY 1971-09-18
65. WØAYL 1971-10-06
66. WA1RAN 1971-11-13
67. WAØWOB 1971-12-01
68. WA1CXE 1971-12-02
69. W9DRL 1971-12-02
70. N2CW 1971-12-10
71. WA4LMR 1972-02-19
72. N4YY 1972-03-02
73. N5DGQ 1972-04-10
74. WB6CPE 1972-04-14
75. W4HA 1972-05-04
76. W6TCD 1972-06-23
77. WAØLRQ 1972-06-24
78. K3LXN 1972-06-29
79. WAØGZA 1972-07-13
80. W2KXL 1972-07-19
81. K1OAZ 1972-07-27
82. W7OK 1972-08-02
83. VE3CBY 1972-08-12
84. W4IZR 1972-08-21
85. K5BTM 1972-10-24
86. K9DCJ 1972-11-01
87. WB4FBS 1972-11-16
88. WDX6ETT 1972-11-22
89. K7JWZ 1972-12-01
90. WA4MGC 1972-12-22
91. WB6EXT 1972-12-30
92. W8WT 1973-01-03
93. K8ODY 1973-01-19
94. W3FNT 1973-01-23
95. WB5DVT 1973-02-01
96. WPE9ETT 1973-02-10
97. WA9OFF 1973-02-23
98. K8IQB 1973-03-28
99. W6UNP 1973-03-28
100. K8DCR 1973-03-29
101. W4LK 1973-04-24
102. WA4LSU 1973-04-23
103. WB6RMZ 1973-04-25
104. K9HRC 1973-05-10
105. W8UOQ 1973-05-16
106. KØAYO 1973-07-26
107. K7SQD 1973-08-14
108. WA3GLJ 1973-09-27
109. W5HDK 1973-10-13
110. W1AQE 1973-10-13
111. K4ELK 1973-10-16
112. K5VYT 1973-11-06
113. W3LDD 1973-11-12
114. K9UTI 1974-01-10
115. W8WUT 1974-01-10
116. WA6OTV 1974-01-14
117. K5HKG 1974-06-29
118. G4JZ 1974-11-07
119. KØARS 1974-12-26
120. N6UW 1975-03-22
121. AC2O 1975-03-03
122. W5VPV 1975-03-03
123. WAØCEL 1975-03-05
124. WA4WQG 1975-03-06
125. KØEQY 1975-03-28
126. W9ZD 1975-04-19
127. W1DIT 1975-04-21
128. WA6MAR 1975-05-10
129. WA5YSC 1975-05-15
130. K9QGR 1975-05-16
131. W5UUM 1975-06-26
132. K1QFD 1975-06-27
133. VE7ATI 1975-07-12
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135. WB5AKI 1975-09-02
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137. WA2GPT 1975-09-18
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139. W7WVD 1975-11-14
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141. W6CCM 1976-02-12
142. K8EUX 1976-02-17
143. VE4QZ 1976-03-12
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147. W8ZCV 1976-04-29
148. W9ABM 1976-06-10
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151. K5JBC 1976-06-19
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156. WA3TUC 1976-09-07
157. VE4EL 1976-09-22
158. W8CXS 1976-09-27
159. W4JVN 1976-11-12
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161. WA9CNV 1976-12-04
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165. AB5C 1977-01-24
166. W6HDV 1977-03-01
167. WØFBB 1977-05-31
168. KW3F 1977-06-09
169. W5AWT 1977-06-29
170. WA6ZUD 1977-07-21
171. W2QKJ 1977-07-26
172. W4YWV 1977-08-08
173. K1UNM 1977-08-11
174. W9CNG 1977-08-20
175. AK4N 1977-09-22
176. WB9DCZ 1977-09-09
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178. WB6EGQ 1978-01-21
179. WA1UVX 1978-01-23
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183. NI7B 1978-04-20
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187. K2PBU 1978-06-06
188. W9JR 1978-06-20
189. KØPFV 1978-06-23
190. VE1RQ 1978-06-26
191. N7TT 1978-08-27
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196. WB4TNY 1978-10-10
197. K7CLO 1978-10-10
198. WAØBPE 1978-10-21
199. WG9A 1978-10-28
200. WØKMH 1978-11-03
201. K4IUO 1978-11-06
202. VE1DI 1978-11-06
203. W5LXG 1978-11-17
204. K2LFG 1978-11-21
205. W2UP 1978-11-25
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207. W4SSU 1978-12-19
208. WN5MBS 1979-01-02
209. WB4AIL 1979-01-02
210. W7CUJ 1979-01-03
211. W4OWY 1979-01-12
212. KØMT 1979-01-19
213. WB4UPW 1979-01-22
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215. W5FS 1979-02-12
216. AD8W 1979-02-20
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218. K9DZG 1979-03-19
219. WO4L 1979-03-21
219. K8BRL 1979-03-21
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223. WA9GOH 1979-04-24
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229. W8NJC 1979-06-27
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232. WA9OBR 1979-07-13
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235. KR4MN 1979-08-07
236. WØDG 1979-08-13
237. WAØUHC 1979-08-13
238. KK6DU 1979-08-14
238. WA6JJC 1979-08-14
239. N6QS 1979-08-14
240. K7WUR 1979-08-24
241. KC4AE 1979-08-24
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266. W1FAB 1980-01-22
267. K3GOO 1980-01-28
268. AC2J 1980-02-06
269. KØXT 1980-02-19
270. N4ANV 1980-03-03
271. WØLRH 1980-03-11
272. W1ORV 1980-03-18
273. K7JJ 1980-04-04
274. K7SE 1980-04-04
275. K5IW 1980-04-05
276. WA4UNS 1980-04-11
277. W5VDW 1980-04-15
278. SM4EAC 1980-04-18
279. KE9O 1980-04-18
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282. K4ZT 1980-04-28
283. W6NAT 1980-05-02
284. WB2NFB 1980-05-16
285. K2UVG 1980-06-13
286. N9ER 1980-06-16
287. KC7EI 1980-06-19
288. K6RLR 1980-06-24
289. WØDSY 1980-06-25
290. W5VNW 1980-07-05
291. WB4ZXP 1980-07-07
292. WA3ZTY 1980-07-25
293. KBØXB 1980-07-30
294. WAØRJJ 1980-07-31
295. W7ULC 1980-07-31
296. W5UMD 1980-08-01
297. W4EHN 1980-08-25
298. WB7AYN 1980-08-25
299. KE6RN 1980-08-25
300. KL7MF 1980-08-27
301. WA3ZMY 1980-09-26
302. K9DAF 1980-09-29
303. N2RT 1980-11-06
304. WDØEMS 1980-11-06
305. W2MEI 1980-11-10
306. N7CLA 1980-11-21
307. VE4ZX 1980-11-25
308. WA2JFL 1980-11-28
309. WD9BCG 1980-12-18
310. VE3BFJ 1981-01-08
311. K4ZA 1981-01-03
312. WA6GQY 1981-02-03
313. WD4HVZ 1981-02-06
314. AH6IP 1981-02-12
315. WB5YDH 1981-03-16
316. W8UPH 1981-03-20
317. W5QEM 1981-03-23
318. KCØUJ 1981-04-02
319. WA3UQR 1981-04-06
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322. WBØAXN 1981-04-18
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324. K6XZ 1981-04-25
325. W4XT 1981-05-08
326. W7LQT 1981-05-11
327. WB7OHB 1981-05-13
328. WB7WBZ 1981-05-16
329. K9CSL 1981-05-26
330. WA5DTK 1981-06-01
336. Y5RS 1981-06-06
332. WA4AUL 1981-07-13
333. NZØA 1981-07-27
334. WA2TJL 1981-07-31
335. W9FD 1981-08-01
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337. AC8F 1981-08-29
338. K1NWE 1981-09-04
339. WD8AYN 1981-09-11
340. WB9ELH 1981-09-14
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342. K1YRP 1981-09-29
343. WB9YZE 1981-09-30
344. WB5KEA 1981-10-06
345. WW1N 1981-10-06
346. K9EHP 1981-10-09
347. NGØT 1981-11-05
348. WB5UJO 1981-11-06
349. WD7N 1981-11-09
349. WBØGRN 1981-11-09
350. KA5A 1981-11-09
351. WBØMNE 1981-11-09
352. N9ATA 1981-11-30
353. N8BNI 1981-12-03
354. W5RBO 1981-12-05
355. WN4M 1981-12-23
356. W1VJ 1981-12-28
357. N5QQ 1982-01-11
358. VE3GCO 1982-01-14
358. VE3XN 1982-01-14
359. KB7W 1982-01-18
360. W1III 1982-01-22
361. KC9DD 1982-01-27
362. NØBHO 1982-02-04
363. WAØYFQ 1982-03-08
364. KDØU 1982-03-08
365. WA2AKJ 1982-03-11
366. WAØSGJ 1982-03-15
367. AG9S 1982-03-19
368. KI4W 1982-03-29
369. K1VSJ 1982-04-02
370. W4ARH 1982-04-08
371. N7AKG 1982-04-12
372. N9CHU 1982-04-14
373. K7GTK 1982-04-16
374. WØGOR 1982-04-19
375. N7BKW 1982-04-19
376. K9BX 1982-04-27
377. K4QFK 1982-05-03
378. N4CCJ 1982-05-06
379. W1WHQ 1982-05-07
380. W1SXX 1982-05-15
381. KS5A 1982-05-22
382. K5MOF 1982-06-01
383. WB6ALC 1982-06-05
384. KB7QO 1982-06-07
385. WB6GMM 1982-06-12
386. KKØV 1982-06-12
387. AI5P 1982-06-18
388. WA3HMJ 1982-06-21
389. K5WQM 1982-07-06
390. WBØLOU 1982-07-12
391. KK5P 1982-07-23
392. KM4W 1982-07-31
393. W5PWG 1982-08-07
394. WAØLKL 1982-08-16
394. KØVPP 1996-08-02
395. WB5CWI 1982-08-21
396. WA9IWM 1982-08-21
397. KD4PY 1982-09-04
398. W8ILC 1982-09-08
399. N8BLO 1982-09-20
400. VE3BHZ 1982-09-23
401. N8BGF 1982-10-07
402. KU9G 1982-10-19
403. W1JR 1982-10-19
404. W4KFA 1982-11-15
405. KCØMB 1982-11-16
406. W1APU 1982-11-23
407. KN5I 1982-11-26
408. KD6PY 1982-12-03
409. VE4SK 1982-12-09
410. N7AKT 1982-12-18
411. KF5F 1982-12-23
412. WA3QNT 1983-01-10
413. WD9GBH 1983-01-17
414. WB2WZE 1983-01-22
415. W8GZF 1983-01-14
416. N9TN 1983-02-08
417. ON4UN 1983-02-17
418. NØCKN 1983-03-18
419. W5EHY 1983-04-19
420. VE7ATH 1983-04-27
421. W2XQ 1983-05-02
422. N8AIL 1983-05-03
423. KS7T 1983-05-14
424. KD4DJ 1983-05-31
425. WAØMQM 1983-06-02
426. K7XN 1983-06-11
427. W5QLD 1983-06-18
428. K2HVN 1983-07-02
429. WA6UFY 1983-08-18
430. WØRSR 1983-08-25
431. WDØCFZ 1983-08-26
432. WV5S 1983-08-31
433. KKØL 1983-09-06
434. N1GMU 1983-09-10
434. N1GMU 1983-09-10
435. K5CKQ 1983-09-14
436. KX2W 1983-09-19
437. N5BDY 1983-09-26
438. AB4HR 1983-10-03
439. KCØJG 1983-10-12
440. KCØVB 1983-10-30
441. WBØTVL 1983-11-05
442. NØCOL 1983-11-05
443. KC2RS 1983-11-12
444. W3ARK 1983-11-19
445. N5DUQ 1983-11-21
446. W6KAW 1983-11-25
447. KC5UO 1983-11-29
448. W1CRL 1983-12-02
449. K8MW 1983-12-03
450. WØEWH 1983-12-05
451. K2YIY 1983-12-21
452. WA2JTY 1983-12-22
453. W2IN 1983-12-22
454. VE7AIO 1983-12-29
455. KB3SN 1984-01-05
456. KA2K 1984-01-07
457. AI1Q 1984-01-07

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(cont.)

458...KB5DM 1984-01-09
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462...W1EKZ.....1984-02-20
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477...N8GEQ.....1984-06-02
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479...KCØVA.....1984-07-01
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488...K4BZV 1984-11-30
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692...W3SQA.....1991-01-25
693...K7IOO.....1991-01-26
694...KG8I 1991-01-31
695...AA4LY 1991-02-11
695...K4SL.....1991-02-11
696...K8BXT 1991-02-14
697...NU9M 1991-02-14
698...WA6KHK 1991-02-25
699...WDØEAM.....1991-02-25
700...K8GPC 1991-03-06
701...KW3H 1991-03-07
702...KCØZU.....1991-03-12
703...OE2EGL 1991-04-01
704...NV6L.....1991-04-06
705...NA5F 1991-04-10
706...KF4FP 1991-04-13
707...VE2YM 1991-04-17
708...WI9C.....1991-04-26
709...K8KIR 1991-05-02
710...KB3WN.....1991-05-04
711...W3RWJ 1991-05-23
712...W5MW.....1991-05-30
713...KA3DRO.....1991-06-04
714...NZ8Q.....1991-06-04
715...K1BM.....1991-06-07
716...KD9OT.....1991-06-10
717...WA4IMC 1991-06-17
718...KA5VWD 1991-06-20
719...W5UGD 1991-06-27
720...KJ4LG.....1991-07-01
721...N6ERM.....1991-07-20
722...K4JFI 1991-07-22
723...ND1H.....1991-07-31
724...KQ1Z.....1991-08-07
725...WØAWP.....1991-08-15
726...WB9QNX.....1991-08-15
727...W4HSA.....1991-08-23
728...VE1GU 1991-09-03
729...W6TMD 1991-09-16
730...N6PLQ.....1991-09-21
731...VK5AQZ 1991-10-25
732...N9HRX 1991-11-14
733...W5RIT 1991-11-15
734...WØWYJ 1991-11-25
735...K5TVC.....1991-11-30
736...VE3FNM.....1991-11-30
737...KC4DUP.....1991-11-30
738...KA5ZXF.....1992-01-07
739...N8AJC 1992-01-10
740...KC4SF 1992-01-14
741...VE1AIT 1992-01-16
742...K4BBF 1992-01-27
743...KJ4JC.....1992-02-08
744...WD8AGC.....1992-02-08
745...KA1JPR.....1992-02-01
746...KF7RU.....1992-02-25
747...WA1FNS.....1992-02-27
748...W9OP 1992-02-27
749...K9AGB.....1992-03-05
750...KE9CA.....1992-03-05
751...HR1KAS 1992-03-05
752...K5AAY 1992-03-06
753...NWØF 1992-03-09
754...WB9HEB 1992-03-09
754...WD9HEB 1992-03-11
755...AC4MP 1992-03-13
756...K2NJ.....1992-03-13
757...KN4Y 1992-03-17
758...G5PQ.....1992-03-20
759...KB3GN 1992-03-25
760...WD9HAW 1992-03-25
761...WA5OPO.....1992-04-01
762...N8ELQ.....1992-04-20
763...N4IXV 1992-04-23
764...WØWYX.....1992-05-01
765...N6OKX 1992-05-01
766...I6FLD.....1992-05-21
767...WB4CCT 1992-05-29
768...WM9F 1992-06-05
769...N7POK 1992-06-11
770...AA2AV 1992-05-16
771...KD8HB.....1992-06-29
772...W8PN 1992-07-09
773...WV2B 1992-07-10
774...KK6BB.....1992-07-20
775...KN4JR 1992-07-24
776...K6PQA.....1992-08-03
777...SM4BNZ.....1992-08-11
778...AA4LB 1992-08-13
779...NW1O.....1992-08-17
780...N9AC 1992-08-17
781...NC2O.....1992-08-29
781...KD4Z 1982-08-29
782...N4SMH.....1992-09-03
783...WD4NEG.....1992-09-10
783...AB4SL 1995-07-05
784...W3DYA.....1992-09-17
785...KD2Q.....1992-10-15
786...KM8U.....1992-10-19
787...N8FEB 1992-10-19
788...AA9CW.....1992-10-24
789...WA2CNJ.....1992-11-04
790...N7LWX 1992-11-20
791...HB9RG 1992-12-22
792...KS3I.....1993-01-01
793...NV6I.....1993-01-08
794...WA4HXG 1993-01-08
795...NØLDT 1993-01-27
796...N2JNE 1993-02-22
797...AA4HD.....1993-03-12
798...WA8KIW 1993-03-20
799...N6HJY 1993-03-26
800...AB4QD 1993-05-06
801...KO4QZ 1993-05-06
802...KI6YX 1993-05-06
803...KA5PVB.....1993-05-11
804...NO2W.....1993-05-20
805...N2ARE.....1993-06-07
806...N1API 1993-07-01
807...AA7CP.....1993-07-03
808...KV1M.....1993-07-23
809...W3FG 1993-07-26
810...KA9PZS.....1993-08-21
811...WU8Q.....1993-08-25
812...WD9EJK 1993-09-08
813...WB3HTK.....1993-09-16
814...ND3T 1993-09-27
815...N7OTR 1993-09-27
816...PT2TF.....199-31-022
817...W5VRA.....1993-10-23
817...W4NUL.....1993-10-23
818...AJ3X 1993-10-25
819...WD6CKT 1993-10-29
820...K3IMC.....1993-11-03
821...KFØYF 1993-11-08
822...WA2MUA.....1993-11-14
823...W2BUO 1993-11-16
824...WB3IET 1993-11-25
825...KA7JAS 1993-12-09
826...KK7X 1993-12-22
827...KG5UZ.....1994-01-05
828...AB4OQ 1994-01-13
829...KA6SWI.....1994-01-20
830...SM5BHW.....1994-01-30
831...N5UR.....1994-01-31
832...WA2AKB.....1994-02-10
833...KFØLZ.....1986-10-04
833...KQ6FS.....1994-02-11
834...NC6M 1994-04-15
835...N6PYN.....1994-04-26
836...W5FHL 1994-04-26
837...WØDFK.....1994-05-19
838...WA2UJH.....1994-05-19
839...PS8YL 1994-06-12
840...WØULU.....1994-07-14
841...W9GPC 1994-07-29
842...AA6PI 1994-08-06
843...N5QOS 1994-08-06
844...N4MYZ 1994-08-06
845...KM6QF 1994-08-05
846...KJ5PQ 1994-08-27
847...KA3MMM.....1994-09-11
848...KEØAY.....1994-09-15
849...N4UGH.....1994-09-17
850...KE2EA.....1994-12-23
851...K1DFO.....1994-12-23
852...N1FJR 1994-12-23
853...W4XQ.....1994-12-23
854...KD4NFE 1995-01-08
855...KBØFQC.....1995-01-08
856...WB4HIN.....1995-01-31
857...NX5Z 1995-02-01
858...WAØRKQ.....1995-02-06
859...W6ISQ.....1995-02-28
860...N5BLK 1994-02-28
861...WS3F.....1994-02-28
862...K5GE 1995-03-13
863...KA4BHL.....1995-03-28
864...KS4Q 1995-03-28
865...NØDRX 1995-04-03
866...KM4ES 1995-04-15
867...KK6QW.....1995-04-29
868...GM3BCL.....1995-04-29
869...KE2FZ 1995-05-22
870...WU3H.....1995-06-19
871...K1ER 1995-06-19
872...KE2C 1995-07-05
873...AB5SL 1995-07-05
873...K5CWR.....1995-07-05
874...N2TPH.....1995-07-31
875...NR2F 1995-07-31
876...VE3EEM 1995-08-05
877...NH6SR 1995-08-20
878...N4UJK 1995-08-20
879...KN4XP.....1995-08-20
880...WV1Y 1995-08-20
881...KA1CLV.....1995-09-01
881...N1IA.....1995-09-01
882...W8QOI.....1995-09-01
883...N4CD.....1995-09-11
884...KF7SG.....1995-09-22
885...KN4RI.....1995-09-24
886...WB8JZN 1995-10-12
887...W4KZT 1995-10-12
888...NB6A 1995-10-27
888...KØGO 1995-10-27
889...W9SUQ 1995-10-27
890...KBØG.....1995-11-25
890...N3XX 1995-11-25
891...KG7GV 1995-12-07
892...NØVWD 1995-12-11
893...N8LXQ.....1996-01-28
894...WD8DON.....1996-01-28
895...WA7JHQ.....1996-02-23
896...KB5DQ 1996-03-10
897...W5AL.....1996-03-22
898...N8COI.....1996-04-28
899...N4MM 1996-05-10
900...VE1BES.....1996-05-12
901...KØTVY 1996-07-06
902...KC1NA.....1996-08-02
903...WB9OOG 1996-08-02
903...W4GP.....1996-08-02
904...W1NHJ 1996-08-27
905...K6YK 1996-08-27
906...KEØVB.....1996-08-30
906...KØVB 1996-08-30
907...KA7AKJ 1996-08-30
908...WA3RTY.....1996-08-30
909...AA4HL 1996-11-02
909...KA1Q 1996-11-02
910...W9MYZ.....1996-11-02
911...KC6CNV.....1996-11-02
912...SM6VR 1996-11-02
913...WD3P 1996-12-03
914...VE9DH.....1996-12-03
916...WB9RJW.....1997-01-07
916...KCØIA.....1997-01-07
917...WWØG.....1997-01-07
918...KA2BOK.....1997-02-02
919...K6OHM.....1997-02-04

The fee for each award is US$10 or 20 IRCs. Apply by *registered mail* to: Award Manager, G.P.O. Box 820, Ulaanbaatar 210613, Mongolia, Asia.

International Marconi Day Award. The Cornish Radio Amateur Club is offering a special award certificate for working International Marconi Day stations. Operation in 1997 will take place from 0000–2359Z on Saturday, April 19th on all HF bands with the main mode of operation being SSB. However, all modes are permitted and encouraged. Only one contact with each participating IMD special event station will count towards the award. The award is not cumulative; contacts made in previous or subsequent years with an IMD station will not count towards the award. The required number must be worked in the same 24 hour period.

Following are the available award classes:

Transmitting Amateur. Work 15 of the official participating groups on two-way communication. Mixed modes permitted.

Transmitting Amateur, Mobile. Work 12 of the official participating groups on two-way communication. Mixed modes permitted.

Transmitting Amateur, CW. Work 15 of the official partipating groups on two-way communication on CW only.

Transmitting Amateur, Digital Modes. Work 15 of the official partipating groups on two-way communication using digital modes only (e.g., AMTOR, PACTOR, RTTY, AX25, ASCII).

Transmitting Amateur, Multi-Operator. Clubs/ groups can take part and gain the award by working 20 official participating groups on two-way communication. Mixed modes permitted, or either CW or digital modes, also 20 contacts.

Shortwave Listeners. Log two-way communications made by 15 of the official participating groups. Mixed modes permitted.

Shortwave Listeners, CW. Log two-way communications made by 10 of the official participating groups using CW only.

The following list of participating stations is provisional and should be used as a guide only. Confirmations have not been received from all of the regular IMD groups.

CT1TGM, EI2IMD, EI3IMD, EI4JAM, EI6YXQ, ED7IMD, GBØIMD, GXØMWT, GB2GM, GB2MDI, GB2SFL, GB4JAM, GB4MDI, IYØGA, IYØORP, IY1TTM, IY1MR, WB6TMY/IMD, PQ1MD, PS1MD, PU1MD, PW1MD, ZW1TTO, VE1IMD, VO1IMD, TMØIMD, DAØIMD, EI3MFT, EI4IMD, EI5IMD, GBØMAR, GB1IMD, GB2MID, GB4IMD, GB4MD, GB4MPC, GB5MD, GB2MD, IYØTCI, IY4FGM, W1AA/IMD, OE1M, PR1MD, PT1MD, PV1MD, PX1MD, NW2P, ZW1USK, ZS6IMD, ZW1LL, VK2IMD, IY4W.

73, Norm, WA3RTY

The Ugedei's Chronicle Award.

The Hubilai's Chronicle Award.

DX

BY CHOD HARRIS, VP2ML

NEWS OF COMMUNICATION AROUND THE WORLD

Heard and Working Split

As I pound out this column (in the San Francisco airport on my way to the Tropical Hamboree in Miami), the VKØIR Heard Island DXpeditioners are sailing away from Heard on their way back home. They have just completed what probably will be regarded as the best DXpedition in the long history of DX.

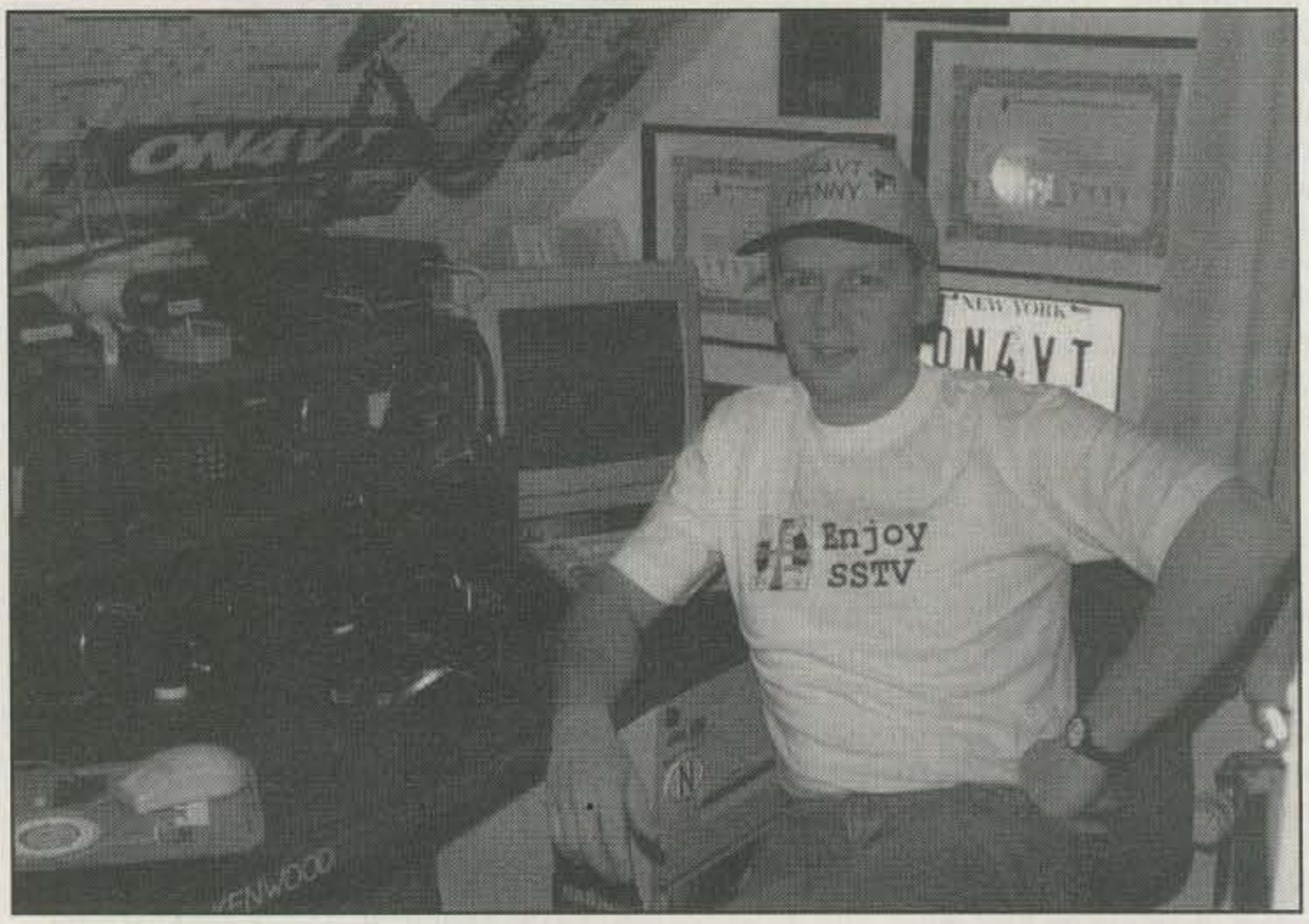
The VKØIR team put up with long weeks away from home, marginal (and much worse) weather, poor band conditions, and considerable personal expense. (Each DXpeditioner chipped in $10,000 of his own money for the trip, plus traveling expenses.) All this to go to what is probably the most difficult place in the world to which to venture.

Many DXers questioned the wisdom of going to Heard, the second Most Wanted country in the world after North Korea, at the dead bottom of the sunspot cycle. These DXers feared that the expected poor propagation to amateur-rich areas would severely limit the number of QSOs and perhaps shut out other than big-gun DXers. The organizers of the Heard DXpedition—Bob Schmeider, KK6EK, and Peter Casier, ON6TT, well-experienced DXpeditioners—said not to worry; the QSOs would come.

And come they did! The VKØIR DXpeditioners made 80,673 contacts, a new record for a DXpedition. Of these, more than 45,000 were on CW and 33,000 on SSB. To answer the naysayers, VKØIR made 230 contacts on 10 meters and close to 10,000 on 15 meters. Who needs sunspots when you have Heard Island on the other side of the pile-up? VKØIR made some 7000 contacts on 30 meters, and a remarkable 1200 on 160 meters.

At least as remarkable as the total number of contacts was the number of different callsigns worked—more than 25,000. The number of active DXers worldwide, measured by those who made at least one DXCC submission in the last two years, is around 7000. The total number of mixed DXCC holders is not much greater than the number of different stations VKØIR worked. Working more than three times the number of active DXers suggests VKØIR worked far down into the ranks of DXers, would-be DXers, and a whole lot of just plain folks.

This superbly organized and operated DXpedition not only has set a new standard in DXpeditioning, but also has given all of amateur radio a shot in the arm when it dearly needs it. The Heard Island Internet reflector was filled with touching stories of DXers and others recounting their positive experiences working VKØIR. Many long-inactive DXers dusted off their radios and keys to make a contact with VKØIR. Others braved the unfriendly elements of midwinter in the northern hemisphere to erect new antennas to work Heard. One delightful story concerned KD8JN, a father and DXer who enlisted his nine-year-old daughter to help put up a 30 meter wire in the rain. When he commented that the very low wire probably wouldn't be enough to reach distant Heard, the daughter told him not to worry. After all, he had told her that antennas erected in the rain *always* work! And, in the case of VKØIR, that antenna, and the antennas of 25,000 other amateurs, did indeed work.



ON4VT waited until he had all 200 zones before sending in his application for DX's most difficult award—CQ's 5-Band Worked All Zones.

My own experience working Heard was probably typical. A series of winter storms (yes, Virginia, we *do* get cruddy weather out here in California) and some roof repair work had eliminated all my low-band antennas. The 12/17 meter beam had lost half of both elements, and it wouldn't work on SSB with only the left halves of the elements. The weather was so bad, including wind gusts above 60 mph, that any tower work was out of the question. In fact, trying to put up wire antennas in such wind is a losing proposition. I got wet, but no new antennas.

The combination of the low sunspot numbers, near zero for much of the VKØIR DXpedition, and the sorry state of my antenna farm meant I was limited to 20 meters for my VKØIR QSO. The west coast is almost halfway around the world from Heard, and certainly the most difficult part of the world for the VKØIR operators to contact. During the entire DXpedition VKØIR *never* moved my S-meter. It was S-0 at best, and during 80–90% of the limited west-coast openings VKØIR was in the noise at my QTH. Even worse, the only available opening between the west coast and Heard was the long-path opening, in the early morning in California. My mountaintop QTH has a wonderful take-off angle in every direction except northeast, where Telegraph Hill towers above my antenna. In most pile-ups in other directions, if I have to call twice, I'm probably on the wrong VFO. However, such was not going to be the case with Heard.

As any good DXer should, I nearly wore out my antenna rotor searching for the best direction to work Heard. (Long-distance and especially long-path signals are usually stronger in other than the textbook direction, thanks to the vagaries of the ionosphere.) Pointing directly northeast, as MiniProp Plus suggests, resulted in nothing. I had to beam slightly farther north, skirting the side of Telegraph Hill, but lowering signal levels from what I enjoy in most circumstances. This direction also meant that my signal had to pass through *both* the north and south polar regions, further lowering signal-to-noise ratios.

I, and thousands of other DXers, looked toward getting up early in the morning for a couple of weeks and trying to locate an S-0 signal. Well, that's a small price to pay for a shot at the number two Most Wanted country in the world. However, when I arose the first morning, I discovered an S-5 noise in the northeast!

Despite the 330,000 volt high-tension lines running next to my house, my location is nearly noise-free. Trust me: I checked this out very thoroughly before moving in. Other than an older-model computer, which easily could be turned off, my location was one of the quietest I have ever operated from. An S-5 noise just eliminates any chance of working an S-0 station. I couldn't even tell they were on the air, except for the ever-present PacketCluster® spots.

I soon eliminated any chance that the noise was coming from my house, even though the antenna was beaming right over the house and

P.O. Box 50, Fulton, CA 95439

The WPX Program

SSB

2622 ..... IK4UNI
2623 ..... N1SHM
2624 ..... DF7GKI

CW

2941 ..... F5PBL
2942 ..... DF7GK
2943 ..... BV7WB

Mixed

1774 ..... WA4QZD
1775 ..... BV7WB

CW: 350 DF7GK, BV7WB. 400 DF7GK, BV7WB. 450 DF7GKI, BV7WB. 500 DF7GK, BV7WB. 550 DF7GK, BV7WB. 600 UA3FT, DF7GK, BV7WB. 650 UA3FT, DF7GK, BV7WB. 700 UA3FT, DL2KDW, BV7WB. 750 UA3FT, BV7WB. 800 NS2H, UA3FT, BV7WB. 850 UA3FT, BV7WB. 900 UA3FT, BV7WB. 1000 UA3FT, BV7WB. 1050 UA3FT, 1100 UA3FT. 1150 UA3FT, JA8AJE. 1200 UA3FT, JA8AJE. 1250 UA3FT, JA8AJE. 1300 UA3FT. 1350 UA3FT. 1400 UA3FT. 1450 UA3FT. 1500 UA3FT. 1550 UA3FT. 1600 UA3FT. 1650 UA3FT. 1700 UA3FT. 1750 UA3FT. 1800 UA3FT. 1850 UA3FT. 1900 UA3FT. 1950 UA3FT. 2000 UA3FT. 2050 UA3FT, PA0SNG. 2100 UA3FT, PA0SNG. 2150 UA3FT. 2200 UA3FT. 2250 UA3FT. 2300 W8IQ, UA3FT. 2350 UA3FT. 2400 UA3FT. 2450 UA3FT. 2500 UA3FT. 2550 UA3FT. 2600 UA3FT. 2650 UA3FT. 2700 UA3FT. 2750 UA3FT. 2800 UA3FT. 2850 UA3FT. 2900 UA3FT. 2950 UA3FT. 3000 UA3FT. 3050 UA3FT. 3100 UA3FT. 3150 UA3FT. 3200 UA3FT. 3250 UA3FT. 3300 UA3FT. 3350 UA3FT. 3400 UA3FT. 3450 UA3FT. 3500 UA3FT. 3550 UA3FT. 3600 UA3FT. 3650 UA3FT. 3700 UA3FT. 3750 UA3FT. 3800 UA3FT. 3850 UA3FT.

SSB: 350 IK4UNI, N1SHN, DF7GK. 400 DF7GK. 450 WD8ANZ, DF7GK. 500 WD8ANZ, DF7GK. 550 DF7GK. 600 TI7DBS, DF7GK. 650 TI7DBS, DF7GK. 800 IK6JYY. 1050 JA2AH. 1100 JA2AH. 1150 JA2AH. 1200 JA2AH. 1250 JA2AH. 1300 JA2AH. 1350 JA2AH. 1400 JA2AH. 1450 JA2AH. 1500 JA2AH. 1550 JA2AH. 1600 JA2AH. 1650 JA2AH. 1700 JA2AH. 1750 JA2AH. 1800 JA2AH. 1850 JA2AH. 1900 JA2AH. 1950 JA2AH. 2000 JA2AH.

Mixed: 450 WD8ANZ, BV7WB. 500 WD8ANZ, BV7WB. 550 BV7WB. 600 BV7WB. 650 BV7WB. 700 BV7WB. 750 BV7WB. 800 W2EZ, BV7WB. 850 W2EZ, BV7WB. 900 W2EZ, BV7WB. 950 BV7WB. 1000 AA1KS, BV7WB. 1450 OZ1ACB. 1500 OZ1ACB. 1550 OZ1ACB. 1600 OZ1ACB.

20 meters: BV7WB
80 meters: AA1KS
Asia: N6PEQ, DL2KDW
No. America: N6PEQ
SO. America: OZ1ACB
Europe: F5PBL, N6PEQ
Oceania: US1IDX, N6PEQ

Award of Excellence: DF7GK

Award of Excellence Plaque Holders: K6JG, N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS. I8YRK, SM0AJU, N5TV, W6OUL, WB8ZRL, WA8YTM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KB0G, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1POR, K9LJN, YB0TK, K9QFR, YU2NA, W4UW, NX0I, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MS, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DE0DAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, W0ULU, K9XR, JA0SU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, S57J.

Award of Excellence Plaque Holders with 160 Meter Endorsement: K6JG, N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, K9BG, W1BWS, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF, N4NX, SM0DJZ, DK5AD, W3ARK, LA7JO, SM0AJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, UR2QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N6JV, ONL-4003, W5AWT, KB0G, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YB0TK, K9QFR, W4UW, NX0I, WB4RUA, I1EEW, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JA0SU, I5ZJK, I2EOW, KS4S, KA1CLV, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J.

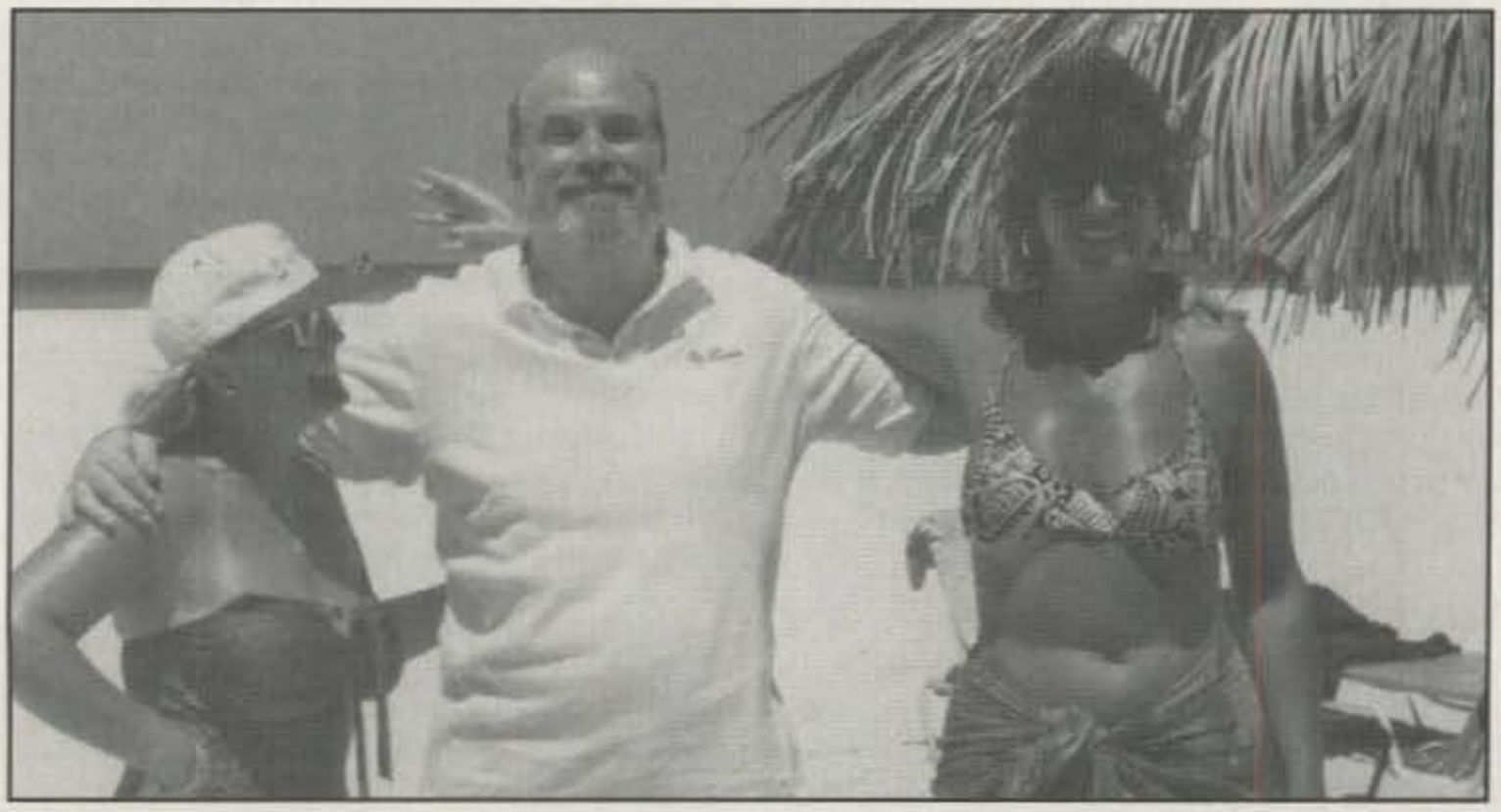
Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

nearby office. The noise was coming from somewhere well up the hill. It was on every morning from about 6 AM to 10 AM, covering just about all of the 20 meter long-path opening to Heard. I was contemplating shorting the coax to the beam and loading it as a long wire, when I got lucky.

One morning, as I listened to the steady roar of the noise, it suddenly stopped! The band was dead quiet. I slipped on the headphones and tuned to 14195 kHz. There, in and out of the noise, was VK0IR! I had a chance. However, I couldn't copy VK0IR consistently enough to recognize my callsign. Not believing in blind calling, I held off. Maybe the signal would improve, although the propagation prediction said the best opening had already passed. About 30 minutes later I could get about half of what the VK0IR operator was saying. That was plenty. A couple of repeats and I would be in the log.

Next I tuned the given listening range—14200–14210. As usual (see below) hundreds of so-called DXers were calling regardless of what the VK0IR operator was saying. Well, at least they weren't good enough DXers to find the correct transmitting frequency. They wouldn't be direct competition, but they did make finding the last QSO more difficult.

Grimly aware that the noise could return at any time, I searched for the station making a successful contact with VK0IR. Once I found it, I waited a few seconds (the VK0IR was not coming back to the first stations calling, but was waiting until the pile-up thinned before picking up a call). I signed my call a couple of times, adding /6 so the operator would know I was the



Who said DXing is all work and no play? Here's KA3DBN enjoying DX fringe benefits in Aruba.

The WAZ Program

Single Band WAZ

20 Meter SSB

997 ..... S57DX
998 ..... IK1HXN
999 ..... BV7GA

15 Meter CW

269 ..... I2VRF

17 Meter CW

22 ..... DL8CM

20 Meter CW

472 ..... S57DX

RTTY

103 ..... I2PKF

All CW

98 ..... WA9MJT

All Phone

626 ..... EA3ALV

All Band WAZ SSB

4368 ..... EA3AOK
4369 ..... ON5EQ
4370 ..... DL5XAW
4371 ..... NK0S
4372 ..... F6HQP

CW/Phone

7721 ..... EA5ABH
7722 ..... ON4AAC
7723 ..... WZ2H (CW)
7724 ..... SM7TUG
7725 ..... S57DX
7726 ..... DL8RB
7727 ..... UU1JA
7728 ..... N6YEU (CW)

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.

The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with *CQ* Master Prefix List. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be updated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4705 9A2AA	3415 VE3XN	3063 KA5W	2745 KF2O	2303 S51NU	2070 KS4S	1588 KØIFL	1383 AI6Z	999 VE6FR
4692 F9RM	3299 I2UIY	3006 WA8YTM	2709 N2AC	2276 KØDEQ	2001 G4OBK	1587 AE5B	1362 YU1ZD	967 JR3TOE
4194 IT9TQH	3295 N9AF	3003 9A2NA	2688 K9AGB	2200 K5UR	1958 YU7JDE	1570 KC6X	1329 KSØZ	953 S52QM
3773 W2FXA	3277 N4MM	2967 PAØSNG	2661 I2MQP	2183 N6JM	1776 W7OM	1563 CT1YH	1289 WØIZV	938 VE7CBH
3740 EA2IA	3229 SM3EVR	2948 HA8XX	2542 WB2YQH	2141 WA1JMP	1752 HA9PP	1560 I2EAY	1212 WT3W	931 W2EZ
3573 K6JG	3218 N4UU	2878 YU7SF	2510 4N7ZZ	2131 W6OUL	1699 CT1LF	1560 OZ1ACB	1197 IT9JPK	850 US1IDX
3452 UA3FT	3184 I2PJA	2866 HAØDU	2486 I2EOW	2113 W8UMR	1683 LU8DY	1550 EA3CWK	1168 Z32KV	838 EA5BHK
3451 N4NO	3141 YU1AB	2834 YU7BCD	2455 S53EO	2105 N2AIF	1681 IØAOF	1500 CT1EEB	1122 N4PYD	835 AA1KS
3447 N6JB	3101 I1EEW	2832 IT9QDS	2375 HA5NK	2094 9A4RU	1669 K5IID	1436 VE4ACY	1013 WB2PCF	801 EA2BNU
3442 W1BWS	3078 ZP5JCY	2756 K9BG	2347 IK2ILH	2086 F6IGF	1589 JN3SAC	1402 I1-21171	1003 KB5OHT	636 9A2AJ

SSB

4595 F9RM	2884 N4MM	2584 PAØSNG	2216 WF4V	1933 W4UW	1544 LU7HJM	1401 W7OM	1100 EA8AG	860 IK4HPU
4186 IT9TQH	2834 I2UIY	2530 I5ZJK	2212 I2EOW	1906 IN3QCI	1503 CT1EEB	1361 IK2AEQ	1068 N4PYD	846 JR3TOE
4127 IØZV	2827 EA2IA	2410 I2MQP	2207 CT1AHU	1903 K5UR	1501 AE5B	1332 G4OBK	1055 IT9JPK	832 I6KYL
3706 VE1YX	2798 F2VX	2371 9A2NA	2206 PY4OY	1754 K2POF	1501 CT1BWW	1327 W5ILR	1054 S51NU	780 I2EAY
3571 ZL3NS	2777 OZ5EV	2370 LU8ESU	2141 EA5AT	1748 LU8DY	1489 W6OUL	1317 K5IID	1031 LU5EWO	772 LW2DBM
3345 F6DZU	2754 EA8AKN	2365 WA8YTM	2102 KF7RU	1685 N6FX	1483 N2AC	1282 NG9L	1006 WT3W	759 N3DRO
3312 L7KG	2708 I1EEW	2330 KF2O	2077 N4UU	1606 YU7SF	1464 K8MDU	1227 KC6X	971 DJ4GJ	748 JH3SAC
3192 I2PJA	2678 N4NO	2294 EA3AQC	2044 K5RPC	1574 KS4S	1454 K3IXD	1158 KØIFL	966 KI7AO	712 DF1IC
3172 WD8MGQ	2677 I4CSP	2290 4X6DK	2029 KD9OT	1567 EA5CGU	1447 K2EEK	1132 WA2FKF	959 EA1AX	682 US1IDX
2966 ZP5JCY	2595 KA5W	2240 I8KCI	2022 CX6BZ	1564 N2AIF	1419 WB3CQN	1115 DF7HX	918 LU3HBO	
2903 CT4NH	2588 HA8XX	2220 YU7BCD	2009 EA1JG	1559 KBØC	1415 HA5NK	1101 KB4HU	873 HA9PP	

CW

4109 IT9TQH	2601 YU7SF	2250 I2UIY	1875 TI4SU	1687 IT9VDQ	1477 ZP5JCY	1275 DJ4GJ	1023 LU3DSI	822 9A3UF
3709 WA2HZR	2439 N2AC	2167 W8IQ	1863 HA8XX	1649 N2AIF	1457 JN3SAC	1219 IK5TSS	993 I2MQP	712 KØIFL
3428 N6JV	2435 K9QVB	2151 S51NR	1823 N6FX	1645 I7PXV	1448 LU2YA	1182 EA6AA	925 LW2EUE	697 K3WWP
3083 VE7CNE	2353 G4UOL	2111 S51NU	1858 K8LJG	1608 G4OBK	1440 EA6BD	1139 EA2CIN	919 HA9PP	691 WT3W
3034 YU7LS	2318 W9DWQ	2076 JA9CWJ	1767 K5UR	1605 W6OUL	1370 I2EAY	1130 AC5K	903 DF6SW	630 LY3B
2993 N4NO	2295 WA8YTM	2065 9A2NA	1741 W1WAI	1542 I1EEW	1356 IK2ECP	1101 K5IID	899 K2LUQ	602 LU1VCD
2843 N4UU	2280 KA5W	1982 KA7T	1740 OZ5UR	1523 DJ1YH	1355 EA7AAW	1090 AI6D	891 I2EOW	
2808 K6JG	2264 YU7BCD	1954 HA5NK	1722 VR2UW	1504 KS4S	1278 W7OM	1072 KC6X	863 PY4WS	
2795 EA2IA	2262 N4MM	1910 KF2O	1707 G4SSH	1480 IK3GER	1277 KA1CLV	1051 4X6DK	830 LU7EAR	

west coast, as he was requesting. Back came, I think, something-something Hotel Oscar Portable Six. Close enough for me. I gave my call a few more times. The VKØIR responded with, "WB2CHO/6 59." Yes! I was in the log. I returned a report of 5-5, although the signal report should have been about the famous bullet—22. One retry, and the VKØIR operator acknowledged the contact. I have not had so much trouble making a contact, nor had so much satisfaction with the result, since my first serious DX contact with Clipperton Island in the 1970s.

For most DXpeditions, this would have been the end of it, besides waiting many months for the fancy four-color QSL cards to be designed, printed, and distributed. Many DXers have taken to routinely making "insurance" QSOs, also known as duplicate contacts, to be certain they were "in the log." However, DXers working VKØIR didn't have to wait months nor make a duplicate contact to know if their contact was correctly logged or not. Following a procedure field-tested on Easter Island, Bob, KK6EK, had arranged for the VKØIR logs to be posted on the Internet and updated daily (or so). A DXer could send a request to a specific spot and get immediate e-mail response of valid contacts! Wow! What a great innovation for serious DXpeditions!

The log checking was not the only role the Internet played in this operation. The DXpeditioners set up a "reflector" devoted solely to the 1997 Heard Island DXpedition. Head "pilot" ON4UN posted a series of official messages on the reflector, which went out to the 1500+ subscribers, on progress of the operation, QSO totals, operating plans for the next day, and more. Individual subscribers posted their frustrations and successes, with successes far outnumbering the failures. This reflector probably eliminated many thousands of those obnoxious "When are you going to be on 160 meter SSTV?" requests that plague many DXpeditions. More than 1100 messages were posted to the Heard DXpedition reflector, amounting to more than 1,700,000 messages sent and nearly 4 gigabytes of traffic!

A great DXpedition team, operating from a Most Wanted country thousands of miles from most DXers, and quick confirmation of successful QSOs make the 1997 Heard Island DXpedition stand head and shoulders above any other such endeavor. If the actual QSLing goes as smoothly as expected, this certainly will be known as the best DXpedition ever.

I personally can't wait for the DXpedition report, the stories, videos, slide shows, and the book. I look forward eagerly to hearing from the operators about what it was like to set up the most equipment ever carried to the DXpedition site and work more than 80,000 contacts.

Incidently, the QSLs go to John Parrott, W4FRU. Remember when you send in your cards that each VKØIR contact costs US$4 (when you divide the $320,000 cost of the DXpedition by the 80,000 QSOs they made). I'm going to include a donation with my card, in the hope that this superb team will go on another DXpedition soon. Maybe North Korea?

Working Split

I mentioned above the common problem of blind-calling a DXpedition and continued calling when the DXpedition operator was obviously trying to copy another station. Dick Green, WC1M, posted a well-reasoned message on the Heard Island DXpedition reflector about these practices. He has given me permission to share it with readers of this column:

• Pardon me for sending this, but if you listen *up* in the split-frequency range VKØIR is working, you will hear the most amazing thing. Even though VKØIR is working someone, hundreds of stations are still calling him—right on top of the QSO and all over the listening range. This leads me to believe that some operators may not be familiar with working split.

If you're having trouble getting through to VKØIR, try these tips for working split:

1. As soon as VKØIR sends another station's callsign and signal report, *stop sending your call!* Don't send your call again until that QSO is finished (VKØIR sends TU, QRZ, etc.)

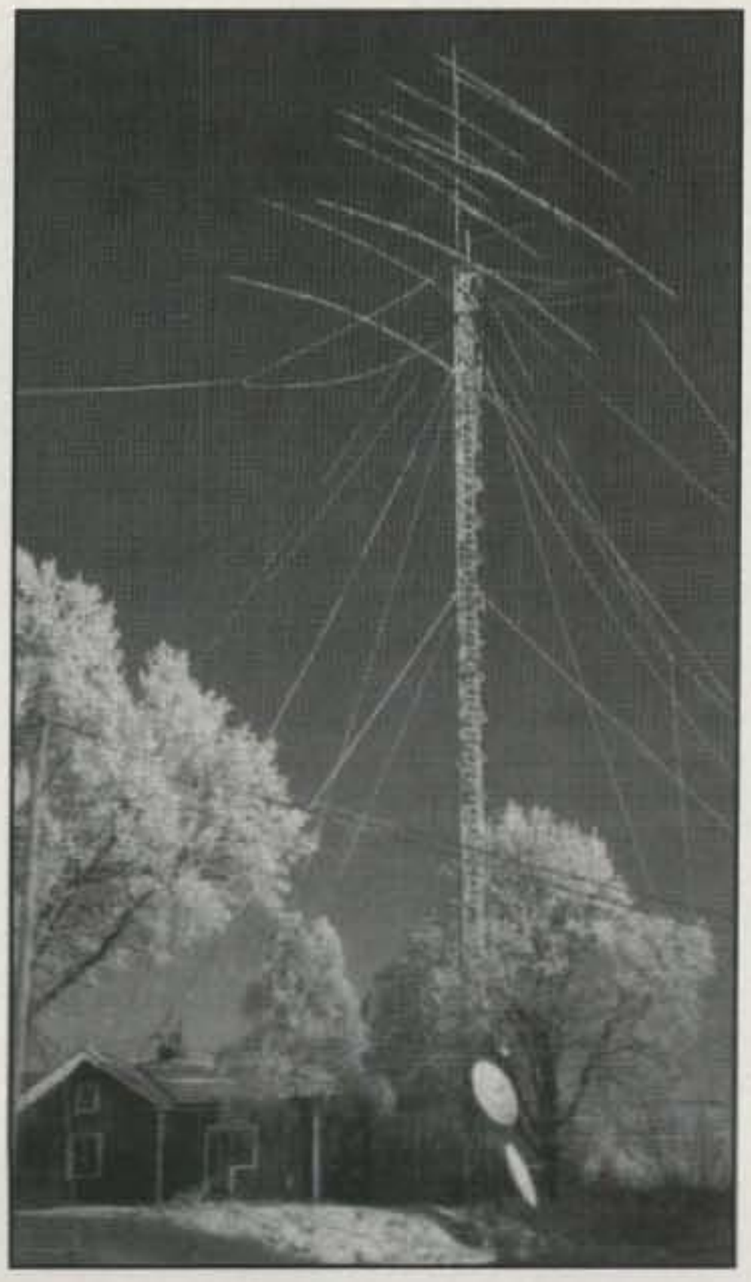
2. If you happen to be on the same frequency as the station VKØIR called, and you send your call, you simply will delay the QSO in progress and will not help yourself at all. VKØIR will not change his mind about working the station he responded to just so that he can work you. It is extremely doubtful that VKØIR will remember your callsign and work you after he finishes the current QSO. More likely, he will QSY to get away from the obnoxious QRM.

3. If you are not on the same frequency as the station VKØIR called, and you send your call, he obviously won't hear it. You are wasting your time and the life of your finals. You are also causing QRM.

4. Instead of calling on top of someone else's QSO, or heating up the atmosphere by calling where VKØIR is not listening, you will find it much more productive to scan the frequency range for the station VKØIR called. If you hear it, you will know where VKØIR is listening!

5. When the QSO is finished, try calling on

Piero Calvi operates mobile from Azerbaijan as 4J0/IK2BHX.



The antenna farm of another 5-Band WAZ winner—Jan Pettersson, SM5FQQ. His last zone was 31 on 80 meters, confirmed by T31BB.

5 Band WAZ

As of December 31, 1996, 450 stations have attained the 200 Zone level.

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

IK2GNW

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

N4WW, 199 (26)
AA4KT, 199 (26)
K7UR, 199 (34)
NAØY, 199 (26)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
W9CH, 199 (26)
ACØM, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199 (34,40m)
K1ST, 199 (26)
ABØP, 199 (23)
KL7Y, 199 (34)
UY5XE, 199 (27)
NN7X, 199 (34)
DL3ZA, 199 (31)
OE6MKG, 199 (31)
HA8IB, 199 (2 on 15)
DK1FW, 199 (31)
OH2DW, 199 (1)
IK1AOD, 199 (1)
DF3CB, 199 (1)
UA3AGW, 198 (1, 12)
VO1FB, 198 (1, 12)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (22, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
KG9N, 198 (18, 22)
KM2P, 198 (22, 26)
GM3YOR, 198 (12, 31)
DKØEE, 198 (19,31)
KØSR, 198 (22, 23)
K3NW, 198 (23, 26)
WB6OKK, 198 (22, 37)
S57J, 198 (2,26)
W3RU, 198 (23, 26)
UA4PO, 198 (1, 2)
K5RT, 198 (22, 23)
JA1DM, 198 (2, 40)

W1JZ, 194 Zones
TI5RLI, 195 Zones
K5RT, 198 Zones
HB9DDZ, 197 Zones
JA1DM, 198 Zones

Endorsements:

1025 Stations have attained the 150 Zone level as of December 31, 1996.

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

the frequency where VKØIR is listening, or just up or just down from there. Many DX ops will do one or two QSOs, then slide up or down the band when the listening frequency gets too crowded to pick out calls. Some ops have a pattern, so if you listen you just might figure it out and be calling exactly where he is listening! A lengthy set of VKØIR split operations guidelines may be found on the Heard Island Web Page. You may gain some insight into the operators' patterns by reading this material.

6. If VKØIR says he is working by call districts only, and he asks for a number other than yours, **don't send your call!** In addition to being rude, it's futile; he simply will not work you.

7. If you can't copy VKØIR because the signal is too weak, *don't send your call!* You can't possibly work him if you can't hear him.

8. The best thing you can do is *listen, listen, listen.* Make sure you listen carefully between transmissions so you will hear when VKØIR starts to work a station (and stop transmitting when he does; it might be you!). Listen up and down the split frequency range to find the station VKØIR is working. *Listen, listen, listen.* Listen to VKØIR to hear instructions (and follow them). Believe it or not, you will work more DX by listening than by transmitting (yes, you do have to transmit, but timing is everything in this game).

9. The worst thing you can do is transmit on VKØIR's frequency. *Never, ever* transmit on his frequency. Period. Never. Really, I mean it. Resist the temptation to shoo people off his frequency or yell at the cops. Probably less than 10% of the QRM comes from people inadvertently starting a QSO or transmitting on the wrong VFO. We all could live with occasional disruptions like that. If the QRM is intentional, it's not going to stop when you yell (in fact, that will cause more QRM because they're trying to get a rise out of you). In other words, there is never a justification for transmitting on VKØIR's frequency. Never. Next time you feel you must transmit on his frequency, *don't touch that dial!*

For most of you, it makes sense that QRM on VKØIR's transmit frequency is a bad thing. But consider that QRM on his listening frequency is a bad thing, too. Continuing to call when VKØIR is in QSO causes QRM that interferes with VKØIR working stations as quickly as possible (thereby reducing his chances of working you) and makes it hard for others to try to follow his listening pattern. Make the most of every transmission by thinking about the right time and the right frequency for doing it.

Good luck and pass the word.—*WC1M* •

Excellent advice, and well said. If more DXers and would-be DXers followed these simple guidelines, we all would be better off: the DXpeditioners for not having to put up with QRM, the DXers trying to work the DXpedition for making it easier to hear the DXpedition, and the other users of the band for the reduced interference. Incidently, Dick gives credit to the excellent book *The Complete DXer*, by Bob Locker, W9KNI, for much of the above advice.

QSL INFORMATION

1B1AD to DK7ZZ
3B8CF to F6HMJ
3C1DX to EA6BH
3C5A to N6ZZ
3C5Z to N6ZZ
3D2RW to ZL1AMO
3E1DX to KU9C
3V8BB to DL2HBX
3Z4JWR to SP4JWR
4A1C to XE1BEF
4D63RG to DU9RG
4L1DX to OZ1HPZ
4L5O to TA7A
4S7DA to W3HNK
4V2A to 9A2AJ
4X/OK1JR to OK1JR
4X6UO to WB3CQN
5B4ADA/HH2 to 9A2AJ
5K6W to HK6MKK
5NØBHF to OE6LAG
5N3/SP5XAR to SP5CPR
5R8EE to FR5EL
5T5U to JA1UT
5V7VT to K5VT
5X1P to G3MRC
5X1T to ON5NT
5X4DEL to WB3DNA
5X4DLI to KE4EW
6Y5DA to VE4JK
7Q7EH to AA9HD
7SØMG to SKØMG
7S4RL to SK4RL
8P9GU to DL7VOG
8P9HT to K4BAI
8P9Z to K4BAI
8Q7BU to DD5BU
8R1K to OHØXX
8R1ZG to W4FRU
9A11ELS to 9A2AA
9A4A to 9A4AA
9H3KE to PAØPAN
9H3RA to DL3BRC
9J2CE to IN3VZE
9J2CW to JF2XTZ
9J2SZ to SP8DIP
9L1MA to WØHSC
9M2/G3NOM to GØCMM
9M2JJ to SMØOEK
9M2QQ to DF5UG
9M6TJ to F5LGQ
9M8R to W7EJ
9Q5MRC to G3MRC
9U5DX to F2VX
9Y4H to CT1AHU
A25/H5ANX to ZS6EW
A35DM to ON4QM
A61AJ to AA6DC
A71BY to F5PYI
A92GD to K1SE
AH1A to K1ER
AH7G to N2AU
AH8N to DU1QKU
C21BH to OH2BH
C31SD to CT1AMK
C6AGH to KA1DIG
CI2AT to VE2AT
CN2GA to DL2GGA
CN8GB to CN8BA
CO1OTA to CT1ESO
CO6AP to W3HCW
CP4BT to DL9OT
CS6AUW to CT1AUW
CT3FN to HB9CRV
D68SE to F6FNU
DU3/AH8F to G4ZVJ
EA7BR/ to EA7CWA
EA8BBR to EC8ATN
EA8BYR to WA1ECA
EK7DX to DL1VJ
EL2DT to IKØPHY
EM1KA to JA2JPA
EM1U to JA2JPA
EU3FT to W3HCW
EW2CO to not WZ2G
EX8QB to IK2QPR
EY3M to K1BV
EY8MM to K1BV
FG5FC to F6DZU
FG5GZ to F6CLK
FG5HR to F6BUM
FH5CB to FH3CB
FM5BH to W3HNK
FM5GU to WA4JTK
FOØHON to DJ2EH
FOØZR to K1RH
FP5EJ to K2RW
FS5PL to WX9E
FT5WE to F5GTW
FW2EH to DJ2EH
FY5YE to W5SVZ
G4VXE/C6A to G3SWH
GB6ØBBC to GJ4GG
GB6BBC to G0RDI
HA/WØYR to AA9DX
HAM8IB to HA8IB
HD2RG to HC2RG
HG1G to HA1KSA
HGM1LPS to HA1CC
HH2B to N4WW
HK6W to HK6KKK
HP1XVH to KF0UI
HS7CDI to 7L1MFS
HZ1AB to K8PYD
HZ1HZ to N7RO
IBØJN to I8JN
J28DE to F2WS
J28JY to F6BFH
J28NP to F6BZF
J28TC to F6FNU
J38AB to KQ1F
J38DF to DL7DF
J38GU to DL7VOG
J38TF to DL7DF
J52IM to KB9XN
J68AG to WD8IXE
J68AR to K9BQL
J68AS to N9AG
J68ET to W9UI
J68ID to W8QID
J68NR to WB8ENR
J6DX to N9AG
J8ØF to DL3MIB
J87GU to DL7VOG
JY5HF to JY5AR
JY8B to DL5MBY
JY8YB to DL5MBY
JY9QJ to DL5MBY
KC4AAA to NC6J
KC6DO to JE8XUC
KC6YZ to JA1BRM
KG4ML to WB6VGI
KG4NA to KD4D
KG4SH to N4KHQ
KG4ZE to K4SXT
KHØAC to K7ZA
OE3S to OE2GEN
OY2H to IØWDX
P4ØJ to WX4G
PR5L to PP5LL
R1ANT to UA1GO
TØØTN to OKDXF
T99A to 9A2AA
TA1BM to TA1CBF
TA2IJ to DJ9ZB
TI4CF to W3HNK
TL8/F5JKK to F6FNU
TL8BC to F5IPW
TM2P to F5LP
TM7TLT to F6KWP
TU4SR to OH8SR
UAØFDX to HH2HM
UA9FAR to W7YS
UN9PQ to IK2QPR
US4IXQ to WB7QXU
V47VJ to G4ZVJ
V8ATG to JH3GAH
VE3AT to VE3AT
VP2EKS to HB9KS
VP2ESJ to W5SJ
VU2AXA to VU2DVC
VU2TS to I1YRL
XT2DM to F5RLE
XT2DP to WB2YQH
XT2GA to F5RLE
XX9TRJ to JH2MRA
ZB2FX to G3RFX
ZD7XY to W4FRU
ZF2GS to DL1DA

Here and There

The 1997 International DX Convention, known as Visalia, is April 4–6 at the Holiday Inn, Fresno Centre Plaza, in Fresno, California. Call the hotel at 209-268-1000. Registration at the door is $65, which includes the Saturday evening banquet, Sunday morning buffet, and cocktails on both Friday and Saturday evenings. For more information, contact the sponsoring Northern California DX Club c/o Gordon Girton, W6NW, P.O. Box 60307, Sunnyvale, CA 94088-0307.

The sixth New Orleans International DX Convention is August 22–23 at the Royal Sonesta Hotel in the New Orleans French Quarter. Note the date. More on this well-run convention will be in a future column.

The North Jersey DX Association, celebrating its 40th year as the W2 QSL Bureau, has elected new officers for 1997. They are: President Ben Friedland, K2BF; Vice-President John Sawina, NA2R; Secretary Bill Hudzik, W2UDT; Treasurer Gene Ingraham, N2BIM.

The Eastern Iowa DX Association has also elected new officers for 1997: President Terry Cellamn, WAØAWL; Vice-President Robert Walstrom, WØEJ; and Secretary-Treasurer Frank Apple, WØGWK.

Finally, the Kermadec Island DXpedition offers a VHS videotape of the operation. This 45-minute, professionally edited video is available in the US for US$25 (plus US$3 shipping) from SGI DX Expeditions, P.O. Box 2235, Melbourne, FL 32902.

QSL Information

Tom Polak, 9A2AJ, QSL manager for **BA4TB, 4V2A, T94YK, 9A1CTL, 9A4MF, T91AVW, T91CFG, T91EGR, HH2AW,** and **HH2PK** (from February 1993), has a new address: P.P. 34551, Lipik, Republic of Crotia. Tom says an SASE isn't necessary, but for two or more QSLs, he requests two or more IRCs or US dollars.

CQ DX Awards Program

SSB

2215 .....Z31JA 2216.....JA2ANM

CW

954 .....JA2ANM

SSB Endorsements

320 .....IT9TQH/328
320 .....IT9TGO/328
320 .....I2EOW/326
320 .....W2CC/326
320 .....YV5IVB/324
320 .....N2VW/323
310 .....WA2FKF/312
310 .....AB4IQ/310
275 .....4X6DK/291
275.....N6CFQ/290
275 .....KK4TR/281
275 .....Z31JA/275
250.....I3ZSX/267
150.....JA2ANM/150

CW Endorsements

320 .....IT9TQH/327
320 .....W4QB/326
310.....KA7T/319
300 .....N1HN/307
300 .....K8JJC/302
300 .....N4OT/301
275 .....I2EOW/294

RTTY Endorsements

250 .....W4QB/265

Total number of active countries is 328. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

QSL **CO2JD, CO2MA, CO2HR, CM2CK, CM8ZZ, CO8ZZ, CO8NA, CO8AR,** and **VP5VER** via Julio Henriquez, HI3JH, P.O. Box 122, Santiago, Dominican Republic.

QSL **COØRCT** from the 1996 CQ WPX CW Contest via CO8RCT, P.O. Box 146, Las Tunas 75100, Cuba.

The direct address of 160 meter enthusiast **CO7EH** is Eduardo Hidalgo, P.O. Box 5426, Camaguet 70300, Cuba.

QSL **ZS6IR** direct to the operator: Uli von Aswegen, Westpreussenstr. 2, 53119 Bonn, Germany. Uli reports that many bureau cards to him have been lost in the postal system. Anyone still wishing a card may send it to him via the DARC (German) bureau, via DL4JZ.

QSL VR2AX direct to the operator: Wyn Hughes, P.O. Box 1501, General Post Office, Hong Kong.

QSL **VK9XB, XV2A, VS6CT**, and **JJ1TBB/BV2** via operator Mark Kawasaki, JJ1TBB, 4-36-10 Kasuga, Nerima, Tokyo 179, Japan.

QSL **ES1HR** via his stateside call: N6HR, P.O. Box 213, Greenbank, WA 98253.

QSL **HI8OMA** direct to him at P.O. Box 3272, Santo Domingo, Dominican Republic.

QSL the Antarctic calls of **EM1KA** and **EM1U** via Takashi Ajiro, JA2JPA, 2-14-18 Doubayashi, Shimizu, Shizuoka 424, Japan. (Cards from previously announced manager 9H3UP do not count for DXCC.)

QSL **8A4EI** from Enggano Island (OC-204) via Tjok Rorimpandey, YBØRX, P.O. Box 7265, Jakarta 12072, Indonesia. 73, Chod, VP2ML

BY GEORGE JACOBS, W3ASK

PROPAGATION

THE SCIENCE OF PREDICTING RADIO CONDITIONS

More Evidence That Cycle 23 Has Begun!

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports a mean sunspot number of 13 for December 1996. A high daily value of 29 was recorded on December 12. The sun's surface was spotless on 12 days. December's mean count results in a 12-month running smoothed sunspot number of 9 centered on June 1996. The cycle is measured by the smoothed level of sunspot numbers. This is an increase of one count in the monthly smoothed sunspot number, and it represents the first such increase since August 1991. There is an increasing amount of evidence that Cycle 23 has begun and is on the rise. A smoothed sunspot number in the neighborhood of 15 is forecast for April 1997.

According to measurements made at Penticton, British Columbia by the Dominion Radio Astrophysical Observatory of Canada, the reported mean level of 10.7 cm solar flux for December 1996 was 78. This results in a smoothed number of 72 centered on June 1996. A smoothed value on the order of 73 is forecast for this month.

Telescopic counting of sunspots and the measurement of solar flux both are indices of sunspot activity. While the radio flux measurements are more sensitive than telescopic counting and are not dependent upon weather conditions, the telescopic method continues since an unbroken record of more than 200 years of such data exists. Solar flux measurements have been made for only the past 50 years.

April DX Propagation

Spring equinoctial conditions are expected to extend well into April. As discussed last month, this is the time of year when the sun crosses the equator as it travels into northern skies. The hours of darkness and daylight are about equal in both hemispheres, and ionization is nearly constant over most of the world at any given local time. Tran-equatorial propagation is at its best during equinoctial seasons.

During April, 17 and 20 meters should be the optimum bands for DX propagation conditions during most of the daylight hours, and into the early evening hours as well. Somewhat fewer openings are expected on 15 and 17 meters compared to the winter months, but some fairly good DX still should be possible towards southern and tropical areas, especially during the afternoon hours when conditions are High Normal or better. Fewer 12 or 10 meter DX openings are expected this month, but occasional ones should be possible from all USA time zones towards South America, and from the western states towards the South Pacific. Be sure to check these bands during the afternoon hours when conditions are High Normal or better.

11307 Clara Street, Silver Spring, MD 20902
e-mail: g.jacobs@ieee.org

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for April 1997

	Expected Signal Quality			
Propagation Index.....	**(4)**	**(3)**	**(2)**	**(1)**
Above Normal: 5, 8, 14-15	**A**	**A**	**B**	**C**
High Normal: 4, 6-7, 9, 13, 23, 26	**A**	**B**	**C**	**C-D**
Low Normal: 3, 10-12, 16, 20-22, 24-25, 27, 30	**B**	**C**	**D**	**D-E**
Below Normal: 1-2, 17, 19, 28-29	**C**	**C-D**	**D-E**	**E**
Disturbed: 18	**C-D**	**D**	**E**	**E**

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.

2. With the *propagation index,* use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair-to-poor (C-D) on April 1st and 2nd, fair (C) on the 3rd, good (B) on the 4th, excellent (A) on the 5th, etc.

For a few hours after sunset, optimum DX propagation conditions should be shared among 20, 30, and 40 meters. Good openings to many parts of the world are forecast for these bands between sunset and midnight, and on 40 meters from midnight to an hour or so after sunrise. Some good DX openings should also be possible on 80 meters during the hours of darkness and sunrise. There is also a good chance for some 160 meter DX during the same times.

Seasonably favorable propagation conditions over long paths between the northern and southern hemispheres—for example, to Australasia, South America, southern Africa, etc.—should continue during April on all HF bands.

Thunderstorm activity increases during April in the northern hemisphere, and this should result in increased levels of static on all HF bands, especially 30, 40, 80, and 160 meters.

Ionospheric absorption should continue to increase in the northern hemisphere during April as the sun rises higher in the northern sky. This should result in somewhat weaker DX signal levels during daytime openings, compared to the winter months.

Short-Skip Propagation

For openings between 50 and 250 miles the best band should be 80 meters during the day and 160 meters at night. Between 250 and 750 miles, 30 and 40 meters should be best during the day, 80 meters for an hour or two after sunrise and again from sunset to midnight, and 160 meters from midnight to sunrise. For openings between 750 miles and the one-hop, short-skip limit of 2300 miles, use 17 and 20 meters during the day, 40 meters for an hour or so at sunrise and again from sunset to midnight, and 80 meters from midnight to sunrise. Look for 12 and 15 meter short-skip openings from about 10 AM to sundown, ranging between approximately 1300 and 2300 miles, although at times openings may be as short as 500 miles. There is also the possibility for some 10 meter short-skip openings during the daylight hours over similar distances.

The DX Propagation Charts in this month's column contain DX propagation predictions for each amateur band between 10 and 160 meters for the period April 15 through June 15, 1997. Beginning this month and continuing through the summer and fall, the times shown in the charts will be local daylight time (EDT, CDT, MDT, and PDT).

For more detailed predictions of short-skip openings between distances of 50 and 2300 miles, refer to the Short-Skip Charts, which appeared in last month's column.

A day-to-day forecast of general propagation conditions expected during April is given in the Last-Minute Forecast, which appears at the beginning of his column.

VHF Ionospheric Openings

Chances for some unusual VHF ionospheric openings during April look pretty good. Some auroral-type openings should be possible during periods of radio storminess. Check the Last-Minute Forecast at the beginning of this column for those days during April that are expected to be Below Normal or Disturbed.

Lyrids, a major meteor shower, is due April 21–23. It will probably peak late April 21st or early on the 22nd, with an average of about 15 good-size meteors entering the Earth's atmosphere every hour. This should increase considerably chances for VHF meteor-scatter-type openings.

Sporadic-*E* propagation usually begins to increase during April, and it should continue to do so through the spring and summer months. Look for an increase in short-skip openings on both the 10 and 6 meter bands during the month. Most openings on 10 meters should fall between approximately 750 and 1300 miles. Sporadic-*E* openings, as the name infers, may occur at any time of the day or night, but there is a tendency for them to peak between 8 AM and noon and between 5 and 9 PM local time.

73, George, W3ASK

HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this 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.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

April 15-June 15, 1997
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	12-17 (1)	05-07 (1) 07-10 (2) 10-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	18-19 (1) 19-21 (2) 21-01 (3) 01-03 (2) 03-04 (1)	20-22 (1) 22-01 (3) 01-02 (2) 02-03 (1) 22-00 (1)* 00-02 (2)* 02-03 (1)*
Northern Europe & CIS (former Eur. USSR)	11-16 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-16 (2) 16-18 (1)	19-20 (1) 20-23 (2) 23-01 (1)	20-00 (1)
Eastern Mediter-ranean & Middle East	14-16 (1)	12-14 (1) 14-16 (2) 16-18 (3) 18-19 (1) 22-00 (1)	19-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Western Africa	12-14 (1)** 10-12 (1) 12-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	20-22 (1) 22-02 (2) 02-03 (1)	00-02 (1)
Eastern & Central Africa	10-13 (1) 13-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	21-01 (1)	22-00 (1)
Southern Africa	12-14 (2) 14-15 (1)	16-17 (2) 17-18 (3) 18-20 (1) 23-01 (1)	22-00 (2) 00-02 (1)	
Central & South Asia	17-19 (1)	07-10 (1) 14-16 (1) 19-21 (1)	05-07 (1) 19-21 (1)	Nil
South-east Asia	Nil	08-10 (1) 18-20 (1)	Nil	Nil
Far East	17-19 (1)	08-10 (1) 18-19 (1) 19-21 (2) 21-23 (1)	04-06 (1)	Nil
South Pacific & New Zealand	15-18 (1)** 09-11 (1) 15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-12 (2) 12-16 (1) 16-18 (2) 18-20 (1) 20-23 (2) 23-02 (1)	02-03 (1) 03-04 (2) 04-06 (3) 06-07 (1)	02-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)*
Austral-asia	17-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 15-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (1)	03-05 (1) 05-07 (2) 07-08 (1)	04-07 (1) 04-06 (1)*
Carib-bean, Central America & North ern Countries of South America	11-14 (1)** 14-16 (2)** 16-17 (1)** 10-11 (1) 11-13 (2) 13-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	04-06 (1) 06-07 (2) 07-08 (3) 08-10 (4) 10-11 (3) 11-15 (2) 15-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-07 (1)	21-02 (1) 02-05 (2) 05-07 (1) 03-06 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile Argen-tina & Uruguay	12-15 (1)** 15-16 (2)** 16-17 (1)** 08-09 (1) 09-11 (2) 11-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-22 (2) 22-00 (3) 00-01 (2) 01-03 (1)	20-21 (1) 21-04 (2) 04-06 (1)	23-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)*
McMurdo Sound, Antarc-tica	Nil	07-08 (1) 08-09 (2) 09-10 (1) 16-20 (1) 20-23 (2) 23-00 (1)	01-05 (1)	Nil

April 15-June 15, 1997
Time Zone: CDT & MDT
(24-Hour Time)
Central USA TO:

15	20 Meters	40 Meters	80 Meters	Meters
Western & Southern Europe & North Africa	14-16 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	19-21 (1) 21-23 (2) 23-01 (1)	21-00 (1)
Northern Europe & CIS (former Eur. USSR	Nil	07-08 (1) 08-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 20-22 (1)	20-20 (1)	21-22 (1)
Eastern Mediter-ranean & Middle East	Nil	07-09 (1) 13-15 (1) 15-17 (2) 17-18 (1) 22-00 (1)	20-00 (1)	Nil
Western Africa	12-14 (1) 14-15 (2) 15-16 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	20-01 (1)	Nil
Eastern & Central Africa	13-15 (1)	07-09 (1) 13-16 (1) 16-19 (2) 18-19 (1)	21-00 (1)	Nil
Southern Africa	09-11 (1) 11-13 (2) 13-14 (1)	14-16 (1) 16-18 (2) 18-21 (1)	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1)

Central & South Asia	17-19 (1)	08-10 (1) 17-19 (1) 19-21 (2) 21-22 (1)	05-07 (1) 19-21 (1)	Nil
South-east Asia	Nil	08-10 (1) 19-22 (1)	05-07 (1)	Nil
Far East	18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-23 (1)	03-05 (1) 05-06 (2) 06-07 (1)	05-06 (1)
South Pacific & New Zealand	15-17 (1)** 11-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	16-19 (1) 19-21 (2) 21-23 (3) 23-03 (2) 03-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-13 (1)	00-02 (1) 02-04 (2) 04-05 (3) 05-06 (2) 06-07 (1)	02-04 (1) 04-05 (2) 05-06 (1) 04-05 (1)*
Austral-asia	16-18 (1) 18-20 (2) 20-21 (1)	06-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	02-04 (1) 04-06 (2) 06-07 (1)	04-06 (1)
Carib-bean, Central America & North ern Countries	11-13 (1)** 13-16 (2)** 16-17 (1)** 09-11 (1) 11-12 (2) 12-14 (3) 14-15 (4)	00-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4)	19-21 (1) 21-22 (2) 22-03 (3) 03-05 (2) 05-07 (1)	21-23 (1) 23-04 (2) 04-06 (1) 00-05 (1)*
of South America	15-16 (3) 16-17 (2) 17-19 (1)	19-21 (3) 21-23 (2) 23-00 (1)		
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	12-15 (1)** 15-16 (2)** 16-17 (1)** 08-10 (1) 10-12 (2) 12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-08 (1) 08-09 (2) 09-10 (3) 10-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-21 (3) 21-23 (2) 23-01 (3) 01-02 (2) 02-04 (1)	21-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-05 (1)	00-04 (1) 01-03 (1)*
McMurdo Sound, Antarc-tica	15-17 (1)	08-10 (1) 16-18 (1) 18-22 (2) 22-00 (1)	00-06 (1)	Nil

April 15 - June 15, 1997
Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & South-ern Europe & North Africa	Nil	07-09 (1) 09-11 (2) 11-13 (1) 13-15 (2) 15-18 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	21-23 (1)
Central & North ern Europe & CIS (former Eur. USSR)		10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)		
Eastern Mediter-ranean & Middle East	Nil	07-10 (1) 10-12 (2) 12-13 (1) 22-00 (1)	20-23 (1)	Nil
Western Africa	10-14 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-19 (1)	20-23 (1)	Nil
Eastern & Central Africa	10-12 (1)	07-09 (1) 12-14 (1) 14-15 (2) 15-17 (1)	20-22 (1)	Nil
South-ern Africa	10-13 (1)	07-09 (1) 13-14 (1) 14-16 (2) 16-17 (1) 22-00 (1)	19-22 (1)	20-22 (1)
Central & South Asia	19-21 (1)	08-09 (1) 09-11 (2) 11-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	04-07(1)	Nil
South-east Asia	19-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 21-22 (1) 22-23 (2) 23-01 (1)	04-07 (1)	05-06 (1)
Far East	19-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 18-21 (1) 21-23 (2) 23-01 (1)	02-03 (1) 03-06 (2) 06-08 (1)	03-07 (1)
South Pacific & New Zealand	15-18 (1)** 11-13 (1) 13-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	06-08 (1) 08-11 (2) 11-17(1) 17-20 (2) 20-21 (3) 21-23 (4) 23-00 (3) 00-02 (2) 02-04 (1)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1)	01-02 (1) 02-05 (2) 05-06 (1) 02-05 (1)*
Austral-asia	16-18 (1)** 13-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-22 (1)	06-08 (1) 08-10 (2) 10-12 (1) 18-20 (1) 20-22 (2) 22-02 (3) 02-03 (2) 03-04 (1)	01-02 (1) 02-04 (2) 04-06 (3) 06-07 (2) 07-08 (1)	02-03 (1) 03-05 (2) 05-06 (1) 03-05 (1)*
Carib-bean, Central America & North ern Countries of South America	11-14 (1)** 14-16 (2)** 16-17 (1)** 09-10 (1) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (2) 17-18 (1)	00-06 (1) 06-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-00 (2)	19-20 (1) 20-21 (2) 21-02 (3) 02-04 (2) 04-06 (1)	21-00 (1) 00-03 (2) 03-05 (1)* 01-04 (1)*
Peru, Bolivia, Para-guay, Brazil, Chile, Argen-tina & Uruguay	13-16 (1)** 09-10 (1) 10-12 (2) 12-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-18 (1)	06-08 (1) 08-10 (2) 10-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-23 (2) 23-01 (1)	20-22 (1) 22-02 (2) 02-04 (1)	21-03 (1) 00-03 (1)*
McMurdo Sound, Antarc-tica	16-19 (1)	07-09 (1) 16-18 (1) 16-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-00 (1)	03-06 (1)	Nil

**Indicates best time for 160 meter opening.*
***Indicates best time for 10 meter opening.*
For 12 meter openings interpolate between 10 and 15 meter openings.
For 17 meter openings interpolate between 15 and 20 meter openings.
For 30 meter openings interpolate between 40 and 20 meter openings.

BY FREDERICK O. MAIA, W5YI

WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

What is the Purpose and Future of Amateur Radio?

Amateur radio has been around for more than a century. Marconi considered himself an amateur. By current international definition, amateur radio is a public, two-way, nonprofessional radio service which exists to further education, experimentation, and unimportant personal communications.[1]

According to the international Radio Regulations, only technical subjects may be discussed[2] and amateur radio may not be used as a messaging service for the public when the transmissions cross national borders.[3] This regulation exists to protect government revenue in foreign countries where commercial telecommunications is provided only by the government. Both of these provisions can be overlooked if the countries involved agree.[4]

The Morse Code Requirement

Manual Morse code proficiency (both hand sending and receiving by ear) is required when the operation takes place below 30 MHz.[5] This regulation has its roots in the belief that radio amateurs might be able to assist during emergencies when telegraphic distress calls are made, such as during the 1912 *Titanic* disaster when an SOS was radioed.

The 500 kHz international distress frequency was established in 1906. Radiotelegraphy is now signing off at sea, however, and will no longer be used after 1999. Morse code communications depend on radio-wave propagation conditions being right. Another downside is the range is limited, as is the amount of traffic Morse signals can carry.

There now are better ways to handle distress communications. Toward that end, the U.S. Coast Guard has already discontinued monitoring 500 kHz, and the conversion to the satellite-based GMDSS (the Global Maritime Distress and Safety System) is already underway.

Justification for U.S. Amateur Radio

The U.S. version is that amateur radio is a voluntary, non-commercial personal communications service the participants of which also learn about radio, assist during emergencies, and contribute by improving radio science and international friendship.[6] The "technical nature" communications limitation exists only during transmissions by U.S. amateurs to foreign countries and is not a domestic requirement.[7]

There is no ban whatsoever on personal communications via amateur radio, even some with a personal business component.[8] The previous government rule which stated, "No amateur station shall transmit any communication the purpose of which is to facilitate the business or commercial affairs of any party. No station shall transmit communications as an alternative to other authorized radio services, except as necessary in providing emergency communications. . . . " was abolished on September 12, 1993. On that date, leisure personal communications was officially sanctioned on the amateur bands.

Morse code knowledge, on the other hand, continues as a U.S. prerequisite for high-frequency voice operation.[9] It is interesting to note that in 1959 the Japanese government took the position that low-power HF signals only have domestic coverage, and they authorized 10 watt operation to its citizens on the 80, 40, 15, 12, and 10 meter bands.[10] Although 10 watts at HF frequencies indeed can have global communications capability, no country has ever challenged Japan's position on the matter.

In a nutshell, the purpose of U.S. amateur radio is simply to foster developmental, recreational "hobby-type" and personal communications. Although certain segments are set aside for certain types of communications, no particular mode or emission is advanced in the rules.

The "hobby" component can be any one of a myriad of activities, including experimentation, traffic handling, home brewing, emergency preparedness, DXing, rag-chewing, satellite operation, CW, FM repeaters, moonbounce, RTTY. . . . You name it! Our licensing scheme rewards technical and Morse code proficiency with additional frequency privileges. This concept was intensified in the late 1960s.

With the support of the American Radio Relay League in 1967, the FCC phased in a three-year program known as the Incentive Licensing System. Effective November 22, 1968 amateur radio became a developmental program with operators climbing the licensing ladder by passing more difficult CW and theory examinations. The new rules also re-established the Advanced Class, which had been unavailable since 1951.

The objective was to motivate approximately 100,000 General Class ticket holders to upgrade by making additional Advanced and Extra Class frequency blocks available to them on an exclusive basis. It never bothered me much, but many General Class amateurs were furious when they lost access to frequencies which would now be restricted to the Advanced and Extra Class. They had to pass additional examinations to get them back!

Morse code proficiency used to be required when the operation took place below the 2 meter amateur band. The World Administrative Radio Conference of 1979 moved the cutoff point down to 30 MHz. In amateur radio telegraphy is the key to accessing the HF bands even if no CW operation is planned. This questionable concept continues to this day.

There is an international move underway, however, to eliminate this international treaty condition at WARC-99. Not all amateurs are in favor of removing the requirement. Some believe that without a Morse code treaty requirement, amateur radio is going to turn into another CB disaster.

We Don't Need Another 27 MHz Fiasco!

The original "Class A" Citizen's Band Radio Service was created in the early-1950s at 450 MHz for utilitarian purposes. The current Class D Citizen's Band emerged in 1958 when the FCC reallocated most of the 450 MHz band to the then-emerging commercial land mobile (Business Radio) service.[11]

The public was then "compensated" for this reallocation by converting the little-used 11 meter amateur band into 23 channels which would be used for short-range personal, emergency, and business communications at 27 MHz.

With no test to take for a license, millions of people eventually took to the airwaves. It was a very big mistake. At 27 MHz the intended 5 mile range became worldwide and hobby-type communications became the rule! In effect, 11 meters reverted back to a totally unsupervised amateur band.

The 1974 Arab oil embargo and the resulting gasoline shortage catapulted CB radio from one million licensees to some 20 million as the public used CB to locate open gas stations and "Smoky" (roadside police). Without enforceable rules, the service eventually self-destructed in the early 1980s due to congestion, discipline problems, and HF interference.

On April 27, 1983 CB radio was delicensed, station identification discontinued[12], and the FCC more or less built a fence around the 27 MHz band and forgot it. The lesson learned was that licensing of hobby radio stations based on knowledge of the rules, and peer pressure is important. With amateurs no longer on 11 meters, chaos prevailed. Today the growth of amateur radio is controlled by the necessity to learn Morse code to access the high-frequency bands.

What Will Happen if the CW Requirement is Dropped?

The Japanese 4th Class 10 watt amateur license does not require code proficiency, and as mentioned previously, it permits limited HF voice operation. It now accounts for 93% of all Japanese amateur stations. Growth through 1992 has been startling! In 1960 there were 8538 amateur stations in Japan. In 1970 there were 105,933, in 1980—442,1055, in 1990—1,027,101, and in 1996—1,350,127.[13]

What is interesting, however, is that the rate of increase in the number of Japanese amateur stations has been going down every year for the past five years to the point where there are now less amateur stations in Japan than a year ago. (In 1995 there were 1,364,316.) Or to put it a different way, the 10% growth rate of

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ARRL WRC-99 Committee Amateur Service Restructuring Proposal

1. The Novice Class would be eliminated. Present Novice licensees would be given the opportunity to take an open-book test given by an accredited VE team to afford them the opportunity to upgrade to what is now the Technician Plus license.

2. The (No code) Technician license would be renamed the "Basic" license. The Technician Plus license would be renamed the "Intermediate" license.

3. The current General, Advanced, and Amateur Extra Class would pick up an *additional* 50 kHz of phone band on 75 and 15 meters and 25 kHz on 40 meters. (This would also return the General Class to their pre-1968 "Incentive Licensing" phone band limits on 75, 40, and 15 meters.)

Band	General	Advanced	Extra Class
80m	3800–3850 kHz	3725–3775 kHz	3700–3750 kHz
40m	7200–7225 kHz	7125–7150 kHz	7125–7150 kHz
15m	21250–21300 kHz	21175–21225 kHz	21150–21200 kHz

4. The new Intermediate Class would get:

Band	CW	Digital	Phone & CW
160m	—	—	1950–2000 kHz
80m	3525–3700 kHz	3600–3625 kHz	3900–4000 kHz
40m	7025–7050 kHz	—	—
15m	21025–21150 kHz	21100–21125 kHz	21350–21450 kHz
10m	28050–28300 kHz	28100–28189 kHz	SSB 28300–28500 kHz FM 29500–29700 kHz

5. Morse code requirements would be 5, 10, and 20 wpm instead of the current 5, 13, and 20 wpm. A new hand sending test would be required and 1 minute solid copy would be required during a 5-minute receiving test period. The multiple-choice answer format would no longer be permitted.

Table I– ARRL WRC-99 Committee Amateur Service restructuring proposal. League members have a chance to comment on the restructuring until May 31, 1997.

the 1980s has now deteriorated. This is the first time that this has happened.

I believe that this decrease is caused by two factors: (1) High-frequency operation is no longer as important to amateur radio as it once was; and (2) the popularity of the Internet is skyrocketing in Japan (just as it is in the U.S.).

While it is safe to assume that interest in the U.S. amateur radio hobby would increase somewhat domestically if the CW requirement for HF voice operation was abolished, I am of the opinion that the increase would be nowhere near as much as it would have been five or ten years ago.

My reasoning is that it is now a simple matter to make international contacts via the Internet, and with approaching voice and video capability, it will be even easier in the future. Couple that with the upcoming increased long-range amateur satellite communications capability, and it all adds up to what I believe to be a major de-emphasis on HF radio—especially for the newcomer to amateur radio.

The CW Requirement—Is It Important?

It appears to me that the code requirement now exists for one reason only—to keep the number of licensed amateur radio operators at a manageable level and to reduce frequency congestion to those who have already passed the code.

My own belief is that the Morse requirement for amateur radio high-frequency operation is now unnecessary. First of all, U.S. amateur radio at the HF level is not expanding at all. Worse than that, licensing statistics reveal that the total number of U.S. General, Advanced, and Amateur Extra Class amateurs is declining. Examination statistics show a marked decrease in upgrading where a telegraphy examination is required.

Second, I believe that the amateur examination (licensing) requirements should be appropriate for the type of operation to be performed. As a member of the VEC's Question Pool Committee, I can tell you that we are required by law to relate our exams to the operating privileges afforded by each class of license.

It seems pointless to require an otherwise qualified person with vast electronics knowledge to be excluded from HF voice operation. Such an individual, for example, could be an asset to the service through experimentation and to society during public-service and disaster-relief communications. And the code-required condition has led to many otherwise qualified amateurs obtaining a questionable medical telegraphy waiver which grants them 20 words-per-minute code credit once they have passed 5 wpm in some manner. It certainly does not seem to be very difficult to get a doctor to certify an applicant as being unable to pass a code test. VEs and VECs are seeing more and more medical waivers these days. While the rules require that the 5 wpm CW exam must be passed in some manner, even a code test administered to a "handicapped" individual one character at a time at no particular speed is permitted.

The Morse code proficiency requirement thus presents an unnecessary (and except for the international requirement, an illegal) impediment to fuller use of the Amateur Service. The American Radio Relay League is in the precarious position of having to support its membership, and most of its membership consists of long-term amateurs. The prevailing view among these amateurs is that all amateur radio operators should have some proficiency in Morse code. This conviction is particularly prevalent among those amateurs who have already passed code examinations.

This attitude, while understandable, is nevertheless unreasonable and very short-sighted, especially when you consider that commercial interests will pay billions of dollars for our extensive frequency holdings. They already have their sights set on our spectrum! Spectrum is the life-blood of our hobby. Once our valuable frequencies are gone, we have nothing at all!

My own feeling is that a growth rate of about

5% at all amateur license classes is about right. We currently have this at the VHF-UHF level. Eliminating—or at least de-emphasizing—the telegraphy requirement at the HF level should revitalize amateur radio at the high-frequency level as well. It is badly needed!

ARRL WRC-99 Planning Committee

Apparently, the American Radio Relay League, or at least their WRC-99 Planning Committee, is thinking along the same lines. A year ago ARRL League President Rod Stafford appointed a nine-member panel to determine possible changes to the international regulations governing the Amateur Service. Six of the committee members were very high-level ARRL officials (two vice-presidents, three division directors, and a vice-director).

The committee developed an opinion survey of ARRL members and non-members. League members overwhelmingly agreed that the Morse code requirements should be retained in the international regulations. Non-members also agreed, but only narrowly. The Technician Class, however, did not support CW retention. Based on the survey results, the ARRL Board voted to retain the code for HF operating privileges as an international treaty obligation.

What is interesting, however, is that this high-level committee agreed that the Amateur Service should be restructured and that recommendation has been made to the Board. The Board in turn has asked the membership for its thoughts on the matter. Table I is a brief recap of the new proposed restructuring line-up. Please keep in mind that this is only a proposal that was floated to the ARRL Board by their WRC-99 Committee. League members will get a chance (until May 31, 1997) to comment on the restructuring. The proposal should have widespread interest among the Amateur community, however, since it offers something for everyone. And considering the makeup of the WRC-99 Committee, restructuring of some sort stands a pretty good chance of eventually being adopted. My own feeling is that it does not go far enough.

Footnotes

1. International Telecommunications Convention (Malaga-Torremolinois, 1973), revised by the World Administrative Radio Conference, Geneva 1979. Article 1, Section III, §3.34, international Radio Regulations.
2. Article 32, Section I, §2(1), international Radio Regulations.
3. Article 32, Section I, §2(2).
4. Article 32, Section I, §2(3).
5. Article 32, Section I, §3(1).
6. 47 CFR §97.1 (a-e).
7. 47 CFR §97.117.
8. 47 CFR §97.113(a).
9. 47 CFR §97.301, §97.305©.
10. Jay S. Oka, JA1TRC/KH2J, Manager, International Section, The Japan Amateur Radio League, Inc., 14-5, Sugamo 1-chome, Toshima-ku, Tokyo 170-73, Japan.
11. FCC First Report and Order, Docket No. 11994.
12. FCC Report and Order, Docket No. 82-799.
13. All Japanese amateur station figures are from the Japan Amateur Radio League, Inc., Tokyo.

73, Fred, W5YI

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The PHDARA Hamfest 3 May from 8–4PM at the KC Market Center. Bob, WA0CLR, 816-436-0069, wa0clr@juno.com or Box 28954, Kansas City, MO 64188-8954.

MORSE CODE SOFTWARE: Learn all 44 characters, build speed to 25 WPM, $15.00. Rick Beals, WA6EHL, 1907 Twain Place, Placentia, CA 92870 (714-528-7358).

100 QSL CARDS $7.50 postpaid. Stamp for sample. ARTIST, P.O. Box 111534, Nashville, TN 37222.

WANTED: Western Electric Audio Equipment. 1927–1960s. Amplifiers, mixing boards, microphones, pre-amps, speaker parts, tubes, etc. Call 1-800-251-5454.

KENWOOD TS-530S $500; TS-430S $600; TS-140S $650. YAESU FT101ZD $450. K1BW, 413-538-7861.

FREE GUIDE "THE TEN MOST COMMON TOWER BUILDING MISTAKES": Written by well-known tower expert Steve Morris, K7LXC, this guide will help you avoid dangerous mistakes. TOWER TECH, Box 572, Woodinville, WA 98072; e-mail UpTheTower@aol.com or call 800-TOWERS8.

FREE! 1997 SHACK ATTACK catalog. New products, full color, License Plaques to CD-ROMs. Contact SHACK ATTACK, Box 91, Enterprise, UT 84725 (801-878-2760; e-mail kb7vrd@aol.com).

Letters *(from page 10)*

are two skills that cannot be overestimated. That's my two cents! Keep up the good work!

R. Kevin DiPeri, AA2CB
Woodbridge, NJ

Larry Smith, N4FD, saw this car license plate recently in St. Simons Island, Georgia and just had to take a photo. He said he didn't know if "DX DAD" was there or not!

A Trivial Toy; A Great Tool

Editor, *CQ:*

Bravo! The ever-omnipotent "they" should pass immmediate legislation requiring a full-size, four-color poster of February "Zero Bias" editorial to be packed with every computer sold to each and every aspiring Joiner of the Internet—the Computer Age answer to CB radio.

In response to my "WEETENNA" article in the November 1996 issue of *CQ* I received over 100 letters from readers, but not a single e-mail, which must prove a point! Once again, *Bravo!*

George Murphy, VE3ERP
Orillia, ON Canada

PS: When I retired in 1992, I did the following: sold my modem; ripped out the cable from my computer to the telephone line; cancelled my fax number; removed all traces of Windows from my computer; and rediscovered that a computer is a trivial *toy*, but a great *tool*.

The Golden Antenna

Editor, *CQ:*

Please let your readers know of the following award. Every year, on the occasion of the German-Dutch Radio Amateur Festival, the town of Bad Bentheim awards the "Golden Antenna" to a radio amateur for an exceptional humanitarian deed in the field of amateur radio broadcasting. This award has been given since 1982 to radio amateurs from countries such as Brazil, Italy, Belgium, The Netherlands, Romania, and the former USSR. Last year's award was received by Joop Willems, PJ2JW, for his engagement during and after a hurricane on Sint Marten. The 16th presentation is to take place at the 29th German-Dutch Radio Amateur Festival, August 29, 1997 in Bad Bentheim.

Radio amateur organizations all over the world, as well as every radio amateur and individual who has been helped in any way by radio amateurs and who knows of humanitarian deeds by a radio amateur, are called upon to submit proposals of individuals or groups of amateurs who should be considered for this award. Detailed documents substantiating proposals must be received by June 15, 1997 by:

Stadt Bad Bentheim
P.O. Box 14 52
D 48445 Bad Bentheim
Germany

Advertiser's Index *(cont'd)*

It's easy to advertise in CQ.
Let me know what I can do to help.
Arnie Sposato,N2IQO
(516) 681-2922 or FAX (516) 681-2926
e-mail:arniecq@aol.com

GAP: The Perfect Antenna

We at GAP realize there isn't a perfect antenna. No singular antenna will scream DX on 80 and be the best for local nets on 10. If anyone tells you there is, beware! The perfect antenna does not exist, but the right one for you may. If you want something to bust the pile on the low bands, then consider the Voyager. Just starting out in ham radio and need a great general coverage antenna, the Challenger is easy to assemble and for little effort will yield superior performance, especially on DX. Maybe you knowingly or unknowingly moved into one of those "restricted areas" where the Eagle's limited visibility, but unlimited ability is desired.

Eagle DX

Challenger DX

Voyager DX

This chart helps you select the right GAP antenna. When comparing GAPs, bandwidth is not a concern. With few exceptions, a GAP yields continuous coverage under 2:1 for the **ENTIRE BAND**.

All antennas utilize a GAP elevated asymmetric feed. A major benefit is the virtual elimination of the earth loss, so more RF radiates into the air instead of the ground. This feed is why a GAP requires **NO RADIALS**. Just as elevating a GAP offers no significant improvement to its performance, adding radials won't either, making set up a breeze.

A GAP antenna has no traps, coils or transformers. This is important. The greatest sources of failure in multiband antennas are these devices. Perhaps you heard someone discuss a trap that had melted, arced or became full of water. Improvements to these inherent problems are the focus of the antenna manufacturer, while the basic design of the antenna remains unchanged. **GAP improved the trap by eliminating it!** Removing these devices means they don't have to be tuned and, more importantly, won't be detuned by the first ice or rain. The absence of these devices improves antenna reliability, stability and increases bandwidth.

Another major advantage to a GAP antenna is its NO tune feature. Screws are simply inserted into predrilled holes with a supplied nutdriver.

The secret is out and people in the know say:

CQ–"The GAP consistently outperformed base-fed antennas...and was quieter."

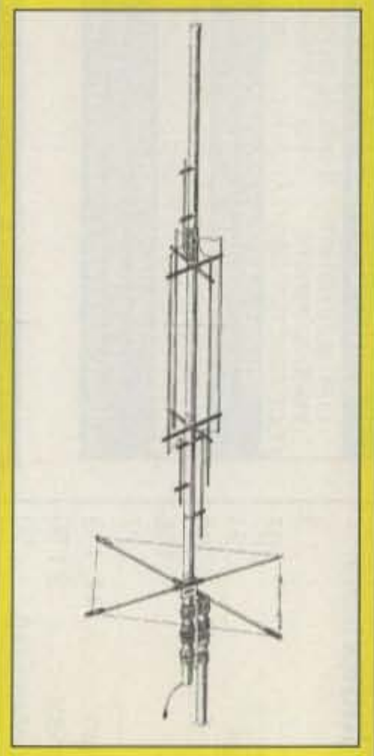
73–"This is a real DX antenna, much quieter than other verticals."

RF–"To say this antenna is effective would be a real understatement. Switching back and forth on 40m between another multiband HF vertical and the GAP, there was no comparison. Signals were always stronger on the GAP, sometimes by S units, not just DB's."

Worldradio – "These guys have solved the problem associated with verticals. That is, an awful lot of RF is wallowing around and dropping into the dirt instead of going outward bound. A half-wave vertical does need radials if it is end fed (at the bottom). But the same half-wave vertical does not (as much, hardly at all) if is fed in the center."

IEEE–"Near field and power density analyses show another advantage of this antenna (asymmetric vertical dipole): it decreases the power density close to the ground, and so avoids power dissipation in the soil below it. The input impedance is very stable and almost independent of ground conductivity. This antenna can operate with high radiation efficiency in the MF AM standard broadcast band, without the classical buried ground plane, so as to yield easier installation and maintenance."

Latest Release: **TITAN DX**



This all purpose antenna is designed to operate 10m-80m, WARC bands included. It sits on a 1-1/4" pipe and can be mounted close to the ground or up on a roof. Its bandwidth and no tune feature make it an ideal antenna for the limited space environment as well as a terrific addition to the antenna farm.

MODEL	BANDS OF OPERATION											HT	WT	MOUNT	COUNTER-POISE	COST
	2m	6m	10m	12m	15m	17m	20m	30m	40m	80m	160m					
Challenger DX	■	■	■	■	■		■		■	■		31.5'	21 lbs	Drop In Ground Mount	3 Wires @ 25'	$259
Eagle DX			■	■	■	■	■		■			21.5'	19 lbs	1-1/4" pipe	80" Rigid	$269
Titan DX			■	■	■	■	■	■	■	■		25'	25 lbs	1-1/4" pipe	80" Rigid	$299
Voyager DX							■		■	■	■	45'	39 lbs	Hinged Base	3 Wires @ 57'	$399

GAP

ANTENNA PRODUCTS INC.
6010 N. Old Dixie Hwy.
Vero Beach, FL 32967

TO ORDER, CALL
(561) 778-3728

Come Visit Us At gapantenna.com

MasterCard VISA DISCOVER COD

2m/70cm Mobiles **FT-2500M/FT-7400H**

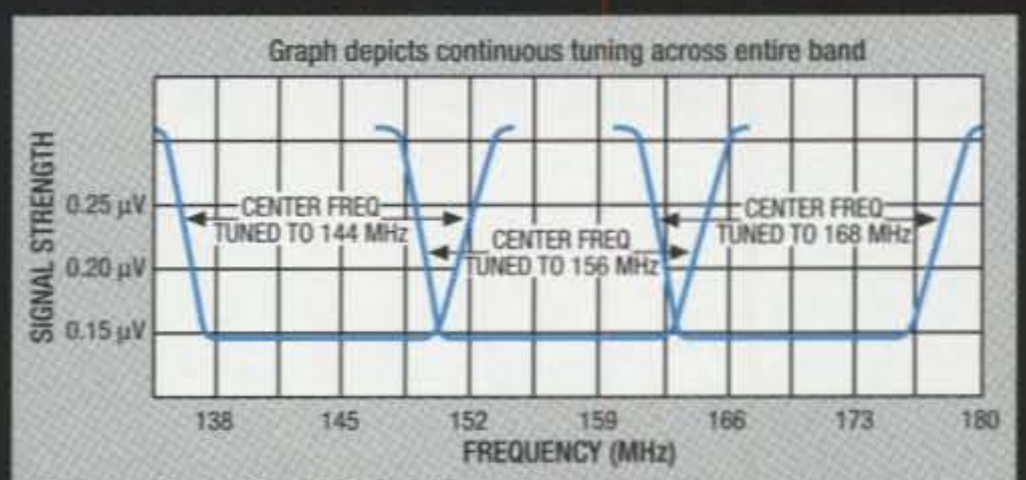
Advanced Track Tuning, Mil Spec, true FM. All in one radio!

Outside, you can easily see why the FT-2500M stands up to the shock and vibration like no other. We engineered the first mobile radio to meet the rigid standards set by the U.S. Military back in the '80s, and that same critical design is in the FT-2500M. From the simplified front panel, rubber coated knobs, durable pebbled finish coating, and huge Omni-Glow™ display to the one-piece die-cast chassis, the FT-2500M can take whatever you throw at it!

Inside, the electrical circuitry meets standards so uncompromising the FT-2500M can respond like no other radio. Built-in 3-Stage Advance Track Tuning (ATT), automatically retunes from 140 to 174 MHz permitting consistent receiver sensitivity across the entire band.

But there's more. Like alpha-numeric display capability! Lets you program a frequency or a 4-character name on any of the 31 memories. With three selectable power output levels and up to 50 watt power output, the FT-2500M extra large heat sink means forced air cooling is not necessary. And, as a bonus, Yaesu's exclusive backlit DTMF mic comes with every FT-2500M.

Experts say the FT-2500M is the only commercial-grade amateur radio available. So, for tough manufacturing standards, inside and out, with true FM clarity, and outstanding performance, the FT-2500M is your mobile.



3-Stage Advance Track Tuning (ATT) – The exclusive 3-Stage Advance Track tuning front end automatically adjusts band width sensitivity across the entire receiver range, while maintaining selectivity specifications. ATT significantly reduces interference from inter-modulation and front end overload.

YAESU

Performance without compromise.℠

Specifications

- **Frequency Coverage:**
  FT-2500M
  RX: 140-174 MHz
  TX: 144-148 MHz
  FT-7400H
  RX/TX: 430-450 MHz
- Rugged Military Spec Design
- Advanced Track Tuning (ATT)
- Selectable Alpha-Numeric Display
- Omni-Glow™ Display, largest available
- Power Output:
  FT-2500M 50/20/5 Watts
  FT-7400H 35/15/5 Watts
- Flip Up Front Control Panel hides seldom used buttons
- Backlit DTMF Mic
- 31 Memory Channels
- CTCSS Encode Built-in
- Automatic Power Off (APO)*
- Time-Out Timer (TOT)*
- Manual* or Automatic Backlighting Adjustment
- **Accessories:**

FP-800	20 Amp HD Power Supply w/ Front Mounted Speaker
FRC-6	DTMF Paging Unit
FTS-17A	CTCSS Decode Unit
SP-4	External Mobile Speaker w/ Audio Filters

*FT-2500M

"Just look inside. Military spec really means something to Yaesu!"

"A QST review says 'the FT-2500M exhibited superior 10 MHz offset IMD dynamic range of 103 db!'"

"This Advanced Track Tuning practically eliminates intermod!"

"Yaesu did it again."

US MILITARY APPROVED MIL-SPEC 810

FT-3000M

High-Powered 2-m FM Transceiver
Feature-rich, 70 full watts of TX power, and built to the tough performance standards you've come to expect from Yaesu.
FEATURES • Frequency Coverage Wide Band Receive-- RX:110-180 MHz, 300-520 MHz, 800-999 MHz* TX:144-148 MHz • AM Aircraft Receive • MIL-STD 810 Rating • Interactive Programming • High Power Output: 70 Watts, plus 50, 25 and 10 Watts • Quick-Touch™ Dual Concentric Control Knob • Twin Cooling Fans • ADMS-2 Windows™ Programmable • Digital Coded Squelch (DCS) • 81 Memory Channels • Auto Range Transpond System™ (ARTS™) • 1200/9600 Baud Packet Compatible • Smart-Search™ • Alphanumeric Display • Dual Watch • Full line of accessories
*800 MHz Cellular blocked

NOW AVAILABLE!

For the ham who's always wanted an IC-781...

Introducing ICOM's IC-756

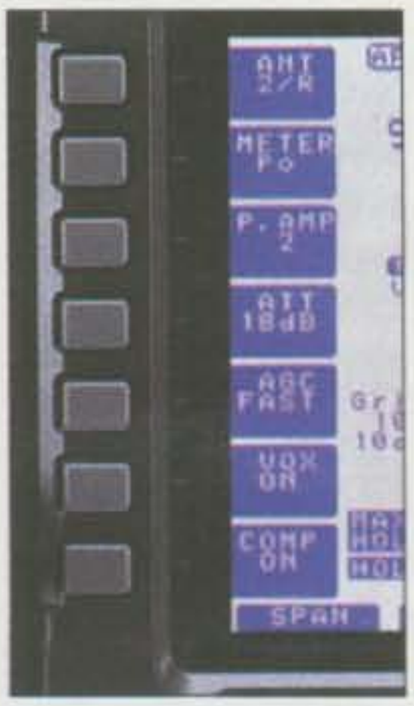
Advanced features and performance, in the spirit of the IC-781.

But at a real down-to-Earth price.

HF+6M!

ICOM uses next generation technology to combine high performance and advanced features in an easy-to-control package: the all new IC-756!

- 4.9" Concentrated Information LCD Display with dot matrix characters
- 5-100 variable-control watts of 100% stable output power (5-40 W on AM)



☞ Large soft key buttons allow for on-screen control of alphanumeric naming, programmable "memo-pad" info, attenuation levels, antenna selection, AGC speed, and more!

- SSB/AM/FM/CW/RTTY
- Fast, built-in automatic antenna tuner with preset 100 kHz steps
- Dual watch
- Twin passband tuning
- 101 memory channels
- 13.8 volt operation

IF-DSP

New, adjustable IF-DSP on transmit and receive! Bring in signals crisp & sharp, and send clean for improved QSOs.

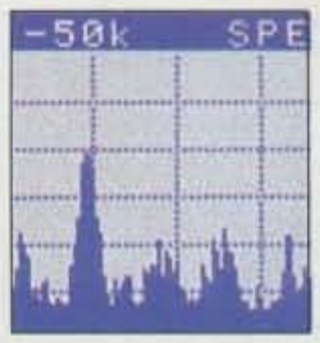
- Noise reduction
- Auto IF notch filter
- Selectable Audio Peak Filter (APF)
- Phase Shift Network (PSN) modulation/demodulation

plus:

- **PC programmable†:** ICOM's CI-V interface is built-in
- High-performance memory keyer

PC Ready!

☞ Use the IC-756's LCD spectrum scope to visually find nearby airwave activity! The displayed info scrolls as the frequency changes!



- Noise blanker on/off control
- Speech synthesizer
- Voice synthesizer (option UT-102 required)

VALUE

Step up to a higher performance rig. The IC-756 is built 100% ICOM reliable, and it's priced only slightly higher than other models with far fewer features.

Call ICOM's brochure hotline today at 206-450-6088 or see the IC-756 at your ICOM dealer!

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† Option CI-17 required. Questions? Contact ICOM Technical Support in the HamNet forum on CompuServe @ 77540,525 (Internet:75540.525@compuserve.com)