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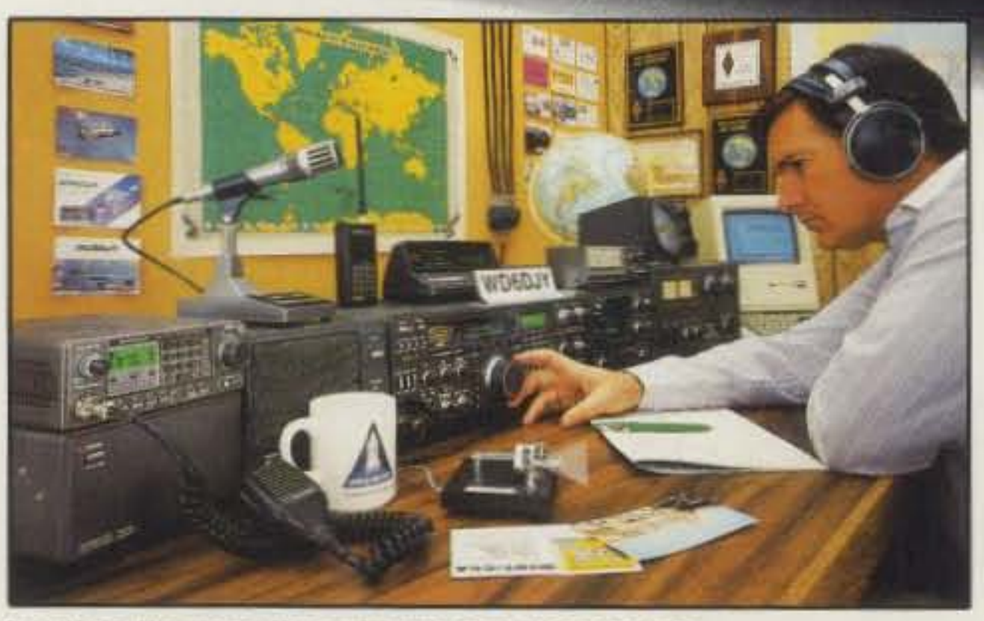

More TS-940S information is available from authorized Kenwood dealers.

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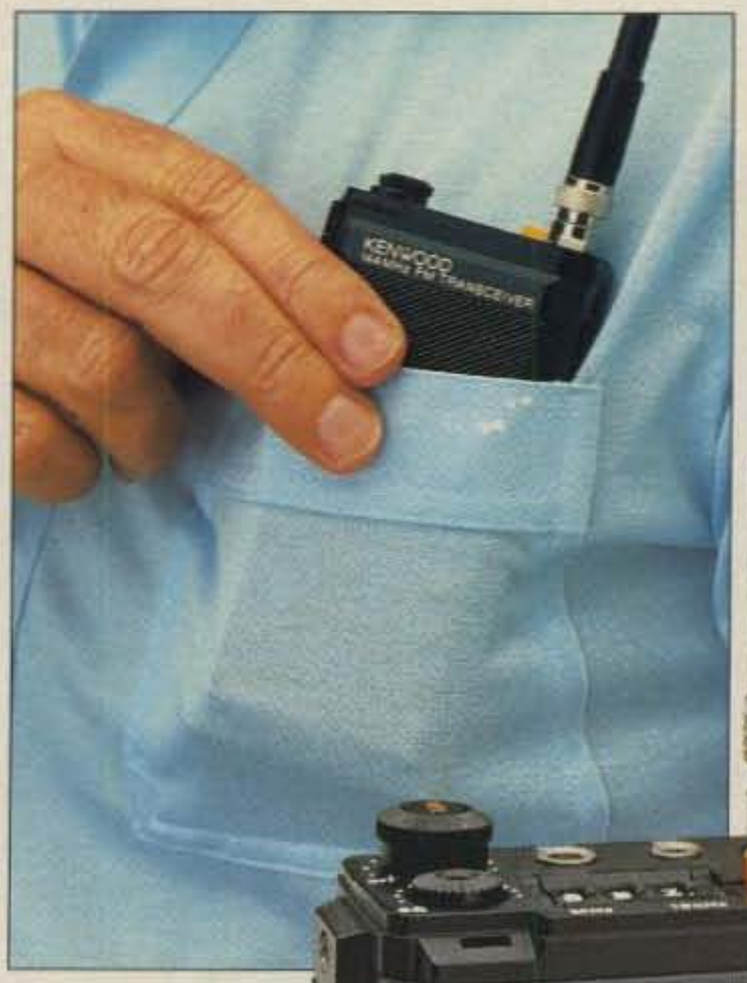

- **Repeater offset switch.**
  TH-21AT/A: ±600 kHz, simplex.
  TH-31AT/A: −1.6 MHz, reverse, simplex.
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- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8** soft case for TH-21A/31A/41A
- **SC-8T** soft case for TH-21AT/31AT/41AT
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **Service manual**

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TH-21AT shown. Standard versions TH-21A/31A/41A without DTMF pad also available.
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TS-830S HF transceiver.

The "Pacesetter" has become a legend in DX and contest circles.

- Covers all 10 Amateur bands (50 kHz extended coverage).
- Wide receiver dynamic range, Junction FETs in the balanced mixer, MOSFET RF amplifier at low level, and dual resonator for each band.
- Variable bandwidth tuning (VBT). Varies IF filter passband width.
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- Noise-blanker threshold level control.
- IF shift (passband tuning).
- 6146B final with RF negative feedback. Runs 220 W PEP (SSB)/180 W DC (CW) input on all bands.
- Built-in RF speech processor.
- SSB monitor circuit.
- Built-in digital display, (fluorescent tube), with analog dial.
- Narrow/wide filter selection on CW.
- RIT and XIT (transmitter incremental tuning).

Optional accessories:

- VFO-230 external digital VFO with five memories, digital display.
- VFO-240 external analog VFO.
- AT-230 antenna tuner/SWR/power meter.
- SP-230 external speaker.
- YG-455C (500 Hz) or YG-455CN (250 Hz) CW filter for 455 kHz IF.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter for 8.83 MHz IF.
- KB-1 deluxe heavyweight knob.

TS-530SP HF transceiver.

This "Cents-ational" HF transceiver is recognized worldwide for superior and dependable performance.

- 160-10 meters, LSB, USB, CW, all Amateur frequencies, including new 10, 18, and 24 MHz bands. Receives WWV on 10 MHz.
- Built-in digital display (six digits, fluorescent tubes), with analog dial.
- Narrow/wide filter selector switch for CW and/or SSB.
- Built-in speech processor, for increased talk power.
- IF shift tunes out interfering signals.
- Wide receiver dynamic range, with greater immunity to overload.
- Two 6146B's in final, allows 220 W PEP/180 W DC input on all bands.
- Advanced single-conversion PLL, for better stability, improved spurious characteristics.
- Adjustable noise-blanker, with front panel threshold control.
- RIT/XIT front panel control allows independent fine-tuning of receive or transmit frequencies.

Optional accessories:

- SP-230 external speaker with selectable audio filters.
- VFO-240 remote analog VFO.
- VFO-230 remote digital VFO.
- AT-230 antenna tuner/SWR/power meter.
- MC-50 desk microphone.
- KB-1 deluxe VFO knob.
- YK-88C (500 Hz) or YK-88CN (270 Hz) CW filter.
- YK-88SN (1.8 kHz) narrow SSB filter.

More information on the TS-830S and TS-530SP is available from authorized Kenwood dealers.

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A Letter from the President . . .

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Dear Fellow Amateurs:

Here is a picture of our newest Amateur Radio transceiver - the CORSAIR II. It is, without question, a superb piece of gear I am proud to put the TEN-TEC name on. New features include a computer designed, 16 pole crystal ladder filter, 8 pole audio bandpass filter, built-in 40 character memory keyer, dual mode noise blanker and out-of-the-box AMTOR compatability.

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73,

TEN-TEC INC.
Jack Burchfield
Jack Burchfield, K4JU
President

Corsair II

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TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862

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The Radio Amateur's Journal

ON THE COVER: Austin Regal, N4WW, shows us it's time to warm up the contest rig for the big one next month. Photo by Larry Mulvehill, WB2ZPI.

SEPTEMBER 1985 **VOL. 41, NO. 9**

FEATURES

DEPARTMENTS

Zero Bias

AN EDITORIAL

According to the FCC, most people enter the amateur ranks via the Novice license. The biggest percentage of amateurs leaving amateur radio also come from the Novice class license. Many of these people never even put a station on the air or make a single contact. Why?

Some may not have equipment. Some may even have equipment, but other than stare at it occasionally, they never do anything with it. The initial studying period is over, the hard sought after license has been earned, and they have demonstrated that they know what is required to hold a Novice license. Do they know how to tune up their rigs? Do they know how to make a contact, or even what a contact sounds like? Do they know how to put up an antenna or how to make sense out of some of the instruction manuals around? The answer to those questions is probably not. In this post-exam period we are dealing with a great number of *probably nots*. The answers to those questions do not come from reading alone. You can read all the literature available on how to drive a car, but until you actually get behind the wheel of a car you don't know how to drive. Amateur radio, or anything new, is the same way. You're not born knowing it.

"How Far Can You Talk?"

That's amateur radio's big "in" joke. Everyone who sees or hears about amateur radio always asks, "How far can you talk?" No one, it seems, ever asks, "How do you talk?" The whole phenomenon is measured in distance and not expertise. Expertise is assumed, starting with the people who write the manuals, right up through family and friends who assume the new Novice knows all there is to know about that marvel of electronic technology sitting on the desk. Well, what's it like for our new Novice? What keeps him from either getting on the air or sticking with it?

Maybe it's stage fright or the simple fear of making a fool of one's self. Maybe it's the fact that for the first time our beginner realizes that words and a myraid of abbreviations can be formed by those sounds so recently learned, and he doesn't know what to send (or how to send it). Morse code is not exactly like talking, whereby the top of your head empties out extemporaneously. Maybe later on when (and if) it becomes second nature to our Novice, the process may seem less awesome.

So, if we can clear the first hurdle and actually get our new Novice before a rig, we can also picture the following. Our Novice is tuning the receiver, listening for a clear spot or for someone calling CQ. We have to assume that our Novice can send code. Since sending is no longer required for the exam, we can also assume he has little or no practice in sending code. The mental process required now is to take a thought or objective, break it down into words, break the words down into letters, and then transliterate the letters into Morse code while at the same time tactily operating an electromechanical device to send the Morse code. Throw in a few thoughts on how to operate the equipment and rudimentary considerations for procedure. On receive, reverse the procedure, exchanging a pencil and paper for the key, and include a bit of prefix recognition to balance it off.

Well, we all know that it really can be done and is done each and every day by thousands of amateurs. However, we're still around to look at it with hindsight. Think about your first few contacts and what it took to accomplish them. How much easier would it have been if you had a buddy there to help you through the rough spots and explain what was going on? I'm sure it's character building to learn things the hard way, but we do have to remember that we're talking about amateur radio and not the Marine Corps.

One of the major tasks is to actually situate our new Novice at the operating position, whether it be his or ours. Whatever it took to get him this far still has to be encouraged a bit more. The on-the-air process, however, is a lot easier to learn than Morse code. What it takes most of all is confidence, and confidence comes with time. It also takes encouragement from fellow amateurs and having someone or a group to turn to for either direct help, guidance, or just to answer a few questions. For someone just starting out, there are no silly or stupid questions, just simply a need to know. Bad operating habits and "lid" behavior are things picked up very easily without proper direction or correction. They come from emulating other people who never learned how to correctly do something. Helping a new Novice get on the air is really helping ourselves.

We've done a pretty good job in organizing classes for the Novice license and in getting the volunteer examiner program off the ground. It would seem to be a shame to have all that effort go to waste or become an intellectual exercise. The next logical step is one of conservation of *our* natural resource—the Novice. If we've gotten the Novice through all of the basic hurdles, including our beloved Morse code, only to drop him on his own, we've wasted everyone's time.

Keeping our Novices and fostering their growth in amateur radio is an integral part of tomorrow's amateur radio. It should be far easier to keep someone who is already motivated, and especially someone licensed within amateur radio, than to recruit someone new. Both are vital and necessary to our continued growth. What it takes in a good many cases is simply being there. It's the one-on-one offering to help. It's the suggestion to the new licensee that you are available to help him get on the air and show him the ropes. It's the resources of your junkbox that can sometimes help put the finishing touches on a new station. All of these things are one-on-one. You are the one who will make the difference and make things happen. You are also the one who knows best what it was like when you got started, and I'm sure you can still remember who helped you. They thought enough of you and amateur radio to say that it was worth the time and effort. Your being around long enough to read this affirms that thought.

Perhaps your club is involved in teaching courses and giving exams. Maybe it does take more free time to get involved with those long-range projects you have. Whatever the reason or excuse, when it comes down to it, we are talking in essence of one or two afternoons. Can *you* spare an afternoon to help a new Novice get on the air? Can *you* become that person the Novice remembers vividly twenty years from now? I do know that if you give it a shot, you'll have more fun than simply going to a club meeting waiting to be entertained by the efforts of a few members or getting involved in some of the petty harangues. You might also find out that you like sharing what you have worked to learn, and that by reviewing some of the basics, you can even learn more about what you probably take for granted.

Travels With CQ

We've hit the dusty trail several times in the last few months keeping up with the hamfest scene. Dick and Arnie were at the Birmingham hamfest in May. Dick was one of the judges for their annual Homebrew Contest. We'll have a picture story on that in a month or so. That same weekend Herb and I were up at the Rochester Hamfest, which was turned into a two-day affair this year. A few weeks later Dick, Arnie, and I were in Dallas for Ham-Com. This was the last year for this convention site, as a brand new facility, bigger and better, will be available in 1986. The following week I was in Washington, D.C. for the Amateur Radio Luncheon sponsored by AFCEA and hosted by our own Dr. Ted Cohen, N4XX. Arnie represented us at the summer LIMARC giant flea-market here on Long Island, while Dick did the honors at Rossville, Georgia (I think he just likes the name). This year it was Dick's turn to wave the *CQ* banner at the biggie in Germany, Friedrichshafen. That is a remarkable show, and one that I hope to get back to next year. July found us at the Atlanta Hamfest. This year it was a new hotel and new convention site. Although much bigger and posher, I sort of lean towards last year's arrangement. Later on in the month Lew McCoy headed up towards the biggie in Arizona, Flagstaff. I was up there about two years ago, and it really is beautiful country. In August we'll be at the hamfest aboard the *Queen Mary* in Long Beach, California. I hope to have some spare time to visit the Spruce Goose, the Howard Hughes giant wooden flying boat built during WW II.

As I keep telling you, there are a lot of activities going on all around you. Be a part of what's going on. Check out some of these hamfests and see for yourself what's new in technology and what's available to improve your operating pleasure. Give your Globe Scout a rest for a day or so and get out in the daylight and fresh air while you attend a hamfest or fleamarket. You're the reason these things are held in the first place, so you don't need an engraved invitation to go to your own party. Just go and have a good time.

73, Alan, K2EEK

Doctor QSO™
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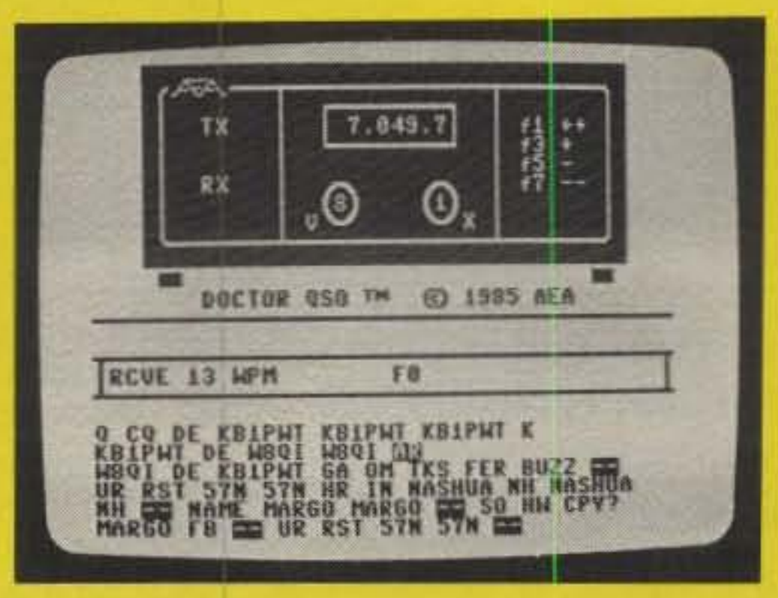

Doctor QSO Relieves All Symptoms Of Morse Code Phobia!

Doctor QSO™ is a plug-in cartridge for the Commodore 64 computer that provides a very realistic simulation of on-the-air two-way Morse Code ragchew contacts (QSOs). AEA, the undisputed leader in Morse training, has introduced Doctor QSO to amateur radio for the purpose of making Morse skill upgrading FUN and EASY. With Doctor QSO you can look forward to practicing your Morse Code skills in a non-confusing manner. Forget about all the drudgery you associated with Morse Code in the past; Doctor QSO ushers in a totally new era in Morse Code learning.

Doctor QSO is based on the same technology that has made the Doctor DX™ contest trainer so famous. The Doctor QSO simulator is so realistic that most skilled operators find it every bit as rewarding as the real thing. You can operate anytime you want; the only extra equipment you need is a Commodore 64 and a TV set.

Doctor QSO also removes the mystery of the CODE BEHIND THE CODE. Many people go so far as to learn the Morse Code characters, only to be frightened of getting on the air the first time because the QSO format is so confusing. With Doctor QSO, you will be a pro before you turn on your first transmitter. The Doctor QSO trainer/simulator is ideal for the aspiring Amateur Radio operator with little or no contact with helpful hams.

With Doctor QSO you will become familiar with all the U.S. call areas and associated call letter prefixes. The standard international QSO format is observed along with all the common amateur radio abbreviations which are explained thoroughly in the operator's manual. All Morse skill levels are addressed by Doctor QSO, from the person who has not yet learned the Code, to the person comfortable with sending and receiving at 40 + WPM.

Who says Morse Code can't be fun? You can even have fun with Doctor QSO before you have learned the Code. To begin with, the operator can view the messages being sent by the computer generated stations in real-time. The operator can also send Morse with the keyboard. In addition, the operator can select simulation of static interference (QRN) and adjacent CW interference (QRM). Normally, the beginner would operate in the novice band where stations will be sending as slow as 3 WPM. Later as the user becomes more skilled, he can move down the band to faster speeds, and he has the choice of using a key or keyer for sending.

If you have tried every other method known to learn the Morse Code and failed, then Doctor QSO has just the prescription for you. Now you can upgrade your Amateur Radio license in record time. Doctor QSO is more than the written word can describe. To fully appreciate all the merits of this trainer, see your dealer for a demonstration or contact AEA for more information.

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Our Readers Say:

Editor, *CQ:*

It is with great shame that I write to you concerning the cover of your May edition, for alas, I can find nothing wrong! I am seriously considering sending in my license for cancellation. I would be guessing that there may be something wrong with the "key," but here again I am remiss as I never use one of the things. The Kenwood transceiver in the background is somewhat blurred, but maybe some of the switches or dials are in the wrong position. Who cares? Was it not supposed to be a photograph rather than a precisely accurate statement?

Golly . . . gee whiz! I really wish that I had the time to sift through magazines and write letter concerning NITS! Maybe if some of these over-zealous types would devote their time to improving their local ham club or in serving the ham community something worthwhile might be done for the betterment of Ham Radio.

I think that you guys are doing a fine job. Keep up the good work. At the beginning of this year I was subscribing to most of the major and a few of the minor ham publications. Due to the continuing higher cost, I have reduced that to one subscription . . . YOURS!

Alan Davis, KB7HM
Green Bay, WI

Fun Is The Essence

Editor, *CQ:*

You hit the nail on the head (Zero Bias, June 1985 *CQ*). The essence is FUN. Some people play hard and fast; others take it smooth and easy. But if they don't have fun, they don't stay with it, and worse, they drive others away.

In the same issue, W6UJD points the way, too. There probably is no substitute for building from scratch and making it work.

As a matter of fact, before the June issue arrived, I had been haunted for days by a couple of lines from a popular song, which seemed to me to maybe sum up our problem in amateur radio: "We surrounded ourselves with expensive toys, but somehow forgot how to play." We certainly have the expensive and quite wonderful toys, but many hams have lost the spirit of fun. I haven't (my XYL confirms that I haven't, though it hasn't always been fun for her). As a group, we have to get it back, and the only way I can see is for everyone to try to set an example. It *is* possible to win a contest without breaking the rules, to listen in a pileup until the time is ripe instead of shouting constantly, to vacate or share a frequency, to go along with band plans you don't totally agree with. When the game sounds like fun to play, new players will be attracted to it.

Bob Eldridge, VE7BS
Pemberton, BC, Canada

QRP and VHF Columns Best

Editor, *CQ:*

Just a note to tell you how much I enjoy the magazine each month. The first thing I look for is Ade Weiss' column on QRP operation. After that I look for the excellent VHF column written by Steve, WB2WIK. I am a neophyte VHFer and have learned something from every column.

One suggestion is to place the VHF column on perforated pages so that they can be removed and retained. I plan on keeping all the columns together in a looseleaf notebook for future reference, and I'm sure others will want to do the same.

Jim Lammers, NB5O
Austin, TX

Thanks Lance Johnson

Editor, *CQ:*

I would like to thank *CQ* and particularly Lance Johnson Engineering for the plaque they sponsored for the 1982 *CQ* WPX CW Contest DXpedition award. It arrived recently and is a handsome addition to my shack.

Lance Johnson Engineering deserves particular recognition, since they were not listed as the donor of this award when the contest results were published and stepped in to fill the void left when the original donor withdrew support from the contest.

Michael J. McGirr, M.D., K9AJ
Crete, IL

Nits Again?

Editor, *CQ:*

I hate to be a nitpicker, but your cover for July 1985 depicts an unsafe operating condition. The cover shows a station set up in water, with an operator holding the base of the metal microphone. The operator is sitting on a metal lawn chair with his left foot (it appears) sunk in a hole of water. His pants legs are already wet. Could he be asking the other person in the picture when the tide is coming in, or are they keeping track of how many times he's been shocked.

Safety first! We all should be thinking safety when we operate our equipment, whether from our home or from a remote location.

Keep up the good work and the best magazine.

David R. Altman, Sr.
El Paso, TX

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IC-745

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The IC-745 is a full featured, high performance HF base station transceiver with a 100dB dynamic range receiver. PLUS features usually found only in more expensive units.

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- 100 Watt RF output / 100% Duty Cycle
- Passband Tuning AND IF Shift
- Adjustable Noise Blanker (width and level)
- Adjustable AGC
- Receiver Preamp
- 16 tunable Memories with lithium battery backup

- Wide selection of filters and filter combinations (opt.)
- Continuously adjustable transmit power
- 10Hz/50Hz/1KHz Tuning rates with 1MHz band steps
- IC-HM12 Microphone with Up/Down Scan

Other Standard Features.

Included as standard are many of the features most asked for by experienced ham radio operators: dual VFO's, RF speech compressor, tunable notch filter, program band scan, memory scan, all-mode squelch and VOX.

Options: Internal IC-PS35 power supply, external IC-PS15 or IC-PS30 system supply. IC-SM8 two-cable desk mic, EX241 marker, EX242 FM module, EX243 electronic keyer, IC-SM6 desk mic, and a variety of filters.

Filter	-6dB Width	Center Freq. MHz
FL45	500 Hz	9.000
FL54	270 Hz	9.000
FL44A	2.1 KHz	0.455
FL52A	500 Hz	0.455
FL53A	250 Hz	0.455

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Announcing

•**Cochise County, Arizona** – On Labor Day weekend a Speical-Event station will operate from the OK Corral at Tombstone, Arizonia. The oldest active amateur radio call in the state of Arizona, W7GV, will be used. Operations will begin at 1500 UTC, Aug. 31, and will run through 2200 UTC, Sept. 2. Frequencies: SSB 28680, 21380, 14280, 7280, 3730; CW 21130, 7130, 3730. A certificate will be awarded to all who work W7GV, as well as SWL's. Send an 8½" × 11" SASE (40 cents postage) to: W7GV, P.O. Box 36032, Tucson, AZ 85741.

•**KCØCP From Oelwein, 1A** – The Great Plains ARC will have a Special-Event station Aug. 31 and Sept. 1 in conjunction with Railroad Days in Oelwein, Iowa. The bands used will be 20M at 14.235 ± 10 QRM, 40M at 7.235 ± 10 QRM, and 80M at 3.970 ± 10 QRM. The call used will be KCØCP. For certificate QSL to KCØCP, Box 203, Oelwein, IA 50662.

•**Morgan City, Louisiana** – The St. Mary Amateur Radio Transmitting Society, SMARTS, will operate NT5K to commemorate the 50th anniversary of the oldest state chartered festival. Frequencies: 7.255 ± 10 kHz and 14.275 ± 10 kHz and 146.52 simplex. Times: 1500–2300 on Sunday, Sept. 1. QSL and other information sent to all contacts. SASE to Jackie Price, KA5LMZ, 708 Front Street, Morgan City, LA 70380.

•**Erie, Pennsylvania** – The Radio Association of Erie (W3GV) will commemorate Commodore Oliver Hazard Perry's victory at the Battle of Lake Erie, War of 1812, on Sept. 7th and 8th. Operation: from 9:00 a.m. to 9:00 p.m. EDT on Saturday and from 9:00 a.m. to 5:00 p.m. on Sunday local times. Frequencies: 7.235, 14.235 MHz (phone), and 7.090, and 14.090 MHz (CW/RTTY). Special QSL via W3GV, 380 Young Rd., Erie, PA 16509, or the W3 QSL Bureau for DX stations. (Both SASE.)

•**K2BR From Miss America Pageant** – Southern Counties ARA will operate K2BR during September 10–14th from the Miss America Pageant, Atlantic City, New Jersey. Frequencies: Phone 25 kHz inside General phone bands; CW 65 kHz up from lower band edges; Novice 7.125, 21.250 MHz. QSL SASE via SCARA, Box 121, Linwood, NJ 08221.

•**Lisbon, Ohio** – The Columbiana County ARC will operate N8DKX to commemorate the annual Johnny Appleseed Festival, Sept. 12, 13, and 14. Operation will be 10 to 20 kHz up from the bottom edge of the General phone bands from 2200Z to 0100Z. A certificate will be issued upon receipt of large SASE and QSL. Send to N8DKX, 6008 Camp Blvd., Lisbon, OH 44432.

•**W8YY From Michigan** – The Michigan Technological University ARC will operate Sept. 13–22 in celebration of the university's centennial and the club's golden anniversary. Work W8YY on CW 3.745, 7.145, 10.145, 14.070, and 21.445 MHz; phone 1.845, 3.995, 7.285, 21.445, and 144.200 MHz; RTTY 3.625, 7.095, and 14.095 MHz; and OSCAR in range. Commemorative certificate for QSL card and a large SASE via Debbie Parmer, c/o W8YY, W. Wadsworth Hall, MTU, Houghton, MI 49931.

•**Special Event From Tuscaloosa, Alabama** – The West Alabama ARS will operate the third annual Special-Event station on Sept. 14th in commemoration of college football coach Paul "Bear" Bryant. WD4DAT will operate from the campus of the University of Alabama from 1300Z to 2400Z. Phone frequencies will be the bottom 25 kHz on the General 40–10 meter band, Novices on the bottom 25 kHz of the Novice band. Commemorative certificate is offered to any station worked by sending $1 and a large SASE to West Alabama ARS, P.O. Box 1741, Tuscaloosa, AL 35403.

•**Elizabethville, Pennsylvania** – The Berry's Mountain ARC will operate from 1600Z to 2200Z, Sept. 14 to celebrate the 150th anniversary of Salem Lutheran Church. Operation will be 10 kHz up from the lower edge of Novice bands on 80/40 meters, and 25 kHz up from the lower edge of General phone bands on 80/40/20 meters using the call N3ELR. Certificate, 8" × 10" for your QSL and SASE to Salem Lutheran Church, Box 427, Elizabethville, PA 17023.

•**Constitution Day Celebration** – The Eagle Rock ARC of Idaho Falls, Idaho will commemorate the 198th anniversary of the adoption of the Constitution of the United States of America on Sept. 17. The following will be in effect. CW—KX7C, 7.135 MHz ± QRM, 1800 to 2300Z. SSB—NO7B, 14.250 MHz ± QRM, 1800 to 2300Z. A commemorative QSL will be available for an SASE (Callbook addresses).

•**Delaware ARA Special Event** – The Little Brown Jug Special Event will be held by the Delaware ARA, W8QLS, at the Delaware County Fair 0900 to 2000 EST on Sept. 18 and 19. Frequencies: 3860, 7235, and 14235 ± QRM. For DELARA QSL card send SASE to W8QLS, Staff Stafford, 5987 Dublin Road, Delaware, OH 43015.

•**French Clipperton DX CLub Meeting** – For hams, DXers, and contesters in Paris, France area on Saturday, Sept. 21st, meet some well-known European DXers at the 7th International DX Convention of the French CLIPPERTON DX CLUB. For further information, contact: Jacques Saget, F6BEE, 34, Rue Maurice Ravel, F 78690 – LES ESSARTS LE ROI (Tel.: (3) 041.57.37).

•**Monmouth County, NJ** – Ocean Monmouth ARC will operate KC2Q from 1600Z Sept. 21 to 1600Z Sept. 22 from the original site of the first U.S. wireless communication at Sandy Hook, NJ by Guglielmo Marconi in Sept. 1899. Freq.: 3.965, 7.265, 14.265, 21.365, 28.365. QSL via OMARC/KC2Q, P.O.B 357, Bradley Beach, NJ 07720. A certificate and QSL available.

•**Connecticut's 350th Anniversary Celebration** – Using the call of KW1V and operating from the grounds of the State Capitol in Hartford, CT, the Connecticut DX Assoc., and the Newington Amateur Radio League will be in the General and Advanced US phone bands from 1400 to 0100 UTC on Sept. 21st and from 1400 to 2100 UTC on September 22nd. For a QSL card and map send a busines-size SASE with 39¢ postage to Dave Rose, KW1V, 13 Long Crossing Road, East Hampton, CT 064234.

•**1985 Fall Classic Radio Exchange** – 2000 UTC Sept. 29 to 0300 UTC Sept. 30. Object is to restore, operate and enjoy older equipment with like-minded hams. A Classic Radio is any equipment at least ten years old; an advantage, but *not required* to operate in the Exchange. For an explanation of the rules of the exchange, send an SASE to Stu Stephens, K8SJ, 1407 Hollywood Road, Sandusky, OH 44870.

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

Sept. 1, **Bloomington, Indiana Hamfest**, Bloomington, IN. Contact Bob Myers, K9KTH, 306 S. Fairview St., Bloomington, IN 47401 (SASE), or 812-332-1105.

Sept. 6–8, **High Plains Ham Roundup**, Medicine Bow National Forest, Yellow Pine Campground, 14 miles east of Laramie. Contact KØHRS, 2204 Vassar Ave., Fort Collins, CO 80525.

Sept. 7, **Windsor Hamfest**, Windsor, ME. Contact Ron Dishman, N1CMZ, 37 Marlboro Ave., Augusta. ME 04330 (207-623-8351).

Sept. 7, **Uniontown ARC Grabfest**, Uniontown, PA. Contact VARC Grabfest Committee, c/o John Cermak, WB3DOD, P.O. Box 433, Republic, PA 15475 (412-246-2870).

Sept. 7–8, **Queen Wilhelmina Hamfest**, Rich Mountain, Mena, AR. Contact John Harris, KC5XK, 5018 S. 9th, Fort Smith, AR 72903.

Sept. 8 (rain date Sept. 15), **Hall of Science ARC Hamfest**, Corona, Queens, NY. Contact John Powers, KA2AHJ at 718-847-8007, or Arnie Schiffman, WB2YXB, at 718-343-0172.

Sept. 8, **Findlay Hamfest**, Findlay, OH. Contact Findlay Radio Club, P.O. Box 587, Findlay, OH 45839.

Sept. 8, **Butler Hamfest**, Butler, PA. Contact Hamfest Chairman, P.O. Box 1787, Butler, PA 16003.

Sept. 14, **1985 Ham O Rama**, Niagara Falls, NY. Contact Nelson Oldfield, 126 Greenaway Blvd., Cheektowaga, NY 14225.

Sept. 14–15, **Mobile ARC Hamfest**, Mobile, AL. Contact Mobile ARC, P.O. Box 7232, Mobile, AL 36607.

Sept. 15, **L'Anse Creuse ARC Swap & Shop**, Mt. Clemens, MI. contact Maurice Schietecatte, N8CEO, 15835 Touraine Ct., Mt. Clemens, MI 48044 (313-286-1843).

Sept. 15, **Augusta ARC Hamfest**, Augusta, GA. Contact Bill Hardin, 4430 Forrest Dr., Martinez, GA 30907 (404-863-4360).

Sept. 16, **Skyview Radio Society Hamfest**, New Kensington, PA. Contact Skyview Radio Society, K3MJW, Turkey Ridge Rd., New Kensington, PA 15068.

Sept. 20–22, **Houston Com-Vention '85**, Houston, TX. Contact Houston Ham Conventions, P.O. Box 800128, Houston, TX 77280-0128 (713-333-1466).

Sept. 21, **Sonoma County Radio Amateurs Fleamarket**, Sebastopol, CA. Contact SCRA, Box 116, Santa Rosa, CA 95402.

Sept. 21, **Grand Rapids ARA Swap & Shop**, Grand Rapids, MI. Contact Grand Rapids ARA, P.O. Box 1248, Grand Rapids, MI 49501.

Sept. 21–22, **York Hamfest**, York, PA. Contact York Hamfest, Box W, Dover, PA 17315.

Sept. 21–22, Peoria Superfest '85, Peoria, IL. Contact Superfest '85, P.O. Box 3461, Peoria, IL 61614 (SASE).

Sept. 21–22, **Walla Walla Valley Hamfest**, Milton-Freewater, OR. Contact Pat Stewart, W7GVC, 1404 Ruth, Walla Walla, WA 99362.

Sept. 22, **New Berlin Hamfest**, New Berlin, IL. Contact Al Swettman, K9QFR, Box 2, Pleasant Plains, IL 62677 (217-626-1634).

Sept. 22, **Wichita ARC Hamfest**, Witchita, KS. Contact Gary Vreeland, NDØT, 1920 S. Santa Fe, Wichita, KS 67211.

Sept. 22, **Natchaug ARA Fleamarket**, Willimantic, CT. Contact Ed Sadeski, KA1HR, 49 Circle Dr., Willimantic, CT 06226 (203-456-7029 after 4 p.m.).

Sept. 22, **Rhode Island Amateur Repeater Service Fleamarket and Auction**, Woonsocket, RI. Contact Richard Fairweather, K1KYI, 127 Sherman Farm Rd., Harrisville, RI 02830 (401-568-3468).

Sept. 22, **Lanierland ARC Hamfest**, Gainesville, GA. Contact Paul Watkins, W4FDK, Route 11 Box 536, Gainesville, GA 30501 (404-536-8280).

Sept. 22, **Long Island Hamfair (LIMARC)**, Old Westbury, Long Island, NY. Contact Hank Wener, WB2ALW, 516-484-4322 or Bob Reed, WB2DIN, 516-221-8116 (both evenings).

Sept. 22, **Adrian ARC Hamfest**, Adrian, MI. Contact Adrian ARC, P.O. Box 26, Adrian, MI 49221.

Sept. 26–28, **QCWA 1985 National Convention**, Winston-Salem, NC. Contact R.G. Low, 5335 Idaho Lane, Concord, NC 28025.

Sept. 28, **Elmira International Hamfest**, Chemung County Fairgrounds, Elmira, NY. Contact Don Estus, 42 Maplehurst Park, Horseheads, NY 14845 (607-739-4807).

Sept. 28, **Anniston Hamfest**, Anniston, AL. Contact Jim Vice, Route 1 Box 462, Alexandria, AL 36250 (205-820-0638).

Sept. 28–29, **Radio Expo '85**, Grayslake, IL. Contact Radio Expo '85, Box 1532, Evanston, IL 60204 (312-582-6923).

Sept. 29, **Connecticut Valley FM Assoc. Hamfest and Fleamarket**, Sutton, NH. Contact Francis B. Callahan, KA1BWE, P.O. Box 173, E. Wallingford, VT 05742.

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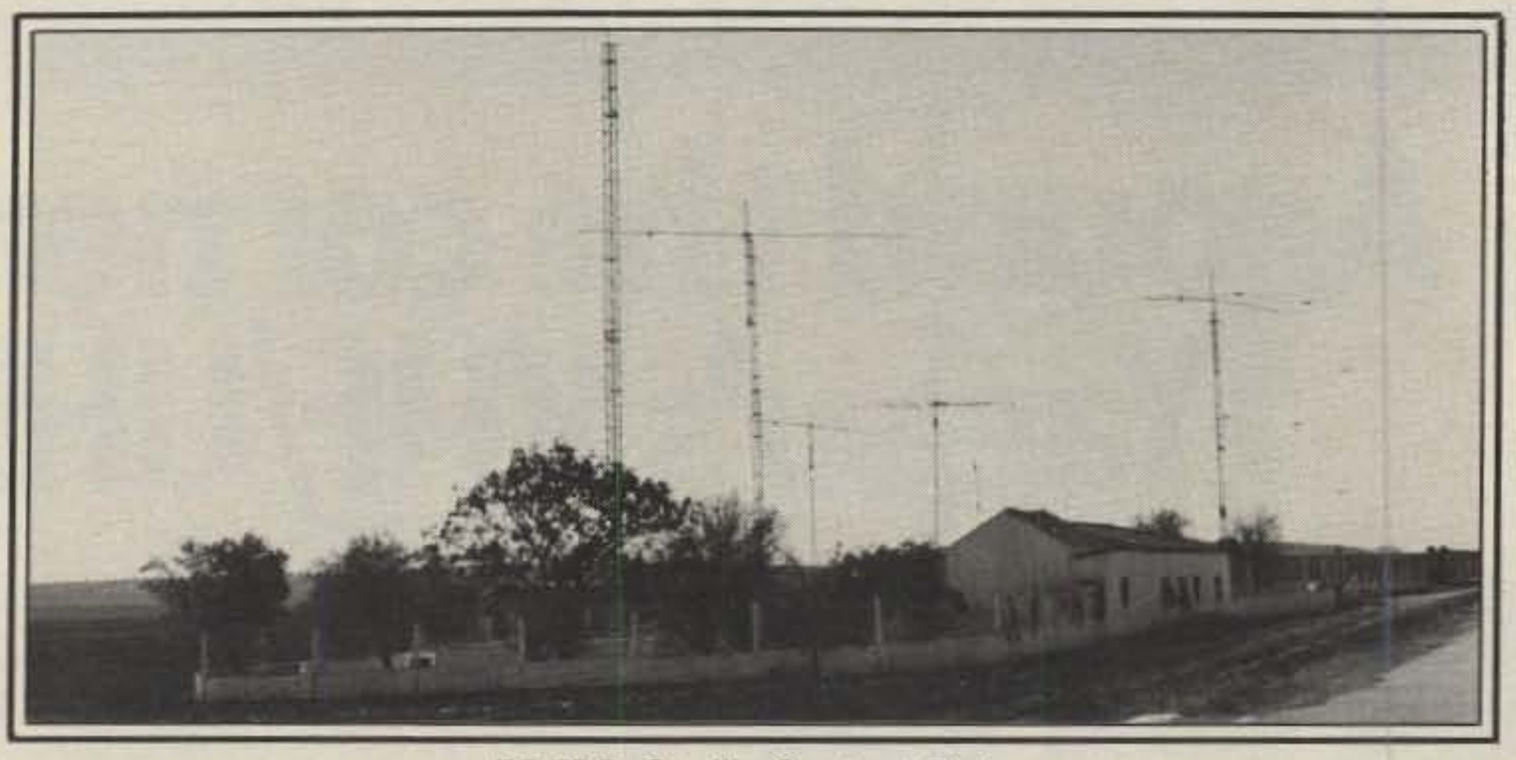
The outstanding crew at LZ7A: (left to right) LZ2DF, LZ2CC, LZ2HE, LZ2UA, LZ2PO, LZ1A-310/2.

PJ2FR, with N6KT at the controls—world top score.

TI1C, world top multi-multi. Front row (left to right): TI2EY, TI2CC, N6BV, TI2JVA. Back row (left to right): TI2J, N6TJ, N6ZZ, TI2CF, N6AA, N6AW. Not shown: TI2JCJ, TI2TO, TI2WI.



ED7BB, Sevilla Contest Club.

HA8IE, Feri.

1984 CQ WORLD-WIDE DX CONTEST PHONE RESULTS

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

Considering our position in the sunspot cycle, conditions were quite good for the 1984 *CQ* World-Wide SSB Contest. Even though sunspots are declining, activity in the test remained high, and many areas of the world showed significant increases. Spain, Chile, Indonesia, India, and Korea are to be congratulated for dramatic increases in contest participation.

Increased activity level, superior equipment, and a keen knowledge of propagation enabled contacts to be made that probably were not possible during the last sunspot minimum.

All-band activity showed itself to be as hot as ever. PJ2FR (Op. N6KT), Rich, repeated last year's top effort, racking up 8.4 million points. To give heart to those who think they will never have a chance without big antennas, P44A operated by K1KI, using only an 18 AVQ and a 160 dipole on the beach, took second place honors with 7.8 million points. From Asia, EX6F broke through the Zone 9 group to capture third place.

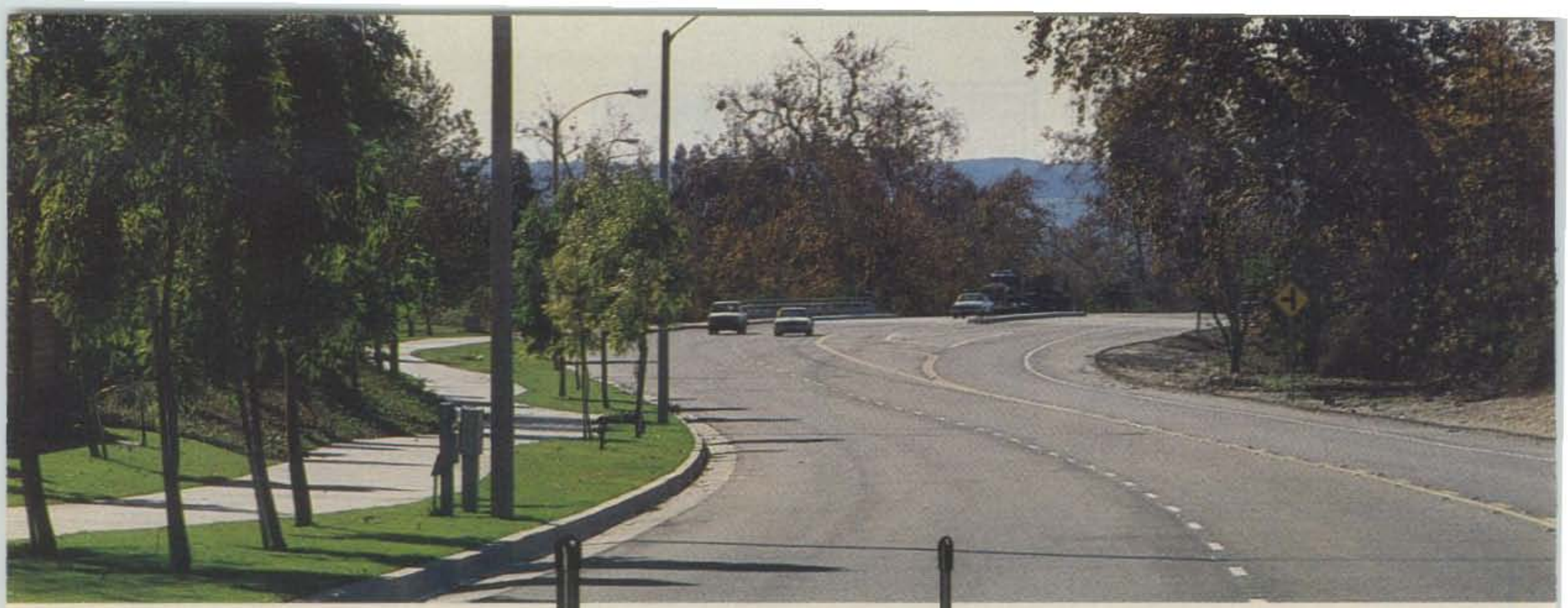
The USA top man was K1AR. John lead the pack with an outstanding multiplier. Several hours of over 125 QSOs per hour on 21 MHz didn't hurt. Second place went to K2VV. John beat everyone, including the USA multi-singles, in QSOs on 14MHz. Third place went to K1DG, Doug.

Single Band Scores

Conditions favored long skip on *28 MHz*. Stations within 2000 miles of high population areas had restricted openings. Taking world honors was CE6EZ with 859K. He was followed by LU2FDR and LU1E, both with FB scores. In the USA, last year's winner, NU4Y, repeated his effort. Second place went to WB7FDQ. Quite a difference in location for first and second place.

It seems that *21 MHz* was in excellent shape. More multipliers were worked on 21 than on 14 MHz. The world high score

*c/o CQ magazine
**P.O. Box 1225, Windermere, FL 32786



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The FT-2700RH is a 25-watt FM dual-bander that lets you operate on 2 meters or 440 MHz. Or combine the two for cross-band, full-duplex, telephone-style operation.

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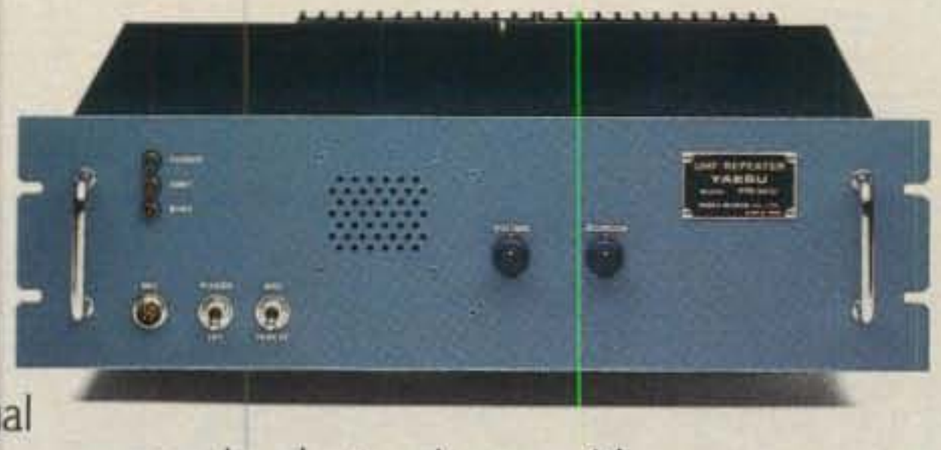

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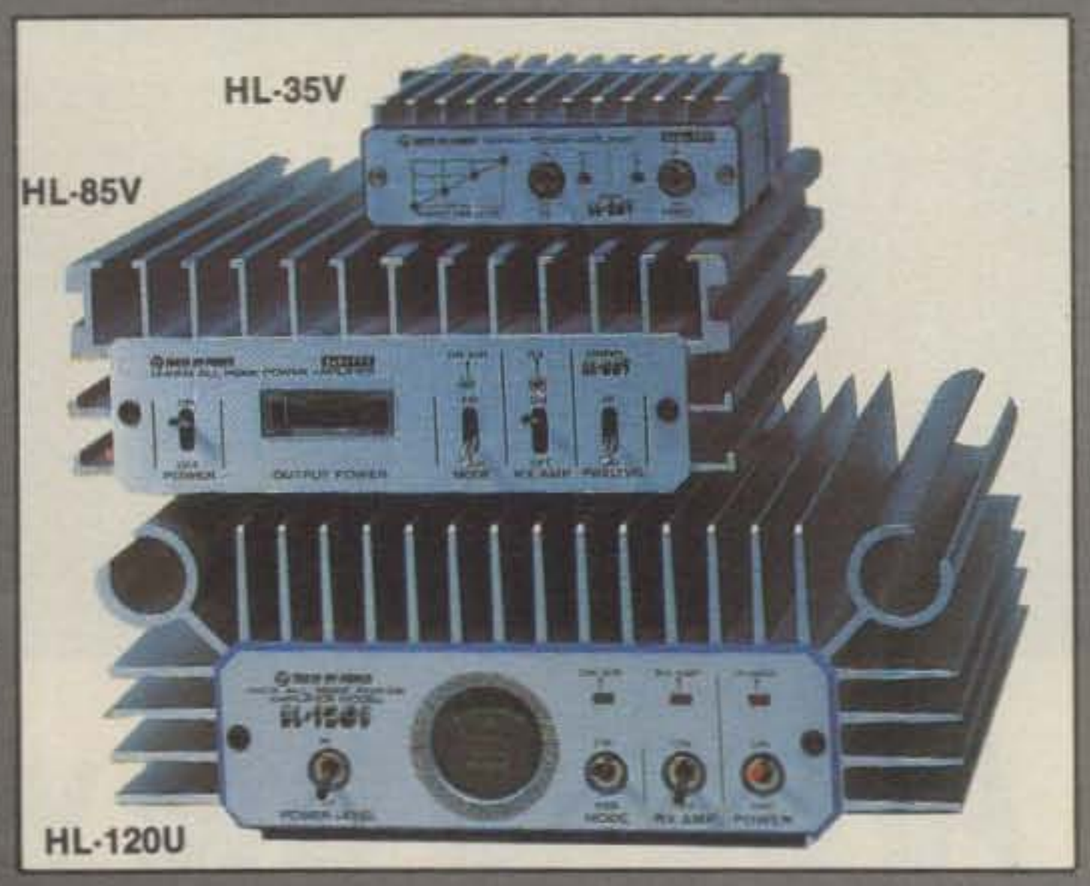

Specifications	2 METERS HL-30V	HL-35V	HL-35VL	HL-85V	HL-110V	HL-160V	HL-160V25	430–450 MHz HL-20U	HL-30U	HL-60U	HL-120U
Pre-Amp Type	N/A	GaAs-FET	GaAs-FET	GaAs-FET	GaAs-FET	MOS-FET	MOS-FET	N/A	GaAs-FET	GaAs-FET	GaAs-FET
Power Metering	N/A	LED	LED	Meter	Meter	Meter	Meter	N/A	LED	Meter	Meter
Input (Watts)	.25-5	.25-5	.25-5	10-14	3-14	3-14	20-30	.1-4	1-4	8-14	8-14
Output (Watts)	2.5-30	2.5-30	2.5-30	70-90	90-110	140-160	140-160	18-22	25-30	45-60	90-110
SSB Mode	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES
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SP-420 VHF/UHF PEP MONITOR

These new compact HF/VHF/UHF meters from WELZ provide multi-mode operation in auto or home station. Utilizing the WELZ toroidial core based wide-band sensor technology, these VSWR/POWER meters are the next generation of accuracy and reliability. Pictured here is the model SP-420 covering the VHF/UHF band from 140-525 MHz. In addition there is the SP-220 covering 1.8 to 200 MHz and the SP-122 covering 1.6-60 MHz with PEP peak hold mode. All three of these new models are ready for PEP output measurement with either the "PEP Monitor" function or the "Instantaneous PEP HOLD" function, back-lighted easy-to-read meters, high sensitivity and very attractive styling. Check your favorite dealer and check out the new WELZ COMPACT VSWR/POWER meters.

MODEL	SP-122	SP-220	SP-420	SP-230	SP-430
Freq. Range	1.6-60MHZ	1.8 ~ 200MHZ	140 ~ 525MHZ	1.8 ~ 150MHZ	140 ~ 500MHZ
Sensor Mnt.	FIXED	FIXED	FIXED	DETACHABLE	DETACHABLE
Pwr Ranges	20/200/2KW	2/20/200	2/20/200	15W/150W	5W/60W
No. Meters	1	1	1	1	1
Peak Mode?	YES + HOLD	YES	YES	NO	NO
Impedance	50 OHMS	50 OHMS	50 OHMS	50 OHMS	50 OHMS
Functions	PWR/VSWR PEP + HOLD	PWR/VSWR PEP	PWR/VSWR PEP	PWR/VSWR CAR VOLTS	PWR/VSWR CAR VOLTS
Accuracy	10% READING	10% READING	5% READING	5% F.S.	5% F.S.

ENCOMM

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was HC1OT with 1.1 million points. Pedro was followed by KG6DX with 1.08 million points. Top USA honors went to K2EK and K7JA, respectively.

As always, *14 MHz* provided lots of excitement in strange band openings and reliability. In the logs submitted, over 20 VU's, 30 YB's, and 18 HL's were counted. Three stations broke the million point mark. K0GU/8R1 lead the way, followed by 5N24AMA and LU6ETB. In the US, W2YV (KQ2M Op.) ran away with honors. Second place went to the fine effort of W7IL.

With decreased conditions on the high frequencies, the low frequencies showed continued signs of increased activity and openings. With signals pounding in from all over the world on *7 MHz*, Fernando, EA8AK, edged out Frank, 9Y4VU, for world top honors. Fernando and Frank had 115 and 110 countries, respectively! The midwest took all three top spots in the USA. KJ9D was the winner, followed by KV0Q and N8RA.

The *3.7 MHz* band was outstanding. Many stations had over 70 countries. YV3AZC had 82 and won world top score over NE4G/6Y5. More and more people are putting in real efforts to increase their signal strength on 3.7 MHz. There were probably 25 real beams or quads on this band during the contest! Using one of those beams, W6RJ took top USA honors, the first time in memory that a west coast station was number one in the USA. He was followed by W0MJ/5 down in Louisiana.

LZ2CJ was the world top *1.8 MHz* scorer. Wally says if you don't believe that it is possible to work 1400 stations, come on over and try it yourself! The only prerequisite is that you speak Russian. Second place went to HB9AMO, an outstanding job from Zone 14. USA laurels went to K5UR down in Arkansas. Rick edged out AA1K/3 in Delaware.

Multi-Single

The multi-single efforts always have a lot of stories behind them. Lots of work, lots of people, lots of time, a little recreation. Each station you see listed deserves a doff of our hats for their efforts. The world high winner was 4V2C, followed by LZ7A, the LZ2KTS boys, and ED9CM. In the US, K2BU just edged out N4CC for the top spot.

A special mention should go out to the boys who put VK9MR on the air especially for the contest. What a thrill they provided for lots of amateurs throughout the world.

Multi-Multi

In the battle of the giants, TI1C won first place over the fellows from VP2VCW. Operating from TI1CF's QTH, a combined group of W6's and TI's lead all groups in total multipliers and QSOs.

VE7WWW and VE7AV fueling 20 kw generator for VE7ZZZ effort.

K7JA at the helm.

CE3DNP, Carlos.

VE2USA, with valuable Zone 2. Left to right are K8AQM, KD8SF, KA8POW, KA8SEW, AC8W, WD8CRY, N8CQA, K8DD.

Third place went to VP9AD, while a fine effort by ZY5EG rounded out the top four.

In the US, N2AA had more of everything than anyone else and with 7.4 million points won top honors. Special mention should be made of their 3.7 multiplier, 100. The first time ever on SSB that 100 countries were worked. W3LPL in Maryland and W4DR in Virginia finished second and third, respectively.

Team Contesting

This new category is being tried on an experimental basis. Its purpose is to generate interest between stations, promote activity, and increase competition. The winner of the first SSB team was the Frankford Radio Club + one, consisting of 6Y3M, N4NW/3D6, N3AD, W3BGN, and N2LT. They were followed by the Q-Processors: KJ9W/KH2, KG6DX, KD7P/KH2, and OH6JW.

QRPp

Using less than 5 watts input, UP2BIM was the world top low-power champion. Second place went to 4X6IF, while K7SS and K3WS finished third and fourth, respectively.

DXpedition Thanks

A special thanks goes out to the following stations who went on DXpeditions to make the contest more fun for all of us: WI4K/C6A, ZF2IM, ZF2HP, 6Y3M, N4WF/6Y5, NE4G/6Y5, XX9CS, 9K2BE, 9M2RT, CT2FH, OH0BH, K4YT/DU9, PJ2FR, P44A, K0GU/8R1, YV5TK, 4V2C, VP2MW, A22ME, D44BC, 3D6DX, 5B4ES, VK9MR, HB0BHA, HB0AON, OE2VEL/HB0, 9H3DN, V2ARS, VP9AD, VP2VCW, VE2USA, TI1C, XE2SI, ZK1XC.

ZY5EG, number 4 in the world multi-multi. Left to right back: PY5CA, PP5ABW, PY5NW, PY5VV, PY5BAB, PY1RR, PY5ZBU, PY5VM. Left to right front: PT9ZE, PY5IW, PY5EG.

Reminder

Please remember that duplicate QSOs can be grounds for disqualification. Dupe check your logs! Computer checking is fine. Any checking method actually is fine as long as your log is clean of dupes. Remember that the penalty for dupes left in the log is stiff. See the rules in this issue.

We would like to thank the *CQ* Contest Committee whose time and expertise are used in large amounts to check the logs: Frank, W1WY; John, K9DX; Terry, N6CW; Rick, N6ND; Dave, K2SS; John, K1AR; Ed, N3ED; Fred, AD6C; Jan, N6AW; Glenn, K6NA; Jim, W7EJ; Gene, N2AA; John, K2VV; and Doug, KR2Q.

Congratulations to all the winners. CU in 1985 tests.

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

BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

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

WORLD TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
PJ2FR	91/7/12	509/23/58	969/28/81	888/28/79	1767/28/86	1443/20/53
P44A	46/5/12	589/20/50	1222/30/84	917/28/82	1906/25/90	713/20/53
EX6F	87/5/20	467/23/46	1060/30/78	850/31/84	1873/26/88	216/18/35
YV5TK	19/8/10	518/22/59	792/27/69	708/30/83	1554/28/84	584/21/55
KJ9W/KH2	28/10/9	250/20/31	880/29/45	448/32/66	1721/32/62	591/22/25
CN8ES	14/3/10	194/12/44	473/17/67	773/29/93	1073/24/82	529/18/64
6Y3M	168/13/24	736/18/42	781/24/62	631/20/60	1381/23/62	623/14/32
FR8FLO	2/2/2	121/22/37	379/26/60	480/30/70	1288/24/85	328/13/49
CE3DNP	3/2/2	51/8/9	266/23/40	709/30/71	1045/21/63	895/21/49
ZP5JCY	10/5/6	40/14/17	449/29/56	646/30/86	930/23/55	544/19/42

WORLD TOP MULTI-OPERATOR SINGLE TRANSMITTER

4V2C	156/8/19	1117/24/71	1170/30/92	1404/32/107	2077/28/81	974/21/49
LZ7A	153/15/53	232/21/81	1024/32/102	1332/39/110	1406/36/114	195/25/76
ED9CM	103/11/36	261/14/51	528/19/82	1395/34/102	1450/28/99	313/20/75
VP2MW	210/8/12	916/19/65	1077/28/86	1345/30/98	1744/27/93	421/15/32
ED7BB	52/8/32	424/18/67	464/21/80	1214/32/94	1446/32/107	176/19/74
D44BC	155/12/29	325/15/41	494/25/80	779/27/85	1204/21/74	646/18/61

WORLD TOP MULTI-OPERATOR MULTI-TRANSMITTER

TI1C	440/13/23	1479/24/69	2475/35/96	3940/35/125	3714/34/126	1894/26/79
VP2VCW	869/19/51	1326/25/92	2042/28/99	3616/32/108	3338/27/94	1241/19/40
VP9AD	750/15/31	1580/22/67	1978/32/99	2899/34/120	3275/32/128	522/20/55
ZY5EG	15/5/7	206/18/33	1363/33/101	2204/39/135	2712/29/96	1272/24/76*
XE2SI	236/7/8	1082/20/43	1938/30/65	2726/34/100	2259/32/86	711/20/48
V2ARS	248/14/24	1023/13/40	1829/26/90	1751/29/86	2109/24/89	1121/20/49

USA TOP SINGLE OPERATOR—ALL BAND

Station	160	80	40	20	15	10
K1AR	29/9/14	83/18/48	79/24/51	834/32/109	804/27/114	63/14/29
K2VV	34/11/19	87/15/42	86/21/49	1026/32/99	588/25/96	57/12/23
K1DG	22/9/15	100/20/54	117/25/64	665/31/101	683/27/106	73/12/30
W1ZM	21/8/11	135/23/62	87/23/51	658/28/93	613/26/105	55/15/33
W3BGN	24/7/13	107/22/57	120/23/55	676/28/89	537/28/96	56/12/27
K2XA	25/8/13	64/16/37	77/21/43	679/30/95	658/26/106	64/13/31
W2RQ	16/5/6	66/15/39	113/26/64	553/26/91	708/26/104	27/9/16
K1TO	18/7/12	65/13/37	85/24/51	574/26/90	629/28/98	76/15/32
N2LT	17/7/9	88/17/47	90/24/54	550/31/87	532/24/90	70/13/30
WØZV	28/11/16	73/22/47	124/26/49	347/32/76	721/30/85	46/15/28

USA TOP MULTI-OPERATOR SINGLE TRANSMITTER

K2BU	32/11/19	140/23/72	161/26/62	853/35/100	587/28/113	74/17/35
N4CC	7/7/7	73/24/58	183/32/84	637/32/107	797/31/120	60/19/48
NA8V	23/9/15	84/20/58	153/31/75	881/37/110	533/30/109	64/15/37
N4ZC	13/8/12	136/24/69	140/32/82	490/33/116	697/32/126	79/19/56
N4RJ	33/14/23	116/25/72	146/30/71	497/34/126	513/31/120	74/20/49
K4VX/Ø	28/13/18	70/23/61	217/29/75	461/36/110	576/29/121	86/15/39

USA TOP MULTI-OPERATOR MULTI-TRANSMITTER

N2AA	80/15/25	509/31/100	498/34/102	1497/37/135	1049/29/137	124/19/48
W3LPL	70/12/23	435/26/84	381/33/105	1281/36/130	992/31/137	163/19/58
W4DR	62/13/23	374/26/81	442/33/104	1521/35/137	784/31/128	135/19/53
N5AU	55/13/23	208/26/65	413/33/82	1090/35/126	1081/31/121	221/24/57
N6RZ	51/11/15	150/23/46	357/25/51	712/34/98	1370/34/101	215/20/46
KØRF	42/10/16	254/24/61	353/30/71	829/35/111	717/31/103	130/16/48

WORLD TOP 10 QRPp

(5w input)
All Band

1. UP2BIM	348,440	6. AH6EK	168,198
2. 4X6IF	220,159	7. K7BTB	134,505
3. K7SS	209,132	8. K7UR	115,868
4. K3WS	193,800	9. OK3IAG	104,095
5. YU2OB	182,608	10. YO2AQB	54,769

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

SINGLE OPERATOR
NORTH AMERICA

UNITED STATES

K1AR	**A**	**2,662,116**	**1893**	**124**	**365**	
K1DG	"	**2,358,850**	**1709**	**124**	**370**	
W1ZM	"	**2,160,082**	**1572**	**123**	**355**	
					(Opr. K1ZM)	
K1TO	"	1,799,548	1447	113	320	
K1EA	"	1,564,156	1328	107	311	
K1YR	"	1,499,284	1238	111	317	
K1OX	"	1,478,688	1227	115	307	
					(Opr. KC1F)	
K1VR	"	971,529	922	100	277	
AG1C	"	870,656	856	100	258	
W1YK	"	617,968	1051	60	148	
					(Opr. KM1P)	
AK1A	"	540,531	731	69	192	
W1WEF	"	534,870	722	77	193	
KA1GG	"	531,180	726	76	184	
AA2Z/1	"	523,200	764	69	171	
K1KJT	"	511,940	620	86	200	
KB1W	"	356,400	532	71	169	
W1CWU	"	341,280	468	74	196	
KR1R	"	302,087	428	83	186	
K1EFI	"	292,776	412	74	190	
K1TR	"	291,500	489	62	150	
WA1ZAM	"	287,799	374	86	205	
W1RM	"	178,815	142	30	67	
K1RQ	"	139,742	250	74	140	
KA1DWX	"	116,564	260	46	115	
KA1FSO	"	115,926	288	40	99	
K1YRP	"	101,231	226	51	118	
W1HX	"	90,598	178	60	134	
W1YN	"	78,668	203	37	106	
KE1E	"	62,244	194	37	89	
KB1IZ	"	54,778	172	38	84	
K1WW	"	50,318	138	49	90	
N1CW	"	45,360	143	37	75	
KB1GN	"	30,508	121	36	72	
K1MEM	"	27,625	95	51	74	
K1RB	"	15,390	74	27	54	
W1WAI	"	13,400	82	38	62	
KA1PF	"	11,200	57	23	47	
K1SA	"	6,494	64	6	28	
N1CJK	"	5,500	40	23	22	
W1PLJ	"	3,145	32	13	24	
K1VUT	**21**	**246,312**	**655**	**27**	**105**	
WA1FCN	"	57,428	203	23	75	
W1MGP	"	7,550	57	13	33	
K5MA/1	"	5,720	41	19	33	
W1GG	**14**	**84,000**	**296**	**25**	**75**	
W1XN	"	37,596	168	20	58	
K1MM	**7**	**41,912**	**165**	**24**	**80**	
WB1FSW	"	33,490	147	26	59	
K1UO	**3.7**	**89,200**	**380**	**25**	**75**	
KS1L	"	10,168	68	18	44	
KA1SR	**1.8**	**3,510**	**62**	**10**	**17**	
N1ACH	"	1,680	32	9	15	
K2VV	**A**	**2,389,164**	**1878**	**116**	**328**	
K2XA	"	**1,971,549**	**1567**	**114**	**325**	
W2RQ	"	**1,807,491**	**1483**	**107**	**320**	
N2LT	"	1,670,514	1347	116	317	
K2RD	"	759,285	754	99	260	
N2SS	"	716,237	723	98	255	
W1GD/2	"	591,500	626	95	243	
K2NJ	"	420,980	456	89	221	
K2FL	"	400,959	490	82	217	
K2QF	"	379,998	493	83	196	
N2VW	"	332,142	442	82	199	
N2MR	"	325,090	422	85	205	
KU2C	"	300,720	392	78	202	
N2AIF	"	210,081	329	68	171	
K2JLA	"	190,442	314	67	156	
K2LS	"	174,040	395	62	128	
KB2WN	"	151,287	266	63	148	
N2JJ	"	140,967	259	62	145	
KB2NU	"	127,328	250	53	131	
W2PAU	"	111,554	218	59	134	
WA2VYA	"	89,814	195	51	115	
K2YGM	"	89,120	207	44	116	
W2KHQ	"	83,352	205	46	105	
KB2ZQ	"	63,754	177	40	87	
ND2P	"	60,615	155	41	94	
KK2B	"	54,180	156	45	95	
KA2AEV	"	44,200	151	45	85	
W2GKZ	"	42,510	127	42	88	
W2TZ	"	39,000	139	25	75	
W2NC	"	36,580	111	42	76	
W2PHT	"	36,256	122	30	73	
WB2PXA	"	26,368	108	37	66	
KT2M	"	25,677	115	23	58	
K2MFY	"	25,662	112	21	57	
W2HG	"	24,860	89	42	68	
KB2SE	"	15,045	73	30	55	
NA2Q	"	14,110	72	31	52	
KA2SAS	"	14,056	87	18	48	
W2KZN	"	6,336	47	18	30	
W2SDO	"	4,646	39	17	29	
KS2I	"	3,760	32	17	30	
KA2QQT	"	1,824	25	14	18	
N2DNY	"	1,564	21	15	19	
K2XU	"	1,302	13	11	13	
W2CBA	"	858	13	9	13	
W2BLV	"	165	6	6	5	
W2KZE	**28**	**4,500**	**48**	**9**	**27**	
K2EK	**21**	**498,648**	**1077**	**30**	**128**	
KC2CR	"	121,068	373	26	88	
KC2VT	"	73,789	230	26	87	
W2DW	"	9,776	70	14	38	
NE2W	"	5,029	45	17	30	
N2AWC	"	90	6	5	5	
W2YV	**14**	**640,640**	**1383**	**37**	**123**	
					(Opr. KQ2M)	
NB2P	"	315,972	802	34	100	
K2WK	"	255,860	781	25	88	
WA2LOG	"	114,204	327	31	93	
WB2ERI	"	4,950	44	13	32	
W2FGY	"	3,738	37	17	25	
AB2Y	"	2,312	27	12	22	
NC2V	**7**	**16,284**	**101**	**20**	**39**	
KF2O	"	5,324	47	14	30	
WA2IFS	"	4,272	36	17	31	
WB2ITR	**3.7**	**38,048**	**198**	**21**	**61**	
K2SX	"	18,876	131	18	48	
K2JT	"	1,872	35	9	17	
W2FCR	1.8	1,664	32	9	17*	
W3BGN	**A**	**1,992,977**	**1520**	**120**	**337**	
K3ZO	"	**1,366,392**	**1220**	**114**	**294**	
N3AD	"	1,313,284	1079	123	311	
K3OO	"	1,312,480	1142	108	308	
KM3T	"	834,309	838	101	268	
K3ZJ	"	685,832	757	95	236	
W3UJ	"	540,708	668	82	205	
W3AP	"	480,192	535	93	235	
AD3V	"	330,870	436	79	190	
WB3CIW	"	325,260	433	81	197	
N3HW	"	317,586	468	72	174	
K3NZ	"	274,850	429	74	156	
W3NX	"	271,184	375	86	186	
W3ARK	"	255,514	431	67	159	
AD3Z	"	250,515	327	80	213	
W3GU	"	230,912	335	85	171	
W3KV	"	214,320	337	70	165	
W3EVW	"	206,064	319	74	169	
W3OV	"	191,334	317	66	157	
N3BNA	"	184,414	318	65	146	
WA3IMY	"	141,469	269	59	134	
W3YFV	"	125,312	268	55	123	
N3AOE	"	119,168	272	42	110	
N3RW	"	106,930	240	50	120	
N3EC	"	96,640	223	49	111	
W3GNQ	"	85,512	188	56	112	
W3GL	"	85,137	184	61	116	
KB3QH	"	60,768	152	48	96	
W3JPT	"	57,150	183	37	90	
W3AA	"	51,221	144	47	84	
KC3DJ	"	48,081	175	24	69	
KD3H	"	42,532	136	43	81	
W3SOH	"	35,316	125	36	72	
AI3Q	"	34,220	115	37	79	
K3II	"	26,319	104	27	66	
W3OD	"	20,670	95	23	55	
K3PPI	"	14,040	78	18	47	
W3IQS	"	11,648	77	22	34	
WA3JBN	"	7,808	42	26	38	
N3WW	"	6,608	45	20	36	
K3UA	**28**	**6,972**	**64**	**12**	**30**	
W3UM	**21**	**114,920**	**292**	**29**	**107**	
KF3C	"	**5,243**	**41**	**18**	**31**	
N3DQI	**14**	**21,744**	**118**	**21**	**51**	
WA3YOB	"	7,744	79	13	29	
W3FGS	"	3,612	47	14	29	
W2UP/3	7	20,100	98	25	50	
K3WGR	"	7,504	53	19	37	
W3FQE	"	46	3	3	3	
WA3LJP	**3.7**	**15,376**	**91**	**16**	**46**	
KQ3V	"	14,190	121	16	39	
K3TW	"	12,992	89	19	45	
K4JLD/3	"	8,030	63	17	38	
WA3VPL	"	1,240	15	5	8	
AA1K/3	**1.8**	**10,258**	**115**	**16**	**30**	
K4ISV	**A**	**1,240,416**	**1062**	**122**	**316**	
N4KG	"	**1,068,625**	**910**	**115**	**300**	
K4JPD	"	985,360	839	124	312	
WZ4F	"	914,736	847	117	291	
W3YY/4	"	819,000	844	108	252	
W3VT/4	"	779,100	759	101	270	
WI4R	"	543,801	619	97	230	
AI2C/4	"	445,968	541	87	217	
K4GFH	"	439,930	553	83	207	
N6AR/4	"	405,130	458	97	222	
N4VZ	"	385,072	423	99	229	
N4KMY	"	377,427	489	86	205	
WA4VCC	"	303,880	394	83	201	
WB4GCP	"	294,921	373	89	208	
K4EZ	"	292,230	418	78	177	
N4JF	"	248,706	383	76	170	
W4BV	"	237,896	351	84	178	
VE3JGC /W4	"	210,944	335	76	180	
WA4BSN	"	188,705	318	70	165	
N4MM	"	165,244	274	70	148	
N4BSN	"	155,940	256	73	153	
W4LVM	"	152,110	267	68	137	
KF4HK	"	126,854	224	88	150	
AA4AM	"	125,664	211	76	155	
K4FYM	"	119,380	240	56	132	
KC4TJ	"	118,428	249	60	153	
W4UYC	"	116,964	249	52	119	
K4CEB	"	112,608	209	72	132	
KA4EQW	"	111,540	216	69	126	
KB4I	"	106,506	208	62	132	
W4UNP	"	104,040	197	68	136	
KA4C	"	101,994	206	53	125	
WD4IKI	"	99,728	209	60	124	
KF4NO	"	98,470	173	76	139	
NA4D	"	87,120	175	68	130	
W4OWJ	"	86,592	194	70	106	
WF4G	"	78,260	200	49	91	
W4OWJ	"	74,976	194	70	106	
WD4RCO	"	69,552	149	74	115	
N4TL	"	68,470	177	61	106	
N4HHZ	"	62,040	162	50	91	
K4PHE	"	60,024	175	35	87	
K4UEE	"	59,130	161	52	94	
W5DZF/4	"	57,951	156	52	89	
WB4FQP	"	56,259	145	52	89	
WK4F	"	56,115	151	51	94	
N4BCV	"	46,452	111	59	99	
WB4VQO	"	46,110	154	35	71	
K4OD	"	45,560	128	46	88	
KE4HX	"	44,516	133	40	84	
WB4ZNH	"	41,216	123	41	87	
K4XO	"	39,933	100	53	100	
W4OO	"	37,875	120	44	81	
W4WJJ	"	37,830	127	51	79	
K4BVQ	"	36,584	98	52	84	
KE4XY	"	36,360	143	35	66	
K4DLI	"	34,816	101	49	79	
KB4IT	"	31,165	113	40	75	
WB4GNT	"	30,525	109	37	74	
KC4LQ	"	28,770	99	37	68	
K4KKJ	"	28,551	111	32	61	
KB4J	"	26,352	97	34	74	
K4MQG	"	25,300	91	41	69	
KA4RLP	"	21,627	111	32	57	
K4KJZ	"	19,552	75	40	64	
NO4N	"	19,000	82	40	55	
WA4HDD	"	18,810	69	35	64	
N4KWX	"	17,922	87	32	55	
W4DA	"	15,826	78	36	46	
KB4FO	"	15,811	63	40	57	
WS4N	"	15,312	84	24	42	
N4OM	"	15,041	65	31	58	
KB4HF	"	13,838	69	28	46	
K4FPF	"	13,246	70	25	49	
WA4QZR	"	13,213	68	26	47	
N4CYG	"	13,122	71	23	58	
KA4HKI	"	8,584	66	15	43	
N4IA	"	7,200	47	23	37	
NF4A	"	6,042	42	22	35	
N4EUK	"	5,152	41	22	34	
K4AHJ	"	1,450	19	14	15	
WB4BBH	"	1,426	18	14	17	
NU4Y	**28**	**38,078**	**216**	**21**	**58**	
N4UM	**21**	**424,853**	**1072**	**30**	**113**	
NO4J	"	406,120	1028	31	112	
KC4HN	"	65,124	212	24	84	
W4IIR	"	56,922	200	28	78	
K4PR	"	53,568	214	25	68	
W4JD	"	43,180	181	22	63	
N4JVP	"	19,215	109	20	43	
KI4KN	"	11,136	70	18	40	
WA4YLD	"	828	19	12	11	
KV4P	**14**	**300,824**	**830**	**30**	**94**	
N4MO	"	194,540	509	31	106	

the tempo S-15

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...the kind of hand held most people want...simple, rugged, reliable, easy to use. The S-15 offers a full 5 watts of power...power that extends your range and improves your talk power. Its state-of-the-art integrated circuitry provides far more reliability and ease of maintenance than conventional circuitry.

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DX QRM

Thanks for a nice contest . . . *UO4OWR*. Did not work any JA's on 15 meters! . . . *UR1RWX*. We could use a few dozen more sunspots this year . . . *UZ9AYA*. First time on 160 meters. Bad conditions on 10 meters the first day . . . *CE2AA*. Condx not very good. Lot of stations don't know dupe sheets. Enjoyed first operation from D44 on top band . . . *D44CB*. Working Mellish on 40 for new one and KL7 on 40 for WAS last one . . . *HZ1AB*. Can't wait until next year . . . *KP4BZ*. First contest CQ WW DX very good! . . . *LU4US*. Hope band conditions better next year . . . *VE6EP*. Hope contesters happy to hear Mellish in CQ WW . . . *VK9MR*. Enjoyed giving 4V2C some competition this year . . . *VP2MW*. Our club tested out the beam. Next year we will go for it . . . *ZS4WRC*. Where were the Caribbean multipliers this year? . . . *ZS6BPL*. Last-minute arrangements had us sleeping at border gates and missing out on a 40 meter beam . . . *3D6DX*.

It was my first participation in CQ WW DX Contest. I liked it very much. Next year I will be there again making "QRM"! My congratulations! . . . *CT1CLR*. My first CQ WW DX Contest! Lots of fun! . . . *CT7AFN*. Terrible propagation most of the time. Good fun as always, despite the bad conditions . . . *CT2DL*. Got engaged a month ago so it wasn't too easy to spare some time for contesting and repairing my antennas in time . . . *DK8AX*. Bad conditions on 40 meters, but makes a lot of fun . . . *DF9ZP*. My first contest effort on top band. Really enjoyed it. Great to work VP2VCW on SSB with 75 watts and a 45 foot vertical . . . *DK2WH*. Broken antenna rotor made me a good sprinter. Guess I'm below 10 seconds at 100 meters now! . . . *DL6RAI*.

After some hours of operation I lost my voice and at the end I was lucky to claim these 772 QSO's in spite of my extreme hoarseness . . . *DL1MAJ*. Gracias a los colegas con buenas antenas que han podido escucharhe hasta el ano que vienne; 73 . . . *EA3DEE*. Congratulations! . . . *EA2BUF*. Es mi primer concurso y prometo que no sera el ultimo! Divertidiiiisimo! . . . *EA6SX*. This is "the contest" . . . *EA6GP*. For my birthday I hope a 4-el 40 meter and Long John Yagi's and 1 kw (I can dream) . . . *F6GDK*. What? No Zone 23? . . . *G3SNN*. Congratulations to XL1CV for putting a beautiful clear signal into Europe (40 m) on Sunday evening and working just about every station that called him . . . *G4XTM*. So nice to hear so many "non-contest" stations get caught up in the fun of the contest . . . *G4UPS*.

SSB contests on 160 are hard work! . . . *G4OBK*. Thank you for opening 21 MHz! . . . *G4IUF*. The only time that I get onto SSB from one end of the year to the other is during the *CQ* WW SSB Contest! Otherwise it's all CW! . . . *G3TXF*. Big thrill to work VP2MW—my brother (G4BGH) . . . *GI4MWA*. I managed to get four new countries on 40 meters, including KL7 for a new zone as well . . . *GM4KHE*. My ears feel as if I've gone 14 rounds with Ali! . . . *GM4JFS*. This was my first contest on phone. I worked the first day for fun, but the second day—no . . . *IK2DVG*. Golden dreams contests. Fifteen was dead from 21 to 0700 each time . . . *I3ON*.

VK9MR was my #242 DXCC country on 40 . . . *I4RYC*. 42 hours of operation—beautiful time. 50 hours of logging—terrible! I wish I had a computer . . . *OK6RA (OK2FD)*. Only 24 W stations worked . . . *OH3XZ*. Most QSOs were made with my 2-year-old son in my lap . . . *SV1RP*. In Greece we can work only 3.685 to 3.700 on SSB. It was a feat for me to work 151 stations on a 15 kHz band . . . *SV1MO*. I've added a second vertical in phase with the one I've was using last year. The result was that I've had to explain to almost every second QSO that I'm not a pirate . . . *LZ2CJ*.

My 1937 vintage call puzzled some operators and time wasted in explanation! . . . *GM8SQ*. TVI "stopped play" for a while . . . *GW4RHW*. 15 meters was excellent—2.9 points per QSO average, even with my 100 watts (linear in bits!!) . . . *GW4BLE*. It always makes a lot of fun to be in your contest. It's really the best one! . . . *HB9BVV*. Fantastic feeling for me. It was the first time. A real thrill! Thank you to *CQ* magazine for this pleasure! . . . *HB9CWA*. Completely surprised when Zone 3 came through on Sunday evening (21 MHz) . . . *HB9ZY*. My country ought to be in Zone 40 like Iceland . . . *OY1A*. Had to participate in family activities to show my good side when I will be away for almost 3 weeks on expedition during the *CQ* WW CW from 5H3BH . . . *SM0AJU*. 73's to the Contest Committee. You sure are doing a hell of a job! . . . *SM2CEW*.

USA QRM

Sorry to say I observed several instances of poor sportsmanship by multi-multi stations . . . *W7FGT*. Very annoyed by certain W operators going out of band on 40 meters, urging DX to "listen up." Here is a list of their calls . . . *W9SE/7*. DX stations should ID more—and after giving a partial callsign of who they are working, *must* repeat back the complete corrected callsign of the station worked . . . *KS7T*. First contest since 1949—had a ball! . . . *K7CC*. Propagation on 10 was decent the 2nd day, but activity poor . . . *WB7FDQ*. Brutal conditions on 20, except great to Japan . . . *W7IL*. Transmitted on the wrong sideband for 20 minutes . . . *KT7H*. Lost my new tower . . . *WA7GVM*. Is it true conditions will get worse? . . . *N8ATR*. Barely got new 40m beam up Friday, then overslept and missed the morning openings . . . *WD8QDQ*. Ban weird prefixes . . . *K8TMK*. Hats off to the DXpeditioners who added to our fun . . . *W4BAA/8*. Good African participation . . . *KC9EW*. Saturday wind took down the power lines for 10 hours . . . *K9YAX*. First contest after 23 years—I'll be back! . . . *WA9BXB*. We need sunspots in zero-land! . . . *KC0XK. (Don't we all—ed.)* Jogging for an hour on Saturday helped relieve the frustration from bad conditions . . . *W0RXL*. Got the last state (KL7) I needed on 160m for my WAS and a multiplier . . . *K0GT*.

QRPping on 20 is rough! . . . *W6CN*. How about an ID requirement? It takes a lot of listening to get the call of some fellas! . . . *KT2M*. I worked 5 new band countries . . . *WA2VYA*. Found amp wouldn't load. Went outside and found hy tower on fire on top! . . . *N2VW*. Leaky cable TVI forced limited operation . . . *N1CW*. New type of interference—CPI (Campus Police Interference) . . . *W1YK*. First contest from home in 29 years . . . *K1VR*. Explaining to my wife of 6 weeks what this is all about! . . . *WB1FSW*. Where was Mellish on 20 meters? . . . *NB2P*. Frustrating to hear two 5X7 VK's ragchewing at sunrise (160 meters) and not be able to work them . . . *AA1K*. Nicest op—KP4BZ . . . *N3BNA*. Phone is painful . . . *W1RM*. Three new countries; 230 now with QRPp . . . *K7BTB*. Startling what 4 watts can do with good antennas . . . *K3WS*. Ten meters—"the night of the living dead" . . . *K7SS/QRP*. Working Zone 3 on 10 was harder than FO8 . . . *KG1D*. We need a multiplier station . . . *K2BU*. Lost a few hours celebrating my 50th wedding anniversary . . . *W2UI*. Had a communal prayer for a 10 meter opening . . . *NW4B*. Biggest thrill: my neighbor threatening my life because of TVI . . . *KA7KDU*. Neighbor cuts down a tree and takes out the power lines with only 4 hours left in test . . . *N8CXX*.

Station Operators
Multi-Operator, Single Transmitter

A22ME & A22TE. **CE2AA:** CE2BNT, CE2BXN, CE2CC, CE2EOQ, CE2HO, CE2MH, CE2WO, CE3CM. **CE4TA:** CE4AET, CE4BQO, CE4CQT, CE4EBJ, CE4EM, CE4ETZ, CE4EUV, CE4EUZ, CE4EVR, CE4FXV, CE4FXY, CE4FYE, CE4HBY, CE4KX. **CE5BYU:** CE5BNC, CE5CYT, CE5EJZ. **D44BC** & DJ6QT. **DF8BV:** DL8MBS, DL7MAT, DL/LX1II, DL7MAE. **DL8JK:** DK1DU, DK2XX, DK8ZL, DF2ZN, DF7FR, DL1FAK, DD4ZY, Ingrid, Harry. **DL8UE:** DJ5FT, DL7BI, DL3LU. **DL1KDT** & DL1KDS, DJ6UP. **DL3MAA** & DL5MAE. **DX1A:** DU1AU, DU1LB, DU1TDY, DU1TW. **EA1RCQ:** EA1BCF, EA1AMV, EA1CRM, EA1DDG, EA1CXI. **EA3EZD** & EA3ADW, EA3OL, EA3BKS, EA3CCN, EA3CUQ, EA3DBP, EA3DJL, EA3EXO, EA3FBP. **ED3CBE:** EA3BOW, EA3BOX, EA3CVA, EA3DDU, EA3DGQ, EA3EIO. **ED6MDX:** EA6MR, EA6MQ, EA6JW, EA6KZ, EA6WA, EA6MS. **ED6WWC:** EA6VQ, EA6UV, EA6LB, EA6VT, EA6LA, EC6LY. **ED7BB:** EA7CEC, EA7EL, EA7TH, EA7BU, EA7TL, EA7FFA, EA7DFF, EA7CFW, Jose, Angel. **ED9CM:** EA9FN, EA9GS, EA9HE, EA9HY, EA9IB, EA9IE, EA9JL, EA9JV, EA9KF, EA9KL, EA9KN, EA9KQ, EA9KS, EA9LD, EA9LZ, EA9MM, EA9QV, EC9FS, EC9HB, EC9HR, EA5AD, and EA7CQV.

F3TV: F1DDA, F6ARC, F6CTT. **F6IWW** & F6BYJ, F6AWN. **F6KAW:** F6IFR, I6BPX, F6CWN, F6GIF, F6DZS, F6GDK, FD1JDS, F6GWV. **G3XEP:** G3VMW, G3VTY, G3ZGA, G1INT, G4DZI, G4EZI, G4LYM, G4IUF, G4KNA, G4ULC, G4XMW, G4YEK, G4ONA. **G4TNB** & G4PWA. **G4VSZ** & G6XYN, G4YYY. **GU3HFN:** GU3MBS, GU3BUO, GU3EON, GU4IUW, GU4WRP, GU4WTN, GU4XEA, GU4XIT, GU6JQF. **HA1KRR:** HA1ZZ, Jozsef, HA1XO, HA1ZN, HA1XU, HA1XV. **HA2KRP:** Erdelyi, Illes, Kohalmia, Merse, Gyarmchi, Tolgyesi. **HA4KYH:** HA4XX, HA4YO, Janos, Laslo, Ferenc. **HA4KYN:** HA4XH, HG4WF, Peller, Tabor. **HA6KNX:** Gyurko, Josef-Gyurko, Gyula. **HA8KAX:** HA8LKB, HA8LKC, HA8BT. **HB8AON:** DF1JC, DK5EZ, DJ2YE, DL3EBX, DL4JV, DL6EAQ. **HB8BHA:** HB9BHA/DK6NN, DJ2EH, DL9NAP, DL8NBH, DF4NN, DL5NP, DL4NAC, DF9GQ. **HB9AUS** & HB9CFU, HB9CLV, HB9SFD, HE9ASD, HE9EEX. **HB9CAT** & HB9ALM, HB9CVN, HB9BLQ. **HB9CHR** & HA9ACA, HB9ADD, HB9BNJ, HB9BOU, HB9BQP, HB9CJG. **HG5A:** HA5GF, HA5OM, HA5ML, HA5MK, HA5FM, HA5WE, HA5UA, HA7SU, HA7RY. **HG6N:** HA6ND, HA6NY, HA6ON, HA6NO, HA6OQ, HA6NF.

HG6V: Simon, Suszter, Varga, Wingender, Peto Dienes. **HG7B:** HA7UO, HA7UG, HA7UX, HA7UL, HA7PL, Cele, Csak, HA5WA, HA5OL. **HG9R:** HA9RB, HA9RP, HA9PP, HA9RU, HA9RX, HA9PZ, HA9PV. **HL8U:** Kim Cheul-Min, Ko Ja-Jun, Jung Jun, Kang Sue-Nam, and Park Young-Gyu. **HZ1AB:** G3VUV, G3ZSS, G4FTC, G4WZI, K2XR, K8CSG, N5DM, W7KJJ, WA8MOA. **I2MQP** & I2VXJ. **I5JHW** & I5OVS, I5RCR, IK5AWL, Nicola. **I09WPO:** IT9WPO, IT9UJU, IT9RYJ, IT9BLB, IT9GYK, IT9QHW, IT9BKI, DA2YD, DA2YA. **JA1YXP:** JL1ROT, JH0NPR, JM1AQU, JJ1OHJ, JF2QLY. **JA2YDC:** JE2EZO, JF2KZO, JF2PEO, JE2EVX, JI2RIQ. **JA2YKA:** JJ1BTA, JJ1BTC, JR2GMC, JE2JCV, JE2VYM, JF2DQJ, JF2PZH, JG2MTC, JG2VTD, JI2JXR, JI2NPL, JG3OET, JL3LDL, JA9SSY, JA9XXS. **JA3YBF:** JR4AGT, JA9TOZ, JG3LZG, JI3XBE, JJ3PYI, JA9VIZ, JE6BXJ, JR4IZK, JA9UXW, JH9GRM, JF3GYI, Furuya, Yamada, Dohue. **JA3YCK:** JA3BCT, JA3ESG, JI3QYW, JL3QWX, JK3QIP. **JH3YJM:** JA3QGI, JA3XGF, JH3FJG, JH3QKV, JK3QZU.

JA5YAV: JA5MVU, JR6JZF/5, JH5PHC. **JA6YBR:** JH5GLL, JR6JQH, JE6WML, JF6BHN, JF6DEA, JF6EAO, JF6LOK, JF6QZE, JF6TMH, JF6WWT, Abe, Masa, Shiba, Tomo. **JA6YDH:** JE6PSL, JE6VFJ, JF6GQC, JR6KDI, JR6PKJ, JR6QHK. **JA7YCQ:** JR7MZC, JN1RPG, Ikeda. **JH7YJF:** JA7DWU, JH7NHE, JH7LRS, JR7QKR. **JA8YAK:** JA8RAW, JH9CZT, JH0DPM, JH0ELL, JH0FBO, JH0FOV, JH0GAT, JH0MVU, JH0NVX, JH0OPX, JH0SDA, JH0VXW, JH0XUP.

KA1X & AK1L. **KB1H** & K1GX, WA1DCP, WA1HYN, WA1IVD, WA1RLV. **KG1D** & KA1VE. **KM1C** & KB1T, W1PH, WB8BTH. **KQ1F** & K1XM. **KS1N** & KA1KVF, WB1EYL. **KT1O** & KA1MBW. **K2BU** & WA2HGM. **K2XR** & KC2GE, KT2B, N2ESP, WA2PID, WA2VUN, WB2EGI, WB2INB, WB2LUD, WB2PSD, WB2WIK, K3QM, NV60. **KA2RLW** & KA2OEE. **KC2NB** & N2BOW, W2FCR, WB2ULI. **KY2P** & KA2OJM, KY2O. **K3KG** & KA4S, K4BAI, N4KUJ, N4TX, W4NL. **K3TUP** & KB3A, KJ3L, N3BJ, AI8S, KB8IZ, W8CY. **K4VX** & K9BGL, KD9Q, KM9P, KR0Y, N0SS, WB0IUN. **KP4BZ** & KP4HC, NP4CC, NP4Z, WP4C. **K5RR** & K5KJ, NR5K, WD5JYF. **KD5RW** & KA5BOO, KA5DLM. **K6KSY** & WA6TMJ. **K6OKW** & K5KT, K6SUL, KG6IP, N6AHV, N6DKZ, N6HCS, N6JVW, N6KN, WB0QPO. **K6ZM** & AK6T, NB6L. **KA7KDU** & N7FNW. **KG7Z** & N0DWR.

KL7HFA & KL7HNU & NL7CT. **KL7IRT** & AL7AS, AL7FG, AL7FQ, AL7L, AL7Z, KL7ENY, KL7GL, KL7LF, KL7TC, KL7XD, KL7XO. **KB8LH** & K3DMG, KD8AM, KD8JW, KD8KF, N8ATZ, N8FEB, WD8MIJ. **KC8PQ** & N8DPD. **K9BIL** & WB9NOV. **K9SD** & KC9AL, K0FU. **KC9XF** & N9ADN, N9EJL, NA9M. **KS9K** & K9CJK, KS9Z, KE9U, N9AW, WB9DZN, WB9AUK, WB9OJE, SM7DZT. **KS9O** & KA9DUY, NB9T. **K0UK** & KD7EY, N0ZA. **KF0H** & KZ0C, WD0EWD. **KJ0G** & K0GAS. **KM0P** & KM0R. **KR0B** & AF9T, KD0KF, N0BIL, N0BKL, N0BKY, N0FKK.

LA1A: LA8KV, LA6TP, LA9QL. **LU4US** & LU1UDZ. **LZ1KBL:** Keremidtchiev, Miladinov, Hristov. **LZ1KDP:** Petrov, LZ1JY, LZ1-0-275. **LZ1KOZ:** Ivanov, Kolev, Nedev. **LZ1KRB:** Iliev, Grudov, Kirov, Dobrev. **LZ1KVZ:** Nikolov, LZ1ZF. **LZ2KAE:** Christov, Nikolov, Kovatchev. **LZ7A:** LZ2HE, LZ2PO, LZ2DF, LZ2CC, LZ2UA, LZ1A310/2. **N1CQ** & KA1XN, KA1YQ, KC1O, KJ1N, KI2P. **N3ARK** & K3IE, WB3FIZ. **N3RL** & K2ITG. **N4BS** & WA4GHO, WA4LSD, WA4VIV, WB4FOT, WB4LSG, WB4PRV, WN4ISX. **N4CC** & K4UTE, N4KE. **N4RJ** & K4EWG, K4PI, K4UEE, KC4GR, N4PN, N4NX, WD4IKI, W6OKX, W8ZF. **N4ZC** & K2SD, N4CQ,

WA4UNZ, N5TR, W6NWS. **NW4B** & AA4DV, AA4UK, K4CIA, K4KZZ, K4NYV, N4SF, N4TN, WA4AOM. **N6CCL** & N6IYI.

NY6Y & N6IC. **N7RO** & AI7P, KC7GX, W7EKM, WA7ZWG, WB7CLU. **N7TT** & KE7V. **N8DKJ** & N8AHA. **N8CXX** & K8CC, N8BTU, N8DET, N8FYT, NE8T. **NA8V** & WA6DGX, K8LX, K8NA, W8TA, WA8YUR. **ND8E** & K9MWM, KI8G, KD8PZ, W8KEA, W8LSD, W8RSG, WB8ITG. **NG8W** & KJ8D. **OE2VEL/HB8:** OE2VEL, OE1ETA, OE2DYL. **OH8BH:** OH3ZE, OH6UM, OH2BH. **OH2AY:** OH2BDN, OH2CW, OH2TE. **OH5AB:** OH5BB, OH5JP, OH5SV, OH5WR. **OH6YF** & OH6XA. **OH7AB:** OH7RS, OH7UE, OH7XI, OH7MA, OH7KA, OH7VR. **OH7AI:** OH7HK, OH7HM, OH7EU, OH7SQ, OH7BY. **OK3RJB:** OK3CQR, OK3QD. **OK5R:** OK1ADM, OK1ADS, OK1ALW, OK1AWZ, OK1DIM, OK1DWA. **OK7MM:** OK3CAP, OK3CAQ, OK3CAW, OK3CDX, OK3CEM, OK3CGM, OK3CLA, OK3CQA, OK3CUM, OK3EA, OK3JW, OK3LU, OK3LZ, OK3MB, OK3TFM, OK3YX. **ON6NL** & ON6EB, ON6JZ, ON6MP, ONL4867, PA8MPM.

RL8PYL: UL7PAE, UL7PBE, UL7PBY, UL7PCZ, UL7-023-158. **SK6RR:** SM6CVT, SM6LGW, SM6LRR. **SP6PAZ:** SP6CYX, SP6JZG, SP6GEQ. **SP6PST:** SP6CC, SP6FJG, SP6HEK, SP6BIB. **SP8KJX:** SP8NAD, SP8-7811. **SP9PDF:** SP6AXW, SP6BGB, SP9BMQ, SP9FIH, SP9GCZ, SP9MDS, SP9MQE, SP9MRN, SP2-7631, SP9-3961-KA. **SP9ZHR:** SP9EMI, SP9MRQ. **UB4EWB:** Club. **UB4EXZ:** UB5ELE, UB5EQG, UB5EUI. **UB4IXB:** RB5II, UB5IFZ, UB5IOK. **UB4IXQ:** UB5IJZ, UB5-073-1302, UB5-073-3860. **UB4IZA:** UB5-073-342, UB5-073-1619, UB5-073-3322, UB5-073-3941. **UB4LXA:** Anatoly, Eugene, Igor. **UB4LZJ:** Club. **UB4MXR:** UB5MLD, UB5MLP, UB5MVK.

UB4MWU: UB5MWU, UB5MBM, UB5MJS, Andre. **UB4MZF:** UB5MAK, UB5MM, UB5MNX, UB5MNY, UB5MOA, UB5MUV. **UB4MWA:** UB5MDA, UB5MDD, UB5MMR. **UB4MZZ:** UB5MBY, UB5MQF, UB5MZ. **UB4TWL:** Club. **UB4VWA:** Moscalenko, Ovcharenko. **UC1AWC:** Alex, Ivan, Leonid. **UC1AWF:** Eugene, Serge, Serge. **UC1AWZ:** Club. **UC1WWF:** Alex, Evgenij, Victor. **UG7GWA/P:** UG6GCV, UG6-004-170, Sofi. **UI9BWF:** Vakulin, Victor, Vlad. **UL8LWA:** Club. **UL8LWZ:** UL7LA, UL7LEZ, UL7LO, UL7-026-177. **UM9MWO:** UM8MFJ, UM8MKO, UM8MU. **UM9MZD:** UM8MB, UM8MCW, UM8MKW. **UO40WR:** Andre, Harry, Oleg. **UP1BWG:** UP2BAA, UP2BLF, UP2BN, UP2BZ, UP2DT.

UP1BWW: UP2BBB, UP3BIJ, UP2BNM, UP2BO. **UP1BYK:** UP2BMX, UP2038-17. **UP1BZA:** UP2BIC, UP2PAQ, UP20X. **UP2BZG:** UP2BCO, UP2QA, UP2BMR, UP2BOC, UP2BCT, UP2-038-439. **UP1BZO:** UP2BFN, UP2BJQ, UP2BNC, UP2BOA, UP3BB. **UP1BZQ:** UP2BAT, UP2BMQ, RP2BHR. **UP1BZR:** UP2BDW, UP2BJK, UP2BKF, UP2BOQ, UP2-038-346, UP2-038-728. **UR1RWQ:** Club. **UR1RWW:** UR2RKM, UR2TAX. **UR1RWX:** UR2RCU, UR2RHF, UR2RNA, UR2RNJ, UR2RNX, UR2RRJ, UR2RRR, UR2-083-162, UR2-083-166. **UT4UWC:** Club. **UT4UWE:** UB5ULJ, UT5UDI, UT5-186-153. **UT4UWL:** Club. **UZ8AWB:** UA8-103-239, UA8-103-712, UA8-103-347. **UZ8AWX:** Arkady, Yuri. **UZ8LWW:** UA8LCZ, UA8LDZ, UA8LFK, UA8-107-467. **UZ8QWE:** UA8QAH, UA8QJ, UA8-098-107. **UZ1AWW:** UA3DPX, UA9OCQ, UA1-169-1843. **UZ1NWD:** RA1NA, UA1NAV, UA1NBO, UA1NCF, UN1CC. **UZ1PWA:** UA1PAO, UP1POL, UA1-114-016. **UZ1ZWO:** George, Serge, Vlad. **UZ2FWA:** RA2FA, UA2FF, UA2FED, UA2FJ, UA2FM, UA2FX. **UZ3DWR:** Club. **UZ3DXW:** UA3DFO, UA3-142-1752, UA3-142-1770, UA3-142-1771. **UZ3QWM:** UA3-121-2913, UA3-121-3100, UA3-121-3104. **UZ3RWA:** Club. **UZ3SWU:** UA3-151-1506, UA3-151-1508.

UZ3TWT: Club. **UZ3WWC:** Club. **UZ3WWW:** Club. **UZ3XWA:** UA3XBB, UA3XCH, UA3XDB, UA3XDM, UA3XDS, UA3-127-21. **UZ3XWW:** Alexej, Alexej, Yuri. **UZ3ZWF:** UA3ZFE, UA3ZDN, UA3ZH, UA3ZJ. **UZ4AXN:** UA4ABS, UA4ADG, UA4-156-919. **UZ4HWZ:** Club. **UZ4PZL:** RA4PNC, UA4-094-1041. **UZ6HXK:** UA6-108-1620, UA6-108-1664, UA6-1081-740. **UZ6HYZ:** UA6HJU, UA6HKP, UW6FC. **UZ6LWT:** Club. **UZ6LWZ:** UA6AN, UA6LV, UB5ITW, UW8MF, UA6-150-1070, UA6-150-1240. **UZ9AYA:** UA9AKI, UA9AKG, UA9AN, UA9AMU, UA9AOA, UA9OCC, UA9QCU, UM8NKW, UW9AN, UW9AR, UW9AW, UW9BY, UA9-165-938. **UZ9CWC:** RA9CVZ, UA9CBW, UA9CKP. **UZ9CWW:** UA1TAC, UA9CDC, UA9CJK, UA9CPB. **UZ9FWR:** RV9FQ, UA4WA, UA9FGJ, UA9FKM, UV9FB. **UZ9OXI:** Club. **UZ9QWM:** UA9QCU, UA9QCV, UA9QDU. **UZ9SWY:** UA9SGW, UA9SHO, UA9TS. **UZ9UMM:** RV9UDZ, UA9UDL, UV9UGC. **UZ9WWS:** UA9WFV, UA9WIT, UW9WR. **UZ9XWW:** RA9XSX, UA9XBD, UA9XHJ, UA9XM, UA9-090-601.

VE3CYX & VE3AER, VE3CDX, VE3CKF, VE3ICR, VE3LWJ, VE3MFA, VE3MFP, VE3MMB, & VE3WT. **VE3UOT:** VE3AER & VE3HTT. **VE6EP** & VE6XS. **VK3BUR:** VK3CWB, VK3DMS, VK3KFQ. **VK9MR:** VK2CIA, VK2WU, VK3CE, VK5ARO. **VP2MW** & G3SJK, G4BGH, G4JVG, G4XRI, G4XRJ, GM3YOR. **W1BK** & K1TXH, KA1CLV. **W1IHN** & KA1FBY. **W2BHK** & N2NM, WB3KIL. **W2HPF** & KB2SG, KM2P. **W2UI** & N3KR. **W2XL** & KA2TIP, KY2J, N2DRR, NA2N. **W3HHG** & K4EIH, N4GFQ, WR4S, K5KSY, AA6DX. **W4MM** & K4XA, KB4IRU, KB4LIT, KJ4OJ, KI4RE, N4FD. **W4PRO** & KA4KEA, N4DJ, W4MBD, WG4O, N7FMB. **WA4JXI** & KA3IKE, WA4SVO, KØOO. **WA4QQV** & N4AOC, WA4QMQ, WD4MDY. **WA4YOF & WB4PRX** & WA4CTA. **W6BIP** & WA6DJI, WA6PYN. **W6TMD** & AB6R, KB6UF, N6RJ, NC6U, NW6S, W6KP, W6LEN. **WA6PVA** & NI7T. **W7ZR** & N7AKQ, UA0FBZ, W7XN, Vlad. **W8GWC** & AD8O, W8CZN, W8JGU, WA8DXB, WA8DXG, WA8RCN. **WA8BIN** & N8DCJ.

XN3BVD: VE3BVD, VE3KZ, VE6OU. **YO8KAN:** YO8ME, YO8MI, YO8PB. **YR6A:** YO6VZ, YO6EZ,YO6AZM, YO6AKN, YO6XA, YO6AW, YO6UX, YO6ZI. **YT3T:** YU3BQ, YU3HED,YU3JT, YU3EIJ. **YU4AAI:** Bajric, Masatovic. **ZS4WRC:** ZS4AE, ZS4DC, ZS4NS. **ZS6BPL** & ZS6BIM, ZS6BTY, & ZS6GO. **3D6DX:** ZS6ADO, ZS6BRZ, 3D6BQ, 3D6BX. **4N2D:** YU2DX, YU2WM, Ive, Frano, Aco, Branko, Ivo, Matko, Slavko, Miso. **4U1VIC:** K7AWD, NK4N, DF1KG, HS1ANV, OE1GLA, OE1YPA, OE1GLA, N4AAK, OE1ZQC. **4V2C:** AA4GA, AA4NC, HH2MC, N4DVW, NQ4I, W5VUX. **5B4ES:** 5B4LP, 5B4MF, 5B4ON, 5B4OQ, 5B4OS, 5B4OX, 5B4OY, 5B4PB, 5B4QL. **9H3DN:** 9H1BT, 9H1BW, 9H1CD, 9H1E, 9H1EL, 9H1EU, 9H5AB, LA2TO.

Station Operators
Multi-Operator Multi-Transmitter

AA4S & K4MQG, KU4V, WD4DJA, WQ4V, WV4Z. **AD8P** & AD8C, KS8S, N8ABL, W8FN, W8KUZ. **DF8DX:** DF7YE, DF8XC, DJ4AX, DJ4PT, DK2QL, DK3BJ, DL8OH, DL9NC. **EA1MH** & EA1ABN, EA1FK, EA1KC, EA1MQ, EA1NQ, EA1VG. **GB4ANT:** G3JOC, LDI, MAN, VZT, XLL, G4BTY, DRS, JQL, RKK, SDP, SFQ, VAO, WTD, G8VLL. **JH1YTX:** JM1JHG, JP1AJQ. **JA3YKC:** JE3MAS, JF3PMM, JF3RAL, JG3CXJ, FMD, HJG, LLB, JH4PAM, JH4RHF, JH5EML, EZP, JI3XTZ, JI3ERV, JJ3SRU, JK3GRR, HYA, JL3TLC, JR4BSM, IMK, PMX, JR6NWN. **JA7YFB:** JE7MOY, JF7GQK, JH7XKI, JH7XMO, JH8QNT, JR7GYC, JLU, LCI, OEF, OYW, RLB, JJ1GXY, JN1RON, H. Furuseki. **JA7YFH:** JE7HMC, HXC, JWU, RCC, WQH, XTQ, JG2XUR, JH7SFR, JO1HBF, JR7ECK, MPT, MRQ, SFR, UOL. **JA7YRR:** JA7CLN, DPT, FDY, JUD, LBY, MQM, OZW, RQE, WSC, JH7VHZ, JR7BPM, JR7LVA. **JA9YBA:** JA9BEX, LNJ, LWB, NFO, OTX, PPC, QCW, QWJ, VBW, VDA, JH7UJR, JH9CAV, JHØCAZ, JHØHHU, JHØVUG , JI3SUB, JR7OMD.

K1NG & KI1G, KA1TS, KF1C, WA1TFF. **K3ZZ** & K3TM, KC3EK, KR3M, WA3EKL, WA3KCY. **K5LZO** & K2TNO, KF4VS, KA5PJG, KA5SBS, KD5SP, KE5IV, NM5M, WB5RUS, WA9LVI. **K8RF** & KYØS, N2IC, NIØE, WØPSY, WØUA. **KH6JDU** & WH6BAT. **KL7RA** & AL7AF, AL7CQ, KL7UN, NL7M, NL7V. **KL7Y** & KL7U, NL7G, NL7P, WL7E, WL7Y. **L8H:** LU1HE, LU1HGA, LU1HOO, LU1HNL, LU2HAM, LU3HAZ, LU4HJU, LU5HCU, LU5HDJ, LU6HDV, LU6HK, LU7HAE, LU7HJM, LU8MBV, LU9HBJ, LU9HCT. **N2AA** & K2BQ, K2NG, K2SS, K2TT, K2TW, K2UR, KR2J, KR2O, KU2M, WB2BHC, K5NA, K8TD. **N2RM** & N2MM. **N5AU** & K5MM, K5ZD, KM5K, KM5X, N5CR, N5RZ, N5UA, WB5VZL, WAØTKJ. **N6RZ** & AA6UO, AL7H, N6TU, W6NV, WA6OCV, WB6SHD. **N8DLR** & K8GG, N8FPI, W8UVZ. **PA6WW:** PA2PGU, PME, XAD, PA3BFX, BIL, BXG, CTM, DBC, DOS, PAØAAJ, ADC, GMM, JWK, KWV, LL, MA, SGL, TMU. **PI4DEC:** PA3AWW, PA3CHC, PA3CJF, PA3CQU, PA3CZW, PA3DJL, PAØBOE, PAØLEG, PAØTUK.

SP9KAO: SP9JBK, SP9JZT. **TI1C:** N6AA, AW, BV, TJ, ZZ, TI2CC, CF, EY, J, JCJ, JVA, TO, WI. **V2ARS:** K4ZLE, K6GXO, KY8X, NC8Q, V2AU, W6CDR, W8ILC, W8OK, W8KKF, W8OF, W8WPV, W9SWM. **VE2USA:** AC8W, K8AQM, K8DD, KA8POW, KA8SEW, KD8SF, N8COA, WD8CRY. **VE7ZZZ:** VE3CRD, VE6EZ, VE7AV, DTS, EPN, EOG, IG, SK, VX, WWW. **VP2VCW:** K1RX, K3EST, KB2XZ, KT6V, N3ED, N6CW, N7ZZ, WA3LRO. **VP9AD** & G4CNY, KU8E, N3RD, N3RS, N8ET, VP9IJ, W2REH, W3MA. **W3GM** & K3GM, K3ND, K3VW, W3FV, KH6CP. **W3LPL** & AI3M, K3DI, KA1GD, KC8C, KF3P, N8II, W3FG, W3MR, WD4AXM. **W4DR** & AA4D, K4WHN, KA4EVH, KG4W, KI4GM, KX4S, N4BLX, N4EHJ, N4HB, N4ND, NK4J, W4MYA, WA4HOT, WB4BVY, WU4G. **W8NGO** & K8ZE, K8ZZU, N8BKF, N8EA, W8ONA, WA8ICX. **XE2SI:** AA6RX, K6NA, N6ND, N6NI, N6VI, NI6W, WA6OTU. **YT7W:** YU1NZV, YU6ZAX, YU7AD, AU, BB, KW, PFR. **YU4EZC:** YU4RS-1580 & YU4RS-1556. **ZK1XC:** PA3BFM, PA3DHH. **ZY5EG:** PY1RR, PY5ABW, PY5ALP, PY5BAB, PY5CA, PY5EG, PY5IW, PY5NW, PY5TT, PY5VM, PY5ZBU, PT9ZE.

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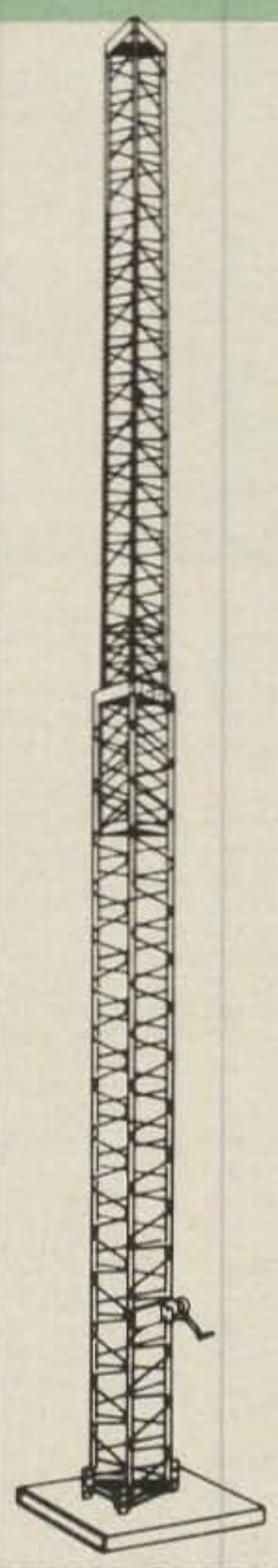

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GUYED TOWERS:

25G section	$47.50
25AG3 top	59.90
25AG4 top	64.00
45G section	109.00
45AG3 top	116.00
45AG4 top	116.00
TB-3 Bearing	49.00

Hy-Gain
CRANK-UPS:

Hy-Gain is now the name in crank-up towers. Shipped freight prepaid!

HG-37SS	
HG-52SS	
HG-54HD	
HG70HD	

REBATES

WIRE & CABLE

COAX:

RG-213/U	$0.29/ft.
RG-8/U	0.28/ft.
RG-8/U foam	0.27/ft
RG-8X	0.16/ft.

ANTENNA WIRE(solid):

12 ga. Copperweld	$0.12/ft
14 ga. Copperweld	0.10/ft
450 ohm ladder line	0.10/ft

ROTOR CABLE:

Std (6-22, 2-18)	$0.19/ft
Hvy (6-18, 2-16)	0.34/ft

BELDEN

RG-213/U	$0.40/ft
RG-8/U	0.32/ft
RG-8/U foam	0.35/ft
RG-8X	0.18/ft
RG-11A/U	0.36/ft
9913	0.42/ft

MISCELLANEOUS ANTENNA SUPPLIES

ALPHA-DELTA

Transi-traps:

LT 200W	$18.95
HT 2KW	29.00
RT 200W Dlx	28.95
HV 2KW Dlx	31.95

HI-Q

1:1 Balun	$11.95
Ctr. insul	6.50
COAX-SEAL	$2.00 /roll
7'' end insul	4.95/pr.
1/8 nylon rope	0.05/ft.

AMERITRON RCS-8 remote coax switch, 5 pos $119.95

ROTORS

TELEX-HY-GAIN

CD54II
HAM IV
T2X
HDR-300

REBATES

KENPRO

KR-500 elev	$159.00
KR-5400 az-el	259.00
KR-5600 az-el	319.00

THIS MONTH'S SPECIAL

We'll match Hy-Gain's 10% rebate with 10% off regular prices of wire and cable purchased with Hy-Gain products.

Now stocking Dynetic Systems DR-10 Azimuth-Elevation rotor.

CIRCLE 147 ON READER SERVICE CARD

ZONE WINNERS

Zone	Call	Score	Zone	Call	Score
1	KL7AF	756	21	EX6F	6,362,000
2	No Entry		22	VU2JXO	297,864
3	W7EJ	1,642,410	23	JT1AO	454,637
4	W0ZV	1,666,281	24	XX9CS	14,940
5	K1AR	2,662,116	25	JH7DNO	1,885,750
6	XE1IF	1,294,308	26	No Entry	
7	TG9VT	1,323,893	27	KJ9W/KH2	4,337,092
8	6Y3M	3,615,344	28	YB4FW	546,612
9	PJ2FR	8,420,220	29	VK6DU	417,261
10	HC1OT	1,112,620	30	VK2WU	594,000
11	ZP5JCY	2,873,404	31	KH6ND	1,972,870
12	CE3DNP	2,956,080	32	AH8A	1,283,559
13	LU1BR	2,107,668	33	CN8ES	4,195,706
14	PA2TMS	1,834,012	34	No Entry	
15	OK6RA	1,942,575	35	5N24AMA	1,057,264
16	RB5FF	779,868	36	No Entry	
17	UA9MR	170,060	37	5Z4DU	177,777
18	UZ9UN	46,926	38	N4NW/3D6	1,726,550
19	UA0QEP	225,060	39	FR0FLO	3,172,668
20	LZ1CW	227,240	40	TF3CW	227,149

Team Contesting

1. Frankford Radio Club + one (6Y3M, N4NW/3D6, W3BGN, N2LT, N3AD) 10,418,669
2. Q-Processors (KJ9W/KH2, KD7P/KH2, KG6DX, OH6JW) 7,212,262

W4ZTW	"	103,323	382	23	78
W4VZB	"	61,388	214	27	76
KC4BX	"	54,450	205	27	72
W4RKV	"	50,127	195	25	68
W4WMQ	"	12,462	77	21	41
KB4FHE	"	11,770	76	14	40
KT4M	"	7,379	62	13	34
KC4I	"	5,082	62	16	26
WG4P	"	3,854	39	13	28
KI4JB	"	3,108	35	12	25
W4YN	"	1,224	21	10	14
N4DLE	"	494	16	6	7
K4RIG	**7**	**29,667**	**126**	**26**	**61**
N4IZ	"	15,879	73	27	52
W4MGX	"	9,130	64	18	37
W4FHI	"	1,175	18	9	16
W4PZV	**3.7**	**22,032**	**111**	**23**	**58**
W4FLA	"	12,028	80	18	44
WB4IUX	"	6,030	60	13	32
KA2CDJ/4	"	3,232	47	9	23
N4SU	**1.8**	**3,360**	**54**	**12**	**20**
K8CFU/4	"	1,254	36	9	13
N4IN	"	357	11	6	11
NA5R	**A**	**1,489,176**	**1150**	**139**	**342**
NR5M	"	1,097,400	1201	112	242
N5DU	"	897,472	930	123	256
K5RX	"	890,724	823	120	278
KI3L/5	"	790,024	989	100	196
KA5W	"	581,221	619	108	251
K5DX	"	561,000	658	100	230
NI5M	"	462,400	539	95	225
W5LMG	"	142,209	268	74	133
KC5UC	"	123,630	239	73	122
W5OSJ	"	93,766	215	66	107
KC5YB	"	89,380	222	60	104
W5OB	"	53,862	149	51	90
N5HB	"	40,299	127	56	77
KA5IAU	"	34,028	134	32	62
K5FUV	"	33,462	125	43	74
N5EPA	"	32,205	123	39	56
N3BB/5	"	29,028	99	56	67
KD5RQ	"	28,583	122	42	59
W5KCR	"	22,275	99	31	50
N7AIH/5	"	19,110	127	22	48
WB5LYT	"	16,274	86	32	47
W5YM	"	15,456	72	33	59
			(OPr. K5GOE)		
KB5OX	"	14,283	85	26	43
NA5F	"	3,950	36	21	29
KN5S	"	3,384	36	18	18
WB5UDX	**21**	**91,832**	**309**	**27**	**77**
KJ5W	"	78,008	264	27	71
K5TSQ	**14**	**241,902**	**597**	**35**	**116**
W5FO	"	155,632	449	35	102
W5AE	"	3,404	48	13	24
W5SJD	"	454	18	9	13
K5NW	**7**	**34,528**	**152**	**28**	**55**
K5BDX	"	8,586	63	20	34
WB5LYT	"	3,131	38	14	17
W8MJ/5	**3.7**	**91,952**	**486**	**28**	**84**
KQ5E	"	27,262	131	25	61
K5BZU	"	12,992	74	18	40
K5UR	**1.8**	**11,600**	**169**	**18**	**32**
K6HNZ	**A**	**1,532,240**	**1550**	**121**	**237**
AI6V	**A**	**1,517,620**	**1560**	**115**	**223**
K6EID	"	886,418	960	110	221
WB6ZHT	"	525,255	676	103	188
KY6I	"	420,368	801	73	115
K6XT	"	254,330	336	106	184
K6DR	"	198,331	365	81	122
W2KVA/6	"	187,758	393	67	104
WC6I	"	187,395	355	75	120
N6AN	"	178,155	356	65	120
NE6I	"	160,599	304	75	126
VE2AQS/ W6	"	136,086	227	83	139
KB6GV	"	127,908	267	72	115
W6MFC	"	118,767	245	71	112
W6RCL	"	116,850	239	76	114
W6SC	"	109,395	240	56	109
W6EUF	"	98,629	218	67	112
N6ADK	"	98,072	220	64	100
WA6FGV	"	93,730	281	55	75
K6YRA	"	91,000	167	70	130
KV6I	"	87,019	192	66	107
N6MB	"	81,438	199	55	92
KQ6X	"	80,400	208	64	86
W6ABW	"	76,464	208	55	89
WA6UFY	"	55,002	191	41	62
W6BYH	"	51,923	146	59	78
W6CS	"	49,404	143	54	84
N6UW	"	48,336	159	50	64
N6JM	"	46,230	130	56	78
W8AKS/6	"	37,080	131	44	59
N6DKZ	"	25,134	77	50	68
K9AGL/6	"	22,698	109	34	44
N8BJQ/6	"	22,525	101	40	45
N6JMV	"	22,100	100	36	49
W6TKF	"	21,840	87	47	57
G3MHV/ W6	"	20,175	96	32	43
K6RQ/P	"	13,690	72	32	42
AA6EE	"	13,275	73	35	40
KJ6Z	"	12,265	85	29	26
N6GRM	"	11,424	90	30	26
AJ6V	"	10,117	59	30	37
N6CGB	A	6,820	46	28	34
W6FRZ	"	6,372	41	25	34
W6YLJ	"	2,618	33	15	19
W6JII	"	1,830	23	12	18
W6AM	"	1,518	25	16	17
NG6W	**28**	**12,031**	**85**	**17**	**36**
AA4M/6	"	11,424	82	17	34
WB6MBF	"	9,072	68	16	32
K6LY	**21**	**276,150**	**898**	**30**	**75**
			(Opr. K0EJ)		
K4KIU/6	"	125,064	406	32	76
N6HR	"	59,986	239	27	62
W6FCF	"	21,096	98	24	55
KS6Q	"	5,472	53	16	20
W6SWM	"	3,984	60	13	11
K6HMA	"	1,998	37	8	10
W6BH	**14**	**282,321**	**839**	**32**	**85**
KB6HW	"	1,364	24	10	12
N6ADI	**7**	**38,000**	**181**	**28**	**48**
W6RJ	**3.7**	**92,910**	**404**	**28**	**67**
K6ANP	"	11,340	97	17	28
WB6JMS	"	2,262	36	11	18
KA6W	"	1,740	24	13	17
AE6U	**1.8**	**4,200**	**114**	**15**	**20**
W6US	"	3,045	180	13	16
K6SE	"	989	20	11	12
W7EJ	**A**	**1,642,410**	**1493**	**124**	**261**
N7ABJ	**"**	**684,537**	**918**	**95**	**164**
K7HBN	"	357,905	538	81	154
W7FGT	"	286,874	522	75	142
KI7M	"	266,037	483	80	133
NC7K	"	208,208	487	57	97
W9SE/7	"	191,684	411	66	107
K7GEX	"	158,260	343	62	102
KY7F	"	155,708	322	57	109
KS7T	"	145,885	316	54	109
VE7EWG /W7	"	119,980	321	52	88
W7KKR	"	103,700	242	70	100
W7GUR	"	96,188	247	43	96
K7GWK	"	93,177	237	66	87
W7HXG	"	84,588	243	44	89
KS7L	"	63,196	189	50	72
AG7J	"	55,212	163	55	74
W7QN	"	49,770	149	48	78
KA7RMV	"	46,224	158	44	63
K7CC	"	42,670	184	46	39
WA7HHX	"	31,562	138	39	47
KC7MM	"	18,703	116	26	33
W7IIT	"	17,263	99	29	32
W7MI	"	13,182	65	34	44
KA7FEF	"	6,640	63	18	22
N7EFC	"	4,371	51	15	16
KD7EJ	"	4,300	56	21	22
KB7M	"	990	17	9	13
WB7FDQ	**28**	**26,496**	**175**	**20**	**49**
K7IDX	"	5,400	47	14	26
K7JA	**21**	**429,769**	**1096**	**34**	**103**
KE7C	**"**	**188,471**	**670**	**26**	**71**
K7DXD	"	159,537	524	29	78
W7AYY	"	47,730	225	25	49
KO7G	"	26,796	163	22	36
KX7J	"	13,715	79	22	43
KU7A	"	9,600	85	17	23
KC7V	"	7,248	57	19	29
WB0WNH /7	"	6,055	63	16	19
K7WA	"	4,544	51	13	19
W7IL	**14**	**391,035**	**1034**	**33**	**98**
W7FP	"	199,629	597	31	92
AG7M	"	172,325	559	29	84
KT7H	"	141,703	539	29	72
WA7GVM	"	66,960	274	23	67
K7ABV	"	43,920	204	20	60
W7ISX	"	20,485	87	24	61
K7LXC	"	7,526	50	23	30
WB7APW	7	8,832	73	19	29
WA7KPH	3.7	9,116	68	18	35
KG7D	**1.8**	**3,248**	**93**	**12**	**17**
K8CW	**A**	**227,994**	**352**	**68**	**169**
N8ATR	**"**	**180,557**	**278**	**82**	**165**
WD8QDQ	"	138,944	244	83	125
AD8W	"	136,335	281	64	119
K8MR	"	93,060	177	61	119
K8TMK	"	84,429	196	46	113
W8ANM	"	81,836	195	54	110
W4BAA /8	"	81,184	182	57	115
NI8Y	"	74,800	190	37	99
K8CV	"	64,883	161	58	103
W8EX	"	59,895	152	56	109
KD8QZ	"	41,148	116	33	94
KA8OUT	"	25,705	103	31	66
N8EKS	"	24,300	98	35	65
K8KUH	"	19,929	99	27	64
W8VEN	"	17,670	79	37	56
KD8QU	"	14,480	74	26	54
KB8TT	"	6,954	53	18	39
W8UPH	"	4,418	41	21	26
KC8UP	"	1,767	24	12	19
W8WPC	**28**	**19,560**	**135**	**17**	**43**
			(Opr. N9AG)		
KB8LM	"	10,664	86	13	30
N8FEH	"	6,438	68	11	26
K8ZR	**21**	**58,195**	**198**	**24**	**79**
K8MNG	"	54,153	198	23	76
KC8KO	"	45,752	188	23	63
NJ8N	**14**	**169,274**	**517**	**27**	**86**
KB8PK	"	141,081	445	27	84
W8TWA	"	140,238	402	31	95
N8CTZ	"	42,084	180	24	60
K8PSR	"	18,720	104	20	45
K8EF	"	16,055	90	17	48
KD8SQ	"	14,280	100	19	37
N8RA	**7**	**43,935**	**159**	**28**	**73**
KT8W	"	8,268	60	18	35
NE8I	"	3,320	34	15	25
AD8C	**3.7**	**24,924**	**287**	**19**	**43**
K8HF	"	459	13	5	12
WB8YUC	**1.8**	**2,523**	**133**	**12**	**17**
KV9S	**A**	**503,055**	**690**	**94**	**221**
KS9U	**A**	**484,606**	**558**	**100**	**237**
AF9Y	**"**	**385,836**	**465**	**93**	**223**
K9CAN	"	383,690	458	91	214
W9XT	"	325,125	425	92	197
W9OP	"	220,971	368	68	151
N9BUS	"	181,640	298	71	168
W9GIL	"	177,103	329	65	132
K9MDO	"	161,364	284	75	151
KC9EW	"	137,111	270	61	138
N8DE/9	"	127,078	239	69	134
K9YAX	"	120,932	224	64	132
W9AMM	"	113,828	224	66	133
WA9BXB	"	94,200	222	44	106
KC9UM	"	93,879	212	58	113
KQ9W	"	58,512	155	45	93
K9BQL	"	56,990	160	52	87
KB9LC	"	55,296	170	47	81
KC9JT	"	50,260	145	49	91
W9GXR	"	44,296	140	37	76
K9YNF	"	40,767	145	32	75
K9GMV	"	32,828	135	34	82
KC9FS	"	31,518	111	39	64
KA9MOM	"	29,267	101	42	71
KD9KN	"	24,644	104	36	65
KB9AW	"	22,119	85	38	63
WD9IRV	"	9,490	89	28	37
N9CIW	"	4,125	38	24	31
WD9DYR	"	551	12	8	11
K2PLF/9	**21**	**120,486**	**331**	**26**	**103**
WB9TIY	"	90,750	254	29	96
AA9M	"	47,505	179	25	70
KR9G	"	45,000	159	25	75
KA9QYA	"	8,262	60	18	33
KC9WP	"	4,384	50	15	17
KG9Z	"	3,872	32	16	28
K9BN	**14**	**176,076**	**462**	**33**	**101**
K9OVB	"	62,832	218	27	75
KJ9D	**7**	**103,362**	**378**	**30**	**77**
W9CH	"	29,412	128	27	59
KB0C/9	"	16,770	101	22	43
WA9YZN	"	9,570	65	20	38
KA9P	"	1,352	22	12	14
W9RN	**3.7**	**31,244**	**194**	**22**	**51**
KE9U	"	5,664	49	16	32
N9MM	**1.8**	**1,932**	**40**	**10**	**18**
			(Opr. N9NC)		
W0ZV	**A**	**1,666,281**	**1339**	**136**	**301**
WBJLC	**"**	**560,162**	**543**	**118**	**260**
WBHBH	**"**	**498,379**	**568**	**106**	**237**
W0EJ	"	396,704	469	98	224
KB0U	"	352,580	436	94	211
N0GA	"	300,160	401	90	190
WB0ISW	"	277,816	373	96	191
N0AT	"	266,019	401	78	169
K0IFL	"	217,580	326	82	171
KM0L	"	199,682	321	78	160
W0OSK	"	175,341	318	75	136
KS0E	"	164,566	294	78	136
AC0N	"	160,011	284	60	147
AB0X	"	152,928	249	82	154
KC0XK	"	151,904	316	66	122
W0GOQ	"	134,801	321	53	110
KJ0N	"	105,774	227	61	122
W6FN/0	"	75,775	176	65	110
W0PPF	"	61,155	179	42	93
K0JV	"	56,516	160	56	86
W0RXL	"	51,084	161	51	78
WA0DCB	"	50,816	151	47	81
K0IYF	"	41,638	138	37	72
WB0CHS	"	36,822	117	47	67
KD0SS	"	34,295	143	42	53
N0EKK	"	32,400	124	48	60
W0IZV	"	27,140	109	38	54
W0BWJ	"	17,381	73	36	55
WD0FSJ	"	16,815	74	41	54
WB0IEL	"	15,147	72	35	46
AK0M	"	5,665	46	23	32
W0GOR	**28**	**8,142**	**66**	**15**	**31**
K0RWL	14	43,218	159	27	71
KV0Q	**7**	**55,610**	**240**	**27**	**56**
N7DF/0	**3.7**	**31,980**	**198**	**24**	**54**
KB0G	"	2,130	33	11	19
K0GT	**1.8**	**1,495**	**33**	**9**	**14**

ALASKA

KL7AF	3.7	756	24	7	7

BAHAMAS

C6AER	A	8,940	62	24	36
WI4K/ C6A	**21**	**83,096**	**868**	**15**	**32**
C6ADZ	**14**	**53,210**	**620**	**12**	**37**

BERMUDA

VP9LB	**A**	**202,536**	**739**	**36**	**80**
VP9KA	**21**	**138,950**	**850**	**21**	**49**

CANADA

VO1AW	**A**	**63,360**	**203**	**37**	**83**
VO1CA	"	34,100	135	32	68
VE1BNN	**28**	**51,904**	**356**	**17**	**47**
XL1QU	**14**	**153,040**	**750**	**18**	**62**
XL1CV	**7**	**391,629**	**1406**	**29**	**90**
VE1AIH	**3.7**	**7,560**	**105**	**9**	**27**
VE2AYU	**A**	**481,440**	**734**	**79**	**193**
VE2YM	"	249,696	475	61	143
XN2FJH	"	156,520	474	40	90
VE2DTI	"	53,880	242	47	73
VE2JO	"	36,328	200	22	54
XN2PD	"	32,775	131	28	67
VE2GON	"	13,286	79	26	47
XN2EVO	**21**	**25,986**	**135**	**21**	**50**
VE2FUY	**14**	**28,080**	**143**	**21**	**59**
XN3XN	**A**	**1,579,648**	**1933**	**90**	**254**
VE5AFX /3	"	180,441	482	49	114
VE3CWE	"	49,800	169	39	77
VE3NPY	**28**	**3,510**	**47**	**9**	**21**
VE2AEJ /3	"	2,675	40	8	17
XN3BXY	21	8,255	50	18	47
XN3OCU	**14**	**320,880**	**1137**	**25**	**87**
				(Opr. VE2ZP)	
XN3NBE	"	80,926	367	22	64
XN3BMV	**7**	**546,615**	**1882**	**31**	**104**
XN3EEW	**3.7**	**103,870**	**1146**	**16**	**31**
VE3OME	**1.8**	**12,690**	**446**	**6**	**9**
VE3NNR	**"**	**11,913**	**346**	**9**	**10**
VE3CPU	"	9,800	367	6	8
VE4AIY	**14**	**43,928**	**425**	**25**	**51**
VE5AAD	A	7,200	85	20	20
XN5RA	**3.7**	**47,987**	**517**	**13**	**34**
VE5XU	1.8	638	32	6	5
VE6AGV	**A**	**73,968**	**363**	**39**	**53**
VE6CPP	28	1,615	32	8	11
XN6CB	14	25,850	184	19	36
VE7FTC	**A**	**44,538**	**201**	**27**	**51**
VE7IN	"	25,681	180	31	30
XN7EIK	**14**	**136,591**	**720**	**23**	**56**
VE7CRW	"	24,750	194	20	35
VE7AO	**3.7**	**16,399**	**266**	**12**	**19**
VE7BS	**1.8**	**1,656**	**45**	**9**	**9**

CAYMAN ISLANDS

ZF2IM	**A**	**355,503**	**975**	**58**	**105**
				(Opr. WB8ZTY)	
ZF2HP	**A**	**168,854**	**843**	**40**	**58**
				(Opr. AA8G)	

CUBA

CO2GB	**A**	**211,460**	**685**	**50**	**97**

DOMINICAN REPUBLIC

HI8WRE	A	16,377	151	19	34
HI8A	**14**	**280,800**	**1400**	**26**	**91**
HI8GB	"	169,323	1050	20	57
HI0EJH	3.7	3,171	141	6	15

GREENLAND

OX3KM	**A**	**61,174**	**404**	**33**	**40**

GUANTANAMO BAY

KG4DX	**14**	**546,840**	**1926**	**28**	**92**

GUATEMALA

TG9VT	**A**	**1,323,893**	**1730**	**99**	**220**

HAITI

HH2WL	**A**	**418,582**	**1396**	**54**	**96**

HONDURAS

HR1FC	**3.7**	**8,460**	**230**	**9**	**27**

JAMAICA

6Y3M	**A**	**3,615,344**	**4325**	**112**	**282**
				(Opr. KT3M)	
N4WF/ 6Y5	**14**	**31,768**	**405**	**14**	**24**
NE4G/ 6Y5	**3.7**	**278,520**	**1221**	**27**	**83**

MEXICO

XE1IF	**A**	**1,294,308**	**2625**	**81**	**148**
				(Opr. K4IIF)	
XE1VV	"	337,554	1000	66	123
XE2PQ	**7**	**24,048**	**237**	**19**	**29**

PANAMA

HP1XXO	**A**	**836,836**	**2824**	**48**	**95**
HP1XKT	"	18,328	96	31	48

TOP SCORES

WORLD Single Op All Band

PJ2FR	8,420,220
P44A	7,814,839
EX6F	6,362,000
YV5TK	6,107,744
KJ9W/KH2	4,337,092
CN8ES	4,195,706
6Y3M	3,615,344
FR0FLO	3,172,668
CE3DNP	2,956,080
ZP5JCY	2,873,404

USA Single Op All Band

K1AR	2,662,116
K2VV	2,389,164
K1DG	2,358,850
W1ZM	2,160,082
W3BGN	1,992,977
K2XA	1,971,549
W2RQ	1,807,491
K1TO	1,799,548
N2LT	1,670,514
W0ZV	1,666,281
W7EJ	1,642,410

Single Op Single Band 28 MHz

CE6EZ	859,165
LU2FDR	589,572
LU1E	573,138
CX5AO	498,386
CX4HS	326,616
LU5MDO	261,250

Single Op Single Band 28 MHz

NU4Y	38,078
WB7FDQ	26,496
W8WPC	19,560
NG6W	12,031
AA4M/6	11,424
KB8LM	10,664

21 MHz

HC1OT	1,112,620
KG6DX	1,080,576
9Y4AT	697,125
EA4LH/CE3	643,710
I1KN	605,382
YC0DPO	587,340

21 MHz

K2EK	498,648
K7JA	429,769
N4UM	424,853
NO4J	406,120
K6LY	272,150
K1VUT	246,312

14 MHz

K0GU/8R1	1,251,096
5N24AMA	1,057,264
LU6ETB	1,033,659
CT2FH	887,656
G3FXB	821,028
KD7P/KH2	781,550

14 MHz

W2YV	640,640
W7IL	391,035
NB2P	315,972
KV4P	300,824
W6BH	282,321
K2WK	255,860

7 MHz

EA8AK	776,700
9Y4VU	700,488
T32AF	677,844
XN3BMV	546,615
XL1CV	391,629
I2VRN	309,672

7 MHz

KJ9D	103,362
KV0Q	55,610
N8RA	43,935
K1MM	41,912
N6ADI	38,000
K5NW	34,528

3.7 MHz

YV3AZC	351,324
NE4G/6Y5	278,520
ZL1BIL	142,560
HA8IE	117,819
XN3EEW	103,870
OH1RY	101,088

3.7 MHz

W6RJ	92,910
W0MJ/5	91,952
K1UO	89,200
WB2ITR	38,048
N7DF/0	31,980
W9RN	31,244

1.8 MHz

LZ2CJ	107,818
HB9AMO	42,092
I4JMY	28,969
SP3IBS	28,892
IK0BYO	28,152
YV2IF	18,291

1.8 MHz

K5UR	11,600
AA1K/3	10,258
AE6U	4,200
KA1SR	3,510
N4SU	3,360
KG7D	3,248

Multi-Op Single Transmitter

4V2C	8,448,099
LZ7A	7,243,456
ED9CM	6,860,565
KP4BZ	6,804,200
VP2MW	6,509,970
ED7BB	5,095,400

Multi-Op Single Transmitter

K2BU	2,791,019
N4CC	2,718,682
NA8V	2,677,584
N4ZC	2,653,413
N4RJ	2,305,635
K4VX/0	2,283,966

Multi-Op Multi-Transmitter

TI1C	22,157,695
VP2VCW	17,842,662
VP9AD	16,794,200
ZY5EG	13,342,416
XE2SI	9,984,236
V2ARS	8,762,040

Multi-Op Multi-Transmitter

N2AA	7,418,328
W3LPL	6,402,844
W4DR	6,270,623
N5AU	5,173,860
N6RZ	4,003,272
K0RF	3,576,748

Say You Saw It In CQ

HP1XKR	"	7,772	57	22	36
HP1XYJ	"	4,080	34	21	27

PUERTO RICO

KP4AM	**A**	**290,850**	**791**	**52**	**123**
NP4AT	**3.7**	**76,212**	**640**	**15**	**43**

AFRICA

CANARY ISLANDS

EA8ACH	**A**	**1,731,620**	**1574**	**98**	**276**
EA8AMX	"	135,309	297	48	111
EA8AOV	"	88,927	568	30	79
EA8ARG	"	33,003	224	22	40
EA8AGH	"	1,716	26	6	16
EA8ATA	"	507	13	4	9
EA8BCJ	"	96	4	4	4
EA8AKN	**21**	**131,672**	**413**	**24**	**85**
EA8RCT	"	88,537	423	20	51
EC8AHH	"	86,742	369	19	60
EA8AVV	**14**	**37,950**	**220**	**24**	**42**
EA8AK	**7**	**776,700**	**1736**	**35**	**115**

CEUTA

EA9PD	A	4,524	58	3	23
EC9GV	**3.7**	**4,800**	**65**	**6**	**19**

DJIBOUTI

J28EG	**28**	**28,956**	**178**	**15**	**42**
			(Opr. F6EBA)		

THE GAMBIA

C53EK	**A**	**444,924**	**992**	**34**	**119**

KENYA

5Z4DU	**21**	**177,777**	**660**	**24**	**67**

MAURITIUS

3B8DB	**A**	**96,824**	**319**	**31**	**73**

MOROCCO

CN8ES	**A**	**4,195,706**	**3056**	**103**	**360**
CN8CW	"	121,396	464	20	69

NAMIBIA

ZS3HL	**A**	**1,652,145**	**1659**	**97**	**244**

NIGERIA

5N24AMA	**14**	**1,057,264**	**2107**	**37**	**132**
			(Opr. KC7UU)		

REPUBLIC OF GUINEA BISSAU

J5WAD	**14**	**40,053**	**179**	**20**	**59**

REPUBLIC OF SOUTH AFRICA

ZS6CDJ	**28**	**242,141**	**772**	**23**	**84**
ZS6P	"	25,650	177	14	36
ZS6BCR	**3.7**	**10,324**	**71**	**22**	**36**

SOMALILAND

T52JL	A	7,250	56	24	26
			(Opr. OH2JL)		

REUNION

FR0FLO	**A**	**3,172,668**	**2598**	**116**	**303**

SWAZILAND

N4NW/ 3D6	**A**	**1,726,550**	**1680**	**243**	**350**

ASIA

INDIA

VU2JX0	**A**	**297,864**	**716**	**62**	**135**
VU2DDT	**14**	**210,124**	**607**	**35**	**96**

ISRAEL

4X4DK	A	67,760	269	20	68

JAPAN

JA1YFG	**A**	**1,465,648**	**1362**	**128**	**248**
			(Opr. JL1BLW)		
JA1ELY	"	**912,219**	**898**	**126**	**233**
JH1EAQ	"	442,756	562	114	170
JA1QXY	"	364,573	544	100	153
JF1SEK	"	268,686	481	76	122
JL1CHV	"	136,432	334	49	93
JA1QZC	"	98,770	218	71	99
JH1NHY	"	47,634	172	47	55
JA2SAP/1	"	47,336	142	50	72
JE1ARQ	"	42,714	136	54	59
JF1OJC	"	35,150	134	41	54
JA1BNW	"	15,870	80	33	36
JA1AAT	"	14,596	65	38	51
JP1TRJ	"	14,070	82	32	35
JA1FO	"	1,972	25	15	14
JH1ADR	"	1,540	21	14	14
JH1FJK	"	30	3	3	3
JH1AJT	**28**	**47,704**	**251**	**24**	**43**
JA1MYW	"	13,992	99	21	32
JO1NZT	"	11,844	91	17	30
JN1KKN	"	2,106	32	11	15
JR1OYL	"	1,536	24	10	14
JA7CUZ/1	"	1,260	21	8	12
JR1CBC	**21**	**270,595**	**816**	**34**	**81**
JR1WHW	"	**207,680**	**566**	**33**	**77**
JP1FZA	"	34,476	172	27	51
JH1UUT	"	27,898	173	24	34
JL1KCO	"	15,057	97	26	37
JK1TLP	"	9,024	73	22	26
JP1LGJ	"	8,800	80	19	21
JA1EM	"	7,511	71	17	20
JQ1IBJ	"	7,220	72	17	21
JQ1IBI	"	3,116	32	15	23
JO1MCC	"	1,500	23	13	12
JP1BPG	"	1,008	20	8	10
JA1JGP	"	378	9	7	7
JP1NFN	"	189	9	3	4
JK1MAZ	**14**	**334,152**	**916**	**37**	**89**
JH1YDT	"	**330,111**	**894**	**35**	**94**
			(Opr. JH4UTP)		
JR1KQU	"	14,994	102	22	29
JA1ASO	"	14,365	78	24	41
JH1LSS	"	13,800	82	23	37
JA1BUN	"	8,313	57	22	29
JE1GZB	"	2,619	37	14	13
JG1FVZ	**7**	**51,914**	**203**	**33**	**68**
JA2BNN	**A**	**132,396**	**272**	**72**	**105**
JA2UOT	"	64,419	208	46	63
JR2SQU	"	48,496	159	47	65
JA2ODS	"	44,505	141	57	58
JF2PTA	"	3,799	47	15	14
JH2XTV	"	2,700	29	17	19
JH2KKW	**28**	**10,980**	**91**	**17**	**28**
JA2DHL	21	7,602	69	18	24
JA2DSF	"	5,987	110	20	27
JI2NDS	"	350	10	7	7
JE2URF	14	1,470	25	21	70
JA2BAY	**7**	**170,520**	**592**	**33**	**72**
JA2QPY	"	23,660	135	27	43
JF3CCN	**A**	**76,800**	**230**	**56**	**64**
JJ3JJL	"	27,840	120	35	52
JR3WXA	"	19,527	97	32	37
JF3CEC	"	4,752	50	17	16
JN1ENK/3	"	722	14	8	11
JA3COA	"	21	6	6	6
JF3EGT	21	60	4	3	3
JR3BOT	**14**	**116,622**	**410**	**28**	**71**
JH3TKM	**7**	**16,786**	**83**	**30**	**47**
JH4DIT	**A**	**212,280**	**376**	**89**	**143**
JA4ESR	"	92,872	222	63	89
JA4GXS	"	42,000	132	45	67
JA4JNR	"	26,772	110	51	41
JA4AQA	"	24,475	105	39	50
JA4FM	"	5,456	46	18	26
JA4AYU	**21**	**38,715**	**207**	**31**	**56**
JR4ISK	"	406	11	6	8
JA4CUU	**14**	**418,656**	**1053**	**38**	**99**
JH4UYB	"	112,682	391	33	70
JA4PA	"	2,160	45	16	23
JH4AAG	"	17,466	101	25	46
JA4MKM	"	693	13	9	12
JR5HCU	21	5,624	55	16	22
JA5AF	14	1,056	17	10	14
JA5BJC	**7**	**224,808**	**606**	**38**	**98**
JA5IU	"	2,618	27	14	20
JA5AUC	**3.7**	**6,996**	**50**	**25**	**28**
JA6BIF	**A**	**352,583**	**533**	**90**	**151**
JR6PGB	"	150,894	273	81	121
JA6EFT	"	24,360	110	38	46
JA6AKV	"	23,250	119	33	42
JE6MQW	**21**	**238,720**	**658**	**35**	**93**
JA6QDU	"	1,840	33	9	11
JA6YAI	**14**	**344,555**	**884**	**37**	**100**
			(Opr. JR6EZE)		
JA6NMV/6	"	1,071	17	10	11
JA6GGD	7	3,204	32	14	22
JA6IEF	**3.7**	**27,230**	**144**	**25**	**45**
JH7DN0	**A**	**1,885,750**	**1667**	**130**	**257**
JA7AMK	"	211,784	441	73	111
JA7NVF	"	47,347	160	47	66
JA7OCW	"	39,000	128	56	64
JA7BAL	"	38,376	119	51	66
JA7NZE	**28**	**4,960**	**49**	**16**	**24**
JR7CDL	"	3,213	42	12	15
JA7KM	"	48	4	2	2
JH7HJF	21	5,764	53	19	25
JE7DOT	"	5,049	69	13	14
JE7SWJ	"	270	18	3	5
JA7UFZ	**14**	**93,240**	**433**	**28**	**46**
JH7QXJ	"	78,075	366	27	48
JA7DOT	"	67,116	258	29	65
JA7AXP	"	1,007	19	9	10
JA7OQQ	"	726	14	11	11
JE7GRW	"	464	14	7	9
JA7FFN	7	2,752	32	16	16
JA8RWU	**A**	**189,570**	**379**	**75**	**103**
JA8KSD	"	116,197	316	51	80
JE8ABA	21	5,940	49	16	38
JA9RPU	**A**	**541,722**	**693**	**104**	**178**
JA9JFO	"	195,804	321	87	135
JH9CAV	3.7	4	3	1	1
JA0JHA	**A**	**1,870,232**	**1755**	**125**	**242**
JA0GCI	"	24,420	90	50	60
JA0KAZ	"	8,122	47	24	38
JL1ILP/0	"	5,733	90	11	10
JA0GZ	"	1,173	19	11	12
JG1EGG/0	**28**	**9,589**	**78**	**15**	**28**
JH0BBA	"	8,602	68	20	26
JR0BQT	"	1,612	23	12	14
JH0MXV	**21**	**40,162**	**184**	**29**	**57**
JR0CBX	"	1,885	41	15	14
JA0NCE	"	72	5	4	4
JH0BUS	"	64	4	4	4
JA0VHI	**14**	**30,222**	**149**	**26**	**47**
JH0LFE	**7**	**76,558**	**285**	**33**	**68**
JA0CIY	"	12,240	72	28	40

KOREA

HL1QT	**A**	**57,054**	**346**	**51**	**60**

KUWAIT

9K2BE	**A**	**173,328**	**333**	**48**	**136**
			(Opr. G4BWP)		

MACAO

XX9CS	**3.7**	**14,940**	**345**	**15**	**21**
			(Opr. K0CS)		

MALAYSIA

9M2RT	**A**	**339,012**	**893**	**88**	**170**
			(Opr. NN6U)		
9M2DC	**14**	**22,496**	**175**	**24**	**50**

MONGOLIA

JT1AO	**A**	**454,637**	**2356**	**65**	**116**
JT1BQ	**14**	**16,605**	**296**	**17**	**28**

SAUDI ARABIA

HZ1HZ	**A**	**916,084**	**1094**	**77**	**239**

SINGAPORE

9V1WH	A	5,768	49	25	31

U.S.S.R. ASIA

ARMENIA

UG6JJ	21	11,172	92	13	29
UG6GAW	**1.8**	**3,525**	**55**	**6**	**19**

ASIATIC A.S.S.R.

UA0QEP	**A**	**225,060**	**996**	**59**	**96**
UA9MR	"	**170,048**	**804**	**73**	**139**
UA0SU	"	53,648	321	42	70
UA9OA	"	27,387	323	14	37
UW0CM	"	8,976	102	21	27
UW0CF	"	6,136	41	23	29
RA9OA	"	5,586	53	18	24
UA0FDX	28	448	18	6	8
UW9UR	"	403	23	6	7
UA0UDC	"	106	53	1	1
UA9CRR	"	40	4	3	4
UV9CM	**21**	**34,100**	**251**	**20**	**42**
UA9NP	"	13,244	204	16	28
UA9CS	"	12,985	110	13	36
UW0CO	"	**11,883**	**99**	**22**	**29**
UA0ABC	"	3,840	115	17	23
UZ9UN	**14**	**46,926**	**279**	**26**	**53**
RW9US	"	20,952	114	21	51
UW9YM	"	19,955	127	24	41
UA9OO	"	15,540	91	23	61
RW0AA	"	5,588	92	14	30
UA0SR	**7**	**33,394**	**469**	**20**	**39**
RA9YD	"	**27,776**	**273**	**20**	**24**
UV9FM	"	26,768	176	15	41
UA9UGU	"	7,200	141	16	20
UA0ZDO	**3.7**	**11,315**	**179**	**16**	**15**
UA9AKO	**1.8**	**4,144**	**113**	**6**	**10**
RA9WKG	"	1,298	48	6	5

AZERBAIJAN

UD6DZ	A	1,600	25	14	18

GEORGIA

EX6F	**A**	**6,362,000**	**4648**	**113**	**387**
RF6FR	"	1,444,872	1923	59	205
UF6QY	14	242	8	4	7
RF6QAI	**1.8**	**3,542**	**55**	**6**	**17**

KAZAKH

UL7QF	**A**	**143,948**	**319**	**57**	**137**
UL7TT	21	120	6	10	12
UL7LCW	**3.7**	**8,094**	**96**	**9**	**29**
RL7LCV	1.8	1,296	37	5	11

KIRGHIZ

UM8MK	**A**	**186,914**	**637**	**44**	**114**
UM8MU	7	2,800	67	11	17

TADZHIK

UJ8JJ	3.7	300	14	5	10

TURKOMAN

UH8EAA	**A**	**2,400,775**	**2180**	**108**	**307**
RH8AD	"	36,372	189	34	50

UZBEK

UI8QAZ	**3.7**	**10,400**	**188**	**20**	**32**

EUROPE

ANDORRA

C31MD	**7**	**15,600**	**181**	**12**	**48**
			(Opr. F6BBJ)		

AUSTRIA

OE5CWL	**A**	**328,944**	**772**	**64**	**203**
OE1WWL	14	6,912	67	14	34
OE3DSA	**3.7**	**31,263**	**575**	**8**	**43**

AZORES

CT2FH	**14**	**887,656**	**2698**	**34**	**120**
			(Opr. K1RZ)		
CT2DL	**3.7**	**83,460**	**448**	**17**	**61**

BALEARIC ISLANDS

EA6SX	**A**	**564,965**	**1180**	**75**	**238**
EA6CE	"	103,334	427	61	181
EA6TC	"	39,330	185	39	99
EA6OA	**21**	**82,468**	**530**	**23**	**83**
EA6DE	"	16,060	127	21	52
EA6GP	**14**	**30,800**	**341**	**15**	**55**
EA6SK	"	11,502	180	10	44
EA6RZ	3.7	732	37	4	15

BELGIUM

ON4ADG	**A**	**103,040**	**447**	**45**	**116**
ON7KA	"	99,216	338	42	118
ON4JJ	"	7,776	76	20	34
ON5FV	**21**	**17,340**	**134**	**15**	**36**
ON4XG	**14**	**27,170**	**235**	**18**	**47**

BULGARIA

LZ1CW	**A**	**227,240**	**658**	**60**	**187**
LZ1HA	"	68,107	204	53	116
LZ2KCS	"	12,960	198	13	47
LZ2SD	"	10,842	115	21	57
LZ1BJ	"	2,432	42	8	24
LZ2RM	**14**	**181,292**	**650**	**34**	**88**
LZ2JA	"	95,711	569	30	83
LZ2VP	"	22,720	198	18	53
LZ2ZF	7	19,184	302	12	43
LZ1KAA	**3.7**	**85,748**	**608**	**23**	**74**
LZ1GI	"	19,584	323	11	40
LZ2DU	"	5,940	204	6	27
LZ1WY	"	689	53	6	7
LZ2CJ	**1.8**	**107,818**	**1319**	**13**	**61**

CRETE

J48DC	**A**	**158,096**	**667**	**43**	**121**

CZECHOSLOVAKIA

OK6RA	**A**	**1,942,575**	**2184**	**99**	**340**
OK1TN	"	**1,371,019**	**1761**	**98**	**303**
OK3CSC	"	**1,168,728**	**1397**	**160**	**350**
OK3CFA	"	797,624	1270	90	268
OK1ARI	"	571,416	1019	64	168
OK2PU	"	529,690	984	81	248
OK1DLA	"	189,837	485	66	171
OK2KR	"	179,988	504	52	160
OK1KZ	"	170,526	677	48	146
OK2ABU	"	148,986	481	48	138
OK1ALQ	"	106,928	406	45	118
OK3CKF	"	97,812	481	38	118
OK1BB	"	69,750	371	37	113
OK3FON	"	66,411	220	45	112
OK1EP	"	61,466	204	49	97
OK1BNS	"	47,472	187	22	70
OK2QR	"	45,030	196	38	76
OK2PDE	"	43,549	181	34	73
OK1AXB	"	33,872	234	29	87
OK1MHI	"	23,214	184	27	79
OK1DVK	"	16,330	100	30	85
OK2PCF	"	15,826	188	20	62
OK3CTX	"	15,614	117	19	55
OK2PBG	"	11,023	104	19	54
OK1DGN	"	6,479	99	17	32
OK2KNJ	"	6,420	92	17	43
OK3TAJ	"	5,616	75	16	36
OK2TH	"	4,550	92	10	25
OK1DKH	"	118	16	8	8
OK3CLD	**28**	**4,290**	**71**	**11**	**28**
OK2QX	"	851	28	7	16
OK1FBH	"	285	15	9	19
OK1PCL	21	4,620	40	15	27
OK2SWD	"	3,080	35	15	25
OK1AJN	**14**	**58,950**	**385**	**22**	**68**
OK1XW	"	30,052	306	20	58
OK1PFJ	"	27,619	216	22	48
OK3YCA	"	24,548	202	22	54
OK2PDC	"	12,150	152	14	36
OK3CAL	"	9,760	158	11	29
OK1DHJ	"	3,906	56	13	29
OK2BBJ	"	638	17	8	14
OK2PDL	**7**	**28,151**	**330**	**15**	**57**
OK3TPV/P	"	682	21	6	16
OK2KMR	**3.7**	**96,760**	**879**	**16**	**66**
OK1AYE/P	"	19,090	316	7	47
OK3YCL	"	17,836	359	7	42
OK1DWX	"	14,706	334	6	37
OK2PAX	"	13,200	108	5	24
OK2BTC	"	3,729	107	6	27
OK2PGT	"	2,996	112	4	24
OK1DIE	"	2,958	102	4	25
OK1MKU	"	2,016	64	4	28
OK2LN	"	434	32	3	11
OK1KPU	**1.8**	**12,343**	**231**	**9**	**42**
			(Opr. OK1JDX)		
OK1DXS	"	4,551	126	5	32
OK1DWS	"	648	36	3	15
OK3TOA	"	396	23	4	14

DENMARK

OZ5EV	**A**	**346,276**	**540**	**76**	**222**
OZ1FAO	"	25,460	101	38	57
OZ6PI	"	16,544	139	24	76
OZ1BUR	"	15,326	90	30	67
OZ4RP	"	7,070	74	15	20
OZ1CFV	"	4,752	44	16	38
OZ3KE	"	3,960	58	16	39
OZ1ACB	"	3,478	30	19	28
OZ5MJ	"	2,992	61	13	31
OZ1FFG	"	2,640	47	10	23
OZ1DYI	"	71	7	4	7
OZ1FLH	14	10,836	137	14	29
OZ1APA	"	4,920	50	14	26
OZ1GCK	"	1,216	52	5	13
OZ4MD	**7**	**15,748**	**212**	**12**	**50**
OZ6XR	"	13,152	265	7	41
OZ3ZK	3.7	2,047	115	4	23

ENGLAND

G3SNN	**A**	**317,505**	**578**	**80**	**225**
G3TXF	"	113,568	368	50	118
G6QQ	"	47,410	230	41	69
G4UDU	"	40,392	244	29	79
G3ICG	"	34,295	233	26	69
G4IUF	"	23,725	130	27	38
G3JKY	"	7,742	121	16	33
G2AJB	"	14,040	160	18	60
G3VPW	**21**	**256,498**	**714**	**28**	**103**
G4NXL	"	16,008	137	14	32
G3FXB	**14**	**821,028**	**2110**	**36**	**120**
G4XTM	7	7,426	156	9	38
G4UPS	**3.7**	**10,528**	**213**	**6**	**41**
G3XWZ/A	**1.8**	**12,188**	**143**	**7**	**37**
G3XTT	"	6,118	130	7	39
G3ZRH	"	3,230	81	5	33
G4OBK	"	850	48	4	21

FAROE ISLANDS

OY1A	**A**	**17,466**	**247**	**16**	**55**

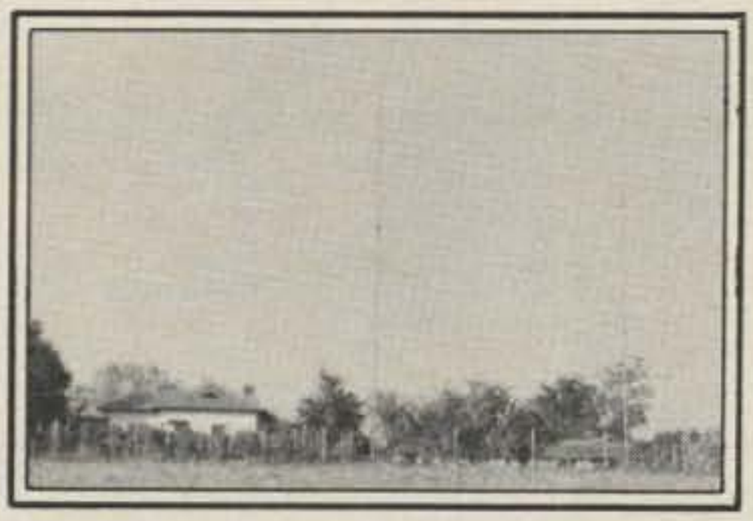
FEDERAL REP. OF GERMANY

DA2ER	**A**	**1,381,012**	**1485**	**100**	**291**
			(Opr. W9UI)		
DL6FBL	"	**1,195,088**	**1589**	**104**	**348**
DJ3HJ	"	**1,114,035**	**1476**	**84**	**293**
DJ9ZB	"	972,712	1134	97	301
DF4RD	"	855,168	1114	92	292
DL6RAI	"	848,934	1052	95	303
DK8AX	"	680,724	898	90	292
DL1MAJ	"	577,291	772	92	275
DK3SN	"	498,256	1074	56	120
DF7NJ	"	401,490	876	72	198
DK2OY	"	264,844	504	73	219
DF2RG	"	218,694	507	68	178
DF0ND	"	172,710	625	53	149
			(Opr. DF7RX)		
DL8PC	"	159,358	492	57	161
DL9JI	"	125,712	298	60	156
DK1FW	"	117,117	236	67	164
DK5DS	"	116,566	361	48	119
DK2PZ	"	98,930	335	39	91
DK3GI	"	91,260	278	37	93
DK1ZN	"	80,855	246	50	107
DJ2UU	"	77,909	265	45	124
DF1SD	"	75,582	227	47	124
DL3PN	"	69,483	213	52	107
DL4FF	"	42,884	172	46	105
DJ1OJ	"	40,460	163	44	75
DF9NW	"	21,090	94	35	60
DF0SX	"	18,614	145	21	61
			(Opr. DL1SBR)		
DJ1ND	"	15,470	129	26	65
DL6QW	"	14,195	92	24	61
DL2YCD	"	8,190	61	30	40
DJ3TF	"	6,486	62	21	48
DL1AM	"	5,989	67	35	51
DL8NBJ	"	3,922	44	19	34
DL3ME	"	3,498	68	16	17
DK1PG	"	2,624	29	17	24
DL5MCH	"	2,380	31	15	19
DJ1ZU	**28**	**36,320**	**239**	**18**	**62**
DH0EAQ	"	7,050	116	14	33
DL9XN	"	1,298	27	7	15
DF4FR	**21**	**101,472**	**410**	**23**	**73**
DK8FS	**14**	**265,064**	**871**	**31**	**105**
DK1QH	"	**247,628**	**823**	**28**	**96**
DJ0BA	"	151,525	631	29	66
DL6LAG	"	123,760	590	30	74
DL2JX	"	16,368	167	16	50
DJ8CR	**7**	**70,808**	**608**	**17**	**71**
DF9ZP	"	**64,032**	**388**	**24**	**72**
DL8AAE	"	25,364	184	13	55
DK4VH/P	"	4,788	62	11	25
DK8NG	**3.7**	**89,488**	**778**	**20**	**74**
DL0LW	"	60,300	765	12	55
DJ5JH	"	10,450	159	10	45
DK2WH	**1.8**	**12,336**	**264**	**7**	**41**

FINLAND

OH6JW	**A**	**1,063,044**	**1566**	**87**	**237**
OH2PM	"	**633,086**	**1039**	**82**	**267**

OH1RY on top of his 80 meter beam.



The world number one 160 location of LZ2CJ, Wally.

SP5INQ.

LU1E (Bob, LU3AJW).

OH4ML	"	82,485	201	57	178
OH7NW	"	24,966	180	27	87
OH1TD	"	20,952	172	26	71
OH5MQ	"	17,615	233	13	52
OH2BYS	"	15,318	98	26	85
OH2BBF	"	12,922	60	35	56
OH5JJ	"	11,022	150	16	50
OH6LL	"	9,055	133	24	55
OH1PY	"	8,385	54	24	41
OH2BLC	21	740	22	7	13
OH1AF	**14**	**422,295**	**1579**	**32**	**109**
			(Opr. OH1TW)		
OH6HD	"	40,950	188	25	66
OH6MU	"	10,605	270	10	25
OH6PW	"	7,248	87	14	34
OH6CD	"	3,842	100	8	26
OH7PT	"	3,081	60	12	27
OH9UW	"	3,036	70	10	23
OH5WA	"	2,759	78	7	24
OH3AT	"	1,344	50	6	18
			(Opr. OH3MP)		
OH5JC	"	460	17	7	13
OH3XZ	**7**	**246,704**	**1151**	**34**	**102**
OH6ZH	"	9,540	139	12	41
OH1RY	**3.7**	**101,088**	**787**	**26**	**78**

FRANCE

F6AOJ	**A**	**544,187**	**812**	**73**	**216**
F6AWW	"	79,105	429	29	92
F3VX	"	67,410	290	36	90
F6API	"	31,824	126	41	95
F6AJA	"	29,830	127	38	57
F6CLM	"	10,656	100	25	49
F6GDK	"	5,408	73	16	36
F6KLN	"	4,440	97	13	27
F9JS	**21**	**52,512**	**218**	**24**	**72**
F6CQU	**14**	**165,270**	**726**	**29**	**76**
F9DK	"	31,930	319	17	45
F6FNA	7	2,130	71	5	25
F6BVB	**3.7**	**6,384**	**151**	**5**	**37**

GERMAN DEMOCRATIC REP.

Y33ZB	**A**	**539,976**	**1259**	**70**	**232**
Y38YK	"	**279,486**	**636**	**56**	**177**
Y41ZH	"	**202,440**	**629**	**59**	**151**
Y54XL	"	**169,830**	**577**	**49**	**136**
Y49ZF	"	**165,900**	**562**	**55**	**155**
Y37UF	"	**152,866**	**717**	**39**	**140**
Y54VA	"	**143,252**	**560**	**32**	**86**
Y58ZA	"	134,697	531	43	134
Y22WD	"	122,500	332	55	141
Y28XL/A	"	118,904	558	40	127
Y36YM	"	111,758	383	47	126
Y36UE	"	105,967	433	57	142
Y42OO	"	90,013	445	39	128
Y24OH	"	87,423	266	53	108
Y21HB	"	61,102	304	38	99
Y22HF	"	54,750	204	45	105
Y24SK/A	"	54,150	241	45	105
Y32PH	"	53,676	334	32	94
Y51WD	"	50,184	280	36	100
Y78XL	"	46,056	336	27	87
Y48ZA	"	45,981	279	32	85
Y23YK	"	42,588	201	37	89
Y49XN	"	42,224	210	35	77
Y24NG	"	41,382	183	38	83
Y63VG	"	41,208	368	26	75
Y45VJ/P	"	39,567	272	26	95

Y47YM	"	29,541	101	44	85
Y44JO	"	29,082	176	35	76
Y26BM/A	"	27,141	188	26	83
Y51XH	"	26,370	189	29	61
Y33ON	"	25,956	239	26	58
Y54TO	"	25,623	140	40	77
Y38TI	"	24,192	146	37	71
Y37XJ	"	20,207	118	36	85
Y75XH	"	15,150	195	20	55
Y44UI	"	14,697	87	27	44
Y44WA	"	12,212	159	15	56
Y42WB	"	11,786	166	22	49
Y46ZC	"	11,408	168	13	49
Y24ND	"	10,764	74	23	46
Y32VJ	"	9,875	73	29	50
Y45WM	"	9,823	103	17	30
Y44NO	"	8,692	92	18	35
Y36UG	"	7,548	75	25	49
Y47SF	"	6,499	70	22	45
Y46XF	"	6,496	50	23	35
Y22GC	"	6,210	48	29	40
Y34SE	"	5,488	66	27	35
Y38ZB	"	4,368	50	19	37
Y44TN	"	4,250	34	23	27
Y24TG	"	3,850	69	13	37
Y22WF	"	3,724	49	18	31
Y31TM	"	3,672	75	13	23
Y24GG	"	2,852	55	10	21
Y36SG	"	2,597	39	16	33
Y73XH	"	2,576	36	16	30
Y22RK	"	2,450	58	8	27
Y67UG	"	2,275	47	14	21
Y31ZE	"	2,106	44	11	28
Y26MH/A	"	1,254	25	12	21
Y57RH	"	1,121	27	9	10
Y37RB	"	773	28	7	16
Y24KB/A	"	500	12	9	11
Y61ZF	"	462	22	6	15
Y64YG	"	336	17	6	10
Y21TG	"	160	16	3	7
Y33VL	"	154	6	5	6
Y24SG	**21**	**37,599**	**192**	**23**	**60**
Y24LE	"	5,738	61	13	25
Y22YE	"	4,459	42	18	31
Y36XC	"	4,320	72	10	22
Y63TI	"	3,663	37	14	23
Y25JA/A	"	1,474	25	9	13
Y32ZF	"	276	17	5	7
Y32UC	**14**	**199,935**	**733**	**34**	**101**
Y25HL	"	46,084	290	23	59
Y43XE	"	36,750	316	19	56
Y26SO	"	23,946	182	21	57
Y38YE	"	18,432	177	20	44
Y22UB	"	9,310	113	15	34
Y64ZF	"	3,744	48	12	27
Y32XG	"	1,944	44	9	18
Y62XG	"	255	9	7	8
Y22JJ	**7**	**48,116**	**375**	**19**	**73**
Y24YH	"	15,648	265	9	49
Y33TA	"	3,420	74	7	31
Y54UA	"	2,820	85	6	24
Y22OO	"	720	39	4	16
Y56YF	**3.7**	**68,820**	**882**	**13**	**61**
Y28AL	"	**36,018**	**724**	**8**	**58**
Y37ZE	"	4,096	130	4	28
Y54NL	"	3,648	113	5	27
Y23RB	"	3,465	108	5	28
Y22XF/A	"	2,904	89	4	29
Y24RK	"	2,160	82	4	23
Y23XF	"	1,536	65	4	20
Y58SA	"	1,012	49	4	18
Y23VB	"	720	40	3	15
Y25PE	"	6	2	1	2
Y22TO	1.8	357	21	4	13

GIBRALTAR

ZB2EO	A	53,690	301	33	85

GREECE

SV1RP	**A**	**74,867**	**349**	**49**	**120**
SV1MO	**3.7**	**4,470**	**151**	**5**	**25**
J48AA	1.8	300	18	4	11

HUNGARY

HA8MM	**A**	**1,590,050**	**1687**	**123**	**367**
HA8UB	"	602,070	1057	83	246
HA8GZ	"	334,361	993	67	172
HA6OS	"	111,760	487	43	133
HA3NU	"	107,008	465	44	132
HA8ZO	"	34,790	290	27	71
HG5AAP	**28**	**10,761**	**111**	**15**	**36**
HG5AAS	"	5,250	61	13	29
HA1UI	**21**	**11,067**	**107**	**17**	**34**
HA9RE	**7**	**266,602**	**1367**	**33**	**104**
HA8IE	**3.7**	**117,819**	**753**	**30**	**87**
HA3PD	"	53,734	733	17	50

ICELAND

AI5P/TF	**A**	**123,283**	**836**	**29**	**84**
TF3CW	**14**	**227,149**	**1518**	**24**	**77**

IRELAND

EI9FN	**A**	**151,740**	**537**	**46**	**134**
EI8AU	"	64,998	309	31	107
EI2VKL	"	63,300	376	22	53
			(Opr. W2ORA)		
EI7CC	**21**	**26,025**	**200**	**22**	**53**
EI2CN	**14**	**605,914**	**2080**	**35**	**107**

ITALY

I4CSP	**A**	**118,594**	**342**	**53**	**144**
I5MXX	**28**	**68,598**	**365**	**23**	**80**
IK1EKX	"	42,315	219	22	71
I2ARC	"	17,754	121	18	47
I1KN	**21**	**605,382**	**1385**	**35**	**128**
IK2BVG	"	359,522	1033	35	101
I3ON	"	330,912	862	31	113
I8BYG	"	111,989	623	26	81
I08RS	"	61,677	361	21	68
IV3TQE	**14**	**491,211**	**1352**	**35**	**126**
I08QLS	"	455,429	1993	32	104
IK2AWK	"	19,598	86	15	60
I2VRN	**7**	**309,672**	**1318**	**32**	**104**
I4RYC	"	202,825	848	30	103
I5FCK	"	194,640	1084	28	92
I4EWH	"	116,739	809	25	84
IN3QBR	"	73,600	660	18	74
I4OQA	**3.7**	**87,219**	**602**	**23**	**76**
			(Opr. I4EAT)		
I4JMY	**1.8**	**28,969**	**461**	**9**	**50**
IKØBYO	"	28,152	349	11	58

LIECHTENSTEIN

HBØNL	21	4,592	45	13	28

LUXEMBORG

LX1RQ	**A**	**52,520**	**342**	**30**	**74**

NETHERLANDS

PA2TMS	**A**	**1,834,012**	**2278**	**91**	**331**
PA3CEF	"	**732,998**	**1296**	**88**	**199**
PA2SWL	"	149,186	523	49	145
PA3AIK	"	101,032	340	44	102
PA3BDK	"	41,364	199	31	77
PA2FHZ	"	32,832	144	41	73
PAØLIE	"	29,312	153	35	143
PAØZH	"	26,500	153	33	73
PA3CZP	"	19,053	153	18	55
PAØKDM	"	14,000	106	18	41
PAØKSB	"	1,520	27	10	10
PA3AAN	**14**	**191,415**	**825**	**28**	**71**
PAØQX	"	33,496	276	19	34
PA3CYX	14	26,230	252	23	38
PAØZTJ	"	2,625	61	12	23
PAØTO	7	3,560	79	7	33
PA3ADJ	**3.7**	**33,976**	**519**	**11**	**51**
PAØIJM	"	22,360	390	8	44
PAØMIR	"	14,147	309	7	40
PAØRRS	"	3,060	63	7	38
PA3ADR	"	2,576	28	3	25

NORTHERN IRELAND

GI4MWA	A	8,234	97	13	33

NORWAY

LA1HCA	**A**	**182,264**	**552**	**52**	**132**
LA2EG	"	69,542	312	34	75
LA2AD	"	30,880	232	24	56
LA6UL	"	28,700	161	31	51
LA2CBA	"	10,108	122	18	58
LA7SI	"	8,866	61	25	37
LA5TBA	"	2,944	51	17	29
LA1FW	"	2,565	23	22	23
LA6BBA	"	2,318	43	16	22
LA7XCA	"	1,300	34	10	15
LA9ZV	**21**	**37,240**	**190**	**21**	**49**
LA9SN	**14**	**78,376**	**695**	**25**	**72**
LA8DY	"	68,540	455	23	69
LA9WBA	"	7,515	165	7	38
LA7YW	"	2,112	52	7	25
LA9DI	**7**	**10,759**	**170**	**10**	**43**
LA5JX	"	682	31	3	19
LA9PT	**3.7**	**6,405**	**182**	**4**	**31**

POLAND

SP7NJX	**A**	**121,788**	**308**	**54**	**150**
SP6CIK	"	100,580	372	49	139
SP9MQH	"	63,375	147	62	107
SP4GFG	"	24,400	185	30	70
SP6CDK	"	17,702	326	8	45
SP3GIL	"	11,400	121	21	54
SP3GVX	"	8,673	132	28	31
SP9FTJ	"	1,475	25	10	15
SP3GEM	**21**	**141,906**	**529**	**28**	**106**
SP9DFH	"	24,312	136	26	62
SP6AGD	"	6,118	90	13	25
SP1MHV	"	3,753	59	10	17
SP2FAP	**14**	**71,205**	**364**	**26**	**75**
SP4CPB	"	59,126	362	27	67
SP6IXF	"	51,660	324	27	63
SP9MRO	"	51,410	330	27	70
SP9CTW	"	44,172	239	25	67
SP2QG	"	7,462	123	11	30
SP9AVZ	"	6,156	131	10	26
SP4OZ	"	1,242	32	10	17
SP9NLD	**3.7**	**4,480**	**132**	**4**	**28**
SP9PPP	"	3,402	137	4	23
SP9LLE	"	1,633	73	4	19
SP3IBS	**1.8**	**28,892**	**436**	**11**	**51**
SP5INQ	"	**11,712**	**251**	**8**	**40**

PORTUGAL

CT7AFN	**A**	**83,000**	**310**	**40**	**85**
CT1TM	"	66,030	222	45	97
CT1QF	"	61,696	279	33	95
CT1AEO	"	47,444	220	35	81
CT1AHU	"	32,549	199	32	89
CT1BFN	"	15,364	102	33	59
CT1AIW	"	13,600	87	29	56
CT1AZS	"	7,504	66	18	38
CT1CVF	"	3,510	66	8	37
CT4MS	**21**	**145,755**	**847**	**20**	**59**
CT1CLR	"	89,523	643	19	68
CT1AV	"	30,702	215	16	35
CR18KW	**14**	**607,540**	**2510**	**36**	**112**
CU8UW	"	105,090	549	22	71
CT1UO	"	12,936	144	13	43
CQ6NH	**7**	**295,008**	**1182**	**26**	**86**

ROMANIA

YO3KWJ	**A**	**383,537**	**962**	**68**	**225**
YO6MD	"	**166,582**	**1079**	**32**	**117**
YO8FR	"	81,627	365	34	135
YO3AIS	"	40,880	272	25	87
YO4ZL	"	8,154	218	13	50
YO5BPE	"	6,883	242	16	68
YO3CR	"	2,380	30	12	22
YO2CJX	"	1,177	104	8	15
YO6KNX	28	450	13	7	11
YO4BXX	**21**	**10,117**	**112**	**13**	**51**
YO3BTC/P	"	5,152	76	14	32
YO5AXH	**14**	**35,112**	**251**	**20**	**57**
YO6BQT	"	9,776	159	10	37
YO6CFB	**3.7**	**11,484**	**225**	**6**	**38**
YO6CRP	"	5,920	199	6	26
YO4BZB	"	737	40	4	15

SARDINIA

IS8AEQ	**14**	**25,484**	**123**	**23**	**69**

SCOTLAND

GM3BCL	**A**	**259,215**	**636**	**43**	**122**
GM4JFS	"	108,418	450	39	112
GM8SQ	"	3,237	51	12	27
GM4WEW	**14**	**13,824**	**226**	**14**	**48**
GM4KHE	**7**	**12,804**	**159**	**14**	**52**

SHETLAND ISLANDS

GM4GPN	**A**	**46,816**	**223**	**41**	**92**

SICILY

IT9YHR	**28**	**58,420**	**455**	**22**	**70**

SPAIN

EA2QU	**A**	**1,248,750**	**1456**	**87**	**246**
EA7BHO	"	**253,346**	**620**	**61**	**165**
EA1AWW	"	**228,750**	**521**	**66**	**184**
ED1CI	"	**198,720**	**535**	**62**	**168**
EA5CGU	"	193,806	408	59	163
EA3NU	"	153,384	379	73	176
EA3EZG	"	135,000	475	48	152
EA5JC	"	131,340	385	61	159
EA3DEE	"	112,344	345	52	134
EA1BFZ	"	108,460	376	49	138
EC3BZI	"	87,360	484	30	110
EA5BMF	"	71,068	222	54	109
EA5AEN	"	70,474	235	51	116
EA7CVD	"	66,044	297	42	116
EA7EHE	"	61,506	282	41	112
EA2BMA	"	58,820	228	43	130
EA2CR	"	52,904	246	36	100
EA2BUF	"	52,788	212	43	131
EA3CZR	"	52,326	286	35	79
EA3ELM	"	51,436	224	42	112
EA7DQZ	"	44,403	188	38	85
EA1CCO	"	40,432	181	33	79
EA5AQX	"	40,250	219	30	85
EA4DAN	"	38,109	140	44	97
EA3EGI	"	34,540	152	38	72
EA7AVU	"	31,506	403	36	74
EA1NZ	"	29,859	127	38	73
EA3CZM	"	28,416	146	33	78
EA3DUU	"	27,690	200	30	40
EA4BJD	"	21,675	160	23	62
EA1BPS	"	21,600	156	16	64
EA3EMY	"	17,992	228	25	79
EA4CMF	"	15,686	242	14	32
EA3CZS	"	15,480	120	26	46
EA3DDG	"	13,482	130	23	40
EA7FCH	"	13,216	130	16	48
EA3EFH	"	12,141	112	22	49
EA5FAG	"	11,524	115	19	48
EA5DWQ	"	10,710	109	22	68
EA3EEY	"	9,384	81	22	47
EA2OY	"	4,896	46	17	34
EA3EXW	"	4,664	55	14	30
EC3BZZ	"	682	13	9	13
EA3ELZ	**28**	**16,348**	**177**	**17**	**44**
EA7DZL	"	13,464	117	20	46
EA1CON	"	9,990	97	18	36
EA4CKH	"	6,776	84	13	31
EA4CFY	"	6,116	78	13	31
EA5DPZ	"	858	22	8	18
EA7ETE	"	108	13	3	6
ED4CFZ	**21**	**378,005**	**1367**	**29**	**86**
EA1BDB	"	**221,490**	**827**	**28**	**79**
ED5BZS	"	59,364	340	22	75
EA7DUD	"	52,765	259	26	79
EC5BNQ	"	33,000	264	22	66
EA7BYM	"	23,312	165	18	44
EA3DXD	"	13,481	161	12	49
EA4BTW	"	10,896	136	15	33
EA3ENE	"	9,180	89	15	36
EC1BOF	"	7,985	107	4	14
EA5CHT	"	4,420	65	11	23
EA3PE	"	2,516	53	10	24
EA4BV	"	864	48	3	3
EA3AAY	**14**	**95,632**	**585**	**21**	**65**
EA3DZG	"	31,808	303	15	56
EA4BKE	"	28,796	143	24	68
EA5EXI	"	13,108	184	10	48
EA3CVI	"	10,584	121	14	35
EA1DFH	"	9,828	145	12	42
EA2AOO	"	4,662	100	8	34
EA5DHE	"	3,492	83	11	25
EA3CTI	**7**	**26,149**	**258**	**16**	**63**
EA1SY	"	4,590	73	11	34
EA5DKS	"	1,218	37	6	23
EA5BHO	3.7	30	5	2	4
EA7BTZ	1.8	36	4	2	2

SWEDEN

SM8AJU	**A**	**266,160**	**571**	**77**	**240**
SM6BJI	"	**254,508**	**656**	**62**	**192**
SK7OL	"	166,165	522	52	147
			(Opr. SM7IWN)		
SM6LIF	"	130,410	340	57	132
SM7WT	"	109,624	243	64	129
SM7BYP	"	50,220	138	52	103
SM7TV	"	36,162	221	30	68
SM7NJJ	"	25,358	112	36	65
SM7CNA	"	18,700	91	31	54
SM7DXQ	"	7,176	52	21	25
SM7BGF	"	2,442	44	15	22
W2TE/ SM5	"	1,330	38	9	26
SM3QJ	"	1,288	38	15	18
SM8DRB	**28**	**1,794**	**42**	**8**	**21**
SM6NWL	"	1,250	23	8	17
SM6PDF	"	504	19	5	9
SM8MVX	"	450	20	6	9
SM5OYC	"	350	16	5	9
SM8FO/8	**21**	**49,852**	**237**	**24**	**79**
SM6BGG	"	27,924	153	23	55
SMØKV/Ø	"	8,791	74	16	43
SM2NTU	"	6,985	64	19	36
SM7FYM	"	6,480	50	17	37
SM2CEW	**14**	**316,960**	**1490**	**29**	**83**
SM5AD	"	238,188	777	33	105
SK3AH	"	153,300	747	26	79
			(Opr. SM3COL)		
SK2KW	"	60,532	643	18	56
			(Opr. SM2KWO)		
SMØTW	"	19,008	121	21	51
SMØBDS	"	6,435	75	15	30
SM3LIV	"	5,270	123	9	25
SM5CAK	**7**	**19,765**	**232**	**14**	**53**
SM4CMG	**3.7**	**11,993**	**145**	**14**	**53**
SM5ARL	"	5,088	141	4	28

SWITZERLAND

HB9BVV	**A**	**168,054**	**565**	**50**	**172**
HB9KC	"	15,801	100	25	44
HB9CWA	"	14,841	68	36	56
HB9ZY	**21**	**103,500**	**303**	**30**	**108**
HB9DX	"	15,744	71	25	71
HB9AMO	**1.8**	**42,092**	**546**	**11**	**57**

U.S.S.R. EUROPEAN

BYELO-RUSSIA

UC2OR	**A**	**608,580**	**1433**	**74**	**248**
UC2AAD	"	102,460	369	48	140
UC2OBB	"	759	29	7	16
UC2AFM	**3.7**	**14,826**	**329**	**5**	**37**
UC2DN	**1.8**	**4,247**	**133**	**5**	**26**
RC2WCN	"	608	41	4	12

ESTONIA

RR2RR	**A**	**119,238**	**482**	**43**	**123**
RR2RX	"	9,940	45	16	27
UR2RIY	"	1,456	29	8	18
UR2RU	21	627	27	6	13
UR2OI	**14**	**107,310**	**757**	**23**	**75**
RR2RN	"	80,898	511	27	80
UR2RE	"	26,350	198	22	63
UR2RZ	"	18,873	139	22	59
UR2RQ	"	13,775	74	23	72
UR2RAM	**3.7**	**10,320**	**224**	**7**	**36**
UR2ROA	**1.8**	**1380**	**63**	**4**	**19**
UR2RCO	"	600	40	4	11

EUROPEAN S.S.R.

UA1ZO	**A**	**204,624**	**708**	**34**	**82**
RA3RK	"	**203,566**	**620**	**59**	**150**
UA4NC	"	**203,561**	**515**	**69**	**182**
UA3DRB	"	156,728	341	67	207
UA3TN	"	70,632	270	52	110
UV6AS	"	56,160	280	37	93
UW1BM	"	49,923	343	27	102
UA4CDL	"	37,296	195	34	77
UV3DN	"	28,835	323	17	56
RV6AF	"	27,738	165	39	95
UA3DQS	"	24,300	204	24	66
RA3RN	"	23,180	138	31	91
UV3MM	"	22,800	158	25	70
UA6JY	"	22,050	138	39	66
UA6JJ	"	19,404	105	32	60
RV6AB	"	9,805	104	16	57
UA3DTT	"	2,997	65	11	26
UA3ICB	"	1,292	33	10	24
UV6AZ	"	594	21	6	16
UA3XBB	28	882	29	8	13
RA3DAV	"	741	23	7	12
RW6AA	**21**	**71,230**	**644**	**22**	**63**
RW3DW	"	20,254	160	21	61
RA3OK	"	19,578	163	19	59
RA3VA	"	3,458	74	9	29
UW6HF	**14**	**247,066**	**1130**	**34**	**97**
UZ3DX	"	**188,992**	**975**	**32**	**96**
RW6PC	"	71,848	555	32	83
UW3RR	"	35,420	361	20	41
UA4ACD	"	24,396	239	17	59
UA3GBI	"	20,596	192	22	54
UA3TG	"	8,360	148	8	36
UV3NB	"	6,336	70	14	30
UA3QBX	"	1265	39	9	14
UA4WF	"	989	27	8	15
UA1DZ	**7**	**197,370**	**996**	**33**	**96**
UA6LCN	"	**126,222**	**609**	**27**	**82**
RA1AO	"	82,949	467	30	79
UA3QA	"	16,836	211	10	51
UV3FD	"	12,265	159	14	41
UA4FY	"	1,125	35	6	19
UA3AQW	"	660	26	6	14
UA6HRZ	**3.7**	**15,912**	**231**	**8**	**44**
UA6HPW	"	15,500	258	7	43
UA3QMK	"	7,585	145	7	34
RZ3DZ	"	6,478	116	8	33
RZ3DX	**1.8**	**10,019**	**194**	**7**	**36**
UA1WCM	"	1,925	77	2	30
UA3QUQ	"	1,656	81	6	17
UA4HSV	"	1,554	50	5	16
UW1AE	"	156	11	4	8

FRANZ JOSEF LAND

UA1OT	7	7,378	73	18	24

KALIININGRAD

UA2FO	**A**	**23,288**	**441**	**37**	**107**
UA2EC	**3.7**	**23,232**	**455**	**8**	**40**
UA2FFH	**1.8**	**2,345**	**87**	**4**	**23**

LATVIA

UØGLW	A	22,896	131	37	69
UØGM	**7**	**187,488**	**1042**	**30**	**94**
UØGNL	1.8	800	51	4	12

LITHUANIA

UP2PBW	**A**	**424,384**	**1030**	**67**	**237**
UP2BBF	"	**216,504**	**709**	**59**	**189**
UP2PW	"	41,912	261	32	92
UP2AV	"	35,670	229	30	83
UP2OO	"	23,556	286	16	62
UP2PAW	"	14,746	163	20	53
UP2PCK	"	14,076	180	18	50
UP2BKZ	"	8,740	83	25	51
UP2BEN	"	995	37	6	21
UP2NK	**28**	**32,163**	**330**	**15**	**56**
UP2BND	"	817	31	7	12
UP2BM	**21**	**46,980**	**252**	**27**	**81**
UP2BFI	**14**	**146,652**	**879**	**28**	**93**
UP2PCI	"	72,072	455	26	78
UP3BA	**7**	**48,140**	**487**	**16**	**67**
UP2OU	**3.7**	**37,878**	**584**	**9**	**50**
UP2BFL	"	19,329	342	9	42
UP2BLE	"	7,744	151	6	38
UP2PY	"	426	30	4	13
RP2BIH	**1.8**	**3,904**	**267**	**3**	**13**
RP2BID	"	928	64	4	12
UP2BNT	"	663	45	4	13

MOLDAVIA

UO5OV	**A**	**69,264**	**377**	**34**	**110**
UO5GR	3.7	11,568	163	10	38
UO5ONA	**1.8**	**2,080**	**72**	**5**	**21**

UKRAINE

UB5MFY	**A**	**192,723**	**633**	**53**	**174**
RB5IA	"	106,524	370	50	148
UY5TE	"	96,860	446	38	129
UT5RY	"	89,505	343	43	110
RB5IQ	"	49,876	218	46	122
UB5MFR	"	42,840	261	27	92
UB5CCP	"	7,301	122	13	36
UT5HP	"	5,700	69	14	46
UT4UCM	"	651	23	7	24
UB5RCA	**28**	**12,050**	**156**	**13**	**37**
UB5BZ	"	9,747	122	17	40
RB5CCO	"	4,970	95	11	24
UB5EMX	"	2,370	61	8	22
RB5GM	"	940	41	4	16
RB5QW	**21**	**258,171**	**1102**	**31**	**110**
RB5CQ	"	85,766	411	28	94
UT5GM	"	43,416	190	28	80
UB5EGB	"	26,082	151	23	58
RB5HT	"	12,556	63	24	49
RT5UY	"	11,118	115	18	45
RT5UO	"	8,896	64	20	40
UB5TBI	"	2,432	50	11	21
RB5FF	**14**	**779,868**	**2420**	**39**	**135**
RB5DX	"	**383,525**	**1427**	**34**	**111**
UB5HEX	"	45,045	211	29	88
UB5VAA	"	10,020	104	17	43
UB5CN	"	9,690	131	13	38

RB5IF	**7**	**20,280**	**235**	**16**	**49**
UB5MLP	"	17,526	173	16	53
UB5ITD	"	255	17	4	11
RB5VA	**3.7**	**46,085**	**620**	**12**	**53**
UB5IJG	"	27,540	390	11	49
RB5SA	"	18,700	317	8	47
RB5CDD	"	7,245	187	6	29
UB5UKH	"	6,475	154	6	31
UB5EEP	"	3,328	94	6	26
UB5IUA	**1.8**	**6,384**	**139**	**7**	**31**
UB5WF	"	**5,032**	**139**	**6**	**31**
UB5SCY	"	3,663	130	6	27
UB5VCK	"	3,312	79	7	29
UB4DWA	"	2,788	79	7	27
			(Opr. UB5DCW)		
UB5ZHQ	"	2,560	75	7	25
UB5VBX	"	2,277	56	7	26
UB5LCV	"	882	38	5	16
UB5HIP	"	116	29	3	5

WALES

GW4BLE	**A**	**931,635**	**1139**	**77**	**232**
GW4RHW	**7**	**22,724**	**244**	**15**	**61**

YUGOSLAVIA

YU2LLL	**A**	**260,832**	**693**	**69**	**195**
YU7PXT	"	158,496	457	54	154
YU2OM	"	61,965	192	40	95
YU1NZW	"	56,565	231	35	100
YU7SF	"	38,304	246	31	95
YU3QI	"	29,601	115	48	69
YU3DFT	"	2,353	58	11	26
YU3MA	**28**	**50,784**	**316**	**22**	**70**
YU2KDE	**21**	**149,188**	**990**	**35**	**116**
YU3HM	"	12,685	110	14	29
YT3A	**14**	**719,160**	**1742**	**36**	**120**
			(Opr.	YU3SO)	
YT3M	"	**682,190**	**1795**	**40**	**127**
			(Opr.	YU3ZO)	
YU1KQ	"	373,456	1448	36	100
YU1PJQ	"	561	21	7	10
YU4EBL	**7**	**371,910**	**1396**	**34**	**120**
4N3E	"	**301,562**	**1800**	**29**	**102**
YU3VM	"	51,961	380	20	71
YU3NA	**3.7**	**89,460**	**770**	**19**	**71**
YU2WV	"	82,464	695	22	74
YU3XO	"	51,982	562	15	64

OCEANIA

AMERICAN SOMOA

AH8A	**A**	**1,283,559**	**2019**	**80**	**139**

AUSTRALIA

VK1RJ	**A**	**108,452**	**489**	**34**	**42**
VK1WB	**14**	**54,390**	**200**	**28**	**70**
VK1LF	"	2,992	35	17	17
VK2DVJ	**A**	**125,496**	**516**	**32**	**51**
VK2WU	**14**	**594,000**	**1387**	**35**	**115**
			(Opr.	VK5GN)	
VK2OE	"	2,856	36	12	16
VK3DVT	A	22,815	121	25	40
VK3CJW	**14**	**64,932**	**267**	**30**	**54**
VK3SM	"	20,331	127	27	54
VK3FY	**3.7**	**100,056**	**449**	**26**	**62**
VK4OX	A	7,380	116	10	10
VK4NX	14	1,026	18	8	11
VK5BJA	**A**	**244,387**	**589**	**52**	**91**
VK5QX	**14**	**199,485**	**596**	**27**	**90**
VK6DU	**A**	**417,261**	**838**	**63**	**106**
VK6MD	**21**	**323,635**	**1685**	**21**	**44**
VK6IR	**7**	**208,748**	**782**	**29**	**63**
VK6HD	**1.8**	**1,007**	**25**	**10**	**9**

FRENCH POLYNESIA

FO8HL	**A**	**454,480**	**1656**	**37**	**55**
FO8GW	"	**436,982**	**1639**	**42**	**49**

GUAM

KJ9W/ KH2	**A**	**4,337,092**	**3914**	**145**	**238**
KG6DX	**21**	**1,080,576**	**2874**	**36**	**92**
KD7P/ KH2	**14**	**781,550**	**1823**	**38**	**116**

HAWAII

KH6ND	**A**	**1,972,870**	**2376**	**113**	**177**
WB6FCR/ KH6	A	1,559,243	2621	74	129
AH6FL	"	375,459	949	62	71
KH6BZF	**21**	**242,032**	**1465**	**19**	**37**
KH6IJ	1.8	252	13	4	3

INDONESIA

YB4FW	**A**	**546,612**	**1145**	**58**	**106**
YB5AQD	A	405,306	742	73	125
YC0DPO	**21**	**587,340**	**1696**	**32**	**85**
YC0DNK	"	**476,064**	**1422**	**31**	**83**
YC8VCE	"	114,239	556	26	45
YC0EFC/4	"	6,419	68	13	19

KIRIBATI

T32AW	**A**	**93,852**	**358**	**41**	**58**
T32AF	**7**	**677,844**	**2045**	**34**	**80**
			(Opr.	KH6UR)	

NEW ZEALAND

ZL2AH	**A**	**51,324**	**210**	**42**	**49**
ZL1IM	"	35,646	181	32	46
ZL1ANJ	**21**	**278,460**	**1490**	**23**	**40**
ZL1AAS	**7**	**105,705**	**420**	**31**	**56**
ZL1BIL	**3.7**	**142,560**	**559**	**28**	**62**

OGASAWARA

JH7EAY/ JD1	21	7,056	259	10	14

PHILIPPINES

K4YT/ DU9	**A**	**2,411,190**	**2283**	**132**	**235**

SOUTH AMERICA

ARGENTINA

LU1BR	**A**	**2,107,668**	**2507**	**101**	**202**
L2X	"	**427,512**	**830**	**68**	**120**
LU4LAV	"	289,050	672	48	102
LU2HLN	"	13,098	94	33	41
LU4MEE	"	12,544	91	26	30
LU6QI	"	2,720	28	16	24
LU6QAF	"	897	13	10	13
LU2FDR	**28**	**589,572**	**2078**	**25**	**83**
LU1E	"	**573,138**	**2141**	**24**	**78**
LU3MDO	"	**261,250**	**1454**	**26**	**69**
LU1VK	"	211,660	767	24	71
LU6FDK	"	190,876	930	22	46
LU8FEU	**21**	**254,043**	**879**	**26**	**71**
LU2FFD	**3.7**	**28,461**	**202**	**20**	**33**
LU1HGN	1.8	143	17	4	7

BRAZIL

PP2ZDD	**A**	**1,313,280**	**1660**	**88**	**182**
PY1NEZ	"	**644,436**	**1028**	**68**	**153**
PY7ZZ	"	**533,368**	**1071**	**76**	**166**
PY4OD	"	190,722	568	41	73
PY2JF	"	91,520	390	30	50
PP5CJ	"	77,292	350	31	45
PY2RE/4	"	59,640	202	40	65
ZY5NF	"	51,830	380	47	83
PR8ET	"	25,296	174	23	28
PT2TF	"	19,092	88	33	53
PY1OL	"	17,372	84	41	60
PY2FND	"	4,324	46	19	28
PY1PL	"	3,510	44	15	15
PY2IS	"	3,408	25	20	28
PY1TIA	"	2,565	34	22	23
PY2CLK	"	1,800	32	10	15
PY6KR	28	72	7	4	4
PY2FZ	**21**	**374,100**	**1275**	**27**	**73**
PY5AAT	"	112,880	466	26	57
PY2GNS	"	52,992	260	28	41
PY2WR	"	14,958	94	13	41
ZZ3ZZ	**14**	**303,186**	**1013**	**38**	**100**
PS7KM	"	30,699	140	26	55
PS7ER	"	24,064	134	12	49
PY3BC	"	2,997	36	15	22
PP5JD	**7**	**38,570**	**221**	**22**	**48**

CHILE

CE3DNP	**A**	**2,956,080**	**2969**	**105**	**234**
CE5CNT	"	520,234	848	74	140
CE3BYL	"	265,568	511	69	124
CE3AEZ	"	5,632	22	16	16
CE6EZ	**28**	**859,165**	**2530**	**27**	**88**
CE3ZI	"	81,928	530	19	37
CE4NV	"	26,864	203	17	29
EA4LH/ CE3	**21**	**643,710**	**1800**	**26**	**103**
CE6DAQ	"	1056	21	10	14
CE3BFZ	**14**	**700,416**	**1850**	**32**	**96**
CE1BSV	"	51,030	271	26	44
CE3FIP	**7**	**163,184**	**615**	**28**	**66**
CE1ANF	"	12,980	119	22	33
CE6DFY	**3.7**	**13,464**	**147**	**15**	**19**
CE8ABF	**1.8**	**1,872**	**32**	**10**	**14**

COLOMBIA

HK5BCZ	**A**	**517,849**	**2202**	**81**	**178**
HK1GAD	"	48,180	254	31	35
HK4GAW	**21**	**415,090**	**1425**	**25**	**78**

CURACAO

PJ2FR	**A**	**8,420,220**	**5667**	**134**	**369**
			(Opr.	N6KT)	
P44A	**A**	**7,814,839**	**5393**	**128**	**371**
			(Opr.	K1KI)	

EASTER ISLAND

CE0ZIJ	**A**	**451,440**	**1300**	**43**	**77**
CE0AE	"	251,370	699	51	75

ECUADOR

HC1OT	**21**	**1,112,620**	**2859**	**29**	**103**

GUYANA

K0GU/ 8R1	**14**	**1,251,096**	**2547**	**37**	**131**

PARAGUAY

ZP5JCY	**A**	**2,873,404**	**2619**	**120**	**262**
ZP5LOB	14	46,547	198	29	60
ZP7CO	7	2,581	30	11	18

PERU

OA4AJG	A	91,494	342	45	57
OA4AGR	"	6,237	83	14	13
OA4BGP	14	10,036	95	21	31
OA4OS	7	217,035	710	30	87

SOUTH SHETLAND

4K1GAG	**A**	**1,013,120**	**1636**	**71**	**169**

TRINIDAD

9Y4AT	**21**	**697,125**	**1900**	**27**	**98**
9Y4VU	**7**	**700,488**	**1718**	**28**	**110**

URUGUAY

CX1FU	A	37,291	169	34	55
CX8CG	"	28,836	164	27	54
CX2ND	"	4,158	46	19	23
CX5AO	**28**	**498,386**	**1747**	**22**	**75**
CX4HS	"	**326,616**	**1189**	**24**	**69**

VENEZUELA

YV5TK	**A**	**6,107,744**	**4175**	**136**	**360**
			(Opr.	N1GL)	
YV7QP	**28**	**76,104**	**473**	**20**	**36**
YV5JEA	**21**	**435,237**	**1343**	**24**	**85**
YV6BTF	"	106,200	607	19	40
YV3AUH	"	88,550	564	15	40
YV5EF	"	1848	28	5	17
YV3ALK	**14**	**648,448**	**1628**	**30**	**106**
YV5EED	"	15,620	87	18	53
YM5BI	**7**	**65,448**	**344**	**25**	**47**
YV3AZC	**3.7**	**351,324**	**1238**	**26**	**82**
YV2IF	**1.8**	**18,291**	**172**	**14**	**25**
YV3AGT	**1.8**	**13,188**	**111**	**15**	**27**

QRPp

UP2BIM	**A**	**348,440**	**747**	**77**	**233**
4X6IF	"	**220,159**	**549**	**38**	**99**
K7SS	"	**209,132**	**394**	**70**	**126**
K3WS	"	**193,800**	**348**	**60**	**144**
YU2OB	"	**182,608**	**450**	**56**	**170**
AH6EK	"	**168,198**	**583**	**42**	**55**
K7BTB	"	**134,505**	**266**	**71**	**112**
K7UR	"	**115,868**	**257**	**66**	**100**
OK3IAG	"	**104,095**	**350**	**51**	**140**
YO2AQB	"	**54,769**	**366**	**32**	**111**
JA1WSK	"	**54,240**	**170**	**57**	**63**
W6YVK	"	**52,128**	**198**	**43**	**53**
SM5CCT	"	**39,675**	**271**	**29**	**86**
SM1CNS	"	36,654	215	36	87
G4MTC	"	**33,108**	**266**	**28**	**65**
JE8CIS	"	**29,681**	**153**	**27**	**40**
KI9A	"	**26,829**	**121**	**35**	**64**
JH3LCU/1	"	24,20	124	34	38
JI3BFG	"	21,183	116	29	40
Y22CC	"	**15,308**	**161**	**17**	**32**
EA3DNC	"	**12,780**	**159**	**17**	**54**
OK3TEI	"	11,700	119	12	53
UC2ACT	"	**7,700**	**98**	**16**	**54**
W3TB/TF	"	5,772	85	9	28
YZ2EY	"	3,587	79	12	38
YO3CD	"	2,501	25	20	21
SP2UUU	"	1,428	34	11	23
NP4KA	**28**	**11,799**	**496**	**12**	**11**
EA4CFN	"	**9,853**	**102**	**18**	**41**
EA7DZI	"	7,192	72	16	42
UA6APU	"	**2,175**	**63**	**8**	**21**
EA3ERT	"	1,113	56	4	17
RA3DQP	"	630	18	8	10
RA3DAD	"	540	25	7	12
OK3CPY	"	351	22	4	9
ZS6PT	**21**	**69,286**	**287**	**28**	**73**
W5VGX	"	**14,400**	**108**	**17**	**33**
EA5DIT	"	**8,949**	**71**	**19**	**38**
HG9TL	"	135	15	3	6
LZ2EW	**14**	**48,224**	**349**	**22**	**66**
UB5MX	"	**46,056**	**302**	**28**	**73**
JA2KVD	"	**45,899**	**194**	**29**	**54**
CT1AWD	"	**33,600**	**236**	**22**	**62**
OK8ACW	"	**28,002**	**183**	**25**	**53**
W6CN	"	**22,570**	**136**	**21**	**31**
UB5MLV	"	3,326	134	10	36
JA1BN	"	8,216	56	21	31
JA2DN	"	5,880	55	20	20
EA2BTO	"	3,267	80	7	26
SP5HEJ	"	1,610	60	5	12
JA1ZLO	**7**	**6,804**	**54**	**22**	**35**
JG2BSO	"	2,782	39	11	15
UA2FFL	"	**756**	**38**	**4**	**17**
JA1KFX	"	266	10	6	8
UB5EKG	**3.7**	**13,436**	**241**	**7**	**41**
OK3CGA	"	**7,616**	**256**	**4**	**28**
OK1AIJ	"	2,958	106	4	25
OK1MNV	"	1,680	80	4	20
SP5FKW	"	664	35	3	13
KK7C	"	**560**	**20**	**5**	**4**
UB5IPJ	**1.8**	**5,250**	**104**	**8**	**34**
UY5XE	"	**4,104**	**99**	**7**	**31**
RA1ASK	"	**3,264**	**116**	**7**	**25**
RA3DKE	"	2,186	90	6	20
OK1MP	"	**1,708**	**63**	**4**	**24**
UB4MXG	"	1,020	53	4	16
UA6WEC	"	468	25	5	12

MULTI-OPERATOR SINGLE TRANSMITTER NORTH AMERICA

USA

N1CQ	**1,374,684**	**1279**	**108**	**280**
KM1C	**1,192,620**	**1083**	**106**	**284**
KB1H	828,188	794	107	287
KQ1F	675,816	701	99	249
KG1D	629,770	650	91	226
K1ZX	602,020	697	91	219
W1IHN	426,810	588	68	178
KS1N	389,004	604	65	166
KA1X	326,816	518	64	160
N1AU	235,415	367	70	169
W1BK	150,700	265	71	149
KT1O	114,080	265	41	114
K2BU	**2,791,019**	**1847**	**140**	**401**
KC2NB	**1,847,820**	**1500**	**105**	**285**
W2VJN	1,084,926	875	123	315
K2XR	976,650	832	116	309
WA2BOT	923,157	862	100	293
KY2P	852,756	899	95	263
W2HPF	719,414	759	99	254
NF2L	540,855	640	85	230
W2XL	532,877	616	93	224
W2BHK	372,735	475	82	169
W2UI	243,936	359	76	176
K2TD	177,480	283	66	166
KA2RLW	64,944	193	35	88
K3TUP	**2,003,613**	**1411**	**132**	**391**
K3KG	1,893,936	1216	143	418
K3WW	1,277,484	1051	117	314
K3ZUF	1,244,995	925	128	357
N3RL	1,227,630	975	122	331
N3ARK	508,896	541	101	241
K3NA	504,064	536	102	250
W3HHG	488,566	569	90	209
WA3SPJ	410,500	610	65	185
N3RG	224,618	321	94	163
K3UEI	17,480	80	36	56
N4CC	**2,718,682**	**1757**	**145**	**424**
N4ZC	**2,653,413**	**1555**	**148**	**461**
N4RJ	**2,305,635**	**1379**	**154**	**461**
NW4B	2,125,179	1423	139	410
WA4JXI	1,169,350	954	129	326
WA4QQV	800,448	779	110	269
N4BS	496,584	550	98	244
W4PRO	432,174	494	100	223
WB4PRX	411,412	479	103	223
K8UNP/4	362,452	435	102	214
W4MM	330,498	464	84	174
WA4YOF	159,396	282	76	146
N4HOH	38,080	98	55	85
K5RR	**500,240**	**544**	**102**	**236**
KD5RW	99,715	297	73	112
W6TMD	**1,398,705**	**1303**	**119**	**266**
K6OKW	906,609	966	114	217
K6ZM	533,553	646	98	195
W6BIP	279,876	370	94	187
N6CCL	256,704	426	88	136
NY6Y	199,044	339	91	137
N6VR	187,116	598	32	92
K6KSY	31,504	197	34	54
N7TT	**1,453,491**	**1443**	**113**	**259**
W7ZR	1,296,338	1308	114	240
N7RO	1,269,900	1312	110	230
WA6PVA /7	945,218	1234	103	190
KG7Z	110,230	600	76	103
KA7KDU	66,834	428	57	87
NA8V	**2,677,584**	**1738**	**142**	**404**
W8GWC	1,206,500	915	127	348
N8CXX	709,048	807	101	236
KB8LH	492,650	624	90	205
KC8PQ	218,828	312	72	169
WA8BIN	178,542	294	77	157
N8DKJ	88,350	218	45	110
KS9K	**2,167,200**	**1504**	**132**	**384**
KS9O	520,612	652	100	214
K9BIL	438,750	516	97	228
K9SD	288,864	434	86	186
KC9XF	242,424	362	76	176
K4VX/8	**2,283,966**	**1438**	**145**	**424**
ND0E	1,530,887	1399	135	274
K0UK	995,697	1104	113	204
KF0H	988,404	1035	107	265
KR0B	431,335	537	94	213
NG0W	252,347	359	90	187
KJ0G	130,390	301	65	105
KM0P	107,706	221	58	116

ALASKA

KL7IRT	**2,243,865**	**2674**	**103**	**208**
KL7HFA	169,167	694	45	62

CANADA

XN3BVD	**4,676,484**	**4115**	**121**	**353**
VE3CYX	3,555,900	2669	133	407
VE3UOT	28,982	155	36	50
VE6EP	122,148	714	25	53

HAITI

4V2C	**8,448,099**	**6898**	**143**	**418**

MONTSERRAT

VP2MW	**6,509,970**	**5713**	**127**	**386**

PUERTO RICO

KP4BZ	**6,804,200**	**5930**	**128**	**392**

AFRICA

BOTSWANA

A22ME	**875,700**	**1309**	**78**	**147**

CAPE VERDE ISLANDS

D44BC	**5,005,823**	**3603**	**118**	**374**

CEUTA & MELILLA

ED9CM	**6,860,565**	**4050**	**126**	**445**

REPUBLIC OF SOUTH AFRICA

ZS6BPL	**4,210,365**	**3272**	**116**	**435**
ZS4WRC	130,186	377	42	77

SWAZILAND

3D6DX	**2,691,725**	**2719**	**95**	**243**

ASIA

CYPRUS

5B4ES	**1,318,500**	**1815**	**48**	**202**

JAPAN

JA3YBF	**2,598,928**	**1958**	**152**	**356**
JH7YJF	**2,291,630**	**2090**	**135**	**280**
JA2YKA	**2,204,856**	**1740**	**145**	**307**
JH3YJM	1,094,450	1281	100	195
JA8YAK	**735,440**	**831**	**115**	**202**
JA7YCQ	469,239	772	83	130
JA6YDH	**424,424**	**553**	**105**	**181**
JA6YBR	288,288	455	90	144
JA1YXP	225,266	492	56	107
JA5YAV	**203,904**	**379**	**70**	**122**
JA2YDC	156,578	377	66	92
JA3YCK	5,510	51	18	20

KOREA

HU8U	**74,375**	**312**	**50**	**75**

SAUDI ARABIA

HZ1AB	**4,720,080**	**3447**	**131**	**423**

OCEANIA

AUSTRALIA

VK3BUR	**313,404**	**2132**	**60**	**87**

MELLISH REEF

VK9MR	**4,982,000**	**4662**	**131**	**245**

PHILIPPINES

DX1A	**2,297,120**	**3223**	**81**	**245**

SOUTH AMERICA

ARGENTINA

LU4US	**3,075,408**	**3116**	**110**	**336**

CHILE

CE4TA	**3,370,296**	**3197**	**108**	**253**
CE2AA	**2,832,050**	**2981**	**110**	**215**
CE5BYU	712,704	1045	56	169

USSR ASIATIC

ARMENIA

UG7GWA/P	**20,252**	**118**	**20**	**41**

ASIATIC SSR

UZ9AYA	**2,104,868**	**1747**	**118**	**331**
UZ9FWR	**1,340,000**	**1486**	**86**	**249**
UZ9CWW	**891,684**	**1156**	**85**	**221**
UZ0AWB	**472,880**	**1107**	**76**	**154**
UZ9SWY	**362,445**	**681**	**79**	**140**
UZ0LWW	**328,064**	**930**	**96**	**137**
UZ9WWS	**317,871**	**654**	**52**	**131**
UZ9XWW	**174,048**	**556**	**36**	**60**
UZ9CWC	**145,899**	**449**	**39**	**68**
UZ9QWM	**127,398**	**484**	**29**	**73**
UZ9UMM	**46,888**	**280**	**20**	**54**
UZ0AWX	**29,110**	**248**	**31**	**51**
UZ0QWE	**23,562**	**174**	**24**	**42**
UZ9QXI	**9,890**	**96**	**17**	**29**

KAZAKH

RL8PYL	2,177,175	2547	125	304
UL8LWZ	1,272,765	1711	81	224
UL8LWA	768,235	1155	76	189

KIRGHIZ

UM9MWO	753,015	1375	73	182
UM9MZD	222,471	608	52	119

UZBEK

UI9BWF	106,502	609	25	69

AALAND ISLAND

OH0BH	**2,499,237**	**2795**	**124**	**409**

BALEARIC ISL.

ED6MDX	**2,150,078**	**2989**	**102**	**311**
ED6WWC	1,461,596	2088	96	292

BELGIUM

ON6NL	**1,196,432**	**1818**	**79**	**265**

BULGARIA

LZ7A	**7,243,456**	**4345**	**168**	**536**
LZ1KDP	1,810,074	2182	96	330
LZ1KRB	579,014	1064	77	221
LZ1KOZ	294,994	753	60	206
LZ1KBL	158,592	689	55	137
LZ2KAE	18,877	404	29	90
LZ1KVZ	5,974	89	15	43

CZECHOSLOVAKIA

OK5R	**4,913,720**	**3449**	**140**	**504**
OK7MM	3,338,826	2959	132	467
OK3KCM	200,813	1364	95	282
OK1ORA/P	184,616	586	51	137
OK3KNS	10,660	143	20	45
OK3RJB	5,250	57	18	24
OK1KPZ	3,515	66	11	26
OK2KNP	2,340	54	9	21

ENGLAND

G3XEP	**936,144**	**1421**	**72**	**225**
G4TNB	288,920	714	63	185
G4VSZ	26,880	244	16	40

FINLAND

OH5NQ	**2,416,458**	**2460**	**125**	**392**
OH7AB	1,404,780	1960	100	290
OH7AI	241,976	807	50	153
OH6YF	139,236	523	46	118
OH5AB	102,555	501	42	117
OH2AY	28,608	406	23	73

FRANCE

F3TV	**4,992,204**	**3753**	**132**	**445**
F6KAW	2,103,588	2422	110	316
F6IWW	386,105	810	65	170

GERMANY (FRG)

DL0JK	**1,815,576**	**2311**	**99**	**305**
DL0UE	756,194	986	93	298
DL0TS	612,675	992	79	236
DF0BV	539,682	869	91	283
DL0JU	238,336	542	53	171
DL1KDT	210,888	532	51	151
DL3MAA	146,854	484	54	148

GUERNSEY

GU3HFN	**1,470,840**	**2041**	**78**	**262**

HUNGARY

HG5A	**4,132,968**	**3548**	**139**	**445**
HG6N	**3,196,747**	**3143**	**122**	**407**
HG7B	2,861,015	3250	118	367
HG9R	2,626,000	2686	128	377
HG6V	1,339,470	1885	89	280
HA1KRR	895,785	1557	80	225
HA2KRP	629,400	1354	82	218
HA7KLG	580,032	1187	90	214
HA2KMR	568,176	1461	64	203
HA4KYH	462,264	1117	72	192
HA4KYN	348,156	927	66	162
HA6KNX	345,950	711	77	198
HA8KAX	334,017	862	62	205

IRELAND

EI6EG	**1,190,160**	**2122**	**78**	**212**

ITALY

I2MQP	**741,405**	**1109**	**89**	**256**
I5JHW	466,734	848	82	239

LIECHTENSTEIN

HB0BHA	**3,163,212**	**3234**	**105**	**362**
HB0AON	2,364,075	2688	100	375
OE2VEL/ HB0	2,285,550	2420	99	351

MALTA

9H3DN	**2,602,504**	**3616**	**104**	**384**

NETHERLANDS

PI1GOE	**111,540**	**443**	**41**	**128**

NORWAY

LA1A	**100,080**	**432**	**144**	

POLAND

SP9PDF	**1,536,052**	**1886**	**110**	**351**
SP9PST	**774,520**	**1393**	**84**	**256**
SP0PEZ	238,108	666	63	178
SP6PAZ	161,557	563	56	153
SP8JKX	32,946	226	27	87
SP9ZHR	6,786	106	12	46
SP3KCL	5,311	108	11	36

ROMANIA

YR6A	**863,440**	**2210**	**74**	**270**
YO8KAN	83,312	358	52	112
YO2KHK	16,643	151	20	69

SICILY ISL.

IO9WPO	**1,770,364**	**2834**	**97**	**315**

SPAIN

ED7BB	**5,095,400**	**3776**	**130**	**454**
EA3EZD	1,586,200	2204	88	297
ED3CBE	946,481	1686	77	230
EA1RCQ	10,024	135	34	62

SWITZERLAND

HB9CHR	**1,812,368**	**1840**	**116**	**338**
HB9CAT	**1,240,848**	**1231**	**76**	**260**
HB9AUS	**944,460**	**1457**	**92**	**232**
HB9AIB	**748,482**	**1037**	**114**	**312**

SWEDEN

SK6RR	**907,214**	**1595**	**66**	**208**

U.N. VIENNA

4U1VIC	**330,330**	**1021**	**55**	**155**

YUGOSLAVIA

4N2D	**2,855,160**	**2874**	**119**	**396**
YT3T	1,236,750	1883	91	284
YU2AKL	310,968	766	70	182
YU4AAI	20,532	118	35	52
YU7AOP	12,486	93	21	46

USSR EUROPEAN

BYELLO-RUSSIA

UC1AWC	**437,310**	**1098**	**70**	**151**
UC1WWF	181,074	670	45	161
UC1AWF	42,375	317	38	75
UC1AWZ	4,961	51	14	27

ESTONIA

UR1RWX	**2,305,488**	**2759**	**112**	**404**
UR1RWW	160,080	402	62	170
UR1RWQ	120,736	405	49	127

EUROPEAN SSR

UZ6LWZ	**1,620,032**	**1881**	**128**	**416**
UZ3XWA	**493,920**	**941**	**82**	**254**
UZ3DXW	463,864	1197	68	224
UZ3ZWF	419,655	944	73	230
UZ3WWW	391,552	1129	61	205
UZ3RWA	375,697	1024	68	213
UZ6LWG	252,161	747	46	175
UZ6HYZ	218,526	596	66	165
UZ1AWW	165,858	661	36	118
UZ1PWA	140,400	638	31	59
UZ1ZWO	119,164	548	37	87
UZ4HWZ	91,584	508	36	108
UZ6HXK	65,800	377	19	81
UZ3SWU	43,197	315	34	87
UZ3WWC	31,248	291	20	73
UZ4AXN	16,170	195	22	48
UZ6LWT	15,235	93	29	60
UZ4PZL	7,000	246	9	19
UZ3TWT	5,244	61	17	40
UZ3DWR	4,114	123	6	28
UZ3XWW	3,210	100	9	21
UZ3QWM	465	32	6	25

KALININGRADSK

UZ2FWA	**2,152,080**	**2439**	**108**	**382**

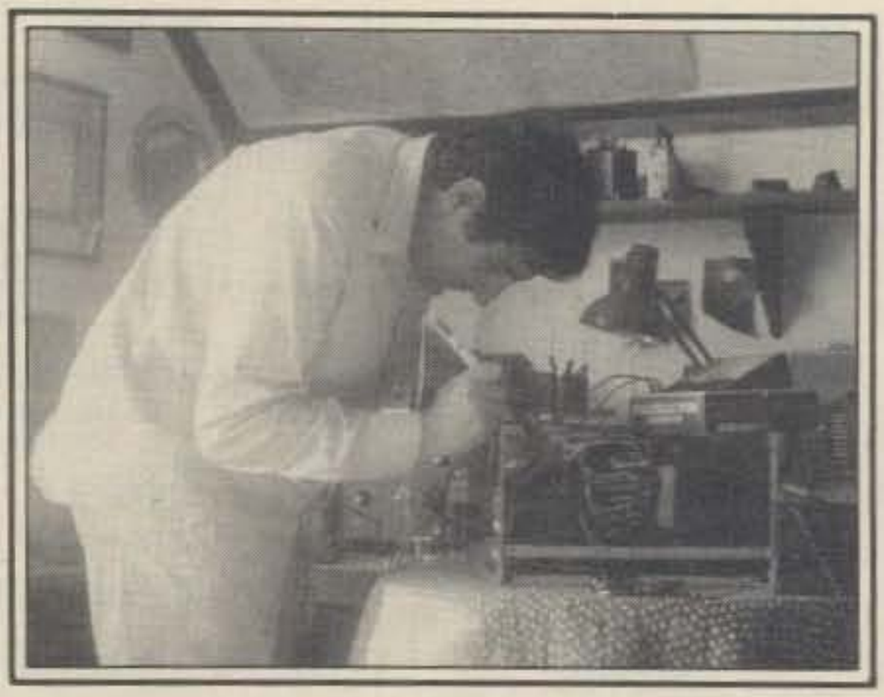
KARELO-FINNISH

UZ1NWD	**140,760**	**645**	**41**	**129**

LITHUANIA

UP1BWW	**1,411,410**	**2045**	**90**	**300**
UP1BZO	**1,031,561**	**1647**	**92**	**309**
UP1BZA	1,030,004	1560	84	297

K4YT/DU9, Karl.



EA4LH/CE3 repairing CE3BFZ's linear three hours before contest.

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UP1BZR	888,636	1720	68	230
UP1BWG	544,986	1107	70	236
UP1BZD	506,884	1152	67	234
UP1BYK	140,686	631	44	138
UP1BZQ	121,422	546	46	131

MOLDAVIA

UO4OWR	9,213	218	14	23

UKRAINE

UB4IXB	**1,548,368**	**2087**	**113**	**351**
UB4MZF	**1,518,475**	**1792**	**105**	**332**
UB4IZA	862,730	1122	82	259
UB4MWA	347,355	767	75	204
UB4MZZ	312,936	895	62	174
UB4EWB	282,940	833	59	176
UB4LXA	132,404	648	42	116
UB4MXR	129,808	559	40	112
UB4IXQ	103,452	603	28	120
UB4MWU	46,020	270	29	89
UB4TWL	43,264	274	32	96
UT4UWE	40,944	479	21	70
UB4EXZ	8,358	165	15	27
UB4VWA	5,624	79	16	24
UT4UWC	4,747	96	13	34
UB4LZJ	4,301	69	9	17
UT4UWL	2,090	41	11	17

MULTI-OPERATOR MULTI-TRANSMITTER NORTH AMERICA

USA

N2AA	**7,418,328**	**3752**	**165**	**547**
W3LPL	**6,402,844**	**3322**	**157**	**537**
W4DR	**6,270,623**	**3318**	**157**	**526**
N5AU	**5,173,860**	**3068**	**162**	**474**
N6RZ	**4,003,272**	**2855**	**147**	**357**
K8RF	**3,576,748**	**2325**	**146**	**410**
K3ZZ	2,299,590	1641	130	380
W3GM	2,131,920	1433	137	403
AD8P	**1,868,500**	**1359**	**130**	**370**
K5LZO	**1,850,331**	**1684**	**143**	**354**
K1NG	**1,765,632**	**1291**	**128**	**356**
N2RM	1,745,550	1447	107	324
AA4S	1,396,831	1027	137	366
N8DLR	992,192	833	136	283
W8NGO	557,034	577	103	250

ALASKA

KL7Y	**3,349,000**	**3970**	**119**	**216**
KL7RA	**2,951,144**	**3990**	**104**	**198**

ANTIGUA

V2ARS	**8,762,040**	**8081**	**126**	**378**

BERMUDA

VP9AD	**16,794,200**	**11004**	**155**	**500**

BRITISH VIRGIN ISLANDS

VP2VCW	**17,842,662**	**12432**	**150**	**484**

CANADA

VE7ZZZ	**2,390,553**	**3699**	**100**	**197**
VE2USA	**1,890,472**	**3454**	**81**	**187**

COSTA RICA

TI1C	**22,157,695**	**13948**	**167**	**518**

MEXICO

XE2SI	**9,984,236**	**8952**	**143**	**350**

ASIA

JAPAN

JA9YBA	**3,843,017**	**2818**	**139**	**340**
JA3YKC	**2,740,904**	**2065**	**144**	**328**
JA7YFB	**2,203,278**	**1888**	**138**	**280**
JA7YRR	1,975,500	1841	134	241
JA7YFH	1,581,822	1849	108	189
JH1YTX	86,516	187	57	115

EUROPE

ENGLAND

GB4ANT	**4,737,051**	**4697**	**104**	**427**

FEDERAL REP. OF GERMANY

DF8DX	**5,866,732**	**4886**	**146**	**497**

NETHERLANDS

PA6WW	**2,252,432**	**4732**	**117**	**359**
PI4DEC	842,400	1158	75	250

POLAND

SP9KAD	**78,312**	**382**	**42**	**114**

SPAIN

EA1MH	**593,952**	**1083**	**77**	**192**

YUGOSLAVIA

YT7W	**7,196,000**	**5448**	**152**	**548**
YU4EZC	62,828	357	37	101

OCEANIA

HAWAII

KH6JDU	**492,660**	**1199**	**76**	**62**

PHILIPPINES

DU1DBT	**2,098,572**	**2886**	**90**	**159**

SOUTH COOK ISLANDS

ZK1XC	**1,768,704**	**3246**	**73**	**115**

SOUTH AMERICA

ARGENTINA

L8H	**3,749,280**	**3112**	**104**	**261**

BRAZIL

ZY5EG	**13,342,416**	**7773**	**148**	**443**

CHILE

CE3AA	**2,302,902**	**2785**	**93**	**201**

CHECK LOGS

We gratefully acknowledge receipt of the following check logs: CE1CQZ, DJ3VC, EA1BDB, EA1XC, EA1AUS, EA4BVE, EA4CVP, EA5CEO, EA7EMR, EA7DNX, EA7FLZ, EC1BPS, HA5FA, HA6NY, JA2MFF, K8PYD, KA7QZK/VY1, KB8AC, KA9QPV, LA1QDA, LA2JX, LA3TQ, LA3JT, LA4TG, LA4RQ, LA5QK, LA6PBA, LA8CJ, LA8WY, LA9ML, LU8DPM, LZ1IU, LZ1KKZ, LZ10T, OH1BV, OH1XX, OH2FQ, OH2SE, OH4YC, OH5SV, OH6GZ, OK1AD, OK3CSQ, OZ1HAS, OZ1FLV, OZ4RT, OZ4ZT, OZ6PP, OZ8AE, PA2NJN, PA3CLD, PA3CNY, PA3CPV, PA3BUT, PA0TV, PY1QQ, PY1YN, RA1TA, RA3EA, RA3RO, RA3VM, RA3VR, RA3VV, RB5IX, RB5MC, RB5WA, RF0FWW, RL7GE, RV9UV, RW3QQ, SK2QW, SM2LWU, SM5BDV, SM5CVC, SM5LL, SM6AVM, SM6JY, SM6KMD, SM6NJK, SM7ASN, SM7IDF, SM7IWN, SM7LPY, SM0BFJ, SP2GJV/2, SP3XR, SP4AS, SP4AWE, SP4LVG, SP5BAK, SP5TT, SP6BSL, SP6CDK, SP6CYV, SP9IZV, SP9PPP, UA2FF, UA3ACJ, UA3AGW, UA3AHA, UA3AMV, UA3DPD, UA3DVF, UA3IDX, UA3PP, UA3TAM, UA4CGP, UA4HNP, UA4LCH, UA4YZ, UA6AB, UA6HKN, UA6HNZ, UA6HO, UA0FF, UA0KAB, UB4WZA, US5HAF, UB5IMD, UB5KW, UB5PS, UB5UCH, UB5UFC, UB5UFD, UB5VEG, UC2LB, UF7VWA, UM9MWW, UQ2GT, UR2RCU, UT4UC, UT4UH, UT4UWG, UT4UX, UZ1TWW, UZ1ZZZ, UZ2FWQ, UZ3MWD, UZ3SWW, UZ4SWM, UZ6HWW, UZ9AXT, UZ9CZI, UZ9OWM, UZ9SWT, UZ9UWN, UZ0AWH, UZ0SWM, VE3OSF, VE3PET, VK3XB, W1LUG, XN3IPR, Y21IC, Y21UD, Y21YJ, Y22YJ, Y23DG, Y23EE, Y23FU, Y23LD, Y23UA, Y23YE, Y24CE, Y24DF, Y24DN, Y24HJ, Y24JA, Y24LA, Y24WJ/A, Y24XD, Y24ZH, Y25MO/A, Y25QN/A, Y25SE, Y25ZN/A, Y26EN, Y26EO, Y26MO/A, Y26LD/A, Y26VN, Y26XM, Y27GL/A, Y27MN/A, Y27VH, Y32IN, Y32OC, Y34XF, Y41WM, Y46MF, Y46TH, Y51XE, Y51YJ, Y53VL, Y53ZL, Y55XD, Y57ZL, Y68WG, Y75YL, Y78WN, Y55ZA, Y2-8700/N62, YB0ZCE, YO2ARV, YO2DFA, YO2CMI, YU7AJD, YV3BQS, ZC4CZ, ZL3GQ.

Disqualified: ZF2IB/4X unverifiable contacts and duplicates

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HF Equipment		Regular	SALE
561	Corsair II 9-band digital Xcvr	1345.00	1169
260	Deluxe 18A ps w/spkr	199.00	179.95
263G	Remote VFO	199.00	179.95
282	250 Hz 6-pole CW filter	59.00	
285	500 Hz 6-pole CW filter	59.00	
288	1.8 KHz 8-pole SSB filter	59.00	
214	Electret desk microphone	45.00	
603	KR-1B Keyer paddle	59.00	
700C	Electret hand mic w/connector	29.95	
1140	18/24.3A DC circuit breaker	10.00	

525D	Argosy II 10/100w digital xcvr	599.00	529.95
225	9A power supply	129.00	119.95
217	500 Hz 8-pole CW filter	59.00	
218	1.8 KHz 8-pole SSB filter	59.00	
219	250 Hz 6-pole CW filter	59.00	
220	2.4 KHz 8-pole SSB filter	59.00	
222	Mobile mount	25.00	
223A	Noise blanker	34.00	
224	Audio CW filter	34.00	
700A	Electret hand microphone	29.95	
1125	DC circuit breaker w/cable	18.00	
1126	Linear amplifier switching kit	15.00	

579	Century/22 50w 6-band CW Xcvr	$389.00	359.95
979	5A power supply	89.00	
979/E	230v 5A power supply	99.00	
226	Crystal calibrator	29.00	
279	Mobile line filter/circuit breaker	TBA	
679	Internal keyer kit	27.00	
1179	DC circuit breaker	10.00	

Misc. accessories		Regular	SALE
214	Electret desk mic w/4-pin plug	45.00	
700A	Electret hand mic, 3-cond ¼" plug	29.95	
700C	Electret hand mic, 4-pin plug	29.95	
670	Single paddle keyer	39.00	
645	Dual paddle ultramatic keyer	85.00	79.95
209	300w dry dummy load	26.00	

HF Linear

		Regular	SALE
425	Titan 1.5kw PEP output amplifier	2485.00	2199

Antenna tuners

		Regular	SALE
229A	1.8-30 MHz 2kw PEP tuner/SWR	279.00	249.95
4229	1.8-30 MHz 2kw tuner/SWR kit	199.00	189.95

227 1.8-30 MHz 200w antenna tuner 89.00 **84.95**

Satellite

		Regular	SALE
2510	SSB/CW, Mode B satellite converter	489.00	439.95

VHF Handheld

		Regular	SALE
2591	.3/2.5w 2m HT/batt/wall cgr/TTP	319.00	269.95
2201	Sub-audible tone encoder	55.00	
2202	Protective case	9.75	
2425	30w amplifier	79.00	
2700	Speaker/microphone	39.00	
2991	Extra 450 ma nicad battery	39.00	
2992	5 hour desk charger	79.00	
2993	12v adapter pack	25.00	

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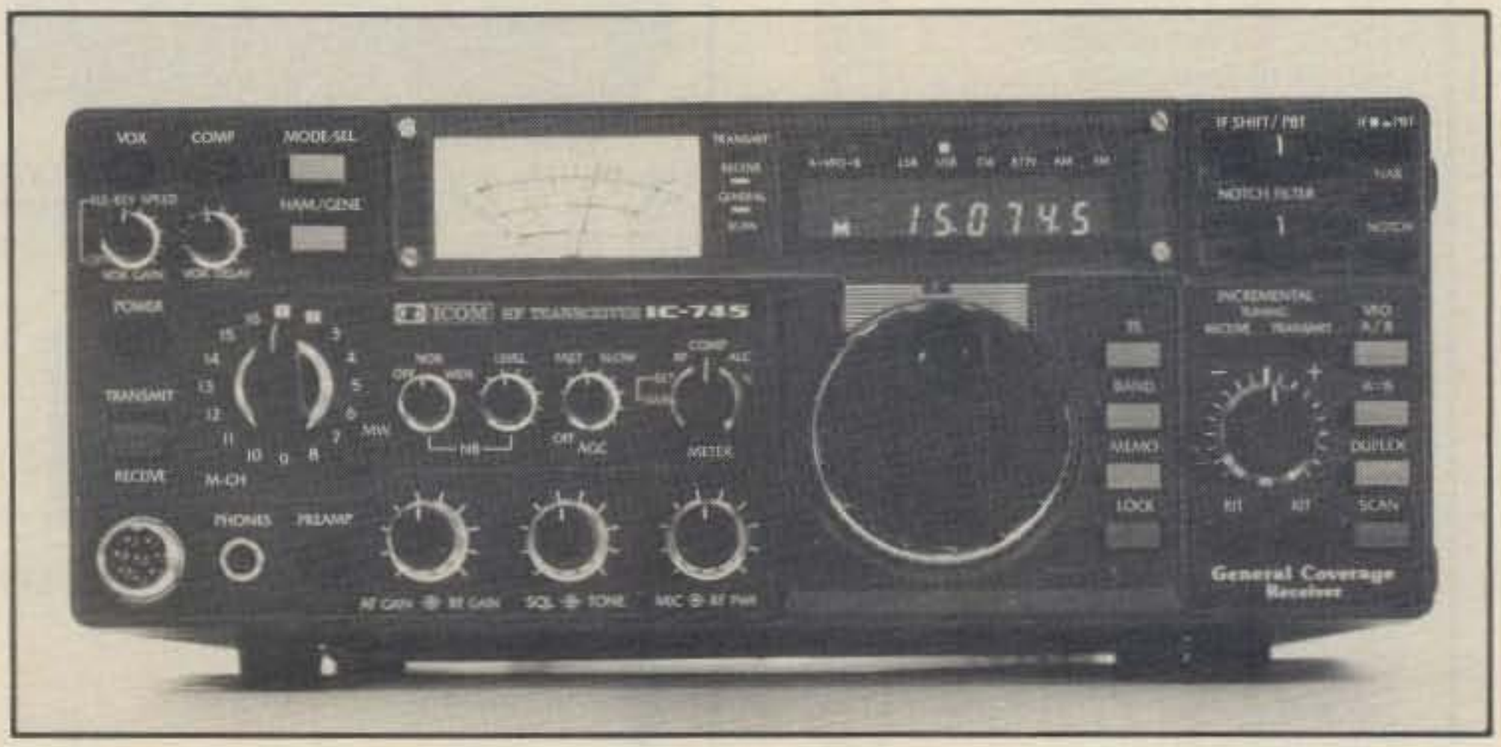
CQ REVIEWS:

The ICOM IC-745 Transceiver

BY LEW MCCOY*, W1ICP



I have had a lot of years in amateur radio, both enjoying it as a hobby and at making it a living. Over those years, since 1945, I have been lucky enough to be in a position to be able to use and test nearly every piece of transmitting and receiving equipment built since 1945. Not too many amateurs are that lucky. In addition, I have been in a position for the last 10 or 15 years of being a product review editor, first for *QST* and then for *CQ*. Someday I should write a story about those years and doing reviews. It should make interesting reading, assuming I don't have to pull any punches.

I was fortunate enough to review the ICOM IC-R71A general-coverage receiver for *CQ*, and that piece of gear impressed me no end. When ICOM used the basic R71 receiver and combined it with a good transmitter, the result was a very good transceiver.

I could have written this review many months ago, because I got an early model of the 745. However, I really wanted to put it through its paces, so I have had the transceiver in operation in my station for about a year now. I operated CW, RTTY, AM, SSB, and several other modes, including portable, taking the transceiver to Mexico with me.

Basic Specs of the IC-745

First, you can study the specifications of the transceiver in Table I. The IC-745 is completely solid-state. The transmitter covers all amateur bands, including the unallocated ones, from 160 through 10 meters, at 200 watts input. The modes are Lower or Upper Sideband, CW, RTTY, and AM (plus an option for FM). For general-coverage receiving, the range is from 0.1 MHz (100 kHz) to 30.0 MHz in 1 MHz segments. The power consumption at 200 watts input is 13.8 VDC at 20 amps. The size is 4¼ "H × 11 "W × 14 "D (111 mm H × 280 mm W × 383 mm D). Weight is 17.5 pounds (8 kg), and it has a handle for carrying.

Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061

It would appear that modern-day equipment is getting more and more complicated to use. The front panel (see fig. 1) looks like part of the cockpit of a 747 jet airplane. And, like most modern equipment, it takes some time to become accustomed to all the different controls. For example, the IC-745 has 16 memory channels that can be set with a rotary switch. At first I thought this was really an unnecessary feature that would get little use. I quickly learned how wrong I was as I filled each channel with a net or sked frequency. One of the most important settings is WWV, because it is easy to turn the switch to the WWV position and receive the signals without tuning the entire transceiver. The memories are backed up with a lithium battery so that when the receiver is turned off, the memories are held.

Receiver Details

Fig. 2 is a block diagram of the RF, main, and IF units, and the signal paths are shown. The receiver input has a selectable RF preamplifier that provides about 10 dB of gain for weak signal reception. (I might add that the preamplifier really soups up an already very hot receiver.) From there, the received signal is fed through three different IF conversions. The first at 70.45 MHz virtually eliminates spurious responses. The second IF at 9.0 MHz is where passband tuning can be utilized to provide excellent selectivity. The last IF conversion is at 455 kHz. A deep notch filter is also used in the IF to provide a great deal of heterodyne interference rejection. Adjustable AGC is available, as is a very good noise blanker. These IF conversions provide total image rejection plus a very great deal of selectivity. In addition, squelch operation is provided with a squelch sensitivity of less than 0.5 uV. You will also note that in the signal path a doubly-balanced mixer is used.

The tuning knob is 2 inches in diameter with two tuning rates available. In the fast rate one knob revolution equals about 160 kHz. With the slow rate it is about 2 kHz per revolution. The tuning knob can be set for whatever desired "drag" the user likes. Of course, with microcomputer frequency control there is absolutely no backlash. The frequency readout is a fluorescent display, and the readout is to tenths of kiloHertz. Specification for drift from warmup is plus or minus 500 Hertz from one minute to one hour. However, on the three different IC-745s I tested, drift was less than 200 Hertz for the same period.

Different from some transceivers I have tested, this one can be tuned in when in the memory mode. For example, let's say I have 3945 punched into memory and call up that frequency via the memory switch. That frequency is not "locked" in. If I hear something such as interference, I can tune away to find out

GENERAL

Frequency Coverage:
- Ham Band 1.8 MHz ~ 2.0MHz
- 3.45MHz ~ 4.1MHz
- 6.95MHz ~ 7.5MHz
- 9.95MHz ~ 10.5MHz
- 13.95MHz ~ 14.5MHz
- 17.95MHz ~ 18.5MHz
- 20.95MHz ~ 21.5MHz
- 24.45MHz ~ 25.1MHz
- 27.95MHz ~ 30.0MHz

General Cover (Receive Only)
- 0.1MHz ~ 30.0MHz
- Thirty 1MHz Segments (or Continuous)

RIT/XIT Coverage ±1.0KHz

Frequency Control:
- CPU based 10Hz step Digital PLL synthesizer.
- Independent Transmit-Receive Frequency Available

Frequency Readout:
- 6 digit 100Hz readout.

Frequency Stability:
- Less than ±500Hz after switch on 1 min to 60 mins, and less than ±100Hz after 1 hour. Less than ±1KHz in the range of −10°C ~ +60°C.

Power Supply Requirements:
- DC 13.8V ±15% Negative ground Current drain 20A max. (at 200W input)
- AC power supply is available for AC operation.

Antenna Impedance:
- 50 ohms Unbalanced

Weight:
- 8.0Kg (11Kg; when optional power supply is installed)

Dimensions:
- 111(123) mm(H) x 280(304) mm(W) x 355(383) mm(D)
- *( ); including projections

TRANSMITTER

RF Power:
- SSB (A_3J) 200 Watts PEP input
- CW (A_1), RTTY (F_1) 200 Watts input
- FM (F_3)* 200 Watts input
- Continuously Adjustable Output power 10 Watts ~ Max.

Emission Mode:
- A_3J SSB (Upper sideband and Lower sideband)
- A_1 CW
- F_1 RTTY (Frequency Shift Keying)
- F_3 FM

Harmonic Output:
- More than 40dB below peak power output

Spurious Output:
- More than 60dB below peak power output

Carrier Suppression:
- More than 40dB below peak power output

Unwanted Sideband:
- More than 55dB down at 1000Hz AF input

Microphone:
- Impedance 600 ohms
- Input Level 12 millivolts typical
- Dynamic or Electret Condenser Microphone (Optional IC-HM12 or IC-SM6 can be used.)

RECEIVER

Receiving System:
- SSB, CW, RTTY, AM: Triple Conversion Superheterodyne with continuous Bandwidth Control.
- FM* Triple Conversion Superheterodyne

Receiving Mode:
- A_1, A_3J (USB, LSB) F_1 (Output FSK audio signal), A_3 (Receive only) F_3*

IF Frequencies:
- 1st 70.4515MHz
- 2nd 9.0115MHz
- 3rd 455KHz

Sensitivity:

SSB, CW, RTTY
- 0.1 ~ 1.6MHz Less than 3.2μV for 10dB S/N
- 1.6 ~ 30MHz Less than 0.15μV for 10dB S/N

AM
- 0.1 ~ 1.6MHz Less than 20μV for 10dB S/N
- 1.6 ~ 30MHz Less than 1μV for 10dB S/N

FM* 1.6 ~ 30MHz Less than 0.3μV for 12dB SINAD

Squelch Sensitivity:
- 1.6 ~ 30MHz Less than 0.5μV

Selectivity:

SSB, CW, RTTY
- 2.2KHz (Adjustable to 0.8KHz Min) at −6dB
- 4.2KHz at −60dB

AM 2.4KHz at −6dB, 4.8KHz at −60dB

(When Filter switch ON)
- 4.0KHz at −6dB, 15KHz at −60dB

FM* 15KHz at −6dB, 30KHz at −50dB

Notch Filter Attenuation:
- More than 30dB

Spurious Response Rejection Ratio:
- More than 60dB

Audio Output:
- More than 2.8 Watts

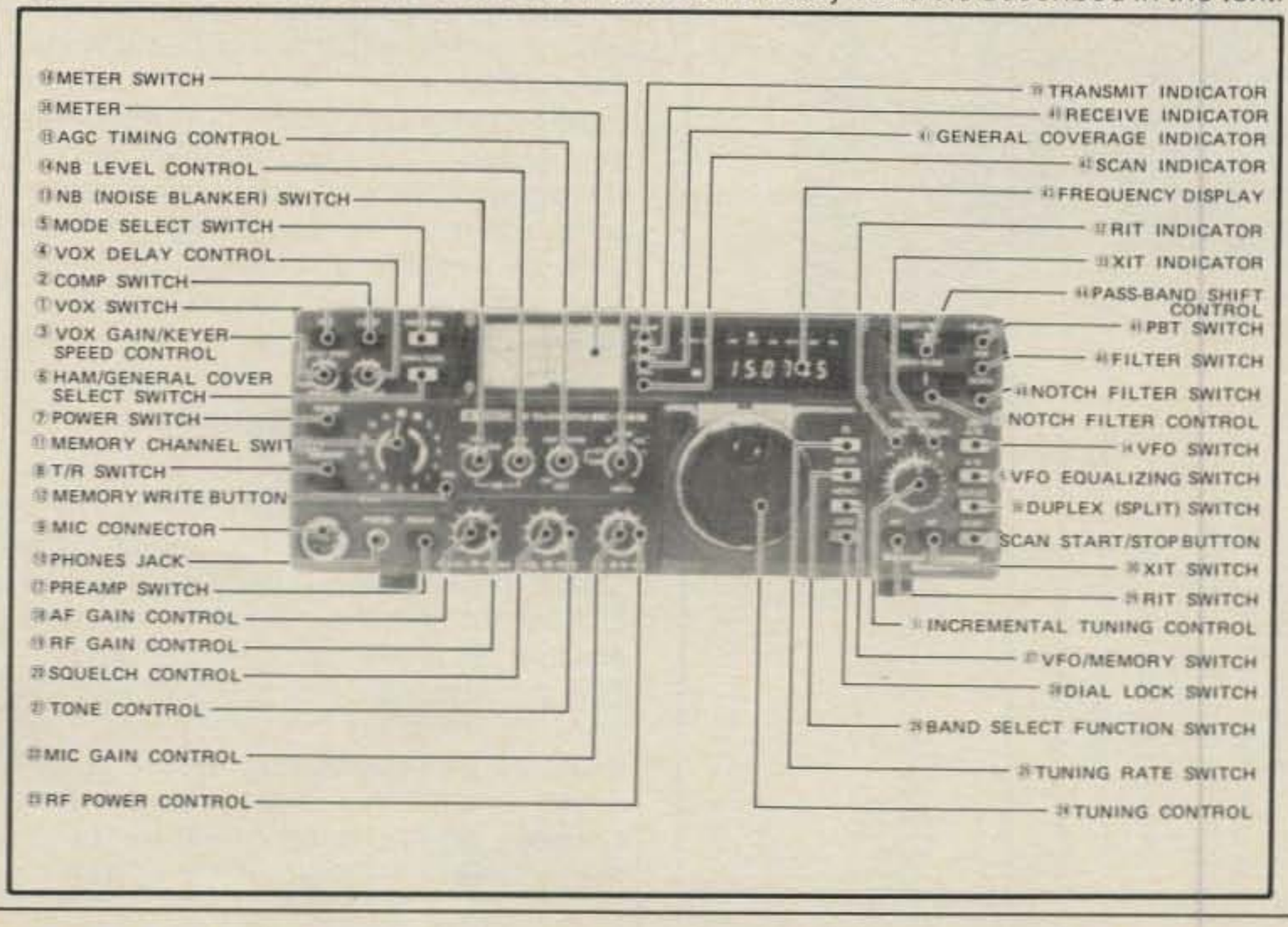
Audio Output Impedance:
- 8 Ohms

* When optional FM unit is installed.

Specifications are approximate and are subject to change without notice or obligation.

Table I– Specifications of the ICOM IC-745.

Fig. 1– This front view of the transceiver shows the many controls described in the text.



what the trouble is. However, on some transceivers this is not possible. The IC-745 does have a **Lock** switch whereby any frequency, memory or otherwise, can be locked in place. (In fact, I accidentally pushed the lock switch when I first tested the transceiver, and then when into shock when I couldn't tune the receiver. I, of course, had not read the instruction manual that well!) This brings up another point: the instruction manual is excellent and is **must** reading and studying in order to get full use of a radio such as the IC-745.

There are optional filters available for extra-sharp CW reception, and I installed them on the transceiver I tested. I mentioned the notch filter, and in addition, the receiver has an adjustable IF passband. The **Passband** tuning control allows continuous shifting of the receiver passband from the upper or lower side in SSB, CW, or RTTY. It is truly amazing how the passband tuning improves selectivity. In these days of crowded bands, good selectivity is not only desired, but necessary. The receiver in the 745 certainly is better than state-of-the-art in this respect.

The receiver has all the regular controls normal to most receivers. RF GAIN, AUDIO GAIN, TONE, and AGC (with an adjustable AGC timing control) are all available. In addition, a noise blanker is built in, and it does an excellent job on most types of noise, including the woodpecker.

There are two VFOs available—either "A" or "B" or both. In the normal "A" switch position, VFO "A" can be selected for both transmit and receive. In the "A" DUPLEX or split position, VFO "A" can be used for receive and "B" for transmit. In the normal "B" position, VFO "B" can be used for both transmit and receive, and in the split position "B" is for receiving and "A" for transmitting. As you can see, there is an abundance of flexibility built in.

Also, there is a SCAN switch which puts the receiver in the scan mode. The scan will start from the stopped frequency in the programmed scan or from the highest memory channel in the memory scan. The programmed scan is achieved by storing the highest and lowest desired frequency in memory channels 1 and 2. The scan will then cover this range. In addition, the SQUELCH control can be set so that the scan will only open up the receiver on desired signal levels. I could devote much more space just to the features of the receiver scanning operation, but suffice it to say, the instruction manual devotes two full pages to this operation alone. I have to be honest and say that I thought the scanning feature would be a waste, but I use it more and more—and wouldn't be without it.

The Transmitter

I tested the transmitter and found that it met or exceeded (in many cases) the

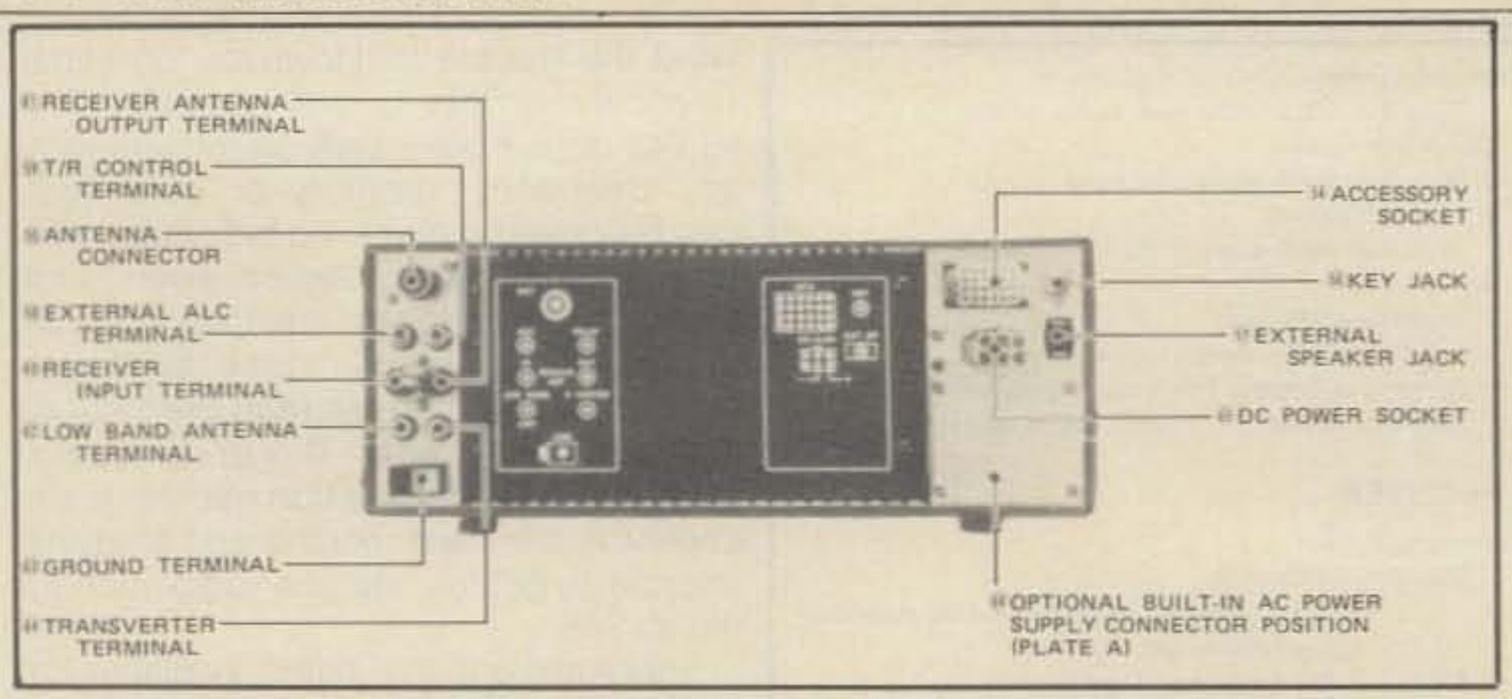
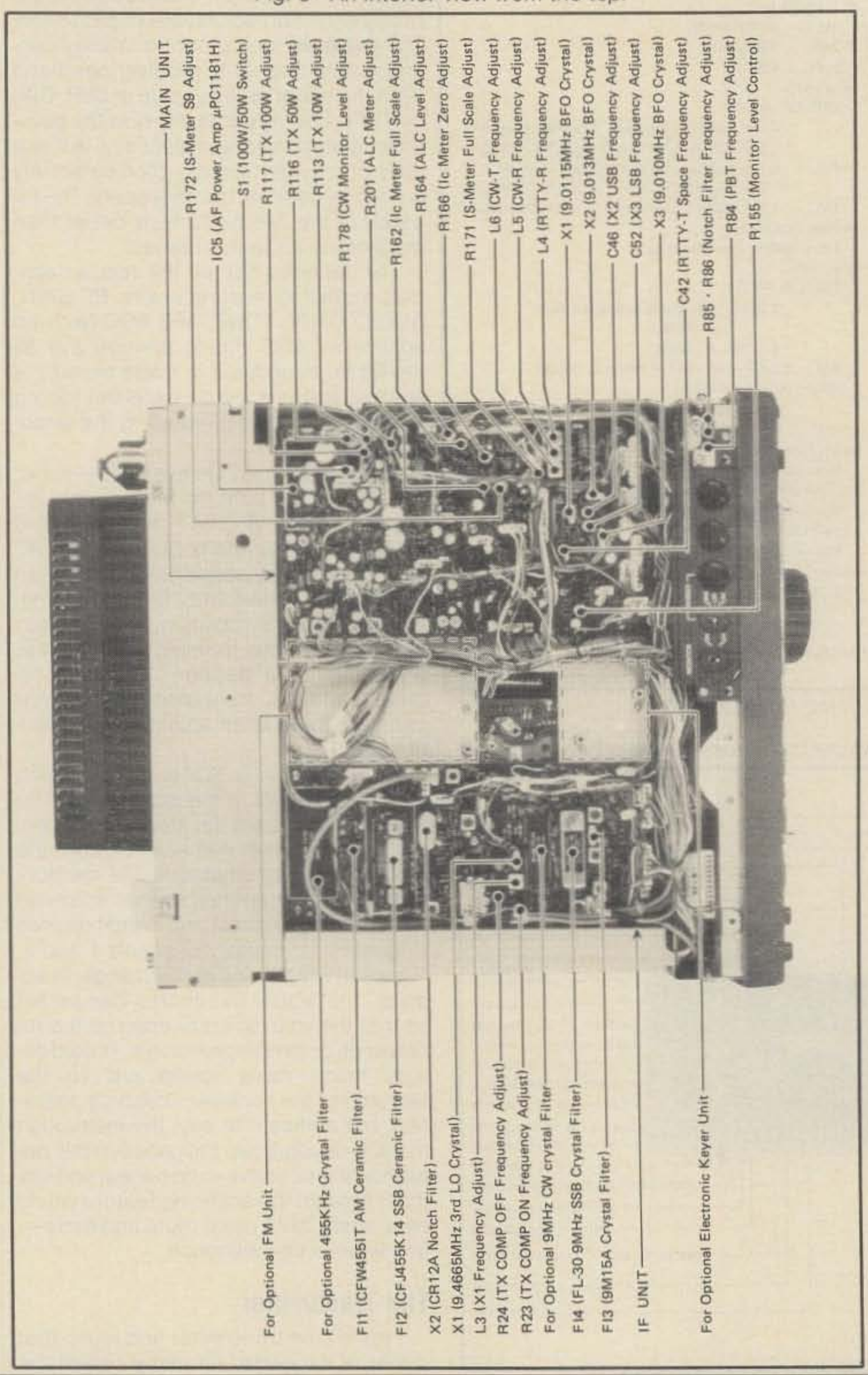


Fig. 2– This shows the rear of the IC-745 and connections.

Fig. 3– An interior view from the top.



specifications shown in Table I. There are several points not shown in Table I, however, that should be covered.

CW: There are some amateurs who insist on full break-in capabilities on CW. (I am not one of them.) In other words, they insist on the ability to "break" another station at very high speeds, say 50 words per minute. The 745 will do this up to about 25 wpm because that is about how fast the VOX system will operate. This feature is probably not important to the majority of readers, but it bears mentioning for those few "speed merchants." The keyed signal is absolutely excellent with very good "make" and "break" characteristics. I tested the transceiver at both low and high speeds (about 50 wpm—computer generated keying) and received nothing but outstanding quality reports.

As an aside, in my first transmitter (high power) I used primary keying of the AC power transformer, which made for a very distinctive "soft" note. (It was great for attracting DX.) One very famous amateur who had an outstanding signal used "tuned" chokes in his power supply which gave him a really different sounding signal. In those olden days we used all kinds of "tricks" to make our signals sound different. Not so with these modern transceivers. They sound so good that it almost makes me ill, hi!

RTTY: My IC-745 was tested on RTTY in several ways—but all with computers. I used the Kantronics system, Microlog's AIR-1, and Newcome's VIC-20/Commodore 64 system. I used a microphone input in all cases. However, there is an accessory socket on the rear of the 745 whereby a teletypewriter or level converter can be used.

SSB: The IC-745 comes with its own microphone, and that is what I used for my phone contacts. The reports I received, and listening to amateurs who were using 745s, reflected the high audio quality produced by the transceivers. The audio was clean and crisp with no preponderance of low-pitched audio. At first I received some reports of distortion, but as usual, it was before I studied the instruction manual and "how to adjust the speech compressor." You would think I would have learned after all these years! There is an excellent built-in speech compressor that can be switched in or out as desired.

Other Transmitter Features

There is a single meter for all transmitter (and receiver) measurements. There are five functions of the meter. One switch position measures the collector current of the final-stage transistors. Another position measures the ALC level. One position indicates the compression level when using the processor. One takes care of measuring the RF output power. And another is for the built-in SWR bridge. I didn't mention it earlier, but in the receive mode the meter is calibrated

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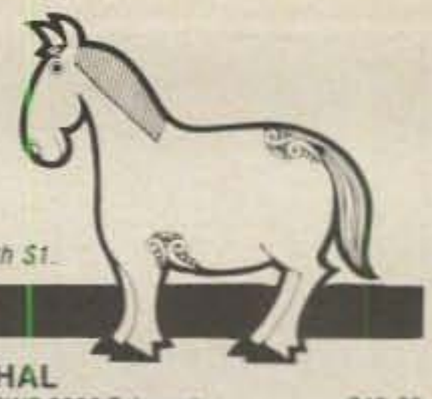

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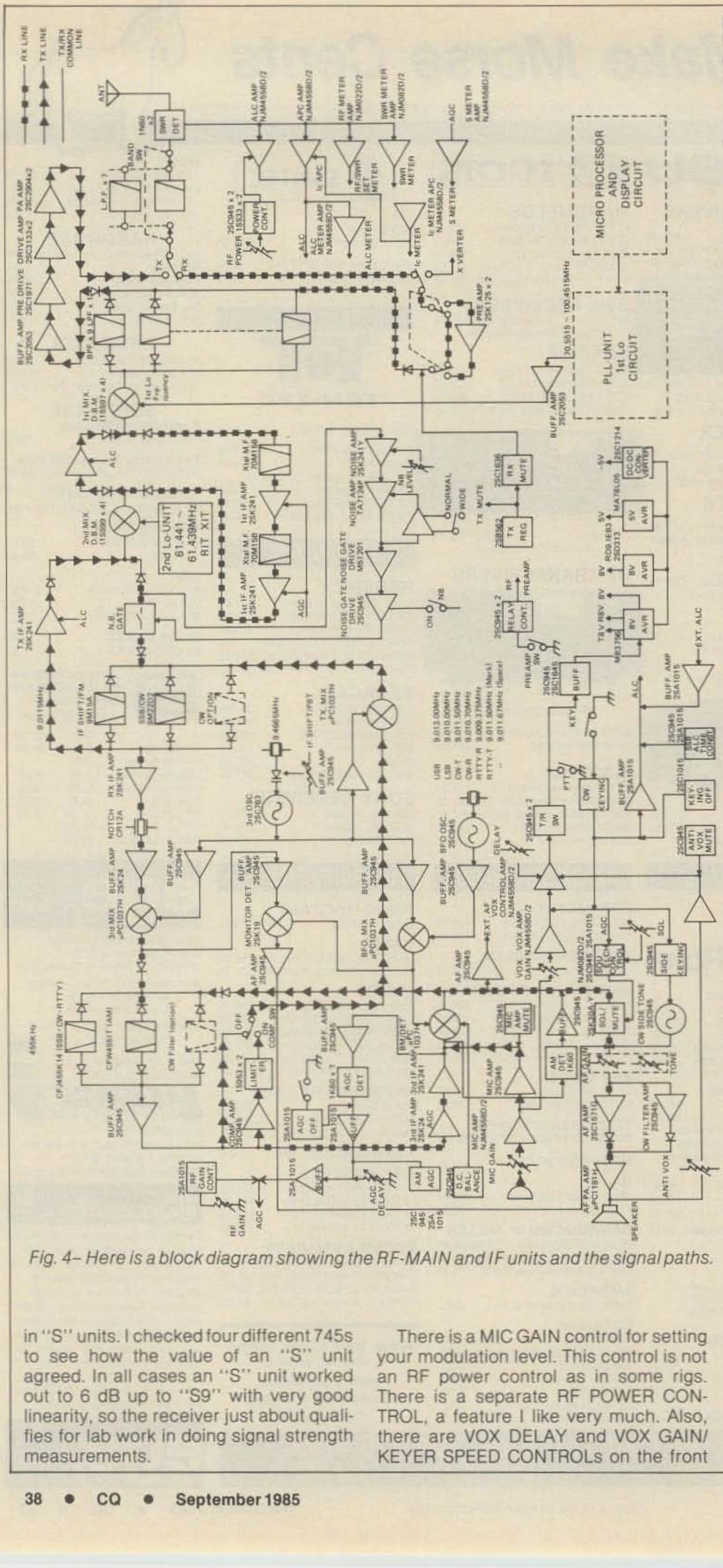


Fig. 4– Here is a block diagram showing the RF-MAIN and IF units and the signal paths.

in "S" units. I checked four different 745s to see how the value of an "S" unit agreed. In all cases an "S" unit worked out to 6 dB up to "S9" with very good linearity, so the receiver just about qualifies for lab work in doing signal strength measurements.

There is a MIC GAIN control for setting your modulation level. This control is not an RF power control as in some rigs. There is a separate RF POWER CONTROL, a feature I like very much. Also, there are VOX DELAY and VOX GAIN/KEYER SPEED CONTROLs on the front panel. One of the options of the 745 is a keyer that can be installed in the transceiver. The KEYER SPEED CONTROL is used, of course, in the CW mode.

There is a built-in, super-quiet cooling fan that operates when temperature (50°C) of the final amplifier transistor compartment gets too high. Like all modern transceivers the IC-745 is designed to be operated into a 50 ohm load and will gradually shut down if a mismatch occurs (and the fan will run faster to provide more cooling).

Other Items

As I said earlier, I have tested and used this transceiver for a long time. I also checked with others using this rig for many months. I monitored them carefully to see if there were any complaints or problems. The only thing that has happened in this time is the push-to-talk switch on one of the microphones went bad and was replaced in a few minutes. I checked the service policy with the ICOM office in Bellevue, Washington. I was told they work on a five working-day turnaround on service from Bellevue direct. They also have about a dozen official service stations around the country. Their aim is to have a reputation of excellent service, so if you have a complaint, please contact their headquarters in Bellevue.

The purpose of a product review (as I see it) is to describe the product in as much detail as space permits, tell whether or not the equipment meets the manufacturer's specs, be critical of its faults, and make recommendations. Keep in mind that these recommendations are the views of the reviewer. To be perfectly honest, I found nothing about which to be critical, except possibly that all radio equipment is getting very expensive. However, what with inflation and all, I guess that is just the way of life these days. One other point here: the prices listed in the next paragraph are list. Needless to say, it pays to shop around for the best buy. But for gosh sakes, stick with reputable dealers.

The list price of the ICOM IC-745 is $999. There are many accessories available. The built-in power supply, the PS-35, is $160, and the external supply, the PS-30, is $260. There are several optional filters for greater selectivity: the FL-45 for CW/RTTY, 500 Hz/ – 6 dB, 1.6 kHz/ – 60 dB; the FL-54 for CW-RTTY, 270 Hz/ – 6 dB, 1.1 kHz/ – 60 dB. Also there is the FL44A, SSB, 2.4 kHz/ – 6 dB, 4.2 kHz/ – 60 dB. Another option is the FM unit IC-EX242 at $39. The electronic keyer unit is the IC-EX243 at $50. The keyer is to be used with an iambic paddle and is adjustable between 5 and 45 wpm. A complete service manual is also available for $25.

The transceiver is manufactured by ICOM Incorporated, Japan and is imported by ICOM America, Inc., 2380 116th Ave., NE, Bellevue, WA 98004. CQ

K4TWJ presents an on-the-spot recap of the activity experienced on opening day, plus an open invitation to try our newest band.

Opening Day On 12 Meters

BY DAVE INGRAM*, K4TWJ

The 1979 WARC-acquired HF allocation of 24.890 to 24.990 MHz was officially opened to U.S. amateurs beginning 0001 GMT, June 22, 1985, and initial impressions were both surprising and encouraging. The band's first weekend of activity resembled an on-the-air rally with semi-brief QSOs and "states chasing" seemingly the order of the day. Although I personally wrangled QSOs with 16 states and 3 continents, others surely did better. In fact, the first QSO we heard (0005 GMT) was W6SAI working T32AB. Incidentally, the approximate sunspot count during that period was 23 . . . a vast difference from the near 200 of a few years ago.

Our 12 meter band seems to exhibit some unique idiosyncracies, many of which will surely require an 11-year period for full understanding. As of this time, the band is an interesting experience in weak signal communications—a trait which more of us need to perfect, and one of high significance in future UHF or amateur satellite developments. The band's noise level seems misleadingly low; it appears "dead," but even S1 signals can be copied quite easily. Don't take that statement factually when monitoring 12 meters with a conventional tribander, however, as you probably won't hear anything. Use an antenna cut for 24.9 MHz. Noise levels are nearly equal on either, but signals are simply "not there" on an untuned antenna.

During the "kickoff weekend" band openings peaked during both midmorning and late afternoon, while heavy QSB was noted by most operators around midday. It also seemed strange, but 12 was open after 10 and 15 closed. Maybe that was due to all the fresh RF.

A wide variety of rigs and antennas

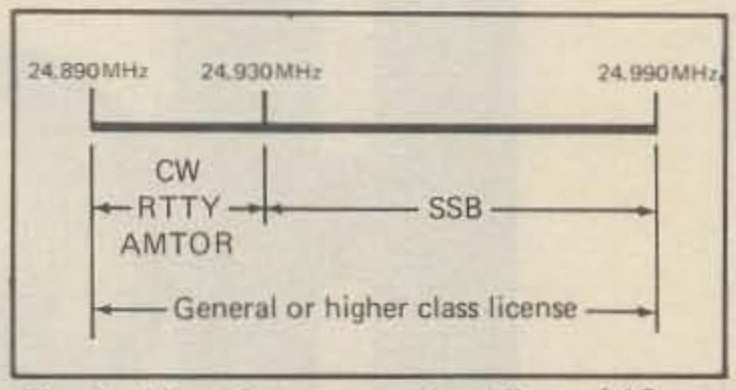
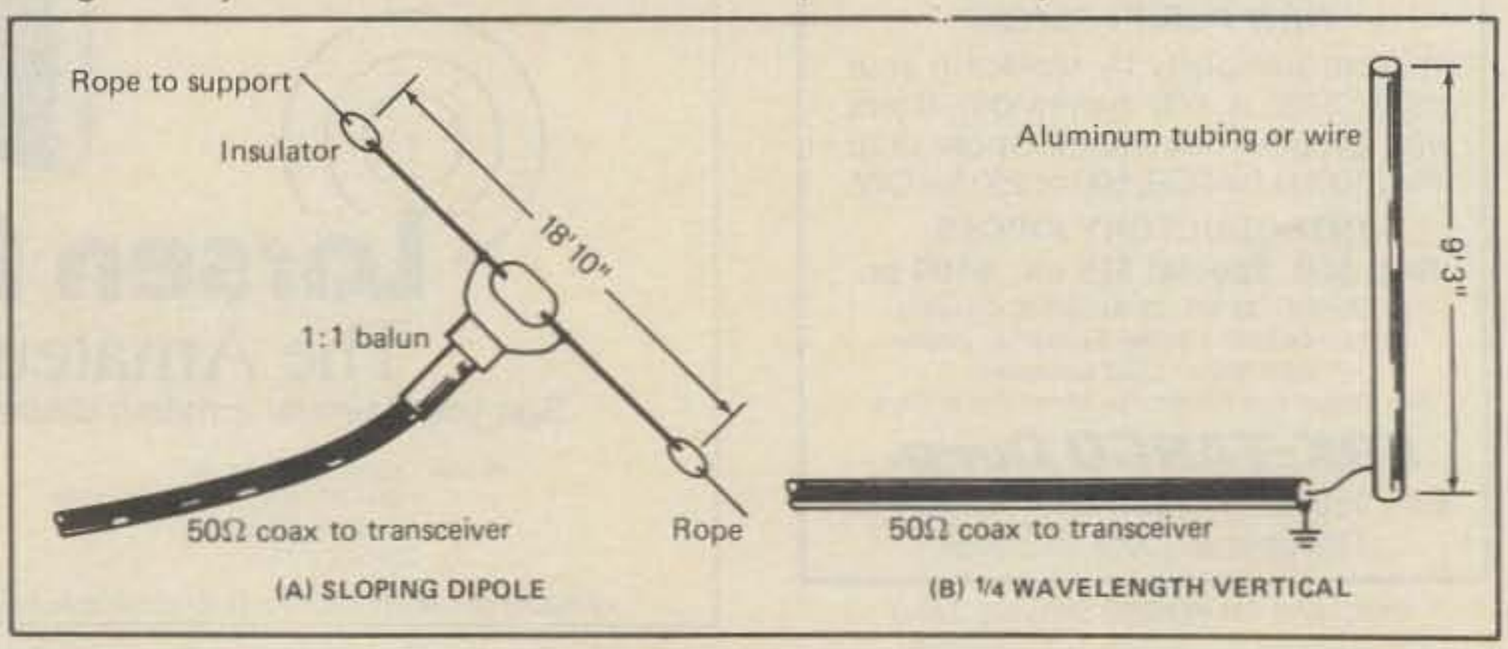


Fig. 1– Here is a general outline of 12 meter activity.

were noted in operation on 12 meters, with late-model transceivers and basic-style antennas being the normal choice. My own fully refurbished and 12 meter recrystalled Collins KWM-1 was an obvious exception, but everyone complimented its glamorous audio. Triband beams or 40 meter dipoles were noticeably inferior to 12 meter sloping dipoles, ¼-wave verticals, or even all-band doublets with open feeders and tuners. Some TS-930 owners reported their automatic tuner wouldn't work properly on 12 meters. Ditto several types of "outboard" tuners. Any form of quickly erected antenna specifically for 24.9 MHz use is obviously preferable. One station was heard using more than 100 watts output, and only one station heard used a 12 meter beam. Two mobile stations were heard (on CW), and their signals were average as compared to others. I modified my own Hustler RM10 for 12 meters by replacing its top whip with a longer rod (example of calculations: If 234/F(28.5) = 8.2 ft., and 234/F(24.9) = 9.39 ft., the new whip should be approximately 9.39 – 8.2, or 1.19 ft. *longer than the original RM10 whip.* A salvaged 5/8 two meter whip worked fine).

The close proximity of CW and SSB allocations on 12 meters lets one quickly notice the advantages of Morse when band conditions are rough. I was pleasantly surprised to see both modes being given nearly equal attention. Hopefully those trends will become commonplace as time progresses. Maybe everyone will continue to use barefoot rigs. Maybe both keys and mikes will become mobile favorites. Maybe you yourself should try this new band sometime soon. And maybe it's also open weekdays, but everyone listens and few transmit. Whatever the case, we invite you to try 12 meters. The novelty will soon wear off, and some doggone good communications will be available to everyone holding a General class or higher license. CQ

Fig. 2– Layout and dimensions for basic "quick and easy" 12 meter antennas.



*Eastwood Village No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210

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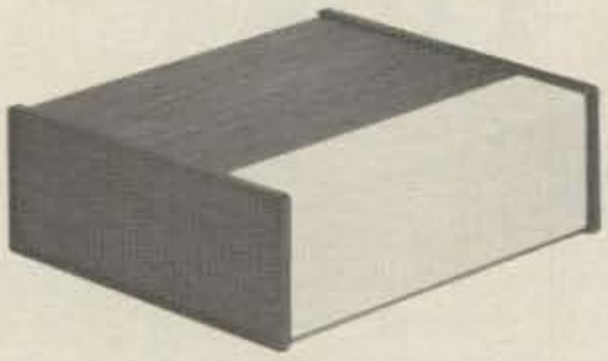
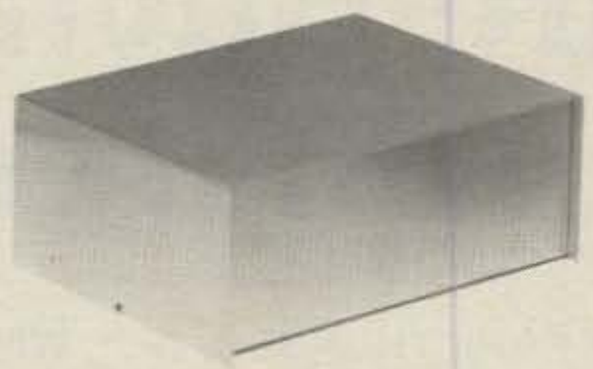


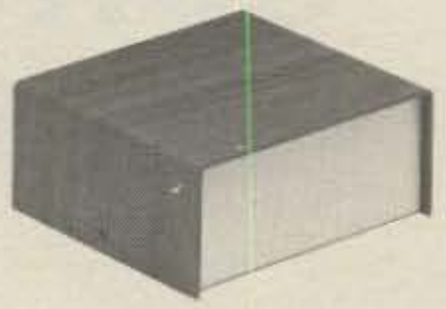
Heavy 16 gauge aluminum panels with two molded Cycolac® sides with channels for circuit board and shields. "W" suffix indicates walnut grained vinyl trim with beige panels. "G" suffix - gray panels with black pebble grained side panels

TP-Series



Economically priced, constructed with heavy gauge aluminum. Supplied to be finished by customer as required.

T-Series



All aluminum; smaller sizes. Two "U" shaped sections of 16 gauge aluminum nest together with slight overhanging top. "W" suffix indicates wood grained vinyl clad top with beige panels. "G" suffix - gray panel with pebble-grained vinyl clad top.

"J" Series

MODEL	H	W	D	PRICE
JG-4	2 3/8"	4 1/8"	5 7/8"	$9.79
JW-4	2 3/8"	4 1/8"	5 7/8"	11.06
JW-5	2 3/8"	5 3/16"	5 7/8"	11.55
JG-6	2 3/8"	6 3/16"	5 7/8"	11.06
JW-7	2 3/8"	7 3/16"	5 7/8"	13.81
JG-8	2 3/8"	8 1/4"	5 7/8"	12.60
JW-10	2 3/8"	10 3/8"	5 7/8"	17.54

"TP" Series

MODEL	H	W	D	PRICE
TP-41	2 1/4"	5 1/2"	4 1/2"	$5.10
TP-42	2 3/8"	5 3/4"	4 3/4"	5.40
TP-43	2 1/2"	6"	5"	6.00
TP-44	2 5/8"	6 1/4"	5 1/4"	6.60
TP-45	2 3/4"	6 1/2"	5 1/2"	7.10
TP-46	2 7/8"	7"	5 3/4"	7.50
TP-47	3"	7 1/4"	6"	8.00
TP-48	3 1/8"	7 1/2"	6 1/8"	8.40
TP-49	3 1/4"	7 3/4"	6 1/4"	8.90
TP-50	3 3/8"	8 1/4"	6 3/8"	9.65

"T" Series

MODEL	H	W	D	PRICE
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TG-26	1 15/16"	6 1/4"	4 1/8"	8.69
TW-26	1 15/16"	6 1/4"	4 1/8"	8.69
TG-28	1 15/16"	8 1/4"	6 1/8"	10.78
TW-28	1 15/16"	8 1/4"	6 1/8"	10.78
TG-34	3 1/16"	4 1/4"	4 1/8"	8.69
TW-34	3 1/16"	4 1/4"	4 1/8"	8.69
TG-36	3 1/16"	6 1/4"	4 1/8"	9.35
TW-36	3 1/16"	6 1/4"	4 1/8"	9.35
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TW-38	3 1/16"	8 1/4"	6 1/8"	11.83

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Making an intelligent decision when buying hamshack computer software is no easy task, and the consequences of poor choices can be costly and frustrating. W8FX provides a number of useful and specific selection criteria in this timely article.

Software Buying Tips for Amateurs

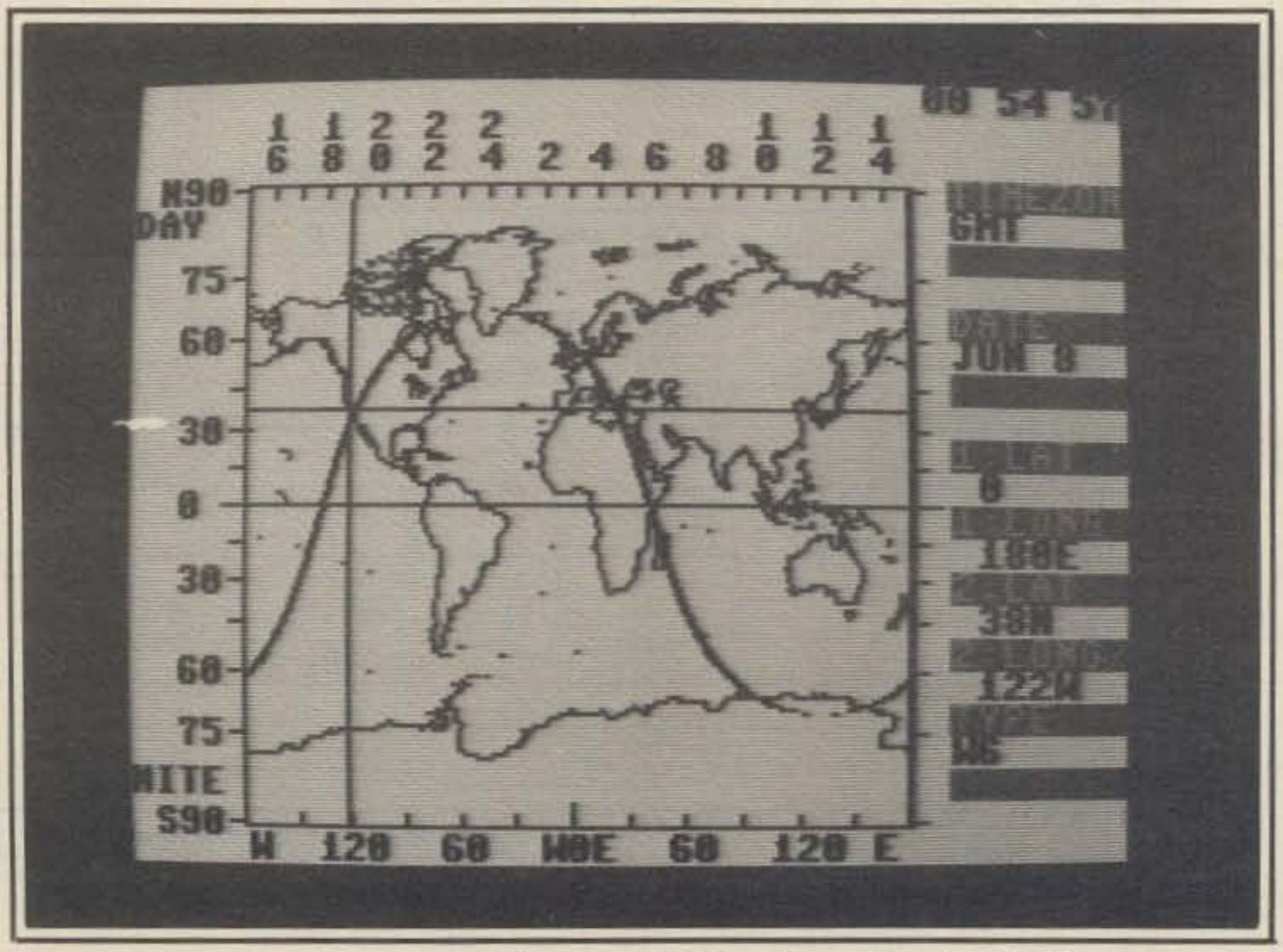
BY KARL THURBER, JR.*, W8FX

It's no secret that the micro-enhanced hamshack represents the wave of the future. Forward-looking amateurs are using their personal computers (PCs) to track satellites, plot beam headings, transmit and receive CW and RTTY, design antennas, maintain logs, predict propagation conditions, and even address QSLs. Doing these things requires computer hardware as a start, yet the real work is done by the software that is employed. But going about selecting high-quality software for the high-tech station is not an especially easy task.

Just about everyone who has turned the cover of a computer magazine, or who has used a personal computer, "knows" that well-known, highly rated commercial software packages such as Visi-Calc, Word Star, and dBase II do bang up jobs when used for their intended purposes: financial spreadsheeting, wordprocessing, and data management, respectively.

It's a different story with most software, especially that for relatively small, specialized markets such as amateur radio. For example, will that new whizz-bang Interface Maximus Mark IV by Sometime Software Systems really enable the best CW and RTTY connection for your computer and transceiver? Whose logging programs will keep the best running tabs on your quest for DXCC? And which satellite tracking program is simplest to use, yet produces easy-to-use data printouts that are "on the nose"?

We can't pretend to claim that we have the answers to questions such as these. But, having had our own personal "trial by fire" in purchasing a variety of computer software over the past few years, we have developed some checklist questions which you should find useful in making the "hard" software selection decisions for your hamshack or home. Let's look at some of these questions now.



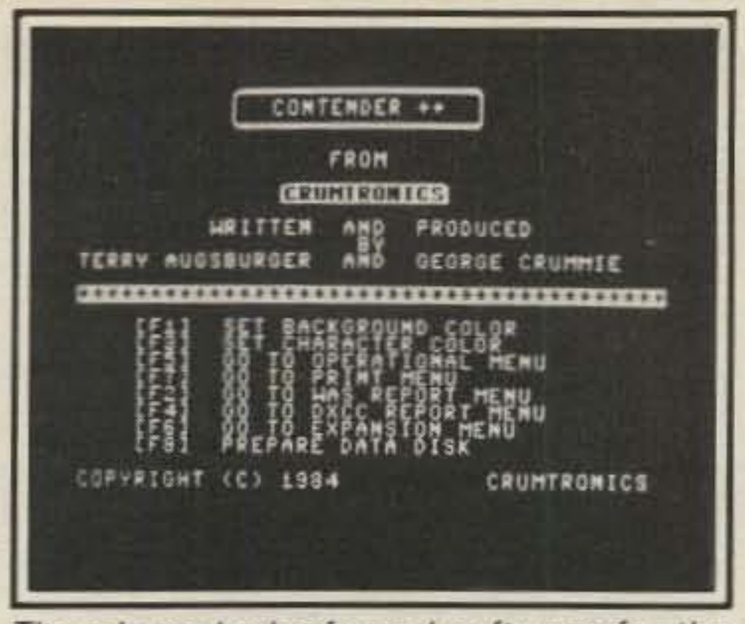
There is amateur software galore for the avid DXer. Most of it takes the form of logging, contest, propagation, and beam-heading programs. A unique sunrise/sunset and grayline calculation program is offered by Xantek, Inc., in the form of "The Computerized DX EDGE." A typical on-screen display is shown here. (Photo courtesy Xantek, Inc.)

1. Is the software you're considering designed for your specific hardware configuration? This should include all major components: video display, printer, disk drive, operating system, and various interfaces. The watchword is *compatibility* of all elements of the system with the software that's to run on it.

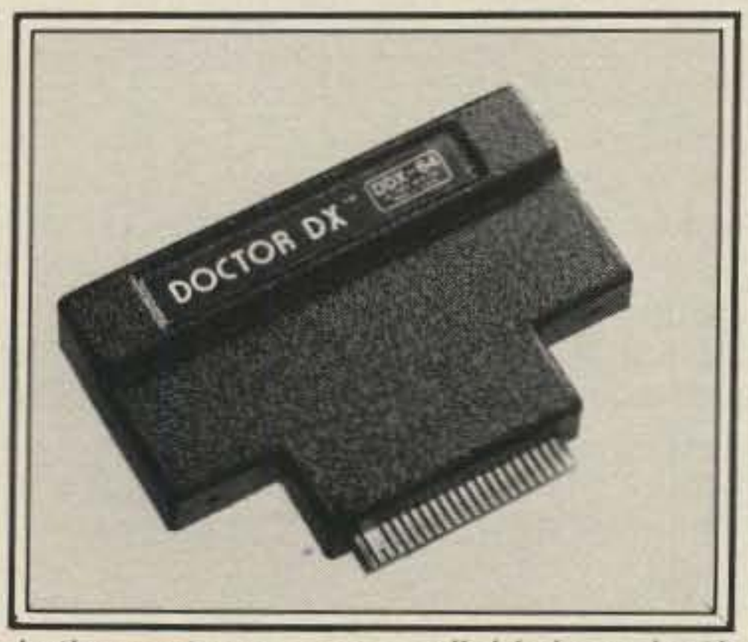
2. Is the software written in a fast assembly or compiled language, or is it written in a relatively slow language such as BASIC? Speedy operation is especially important in data-handling programs which must search for and sort data, as well as in various real-time on-the-air applications.

3. Is the software's documentation complete, clearly written, and legibly printed? Unlike a book, often you *can* fairly well size up a software package by its "cover."

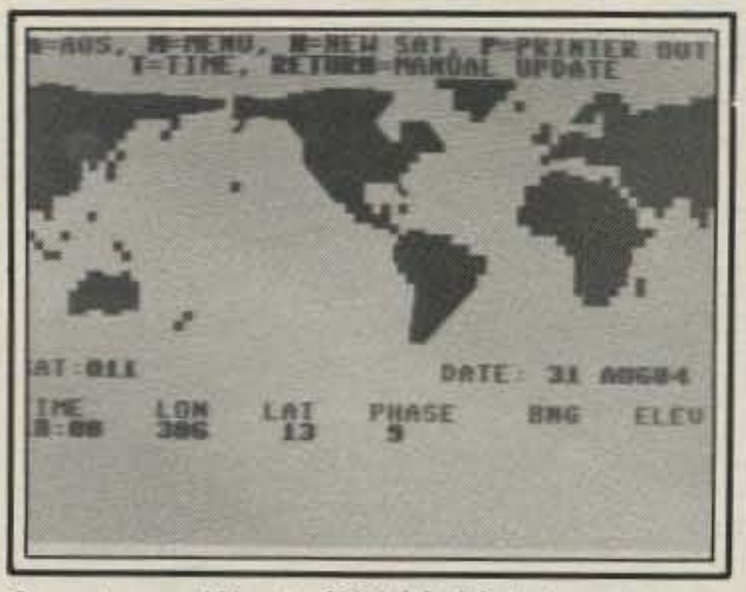
4. What kind of storage medium is required—cassette or disk drive? Some programs require the use of two cassette or disk units for effective operation. Note that the most sophisticated programs are



There's no lack of good software for the "plugged-in" hamshack. In my Antennas & Accessories column I try to highlight what's out there for the amateur computerist. One excellent logging program is Crumtronics' Contender series for the Commodore 64, the main menu of which is shown here in this video screen photo. (W8FX photo)



In the past year or so available hamshack software has taken a quantum leap in terms of sophistication. A rather amazing hardware/software combination package is this Doctor DX™, module for the Commodore 64. The plug-in device contitutes a comprehensive Morse Transceiver Simulator/Trainer. Another unusual device from the same firm, Doctor QSO™ is a Morse code trainer that simulates actual code ragchews. (Photo courtesy Advanced Electronic Applications, Inc.)



Spectrum West C64-Multistat program provides satellite location with a blinking cursor on a graphic world map. The program is also available in a Vic-20 version, and interface-to-rotor options are available. A separate program series is available for the Timex/Sinclair.

usually available on disk rather than on tape cassette, due to the many inherent limitations of the latter.

5. Is the manufacturer service oriented with solid follow-up support after purchase? What do other purchasers say about the service rendered?

6. Are there magazine reviews or users' group critiques available which rate the software? A trip to the local library and to a local amateur club or users' group meeting may be a wise move in order to obtain a "second opinion."

7. Does the manufacturer have a regular program to offer enhancements such as new features, updates, and "fixes" in the future? These may not be free, however, especially after expiration of the warranty. However, the prices charged for updates should be reasonable.

8. Is the software written so that you can make backups for your own use to guard against accidental damage to a tape or disk? If not, will the manufacturer sell you a backup, and under what conditions and at what cost?

9. Is the program simple to learn and use with easy to remember control codes, commands, and formats? Any minor annoyances at first use of the software will likely grow over time.

10. Is the package menu-driven and self-prompting, or must constant reference be made to the user's manual?

11. What form does the software take: ROM "firmware," disk, or cassette tape? Are the capabilities and limitations of each clearly understood? (Amateur/computer interfaces generally require the computer to be "tied up" for on-the-air work. Bear this in mind if you want to task your hamshack computer with multiple jobs.)

12. How much memory (RAM) is required for the program? Will your computer handle the RAM requirement, yet have adequate working space left for the files that may be created?

13. Can you see the software demonstrated before purchase? (Not always possible, but highly recommended.)

14. Does the program contain convenient and logically chosen "default" values for editing, searching, printing, and the like?

15. Can necessary disk "housekeeping" operations be performed from within the program without any loss of program data? This is very nearly a "must," in my view.

16. Is the program well error-trapped so as to be as nearly "crash proof" as possible? (Woe unto the program that, upon the occurrence of certain errors, seizes control of your computer and refuses to relinquish it, causing you to lose all data!)

17. Are setup templates or comprehensive program or file examples provided for your assistance in getting started with the software?

18. Is the program designed for easy, file-compatible interface with other software? (In the hamshack, an interface between a log or database program and a QSL-printing program might be important; in business applications, logical interfaces are usually "must haves.")

19. Is the package flexible so that you can design custom input and output displays if necessary to suit your own needs and preferences?

20. What is the manufacturer's overall reputation? If he's known for products other than computer software, would you buy these from him?

21. What is the return and restocking policy? Customarily, software—by virtue of its very nature—is nonreturnable, though some firms are more lenient in this respect than others, and have a short trial return period. But be sure before you buy!

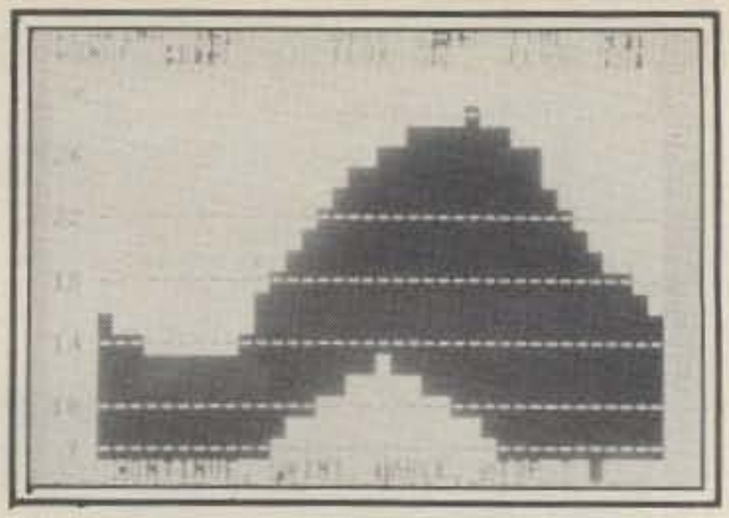
22. If the software is to be used on a computer that is to be operated in an RF environment, will the hardware be adversely affected by the presence of strong RF fields? And does the computer generate too much receiver hash? (These can be real problems in amateur/computer interface packages.)

In addition to commercial software firms, there are other sources, too. Such sources include the countless computer-oriented magazines published today. Many of these contain program listings each month, some of which may be useful to you in home and hamshack applications. Needless to say, these programs are of widely varying quality, and rarely will such programs represent the "last word" in sophistication. Note that some computer magazines include a list of in-print back issues near the rear of the current issue so you can see what software programs may have been published in recent issues. Too, some magazines publish conversions of previously published programs for other computers, often on the back pages. Again, a trip to the local library may be productive.

Additionally, it may take some ferreting-out to discover them, but most computer systems that have been around for a few years have built a stalwart following, so users'-group program exchanges have developed around them. These users'-group exchanges, which specialize in public-domain programs, can help you to effectively cope with the high cost of software. Again, however, the most sophisticated programs are usually not found in the public domain. To locate users'-group/public-domain sources applicable to your computer, browse through the specialized magazines which have sprouted up to support your PC. Many of these magazines list such groups and sources regularly and may even have columns devoted to them.

Several excellent books are available to help you make the right software decisions. Although written without specific reference to the hamshack, two com-

Typical graphic screen display from the highly acclaimed MUFPLOT propagation program for the Commodore 64 and Apple. The program is offered by Base (2) Systems. (W8FX photo)

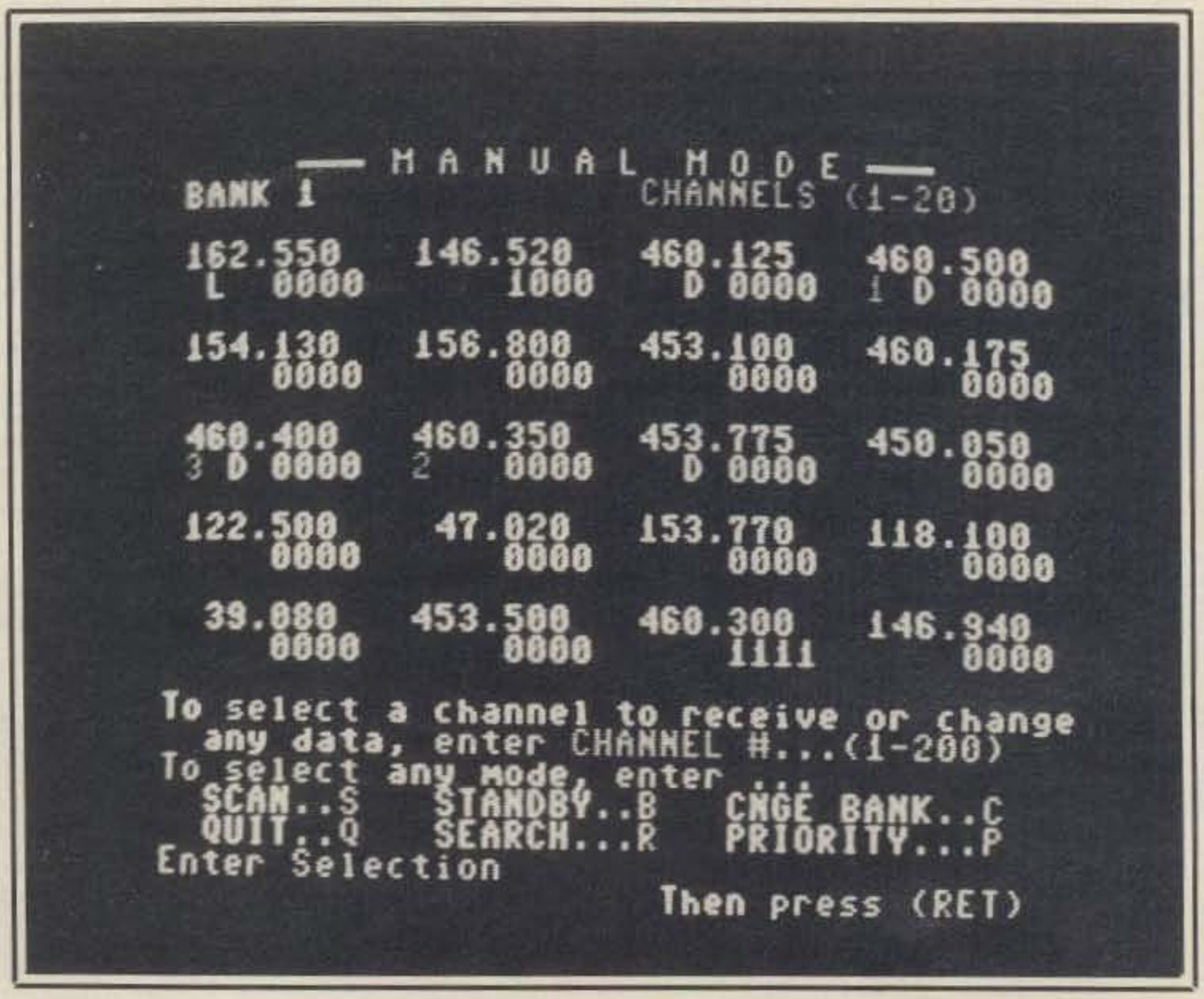


If you're really "into" antenna analysis and design from a technical standpoint, AJ3K, Jim Rautio, has come up with "Annie," a comprehensive designer's tool for the Apple and Commodore 64 computers. The main options screen is shown here. (W8FX photo)

puter software books by Alfred Glossbrenner are "musts." One is *How to Buy Software,* and the other is *How to Get Free Software.* These two books are highly authoritative in the critical areas of selecting and acquiring software, and I suggest their purchase for anyone who will make any serious use of the computer in the hamshack.

Glossbrenner's *How to Buy Software* (ISBN 0-312-39551-5) is billed as "the master guide to picking the right program." Indeed, it is: the 648-page book is chock full of information needed to buy software with confidence. Included is information on computer operating systems and programming languages; how to read between the lines of software ads, reviews, and catalogs; how to evaluate programs before buying; interpreting sales and documentation jargon; where to buy software and what to do if your programs "crash"; and many other topics. Specific selection criteria are provided for most major types of programs, including communications, wordprocessing, spreadsheets, databases, and integrated software packages of various kinds.

A typical screen display from Electra's CompuScan 2100 scanner radio. The first scanner to feature an automatic video display which shows detailed information about the service being monitored, a wide range of sophisticated scanning patterns are possible with this computer-controlled hardware/software device, which interfaces with the user's personal computer. (Photo courtesy Electra Co.)



Whether you're using a vintage Radio Shack Model I computer, as shown here, a Timex-Sinclair, a Commodore 64, or a top-of-the-line IBM-PC, software selection techniques are similar. See the tips and suggestions contained in this article. (Photo courtesy Radio Shack)

Equally authoritative is the author's companion piece, *How to Get Free Software* (ISBN 0-312-39563-9). Based on the premise that whatever brand of computer you own there are thousands of free programs for you to run—if you know where to look and what to do—the book has the key addresses, contacts, and techniques to tap the vast and expanding reservoirs of free (or nearly so) public-domain programs. As the author points out, public-domain software can provide a useful and attractive alternative to commercially available software—and the price is right, too.

Special coverage is given to free software sources such as computer bulletin boards, services such as CompuServe and The Source, remote CP/M networks, the large user-group libraries, system-specific magazines, and non-user-group software collections and libraries. The author also introduces user-supported software, known as "freeware" or "shareware." Such software lies in a hazy area between public-domain and regular commercial software, where an author puts out a polished program but generally does not limit its distribution, not wanting to get involved in the myriad details of marketing his program. The idea is that if you use the program you remit a nominal amount to its author. This contribution often entitles you to printed documentation, telephone support, updates, etc.

We've consistently promoted the personal computer (PC) in a variety of hamshack applications, from antenna design to logging to propagation prediction, in our *CQ* articles and monthly columns. But it took Wayne Overbeck, N6NB, and James Steffen, KC6A, to "put it all together" in a comprehensive volume, *Computer Programs for Amateur Radio.* This 328-page book is published at $16.95 by Hayden Books, 10 Mulholland Drive, Hasbrouck Heights, NJ 07604. It's available also from the *CQ* Bookshop.

The book is both a computer tutorial and a collection of BASIC-language amateur-radio computer programs. It shows you how to harness your PC for contest and general-purpose logging, VHF operating, antenna design and improvement, moonbounce, database management, awards tracking, and the like. The emphasis is on practical hamshack computer applications, with a view to cutting down on the time spent in keeping records, performing mathematical calculations, and other "overhead" chores.

No specialized knowledge is required to get the programs up and running on the computers for which they were written. As long as you have a disk-drive-equipped Apple II, IBM-PC, TRS-80, Commodore 64, or any computer that runs CP/M and Microsoft BASIC, you should be able to use the programs in the book. Commodore Vic-20 and Timex-Sinclair computer owners can run a number of the programs, too.

For the user who doesn't enjoy the typing-in of lengthy programs, a package of software, which includes some 20 programs, is available on disk for the Commodore 64, TRS-80 Model III, and IBM-PC, as well as in several CP/M formats. The disks are available from some dealers, or directly from co-author James Steffen, KC6A, 6831 Espanita, Long Beach, CA 90815.

You obviously won't be able to consistently apply all of the software selection criteria we've provided all of the time. Sometimes, for example, it just isn't possible to get a "hands on" program demonstration prior to purchase, or you may find that the program is a new one with scant information available, and so you purchase it on faith and luck. But we hope these tips have taken some of the mystery out of software selection.

When buying software for the home or hamshack, make reference to the tips we have provided here. But above all, apply the same logical buying criteria that you would otherwise apply in making any substantial household or hobby purchase. Good shopping . . . and good luck! CQ

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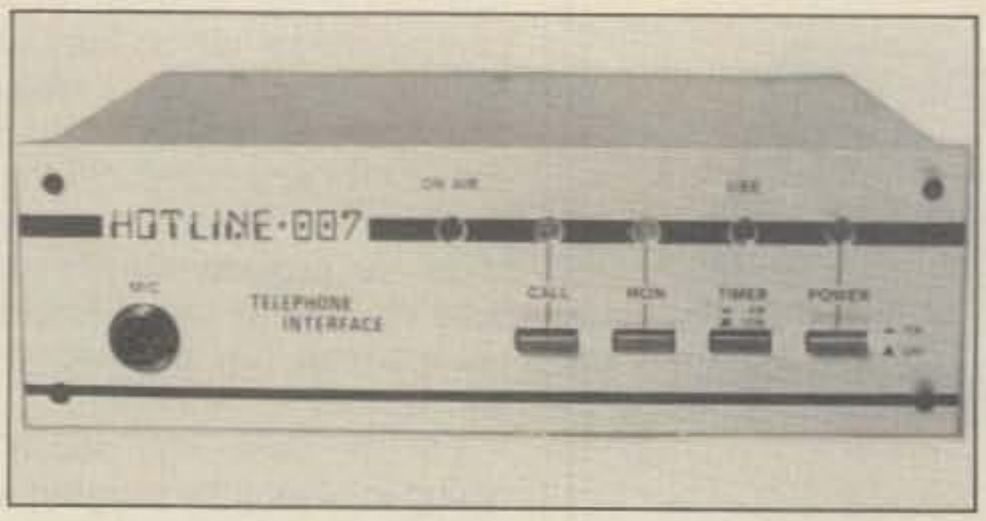

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New Features: individually calibrated resistance scale, expanded capacitance range (±150 pf). Built-in range extender for measurements beyond scale readings. 1-100 MHz. Comprehensive manual. Use 9 V battery. 2x4x4 in.

INDOOR TUNED ACTIVE ANTENNA

NEW! IMPROVED! with higher gain

"World Grabber" rivals or exceeds reception of outside long wires! Unique **tuned** Active Antenna minimizes intermode, improves selectivity, reduces noise outside tuned band, even functions as preselector with external antennas. Covers 0.3-30 MHz. Telescoping antenna. Tune, Band, Gain, On-off bypass controls. 6x2x6 in. Uses 9V battery, 9-18 VDC or 110 VAC with adapter, MFJ-1312, $9.95.

MFJ-1020A **$79.95**

POLICE/FIRE/WEATHER 2 M HANDHELD CONVERTER

Turn your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner! **$39.95** MFJ-313
144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency readout. Hear NOAA maritime coastal plus more on 160-164 MHz. Converter mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. Crystal controlled. Bypass/Off switch allows transmitting (up to 5 watts). Use AAA battery. 2¼x1½x1½ in. BNC connectors.

MFJ/BENCHER KEYER COMBO

MFJ-422 **$109.95**

The best of all CW worlds- a deluxe MFJ Keyer in a compact configuration that fits right on the Bencher iambic paddle! MFJ Keyer - small in size, big in features. Curtis 8044-B IC, adjustable weight and tone, front panel volume and speed controls (8-50 WPM). Built-in dot-dash memories. Speaker, sidetone, and push button selection of semi-automatic/tune or automatic modes. Solid state keying. Bencher paddle is fully adjustable; heavy steel base with non-skid feet. Uses 9 V battery or 110 VAC with optional adapter, MFJ-1305, $9.95.

VHF SWR/WATTMETER

MFJ-812 **$29.95**

Low cost VHF SWR/Wattmeter! Read SWR (14 to 170 MHz) and forward/reflected power at 2 meters. Has 30 and 300 watts scales. Also read relative field strength. 4x2x3 in.

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MFJ-250 **$39.95**

Tune up fast, extend life of finals, reduce QRM! Rated 1KW CW or 2KW PEP for 10 minutes. Half rating for 20 minutes, continuous at 200 W CW, 400 W PEP VSWR under 1.2 to 30 MHz, 1.5 to 300 MHz. Oil contains no PCB. 50 ohm non-inductive resistor. Safety vent. Carrying handle. 7½x6¾ in.

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Switch to 24 hour UTC or 12 hour format! Battery backup maintains time during power outage. ID timer alerts every 9 minutes after reset. Red LED .6 inch digits. Synchronizable with WWV. Alarm with snooze function. Minute set, hour set switches. Time set switch prevents mis-setting. Power out, alarm on indicators. Gray and black cabinet. 5x2x3 inches. 110 VAC, 60 Hz.

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MFJ-752B **$99.95**

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CIRCLE 11 ON READER SERVICE CARD

RTTY FOR ALL

MPT3100 + DSK3100 + ST6000:
MPT3100—the acknowledged top-of-the-line system for both commercial and serious amateur RTTY and CW stations. HAL pioneered the radio mailbox technique with the MPT3100, and now the new DSK3100 disc drive option gives you 326,000 characters of message storage. The system is designed particularly for the amateur, commercial, or military operator who has to handle a large amount of traffic. You can collect, edit, and retransmit traffic perfectly with a minimum of effort. The ST6000 is renowned for its weak-signal performance and reliability. Add the ARQ1000 for full AMTOR operations, including an AMTOR mailbox. If you are serious about your code and need high performance and reliability, this system is the proven world leader.

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CRI-200:
At last, a computer interface that *really* works and has an accurate tuning indicator. Take advantage of HAL's years of experience in RTTY and see how good computer RTTY can be. Best of all, it's universal and you can select the computer and software of your choice. Why be frustrated with computer RTTY? Hook-up the CRI-200 and work ALL the stations!

CWR6850:
Have a space problem or want portable RTTY? The CWR6850 is a one-package complete RTTY system. All you need is your transceiver and 12 VDC—the rest is in the CWR6850, including the screen. The high-performance RTTY demodulator for all shifts and either high or low tones is built-in. AND, the system is expandable! Add the ARQ1000 for AMTOR, the RS2100 RTTY Scope, and an ASCII printer, and you have a no-compromise base station for all modes.

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CIRCLE 20 ON READER SERVICE CARD

Announcing:

The 1985 CQ World-Wide DX Contest

Phone: October 26-27 & C.W.: November 24-25
Starts 0000 GMT Saturday Ends 2400 GMT Sunday

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones and countries as possible.
II. BANDS: All bands, 1.8 through 28 MHz.
III. TYPE OF COMPETITION:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IX. TROPHIES & PLAQUES (Donors)

PHONE

Single Operator, All Band
World - Dave Rosen, K2GM - WA2RAU Memorial
World - QRPp - Adrian Weiss, K8EEG/Ø
U.S.A. - Potomac Valley Radio Club
*Canada - Jack Baldwin, VE7RG
Carib./C.A. - Alex M. Kasevich, VP2MM
Europe - Thomas J. Peruzzi, Jr., W4BVV
Africa - Gordon Marshall, W6RR
*Asia - Japan CQ Magazine
*Japan - Japan Crazy Contesters Club
Oceania - No. California DX Club
S. America - David Novoa, KP4AM

Single Operator, Single Band
World - North Jersey DX Assn., K2HLB Memorial
*World - 21 MHz - Lee Wical, KH6BZF
World - 3.8 MHz - Fred Capossela, K6SSS

No-51-52

U.S.A. - 28 MHz - Donald Thomas, N6DT
U.S.A. - 3.8 MHz - Arnold Tamchin, W2HCW
U.S.A. - So. California DX Club
*Canada - Gene Krehbiel, VE7KB
Carib./C.A. - Pedro Piza, Jr., NP4A - KP4ES Memorial
Europe - 28 MHz Zone 14 - A. G. Anderson, GM3BCL
Japan - 21 MHz - DX Family Foundation

Multi-Operator, Single Transmitter

World - So. Calif. DX Club - W6AM Memorial
U.S.A. - Carolina DX Association
Europe - Box Cox, K3EST
*Canada - Calgary Amateur Radio Assn.

Multi-Operator, Multi-Transmitter

World - Radio Club Venezolano
U.S.A. - Dale Hoppe, K6UA
Europe - OH-DX-RING - OH2AM

Contest Expeditions

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

C.W.

Single Operator, All Band

World - Albert Kahn, K4FW - W2AB Memorial
World - QRPp - Gene Walsh, N2AA
U.S.A. - Frankford Radio Club
*Canada - Canadian DX Association
Carib./C.A. - Peter Munroe, WB1DQC
Europe - Edward Bissell, W3AU
Africa - Gordon Marshall, W6RR
*Asia - Japan CQ Magazine
*Japan - Japan Crazy Contesters Club
Oceania - Maui Amateur Radio Club
*So. Amer. - Venezuela DX Club - YV5AAZ Memorial

Single Operator, Single Band

World - North Jersey DX Assn. - W2JT Memorial
World - 3.5 MHz - Fred Capossela, K6SSS
World - 1.8 MHz - Chip Margelli, K7JA - KP4ES Memorial
U.S.A. - No. Illinois DX Association
*Canada - Canadian Amateur Radio Federation
Carib./C.A. - DX Club of Puerto Rico
Europe - Southern New England DX Club
Australia - 14 MHz - Jay Carr, W6FAY
*Japan - 21 MHz - DX Family Foundation

Multi-Operator, Single Transmitter

World - Anthony Susen, W3AOH
U.S.A. - Douglas Zwiebel, KR2Q

Multi-Operator, Multi-Transmitter

World - Hazard Reeves, K2GL
U.S.A. - James Rafferty, N6RJ
Europe - OH-DX-RING - OH2AM

Contest Expeditions

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

Special - Single Operator Awards

World - All Band - SSB/CW - John Knight, W6YY
World - Single Band SSB/CW - Yuri Blanarovich, VE3BMV
World - All Band - CW - Most QSOs - KV4AA Memorial. (From the 14270 kHz Group)
World - Club - SSB/CW - CQ Magazine

Trophy supplied by Donor.

Trophy winners may win the same trophy only once in a two-year period. In the event that the same station wins the same category in two consecutive years, a special *CQ* Magazine Championship plaque will be awarded the second year. The sponsored trophy in that category will then be awarded to the second-place finisher in that category if the returns justify the award.

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

The Canadian and Carib./C.A. awards are for residents *only*.
**A resident is defined as one living in that country with an established Post Office address.

X. CLUB COMPETITION:

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

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

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

XI. LOG INSTRUCTIONS:

1. All times must be in GMT.

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

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

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

5. Use a separate sheet for each band.

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

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

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

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

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

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

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

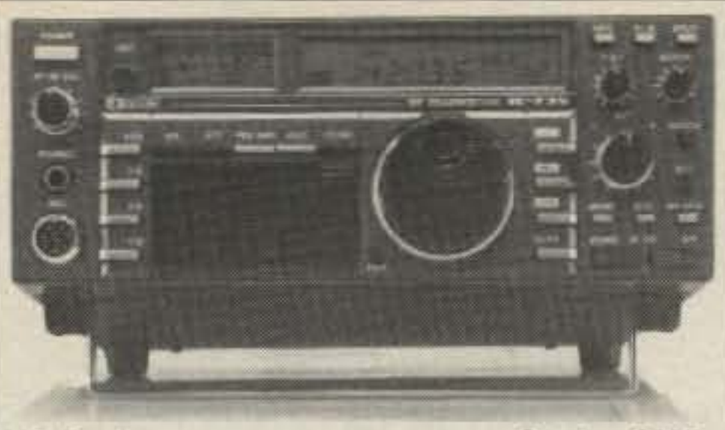
An entrant whose log is deemed by the Committee to contain a large number of discrepancies may be disqualified from eligibility for an award, both as a participant operator or station, for one year. If an operator is disqualified a second time within 5 years, he will be ineligible for any *CQ* contest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

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

XIII. DEADLINE: All entries must be postmarked NO LATER than December 1, 1985 for the Phone section and January 15, 1986 for the C.W. section. An extension may be given if requested. Indicate phone or c.w. on envelope.

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

**Trophy supplied by donor.*



HF Equipment	Regular	SALE
IC-735 Xcvr/SW rcvr/mic	849.00	**749.95**
PS-55 Power supply	160.00	**144.95**
AT-120 Automatic antenna tuner	TBA	
FL-32 500 Hz CW filter	59.50	
EX-243 Electronic keyer unit	50.00	
IC-730 8-band 200w PEP xcvr w/mic	829.00	**569.95**
FL-30 SSB filter (passband tuning)	59.50	
FL-44A SSB filter (2nd IF)	159.00	**144.95**
FL-45 500 Hz CW filter	59.50	
EX-195 Marker unit	39.00	
EX-202 LDA interface; 730/2KL/AH-1	27.50	
EX-203 150 Hz CW audio filter	39.00	
EX-205 Transverter switching unit	29.00	
SM-5 8-pin electret desk microphone	39.00	
HM-10 Scanning mobile microphone	39.50	
MB-5 Mobile mount	19.50	
IC-720A 9-band xcvr/.1-30 MHz rcvr	1349.00	**799.95**
FL-32 500 Hz CW filter	59.50	
FL-34 5.2 kHz AM filter	49.50	
SM-5 8-pin electret desk microphone	39.00	
MB-5 Mobile mount	19.50	
IC-745 9-band xcvr w/.1-30 Mhz rcvr	999.00	**779.95**
PS-35 Internal power supply	160.00	**144.95**
EX-241 Marker unit	20.00	
EX-242 FM unit	39.00	
EX-243 Electronic keyer unit	50.00	
FL-45 500 Hz CW filter (1st IF)	59.50	
FL-54 270 Hz CW filter (1st IF)	47.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	**89.95**
FL-53A 250 Hz CW filter (2nd IF)	96.50	**89.95**
FL-44A SSB filter (2nd IF)	159.00	**144.95**
HM-10 Scanning mobile microphone	39.50	
SM-6 Desk microphone	39.00	
HM-12 Extra hand microphone	39.50	
MB-12 Mobile mount	19.50	

IC-751 9-band xcvr/.1-30 MHz rcvr	1399.00	**1199**
PS-35 Internal power supply	160.00	**144.95**
FL-32 500 Hz CW filter (1st IF)	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-52A 500 Hz CW filter (2nd IF)	96.50	**89.95**
FL-53A 250 Hz CW filter (2nd IF)	96.50	**89.95**
FL-33 AM filter	31.50	
FL-70 2.8 Khz wide SSB filter	46.50	
HM-12 Extra hand microphone	39.50	
SM-6 Desk microphone	39.00	
CR-64 High stability reference xtal	56.00	
RC-10 External frequency controller	35.00	
MB-18 Mobile mount	19.50	

Options: 720/730/745/751	Regular	SALE
PS-15 20A external power supply	149.00	**134.95**
EX-144 Adaptor for CF-1/PS-15	6.50	

ICOM

Options - continued	Regular	SALE
CF-1 Cooling fan for PS-15	45.00	
EX-310 Voice synth for 751, R-71A	39.95	
SP-3 External base station speaker	49.50	
Speaker/Phone patch - specify radio	139.00	**129.95**
BC-10A Memory back-up	8.50	
EX-2 Relay box with marker	34.00	
AT-100 100w 8-band automatic ant tuner	349.00	**314.95**
AT-500 500w 9-band automatic ant tuner	449.00	**399.95**
AH-1 5-band mobile antenna w/tuner	289.00	**259.95**
PS-30 Systems p/s w/cord, 6-pin plug	259.95	**234.95**
OPC Optional cord, specify 2 or 4-pin	5.50	
GC-4 World clock **(Closeout!)**	99.95	**79.95**

HF linear amplifier	Regular	SALE
IC-2KL w/ps 160-15m solid state amp	1795.00	**1299**

VHF/UHF base multi-modes	Regular	SALE
IC-551D 80 Watt 6m transceiver	699.00	**599.95**
EX-106 FM option	125.00	**112.95**
BC-10A Memory back-up	8.50	
SM-2 Electret desk microphone	39.00	
IC-271A 25w 2m FM/SSB/CW xcvr	699.00	**569.95**
AG-20 Internal preamplifier*	56.95	
IC-271H 100w 2m FM/SSB/CW xcvr	899.00	**759.95**
AG-25 Mast mounted preamplifier*	84.95	
IC-471A 25w 430-450 SSB/CW/FM xcvr	799.00	**699.95**
AG-1 Mast mounted preamplifier*	89.00	
IC-471H 75w 430-450 SSB/CW/FM xcvr	1099.00	**969.95**
AG-35 Mast mounted preamplifier*	84.95	

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Common accessories for 271A/H and 471A/H		
PS-25 Internal power supply for (A)	99.00	**89.95**
PS-35 Internal power supply for (H)	160.00	**144.95**
PS-15 External power supply	149.00	**134.95**
CF-1 Cooling fan for PS-15	45.00	
EX-144 Adaptor for PS-15/CF-1	6.50	
SM-6 Desk microphone	39.00	
EX-310 Voice sythesizer	39.95	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	

VHF/UHF mobile multi-modes		
IC-290H 25w 2m SSB/FM xcvr, TTP mic	549.00	**479.95**
IC-490A 10w 430-440 SSB/FM/CW xcvr	649.00	**579.95**

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-27A Compact 25w 2m FM w/TTP mic	369.00	**319.95**
IC-27H Compact 45w 2m FM w/TTP mic	409.00	**359.95**
IC-37A Compact 25w 220 FM, TTP mic	449.00	**299.95**
IC-47A Compact 25w 440 FM, TTP mic	469.00	**419.95**
UT-16/EX-388 Voice synthesizer	29.95	
IC-3200A 25w 2m/440 FM w/TTP	549.00	**489.95**
UT-23 Voice synthesizer	29.95	
IC-120 1w 1.2 GHz FM transceiver	499.00	**449.95**
ML-12 10w amplifier	339.00	**299.95**

6m portable	Regular	SALE
IC-505 3/10w 6m port. SSB/CW xcvr	449.00	**399.95**
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
SP-4 Remote speaker	24.95	

Hand-held Transceivers		
Deluxe models	**Regular**	**SALE**
IC-02AT for 2m	349.00	**289.95**
IC-04AT for 440 MHz	379.00	**289.95**
Standard models	**Regular**	**SALE**
IC-2A for 2m	239.50	**189.95**
IC-2AT with TTP	269.50	**199.95**
IC-3AT 220 MHz, TTP	299.95	**239.95**
IC-4AT 440 MHz, TTP	299.95	**239.95**

Accessories for Deluxe models	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50
BC-35 Drop in desk charger for all batteries	69.00
BC-60 6-position gang charger, all batts **SALE**	**359.95**
BC-16U Wall charger for BP7/BP8	10.00
LC-11 Vinyl case	17.95
LC-14 Vinyl case for Dlx using BP-7/8	17.95
LC-02AT Leather case for Dlx models w/BP-7/8	39.95

Accessories for both models	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	39.50
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	29.50
BP-4 Alkaline battery case	12.50
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-2 Telescoping 2m antenna	10.00
CA-5 5/8-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
CP-1 Cig. lighter plug/cord for BP3 or Dlx	9.50
DC-1 DC operation pak for standard models	17.50
LC-2AT Leather case for standard models	34.95
RB-1 Vinyl waterproof radio bag	30.00
HH-SS Handheld shoulder strap	14.95
HM-9 Speaker microphone	34.50
HS10 Boom microphone/headset	19.50
HS-10SA Vox unit for HS-10 & Deluxe only	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier **SALE**	**79.95**
SS-32M Commspec 32-tone encoder	29.95

Shortwave receiver	Regular	SALE
R-71A 100 kHz-30 Mhz digital receiver	$799.00	**659.95**
RC-11 Wireless remote controller	59.95	**49.95**
FL-32 500 Hz CW filter	59.50	
FL-63 250 Hz CW filter (1st IF)	48.50	
FL-44A SSB filter (2nd IF)	159.00	**144.95**
EX-257 FM unit	38.00	
EX-310 Voice synthesizer	39.95	
CR-64 High stability oscillator xtal	56.00	
SP-3 External speaker	49.50	
CK-70 (EX-299) 12V DC option	9.95	
MB-12 Mobile mount	19.50	

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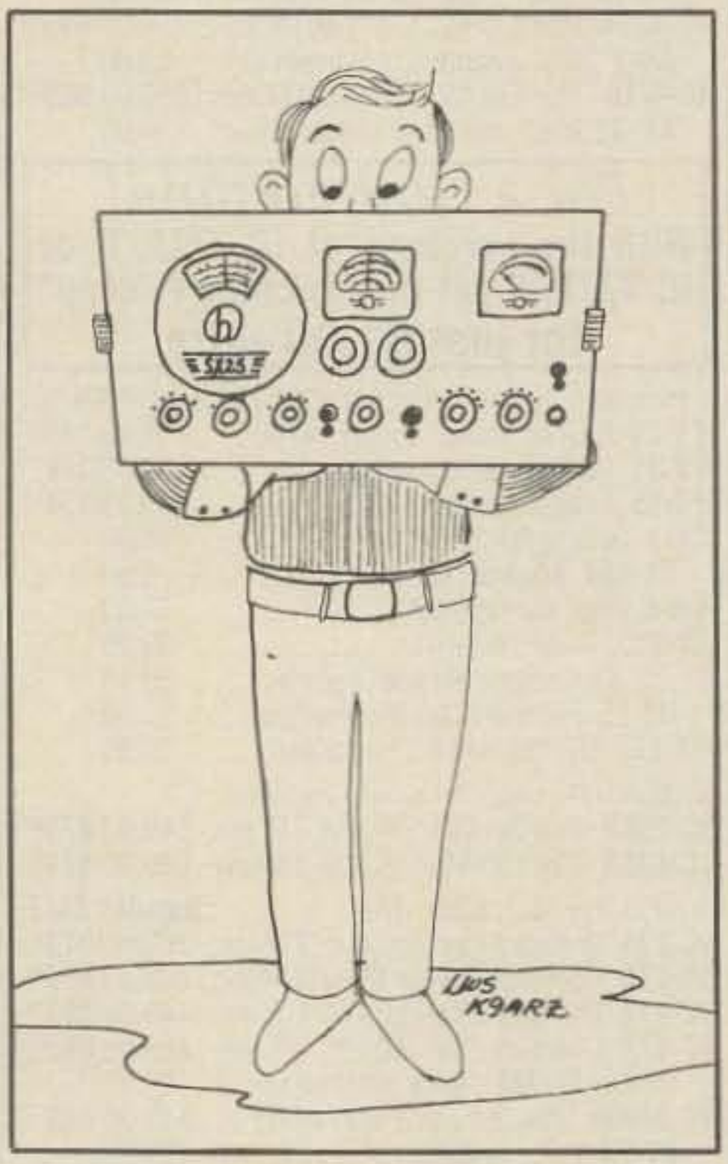
"BOAT ANCHORS AWAY"

BY LAWRENCE W. STARK*, K9ARZ

Over the years it seems as though hundreds of radio sets have passed through my hands, some for just a few weeks or months, others for years at a time. Occasionally, wives will joke about the measure of a boy's maturity as gauged by the complexity of his toys, and perhaps they are correct. One of the great fascinations of the hobby is the accumulation of "black boxes" adorned with calibrated knobs, chrome switches, and brightly color lights to amuse and impress the "child" in each of us. The novice amateur emulates the old timer by stacking as many pieces of radio paraphernalia on the desk top as it can hold, including an old CB radio or the Zenith "Trans-Oceanic" in order to impress a fellow amateur or the girlfriend next door. And non-amateurs are always impressed with their first hamshack visit and relate stories of "wall-to-wall radios that can communicate with faraway places such as Idaho or Hawaii."

Aside from the normal amateur's affinity for "hardware" in the shack, as one gets older and has more operating time logged, nostalgia can set in and complicate matters. You find yourself looking back through an old handbook or *CQ* magazine. You see a picture of that SX101 or HRO-60 that you lusted after in your youth, and try to remember what it was like operating radio during those times. For some it was a Grebe, HRO, or Superskyrider that headed their wish list. If your period of youth was like mine, those great radios were out of reach, so you might have had to make due with a used SW-3, S-38, or the like.

At a recent meeting of our local Friday Night DX Club, a few of us discussed the abundance of good, recent vintage radios that are now beginning to show up at the fleamarkets at very reasonable prices: Drake B-lines, Heath SB and HW



series, and Tempo Ones, which are not exactly state-of-the-art radios, but are still considered to be good performers. Two-hundred dollars or less can now provide the newly licensed Novice with a first-class station if he knows what to look for. The pickings are much better now than when I was a Novice.

My specialty, on the other hand, is the "boat anchor," and I'm not alone. There is a specialized group of hamfest goers who seek out the old classics and clunkers that appear as so much junk to the average neophyte. We dig through the junk looking for old Command Set receivers and transmitters (SCR-274N, ARC-5 military surplus). The old timers will remember modifying these World War II vintage HF aircraft radios for mobile and fixed use during the 50s. I have used them on and off over the years for portable use. The receivers were generally broader than a barn door with bandwidths from 10–15 kHz, but using the ARC-5 receivers "on-the-air" was and is a real challenge.

Other sought-after items include the TCS-12 navy transmitters and receivers, BC-312's, BC-348's, and the next generation of military and industrial surplus units such as the Hammarlund SP-600JX, and Collins R-388(51J) and R390 series. The latter units weigh a ton, but they use miniature tubes and are usually more sensitive, selective, and stable than their predecessors.

Each time I myself haul one of these old "boat anchors" to a fleamarket, I swear that never again will I buy another. However, like a New Year's resolution, it is quickly forgotten. One recent hamfest presented the opportunity to purchase a clean HT-32A for 60 bucks. Well, I remember when they sold for 600 bucks and put out a nice, clean signal. I could always save it for a new Novice (or so I thought), so home it came only to be sold again in six months. Unfortunately, it was sold to a "new General" who wanted to use the cabinet and transformer to make a linear for his HW-16!

Now my station is filled with little things: several solid-state transceivers, a general-coverage receiver, and the only "boat anchor" I won't part with—a short, rack-mounted 3/813's linear amplifier I built a few years back. It is large by current standards, but those old, round panel meters and TU-10B rack-handles take me back to a time when the only route to QRO was "rolling your own," and miniature meant 2E26's instead of 807's.

And what of the future? Well, I'll still scour the hamfests in search of a mint Collins R-388, RCA AR-88, or perhaps another TCS receiver (I sold both of mine). By the way, are there any collectors out there who share my love for "boat anchors"? I'd like to have someone recommend a good orthopedist! CQ

*1320 Fox Glade Ct., St. Charles, IL 60174

Ticket Talk

a monthly feature by
FREDERICK O. MAIA, W5YI

INFO ON AMATEUR RADIO LICENSING

Volunteer Examiners—What They Do and How To Become One

The FCC showed a lot of savvy by authorizing a VE program administrative layer (called VECs) between the volunteer examiner (VE) who actually administers the tests and their Gettysburg license issuing facility. It would have been chaotic had they not done so. Testing would have gone in a hundred different directions and unchecked amateur radio operator applications would have been submitted to the FCC by the thousands. The new volunteer examination program exists to save the taxpayer money . . . not to cost them more. It probably would have cost more without the VEC. The **Volunteer Examiner Coordinator** does just that—coordinates amateur testing with the government so that the program operates smoothly. Early indications are that it is working! At the rate VE testing is going, nearly double the number of exams could be administered this year versus the number given by the FCC in 1984!

The VEC provides leadership to the new amateur testing program and takes steps to ensure that the FCC rules that apply are followed. Each VEC also has some of his own procedures, too. While every VEC must adhere to FCC guidelines, every VEC's program is a little different. Each VEC has his own "stable" of VEs who administer examinations according to their established policies. So in effect, the VEC is the VE's boss.

How Do You Become a VE?

To become a VE, you must apply to the VEC. A VE can be accredited by more than one VEC, but must follow the VEC's policies when administering tests under their program. Although not required by the enabling legislation, the FCC requires three VEC accredited examiners to hold a test session. Each VEC sends his VEs some sort of accreditation credentials. It is important that a volunteer examiner line up at least two other VEs (and preferably more to act as alternates) so that a testing team can be formed.

Since the FCC elected to appoint VECs on a regional basis, there are many of them. Only three or four are national in scope, however. To handle more than one callsign region, a VEC had to convince the FCC that they could effectively supervise testing in a larger area. Those VECs that are national in scope (our program included) have instruction manuals that are distributed by mail for their VEs to follow.

Novice testing has been done by volunteers for decades, but that is a separate program not connected with *the new VE program.* We will only be addressing examining the Technician-and-up applicant. The biggest testing program, by far, is the ARRL's. The W5YI program is a distant second, but still we are testing hundreds of amateurs a month throughout the world. All VECs have the same authority.

While the FCC has set the general VE criteria, each VEC goes about it in a slightly different way. We believe our program is the simplest and most streamlined. You don't need other amateurs to attest to your character, nor do you have to take any tests to become a VE. Accreditation is fast (within a week). A short signed statement is all that is necessary along with a photocopy of your Extra class license.

Requirements For Becoming a VE

Actually, the FCC has said that Advanced class amateurs can participate in the new program, but only at the Technician class and General class *written* test level. All code tests must be administered by Extra class VEs. Due to a strange interpretation of the enabling legislation signed by President Reagan in 1982 (Public Law 97-259), the Commission requires that a VE must have passed test elements higher than those being administered. We believe that the FCC erred in this judgment. What the law actually says is that a VE must hold a higher class *license.*

If the FCC held to the law, Advanced class VEs would be able to administer the entire General class examination (including the code) instead of just the written (Element 3) portion. Look for a change in the FCC's position on this. We filed a *Petition for Reconsideration* on this sometime ago.

At the present our program only accredits Extra class amateurs as VEs. We have an application form available for those of you who are interested (send an SASE, please). There is plenty for non-VEs to do at a testing session, however, if you want to get involved! Contact a local VE team or a VEC, and they will tell you how you can help.

In order to have impartial testing, the FCC requires that VEs be 18 years old, not be related to the applicant, and not have a *significant* interest in the amateur equipment or license preparation publishing business. The key words are "significant" and "business." Minor connections (as long as you *do not personally profit* from the relationship) normally do not disqualify you from being a volunteer examiner. It is the VEC who makes this determination. These rules exist to preclude any possible conflict of interest. VEs must never have had their license revoked or suspended.

Expense Recoupment . . . The Test Fee

"Volunteer examiners may not be compensated for their services. They may be reimbursed for out-of-pocket expenses, except for Novice class examinations," a direct quote from Part 97.31 and pretty clear. The FCC sets the maximum expenses that are allowed to be reimbursed for each test session annually. Only one fee is allowed no matter how many elements an applicant takes. Applicants also cannot be required to pay any other fee associated with the examination, such as admission to a hamfest, testing material costs, etc.

The maximum expense reimbursement allowed initially was $4.00, but due to a provision that allowed for inflation, it was increased to $4.16 this past January. The figure is adjusted annually for changes in the Department of Labor Consumer Price Index. Most VECs have retained the $4.00 fee, however, since $4.16 is a cumbersome figure with which to work.

Who gets the fee (which is what we will call **expense recoupment** from now on) depends on how the VEC structures his program. If the VEC pays most (or all) of the expenses, he can elect to retain it. The re-

National Volunteer Examiner Coordinator, P.O. Box #10101, Dallas, TX 75207

ceived fees, of course, must be accounted for in the form of legitimate test connected expenses. Records must be kept for three years and be made available to the FCC upon request.

We believe that our program is the only one that shares test fees with our VEs. We feel that they also have legitimate expenses that must be paid for. We split the $4.00 fee down the middle when ten or more applicants are tested. A $3.00 fee is forwarded to us when there are nine or less exams. The difference between the $4.00 fee and the VEC share goes to the VE to help offset expenses.

Novice testing is a separate program, and VEs cannot charge a testing fee unless a higher class of license is applied for by the applicant, in which case it is the higher class and not the Novice test that has the fee attached to it.

Any legitimate expense can be reimbursed against test fees collected. The FCC has said that if the expense can reasonably be associated with the test session, it can be reimbursed.

Once a year (during January) all VEs and VECs recouping expenses must certify to the FCC that all funds received during the previous calendar year "were necessarily and prudently incurred." A detailed expense breakdown is not necessary. VEs who fail to return this certification must be disaccredited by the VEC and the FCC notified.

Next month: **So you want to give a test?**

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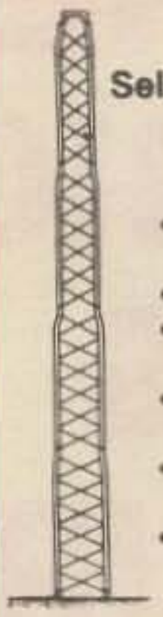
HG52SS	52 ft	9 sq. ft.	$CALL
HG54HD	54 ft	16 sq. ft.	$CALL
HG70HD	70 ft	16 sq. ft.	$CALL

Masts—Thrust Bearings—Other Accessories Available—Call! Prices Shown Are Your Total Delivered Price In Continental U.S.A.!



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- America's Best Tower Buy—Compare Save $
- Complete With Base and Rotor Plate
- In Stock Now—Fast Delivery

Model	Height	Ant. Load*	Weight	Delivered Price*
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HBX48	48 ft	10 sq ft	303	$429
HBX56	56 ft	10 sq ft	385	$499
HDBX40	40 ft	18 sq ft	281	$399
HDBX48	48 ft	18 sq ft	363	$489

*Your Total Delivered Price Anywhere in Continental 48 States. Antenna Load Based on 70 MPH Wind.

Tri-Ex®

These rugged crankup towers now available from Texas Towers! All models available On Sale for tremendous savings to you!

To save on freight costs, all towers are shipped directly from the Tri-Ex factory to you!

Check these features:
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- **Complete with base and rotor plate**
- **Totally self-supporting—no guys needed**

Model	Height Up	Down	Wind Load	List	Sale
W36	36.0 ft	20.5 ft	9.0 sq ft	$694	$579
WT51	51.0 ft	20.5 ft	9.0 sq ft	$1154	$899
LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$3199
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Formerly Tristao Tower Co.

MA-40
40' tubular
Regular $745
SALE! $549

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Will handle 12 sq. ft. antennas at 50 MPH winds.
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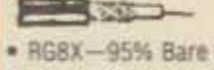
RG-213U

$.29/ft $279/1000 ft
Up to 600 ft via UPS

- RG-213/U—95% Bare Copper Shield
- Mil-Spec Non-contaminating Jacket for longer life than RG8 cables.
- Our RG-213/U uses virgin materials.
- Guaranteed Highest Quality!

RG-8X



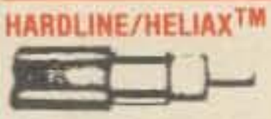
$.19/ft $179/1000 ft

- RG8X—95% Bare Copper Shield • Low Loss
- Non-contaminating Vinyl Jacket Foam Dielectric

Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
RG-213/U	50	.6	.9	2.3	5.2
RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

HARDLINE/HELIAX™



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½" Alum. w/poly Jacket $.79/ft
½" LDF4-50 Andrew Heliax ™ $1.69/ft
⅞" LDF5-50 Andrew Heliax ™ $3.99/ft
select connectors below.

HARDLINE & HELIAX ™ CONNECTORS

Cable Type	UHF FML	UHF MALE	N FML	N MALE
½" Alum	$19	$19	$19	$25
½" Heliax ™	$22	$22	$22	$22
⅞" Heliax ™	$49	$49	$49	$49

AMPHENOL CONNECTORS

Silver PL259 $1.25
UG21B N Male $2.95 UG23D N Female $2.95

Antenna Wire & Accessories

Copperweld Antenna Wire (steel core, copper coated)

Solid 12 ga. $.12/ft 14 ga. $.10/ft
Stranded 14 ga. $.10/ft 16 ga. $.09/ft
¼ mile 18 ga copper-clad steel wire $30
6 inch heavy-duty end insulator $2.00/ea.
Dog-bone insulator $.79 Coax seal $2.50

Van Gorden

1:1 Balun $11 Center Insulator $6
Dipole Kits D80 $31/D40 $28
Short Dipole Kits SD80 $35/SD40 $33
All-band Dipole w/ ladder line $29
Eavesdropper SWL Antenna $64

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MULTI-BAND HF ANTENNAS

A3 3-el Tribander	$219	A4 4-el Tribander	$289
R3 20/15/10mtr Vert	$279	A743/A744 40mtr Kit	$75

HF MONO-BAND ANTENNAS

10-3CD	$ 95	10-4CD	$109
15-3CD	$119	15-4CD	$129
20-3CD	$199	20-4CD	$279
40-2CD	$289	D40	$149

VHF/UHF BEAMS

A50-5	$ 79	617B	$199
214B	$ 79	3219	$ 95
220B	$ 95	424B	$ 79

OSCAR/TWIST ANTENNAS

A144-10T	$ 52	A144-20T	$ 75
A147-20T	$ 63	416TB	$ 59
A14TMB	$ 29	PS4	$ 69

VHF/UHF FM ANTENNAS

A147-4	$ 29	A147-11	$ 49
214FB	$ 79	228FB	$219
A449-6	$ 29	ARX2B	$ 39

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Discoverer 2-el 40-mtr Beam
Discoverer 3-el Conversion Kit
EXPLORER-14 SUPER SPECIAL
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TH2MK3S 2-el Triband Beam
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155BAS 5-el 15-mtr Beam
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204BAS 4-el 20-mtr Beam
64BS 4-el 6-mtr Beam
66BS 6-el 6-mtr Beam
18HTS 80-10 mtr Hy-Tower Vertical
LC-160 160-mtr Coil Kit for TH7DXS
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2BDQ 80/40 mtr Trap Dipole
5BDQ 80-10 mtr Trap Dipole
BN86 80-10 mtr KW Balun W/Coax Seal

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6BTV 80-10 mtr Vert. $129 5BTV 80-10 mtr Vert. $109
4BTV 40-10 mtr Vert. $89 G7-144 2-mtr Base. $119
G6-144B 2-mtr Base. $89

Mobile Resonators	10m	15m	20m	40m	75m
400W Standard	$16	$17	$19	$22	$26
2KW Super	$20	$22	$25	$29	$39

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40m-2 2-el 40-mtr Beam	$309
40m-3 3-el 40-mtr Beam	$459
40m-4 4-el 40-mtr Beam	$649
2m-13LBA 13-el 2-mtr Beam	$79
2m-14C 14-el 2-mtr Satellite Antenna	$89
2m-16LBX NEW-16-el 2-mtr Beam	$99
2m-22C NEW-22-el 2-mtr Satellite Antenna	$119
432-30LBX NEW-30-el-432 MHz Antenna	$99
435-18C 435 MHz Satellite Antenna W/CS-2	$119
432-16LB 16-el 432 MHz Beam	$69
435-40CX 435 MHz Satellite Antenna w. CS-2	$159

MINI-PRODUCTS HQ-1 $159

ROTORS

Alliance HD73 (10.7 sq ft rating)	$109
Alliance U110 (3 sq ft rating)	$49
Telex HAM 4 (15 sq ft rating)	$219
Telex Tailtwister (20 sq ft rating)	$269
Telex HDR300 Heavy Duty (25 sq ft rating)	$519
KLM EL-3000 Moon Tracker Elevation Rotator	$369
Kenpro KR400 Azimuth Rotator	$129
Kenpro KR500 Heavy Duty Elevator Rotator	$159
Kenpro KR600 Azimuth Rotator	$199
Kenpro KR2000 Heavy Duty Azimuth Rotator	$379
Kenpro KR5400 AZ/EL Rotor Package	$259
Kenpro KR5600 Heavy Duty AZ/EL Rotor Pkg.	$329

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10 ft Stack Sections

20G $39.50 45G $112.50
25G $49.50 55G $134.50

All 20G, 25G, 45G and 55G Accessories In Stock at Discount Prices - CALL!

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Model	Height	Ant Load*	Price
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FK4544	44 ft	34.8 sq ft	$1199
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FK4564	64 ft	28.4 sq ft	$1399

25G Foldover Double Guy Kit $219
45G Foldover Double Guy Kit $249

*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

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3/16" EHS Guywire (3990 lb rating)	$.15/ft
1/4" EHS Guywire (6000 lb rating)	$.18/ft
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3/16" CCM Cable Clamp (3/16" or 5/32" Cable)	$.45
1/4" CCM Cable Clamp (1/4" Cable)	$.55
1/4" TH Thimble (fits all sizes)	$.45
3/8EE (3/8" Eye & Eye Turnbuckle)	$6.95
3/8"EJ (3/8" Eye & Jaw Turnbuckle)	$7.95
1/2"EE (1/2" Eye & Eye Turnbuckle)	$9.95
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3/16" Preformed Guy Grip	$2.49
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6" Diam - 4 ft Long Earth Screw Anchor	$14.95
500D Guy Insulator (5/32" or 3/16" Cable)	$1.69
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5/8" Diam - 8 ft Copper Clad Ground Rod	$12.95

PHILLYSTRAN GUY CABLE

HPTG2100 Guy Cable (2100 lb rating)	$.29/ft
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9901LD Cable End (for 2100/4000 cable)	$7.95
9902LD Cable End (for 6700 cable)	$8.95
Socketfast Potting Compound (does 6-8 ends)	$14.95

GALVANIZED STEEL MASTS

Heavy Duty Steel Masts 2 in OD - Galvanized Finish

Length	5 FT	10 FT	15 FT	20 FT
12 in Wall	$29	$49	$59	$79
18 in Wall	$39	$69	$99	$129
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NEW Top-of-the-Line HF Transceiver
- **100% Duty Cycle**
- **40 Memory Channels**

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TR2600A - 2mtr
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NEW Ultra-Compact HT XCVRS
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MIRAGE AMPLIFIER SALE!

B3016 ONLY $199!

Model	Band	Pre-amp	Input	Output	Sale Price
A1015	6M	Yes	10W	150W	$249
B23	2M	No	2W	30W	$ 79
B215	2M	Yes	2W	150W	$259
B108	2M	Yes	10W	80W	$159
B1016	2M	Yes	10W	160W	$249
B3016	2M	Yes	30W	160W	$199
C22	220	No	2W	20W	$ 79
C106	220	Yes	10W	60W	$179
C1012	220	Yes	10W	120W	$259
D24	440	No	2W	40W	$179
D1010N	440	No	10W	100W	$289

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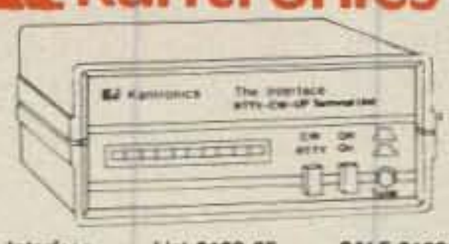

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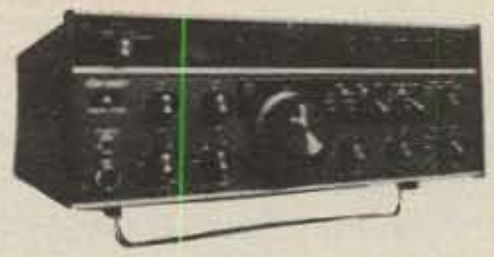

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A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

From the Notebook—Part VI

This month columnist Thurber again opens the Antennas Notebook to discuss the bottom line of antenna performance parameters. Stay with us for a very interesting and instructive presentation.
—K2EEK

Last month it was Part V of the Notebook series. In that column we discussed the venerable Beverage antenna, dear to the hearts of 160 meter *aficionados.* We also looked at some interesting and informative hamshack reading matter, as well as several new antenna products. We examined some new software, and recalled the familiar Greenwich Mean Time standard at the 101-year point.

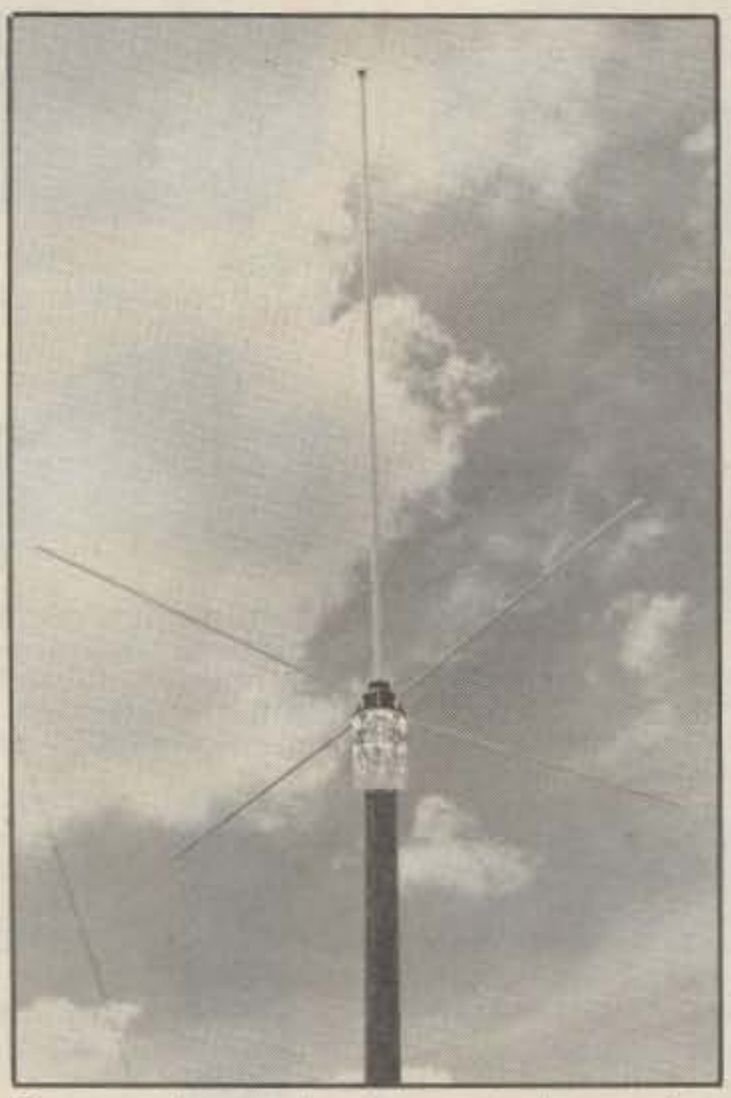
This time we'll close out the Notebook series with an examination of antenna performance parameters, primarily from the standpoint of the parameters themselves, but we will also consider some measurement aspects. We'll also examine some new antenna-related products, and take note of some hamshack reading material that you should find interesting. First, let's look at the "bottom line."

Antenna Performance Parameters

The bottom line with respect to antenna performance, from a practical standpoint, is how a particular antenna "works out"—how easily contacts are made, particularly on a competitive basis, and how well signals are radiated and received. For most amateurs the assessment of an antenna's overall performance is largely subjective, with little in the way of precise measurement involved, with the possible exception of standing wave ratio (SWR) measurement. But there are a number of important performance parameters, or characteristics, with which one should be familiar.

Here we'll examine a number of these parameters, or characteristics, and also have a few words to say about performance measurement. We'll look at the parameters in four broad categories: gain, radiation characteristics, feedline considerations, and physical factors.

1. **Gain.** There is little doubt that gain is one of the most important antenna parameters. Shaping an antenna's pattern, to concentrate the radiated energy or received signal, in some directions at the expense of others is the only way to develop gain. The antenna can't create radiation, but can only take the energy emitted by the transmitter and rearrange the way that it is radiated. Stated differently, gain may be thought of as a relative property of an antenna which allows it to concentrate radiation in a desired direction as well as to receive signals from that direction. Gain may be enhanced by various techniques, such as using multiple driven or parasitic elements, stacking, etc.



Some antenna designers and manufacturers rate their VHF and UHF antennas referenced to a quarter-wave groundplane antenna. This type of antenna exhibits a 0.3 dB gain over isotropic, but a −1.8 dB gain over the dipole. When comparing antennas based on different reference antennas, you may add or subtract the appropriate corrective factors for the three commonly used references, as in Table I. (Photo courtesy Hy-Gain)

Since gain is a relative property, not something that can be specified absolutely in terms of power, current, or voltage units, this property must be referenced to something. Usually, this reference is either the dipole, a quarter-wave groundplane, or a so-called isotropic radiator (a theoretical antenna that radiates power equally in every direction). There are some shortcomings in using these references, but it really doesn't make much difference which source we use, as long as *we know what the reference is.* Knowing the reference used is particularly important when evaluating competing commercial antenna performance claims.

For starters, it's helpful to commit to memory the fact that an isotropic radiator, our real baseline, is said to have a 0 dB gain. A quarter-wave groundplane has a −0.3 dB gain with respect to the isotropic radiator, while the dipole has a +2.1 dB "gain over isotropic." Table I lists a number of the most common relative antenna gains, and provides a convenient means of converting between the different baselines used.

Closely tied in with gain is *frequency response:* an antenna's gain is valid only over a certain frequency range, which may be as narrow as a few kHz or as wide as several MHz, depending on the antenna's design and the frequencies involved.

Antenna Type	Gain over Isotropic	Gain over Groundplane	Gain over Dipole
Isotropic	0 dB	−0.3 dB	−2.1 dB
Groundplane	0.3 dB	0 dB	−1.8 dB
Dipole	2.1 dB	1.8 dB	0 dB
5/8-wave Vertical	3.3 dB	3.0 dB	1.2 dB
2-element Yagi	7.1 dB	6.8 dB	5.0 dB
3-element Yagi	10.1 dB	9.8 dB	8.0 dB
4-element Yagi	12.1 dB	11.8 dB	10.0 dB
5-element Yagi	14.1 dB	13.8 dB	12.0 dB
2-element Quad	9.1 dB	8.8 dB	7.0 dB
3-element Quad	12.1 dB	11.8 dB	10.0 dB
4-element Quad	14.1 dB	13.8 dB	12.0 dB

Table I– Comparative antenna gain chart. The chart compares antenna gains for some common amateur antennas, with reference to isotropic, groundplane, and dipole antennas. Bear in mind that for gain figures to be meaningful, they must have a common reference. Be sure you know which reference is intended!

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Generally, gain is stated at the frequency at which maximum radiation occurs, but you should be aware of the overall frequency response if ability to work over a wide band of frequencies is important. Various methods can be used to increase an antenna's frequency response, such as by increasing conductor diameter.

2. **Radiation Characteristics.** Antenna radiation may be omnidirectional, bidirectional, unidirectional, or anything in between. Closely tied to directionality and gain, **beamwidth** is an extremely important parameter, since it tells you how wide an area you are "hitting" with your signal, or "capturing" with your receiver. As a rule, gain and beamwidth are mutually exclusive: you can't have high gain with wide beamwidth. Wide antenna beamwidth suggests low gain, while narrow beamwidth suggests high gain . . . the old "can't have your cake and eat it too" maxim.

In the same breath as gain and beamwidth should be mentioned **front-to-back (F/B) ratio.** This ratio, expressed in dB, indicates that signals arriving at the rear of the antenna will be attenuated so many dB below signals arriving via the front of the antenna. A high F/B ratio generally goes hand-in-hand with high antenna gain, but the figure is hard to accurately measure due to the narrow angular width involved, as well as local signal reflections. However, a moderately high F/B ratio will help reduce QRM (interference) from stations off the back of the beam.

Also to be considered are **side lobes,** which represent additional signal and noise pickup in addition to lower gain in the forward direction. These lobes may be numerous, and they make for signal waste in most applications; "cleaner" antenna designs suppress the side lobes as far as possible. Some VHF/UHF Yagis, such as those based on NBS (National Bureau of Standards) designs, boast side lobes that are down 13 to 15 dB.

Another factor of note is **polarization.** Whether to position the antenna elements horizontally or vertically depends on many factors. These include, but certainly are not limited to, frequency of operation, distance between transmitter and receiver, ionospheric conditions, local obstructions and noise levels, and antenna polarization on the other end of the path. On HF, for example, horizontal elements are generally used in rotary arrays, but the simple vertical groundplane has a lot going for it in terms of low-angle of radiation, an important consideration in DX work.

3. **Feeding Considerations.** Amateur antennas are usually fed with either balanced (openwire or twinlead) or unbalanced (coaxial) feedlines. Naturally, both types have their advantages and disadvantages. Both can do a fine job if properly selected for the job at hand, though you should be aware of your feedline's limitations and be careful not to exceed them.

Standing wave ratio (SWR) is one of the most commonly measured antenna "characteristics" or parameters. While it's the one most easily measured by amateurs, the results obtained only tell a small part of the total antenna performance story. This month's column discusses antenna performance parameters, their measurement and assessment. (Photo courtesy MFJ Enterprises)

If you're not careful, line losses—from ohmic resistance, radiation from the line, and deficiencies in the cable's insulation—can induce losses that may ruin the performance of an otherwise excellent antenna.

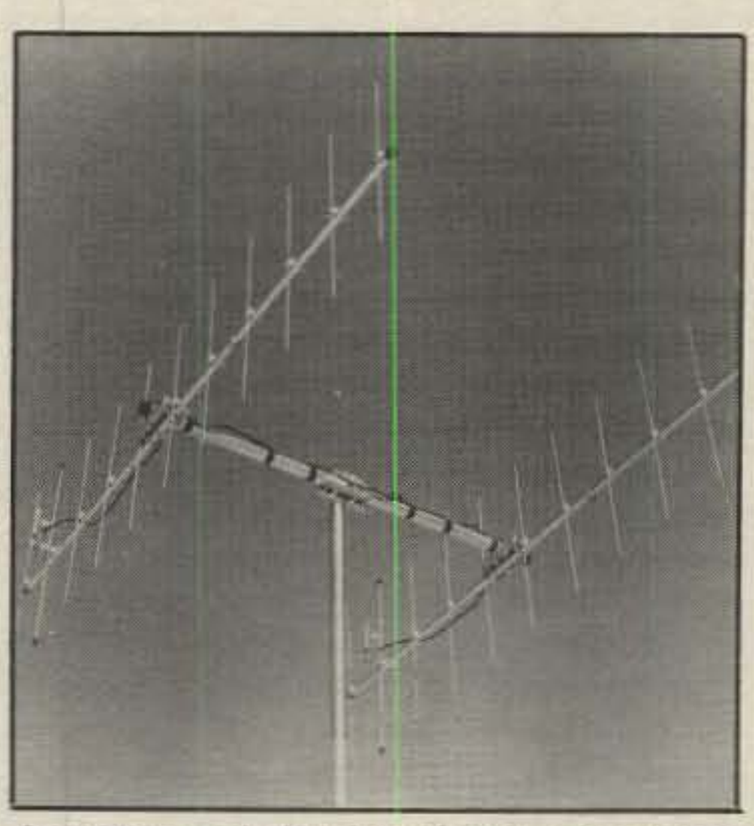
When selecting your feedline, be sure to consider factors such as the bands on which the antenna is to be used; expected feedpoint impedance; whether the antenna is inherently balanced or unbalanced; the transmission line length required; power level to be used; local weather conditions; SWR; and the like. Be sure to select the feedline to suit the antenna, rather than feed the antenna to suit the available feedline! Bear in mind that devices such as gamma- and T-matches, line matching sections, transmatches, and baluns can often provide the necessary interface between a normally incompatible antenna and transmission line.

Let's not neglect to mention **SWR.** Most antenna authorities will tell you that you don't have to have a 1:1 SWR on your antenna for it to work well. In some situations, SWR hardly matters, such as when feedling a center-fed HF dipole with openwire line on multiple bands, using a transmatch. However, when using coax on the higher HF bands and on VHF/UHF, you should strive to minimize SWR, to keep additional, SWR-induced line losses down. Too, many solid-state-final transmitters don't operate well with a high line SWR.

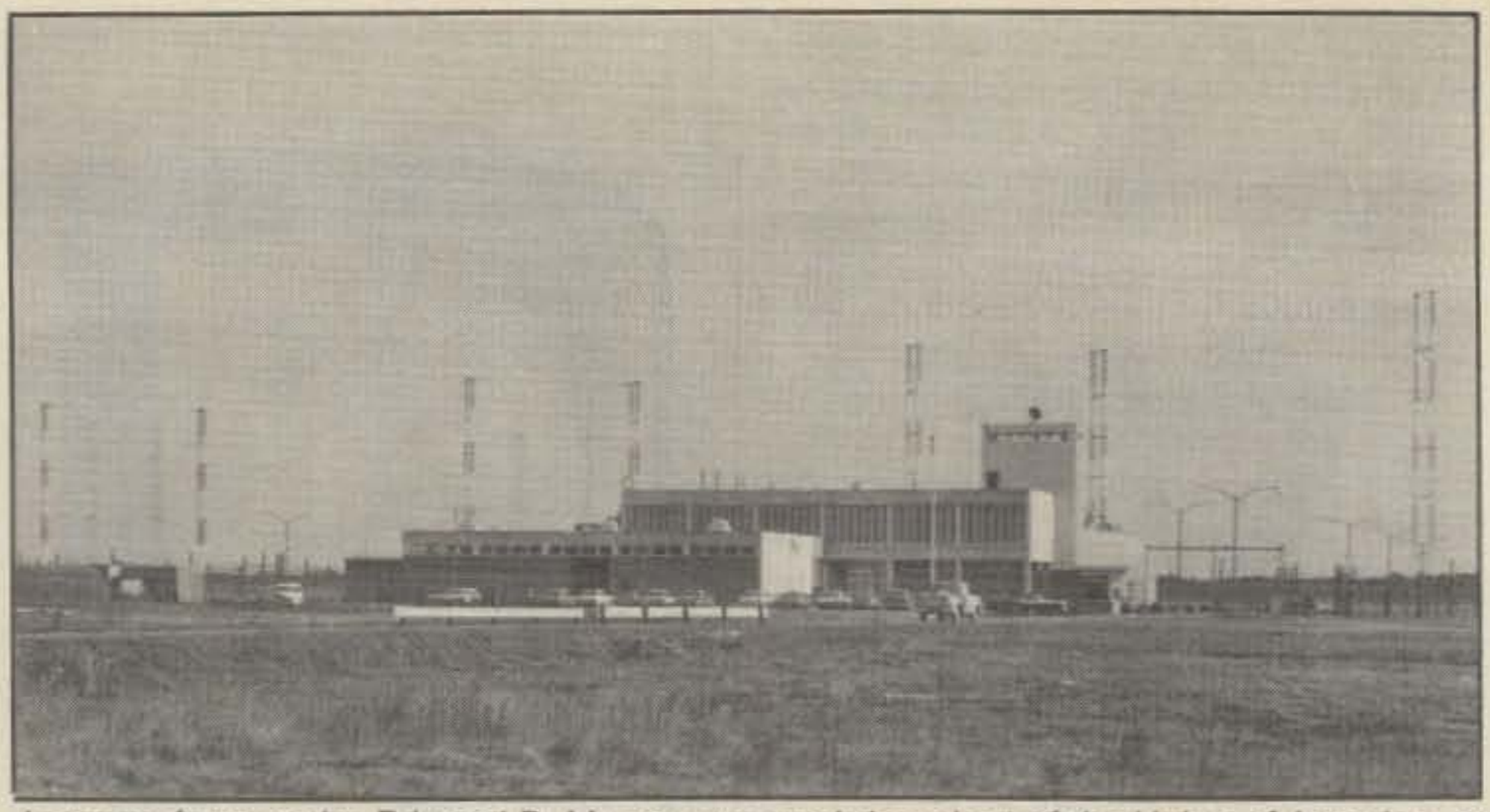
4. **Physical Factors.** It's good to keep in perspective some of the physical considerations when designing or purchasing an antenna. Every antenna installation is influenced by these factors. Not the least of these is *physical size.* Generally, high-gain antennas are large antennas, and one must decide whether he or she has the inclination to build, and the space to install, a physically large antenna. In general, most amateurs seek overall "antenna suitability" on the lower HF bands, where real gain is hard to come by. On the other hand, it's relatively easy to "go for the gain" on 220 MHz, where physical antenna dimensions are not so intimidating. Regardless, physical sturdiness and wind load should be considered as selection factors, especially in severe climates.

Another physical factor is *antenna height.* In general, the higher the better for antenna performance. This is especially true on VHF and UHF, where clearance of obstructions can result in dramatic improvement in performance. However, at higher frequencies "height gain" must be balanced against increased transmission line loss. On the lower HF bands antennas are usually installed at a height of one wavelength or less; small variations in height can have a marked influence over performance. Depending on the height above ground, the signal might radiate with a very low rise (a low angle of radiation), or with a very high rise (a high angle of radiation), with very different results.

Bear in mind that the antenna's effective height above ground is not necessarily the exact distance from the top of the antenna to the earth. Factors such as soil conductivity and conditions, local weather, and water tables determine the "true" antenna height. These variations can be minimized by installing a radial ground system below the antenna, whether that antenna be a beam, dipole, or vertical.



Stacking and phasing of arrays becomes practical on the VHF and UHF bands, where the physical size of such arrays becomes manageable. (Photo courtesy Cushcraft)



Antenna farm at the Edward R. Murrow transmitting plant of the Voice of America, at Greenville, NC. In addition to the primary design parameters, antenna peformance—including that of these curtains—is also influenced by soil conditions below the antenna, proximity effects of nearby objects, quality of feedline used, and the type of support structure and guying used. Whenever possible, antennas should be mounted in large clear areas, particularly if antenna pattern, gain figures, and front-to-back ratio are to approach the design specs. (Photo courtesy Voice of America)

Often overlooked in examining the factors which may impact on antenna performance are those such as *proximity effects* and *supporting structures*. It's best, of course, to have available a large, unobstructed area for antenna installation. Doing so will reduce or eliminate the effects of nearby objects on the antenna—effects which may include reduced gain, lowered F/B ratio, detuning, ragged SWR, and the like. Verticals that are mounted on the side of a house may experience excessive detuning and other undesirable effects. A similar result can be expected with a beam antenna that is installed but a short distance above the rooftop.

The tower or mast used to support a beam or flattop can have an effect on antenna performance, too. Wooden towers shoud give little trouble, but guyed metal towers can produce odd resonances and severely distort radiation patterns. To reduce such effects, you should use strain insulators to "break up" guy wire sections into short stretches. After doing this, each guy section may be checked for RF using a neon indicator.

So far we've discussed the performance parameters themselves; the actual measurement of the key antenna performance parameters is outside the scope of this article. A few observations, however, are in order.

First, gain is probably the most important parameter that you would be interested in measuring. It is possible to measure gain on an antenna test range, in which the antenna under test is compared to the gain of a reference antenna which has a known gain. Other less-precise techniques involve no equipment other than an antenna rotator, but rather use various mathematical and/or charting techniques to estimate antenna gain from bandwidth and other factors.

From a practical amateur standpoint, however, it's not necessary to accurately measure gain. With a tested-and-true antenna design, or a commercial product from a reputable manufacturer, satisfactory results ensue if one exactly follows the designer's or manufacturer's instructions, taking particular care with dimensions and spacings, as well as installation details.

The F/B ratio of directional arrays is roughly but easily checked by careful antenna rotation and comparison of signals arriving off the front and rear of the antenna. However, changing atmospheric conditions, even over short distances, influence the results, as do reflections from nearby objects, including other antennas. Don't be surprised if your estimated F/B ratio doesn't quite measure up to what you expected!

SWR is the characteristic most easily measured by amateurs, and we won't belabor SWR measurement here; enough has been written about SWR and its measurement to fill several textbooks. Know what you're measuring when you measure SWR, and interpret the results in terms of a guide to overall antenna system performance, not as an end unto itself. Note that whatever the limitations involved in SWR measurement, such measurements, even if made at the equipment end of the transmission line, will indicate whether the antenna favors operation at a frequency higher or lower than the desired point.

In this month's column we've just scratched the surface of antenna performance parameters, their measurement and assessment. Going into more

(1) PARASITIC ELEMENTS: A common problem caused by the proliferation of mistletoe growing out of a dipole antenna.

(2) DIPOLE ANTENNA: Any antenna that is suspended between two poles, hence the name "dipole."

(3) FOLDED DIPOLE ANTENNA: A dipole antenna that has not yet been taken out of the box.

(4) BROADBAND: A sexist term formerly applied to ham bands erroneously thought to have been restricted to YL hams.

(5) ANTENNA FEED: A mixture of powdered aluminum, Kibbles & Bits, and cod liver oil.

(6) DIGITAL LOGIC: Counting on one's fingers during the FCC exams (use of square roots and exponential numbers is not recommended for those who are not double jointed).

(7) FERRITE BEADS: Highly poisonous bait for ferrites, small nocturnal animals that feed on coaxial cable.

(8) DECAY TIME: A little-known property of integrated circuits defined as the number of days an IC will function before its insides rot out.

(9) PUSH-PULL AMPLIFIER: An amplifier with handles on either end of the case.

(10) FREQUENCY RESPONSE: The number of QSLs received divided by the number sent out, multiplied by 100.

(11) CARRIER FREQUENCY: The number of aircraft carriers in a fleet, specifically, those equipped with radio.

(12) R.F. SUPPRESSION: A recent attempt by consumer activists to put severe restrictions on radio transmissions.

(13) POLARIZATION: The sticking together of CW characters in an extremely cold environment.

(14) MUF—Maximum Usable Fudge: The most home-made fudge a ham radio operator can eat during a DX contest.

Table II– GERVAKf Bulletin excerpt. From the December 1984 parody issue of the bulletin, in which a "takeoff" on the "W5YIPES Retort" was presented, comes this listing of FCC definitions to be used on new Novice class exams.

detail would require far more space than we have available, and so I'll refer you to the standard texts: *The ARRL Antenna Book*, Bill Orr's *Radio Handbook*, and *The Radio Amateur's Handbook*. In addition, several excellent magazine articles have been published in this area. Notable among them are "Improving Antenna Performance," by John E. Magnusson, W0AGD, in the June 1981 *CQ*; "Antenna Performance Measurements," by Dick Turrin, W2IMU, in *QST* for November 1974; and Joe Reisert, W1JR's February and May 1984 VHF/UHF World columns in *Ham Radio*.

Product Peek

A new Nye Viking catalog shows an increase in the number of antennas and antenna-related products offered. In addition to at least five different Viking antenna tuners (which can handle up to 3 kw RF), Bill Nye, W7DZ, offers a number of accessories, including lowpass filters and wattmeters, plus a line of phone patches, keys, and keyer accessories.

A new product, designed especially to mate with the Nye line of antenna tuners, is the Model ANT-100 all-band dipole antenna. Basically a 135 foot centerfed dipole, the antenna itself is constructed of 14-gauge stranded copper wire, and is furnished with 100 feet of low-loss PVC covered twinlead. I found the instructions interesting, in that they included a number of tips, including modification of the antenna to form an end-fed Zepp, ideas for space-limited applications, some mounting height considerations, and various feedline length recommendations. For more information, contact the William M. Nye Company, 1614-130th Ave. N.E., Bellevue, WA 98005.

Spi-Ro Distributors, P.O. Box 1538, Hendersonville, NC 28793, specializes in multiband, trapped vertical and horizontal antennas. A recent catalog describes three multiband verticals, covering three, four, or five HF bands, varying in length from 12 feet for the 20–10 meter model, to 52 feet for the 80–10 meter model. A line of "two-trap" 3-, 4-, and 5-band multiband dipoles is also offered. At the top of the line are a series of four- and six-trap dipoles for optimal 3-, 4-, and 5-band coverage. According to the manufacturer, all traps are individually tested and calibrated, then matched in pairs for best results; all traps handle full legal power output. The firm features a 10-day money-back guarantee on its products.

Centurion, P.O. Box 82846, Lincoln, NE 68501-2846, has found an interesting "product niche" in the amateur marketplace. The firm sells small VHF/UHF antennas and replacement batteries, primarily for handi-talkie use.

The firm's "Tuf Duck" replacement antennas are available for a broad range of applications, including just about any combination of frequency, length, style, and connector. A full line of adapters, extensions, and accessories is also offered for both amateur and commercial two-way work. On the flip side, the firm offers an impressive selection of rechargeable Nicad batteries in single cell or modular form.

Good Reading

Following are several items with which you might want to curl up as the long evenings of fall and winter approach. First among these is a new hamshack computer book by Joe Kasser, G3ZCZ. Joe's October 1984 paperback is *Software for Amateur Radio*, and it's available from TAB Books, Inc., Blue Ridge Summit, PA 17214, for $15.95. (The TAB order number is 1560, and the ISBN number is 0-8306-0260-7).

Somewhat oriented to the TRS-80

series, the book is a valuable source of information for anyone interested in both computers and amateur radio. The book includes a number of BASIC programs and programming ideas that cover contesting, OSCAR satellites, antenna positioning, RTTY, packet radio, computer-aided design and circuit analysis, simulations and modeling, and SSTV.

Two from Glossbrenner. Two computer software books by Alfred Glossbrenner deserve special mention. Although written without specific reference to the hamshack, his books *How to Buy Software* and *How to Get Free Software* are clearly among the most authoritative and useful publications in the critical areas of selecting and acquiring software. I heartily recommend purchase of both books for anyone who will make any serious use at all of his or her computer—within or outside the hamshack.

Glossbrenner's *How to Buy Software* (ISBN 0-312-39551-5) is billed as "the master guide to picking the right program." Indeed, it is. The 648-page book is chock full of information needed to buy software with confidence. Included are information on computer operating systems and programming languages; how to read between the lines of software ads, reviews, and catalogs; how to evaluate programs before buying; interpreting sales and documentation jargon; where to buy software and what to do if your programs "crash"; and many other topics. Specific selection criteria are provided for most major types of programs, including communications, word processing, spreadsheets, databases, and integrated software packages of various kinds.

Equally authoritative is the author's companion piece, *How to Get Free Software* (ISBN 0-312-39563-9). Based on the premise that whatever brand of computer you own there are thousands of free programs for you to run—if you know where to look and what to do—the book has the key addresses, contacts, and techniques to tap the vast and expanding reservoirs of free (or nearly so) public-domain programs. As the author points out, public-domain software can provide a useful and attractive alternative to commercially available software—and the price is right, too.

Marked for special coverage are free software sources such as computer bulletin boards, services such as CompuServe and The Source, remote CP/M networks, the large user group libraries, system-specific magazines, and non-user group software collections and libraries. The author also introduces user-supported software, known as "freeware" or "shareware." Such software lies in a hazy area between public-domain and regular commercial software, where an author puts out a polished program but generally does not limit its distribution, not wanting to get involved in the myriad details of marketing his program. The idea is that if you use the program, you remit a nominal amount to its author. This contribution often entitles you to printed documentation, telephone support, updates, and the like.

GEARVAKf Bulletin. A typo, you say? No, there really is such a publication. It's been around since about 1958, either in its present newsletter format or in the form of private letter exchanges between several amateurs who attended college together in the mid-1950s. It's published by Joe Ventolo, K8DMZ, 356 Coronado Trail, Enon, OH 45323, and is a well-known Dayton Hamfest feature.

It's hard to accurately describe the newsletter. Perhaps it's best described as a spirited vehicle for amateurs to make fun of themselves and, good-naturedly, of other amateurs, the ARRL, hamfests, all amateur magazines, the FCC, and just about anything else that comes to mind. Parody sometimes plays a strong part in the newsletter—whose initials, incidentally, stand for a somewhat mystical organization known as "The Greater Enon AmateurRadioVention and Kitefly"—the author and his friends also being enthusiastic backyard kite-flyers.

Actually, the best way to learn about the bulletin is to read it. Joe asks a $1 donation per issue, although the paper is a hobby with him, and not a money-making venture. As he says, "It isn't worth it, so don't send any more money than you can afford to lose!" For more information, contact Joe at the address listed above. In the meantime, check out Table II, which is extracted from the December 1984 "W5YIPES Retort" parody issue!

SWL readers may be interested in *The Shortwave Guide,* published monthly by Lawrence Miller Publishing, 424 West Jefferson St., Media, PA 19063. This newspaper-like publication includes do-it-yourself projects each month, extensive and up-to-date listings of shortwave programs and English-language broadcasts, SW DX tips, and more. Sporting the motto "we'll put the world at your fingertips for 83 cents a month," the *Guide* is $9.95 for a one-year subscription.

Wrapping It

Time to "tie the ribbons" on the column this month. This time we have featured a discussion of antenna performance parameters, looked at some new and interesting products, and highlighted some worthwhile acquisitions for the bookcase, thus closing out the Notebook series, which has run for the past few months. Next time in the column we'll do some catching up with reader mail. See you then.

73, Karl, W8FX

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month as told by Henry is:

Henry Zimmerman, KB7W
All Counties #359, 1-18-82

"My interest in radio began when I was 19 years old and working in the express department of Pan American Airways. I was assigned as a supercargo aboard a cargo flight and my job was to make a weight report for the flight Radio Officer to send by CW. After watching him send the first report, I was hooked and wanted to become a radio operator. While still working in the express department on the four to midnight shift, I went to school during the day at a local vocational high school. After a month with no progress in learning the code, my instructor advised me to quit, saying that in his opinion I would never be a radio operator. A year later I took a job as a hotel night clerk so I could study on the job and enrolled in school once more. Nine months later I passed the exam for second class radiotelegraph, and Pan American had quit using Flight Radio Officers. So it was off to sea for me as a 'sparks.' Oddly, I did not sail on any ship that had an amateur radio operator until about ten years ago.

"The captain on one of my ships was a ham, and I did become mildly interested. It was necessary for me to take a correspondence course prior to attending a union school for 12 weeks to be certified as a Radio Electronics Officer. Having invested so much time in review of basic theory, I decided to study for other licenses, and within the next two months I passed the tests for radar endorsement, aircraft radiotelegraph endorsement, first class radiotelephone, amateur General class, and amateur Advanced class.

"I first got on the amateur bands maritime mobile and was helping out a ham who was living close to me. I was helping him get countries in the Pacific Ocean, and I got bitten by the DX bug . . . .

"I eventually became licensed in Jordan as JY8RS, in Portugal as WA7ZLC/CT1, and in Israel as WA7ZLC/4X. I worked 294 countries from the home QTH and 294 from maritime mobile, not each the same 294.

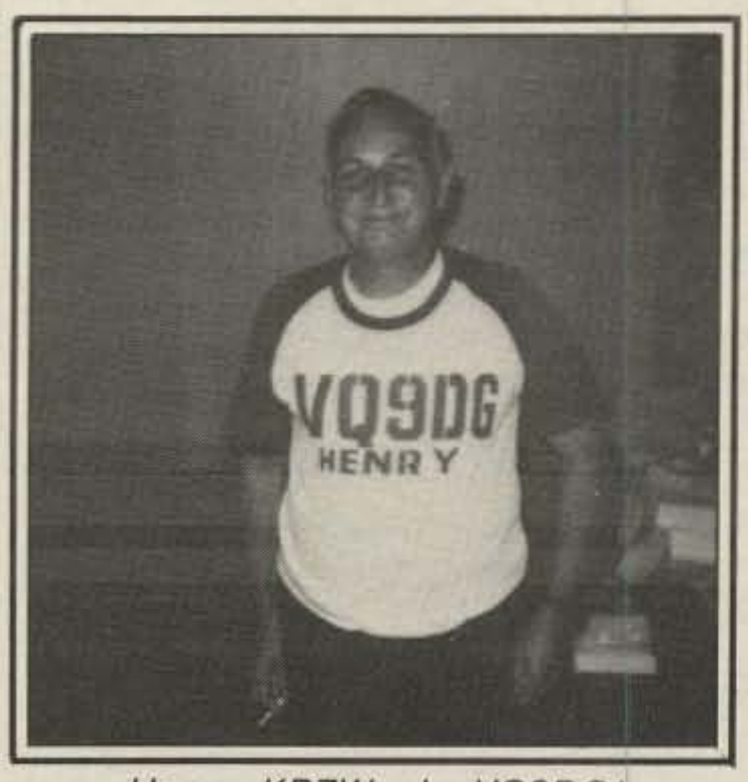
"I got into county hunting by accident while MM when I found the net operating on 14.336 and was told by net control that since I was less than 3 miles from the coast, I could run the county that I was in. So I started putting out the counties in the ports that I entered and left. Realizing that I already had about 650 counties worked before joining the net, I figured that I might as well go all the way and work them all. I had a wonderful time hunting the counties and getting to know the county hunters. Bill, KM4W, gave me my very last county, Lawrence County, Tennessee, on October 23, 1981.

"At present I am working aboard a ship chartered to the U.S. Navy. We shuttle between Subic Bay and Diego Garcia in the Chagos Islands. Each time at Diego Garcia I go ashore and operate the club station with my own call, VQ9DG. So far, during four visits or 12 days, I have made 1909 contacts. I hope to make at least 3076.

"It is my intention to work all counties the second time. I would like to make these contacts only as net control, but it is tempting to used the counties I have worked as VQ9DG. In any case, when I do get moved again to where I can put up towers and beams, I will be back on 14.336 to say 'thank you for all those counties' by acting as NCS or assistant.

"Thanks to all those wonderful hams who are also active county hunters! 73, Henry, KB7W."

Henry Zimmerman, KB7W, USA-CA All Counties #359, 1-18-85.



Henry, KB7W, aka VQ9DG!

Special Honor Roll
Charles M. Betz, N0AKC
All Counties #492, 5-15-85
All SSB, All Mobile

Awards Issued

Charles M. Betz, N0AKC, finished them all and qualified for USA-CA 500 #2030, USA-CA 1000 #879, USA-CA 1500 #714, USA-CA 2000 #640, USA-CA 2500 #584, USA-CA 3000 #522, and All Counties #492, endorsed All SSB, All Mobile, 5-15-85.

Bernard D. Fair, KA8CUS, claimed USA-CA 1000 #878, All CW, 5-8-85.

Colin E. Pollard, N6UH, has added another gold seal to his award certificate by qualifying for USA-CA 1500 #713, All CW, 5-2-85.

USA-CA 500 certificates went to:

Kenneth W. Jewell, VK3AKK, USA-CA 500 #2027, 5-4-85, Mixed.

Hideki Takeuchi, JA2BAY, recipient of USA-CA 500 #2029, #1 all 7 MHz.

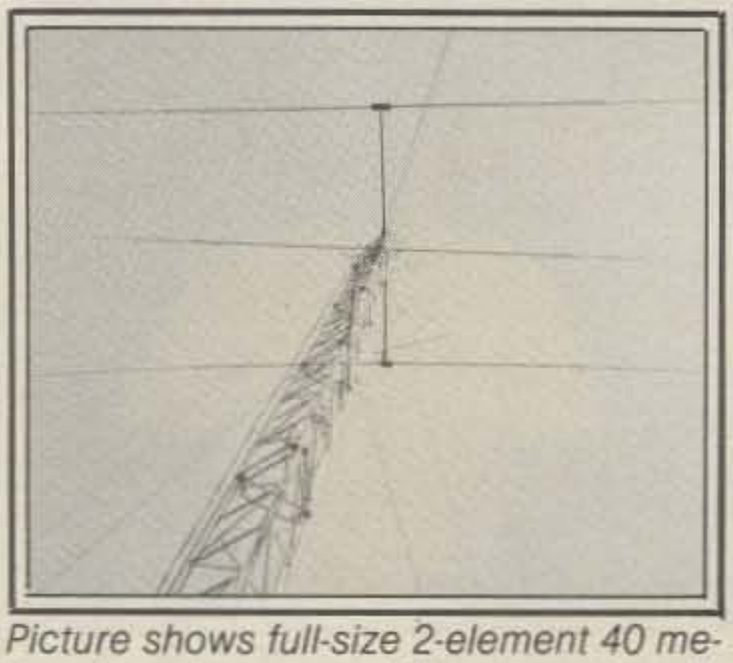
Top of the tower belonging to JA2BAY, Shizuoka, Japan. Beam is pointing toward the United States.

333 South Lincoln Ave., Mundelein, IL 60060

No-69-70

USA-CA Honor Roll

3000		1500		500	
NØAKC	522	N6UH	713	VK3AKK	2027
		NØAKC	714	W4WXJ	2028
2500				JA2BAY	2029
NØAKC	584	1000		NØAKC	2030
		KA8CUS	878	PY1DFF	2031
2000		NØAKC	879		
NØAKC	640				



Picture shows full-size 2-element 40 meter phased array and ½-wave rotary dipole for 20 meters up about 20 meters. Antenna installation of JA2BAY.

John D. Hill, W4WXJ, USA-CA 500 #2028, 5-7-85, Mixed.

Hideki Takeuchi, JA2BAY, USA-CA 500 #2029, 5-13-85, All 7 MHz, All SSB. This is the #1 endorsement for 7 MHz (see photos).

Charles M. Betz, NØAKC, USA-CA 500 #2030, 5-15-85, All Mobile, All SSB.

Claudio R. S. Pinto, PY1DFF, USA-CA 500 #2031, 5-28-85, Mixed.

Awards Available

Award "Citta di Firenze." From September 1, 1985 to October 31, 1985 the first edition of the Award "Citta di Firenze" will be celebrated. The award is organized by the Amateur Club of Florence and is dedicated to the city of Florence. A certificate will be issued to any radio amateur meeting the required conditions. All licensed amateurs and SWL's worldwide are invited to participate. Contacts for the award must be made between 0000 GMT September 1, 1985 and 2400 GMT October 31, 1985. Operation: All bands—3.5, 7, 14, 21, 28 MHz and higher frequencies may be used in SSB, CW, RTTY, and SSTV.

Amateurs and SWLs wishing to apply for the award must only work amateurs belonging to the Florence Radio Club. They will give a report and a progressive number for each QSO.

Points: Extra—Europe HF Contacts—To obtain the award amateurs must make 3 contacts or HRDs in SSB or 3 in CW or 1 (one) contact or HRD in SSTV or RTTY. Europe HF Contacts: In this area, 10 contacts or HRD's in SSB or 10 in CW or 2 contacts or HRDs in SSTV or RTTY. Concerning all the frequencies above 28 MHz, 1 (one) contact or HRD is enough

Diploma Citta di Firenze, sponsored by the Sezione A.R.I. de Firenze.

for the application (contacts via EME Satellite are also acceptable). Repeater or ground transponder QSOs or HRDs are not acceptable.

Mail your application for the award to: SEZ. A.R.I. (Firenze), P.O.B. 511, 501000 FIRENZE (ITALIA), along with the list of QSLs confirming the QSOs with stations worked by the amateur and Lit. 10.000 or 20 IRC's or 5 dollars U.S.A. Final date for submitting applications is February 28, 1986.

The Saskatoon Wheat Belt Award, sponsored by the Saskatoon ARC.

The Saskatoon Wheat Belt Award. The Saskatoon Amateur Radio Club wishes to announce the Wheat Belt Award. This award is available to any amateur submitting proof of contacting members of the Saskatoon Amateur Radio Club as follows:

If in North America, 5 contacts;
If in Saskatoon, 10 contacts;
DX stations, 3 contacts.

Mixed modes or bands are acceptable.

For stations in North America the fee for the award is one IRC, or SASE. The fee for stations outside North America is 2 IRCs. Send log data and fee to: Awards

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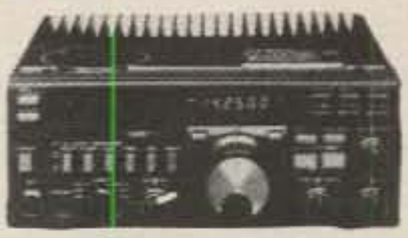
IC-745

ICOM

IC-02A

YAESU

FT-980 CAT

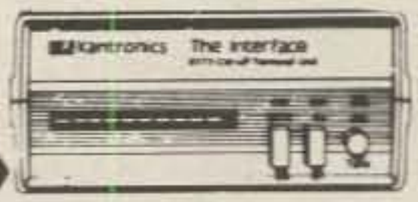


FT-757 GX

FT-209 RH

TR-7950

CP-1



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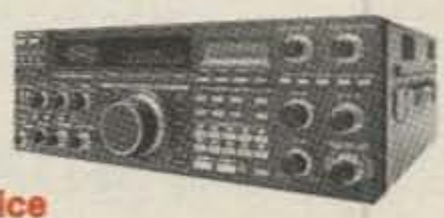

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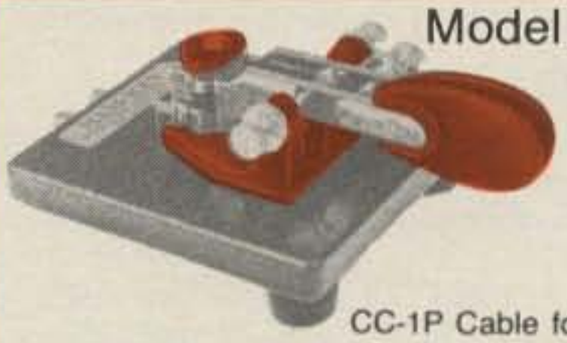

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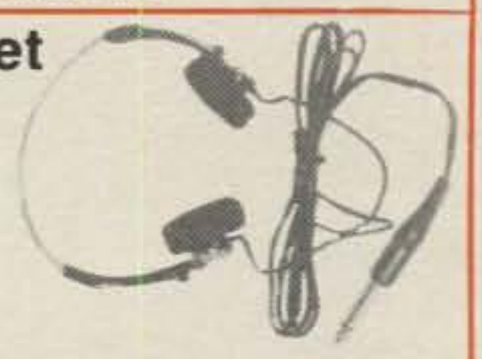

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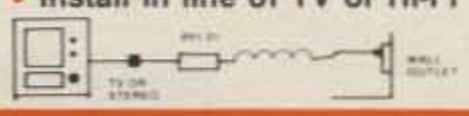

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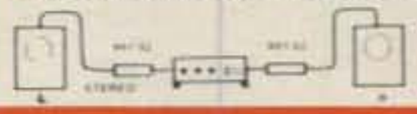

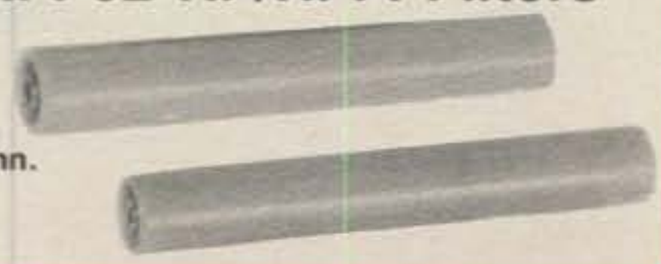

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"On 40 meters, I have the ColAtchCo four element array, with 42 radials under each vertical. It does a fine job. Look at this list of stations which answered my CQ's on Sunday afternoon of the 1985 ARRL DX CW Contest: VK3AJJ, 4X6IF, JA7RHJ, KØAX/KH2, HB9EU/ZS1, JA7YAA, JA5KQD, JA7YFB and a string of Europeans! That's a lot of long path performance.
On 80 meters, I really enjoy **not** waiting in pile-ups. The pleasure is keener when people see how modest is the construction of the two element 42 foot vertical array. DX on 80 has included VKØGC, YBØJH, VU2GO, 3B9CD, CEØZIJ, and Japan." **K1VR**

"My experiences with the ColAtchCo 'Instantarrays' can only be described in superlatives. You may recall that I have the 4 element array on 80 and a 2 element array on 160. The 80 meter array has brought the world to my fingertips. Within the next year I should be at the 300 country mark on 80 (only 5 to go!).
The best proof of performance on 160 is just to list a few of the prefixes I have worked since putting up the array last fall: ZK2, HZ1, UI8, 9J2, 3C1, 7X5, SV5, ZS3, VS6, ISØ, U05, CE8, H44, JA, 3B9, 5T5, KX6, 5N8...etc. Two nights ago I worked all continents on SSB with no report less than S8. What more can I say?" **W4DR**

"Achieved top claimed single band 80 meter score in 1984 CQ WW CW and 1985 ARRL CW contests using three ColAtchCo 1-80 verticals in home-brew triangular array." **W1FV**

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Say You Saw It In CQ

The SLA Award, sponsored by the O.B.P. #1 Radio Club of St. Louis.

Committee, S.A.R.C., P.O. Box 751, Saskatoon, Saskatchewan, Canada, S7K 3L7.

St. Louis Award (SLA). This award is issued by the O.B.P. #1 Amateur Radio Club of St. Louis, Missouri, W0WJ, for contacting a total of 10 stations in the City of St. Louis or St. Louis County. Cost of this award is $1.00, or 4 IRC's. For DX stations airmail is 6 IRCs. This award can be endorsed once for single band and mode on the original application, or for 2 IRCs at a later date.

The 10 cards must be in your possession for this award. Apply with a list of the cards which has been certified by another amateur and yourself. Address all applications to: Jim Glasscock, W0FF, 3416 Manhattan Ave., St. Louis, MO 63143.

Zone 4 Award, offered by the O.B.P. #1 Radio Club of St. Louis, Missouri.

Zone 4 Award. The Zone 4 Award is issued for working one station in each of the call areas of zone 4 on the WAZ list. Required call areas are as follows: VE's 3, 4, 5, and 6, W/K 4 (Kentucky, Tennessee, or Alabama only), W/K 5, W/K 7 (Montana or Wyoming only), W/K 8 (Ohio or Michigan only), W/K 9 and W/K 0 for a count of ten cards.

Cost is $1.00 US, or 4 IRCs. DX airmail is 6 IRCs. Apply with a list of the cards which has been certified by yourself and one other amateur. Send application to: Jim Glasscock, W0FF, 3416 Manhattan Ave., St. Louis, MO 63143.

Northern Kanagawa DX Association—Single Mode Five Band All Continents. Applicants must submit proof of QSOs with stations

The Single Mode Five Band WAC Award, sponsored by NKDXA.

in six continents on a single mode and five bands. This award is issued to any licensed radio amateur and SWL who submits proof of two-way radio contacts with the above stations. The mode and amateur bands used, and the date of contact, are not limited at all. The serial number of the award is separately given to each mode.

This award may be issued for six or more bands with special endorsements if all supporting information is included in the application. QSL cards of the same station for different bands and different modes may be used in one application. Cross-band and cross-mode QSOs cannot be counted. This award is given in the form of a trophy with a medal.

Send the log data certified by two licensed radio amateurs and 35 IRCs to: Award Chairman, Northern Kanagawa DX Association, JE1TTI, Michinori Jimbo, 2653, Suarashi, Sagamiko-Machi, Tsukui-Gun, Kanagawa-Ken, 199-01, Japan.

WIA 75 Award. The world's first and oldest radio society, Wireless Institute of Australia, is celebrating its 75th Anniversary. One of the many planned activities is the WIA 75 Award, which will be available during the period March 1 to December 31, 1985. To qualify, Australian radio amateurs (and shortwave listeners) need to contact (log) 75 members of the Wireless Institute of Australia. A contact will only be valid if the WIA member's individual membership number is logged. No more than 30 WIA members may be logged in any one callsign area.

Overseas radio amateurs and shortwave listeners, including those in VK9 and VK0, can qualify in any of the following ways:

1. Contact (log) the commemorative station VK75A.
2. Contact (log) a radio amateur who has already qualified for the WIA Award, and during the QSO obtain his/her Award Certificate number.
3. Contact 75 WIA members, no more than 30 in any one callsign area, and log their WIA membership number.

Claims should include a log extract of the required contact(s), and $2 to cover certificate, handling, and postage costs. Send to: WIA 75 Award Manager, Wireless Institute of Australia, 412 Brunswick Street, Fitzroy, 3065, Victoria, Australia.

Notes:

September in Midwest America brings harvest time, thoughts of the children returning to school, and the start of preparations for the onslaught of another winter. I hope things are going well where you are.

73, Dorothy, WB9RCY

Novice

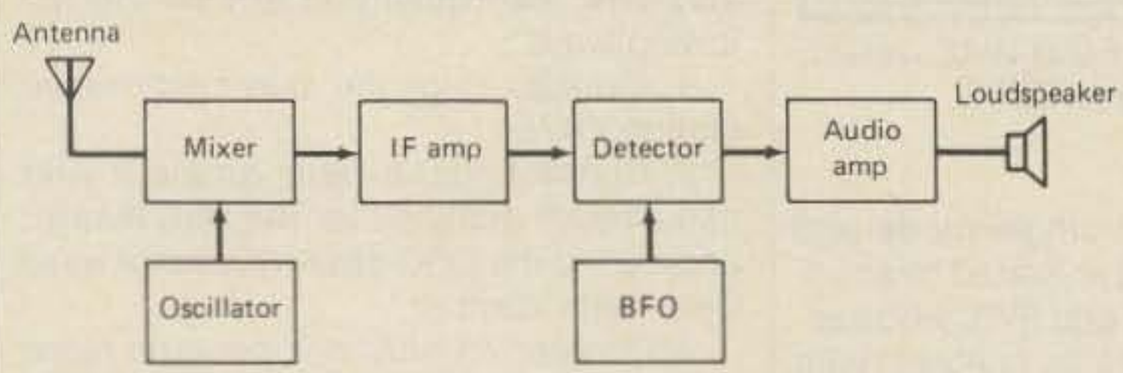
a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Novice Licensing Data—Part III

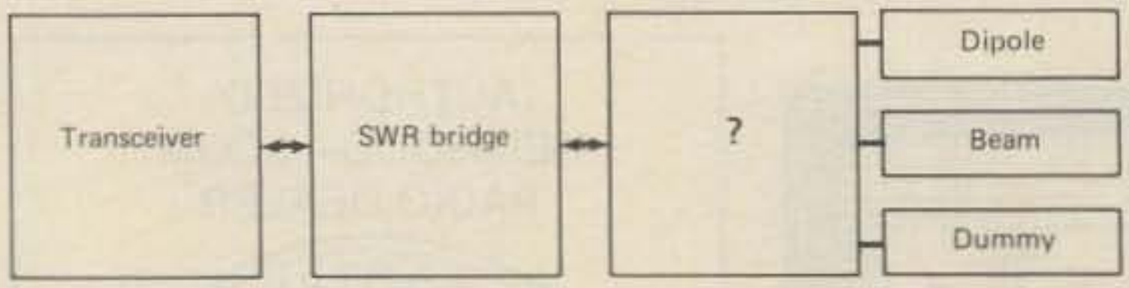
Last month we began to cover the material necessary to pass the Novice amateur radio exam. This month we take up where we left off and complete the segment on circuit components, practical circuits, signals and emissions, and operating procedures. Although designed to run in six installments, this series will run at least seven now due to the length of material to be covered plus the illustrations necessary to understand what is being taught.

2G-2.2. What type of device does this block diagram represent? This is a single conversion superheterodyne receiver.



2G-3.1. Draw a block diagram representing how two different antennas and a dummy load can be connected to the same transceiver. The antenna switch is used to connect the desired "antenna" to the transceiver, and to disconnect the other two "antennas" from the transceiver. The dummy load is called an antenna in this explanation because it serves in lieu of an antenna during transmitter tune up and test transmissions.

2G-3.2. What is the unlabeled block in this diagram? It is the antenna switch. Signals flow both ways between the transceiver and the selected antenna. Transmitter output is applied to the antenna system to be radiated. The selected antenna supplies received signals to the receiver section of the transceiver.



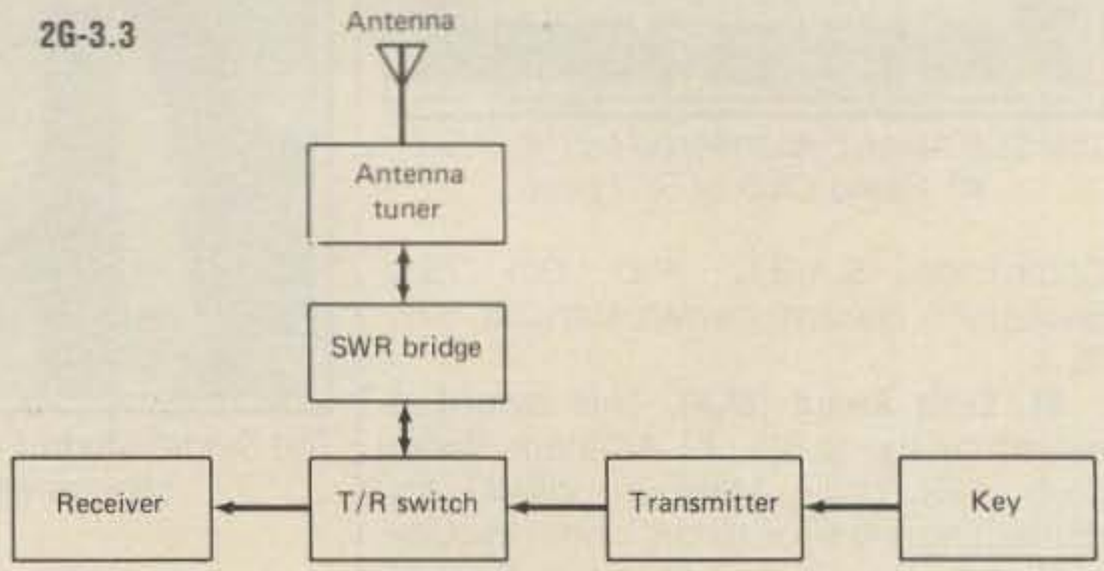
2G-3.3. Draw a block diagram representing an amateur radio station including a transmitter, receiver, telegraph key, TR switch, SWR bridge, antenna tuner, and antenna. When the key is depressed, the transmitter (XMTR) produces an RF output to the antenna through the transmit/receive (T/R switch), SWR bridge, and antenna (ANT) tuner. When in transmit mode, the T/R switch protects the receiver's input circuit from the transmitter's output. When in receive mode (not transmitting) the antenna is connected to the receiver input through the antenna tuner, SWR bridge, and T/R switch.

2G-3.4. What is the unlabeled block in this diagram? The transmit/receive (T/R) switch.

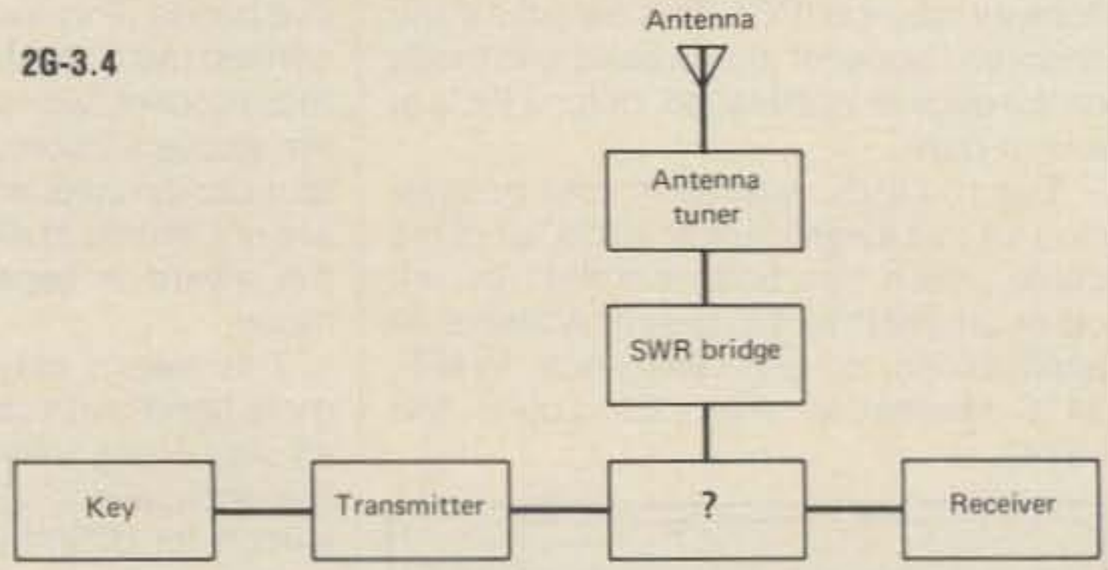
Signals and Emissions

2H-1I1. An interrupted carrier wave is considered to be which type of emission? It is A1 (A-one). It is an RF output carrier wave being turned on and

2G-3.3



2G-3.4



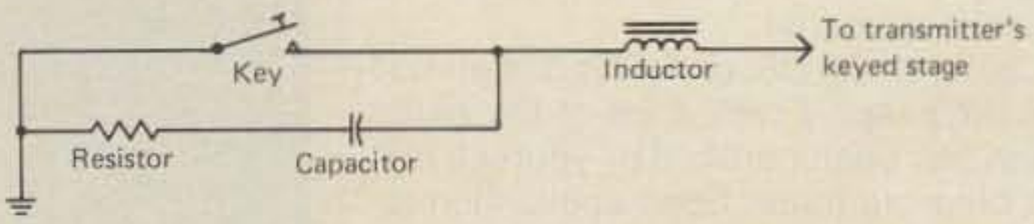
off to produce the symbols of a known telegraph code, such as the International Morse Code. *(The June 1984 Novice column covers the terms and abbreviations associated with amateur radio. The June through August 1979 Novice columns provide all the information you are likely to ever need about code, our most efficient method of radio communications.—ed.)*

2H-2.1. What does the term backwave **mean?** Backwave is an unwanted condition wherein the output carrier is not completely cut off between dits and dahs. This results in a low-level RF output at all times while in transmit mode.

2H-2.2. What is a possible cause of backwave? Incorrect biasing can result in failure to completely cut off RF final amplifier output between portions of code symbols (dits and dahs) when in transmit mode. Incomplete neutralization of the RF power amplifier(s) can also cause backwave to occur.

2H-3.1. What does the term key clicks **mean?** Key clicks are objectionable click sounds heard above and below the offending station's fundamental (intended) transmitting frequency. Clicks are heard each time the telegraph key is closed and opened while sending code. Clicks are caused by unwanted modulation at the leading and/or trailing edges of each dit and dah. Clicks have an unpleasant, harsh sound.

2H-3.2. How can key clicks be eliminated?



Without a key click filter, the rise and decay of each dit and dah leading and trailing edge would be almost instantaneous. Such square-wave emissions would have a harsh sound. Of more importance, the leading edge would have an unwanted voltage spike that is produced

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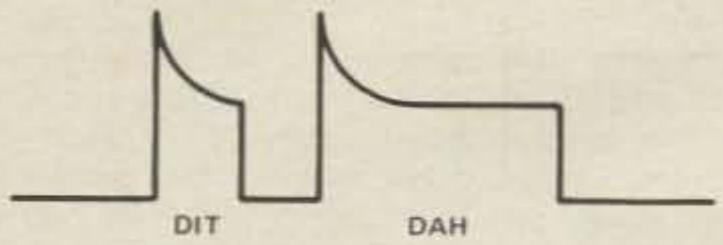
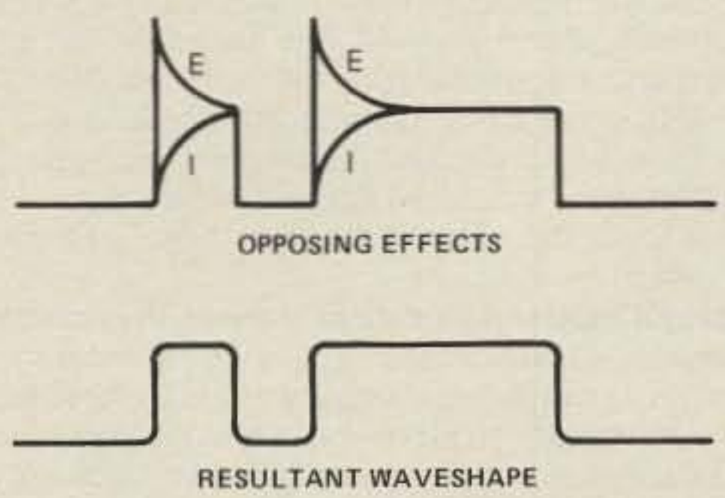
by the amplifier's collector/plate voltage increasing while that stage is not keyed. This waveshape is as shown.



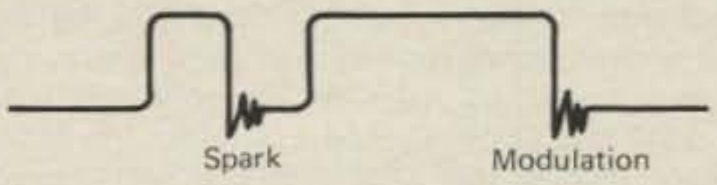
Adding the inductor in series between the telegraph key and ground eliminates the leading-edge spike. An inductor opposes any change in current flow rate. Consequently, the initial rise from a zero current condition (key contacts open) to a full current condition (key contacts closed) produces an extreme current change which the inductor opposes. The leading-edge current build-up approximately equals the shape of the voltage spike at the leading edge. These voltage and current curves offset each other, resulting in a good leading edge, as shown.



OPPOSING EFFECTS

RESULTANT WAVESHAPE

The added inductor eliminates the leading-edge spike, but it creates a spark modulation problem at the trailing edge of each dit and dah. The inductor opposes any change in current flow rate, including the shift from full current to zero current at the end of each dit and dah. The inductor tries to sustain the existing current level when the key contacts are opened. This results in sparking between the key contacts, resulting in this waveshape.



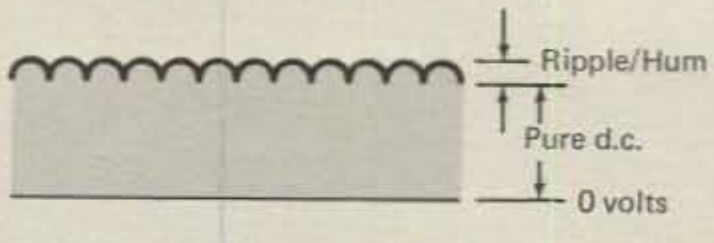
This new key click problem is overcome by adding a capacitor across the key contacts. When the key contacts are opened (at the completion of a dit or dah), the capacitor accepts the charge that occurs as the inductor's magnetic flux field collapses. This action eliminates heavy key contacts sparking. However, the capacitor remains charged, and it discharges when the key contacts are again closed, creating a new key click problem. This new problem is eliminated by adding a resistor to limit the capacitor's discharge current rate.

The combined properties of inductance, capacitance, and resistance eliminate (or greatly reduce) any possibility of key clicks, which can be extremely annoying to other operators.

2H-4.1. What does the term chirp **mean?** It is a bird-like chirping sound that occurs when the transmitter's oscillator stage quickly shifts from a higher to a lower frequency at the start of each dit and dah.

2H-4.2. What can be done to a telegraph transmitter's power supply to avoid chirp? Anything that improves power-supply regulation will decrease chirp. Adding a swinging choke and bleeder resistor to a power supply are two ways to hold its output voltage more constant (regulated) between light- and heavy-load (current) conditions. External to the supply, the use of a voltage regulator (tube rig) or zener diode (solid state rig) will hold oscillator voltage constant and minimize chirp. The use of a buffer (additional) stage between the keyed power amplifier and the oscillator reduces the undesired loading shifts that would otherwise be imposed on the oscillator each time the RF final amplifier is keyed or unkeyed. The isolation provided by a buffer stage minimizes the possibility of chirp. This approach is in addition to the original one, which involves improving power-supply voltage regulation.

2H-5.1. What is a common cause of superimposed hum? An open (defective) filter capacitor in a power supply. When this condition exists in a receiver, the ripple frequency (usually 60 or 120 Hertz) is heard no matter what tuning point is selected. This hum is added to the desired signal, creating distortion and reducing intelligibility. When this condition exists in a radiotelegraph transmitter, the hum is superimposed on the keyed output carrier, resulting in an A2 (modulated radiotelegraph) emission that is illegal to transmit on the Novice bands. The defective filter capacitor causes the power-supply DC output voltage to have an unacceptably high AC ripple on top of it as follows.



The resultant ripple is fed to each stage, along with the DC required to power the stages. The amplifiers amplify the ripple, creating the stated problems.

2H-6.1. A signal received on 28.160 MHz is the fourth harmonic of what frequency? 7.04 MHz, or 7040 kHz. The second and third harmonics of 7040 kHz are 14.08 and 21.12 MHz, respectively.

2H-7.1. Spurious emissions from a transmitter may be caused by what problem in the power amplifier stage? Improper neutralization and poor grounding are two possible causes of spurious emissions. A spurious emission is any unwanted emission which occurs simultaneously with the intended (desired) emission. Harmonics, parasitic oscillations, key clicks, chirp, and splatter are examples of spurious emissions.

Operating Procedures

2B-1.1. What does the S in the RST signal report mean? S represents the strength of the received signal. Signal strength numbers and meanings are: (1) faint, barely perceptible, (2) very weak, (3) weak, (4) fair, (5) fairly good, (6) good, (7) moderately strong, (8) strong, and (9) extremely strong.

2B-1.2. What does the R in the RST signal report mean? R represents the readability of the received signal. Signal readability numbers and meanings are: (1) unreadable, (2) occasional words, (3) considerable difficulty, (4) slight difficulty, and (5) no difficulty.

2B-1.3. What does the T in the RST signal report mean? T represents the tone of the received signal. Signal tone numbers and meanings are: (1) extremely rough, hissing sound; (2) very rough AC signal (hum); (3) rough low-pitch AC signal; (4) moderately rough low-pitch AC signal; (5) musically modulated signal; (6) modulated signal, slight whistle; (7)

near DC signal, smooth ripple; (8) good DC signal, trace of ripple; and (9) pure DC signal, no ripple. The T portion of the RST signal report has very limited use now. When most amateurs built their own equipment, the T report was important.

RST reports have three suffix letters, which are explained herein: *C*—chirp, such as 579C; *K*—clicks, such as 579K; and *X*—crystal control (extreme frequency stability), such as 579X. Modern equipment produces extremely stable transmissions, making the X suffix superfluous. It would have to be added to almost every RST signal report, if it were used. The X suffix is seldom used.

2B-2.1. At what telegraphy speed should a CQ message be transmitted? It should not be sent at a faster speed than the transmitting operator can receive. If the other operator is more proficient, she/he should slow down (QRS) to the speed at which the CQ (call to all stations) is sent. Most operators can send code faster than they can receive it; consequently, one must be careful to keep the transmission speed down to what one is able to receive.

2B-3.1. What is the meaning of the term zero beat **?** It is the zero frequency difference that exists when two frequency sources are set to the exact same frequency. When two frequencies are mixed (beat), the resultant outputs are the two input frequencies, plus their sum and difference. As an example, if 455 and 456 kHz are applied to a frequency mixer stage, its output frequencies are 1, 455, 456, and 911 kHz. In this example the 1 kHz signal would be selected because it is within our hearing range. However, if 455 kHz is mixed with 455 kHz, the resultant difference frequency is zero, which cannot be heard. *(The November 1984 Novice column is devoted to the subject of zero beat. It is worth reading.—ed.)*

2B-3.2. Why should amateur radio stations in communication with each other zero beat? When both transmitters are set to the same frequency, minimum spectrum is used and the possibility of inadvertent interference is reduced. *(The November 1984 Novice column covers this subject in detail.—ed.)* If each transmitter uses a different frequency, two frequencies are being used where one would suffice. Also, while an operator is receiving, his/her transmit frequency is not in use and another operator may decide to use it.

2B-4.1. How can on-the-air transmitter tune-up be kept as short as possible? Partial tune-up can be accomplished with the RF final amplifier left off. This does not apply to most solid state transmitters built into modern transceivers. A dummy load can be used to permit transmitter tuning, including final amplifier tuning, without radiating a signal. One cannot tune-up into a dummy load and then just switch to a real antenna. The dummy load is a nonradiating resistive element, whereas the antenna includes reactive properties. After the transmitter is tuned into the dummy load, it still has to be retuned a bit when the antenna is connected. However, most of the adjustments remain untouched, and it does not take long to match the transmitter to the antenna.

(This question is out of date because modern solid state transmitters do not involve the tune-up procedures that are common to transmitters containing tubes in the final amplifier.—ed.)

2B-5.1. What is the difference between the telegraphy signals CQ and QRZ? CQ is the general call to all stations. It is an invitation to any other amateur who may want to engage in a two-way radio conversation. QRZ? asks what station called me. It is properly used when the callsign of a responding station is missed after one makes a CQ call. It should be used as shown in this example: DE W6JEP QRZ? K

Poor operators sometimes transmit QRZ? instead of making a proper CQ call. It is a poor practice. The obvious answer to such an operator's question is that no one called her/him. *(The February 1980 Novice column covers Q-signals for amateur radio use.—ed.)*

2B-5.2. What is the difference between the telegraphy abbreviations K and SK? K is a telegraph (code) invitation to transmit. It tells the other operators that you are ready to receive what she/he sends. $\overline{SK}$ indicates to the other operator that one is ending the contact. After sending $\overline{SK}$, the operator listens to the closing remarks of the other amateur.

2B-5.3. What is the meaning of the telegraphy abbreviations DE, $\overline{AR}$, and QRS? DE means from, such as W6JEP DE W6DDB, when W6DDB is calling W6JEP. $\overline{AR}$ means the end of the message. If one is handling message traffic, it indicates that one should get ready to copy the next message on a fresh message blank. If it is used when one is involved in a routine conversation with another amateur, $\overline{AR}$ is interpreted to mean "that is all I have to say in this transmission." QRS tells the other operator to send (code) at a slower rate. It is a convenient way for one operator to tell the other amateur that she/he is sending too fast.

Summary

This completes the second part of this article. We have covered five of the nine subelements (subjects) contained in the FCC element two (Novice) syllabus. Next month's column covers amateur radio practices.

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World of Ideas

a monthly feature by
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A LOOK AT THE WORLD AROUND US

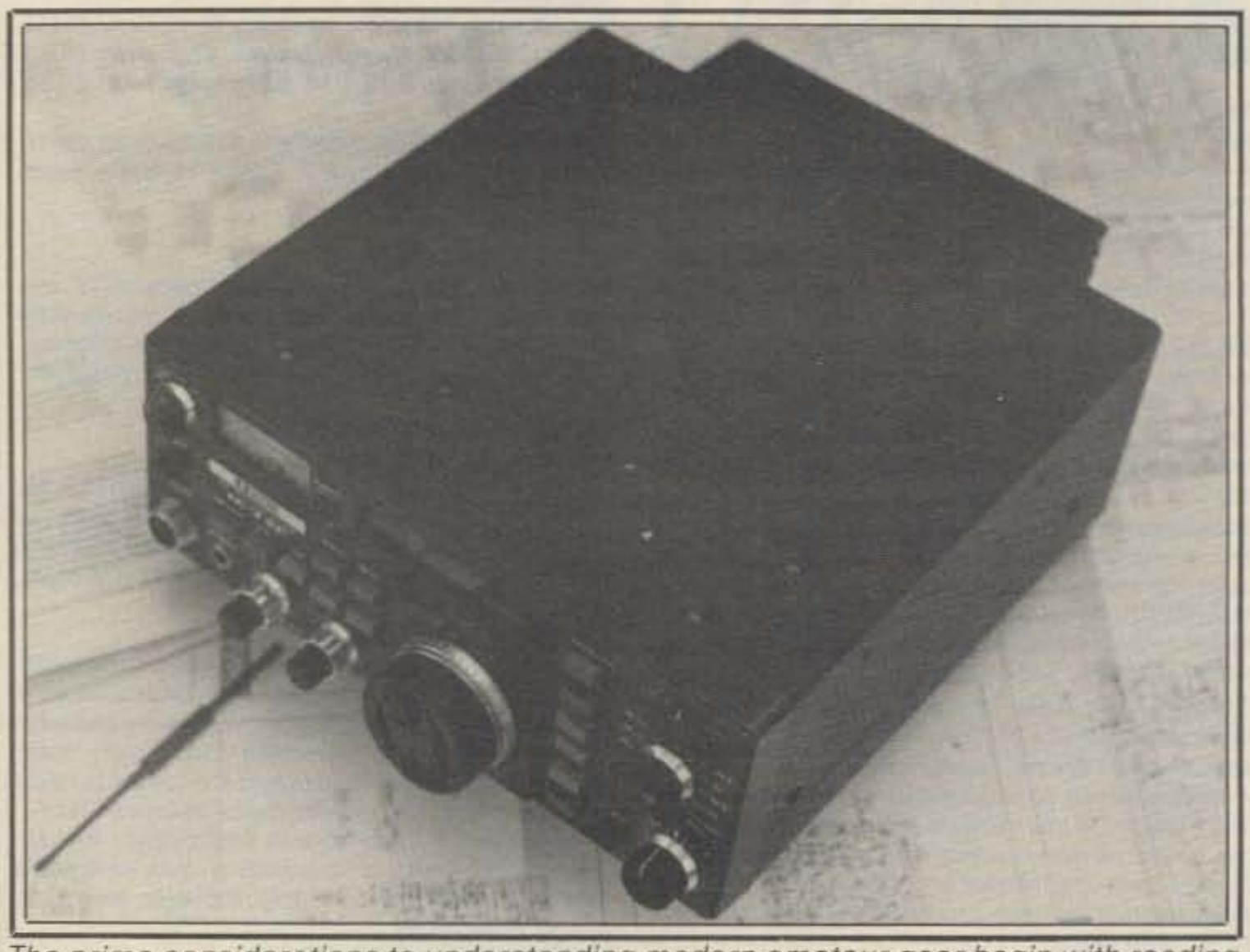
Understanding Modern Amateur Gear—Part II

Your response to our March 1985 column feature "Understanding Modern Amateur Gear" was pleasantly overwhelming. Our views and ideas apparently inspired old-timers and newcomers alike, with typical received comments encouraging us to "delve deeper" or "explain more troubleshooting ideas for modern gear." Such words are, in our opinion, quite complimentary to amateur radio overall. We enjoy operating our modern gear (who wouldn't . . . it's fantastic!), yet we also want to know how it functions and how to keep it functioning smoothly.

Considering these facts, both this and next month's column will "plain language" expand on concepts of both understanding and troubleshooting modern HF transceivers. Although we will include some technical aspects along the way, we'll try to keep explanations as understandable and unconfusing as possible. We'll also include a general questionnaire/guide to help define your own abilities and technical limits, and to illustrate that basic designs of modern gear really aren't more mysterious than tube-type transceivers of past popularity.

In some respects, you might consider this a mini-course in amateur gear itself—an aspect which it is assumed many of us know, but one which is seldom explained in our regular books or magazines. If you would like to see similar discussions on specialized-area items such as RTTY or SSTV gear, etc., let us know. We take our cues for this column's contents from your interests and requests.

We may be going out on a limb with thoughts on delving inside modern gear (I hear that some amateurs have never opened a rig's cabinet. Could that actually be true?), so let's begin with some important facts which should always be kept foremost in mind. Every radio amateur has a different level of technical background, involvement, and understanding. We are not all technically inclined, nor are we expected to be electronic wizards. We are, as our title implies, radio *amateurs*—folks enjoying the (advanced) world of electronic communication. Conversely, we should avoid shortselling ourselves and our abilities through what I call "unnecessary excuses": casually saying that modern gear is too complex or too small when common reasoning and patience haven't even been tried. These are aspects which you alone know and understand. On the other hand, you must always recognize your own limits and proceed very carefully when "pushing" those abilities. If you become stumped when pursuing technical involvements, seek knowledgeable assistance rather than blindly pressing your luck and hoping for success.



The prime considerations to understanding modern amateur gear begin with reading the instruction manual and continue through relating theory of operations to block diagrams. Acquired knowledge can then be related to schematics, and finally to pc boards themselves. Stick with us, and you'll learn the easiest way to that end.

Although I would like to help/tutor each of you individually, that's a physical impossibility. I'm thus offering guidance via this month and next month's column—information that can be self-applied as you find personally feasible. You're also encouraged to review my March 1985 column for maximum understanding of this and possible future articles concerning technical pursuits.

Malfunctions or Misunderstandings?

A large portion of today's transceivers are loaded with special features and "frills," many of which can give their new owners the illusion of internal defects. A unit switched to memory recall can seem stuck on one frequency, for example, or a "no carrier/CW output" idiosyncracy might be traced to a reduced carrier level control or the omission of a closed key in a nonshorting rear jack. "Problems" (embarrassments?) of this nature are more common than expected, and they are the direct results of operators failing to **thoroughly read instruction manuals before use.** A knowledgeable consulting engineer once told me "don't assume anything . . . and always check your own assumed (but not necessarily right) actions several times." That viewpoint holds more logic than any other idea we've heard.

New models of amateur transceivers have habitually been items subjected to our suspicious nature (they look great, we say, but might such unproven gems be infested with bugs?). Today's units, however, usually reflect a very high degree of quality control. If a new transceiver successfully completes its first couple of weeks of operation, it probably will operate smoothly for many moons. Some amateurs prefer to kick off that period with a Friday night to Sunday evening "burn in" operation. The new unit is periodically enjoyed while being allowed to quietly monitor some interesting activity during the weekend's off-air times. If the rig continues operating smoothly

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afterwards, it's considered bug free. I'm not fully convinced of that logic, but I must admit the concept has proven quite beneficial. All aspects considered, we can thus surmise that today's equipment usually delivers outstanding performance, and malfunctions are noticeably less common today than ten years ago. Technical complexities, however, continue increasing the possibilities of operator errors.

Modern Tools for Modern Gear

Whether preparing for unexpected future repairs or equipping a mini work area for possible equipment modifications/accessory installations, a few "new style" tools are almost vital when delving inside today's compact gear. Considering the fact that amateur radio is a long-term pursuit rather than a passing whim, investments in such servicing aids can only escalate one's favorable returns.

Some of the tools most often required are "miniature size" needlenose pliers and diagonal cutters (especially those with fine-crafted tips), small 20 to 30 watt soldering irons (the instant-heating battery-powered versions are particularly handy to use), and a roll of very thin (pc-board type) solder. A reasonable-quality multimeter of the volt/ohm/milliamp category is another item which should be included in every amateur's paraphernalia. Try to select a meter with at least 20k ohms per volt DC and 8k ohms per volt AC sensitivity. Choice of analog movement or digital displays is a personal preference, but it's often difficult to watch capacitor "kick checks" with basic digital meters. (Capacitors can often be checked by selecting a high-resistance scale, placing VOM leads on their connections, and watching quick rise/fall of the meter's pointer. Being lightly charged from the VOM's measuring circuit's energy, test leads are then reversed, and a similar upward "kick" is noted with good capacitors.)

An illuminated magnifier of either the "clamp to desk" or handheld type is another definitely useful work-area item. The larger version with a circular neon light is dandy, as it frees both hands for servicing. These magnifiers really bring things up to size and add a totally new ease to working with small components or reading small-print schematics. Take a look through one and you'll understand our point here; they're great. Beyond this point are items of personal preference and/or general use: suction-mounted brackets for solidly holding small boards, wrist/arm braces to reduce "shakiness," small screwdriver sets, a pack of small clip leads (for quick connection tests), solderwick (for desoldering pc board components), a couple of plastic tuning wands (never poke in electronic gear with the metal end of a screwdriver), and patience—plenty of patience. Assuming you're now physically equipped, let's take a closer look at what I call mental preparation.

Judging Your Technical Abilities

Several decades ago radio amateurs were known and recognized for their ability to assemble and/or maintain their own transmitting and receiving gear. Today's equipment, however, seems to unnecessarily intimidate some technically competent amateurs while leaving others wondering if they should delve inside or leave well enough alone. We don't offer any universal answers in this area; as mentioned earlier, every amateur's inclinations and abilities are noticeably different. Possibly the following questions and discussions will prove useful for self-evaluating your own situation, or recognizing your limitations.

(1) Do you thoroughly read a new rig's instruction manual before operating that unit? Be honest here. This important consideration shouldn't be taken lightly, especially with today's sophisticated gear. A creditable number of new equipment discrepancies can be traced to operator confusion. Consider a manual as your own manufacturer-supplied assistant, and try to understand that person's form of reasoning.

(2) Have you ever replaced final amplifier tubes in a transceiver, added an optional filter or other accessory, or opened a new WARC band for operation? These basic amateur radio "servicings" are good first steps which nearly anyone capable of following directions and skillfully handling a few small tools should be able to master without extreme difficulty.

(3) Have you ever constructed an amateur radio related project that worked properly (keyer, simple transmitter, receiver, etc.)? If not, don't try initially acquiring knowledge on your new HF transceiver. Gain skill and expertise on simpler and less expensive items; work your way upward as you feel comfortable in such pursuits.

(4) Do you feel confident using a small soldering iron (20 or 30 watts) and thin printed-circuit-type solder? Again we suggest gaining prior experience on basic homebrew projects rather than on expensive HF transceivers.

(5) Can you generally read and understand block diagrams and schematics of conventional-type amateur transceivers? If not, don't try troubleshooting or repairing your deluxe HF transceiver without aid or knowledgeable assistance. After that line of reasoning/visualization of circuits is acquired, you can progress toward understanding units of sophisticated design. Additional discussions in this area are included in the following paragraphs and in next month's column.

(6) Are you able to trace printed circuit boards using related schematics and maybe X-ray pictorials? This question is especially significant, as it requires blending book knowledge and hands-on ability, a somewhat rare yet highly desirable trait.

Let's now briefly shift our discussion to a more theoretical direction and consider your general understanding of concepts used in amateur SSB gear. The partial block diagram shown in fig. 1 illustrates basic post-RF stages and circuits included in modern HF transceivers. If you can accurately visualize involved actions and frequency relations *using only that figure's information* (don't peep at the text), you're either fresh out of electronics school or know your way around circuits like a pro. If your hands-on ability is comparable to that level of understanding, categorize yourself as an exceptionally good technician. If you can understand the figure *after* reading our upcoming summary of its action, you're still a technically competent amateur. If the general concept of fig. 1 and its text discussion seems vaguely familiar, and if you can use a calculator to understand frequency relations, you can probably reason your way through all except the most difficult equipment repairs or modifications. If fig. 1's diagram seems totally foreign to you and the frequencies are absolutely meaningless, I advise only *operating* your transceiver and relying on outside assistance regarding technical matters.

Briefly stated, fig 1's operation is as follows. A received signal which has been RF-amplified and IF-converted is direct-

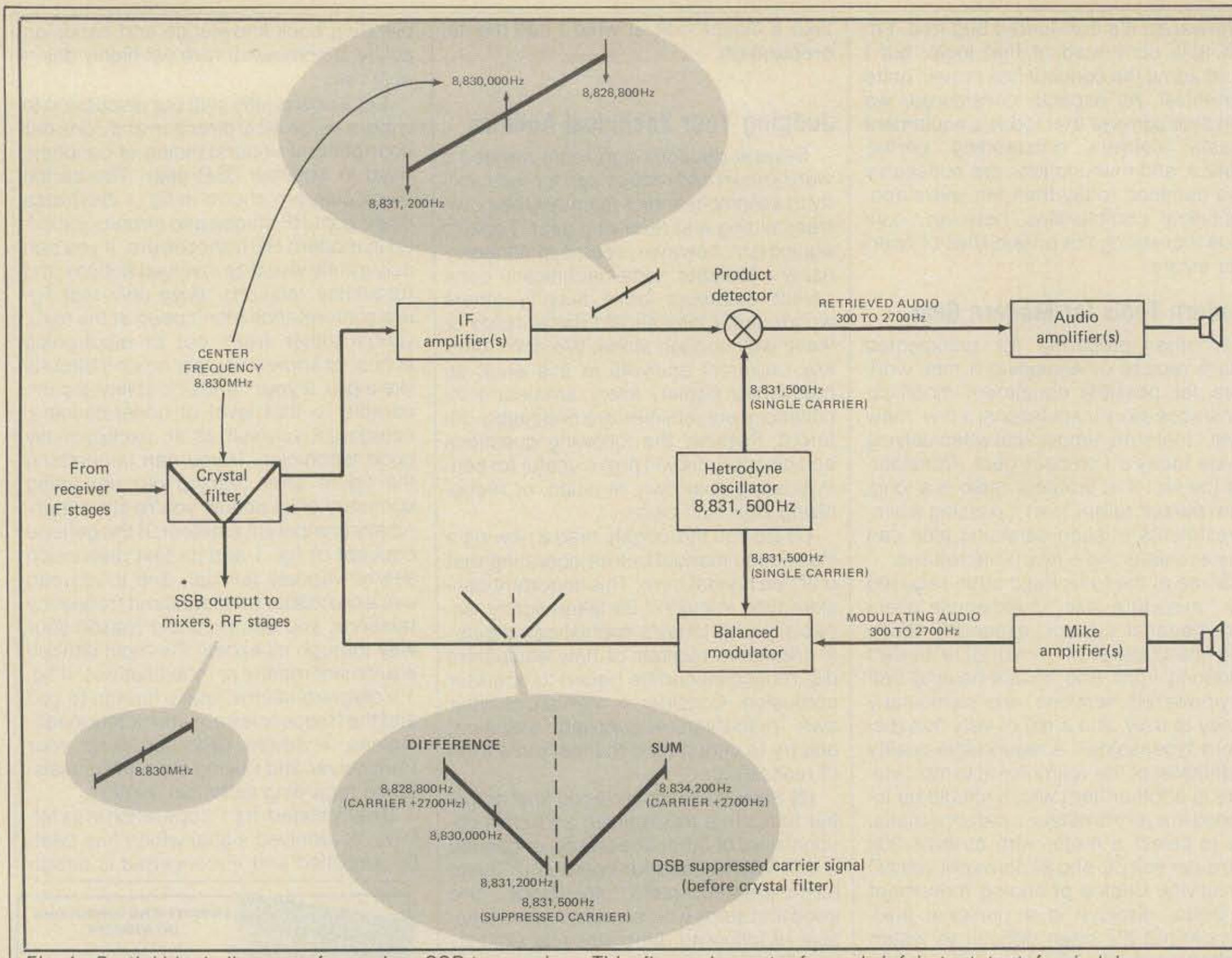


Fig. 1– Partial block diagram of a modern SSB transceiver. This figure is part of our brief in-text test for judging your own technical abilities and limitations. Can you visualize associated operations of stages without the aid of the text? What is the receiver's bandwidth: 2.1, 2.4, 2.7, 2.8, or 8.8 kHz? How many Hz in a kHz? A MHz?

ed to the crystal filter. The filter has a total bandwidth of 2400 Hz and a center frequency of 8.830 MHz. That full spread of frequencies is beat with the local oscillator's output (a single signal on 8.8315 MHz) in the product detector. The resultant audio output is contained in a 2400 Hz bandwidth between 300 Hz (bass) and 2400 Hz (treble). During transmit, both modulating audio and the local oscillator's 8.8315 MHz signal are directed to the balance modulator. This stage superimposes audio and RF, generating both upper and lower sidebands while nulling the carrier itself. That DSB signal is then directed through the crystal filter, producing a single sideband output which is subsequently frequency converted and amplified by additional stages in our hypothetical transceiver. Notice the product detector's action is essentially heterodyning, a concept that has been used since the 1930s. Also notice the balance modulator's output closely resembles an old-fashioned AM signal, except the carrier is nulled 50 or 60 dB. Closer investigation explains why only one sideband "gets through" the filter: the other sideband (8.8318 MHz to 8.8342 MHz) is "outside" of its range. A crystal filter can pass signals in either direction (but not simultaneously). In actual practice, diodes are used for switching the filter between transmit and receive paths. Incidentally, the concept exemplified in fig. 1 has been employed in transceivers since the Collins KWM-1 (1957), and through Kenwood's TS430 (1985). Various IFs and bandwidths were employed, and older rigs used relays in lieu of diodes. Otherwise things have changed only slightly.

Summary

This column's featured the first portion of our closer look at modern HF transceivers—an area of unlimited investigation, yet one of significance to newcomers and old-timers alike. Since we couldn't individually establish every reader's electronic background/aptitude, we included a brief test (or might it be called a teacher) for one's self-evaluation. We also elected to start slow and pick up speed as this discussion continues.

Next month we'll conclude the minicourse with methods and ideas of relating block diagrams, schematics, and pc boards in presently popular transceivers. We'll also discuss troubleshooting modern amateur gear using what are known as dynamic concepts. (Remember the dynamic and static IpEG curves of vacuum tubes? Dynamic meant operating with signals; static meant no signal operation.) Meanwhile, you have time to review this column and relate presented ideas to your own situation.

When looking at circuits, simply remember to separate fancy frills from basic sections and avoid being sidetracked along support paths. Using that technique, you'll probably find today's transceivers surprisingly understandable in design. Possibly those nomenclatures of "high tech" and "sophisticated design" really were only intimidating statements.

73, Dave, K4TWJ

DX

This month by
JOHN A. ATTAWAY, K4IIF

NEWS OF COMMUNICATIONS AROUND THE WORLD

I had the privilege of attending the 1985 International DX Convention in Fresno, California. This is the major event hosted in alternate years by the Northern California DX Club and the Southern California DX Club, and it is the greatest pure DX convention staged anywhere in the world. Participants come from all continents, and the program is planned entirely around DX and DX contest activities. The 1985 Convention Chairman was Steve Thomas, N6ST, of the Northern California DX Club. Steve was assisted by able subcommittees chaired by Ted Algren, KA6W, Bruno Bienenfield, AA6AD, Steve Brunt, WC6I, Roger Gearhart, W6PKB, and Bob Thompson, K6SSJ.

The highlight of the convention was the main banquet Saturday night with Jack Troster, W6ISQ, as Master of Ceremonies and Chuck Taylor, KC7UU, as featured speaker. Chuck described his DXventures activating rare countries in Africa and the frustrations of trying to have a few words on the air without breakers. He kept everyone on the edge of his chair for the better part of an hour, even though his slides had been stolen enroute and he had to "wing it" with the aid of tape recordings from some of his operations.

Another banquet highpoint was the announcement of the election of Ron Wright, ZL1AMO, and Herb Becker, W6QD, to the DX Hall of Fame. Thanks to the fund-raising efforts of Murph Ratterree, W4WMQ, and INDXA, Ron was able to come from New Zealand to receive his plaque in person. The award came as a surprise to him and was greeted by a standing ovation from the approximately 600 DXers in attendance. We were sorry that Herb, W6QD, was unable to be present to receive his award, but a presentation with some 110 DXers in attendance was arranged by Chris Williams, KG6AR, *CQ*'s award checker at the Southern California DX Club.

Other Fresno highlights included the DX Forum hosted by Bob Thompson, K6SSJ, the Contest Forum led by Kip Edwards, K6SZN, and the announcements that Josephine Clarke, WB6ZUC, had been honored as the Northern California DX Club's DXer of the Year and Jim Rafferty, N6RJ, had been named the Southern California DX Club's DXer of the Year. The DX Forum included a program on the Pribiloff Islands controversy and a discussion of the status of the Baker/Howland Islands. The Contest Forum featured

P.O. Box 205, Winter Haven, FL 33880

The scene is Fresno - 1985. The occasion is awarding the DX Hall of Fame plaque to Ron Wright, ZL1AMO (right) by CQ DX Chairman John Attaway, K4IIF (left). Wright was honored for his many successful DXpeditions in the Pacific area. (Photo courtesy Bob Winn, W5KNE, of QRZ DX.*)*

tips from outstanding contestpedition operators including Dick Norton, N6AA, and Jim Neiger, N6TJ. N6TJ showed slides from his EA9 contest operation, and Duane Ausherman, W6REC, described the ZL DXpedition to Kermedec.

Special thanks was expressed to Bob Ferrero, W6RJ, for his support of the convention.

Contest Time Is Coming!

Each year we point out that the quickest way for a new DXer to build up his or her score of zones, prefixes, and countries is to be active in the *CQ* World-Wide DX Phone and CW Contests in the fall and the *CQ* WPX Phone and CW Contests in the spring. These are four weekends each year when maximum DX activity is guaranteed on the bands, and many stations can be worked quickly, contest style. The dates for the 1985 fall WW DX Contests are October 26–27 for phone and November 23–24 for CW. See Frank Anzalone's Contest Calendar column elsewhere in this issue for full details.

Contestpedition operations are extremely popular during the *CQ* World-Wide Contests, and this popularity is continuing despite increasingly unfavorable sunspot conditions. A big turnout of stations in the Caribbean, as well as stations from the Pacific Islands and the islands off the coast of North Africa, is expected again this year. If you plan to operate as a DX station during the fall contests, it's time to make your intentions known, or as we have said in past columns, reserve your island. Nothing could be more embarrassing than to reach your secret island hideaway only to find someone else already raising antennas on the guesthouse roof. To avoid such heartbreaking conflicts, use the DX bulletins to let people know where you are going.

It is also important to publicize your operation so that the homebound brethren can find you for their multiplier count or country score. Send your contest callsign and proposed bands and frequencies to your favorite DX bulletin without delay.

The 1984 contests produced some surprises. We have frequently stated that you shouldn't expect to win from your Caribbean contestpedition station unless you go to an island or country that counts as South America and receives three points for each W/VE contact. However, early *unofficial* scores indicate that top scores world-wide were turned in by 4V2C in the multi-operator, single transmitter category and by TI2C in the multi-operator, multi-transmitter class. In addition, numbers two and three in the multi-multi class were Terry's crew at VP2VCW followed by VP9AD. In fifth place was XE2SI. Therefore, a determined crew can make a big score, but of course they would have had much higher scores from PJ2 or 9Y4.

Dias, PS7ABT/S9, operated briefly from Principe in October 1984, making 155 contacts in 20 countries. Dias has served in the Brazilian navy for 30 years and was in Principe on an official visit which included stops at Ascension Island, St. Helena, Gabon and Nigeria. He is 47 years of age and a resident of Natal, Brazil. (Photo via W4WMQ and INDEXA).

The WPX Program

Mixed

1161	KL7VZ	1165	VE3NUP
1162	SV1PL	1166	JA0SU
1163	OZ4ZT	1167	SM6NJK
1164	OZ1ACB	1168	LU1DOW

S.S.B.

1738	NE8Q	1742	HI3AMF
1739	OE5THL	1743	VE3NUP
1740	PP2ZDD	1744	EA3AAY
1741	EA4CDZ	1745	EA2AOM

CW

2320	LA7JO	2324	PA3BQX
2321	KA4IKH	2325	DL2HBX
2322	PA3CKO	2326	EA8AGH
2323	PA3EBJ		

WPNX

DL4LAX

Endorsements

Mixed: 450 KL7VZ, OZ1ACB, JA0SU. 500 KL7VZ, JA0SU. 550 KL7VZ, JA0SUY. 600 I2EAY. 650 VE3UR, I2EAY. 700 VE3UR. 750 VE3UR. 800 VE3UR. 850 VE3UR. 900 HB9HYZ, K7CU, VE3UR. 950 WD4RAF, K7CU. 1000 WD4RAF, K7CU. 1100 K2OLG. 1200 LA7JO. 1250 LA7JO, JA1BN. 1300 JA1BN. 1400 I2DMK. 1700 F9MD. 1900 N9AF. 1950 N9AF.

S.S.B.: 350 NE8Q, PP2ZDD, EA4CDZ, JG2MWA, EA3AAY, EA2AOM. 400 PP2ZDD, EA4CDZ, EA2AOM. 450 PP2ZDD, EA4CDZ, EA2AOM. 500 PP2ZDD, EA2AOM. 550 PP2ZDD. 600 PP2ZDD, K2POF, WB9TDR. 650 PP2ZDD. 700 PP2ZDD, W7KWI. 750 PP2ZDD. 800 OE9SLH, PP2ZDD. 850 PP1ZDD, NF0X, XE1XF. 900 PP2ZDD, NF0X, XE1XF, ZL1AGO, W0ULU. 950 W3GXK, PP2ZDD, XE1XF, I2DMK. 1000 PP2ZDD. 1050 AC2J. 1150 W4WJ. 1200 W4WJ.

C.W.: 350 LA7JO, KO5KP, PA3CKO, PA3BEJ. 400 LA7JO, PA3CKO, PA3BEJ. 450 LA7JO, PA3CKO. 500 I2EAY, LA7JO, PA3CKO. 550 I2EAY, LA7JO, VK5AGX, PA3CKO. 600 LA7JO, VK5AGX, PA3CKO. 850 K0DEQ, I7PXV, K2POF. 900 K0KEQ. 950 K0DEQ. 1000 K0DEQ, KA7T, IT9VDQ. 1050 K0DEQ. 1100 K0DEQ, JE1JKL. 1150 K0DEQ, JE1JKL.

10 meters:	K7CU.
15 meters:	JG2MWA, JA0SU.
40 meters:	HB9BYZ, JA0SU, K3IXD.
80 meters:	KE6KT, K2POF.
160 meters:	LA7JO, OE9SLH.
Asia:	I2EOW, KL7VZ, PP1ZDD, I7PXV, JA0SU, JA8EZK, VE3UR.
Africa:	VE3UR.
No. America:	KE6KT, PP2ZDD, I7PXV.
So. America:	VE3UR.
Europe:	KL7VZ, JA2KVD, OZ4ZT, OZ1ACB, PP2ZDD, I7PXV, PA3BEJ.
Oceania:	JA0SU, VE3UR.

Award of Excellence: LA7JO with 160 meter endorsement.

Award of Excellence Holders: K6JG, N4MM, W4CRW, K5UR, K6XP, K2VV, VE3GCO, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, YU2DX, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, K4IEX, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YZ/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO.

Award of Excellence Holders with 160 meter endorsement: K6JG, W4CRW, K5UR, OK1MP, W8CNL, W1JR, W5UR, W8RSW, W8ILC, W1BWS, G4BUE, LU3YL/W4, VE7WJ, W9NUF, N4NX, SM0DJZ, DK5AD, W3ARK, LA7JO.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.

Other categories appear to have been more true to form in the phone test with *unofficial* tops earned by PJ2FR in the single operator, all band class; CE6EZ on 28 MHz, single band; HC1OT on 21 MHz, single band; K0GU/8R1 on 14 MHz single band; EA8AK and 9Y4VU neck and neck on 7 MHz; and YV3AZC winning for 3.5 MHz.

It was also true to form on CW, where 9Y4VT is leading all band, 4M7QP on 28 MHz, 9Y4W on 21 MHz, and LU8DQ on 14 MHz. The multi-single leader is FY0GA, and the multi-multi leader on CW is EA9CE, which counts as North Africa and receives three points for each European contact. Again, these are *unofficial* results.

Here and There

China: As the number of stations in the Peoples Republic of China continues to increase, the opportunities to make a BY/BT contact continue to improve. Active Chinese stations and their QSL addresses are as follows:

BY1PK: Chinese Radio Sports Association, Box 6106, Beijing, PRC.

BY4AA: Chinese Radio Sports Association, Box 205, Shanghai, PRC.

BY5RA: Box 730, Fuzhou, PRC. (This station checks into the W7PHO Family Hour on Tuesdays and Fridays at 2300 UTC on 14227 kHz.)

BY8AA: Box 607, Chendu, PRC.

BY1QH: Qing Hau University, Box 2654, Beijing, PRC. (This station frequently checks into the W7PHO Family Hour on 14227 at 2330 UTC.)

BY5RF: Chinese Science & Technology Association of the Fujian Government, Fujian, PRC.

BT0NMN: Box 6106, Beijing, PRC. (This station, reported on 14022 kHz CW, is said to be located in rare *CQ* Zone 23.)

Greenland on 80 meters: The OX 80 Meter Net meets Sundays and Mondays at 2330 UTC on 3650 kHz SSB.

Iceland: It is difficult to erect and maintain big towers and antenna arrays in TF-land because of the high winds. However, TF3CW reports that the Reykjavik group plans a 100 foot tower with a 4-element, wide-spaced, 20 meter Yagi to be ready for the *CQ* contests this fall. The boom will be 42 feet, and the array will be equipped with a Telrex rotor to provide the necessary rotational torque.

SV/Mt. Athos: Activity from his rare country may have ended for all time. A letter to the Director of the Civil Authority of Mt. Athos from the Directors of the 20 monasteries states: "As an answer to the request made by radio amateurs to visit and transmit from Mt. Athos, the Sacred Community has decided to forbid forever the making of such transmissions from Mt. Athos." That sounds as if the gentlemen have made up their minds most positively. However, nothing is sure in life but death, taxes . . . and changes, so who knows what the future may hold.

Computerized DX Edge: A computerized version of the famous DX Edge, programmed for the Commodore 64, is now available from Xantek, P.O. Box 834, Madison Square Garden Station, New York, NY 10159. It features a real-time gray line which can be placed on any QTH.

WB4KCL QSL Manager's Directory: Fred Smith has published a 1985 supplement to his Directory of over 11,000 QSL Managers. If you are interested, contact Fred at 2265 Sweetbriar Drive, Alexandria, VA 22307.

At a DX gathering in Havana, here are, left to right, CO2HQ, CO2AA, XE1JFF, XE1XF, and CO2XM. (Photo via XE1XF)

Central California DX Club: This club was organized in August 1981 to fill the gap between the Northern California DX Club (NCDXC) and the Southern California DX Club (SCDXC). Many central California DXers belonged to either the NCDXC or the SCDXC, or both, but could not attend meetings due to the great distances involved. Under the constitution and bylaws of the Central California DX Club, the club's area includes, but it not limited to, the following counties: Stanislaus, Mariposa, Merced, Madera, Fresno, Kings, Tulare, Kern, San Benito, San Luis Obispo, and Santa Barbara. Meetings are held quarterly, usually in Visalia. For further info contact the club president, Harry Billings, at 260 Fulton Street, Fresno, CA 93721.

DXPO 1985: DXPO 1985 will take place

The WAZ Program

10 Meter Phone

299	W5JM	300	JR7OEF

20 Meter Phone

536	DU1RFA

15 Meter CW

116	JM1VRW

20 Meter CW

229	N4RI

All Band WAZ

S.S.B.

2955	SV1JG	2959	DI1RFA
2956	W1GD	2960	G4KDV
2957	OZ1BQA	2961	JA7YFB
2958	C21RK		

C.W. and Phone

5882	OZ1EUO	5885	JH2VAD
5883	K6JEY	5886	KY2W
5884	OZ1APA		

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the W A Z Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is $4.00 for subscribers and $10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest *CQ* mailing label with your application.

5 Band WAZ

Standings as of June 1, 1985

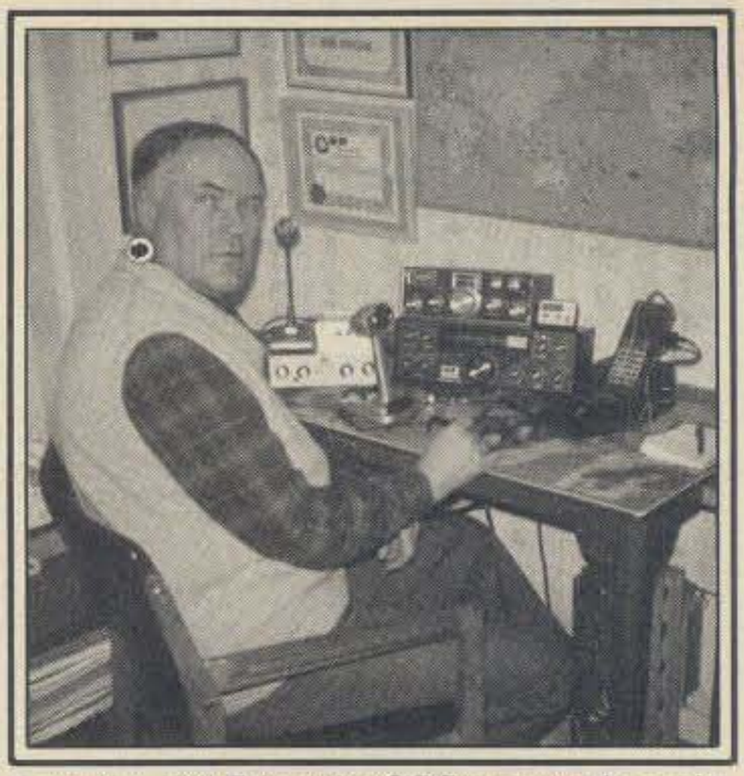
All 200 zones worked:

1. ON4UN	34. I0RIZ	67. ZS5LB
2. K4MQG	35. ON5NT	68. F6DZU
3. SM4CAN	36. OH6JW	69. DL4YAH
4. AA6AA	37. OK1AWZ	70. LA7ZO
5. W8AH	38. IV3PRK	71. W9ZR
6. W6KUT	39. DJ6RX	72. W1NG
7. EA8AK	40. OH3YI	73. VK9NS
8. LA7JO	41. I4RYC	74. N4KG
9. EA3SF	42. ZL1BIL	75. YU7DX
10. OH1XX	43. I4EAT	76. DL8MAG
11. EA8OZ	44. ZL1BQD	77. OK3DG
12. W0SD	45. TG9NX	78. ZL1BOQ
13. K0ZZ	46. XE1J	79. EA9IE
14. ON6OS	47. F5VU	80. DL7HZ
15. OK3TCA	48. W3AP	81. DJ9RQ
16. K6SSS	49. YO3AC	82. EA5SP
17. ZL3GQ	50. K3TW	83. EA2IA
18. OK3CGP	51. XE1OX	84. SP3BQD
19. SM0AJU	52. VE7IG	85. LZ1NG
20. OZ3PZ	53. OK1ADM	86. N4JF
21. I3MAU	54. CT1FL	87. CT2AK
22. I2ZGC	55. WA1AER	88. HB9CIP
23. 4Z4DX	56. N4RR	89. OK1MG
24. N4KE	57. UW0MF	90. CT4BD
25. K5UR	58. W4DR	91. VK6HD
26. K9AJ	59. OK1MP	92. EA6ET
27. SM3EVR	60. W1NW	93. VK3QI
28. LA5YJ	61. OE1ZJ	94. LZ2DF
29. DL3RK	62. HB9AHL	95. ON4QX
30. N4WJ	63. HB9AMO	96. SM0DJC
31. G3MCS	64. LA6OT	97. CT3BM
32. SM5AQD	65. UR2QD	98. K2TQC
33. W0MLY	66. UK2RDX	

The top 12 contenders for 5 Band WAZ are:

1. DK5AD, 199	7. LA9GV, 198
2. JA3EMU, 199	8. W6GO, 198
3. N4WW, 199	9. W4CEB, 198
4. EA8XS, 199	10. W2YY, 198
5. K6YRA, 199	11. SM5AKT, 198
6. W8UVZ, 199	12. G3GIQ, 198

318 Stations have attained the 150 zone level



Earning WAZ by the QRPp route is a significant achievement and Rune Erikson, SM0GKF, was the first Swedish station to reach this milestone. Rune used a Ten-Tec Argonaut with 5 watts input to a 10-15-20 meter groundplane with 6 radials. Working and confirming QRPp WAZ took 8 years, 1976-84. His best DX was a QSO with KH6HHN on 20 meters in 1977. Rune also holds the 1000 miles per watt award. He and XYL Margareta live in Vallingby, Sweden.

in Atlanta on September 27, 28, and 29 at the Lanier Plaza Hotel located at I-85 and Monroe Drive N.E. Reservations may be made through Grover Meinert, KC4BX, 720 Starlight Lane, NE, Atlanta, GA 30342. Registration is $49.50. Hotel reservations can be made directly with the motel via these toll-free numbers: 1-800-554-8444, or inside Georgia 1-800-282-8222. Rates for DXPO are $39.00 single and $45.00 double. One of the premier attractions will be John Devoldere, ON4UN. John is holder of 5BWAZ #1 and author of several books, including one on 80 meter DXing. Also featured will be Rusty Epps, W6OAT, of the recent FO0XX Clipperton DXpedition, and the first presentation of Carl and Martha Henson's expedition to 3C1.

How To Identify Unusual DX Prefixes

A beginning DXer usually starts with a DXCC countries list and an atlas and soon knows that a ZL is in New Zealand, a UA9 is in Russia, a JA is in Japan, and so forth. However, about the time he thinks he has the prefix scheme all figured out, along comes a bunch of weird prefixes which do not appear on the countries list, in the *Callbook*, or on a DX map. These are callsigns such as EK9K, TO5WF, 4N4BW, or 8J2IYC! So how does one figure out where these interesting DX stations are located?

First of all, these unusual prefixes are normally used only for special events or for commemorative purposes in the country to which the callsign block is assigned. For example, in 1976 all U.S. amateurs were permitted to use special prefixes to commemorate our bicentennial. The bad news is that there isn't a clear-cut system that will pin down the QTH of each unusual prefix 100% of the time. The good news is that there is a handy list in the information pages of the *Radio Amateurs Callbook*, on the back cover of the *Radio Amateur's World Atlas*, and in the back pages of the ARRL logbooks. This list is issued by the International Telecommunications Union (ITU) in Geneva, Switzerland.

Here are some examples of how the ITU list may be used to find the location of the stations mentioned above:

1. *EK9K*—In the ITU list you will find that the prefix block EKA-EKZ is assigned to the USSR. Therefore, EK9K is a Russian station operating in the 9th call district, Siberia.

2. *TO5WF*—The ITU list shows TOA–TQZ to be assigned to France. Therefore, TO5WF is a French station operating from the 5th call district of France. This

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more active countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application for 275 or more active countries. Deleted countries do not count and are dropped from all totals as they occur. The total number of countries is now 316. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE for confirmation of total. The fee for endorsement stickers is $1.00.

C.W.

ON4QX	316	W6ID	311	W0IZ	303	EA2IA	293	K7ZR	280
W9DWQ	316	W4BQY	310	WA8DXA	302	N5DX	291	I5XIM	280
W6PT	315	DL3RK	310	YU2TW	301	I3OBO	290	W2LZX	280
K4CEB	315	K4XO	309	SM3EVR	300	WD9IIX	290	K1VHS	280
K9MM	315	N4MM	308	W6SN	300	W1WLW	289	HB9AFI	279
DL7AA	314	W9BW	308	W0SR	299	W4BV	289	WB4RUA	277
W3GRS	314	W4OEL	307	K3FN	298	WA2HZR	286	W6YQ	277
N4PN	314	AA6AA	307	W7CNL	298	K8LJG	284	DL1QT	277
W8KPL	314	W1NG	306	DJ7CX	297	WD9IIC	284	NN4Q	276
K6LEB	314	K1MEM	306	SM6CST	297	N8MC	284	KA3R	276
N6AV	313	OK1MP	306	K3UA	295	K8PYD	281	K4SE	275
K6JG	313	K9QVB	306	K9IW	294	WA4JTI	281	WA4DAN	275
K6EC	312	N4KG	304	W9RY	293	W0HZ	281	K4CXY	275
N6CW	311	AB4H	304						

S.S.B.

K2FL	316	K4MQG	312	WD8MGQ	304	K4CXY	296	WB3HAZ	283
W4EEE	316	N4MM	312	VE7HP	304	W4UNP	296	WD8PUG	283
K6WR	316	I2LLD	312	XE1KS	303	KE3A	296	XE1OW	283
W4UG	316	VE7WJ	312	W2LZX	303	WZ4I	296	VE3MV	283
W6EUF	316	W9SS	312	KR9O	303	WB3GPR	296	IN3ANE	283
VE3MR	316	K6EC	311	KU9I	303	I8ACB	295	KI3L	283
W3GRS	315	W4SSU	311	I0MBX	303	I3OBO	295	AE5B	282
KD8VM	315	I4LCK	311	KB8DB	303	WA9PWN	295	CT1UA	282
DL9OH	315	N7RO	311	WA4WTG	303	XE1OX	295	KC8YM	282
I0AMU	315	LU3YL	311	K1MEM	302	W0IYR	295	AI9R	282
F9RM	315	OZ5EV	311	N5FG	302	KK0C	295	VE3DLR	282
VE3MJ	315	N2SS	311	W6FET	302	W4BQY	295	TG9EP	282
I8AA	315	W8PCA	311	W2FGY	302	I8ZTE	294	K4LR	282
I0ZV	315	K9BWQ	311	K9HQM	302	NN4Q	294	I1POR	282
KS2I	315	EA4LH	310	KV2S	302	WD0BNC	294	KD5ZM	281
4Z4DX	315	K6XP	310	WD9IIX	302	I5BDE	294	K9TI	280
W9DWQ	315	OS2EGL	310	W6SN	302	K4SE	293	N5FW	280
W9JT	315	DK2BL	310	K9IW	302	WD8MOV	293	ZL1BOQ	280
ZL1AGO	315	K4XO	310	K9UAA	302	KC8JH	293	KA8T	279
W4NKI	315	IV3YRN	310	VE3FJE	301	AI5I	293	KB5DN	279
VE2WY	315	W2SUA	310	WB4NDX	301	KB3OQ	293	EA3KW	279
N4JF	315	YU1DZ	310	WA3HUP	301	WA4LOF	292	EA6DE	279
W3AZD	315	LA7JO	310	K8CMO	301	AC0A	292	W9OKL	279
I8KDB	314	VE3GCO	309	W8ILC/QRPp	301	I2MOP	292	JH8NYK	279
K6YRA	314	DL6KG	309	AI8S	301	VE3FEA	292	KX5V	279
ZL3NS	314	N4PN	309	W1LQQ	301	VP9CP	292	AI8M	278
VE3GMT	314	K1UO	309	W9RY	301	W8LKG	292	K4BYK	278
EA2IA	314	W8JXM	309	YU2TW	301	VE3IPR	291	I5EFO	278
YV1KZ	314	W1NG	308	N4CRU	301	N5AWS	291	VE3IUE	278
DJ9ZB	314	VK4VC	308	W4OHZ	300	WB6GFJ	291	K3LUE	278
N4WF	314	YV5AIP	308	I5EFO	300	W4JFE	291	KB3KV	278
OZ3SK	314	ZL1BIL	308	W8IMZ	300	K1VHS	291	WA2FKF	278
W4DPS	314	N6AV	308	K9QVB	300	W6MFC	291	KB8O	277
K9MM	314	AA6AA	308	KB5FU	300	KB0U	291	KP4EQF	277
YV5DFI	314	N6OC	308	KB9KD	300	KQ9W	291	WB0UFL	277
K9LKA	313	WAJTI	308	K3UA	300	K2JLA	291	W4PIT	277
XE1AE	313	W2CC	308	KB8KW	300	KZ2P	290	KB0SY	277
I4ZSQ	313	VE4SK	307	VE4AT	300	YU7KV	290	I8XTX	277
ZS6LW	313	K8PYD	307	I8KCI	300	I0SGF	290	K2JF	277
ON5KL	313	N4KG	307	WB3DNA	300	VE3CKP	290	N7ASL	276
K6JC	313	I0MBX	307	WA0TKJ	299	JA5PUL	289	WA6DTG	276
OE3WWB	313	W0SR	307	I6PLN	299	W9TA	289	WA4OPW	276
OK1MP	313	W7FP	307	KB9OC	299	K8ZZU	289	AI9U	276
VE1YX	313	W6DN	307	W6NLG	299	K0GT	288	KC2RS	276
W0SFU	313	9H4G	307	DJ7CX	298	OK1AWZ	288	W5LLU	276
W9BW	313	N4KE	306	K9SM	298	I8KCI	288	I8INW	275
W0YDB	313	W7OM	306	I8LEL	298	N2ATD	288	WB3CQN	275
W8ILC	313	WA0DCQ	306	K8NA	298	W0ULU	288	WB1EAZ	275
F2MO	312	G4CHP	306	JH4PRU	298	AB9E	287	VE7BSM	275
N6AW	312	VE3MRS	306	K8VFV	298	W6BCQ	286	K8NWD	275
W3GG	312	W2CC	305	WB4UBD	298	N3ARK	286	KA9ABC	275
I8YRK	312	VK3JF	305	EA9IE	298	VE3CYX	285	G3XTT	275
CT1FL	312	EA1QF	305	XE1NI	298	KC8EU	284		
W0SD	312	SM4CTT	305	HP1JC	297	KB5RF	284		
K9RF	312	XE1J	304	K5DUT	297	N8BKF	284		
K5OVC	312	WB1DQC	304	WA4DAN	297	W9NUF	284		
K8LJG	312	KM6B	304	NA5W	297	AG9S	284		

particular station was located in the city of Cognac.

3. *4N4BW*—4NA–4OZ appears on the ITU list as Yugoslavia. Therefore, 4N4BW is a Yugoslav station operating from the 4th call district.

4. *8J2IYC*—This example is confusing because the Countries List shows 8J to be in Antarctica, while the ITU list shows 8JA–8JZ as being assigned to Japan. In fact, the 8J2IYC station cited operated from Aichi, Japan in 1979. A Japanese scientific expedition to the Antarctic would probably use the 8J prefix, but this prefix has been used by a number of stations operating from Japan proper.

This brief explanation should help you get started on resolving questions related to unusual prefixes. Other examples are 6E2 used from Mexico, CH2 used from Canada, and AX2 used several years ago from Australia. You may have thought that prefixes beginning with the letter "A" were exclusively U.S., but a visit to the ITU list shows that the U.S. cannot issue "A" callsigns beyond ALZ, and therefore, nothing after AL7.

Akio Takahashi, JA4FWM, is very active in the CQ DX Awards program. Akio has been licensed since 1976 and is 44 years old. He uses a TS-930S and a Henry amplifier to a 2-element quad for 10, 15, and 20 meters. His most difficult zones to confirm were zones 16, 17, and 18. Akio is a member of the Okayama DX Club. (Photo via W4KA)

Robin U. Go, DU9RG, has given a Philippine contact to many a happy DXer. Robin uses a Drake transceiver and a 4-element Wilson monobander. His favorite time and frequency are 14.205 MHz at 1200 UTC.

The ITU list is updated frequently so the version in the back if your logbook may sometimes be out of date. For example, on April 20, 1983 the ITU assigned a new prefix block, T7A-T7Z, to San Marino. However, hams in San Marino continued to use the unofficial M1 prefix.

DXers in the *CQ* WPX Awards program usually observe one principal rule when they hear an unusual prefix: *Work 'em first, then worry about where they are!* If you are interested in *CQ*'s prefix awards, send a self-addressed, stamped envelope to the WPX Awards Manager, Norm Koch, K6ZDL, P.O. Box 1351, Torrance, CA 90505-0351, USA. (Thanks to Jack Wichels, W7YF, in *Totem Tabloid*.)

Some Special Prefixes On The Air

CN31: CN31FIC operated from the 31st Casablanca Fair in Morocco in early May.

EJ2: EJ2B in July was a DXpedition to Basket Island, the westernmost part of Ireland, by a group of Belgian DXers. It counts as Ireland for country awards, but

it is recognized by the Islands On The Air (IOTA) Award as EU 07. QSL to ON5KL.

LY4: From May 22–26, 1985 the special station LY4L was active from Russia to celebrate the 115th anniversary of Lenin's birthday. QSL to UA4LM. On May 26, from 0700–0900 UTC, 14 stations used the special prefixes R4 and U4.

VX6: To celebrate the 100th birthday of the city of Leithbridge, Alberta, the prefix VX6 was used in place of VE6 from July 14–27, 1985.

XO/XJ/XK: The 100th anniversary of Parks Canada was commemorated with special prefixes during the interval June 29 to August 29, 1985 as follows: XO1-Newfoundland, XO2-Labrador, XJ1 Maritimes, XJ2-Quebec, XJ3-Ontario, XJ4-Manitoba, XJ5-Saskatchewan, XJ6-Alberta, XJ7-British Columbia, XJ8-Northwest Territories, and XK1-Yukon.

4X85: 4X85WSE was a special station at the World Stamp Exhibition in Tel Aviv.

7S: This prefix was used by Swedish amateurs during the spring to celebrate the 60th anniversary of SSA, The Swedish Amateur Radio Society.

W6AM—Silent Key

The DX world was saddened by the passing of Don Wallace, W6AM, on May 25, 1985 at the age of 86. Don was a member of the DX Hall of Fame, to which he was elected on September 23, 1978.

At the 1985 Fresno DX Convention, we held the hotel door for Don as he came in from his car with his suitcase. At the Convention banquet, an exercise was conducted during which everyone who had worked 300 countries was asked to stand, then only those with 310 remained standing, then 320, and on up the ladder as those still standing gradually diminished. Finally, a level was reached where only Don Wallace was still standing quietly with a shy smile on his face. It was to be the last time we would see him. He will be missed.

Juan Font Gregori, EA5SP, of Valencia, Spain has an outstanding record in the CQ WAZ program. Juan earned 5-Band WAZ #283, 80 meter single band phone WAZ #26, 40 meter phone single band WAZ #28, 20 meter phone single band WAZ #512, 15 meter phone single band WAZ #207, and 10 meter phone single band WAZ #284. Juan's station includes a Yaesu FT-101 and a Kenwood TS-930S to an Alpha 76 linear which feeds either a 12-element log periodic for 10, 15, and 20, a full size cubical quad for 40 and 30, and inverted Vees for 40 and 80. (Photo via W4KA)

More Comments on Lists and Nets

Since *De Extra* printed the views of the IARU Region 1 High Frequency Working Group on DX Lists and Nets in the March 1985 issue, a number of responses have been received. Here are the views of three active U.S. DXers.

de Art Ekblad, KØQQ: "Any comment on lists and nets, whether for or against, is like blowing in the wind, but when one is offered the right to be heard he should express his opinion.

"When I first started the DX chase, shortly after World War II, our receivers had images, poor stability, poor selectivity, and lacked sensitivity above 20 meters. Our transmitters were NBFM, Heising modulated, or poorly filtered AM rigs. CW operation was 90% straight key, and key clicks, chirps, and rough signals abounded. Few beams were available, and most DX was worked using a long wire, a doublet, or a vertical. No one wanted any help working DX. If you put the station together and it worked well enough to reach across the pond, you

CQ DX Awards Program

S.S.B.

1417	K2JF	1421	EA2AOM
1418	NF4L	1422	VK4ATQ
1419	K9DCJ	1423	N4JF
1420	EA8AKN	1424	CX4HS

C.W.

640	N8BKF	641	LA7JO

S.S.B. Endorsements

310	W4NKI/315	300	K9IW/302
310	VE2WY/315	300	K9UAA/302
310	N4JF/315	275	W8LKG/292
310	W9SS/312	275	VE3CKP/290
310	W8PCA/311	275	KI3L/283
300	W2CC/308	275	K2JF/277
300	G4CHP/306	200	CX4HS/217
300	WA4WTG/303	200	SV1LV/203
300	KR9O/303	150	EA2AOM/178
28 MHz	EA8AKN	28 MHz	CX4HS

C.W. Endorsements

300	W6SN/300	150	LA7JO/186
275	K9IW/294		

Total number of active countries is 315. 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 s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

sure didn't want some other ham taking *any* of the credit for your accomplishment.

"Today we have highly stable, selective, and sensitive receivers and transceivers on both SSB and CW. We have automatic keyers, excellent filters, noise blankers, digital readouts, and kilowatt amplifiers. Some have 100–200 foot towers, stacked Yagis on the high bands, and 40 meter beams are common. Some even have beams on 75 meters. Of course, we also have that famous Net Control or List Operator, who, after the DX station has counted out the signal report three times and half the band tells everyone what it was, exclaims . . . GOOD CONTACT!

"In my humble judgment, this represents as much progress in the art of DXing as Congress has had in controlling the national debt. However, through it all we must remember that it really is no life and death matter . . . . It really is only a game!"

de Charles Brown, KF2F: "I was most interested in your 'DX Lists and Nets, A Code of Operation.'

"I'm a late starter with amateur radio, Novice early 1978 as a 70 year old and Extra class in 1980. When the Extra mountain was climbed, I became most interested in DX and became a charter member of a DX hunter group. We worked out a 2 meter call system to alert our group when DX was on and made many new contacts. Naturally, we encountered many types of DX operation in our zeal to gain new countries and qualify for the DXCC Honor Roll. We learned that the most effective way for a DX operator to cover the most ground quickly is by split-frequency operation with CW best and SSB second best. Anything else falls under the heading of *zoo*. I'm sure you have heard them all: the tuning on frequency, the carriers, slow scan TV, hoots, whistles, TALKERS not listeners, together with so-called DXers giving 5 by 9 reports even though they can't hear the reply.

"Lists and nets were developed mainly to try to maintain order, to give hams a chance to be courteous, and to ensure a quiet exchange between interested DXers. Unfortunately, it will never happen! Sure, all amateurs want that rare contact, but the problem is that the DX station needs training. DXCC never meant for DX to be spoon fed to a group standing in line. It shouldn't be handed on a platter to just anyone. What is the thrill of a rare DX contact made in this manner?

"Looking back at the great DXpeditions of the past, their success was due to split operation by experienced DXers. That is the way to make the most contacts quickly with a minimum of effort.

"Finally, I have and will try to make a list as a last resort, if there is no other way, but lists are the pits and should be disallowed as confirmed contacts. A DXpedition operator should have an external VFO as a necessary piece of equipment and certainly for his own well being. When I hear 'zoo' operation, I usually turn off my rig and wait for a better opportunity."

de John Harris, W6MUM (In SCDXC Bulletin): "Firstly, lists and nets are here to stay, for the basic reason that many foreign amateurs prefer to operate that way rather than be driven off the frequency by uncontrolled bedlam. Amateurs with big arrays who want to do it on their own rather than ask for help prove absolutely nothing except that they may be putting out a stronger signal than others with less equipment and affluence.

"I might add further, some Extra class operators are the biggest offenders on the DX bands. When it comes to operating ethics, they should be exemplary in conduct.

"Amateur radio is a great privilege. The fact that a particular individual can put a louder signal on the band doesn't mean that he or she is a more skilled operator. The truly good operators are the ones who show courtesy and consideration to others. To have superior equipment is well and good, but to use it unselfishly is the true essence of amateur radio."

73, John, K4IIF

QSL Information

K5TVC volunteers his services as QSL Manager for any DX station. His address is Q.R. Galbraith, K5TVC, 4303 Kingsway Drive, Farmington, NM 87401.

A22BW to DK3KD
A35CQ to WA6VNR
A35EA to ZL1AMO
A92P to G4SOK
AH8A to NE4S
BY1PK to P.O. Box 6106, Beijing, Peoples Republic of China
BY1QR to Box 2654, Beijing, PRC
BY5RA to P.O. Box 730, Fuzhou, PRC
BY8AA to P.O. Box 202, Mulumuqi, PRC
C21BD to WB0TEC
EL1G to WD9IDS
EL2AL to KW9Z
EL2FJ to JF2QHC
EL7C to DK5VI
FK8AE to F6EWK
FW8AF to P.O. Box 92, Wallis Island
GB4LI to G4NWZ
J6LDB to P.O. Box 198, Castries, St. Lucia
JT8APE to UZ3AZO
JY9WR to G4ATS
HL9AA to NJ7Q
KG4DX to Bill Crews, 1421 Hampton Ridge Rd., Norcross, GA 30093
KC6HA to K6EDV
LU2BC to SM0KCR
OD5AS to I5WVI
OD5LX to SM0DJZ
OX3AX to OZ5DX
OX3OA to OZ1FAO
P29KJ to VK9NL
P46S to K3UOC
SO9FY to LA9FY
SU1ER to Box 33, Cairo Airport, Cairo, Egypt
SV8AA to N2OO
SV8DV/9 to WB4TDB
TI9CF to TI2CF
TR8DR to W2PD
TU4BR to KN4F
TZ6FE to DL4BC
V2ACW to WB4OSN
V2AZL to W2HWS
V2AZM to WB8SSR
V44KM to WA6ZEF
VK0GC (Macquarie Island) to P29JS
VP8ALJ to P.O. Box 68, Port Stanley, Falkland Islands
VP8BDM to P.O. Box 217, Port Stanley, Falkland Islands
VP8VK to G4RFV
VQ9CK to WB3CQN
VQ9YR to KA4SPA
VU2ISV to K4JR
WB4YIX/VP2M to K1ANU
XX9LL to DL7LL
XX9UT (Macao) to JA1UT
YB8ARA to WA6AHF
Z21GN to KV3D
ZD8JP to G3ATK
ZD8KM to ZD8AR
3A2TO to EA5AGY
3X4EX to N4CID
4U8ITU (May 2-5, 1985) to F6EYS
5Z4MX to SM3CXS
5Z4WD to DF0BV
6Y5FS/KP1 and 6Y5NR/KP1 to 6Y5NR
9L3WA to WD8OHU
9M2DC to G4RZQ
9U5JB to ON5NT
9V1VY to N6HHY
9X5WP to WB6VKD
9Y4F to VE7DPW

dateline... Washington, D.C.

a regular feature by
THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

AFCEA Luncheon Scores Another Success

The Amateur Radio Operator's Luncheon, held as part of the Armed Forces Communications and Electronics Association (AFCEA) 39th Annual Convention in Washington, DC, welcomed over 120 amateurs and friends from government, industry, and the military. Like the convention itself, the luncheon took place in the Washington, DC Convention Center, thereby affording attendees the opportunity to see the latest offerings in communications/electronics equipment and systems from the more than 400 participating corporations.

Following a superb hot dinner, comments on the state of amateur radio and on the issue of growth in our service were solicited from invited guests. First to speak was Robert Foosaner, Chief, Private Radio Bureau (PRB), FCC, who stated that the solution to the growth problem was not to be found in a "no code" license. Rather, Foosaner suggested that amateurs should take a close look at the Novice class license and at what could be done to make it more successful in attracting and retaining new amateurs. For some reason, he noted, the incentives provided in the U.S. amateur licensing structure have not been sufficient to encourage Novices to upgrade their privileges. Further, said Foosaner, amateurs holding licenses above the Novice class are not doing everything they could be doing to help newcomers move up the licensing ladder.

James McKinney, Chief, Mass Media Bureau (and, formerly, Chief of the PRB), disagreed with Foosaner regarding the need for a "no code" license. "CB introduced many people to amateur radio," said McKinney, "but many did not become licensed. Why? Because of the Morse code requirement." He also commented on the difficulties being experienced by the Commission and other government agencies in filling technically related job vacancies . . . jobs that, in the past, were often filled by young engineers who got their start in amateur radio. In concluding his remarks, McKinney agreed with Foosaner, stating that our two biggest problems were licensing new amateurs (i.e., Novices), and then getting them to upgrade.

Roy Kolly, Field Operations Bureau (FOB), took a different tack in his remarks. For better or worse, he said, the FOB tends to focus on investigations and enforcement. And since operators in the Amateur service mirror society, we have our fair share of "bad apples." Unfortunately, the time and money spent on tracking these people down distracts the Commission from more critical problems . . . problems such as removing intruders from our bands and the bands allocated to other services. To the extent that amateurs can resolve their own problems, the Commission can be more effective in protecting our frequencies from unauthorized use by others.

Dr. Robert Powers, Chief Scientist of the Commission and Head of its Office of Science and Technology, noted in his comments that the recently adopted Report and Order on the use of spread-spectrum modulation techniques in the Amateur service is a good example of where we should be placing more emphasis. He lamented the shift in recent years away from experimentation, and asked U.S. amateurs to inform the Commission of other technologies we wish to explore. "Government should amplify opportunities for people," said Powers, and he pledged his support to those who are committed to expanding our frontiers.

Ed Minkle, the Commission's Managing Director, spoke briefly of the problem in attracting our young people to amateur radio. Noting that the interconnection of amateur radio and computers should be one of today's most interesting challenges, Minkle tasked those present to find a way of informing our young people what we have to offer.

Alan Dorhoffer, K2EEK, Editor, *CQ*, spoke briefly to the need for a no-code license, citing the growth to which such licenses have given rise in the amateur populations of Germany and Spain. But he also noted that we are going to have to go "one-on-one" to get people involved in amateur radio. Among other things, said Dorhoffer, we are going to have to interest young people in attending amateur conventions and shows, and once they are there, we are going to have to ensure that they are not ignored or left dazed by the technology.

Dr. Larry Price, W4RA, President, American Radio Relay League, took the position that a no-code license was not the answer to the growth problem. "The League is not in favor of getting large numbers of amateurs at the expense of losing our credibility." Price noted that "pools" of scientifically oriented youths and adults should be tapped more effectively for new licensees.

Finally, Dave Siddall, K3ZJ, President, Capitol Hill Amateur Radio Society (CHARS), stated that "we must get off the no-code idea and look at other solutions." Included in his suggestions was expanded Novice privileges, something into which the League's Executive Committee and Board are already looking. Siddall also congratulated those participating in the Volunteer Examination Program for making it such a success. "The availability of examination points all over the country today," said Siddall," is a real 'plus.'"

Prior to the drawing for prizes, Edward LaFleur, WB4ZFR, Senior Legislative Liaison Representative, Rockwell International, Inc., presented the ARRL with a 1/100 scale model of the Space Shuttle in recognition of the League's space-related efforts. Stu Meyer, W2GHK/Forever, then presented checks from the Quarter Century Wireless Association and the Radio Club of America to AMSAT and the Foundation for Amateur Radio. The funds are intended to assist the recipients in furthering their educational scholarship programs.

Door prizes, which included two EIMAC 3CX800A7 tubes and sockets, a mobile antenna, station accessories, and numerous books on a variety of subjects, were contributed by the following merchants, corporations, and organizations: *CQ* magazine, the American Radio Relay League, The Electronic Equipment Bank (Vienna, VA), Varian/EIMAC Division, and ORI, Inc.

Your Editor takes this opportunity to thank Col. "Bud" Deem and his AFCEA convention staff for making the arrangements for this year's Amateur Radio Operator's Luncheon, and Mary Ellen Stoner of The Electronic Equipment Bank for helping with the luncheon events.

See you at next year's luncheon?!

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FCC Considers Five Petitions On Novice Privileges

The Commission has assigned Rule Making (RM) numbers to five petitions for new Novice privileges. Four of the petitions were filed by Larry Garens, KC5OQ:

RM 5022; to permit Novices to use ASCII on 10 meters.

RM 5023; to permit Novice and Technician class licensees to use phone on 10 meters.

RM 5024; to permit Novice and Technician class licensees to use CW on 30 meters (10 MHz).

RM 5025; to permit Novices to use phone on 220 MHz.

The fifth petition to make the Novice class license more attractive was from the ARRL (RM 5038); details of the League's major proposals were covered in an earlier column.

For many years the FCC has rejected petitions to increase Novice privileges, citing the fact that earlier rule-making proceedings had exhaustively examined all viable alternatives. That the Commission did not dismiss the five petitions cited above suggests that it is now open to suggestions as to how the Novice class license can be used to attract and retain newcomers to the amateur ranks. Any actions that would result from these RMs, however, would probably occur late in the year, and would, in all liklihood, take the form of a Notice of Proposed Rule Making (NPRM).

Comments Favor Mandatory Coordination of Repeaters

Comments filed in the matter of PR Docket 85-22 (frequency coordination of amateur repeaters) are strongly in favor of mandatory coordination. However, while most everyone thinks that there should be a system by which repeaters can be coordinated, no one has proposed a scheme for implementing such an activity.

As this is written, the ARRL has yet to file its comments. When it does, its comments are expected to reflect the decisions of the Executive Committee, which ". . . expressed a preference for mandatory coordination of repeaters; for open repeaters having priority over closed repeaters in the coordination process; and for regional coordination in preference to a national coordinator." (Minute 2.2, ARRL Executive Committee, May 18, 1985.) The Executive Committee's reluctance to endorse a national coordinator was not unexpected; historically, the ARRL has not participated actively in the coordination process.

The deadline for filing Comments was extended to August 15, 1985. Reply Comments are due September 30, 1985.

Amateur Fined $2,000 For Disrupting Communications

According to Carol Foelak, PRB, the Commission has issued a Notice of Apparent Liability to Monetary Forfeiture for $2,000 to James Brantley, K6KPS, of Los Angeles, CA. Brantley, an Advanced class licensee, had been the subject of numerous complaints from other amateurs, who accused him of disrupting their HF communications. Most recently, the FCC received complaints that Brantley had disrupted communications on the 20 meter band by repeatedly calling "CQ" or by making calls to nonexistent stations. As a result, Brantley was cited for violating Section 97.113 of the Amateur Rules, which prohibits "broadcasting" in the Amateur service. The Commission considered that prolonged calls, calls to nonexistent stations, and refusal to establish communications when his calls were answered constituted operation in violation of the broadcasting prohibition.

The Notice of Apparent Liability was issued on June 13, 1985, and Brantley has 30 days to submit payment or a reply. Further information in the matter may be obtained from Carol Foelak, PRB, FCC, 1919 M St. NW, Washington, DC 20554.

Commission Proposes That VECs Maintain Exam Questions

In an NPRM released earlier this year (PR Docket 85-196), the FCC is proposing that VECs maintain the question sets they use for amateur exams. If adopted, the Commission would require that the material developed by the VECs be in keeping with the Commission-issued syllabus that lays out the "courses of study" for the various examination elements. Amateurs wishing to contribute questions to these elements could still do so by submitting their questions to one or more VECs.

The Commission is also proposing that volunteer examiners (VEs) pick the questions to be used on any given test from tests to be provided by their VECs. (Currently, VECs select the questions used.) Actually, VEs were to start selecting the questions on January 1, 1987, but that date would be moved forward to coincide with the date the VECs would become responsible for maintaining their own examination questions.

According to John Johnston, Special Services Division, Private Radio Bureau, the proposals are intended to provide more flexibility to VECs and VEs. Comments are due August 30, 1985, with Reply Comments due September 30, 1985.

ARRL Again Makes Request For Amateur Satellite Stamp

By the time this is read, preparations may be underway for the Postal Service to issue a new stamp commemorating the first amateur satellite. This satellite, OSCAR 1, was launched 25 years ago, on December 12, 1961, and was the first nongovernment satellite placed in orbit.

Spearheading the League's effort before the Citizen's Stamp Advisory Committee, the group that makes recommendations to the Postmaster General regarding the issuance of commemorative postage stamps, is the ARRL's Public Information Officer, Paul Courson, WA3VJB, and Washington Area Coordinator Perry Williams, W1UED. An earlier attempt (May 1985) to secure the Committee's recommendation for an amateur stamp was unsuccessful. However, each meeting of the Advisory Committee is considered a separate entity, and so the League resubmitted its request for the round that took place on July 26, 1985.

DC Government Rejects People's Republic of Benin Antenna Application

Ever since the People's Republic of Benin applied for a zoning exception to construct an HF radio tower and rotary antenna at their chancery in Washington, DC, their neighbors have been up in arms. And to stop construction of what one local group viewed as not only an unsightly structure, but one that would lead to interference and radiation problems, as well, the 6,000-member Woodley Park Community Association took on Benin before the District's Board of Zoning Adjustment. Despite support to Benin from the U.S. Department of State, the District government sided with its citizens.

According to Kenneth Bredemeier of *The Washington Post*, the Board voted four to zero against construction of the tower. It agreed with the Woodley Park Community Association that the tower would be "visually obtrusive," and could result in interference to radios, television receivers, and stereo systems. The Board also agreed that the tower would lower property values and could create a safety hazard for neighborhood children.

The Department of State is now in the process of considering whether to appeal the decision to the DC Court of Appeals. Noting that such decisions could lead to the rejection of U.S. requests to build similar structures at our embassies around the world, Ronald Mlotek, Legal counsel for the State Department's foreign missions office, stated: "Reciprocity is the first and the most fundamental rule of diplomatic relations. We, the United States, can hardly expect other countries to give us what we cannot give those countries here." Making the situation all the more awkward is the fact that the Republic of Benin has already permitted the United States to construct an antenna system in Benin similar to the one they intended to erect in Washington.

In commenting on the Board's decision, the Hon. Guy Landry Hazoume, Ambassador of Benin, told *The Washington Post* ". . . that Benin, in accordance with international law and practice, as well as principles of reciprocity that result, is entitled to benefit, in Washington, from the same communication facilities accorded (the United States) in Cotonou. We shall therefore continue with the serenity and dignity we have always observed and, in close cooperation with the State Department, to look with patience and firmness for the triumph of these principles."

It is unknown at this time how the Board's decision on Benin's antenna installation will affect requests by District amateurs for permits or variances related to their tower construction projects.

FCC Moves Against Illegal HF Operators

The Commission is currently investigating a group of unlicensed operators known as the "Oscar Group" (no ties, whatsoever, to OSCAR satellite organizations). This group, according to King Hall, Chief Watch Officer, Signal Analysis Branch, Enforcement Division, FOB, has been using 6930 and 6933 kHz, apparently to maintain friendships that have extended over many years. The frequencies they use are allocated to the Fixed and Land Mobile services, and accordingly, the FCC was called to investigate.

The first step in a series of planned enforcement actions took place on June 8, 1985, when Clinton E. Berger of Ridgetop, TN, was located by Royce Leonardson, an Investigator with the Commission's Atlanta District Office. At the time, Berger was communicating with other "Oscar Group" members. He is now subject to a maximum fine of $10,000 and up to one year in jail. Other cities targeted for concentrated enforcement by the FOB include Indianapolis, IN, and San Francisco, CA.

Hall urged "Oscar Group" operators to cease their actions immediately. "Failure to do so," he said, "will result in severe penalties."

Concern Grows Regarding Foreign Engineering Students

According to speakers at a symposium held in Washington, DC, the United States is becoming increasingly dependent on foreign engineering and science students. In fact, *The Institute*, a publication of The Institute of Electrical and Electronics Engineers (IEEE), observed that "more than half of the engineering doctorate degrees in the United States are now awarded to non-U.S. students—the largest percentage of whom are studying electrical engineering."

The symposium, organized by the Scientific Manpower Commission and the American Association of Engineering Societies' Engineering Manpower Commission, addressed a number of questions, including:

- Does the large population of foreign engineers and scientists in the U.S. depress salaries and result in a lower quality of teaching than might otherwise be available?
- To what extent should U.S. taxpayers support the education of foreign engineers and scientists?
- How much do U.S. industry and universities rely on non-U.S. scientific and technical talent?
- How does this growth affect practitioners and students who are U.S. citizens?

While many viewed the large number of foreign students as a matter of grave concern, others, such as Richard Nicholson of the National Science Foundation (NSF), stated that the ". . . advantages (of having foreign students in the United States) outweigh the disadvantages." Still others noted that there simply were not enough U.S. students around who were interested in graduate studies. "My problem is that I can't find American students to train," said Mary Gray of the American University in Washington, DC. Gray noted that "they all want to go out and get jobs for $30,000 per year. They don't want to take teaching assistantships, they don't want to go to graduate school, and I can well understand that."

Readers who desire more information on the issue of foreign students in the U.S. are referred to the following publications:

- "Foreign Engineers in the United States: Immigration or Importation?" Copies are available from the IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854.
- "Participation of Foreign Citizens in U.S. Science and Engineering." Published by the NSF, Washington, DC.

Your Washington Editor would like to thank Messrs. Richard Smith and Jeffrey Young, FOB, FCC, for their contributions to this month's column.

CQ SHOWCASE

NCG Amateur Antennas

NCG Co. has made available their new line of amateur antennas: the 1.2 GHz antennas for base/repeater with a 12.5 dB gain and the new mobile with a 7.5 dB gain. Also available are the new 2 meter 70 cm antenna combinations, a Quad band vertical for HF and VHF 40, 15, 10, and 6 meters. The newest antenna is the tribander for the 10, 12, and 18 MHz bands. It's a ground plane-vertical. Information regarding these new antennas plus multi-boom beams for VHF/UHF is now available from NCG Co., 1275 North Grove Street, Anaheim, CA 92806, or circle number 103 on the reader service card.

The Yaesu FRG-8800 Receiver

The Yaesu FRG-8800 is an HF receiver covering 150 kHz through 29.99 MHz. Direct frequency entry is provided via the front-panel keyboard, which also controls scanning functions and storage/recall of the memory channels. The green LCD information display provides frequency squelch, two 24-hour clocks, and recording capability (including on/off timer switching) make for maximum operating flexibility. The FRG-8800 is designed for easy interface to a personal computer for expanded operating control, and the FRV-8800 VHF Converter option expands coverage to include 118–174 MHz, with front-panel frequency entry and display.

For more information, contact Yaesu Electronics Corp., P.O. Box 49, Paramount, CA 97023, or circle number 104 on the reader service card.

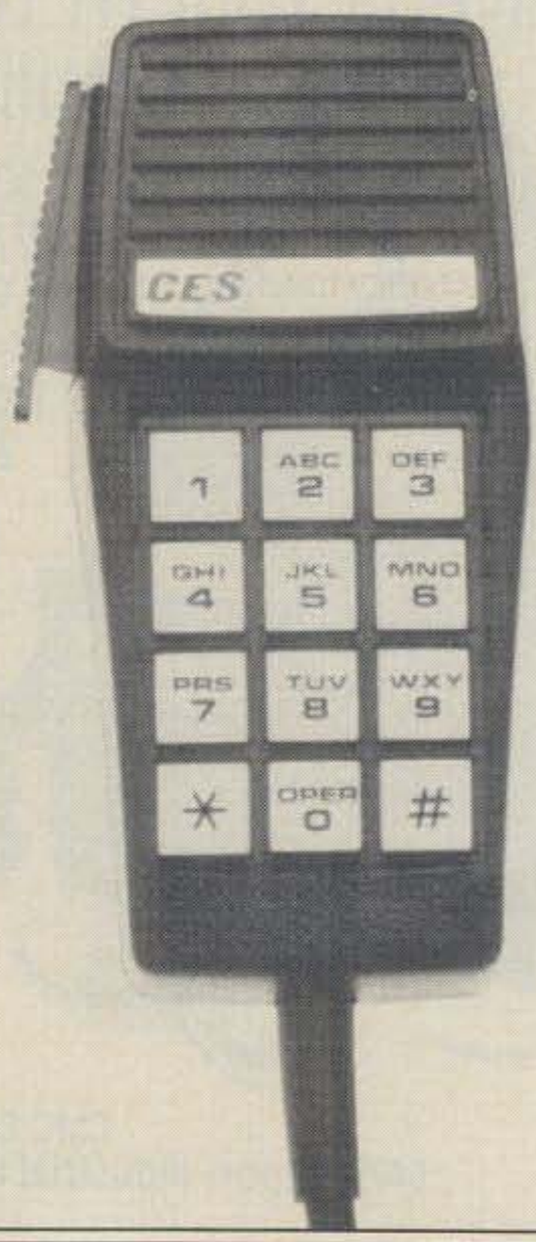
Hamtronics® Packet Radio Relay Power Amplifier

With linking of packer radio stations on 220 MHz becoming popular, Hamtronics has announced the PPA-220, a new PA similar to the Hamtronics LPA 2-40, except that it has increased gain (up to 50 watts out with 2 watts drive), and it has built-in PIN diode antenna switching to allow T/R transition in a few milliseconds. The new PA can be used with the Hamtronics T51 or any other 2 watt, 220 MHz exciter. With the ultra-fast T/R switching, the PPA-220 is suited for packet relay stations being constructed for inter-area ties at 9600 baud maker says. Cost of the kit is $138. For more information, contact Hamtronics, Inc., 65 Moul Road, Hilton, NY 14468-9535, or circle number 102 on the reader service card.

CES, Inc. Micropad

The Micropad Model 600L is available from CES, Inc. Once the user depresses a key, the automatic PTT "brings up" the transmitter, enabling one-handed dialing. A 2 second hold prevents the transmitter from dropping between digits. The muted microphone cartridge prevents ambient noise from interferring with tones and acts as a tone monitor speaker.

The unit features a 90 inch cord, backlighted keyboard, a crystal-control frequency, side tone audio, a jumper plug to match mics to radio, and a six-month warranty. For more information, contact CES, Inc., P.O. Box 2930, Winter Park, FL 32790, or circle number 105 on the reader service card.



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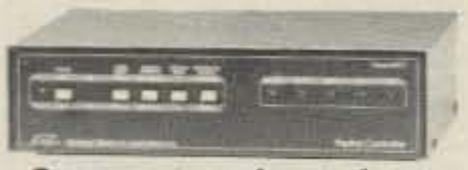

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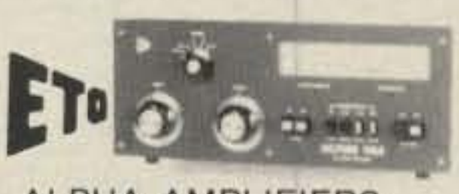

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Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

My commentary in the June column regarding the Canadian province/territory question did clear up the confusion of the number of available multipliers, but I was in error when I called Labrador a province. Labrador itself is *not* a province, but is a part of the province of Newfoundland. The geographical term *Maritime Area* therefore covers four provinces: Newfoundland, New Brunswick, Nova Scotia, and Prince Edward Island.

The fact that Newfoundland and Labrador are in different call areas and *CQ* zones qualifies them as separate multipliers for contest purposes. It is up to the organizers, however, to decide how many multipliers are available for their contest or party. As explained above there are 13 multipliers available by virtue of the separate call areas (VO1/VO2 and VE8/VY1). Indicating the Canadian multiplier as province/call areas would probably clear up the confusion.

My thanks to Norm Monro, K4FRY, and Jim Lawson of the Oklahoma Geophysical Observatory for their explanation of the province/territory geographical separation. *(You would think the Canadians would have advised me of my error.—ed.)*

I was personally saddened when I heard that Father Dave, CE0AE, became a Silent Key on June 7th. I had the pleasure of presenting Father Dave with a World-Wide Contest certificate at one of our local club meetings some years ago. The Reverend David L. Reddy, 61, was a native of Staten Island, New York and was ordained a Franciscan priest in 1951. He spent the early years of his ministry as a teacher and also served the Polynesian community of Santa Cruz as a pastor for 15 years. He later volunteered to serve as a missionary on Easter Island. The rest is history. With the help of Mary Ann Crider, WA3HUP, his QSL Manager, Easter Island was soon removed from the rare country DXCC list. (He was also a member of the QCWA, which verifies that he had been a licensed amateur for some time.)

Rules for our upcoming World-Wide DX Contest this fall will be found in this issue. There are no changes from those used these past many years. The Team Competition used last year will also be included. However, you will find several deletions in and some additions to the trophy list. It's too late to include any new ones in the final rules announcement, but they can be included later and proper credit will be given in future columns. More details about the current changes will be given in next month's column.

Several domestic events usually held in September have not been heard from and therefore are not included in this month's Calendar of Events.

Deadline for December events is September 15th, and October 15th for the January issue. Again, I am requesting that all material be sent directly to my home address.

73 for this time, Frank, W1WY

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

*	Sep.	1	Bulgarian CW Contest
	Sep.	1	ARCI QRP Novice Sprint
*	Sep.	4-5	YLRL "Howdy Days"
	Sep.	7	ARCI QRP SSB Sprint
	Sep.	9-15	QCWA Invitational Party
*	Sep.	14-15	European Phone Contest
	Sep.	14-16	Washington State QSO Party
	Sep.	15	North American CW Sprint
	Sep.	21-22	CAN-AM Phone Contest
	Sep.	21-22	Scandinavian CW Contest
	Sep.	22	North American SSB Sprint
	Sep.	27-29	Maine QSO Party
	Sep.	28-29	CAN-AM CW Contest
	Sep.	28-29	Scandinavian SSB Contest
	Sep.	28-29	G-QRP Club Activity
	Oct.	5-6	California QSO Party
	Oct.	6-7	Illinois QSO Party
	Oct.	12-13	Pennsylvania QSO Party
	Oct.	12-13	ARCI QRP CW Contest
	Oct.	13	RSGB 21/28 MHz Phone
	Oct.	16-17	YLRL Anniv. CW Party
	Oct.	19-20	Boy Scouts Jamboree
	Oct.	19-20	Rhode Island QSO Party
	Oct.	20	RSGB 21 MHz CW Contest
	Oct.	**26-27**	**CQ WW DX Phone Contest**
	Oct.	30-31	YLRL Anniv. SSB Party
	Nov.	**23-24**	**CQ WW DX CW Contest**

* *Covered last month.*

ARCI QRP Sprints

4 hrs. Novice, 0200Z to 0600Z Sun., Sept. 1
6 hrs. SSB, 0200Z to 0800Z Sat., Sept. 7

Rules are the same for both Sprints, except for the suggested frequencies. *(The scoring is lengthy and quite complicated.—ed.)*

Exchange: RS(T) and state or VE province. ARCI members will include their membership number, non-members their power output.

Scoring: Five points for each member contacted; 2 points for nonmembers worked. Stations may be worked once on each band for QSO and multiplier credit.

(A) Multiplier: One for each state or VE province worked, add total from each band. DX countries also count as multiplier.

(B) Power output: 4 to 5 watts ×2, 3 to 4 watts ×4, 2 to 3 watts ×6, 1 to 2 watts ×8, less than 1 watt ×10. Over 5 watts counted as check log. Power output measured in PEP.

(C) Battery Power Bonus: No other source may be used. Multiply score by 1.5.

(D) Antenna Bonus: Use single element, dipole, vertical, etc. (no beam). Another 1.5 multiplier. If you qualify for both (C) and (D) use 2.5 instead of 1.5 each.

(E) U.S./VE/DX Bonus: Add 200 points each to final score if you work 10 U.S. districts, 5 VE provinces, or 5 DX countries.

Final Score: Total QSO points times (A) × (B) × (C) and/or (D) if used, and add bonus (E) for final score.

Frequencies: Novice—3710, 7110, 21100, 28110 kHz. SSB—1810, 3985, 7285, 14285, 21285, 28885 kHz.

Awards: Certificates to top-scoring stations in each state and province with two or more entries.

Use a separate log sheet for each band and include a summary sheet with your entry. Log forms are available by sending a large SASE tro KA5NLY.

Novice logs must be received no later than October 1st, and October 7th for SSB entries. Include an SASE for results. They go to: QRP ARCI Contest Chairman, Eugene Smith, KA5NLY, P.O. Box 55010, Little Rock, AR 72225.

QCWA Invitational Party

1200Z Mon. to 2000Z Sun., Sept. 9–15

This week-long activity was organized to acquaint nonmembers with the Quarter Century Wireless Association. The exchange will be between members and nonmembers on all bands and modes. Only one contact with each station will be counted.

Exchange: Members—Call, name, QSO no., RS(T), chapter no., and state. Nonmembers—QSO no., RS(T), and year first licensed.

Scoring: Members—One point for each non-member worked. Nonmembers—Two points for each QCWA member worked. No multiplier, just add QSO points.

Awards: Top-scoring QCWA member and nonmember will each receive a plaque, on both phone and CW. Certificates to the next 9 top scorers in each category.

Keep separate logs for phone and CW. Log forms are available from W1ZEM (a large SASE please).

QCWA membership eligibility: presently holding an amateur call, and have been licensed for 25 or more years. (Not necessary to have been licensed the entire 25 years.)

The following QCWA certificates are available: worked 50 states (1 member in each state), worked 60 chapters (1 member in each chapter), worked 100 members, and worked 500 members.

You may apply to the Activities Manager by sending a list of contacts, having the QSL cards in your possession, or contacts from the log of the Invitational Party. Indicate for what certificate you are applying on your log. If using QSL cards, have list checked and verified by a club officer or another amateur. Do not send cards.

Party logs must be received no later than October 10th, and go to the QCWA Activity Manager, Onie Woodward, W1ZEN, 14 Emmet Street, Marlboro, MA 01752.

Wash. State QSO Party

0100Z to 0700Z Sat., Sept. 14
1300Z to 0700Z Sat./Sun., Sept. 14-15
1300Z to 0100Z Sun./Mon., Sept. 15-16

This is the 20th annual party sponsored by the Boeing Employees ARS (BEARS). The same station may be worked on each band and mode for QSO and multiplier credit. Wash. stations may work other in-state stations for QSO points.

Exchange: QSO no., RS(T), and QTH. County for Wash.; state, province, or country for others.

Scoring: Phone contacts are worth 2 points,c.w. contacts 3 points.

Wash. stations multiply total QSO points by number of states, VE provinces, and DX countries worked. Others use Wash. counties for their multiplier (maximum of 39). There is an additional multiplier of one (1) for each group of 8 contacts with the same Wash. county for non-Wash. stations.

Frequencies: CW—1805, 3560, 7060, 14060, 21060, 28160. Phone—1815, 3925, 7260, 14280, 21380, 28580. Novice—3725, 7125, 21150, 28160.

Awards: Certificates to the top scorers, both single and multi-operator, in each state, VE province, DX country, and Wash. county. Additional awards where warranted.

The Worked Five Bears Award is available to anyone working 5 club members before, during, or after the party. The Worked Three Cubs Award is available for working 3 Novice club members.

Include a check sheet with your entry if you made 200 or more contacts. Results will be mailed to all entrants, no s.a.s.e. required.

Mailing deadline is October 26th to: Boeing Employees ARS, Contest Committee, Att: Willes D. Propst, K7RS, 18415 38th Ave. S., Seattle, WA 98188.

Scandinavian Activity Contest

C.W.: Sept. 21-22 Phone: Sept. 28-29
1500Z Saturday to 1800Z Sunday

It's the world working the Scandinavians in this the 27th SAC. The same station may be worked on each band for QSO and multiplier credit.

The prefixes used in Scandinavia are: LA, LB, LG, LJ (Norway); JW (Svalbard & Bear Is.); JX (Jan Mayen); OF, OG, OH, OI (Finland); OH0 (Aland Is.); OJ0 (Market Reef); OX (Greenland); OY (Faroe Is.); OZ (Denmark); SJ, SK, SL, SM (Sweden); TF (Iceland).

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

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

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

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

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

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

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

The usual disqualification criteria will be observed. Include a summary sheet and a dupe sheet for logs with more than 200 QSOs, and a signed declaration. Mailing deadline is October 30th to: NRRL Contest Manager, LA9XG, Terje Roghell, Aspv. 14, N-8200, FAUSKE, Norway.

North American "Sprint"

CW: Sept. 15 SSB: Sept. 22
Sunday 0000Z to 0395Z (Sat. night)

This is the fall edition of the "Sprint" run by the National Contest Journal. Take note that the starting time has been advanced to an hour earlier, but it remains as a 4 hour "Sprint."

North Americans will be contacting other North American stations as well as stations in other countries, single operator only.

Exchange: Call, QSO no., name, and QTH (state, VE province, or country).

Scoring: Multiply total QSOs by the sum of states, VE provinces, and other North American countries worked for your final score (U.S. and VE not countries; KH6 not a state). There are 8 VE provinces, Maritime and VE2 through VE8.

Frequencies: Three bands only, 3530–3550, 7030–7050, 14030–14050 kHz on CW, and 3870–3910, 7210–7240, 14260–14290 kHz on SSB.

Awards: A trophy to the highest scoring station on each mode. Certificates to the top station in each USA call district, Canada, and other countries. The top 10 scorers, the winning team, and each member of the winning team will also be rewarded.

Team competition is limited to a maximum of 10 operators as a single unit. Pre-contest registration is required for each team at least 24 hours before the start of the "Sprint." W6OAT is the coordinator.

There are other detailed rules, a special QSY rule, etc. I suggest you write to W6OAT or K7GM if you do not have a copy of the National Contest Journal. Entries must be received no later than 30 days after the end of each "Sprint." The CW go to: Rusty Epps, W6OAT, 948-H Kiely Blvd., Santa Clara, CA 95051, and the SSB to: Rick Niswander, K7GM, 1914 W. Cortez Circle, Chandler, AZ 85224.

CRRL CAN-AM Contest

Phone: Sept. 21–22 CW: Sept. 28–29
1800Z Saturday to 1800Z Sunday

This year's CAN-AM Contest is sponsored by the Ontario Contest Club and the Canadian Radio Relay League to increase friendship between American and Canadian amateurs. Use all 6 bands between 1.8 and 28 MHz in the U.S. General portion of each band.

Categories: Single operator, all band, single band, and QRP. And multi-operator, single transmitter.

Single operator stations are limited to 20 hours with one or two rest periods. Multi-operator stations can operate the full 24 hours.

Exchange: RS(T) plus a QSO number starting with 001, and state or province abbreviation (use CN for Caribbean and PC for Pacific U.S. possessions).

Points: U.S. to U.S. and VE to VE QSOs 2 points. U.S. to VE QSOs 3 points.

Multiplier: 50 U.S. states, 2 U.S. possessions (CN & PC), 10 VE provinces, 2 VE territories (NWT & YU), 1 VE island (Sable & St. Paul). Total of 65 per band.

Final Score: Total QSO points times the sum of the multiplier from each band. (Phone and CW are separate contests. However, combined score from phone and CW will be used for overall competition.)

Awards: Certificates to the winners in each multiplier area on each mode in the single operator category, and to the top five multi stations in each country for combined phone/CW scores. There are four trophies for the U.S. and Canadian combined scores to the single and multi-operator champions.

QRP is limited to a maximum of 10 watts input.

The usual disqualification rules will be observed. It is suggested you send for official rules, sample log forms, check sheets, and summary sheets. Include a large SASE (do not glue U.S. stamps to envelope).

Mailing deadline is 30 days from end of the contest to CRRL CAN-AM Contest, Att: VE3BMV, P.O. Box 65, Don Mills, Ont., Canada M3C 2R6.

Maine QSO Party

2300Z Fri. to 2259Z Sun., Sept. 27-29

The Portland A.W.A. is again running this QSO party. The same station may be worked on CW, phone, and RTTY on each band. ME stations may contact other ME stations for QSO credit.

Exchange: RS(T), QSO serial number, and QTH. County for Maine; state, VE province, or country for others.

Scoring: Count 1 point for phone contacts, 3 points if on CW, and 5 points on RTTY. ME stations multipy total by (ME counties + states + provinces + DX countries) worked for their final score.

All others use Maine counties for their multiplier (maximum of 16).

Frequencies: CW—1810, and 60 kHz up from low edge on other bands. Phone—1870, 3930, 7280, 14280, 21380, 28580. RTTY—3610, and 90 kHz up on other bands. Novice—3720, 7120, 21120, and 28120.

Awards: Certificates to the top-scoring stations and a trophy to the highest aggregate ME club score (ME stations indicate club affiliation in their logs).

Applications for the Worked All Maine

Counties award may also be sent to the address below. Mailing deadline for logs is November 1st to Portland A.W.A., P.O. Box 1605, Portland, ME 04104.

G-QRP Club Activity

The G-QRP Club scheduled a series of CW and SSB tests for 1985. Times and frequencies were fully covered in the March issue. The weekend of Sept. 28–29 is a CW activity. The next and last one for 1985 will be another CW, on Dec. 26–Jan. 1.

Address your inquiries about club activities to: Christopher J. Page, G4BUE, "Alamosa" The Paddocks, Upper Beeding, Steyning, West Sussex, BN4 3JW, England.

California QSO Party

1600Z Sat. to 2359Z Sun., Oct. 5–6

This year's party is again being sponsored by The Northern California Contest Club. Operating time is limited to 24 out of the 32-hour contest period for single operator stations. Multi-operators can use the full 32 hours. Off times must be at least 15 minutes long and clearly indicated in the log.

The same station may be worked on each band and each mode, and CA stations may contact other in-state stations for QSO and multiplier credit. CA mobiles may be worked in each county change.

Exchange: QSO no. and QTH. County for CA stations; state, province, or DX country for others.

Scoring: Two points for phone contacts; 3 points if on CW.

The multiplier for CA is the number of states (50) and VE call areas (8) worked. Out-of-state stations use CA counties for their multiplier (maximum of 58).

Frequencies: C.W.—1805 and 50 kHz up from low end of each CW band. Phone—1815, 3850, 7230, 14250, 21300, 28500. Try CW on the half hour, 160 at 0500Z, and 75 at 0700Z.

Awards: None specifically indicated. *(However, I am sure the usual certificates will be awarded to the top scorers in each CA county, each state, VE call area, and DX station. Also plaques to the overall winners.—ed.)*

Indicate each multiplier in your log as it is worked. Include a summary sheet showing the scoring and other information with your entry, and a large SASE for a copy of the results.

Mailing deadline is November 10th to: Alan A. Brubaker, K6XO, 3675 El Grande Drive, San Jose, CA 95132.

Illinois QSO Party

1800Z Sun. to 0100Z Mon., October 7

The Radio Amateur Megacycle Society has changed the dates of this year's party and made other minor modifications. It's a shorty, only 7 hours long.

Stations may be worked once per band and mode, and IL stations can now contact other in-state stations for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for IL stations; state, province, or DX country for others.

Scoring: One point for phone QSOs, 2 points if on CW. IL stations multiply total QSO points by (states + provinces + IL counties + maximum of 5 DX countries) worked for their final score. Others use IL counties for their multiplier (maximum of 102).

Additonal DX can be worked, but for QSO points only. IL mobiles add 200 bonus points to their final score for each county from which 10 or more QSOs were made. All stations earn one extra multiplier for every eight QSOs with the same county.

Frequencies: CW—3550, 7050, 14050. Phone—3890, 7290, 14290. Other bands may also be used.

Awards: Highest score in each state, VE province, and DX country. Also top 10 IL stations and top 5 IL mobiles, and highest club/team aggregate score.

Include a summary sheet with your entry and a dupe sheet for logs with 100 or more contacts.

Mailing deadline is November 1st to: RAMS, Att: Joe Le Kostaj, WB9GOJ, 9134 Ewing Ave., Evanston, IL 60203.

Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

The present sunspot cycle continues to drop rapidly. The Royal Observatory of Belgium reports a monthly mean sunspot number of 27 for May 1985. This results in a smoothed sunspot number of 24 centered on November 1984. A smoothed sunspot number of approximately 17 is forecast for September 1985. The present cycle is now well into its low phase, and the minimum is likely to occur in approximately one year.

September Propagation

Mid-September to mid-October is generally a period of changing propagation conditions on the HF amateur bands. On some days conditions should continue to be much the same as they were earlier in the summer, but on other days the first signs of winter-time conditions should be noticeable. This month's DX Propagation Charts cover the period of variable conditions between September 15 and October 15, rather than the usual two-month span. A Short-Skip Propagation Chart for September and October is also included in this month's column.

Twenty meters should continue to be the best band for DX propagation from mid-September to mid-October. The band should open in almost all directions for a few hours after sunrise, and remain open to several different areas of the world throughout most of the day and into the early evening. Signals might be a bit stronger than they were during July and August, but the band will close an hour or two earlier because of the shorter period of daylight.

A seasonal improvement is expected for DX conditions on *15* meters, but solar activity is so low now that considerably fewer openings are expected compared to the past several years. The best time to check the band is from a few hours before noon through the afternoon hours. The best bet for fairly good openings is towards South America, but openings to Africa and the South Pacific should also be possible.

Solar activity is too low for any real *10* meter DX openings, although some may be possible towards South America and other southern localities during the afternoon hours.

Improved nighttime DX propagation conditions are expected on *40*, *80*, and *160* meters as a result of seasonally *lower* static levels and the increasing hours of darkness. *Forty* should provide the best chances for DX from sunset through the sunrise period. Be sure to also check *80* and *160* meters during the hours of darkness and the sunrise period.

From mid-September through mid-October, for *short-skip* openings less than *250* miles use *80* meters during the day and either *80* or *160* meters at night. For distances between *250* and *750* miles try *40* meters during the day and *80* meters at night. For openings between *750* and *1300* miles the best bet should be *20* meters during the day, *40* meters from sundown to midnight, and *80* meters from midnight to sunrise. For openings beyond *1300* miles, *20* meters should be most reliable during most of the daylight period, with *40* meters optimum during the hours of darkness. Check *15* meters for some good openings beyond 1300 miles during the afternoon hours.

Equinoctial Propagation

It's that time of year again, when the sun is almost directly overhead at the equator. This happens twice a year—in the spring and fall—and is called an equinox.

The fall equinoctial period marks the time that the sun crosses the equator on its apparent travel into southern skies. During this period the hours of daylight and darkness are just about equal in length throughout the world. Sunrise should take place at approximately 6 a.m. local time (7 a.m. daylight) and sunset at about 6 p.m. local time (7 p.m. daylight), no matter where you are in the world.

This results in an ionosphere of almost similar characteristics over large areas of the world, and it is usually the best time of year for long DX openings between the temperate regions of the northern and southern hemispheres on all HF bands. Expect considerably more frequent openings from mid-September through mid-October between the USA and South America, South Pacific, South Asia, and

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for September 1985

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 2, 7, 29	A	A	B	C
High Normal: 1, 3-4, 8, 13, 20-21, 26-27, 30	A	B	C	C-D
Low Normal: 5-6, 9-12, 14, 19, 25, 28	A-B	B-C	C-D	D-E
Below Normal: 15, 17-18, 22, 24	B-C	C-D	D-E	E
Disturbed: 16, 23	C-E	D-E	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between 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 day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on the 1st, excellent (A) on the 2nd, good (B) on the 3rd and 4th, good-to-fair (B-C) on the 5th and 6th, etc.**

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular Meter band (10 through 160 Meters), as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 40 Meters) for a particular geographical region of the continental USA, as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate *daylight* time is used at the *path midpoint*. For example, on a circuit between Maine and Florida, the time shown would be EDT; on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones, *add* 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in CDT zone, and 6 hours in the EDT zone. *Add* 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA, *subtract* 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave 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 10db loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

CQ Short-Skip Propagation Chart
September & October, 1985
Local Daylight Savings Time
At Path Mid-Point

Meter Band	Distance Between Stations (Miles) 50-250	250-750	750-1300	1300-2300
10	Nil	10-21 (0-1)	08-10 (1) 10-15 (1-2) 15-22 (1)	08-10 (1-0) 10-14 (2-0) 14-18 (1) 18-22 1-0)
15	Nil	08-10 (0-1) 10-14 (0-2) 14-22 (0-1)	08-10 (1) 10-14 (2) 14-17 (1-3) 17-18 (1-2) 18-22 (1) 22-00 (0-1)	08-10 (1) 10-14 (2) 14-17 (3) 17-18 (2-1) 18-20 (1) 20-00 (1-0)
20	12-20 (0-1)	08-10 (0-1) 10-12 (0-2) 12-15 (1-4) 15-17 (1-3) 17-20 (1-2) 20-07 (0-1)	08-10 (1-2) 10-12 (2-4) 12-15 (4) 15-17 (3-4) 17-19 (2-4) 19-20 (2-3) 20-21 (1-3) 21-23 (1-2) 23-08 (1)	08-09 (2-1) 09-10 (2) 10-14 (4-2) 14-16 (4-3) 16-19 (4) 19-21 (3) 21-23 (2) 23-01 (1) 01-06 (1-0) 06-08 (1)
40	08-10 (8-2) 10-12 (2-4) 12-16 (3-4) 16-18 (2-3) 18-20 (1-2) 20-22 (0-1)	08-10 (2-3) 10-12 (4-3) 12-16 (4-2) 16-18 (3) 18-20 (2-4) 20-22 (1-4) 22-00 (0-3) 00-03 (0-2) 03-06 (0-1) 06-08 (0-2)	08-10 (3-2) 10-12 (3-1) 12-16 (2-1) 16-18 (3-2) 18-20 (4-3) 20-22 (4) 22-00 (3-4) 00-03 (2-3) 03-06 (1-2) 06-08 (2-4)	08-10 (2-1) 10-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-21 (4-3) 21-00 (4) 00-03 (3-4) 03-06 (2-3) 06-08 (4-2)
80	07-09 (3-4) 09-12 (4) 12-19 (4-3) 19-22 (4) 22-04 (3-4) 04-07 (2-3)	07-09 (4-2) 09-12 (4-1) 12-17 (3-1) 17-19 (3-2) 19-21 (4-3) 21-04 (4) 04-06 (3-4) 06-07 (3)	07-09 (2-1) 09-17 (1-0) 17-19 (2-1) 19-21 (3-2) 21-22 (4-3) 22-04 (4) 04-06 (4-2) 06-07 (3-2)	07-09 (1) 09-17 (0) 17-19 (1) 19-21 (2) 21-22 (3-2) 22-04 (4-3) 04-06 (2) 06-07 (2-1)
160	17-19 (1-0) 19-21 (2-1) 21-06 (4) 06-08 (3-2) 08-10 (2-1) 10-12 (1-0)	18-20 (1-0) 20-21 (1) 21-03 (4-3) 03-06 (3-2) 06-08 (2-1) 08-10 (1-0)	20-21 (1-0) 21-23 (3-1) 23-03 (3) 03-06 (2-1) 06-08 (1)	21-23 (1-0) 23-03 (3-2) 03-06 (1) 06-08 (1-0)

ALASKA
September & October, 1985
Openings Given in GMT

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern States	Nil	21-23 (1)	12-14 (1) 18-21 (1) 21-00 (2) 00-02 (1)	08-12 (1)
Central States	Nil	21-01 (1)	13-15 (1) 19-22 (1) 22-01 (2) 01-03 (1)	08-13 (1)
Western States	Nil	20-21 (1) 21-23 (2) 23-01 (1)	17-18 (1) 18-22 (2) 22-01 (3) 01-03 (2) 03-05 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

#See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.
Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 1300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.
*Indicates best time to liste for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2), or higher.

HAWAII
September & October, 1985
Openings Given In
Hawaiian Standard Time#

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern States	Nil	07-12 (1) 12-15 (2) 15-16 (1)	11-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-19 (1) 03-05 (1) 05-07 (2) 07-08 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-02 (2) 02-03 (1) 19-20 (1)* 20-23 (2)* 23-01 (1)*
Central States	09-13 (1)	07-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1)	05-06 (1) 06-09 (2) 09-13 (1) 13-15 (2) 15-17 (4) 17-18 (2) 18-20 (1)	17-19 (1) 19-21 (2) 21-02 (3) 02-04 (2) 04-05 (1) 19-20 (1)* 20-00 (2)* 00-02 (1)*
Western States	10-15 (1)	07-10 (1) 10-12 (2) 12-15 (3) 15-16 (2) 16-18 (1)	06-07 (1) 07-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-21 (1)	17-18 (1) 18-19 (2) 19-01 (4) 01-03 (3) 03-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-03 (3)* 03-04 (2)* 04-06 (1)*

September 15 - October 15, 1985
Time Zone: EDT (24-Hour Time System)
EASTERN USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe & North Africa	Nil	10-11 (1) 11-15 (2) 15-16 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-21 (2) 21-23 (3) 23-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 20-22 (1)* 22-01 (2)* 01-04 (1)*
Northern Europe & European USSR	Nil	10-13 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-14 (1) 14-16 (2) 16-18 (1)	18-20 (1) 20-04 (2) 04-05 (1) 21-04 (1)*
Eastern Mediter-ranean & Middle East	Nil	10-11 (1) 11-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 22-00 (1)	19-21 (1) 21-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	14-16 (1)	09-11 (1) 11-13 (2) 13-16)3) 16-17 (2) 17-18 (1)	08-10 (1) 13-15)1) 15-16 (2) 16-17 (3) 17-18 (4) 18-20 (3) 20-21 (2) 21-23 (1)	20-23 (1) 23-02 (2) 02-04 (1) 01-03 (1)*
Eastern & Central Africa	Nil	11-13 (1) 13-15 (2) 15-16 (1)	13-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	21-02 (1)
Southern Africa	11-14 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	08-10 (1) 13-15 (1) 15-18 (2) 18-19 (3) 19-20 (2) 20-21 (1) 23-01 (1)	19-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	Nil	09-11 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 19-22 (1)	05-07 (1) 20-23 (1)
Southeast Asia	Nil	10-12 (1) 14-16 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 16-18 (1) 20-22 (1)	06-08 (1)
Far East	Nil	09-11 (1) 18-20 (1)	08-09 (1) 09-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-23 (1)	06-08 (1)
South Pacific & New Zealand	15-18 (1)	11-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-11 (2) 11-14 (1) 16-20 (1) 20-00 (2) 00-04 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-09 (2) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	17-19 (1)	14-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 14-16 (1) 16-18 (2) 18-21 (1) 21-00 (2) 00-02 (1)	02-04 (1) 04-06 (2) 06-07 (3) 07-08 (2) 08-09 (1) 04-05 (1)* 05-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-14 (1) 14-17 (2) 17-18 (1)	09-10 (1) 10-13 (2) 13-15 (3) 15-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (3) 09-10 (4) 10-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (4) 04-06 (3) 06-07 (2) 07-08 (1) 21-23 (1)* 23-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina and Uruguay	14-15 (1) 15-17 (2) 17-18 (1)	09-10 (1) 10-11 (2) 11-14 (1) 14-16 (2) 16-18 (3) 18-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 14-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-21 (3) 21-23 (2) 23-00 (1)	21-00 (1) 00-05 (2) 05-07 (1) 01-06 (1)*
McMurdo Sound, Antarctica	Nil	16-18 (1)	18-20 (1) 20-23 (2) 23-01 (1) 08-09 (1)	00-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*

Time Zones: CDT and MDT
(24-Hour Time System)
CENTRAL USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western & Central Europe & North Africa	Nil	10-14 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-02 (2) 02-03 (1) 21-23 (1)* 23-01 (2)* 01-02 (1)*
Northern Europe & European USSR	Nil	10-13 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-15 (2) 15-17 (1) 21-23 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*

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 (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:
(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days
Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Eastern Mediterranean & Middle East	Nil	10-13 (1)	07-08 (1) 08-09 (2) 09-15 (1) 15-17 (2) 17-18 (1) 21-23 (1)	20-23 (1) 21-23 (1)*
Western Africa	12-14 (1)	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-22 (1)	20-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern & Central Africa	Nil	12-16 (1)	07-09 (1) 13-16 (1) 16-19 (2) 19-20 (1)	21-00 (1)
Southern Africa	11-13 (1)	09-10 (1) 10-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-01 (1) 21-23 (1)*
Central & South Asia	Nil	18-21 (1)	07-08 (1) 08-10 (2) 10-12 (1) 18-21 (1)	06-08 (1) 19-21 (1)
Southeast Asia	Nil	17-19 (1)	07-08 (1) 08-10 (2) 10-13 (1) 18-22 (1)	05-08 (1)
Far East	Nil	15-17 (1) 17-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-13 (1) 17-19 (1) 19-22 (2) 22-00 (1)	03-05 (1) 05-07 (2) 07-09 (1) 06-08 (1)*
South Pacific & New Zealand	14-18 (1)	10-13 (1) 13-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-08 (1) 08-10 (3) 10-12 (2) 12-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-02 (1)	00-01 (1) 01-07 (3) 07-08 (2) 08-09 (1) 02-04 (1)* 04-07 (2)* 07-08 (1)*
Australasia	16-18 (1)	13-16 (1) 16-19 (2) 19-21 (1)	05-07 (1) 07-08 (2) 08-10 (3) 10-13 (2) 13-17 (1) 17-18 (2) 18-20 (1) 20-23 (2) 23-01 (1)	02-03 (1) 03-05 (2) 05-07 (3) 07-08 (2) 08-09 (1) 05-06 (1)* 06-07 (2)* 07-08 (1)*
Caribbean, Central America & Northern Countries of South America	11-13 (1) 13-16 (2) 16-18 (1)	09-10 (1) 10-11 (2) 11-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-01 (3) 01-05 (4) 05-06 (3) 06-07 (2) 07-08 (1) 20-23 (1)* 23-05 (2)* 05-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	14-15 (1) 15-17 (2) 17-18 (1)	09-10 (1) 10-11 (2) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-09 (2) 09-11 (1) 13-16 (1) 16-18 (2) 18-19 (3) 19-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	21-00 (1) 00-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	Nil	16-18 (1)	17-20 (1) 20-23 (2) 23-01 (1) 08-10 (1)	00-03 (1) 03-05 (2) 05-07 (1) 04-06 (1)*

Time Zone: PDT (24-Hour Time System)
WESTERN USA TO:

Reception Area	10 Meters	15 Meters	20 Meters	40/80* Meters
Western Europe & North Africa	Nil	10-12 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-16 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Central & Northern Europe & European USSR	Nil	10-12 (1)	08-09 (1) 09-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-00 (1)
Eastern Mediterranean & Middle East	Nil	10-12 (1)	08-12 (1) 12-14 (2) 14-16 (1) 20-22 (1)	20-23 (1)
Western & Central Africa	12-14 (1)	10-13 (1) 13-15 (2) 15-16 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	21-00 (1)
Eastern Africa	Nil	13-15 (1)	07-09 (1) 13-15 (1) 15-17 (2) 17-19 (1) 21-23 (1)	20-22 (1)
Southern Africa	Nil	11-15 (1)	07-09 (1) 12-14 (1) 14-18 (2) 18-19 (1) 22-00 (1)	19-22 (1)
Central & South Asia	Nil	17-19 (1)	08-09 (1) 09-11 (2) 11-13 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 19-21 (1)
Southeast Asia	Nil	16-19 (1)	07-08 (1) 08-10 (3) 10-11 (2) 11-12 (1) 21-22 (1) 22-00 (2) 00-01 (1)	01-03 (1) 03-06 (2) 06-08 (1) 03-06 (1)*
Far East	Nil	14-16 (1) 16-19 (2) 19-20 (1)	07-08 (1) 08-10 (3) 10-13 (2) 13-20 (1) 20-21 (2) 21-22 (3) 22-23 (2) 23-01 (1)	01-03 (1) 03-08 (2) 08-09 (1) 03-07 (1)*
South Pacific & New Zealand	13-15 (1) 15-17 (2) 17-18 (1)	11-15 (1) 15-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	14-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-01 (2) 01-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-14 (1)	21-22 (1) 22-23 (2) 23-00 (3) 00-05 (4) 05-07 (3) 07-08 (2) 08-09 (1) 23-02 (1)* 02-06 (2)* 06-07 (1)*
Australasia	15-17 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	17-19 (1) 19-20 (2) 20-00 (3) 00-03 (2) 03-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-13 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-13 (1) 13-15 (2) 15-17 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	07-08 (1) 08-09 (2) 09-10 (3) 10-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-23 (2) 23-00 (1)	19-21 (1) 21-02 (3) 02-04 (2) 04-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina, & Uruguay	13-14 (1) 14-16 (2) 16-17 (1)	09-10 (1) 10-11 (2) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	08-10 (1) 13-15 (1) 15-17 (2) 17-20 (4) 20-21 (3) 21-22 (2) 22-00 (1)	21-23 (1) 23-02 (2) 02-04 (1) 00-03 (1)*
McMurdo Sound, Antarctica	Nil	16-19 (1)	07-10 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-00 (2) 00-01 (1)	01-03 (1) 03-05 (2) 05-07 (1) 03-06 (1)*

southern Africa, particularly on *20* meters for a few hours after sunrise and again during the sunset period.

Long-path openings also improve considerably during the equinoctial period. In western states look for long-path openings to Europe and Africa on *20* meters shortly after sunrise and again during the early evening. Stations in eastern states can expect some long-path openings to the South Pacific during the later afternoon and early evening, and to parts of eastern Africa and Asia just after sunrise. Long-path openings should also be possible on *40* meters, and at times on *80* meters, for an hour or so *before* sunrise and just *before* sunset.

VHF Ionospheric Openings

Although summertime sporadic-*E* ionization is expected to fall off considerably during September and early October, an occasional *6* meter short-skip opening may still be possible over distances ranging between approximately 1000 and 1300 miles. The best time to check is before noon and during the early evening.

There is usually an *increase* in auroral activity during an equinoctial period, so look for some fairly frequent *6* and *2* meter auroral-type openings. The best times for such openings are when conditions on the HF bands are Below Normal or Disturbed. Check the Last Minute Forecast at the beginning of this column for those days likely to be in these categories during September.

No major meteor showers are expected during September, so few, if any, meteor-scatter-type openings are likely on the VHF bands this month.

CQ DX Contest Special

This year's *CQ* World-Wide DX Contest will be held on the following dates:

October 26–27 Phone Section
November 23–24 CW Section

As for the past 35 years, next month's Propagation column will be devoted to a special, comprehensive forecast which will focus on both sections of the contest.

73, George, W3ASK

VHF

a monthly feature by
STEVE KATZ, WB2WIK

PRINCIPLES, PRACTICES, AND PROJECTS FOR THE VHFER

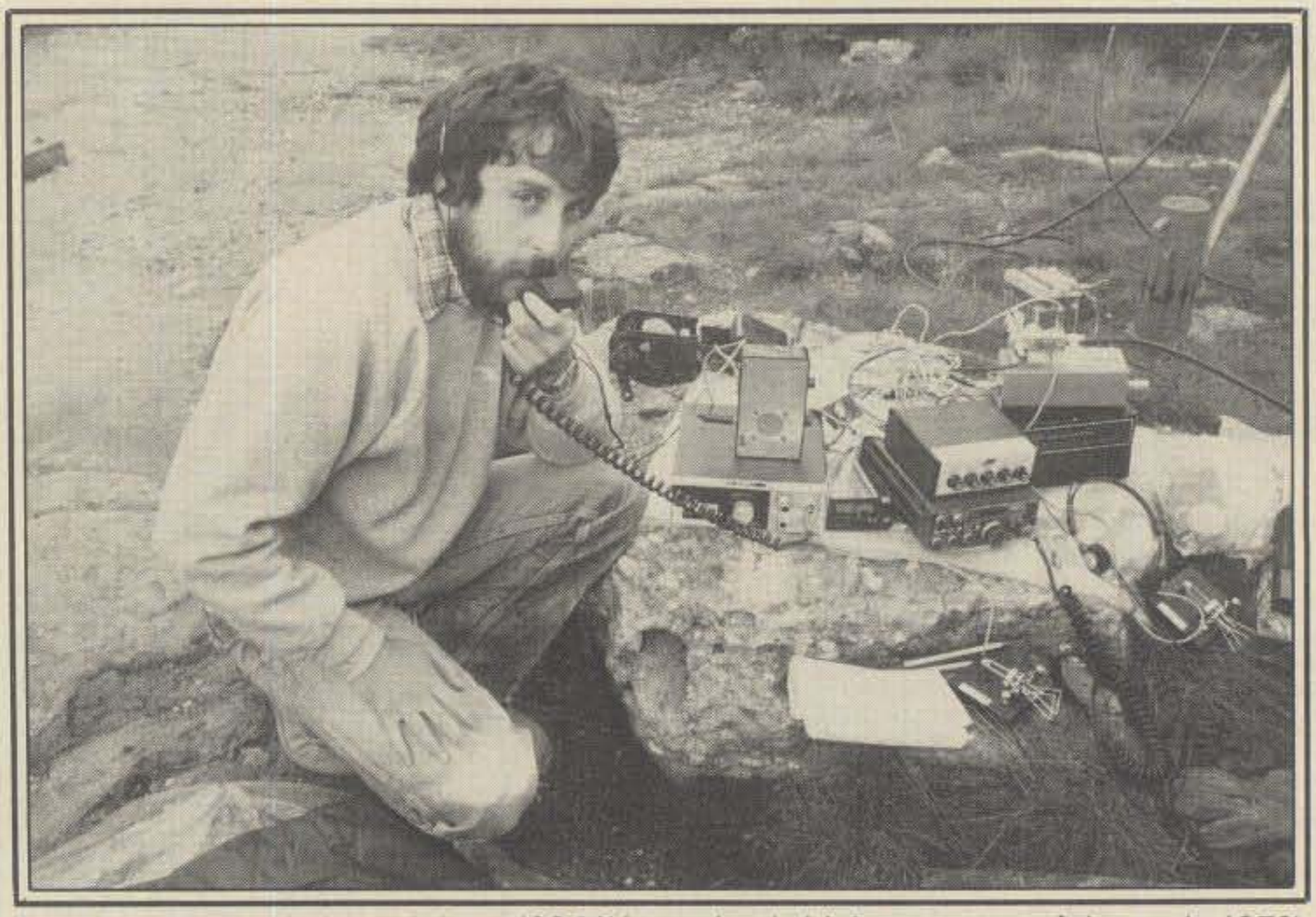
What Price Glory?

You don't have to be crazy to backpack three miles up a mountain with complete stations for 432 and 1296 MHz, but it does help.

Having hiked up Slide Mountain, the highest peak in the New York Catskills (FN22, el. 4204 feet), on a cool and calm day last October, Pete, KT2B, and I decided we should try it sometime during a VHF or UHF contest to see what could be worked with simple solid-state battery-powered gear from that fabulous site. We spoke about it often during the winter season, and finally decided the ARRL June VHF QSO Party would be an ideal time to give the mountain a go. The weather would be warm, conditions were likely to be good, and half of Slide Mountain is in a rather rare grid square, FN22. (It should be mentioned that the *other* half the mountain is in more populated FN21, and the hill's summit is almost exactly on the grid-square border, so we would have to be careful where we set up.) Besides, we were saving the new *CQ* VHF WPX Contest in July for a multi-op effort from our home state of New Jersey.

The question was, how to get there? The nearest paved road—or auto road of any kind, for that matter—is miles from the summit and about 2000 feet below it. The trails up Slide Mountain are well-hiked, but impassible for anyone not on foot, pack mule, or mountain goat. There was once a makeshift carriage trail, but that was in grand days of long ago (unfortunately). I suggested to Pete that we charter a helicopter and cable-drop to the summit *a la* James Bond, but we decided discretion really is the better part of valor, and elected to hike up with backpacks containing every imaginable item which might make the trip worthwhile.

In preparation for the June contest, we brought all the gear we intended to backpack up Slide Mountain to a different, more accessible mountaintop QTH for a pre-contest tryout. This preliminary operation took place on Sunday morning, May 26, from Mt. Equinox, Vermont (FN33). The Mt. Equinox site is legendary in these parts, having been used for numerous VHF/UHF contests and experiments since the 1950s, when the toll road to its 3848 foot summit was paved. Our setup there was easy, since we didn't need to backpack any of the gear; Pete's Honda station wagon carried it all, plus us and our wives, nicely.



Here I am, operating our deluxe 432 MHz station (which was state-of-the-art in 1970). My hunched position was, I feared, a permanent condition brought about by the hike.

The exercise at Mt. Equinox was one of our smarter ideas (I won't tell you about all the not very smart ones), as it allowed us the chance to find out that our intended 432 MHz transverter, a Microwave Modules MMT432/144, was a dud. It received well, but only developed 1 watt of output instead of its rated 10 watts. Our meager attempts to repair the unit in the field—we did have a screwdriver, electrical tape, and a crowbar—quickly ap-

Here's Pete, KT2B, inspecting the innards of the 70 cm transverter which failed us during our Mt. Equinox expedition. Even under these most ideal working conditions, we couldn't seem to find the problem.

*24 Louis Dr., Budd Lake, NJ 07828

Yours truly doing some serious operating from the base of the 20 foot mast we set up at Mt. Equinox, VT, in preparation for the Slide Mountain expedition. The funny-looking towers in the background are part of an FAA installation (VOR for Logan Airport, Boston, 130 miles to the southeast).

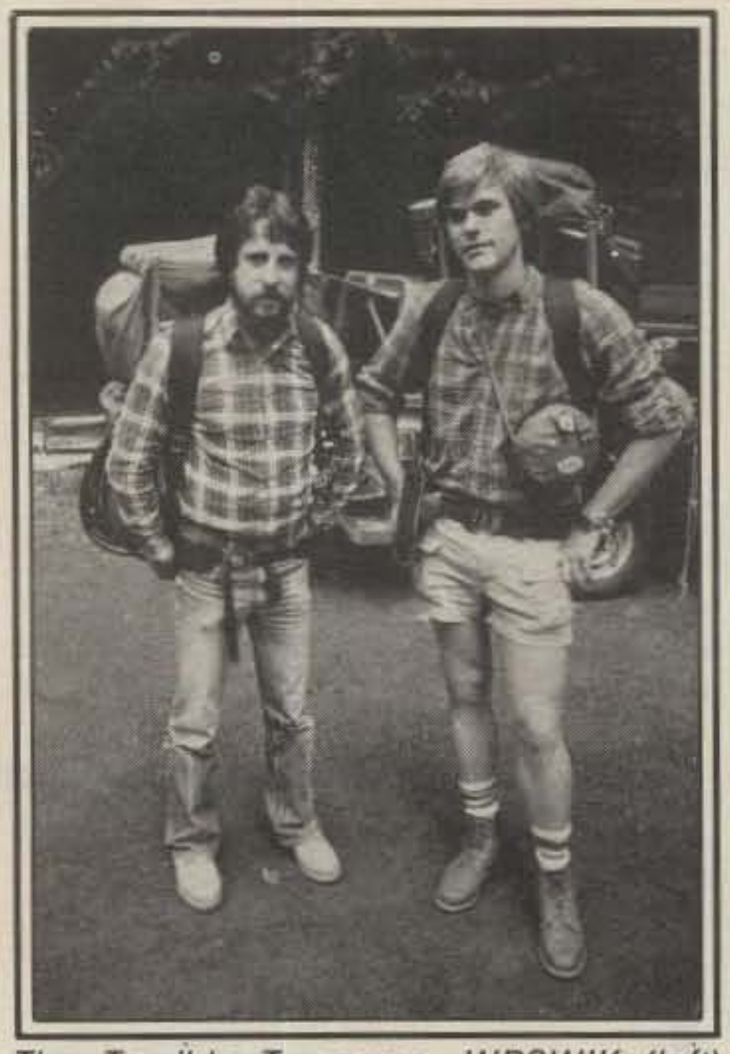
peared hopeless, so we had to settle for a watt of power to our little 21-element F9FT Yagi at 20 feet. Despite our mighty 40 watts ERP (effective radiated power), we did manage to make several contacts "back home" in New Jersey, about 200 miles away, on 70 cm. Being up nearly 400 feet probably helped.

WE also brought along some 23 cm equipment, a Microwave Modules MMT 1296/144, and SSB Electronics 10 watt solid-state power amp, and that setup worked flawlessly, developing about 7.5 watts out while powered by a small 14 AH motorcycle battery. Our poor little 23-element F9FT Yagi for 1296 was surrounded by so much dense water vapor, the price one sometimes pays for setting up operations amidst the clouds, that it wasn't performing up to par. However, we could hear K2LNS in central New Jersey, 200 miles away, a solid S5 or so. We were ready.

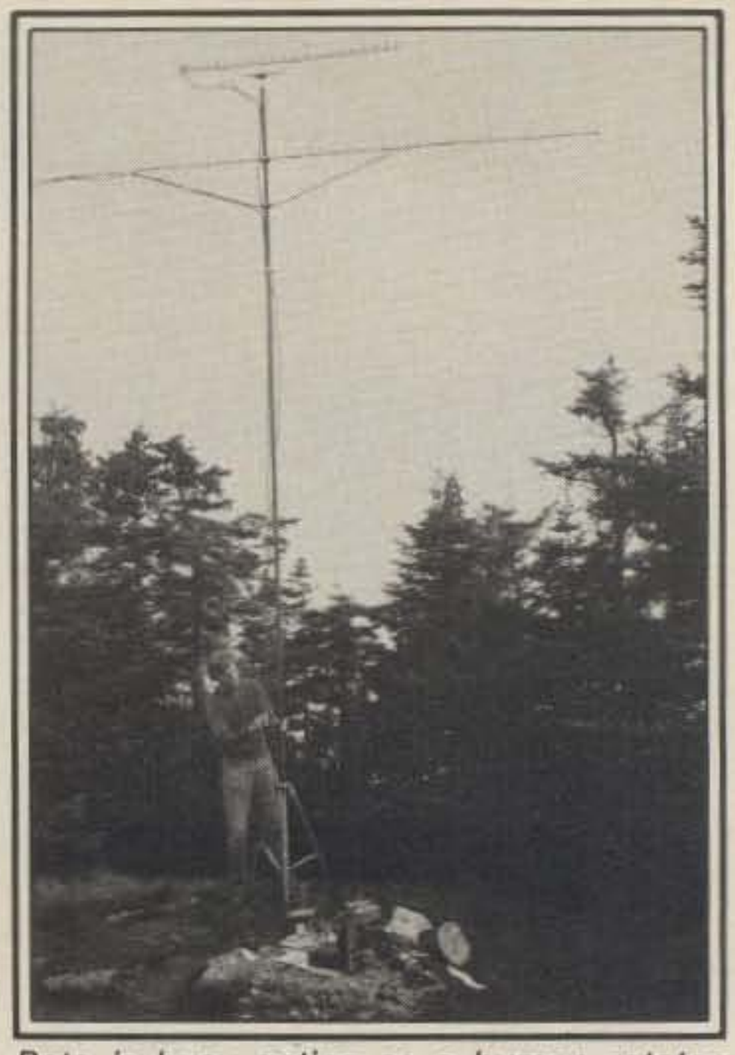
Returning home, we had less than two weeks to fully repair the 432 transverter or find alternate portable equipment. Pete investigated the "module" to find about half the PA (power amplifier) components blown out. Why this was so remains a mystery, as we didn't do anything wrong (that we know of), and this unit *did* work. Oh, well. No time to mess around with a questionable rig. We had to find something else with a 144 MHz IF. Pete drove to The VHF Shop in Mountaintop, Pennsylvania and purchased a new 432 transverter with a 2 meter IF and a small companion solid-state amp in kit form. He got this all working pretty quickly, and I recommend he run the transmit section key-down at full power for a few hours to "burn it in" and reveal any potential weakness. The new rig failed the test. Now what?

Looking around my home shack, I stumbled across an old Echo 70 transceiver for 432. This rig, made in Japan by FDK (or somebody) back in the 1970s, was't exactly state-of-the-art, but it did develop 10 watts output, work SSB/CW, and had been very reliable over the years. Problem was, the Echo's receiver section was pretty poor (as I remembered it, not having listened to it in years), lacking in both sensitivity and adequate AGC to prevent earphone popping. It was Thursday, just two days before the June contest. Oh, what the heck. I tore the old Echo 70 apart and installed an MGF1400 preamp in its receiver section, ahead of the helical resonators, and designed a single-IC AGC circuit—using a 40 dB differential amplifier with a lot of negative feedback—for installation before the audio driver stage. The preamp and the AGC stage barely fit in the tiny cabinet, but I crammed it all in and evaluated the results. Eureka! The receiver sensitivity appeared to be fine, as it was hearing airport radar all across the band (my normal test), and the AGC worked. Just in time.

Pete and I had intended to spend the evening before the contest's start at a country house owned by his family and located in New York state about 90 minutes from the base of the mountain, but at the last minute we decided against this and each enjoyed a good night's sleep at home on Friday. Saturday morning, June 8, was dreary, drizzly, and cool in New Jersey, and we didn't expect it to be



The Terrible Twosome, WB2WIK (left) and KT2B (right), nearly loaded up and ready to head for the trail. I'm the one with the pained expression. Posing for this photo made me so tired, I was ready for our first break.



Pete is busy acting as a human rotator while I'm operating, taking pictures, and chasing away porcupines. Our very elaborate radio installation is located on the rock near the antenna tripod. It all worked. Really.

much better in the Catskill Forest Preserve of New York. It wasn't. When we arrived at the base of the mountain at about 1:30 pm, it was raining lightly. We asked a few hikers who had just descended the mountain how the weather was at the top. They offered encouraging comments. It wasn't clear, but it wasn't raining, either. That was good enough for us. On with the backpacks, and up the trail!

We loaded our backpacks at the base of the mountain. Mine contained a 14 AH motorcycle battery, a 2¼ TLR camera, the 1296 MHz Microwave Modules transverter (a two-chassis affair), electronic keyer and Bencher paddle, 100 feet of nylon rope, tent stakes, headphones, microphone, lantern battery, flashlight, insect repellent, water purification tablets, first-aid kit, eight sandwiches, some "trail mix," a Thermos of hot chicken soup, a two-quart canteen, a Nikon SLR camera, dry clothes, and other sundries. Bundled to this pack with stretch cords was a 3 foot steel antenna tripod, a down-filled sleeping bag, and two 30 foot lengths of low-loss coaxial cable with connectors. My pack was so heavy it almost pulled me to the ground. Pete's pack was heavier, as it contained even more such equipment. I thought this only fair, as Pete is about 6 inches taller and 40 pounds heavier than I am. Pete didn't comment on the equity of it all. He grunted a lot.

In addition to our packframes, which were ungodly heavy, we each carried two 5 foot lengths of heavy-duty aluminum antenna mast weighing about 4 pounds each. We thought these might come in handy as walking sticks, but the masts just turned out to be an additional burden which I could have gladly done without.

A little more than five hours later we arrived at Slide Mountain's summit, much the worse for wear. What was a pleasant 90 minute hike (*sans* backpacks) last October became an agonizing test of physical endurance which we nearly failed at several points. Without going into undue detail, I'll just say that this hike, with such heavy packs as we were carrying, should not even be attempted by anyone in less than terrific condition. It is a severe strain on the legs, back, neck, and cardiovascular system and could probably result in a heart attack for anyone prone to such. My "at rest" pulse rate is 60, and there were times during our hike when I clocked my pulse at 180. Not being a doctor, I'm not certain what, if any, danger lies in this 3:1 increase in heartbeat, but I'll bet it's not healthy for anyone whose primary activity is lifting a coffee cup.

We had antennas up and were on the air by 8 o'clock, about five hours into the contest. The 70 cm band sounded very "alive," with plenty of S9+ signals spread from 432.070 to 432.150 or so. Ironically, our first contest QSO was with K2JWE, from whom we had borrowed the 20 feet of Army-surplus antenna mast. Jerry was *very* strong, about S9 +60 dB, from about 90 miles away. The fellows at W1TKZ/1, operating from Mt. Equinox, Vermont, were also S9 +60 dB from about 120 miles away and reported lousy band conditions. I laughed and said, "The band sounds open here." Pete called a

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CQ on 1296 and had multiple replies, which really shocked him. He had never received an answer to a CQ on 23 cm before, but then he had never operated from a 4200 foot mountain before.

Our setup was *very* modest. We set the base of our antenna tripod on a rock which represented the very highest point in all the Catskills. Therefore, our 1296 antenna was 4224 feet above sea level, and about 10 feet above the little evergreen trees which populate the mountain's peak. By midnight we had about worked the two UHF bands dry, so we laid back in our sleeping bags to enjoy the beautiful, starry sky. It was *cold* up there, I'd guess about 40 degrees or so, and our last hour of operating was done from inside our sleeping bags. We had no other shelter or protection, as "camping" at the summit is strictly prohibited. Thankfully, while it was cold, we were dry and reasonably comfortable. Our equipment, what little there was, rested on a large rock, while we sat or lay beside and just below the rigs. It wasn't so bad, except for the porcupines. Porcupines? Yes, they were on the mountain with us, and as we had invaded their natural habitat, they insisted on eating everything in sight (backpacks, sleeping bags, flashlights, rocks, etc.) and making loud grunting noises to let us know they were there. Pete made a sport of chasing them around at about 3 o'clock am. I'm not sure who was more comic, the procupines or Pete.

We found out that while we were making this ridiculous hike, 6 meters was wide open with E-skip to everywhere, which meant that all the "single ops" were on 6 throughout the day. Thus, many devoted all Saturday night to working 2 meters, where they had accumulated few contacts during the first several hours. This, plus the sad fact that Pete and I found ourselves above the cloud layer surrounding Slide Mountain, might explain why we didn't make hundreds of contacts on 70 and 23 cm in the 6 or 7 hours we spent operating. We did hear several "grids" which we just couldn't work, even after lots of trying, because of our low power. K2UOP/4 and K3HZO were in two grids we needed, and I spent much of Sunday morning listening to these fellows on 432, but I just couldn't seem to attract their attention with my 10 watt transmitter. VE3ONT, only a couple of hundred miles away, was nowhere to be found during the periods we could operate, so we missed them as well. But we did work a lot, in very little time, with our 10 watt rigs on 432 and 1296. And we had to QRT by about 9 am Sunday to pack up everything and make the long descent.

The trip down the mountain wasn't as bad as the one up. It took us less than two hours to hike down with gravity working in our favor. Our backpacks were a bit lighter, as we were carrying less food and water, but they still felt very heavy and we had to stop just once to take a needed rest. All the way down the trail I kept pushing on by visualizing an ice cold beer and cheeseburger waiting for me somewhere down below.

Here's San Hutson, K5YY, in his shack, where 144 and 432 MHz equipment abounds. But what is that Signal One transceiver doing there on the left? Probably a remnant from San's DX'ing days . . .

When all was said and done, we had made about 80 stations very happy to receive our rather rare FN22 exchange. We were so rare on 1296, we couldn't even find one other station to work in our own grid. Was it worth it? If there had been a *big* cash prize, it still wouldn't have been worth the sore shoulders and neck. But we did it; we operated from the top of the highest hill within 200 miles of New York City, one which hadn't been used for a VHF contest in many, many years. And we determined why Slide Mountain isn't used much for radio contesting (groan).

Will we do it again? I'd love to, but not carrying the equivalent of a 12-year-old on my back. FN22 is still rare on 1296, and I'd really like to try out the mountain on 6 and 2 meters. Maybe next year.

By the way, I don't know about you, but I *love* these kinds of stories. This one is not as exciting reading as a story about Clipperton Island might be, but tales of adventure relating to VHF/UHF operations will always be welcome here. If you have an interesting experience to relate, by all means, write and let me know! We'll either print it in this column, or help you write a stand-alone article.

News and Views

Frank Cook, W8HBG, writes of his VHF activities from his home in Bucksville, Ohio. Frank runs 160 watts to a pair of 16-element KLM Yagis on separate towers and achieves terrific results, at least partly because of his 1250 feet above sea level QTH. As far as I know, this figure puts Frank at something close to the highest elevation in Ohio. At this writing (mid-June) Frank was looking forward to the first *CQ* VHF WPX Contest and intended to give it a go.

Speaking of highspots, we are pleased to welcome San Hutson, K5YY, of Paris, Arkansas to the *CQ* VHF WPX Contest Committee. San, long known for his DXer status (San is a DXCC "Honor Roll" resident and a member of the *CQ* DX Hall of Fame) has recently become an active VHFer. What took you so long, San?

K5YY has worked 35 states on 144 MHz since January 1983, and 15 states on 432 MHz since September 1984, and has achieved VUCC with 145 "grids" on 2 meters. I've never seen San's QTH, but Paris, Arkansas is in the Ozarks, in very close proximity to Magazine Mountain, the highest point in the state (el. 2753 feet). I wonder if amateur radio played any role in San's choice of a homesite? Dr. Hutson says he became active on 432 because so many folks were asking him to confirm his rare grid square, EM35. I wish more people would consider the grid-chasers in this way!

San writes that he'd like to use "hardline," but cannot because he has a crankup tower. This is a problem for VHFers everywhere, and there aren't any easy remedies. I usually recommend that "crankup" owners run hardline from their rigs to the bases of their towers, then splice to Belden 9913 or some similar low-loss flexible cable to run up the tower and around the rotator to the antennas. If such a splice is made with properly

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installed type N connectors, it should be lossless through 23 cm.

The photo of K5YY's neat shack shows some of his VHF gear: Kenwood TS700A and TS780 transceivers, a GaAsFET preamp for 144 and bipolar preamp for 432, a Mirage D1010 amplifier (110 watts output) for 432, Henry Radio Tempo 2002A and homebrew 3CX800 amplifiers for 144, and ancillary gear of all sorts. San's antennas include a pair of stacked 13-element 2 meter beams at 75 and 86 feet, plus a 16-element 70 cm Yagi at 80 feet. He plans to stack antennas for 70 cm and possibly install a moonbounce system. Maybe some of this will have been done by the time this reaches print. San welcomes skeds for meteor scatter work or anytime.

I'm happy to announce that we now have a W1-area member of our *CQ* VHF WPX Contest Committee, as well: Ed Parsons, K1TR. Ed's been an active VHF contester for years, and was set up with the Birds Hill VHF Society on Mt. Wachusett (a 2002 foot hill in central Massachusetts) for the June VHF QSO Party while KT2B and I were "enjoying" ourselves on Slide Mountain. K1TR is a well-known callsign in VHF/UHF operating events, and I'm certain he'll be organizing some terrific station(s) for the *CQ* World-Wide VHF WPX Contests.

We are very pleased to be working with such respected members of the amateur community and anticipate a long and fruitful relationship with San and Ed, as well as our other committee members.

I've received letters from several readers inquiring about the large 6 meter amplifier pictured on the cover of February 1985 *CQ*. That amp, a 4-1000A for 50 MHz, is described in great detail in the July '85 issue of *73 Magazine*, on pp. 50–55. I had written the construction article more than a year ago, and had sold the manuscript to *73* before starting my relationship with *CQ*. I would have loved to run the article here, of course, but it was too late to do so. My future VHF construction articles will be aimed at publication in *CQ*, and I'm actively seeking good construction articles on VHF/UHF gear from readers. If you have designed and assembled a unique piece of VHF gear and are interested in writing about it, let me know. I'll be glad to help anyone desirous of publishing his efforts.

Jim Walsh, W7LVN, of Eugene, Oregon has written to inform us that Trompeter Electronics, a supplier of special, dedicated "N" connectors for Belden 9913 low-loss coax, has raised their price for these fittings to about $18 each and imposes a minimum 10-piece order. All is not lost, however. According to Jim's letter, Amphenol was developing an appropriate "N" connector for 9913 and would have this on the market, hopefully at a realistic price, shortly. My attempts to follow up on this story have been rather futile. I've been in touch with the Amphenol division (in Danbury, Connecticut) which manufactures coaxial connectors and determined they have, indeed, designed a 9913-dedicated type-N male fitting, Amphenol part number 82-101-1006. Unfortunately, this, too, is a "special order" item with 8–12 weeks lead time required for delivery, and Amphenol will not sell directly to the public. An Amphenol customer-service agent obligingly gave me the names of several local franchised distributors who could take my order for the new connectors, but all my local distributors had no listing for the 82-101-1006. They each took my name and telephone number and promised to get right back to me with a price quote for the special connectors; that was two days ago and I'm still waiting.

Speaking of connectors, I'm amazed at how many VHFers are using plain, old "UHF" (PL-259) fittings on their cables. Not that the "UHF" design is so bad, but some of the connectors on the market are of such inferior quality that they can degrade system performance at frequencies as low as 144 MHz. I *strongly* recommend to anyone who insists on using "UHF" fittings that he use only the silver-plated Teflon-dielectric type, like Amphenol part number 83-822. These special PL-259 type connectors are easier to install, last longer, and handle more power—especially at VHF—than their stan-

dard, commercial counterparts. Properly installed 83-822 fittings are essentially lossless at 220 MHz and perform well at 432 MHz. I wouldn't recommend any sort of "UHF" connector be used at 1296 MHz or above. The advantages of the 83-822 include a silver-plated housing which accepts solder much more readily than the "Astroplate" (bright nickel finish) housing, and a Teflon insulator which withstands severe heat (such as might be applied during installation) and high voltages better than the standard phenolic material. I've "blown out" standard (phenolic dielectric) "UHF" fittings with high power at VHF, but I've never been able to damage the Teflon variety at any power level.

How can you tell if you have a "blown" coaxial connector? By visual inspection, or by measuring its insulation resistance. An RF connector the insulation of which has been damaged by overvoltage will often look and smell a bit carbonized (like a burned-out carbon resistor), and will sometimes show small cracks in the dielectric. Usually, a connector so damaged will also exhibit measurable leakage resistance (use a very high resistance scale on your DC ohmmeter). When in doubt, change the connector! And when you change the connector, use the Teflon type, and follow proper installation procedure. I've seen all too many field-failures of coaxial cables caused by improper connector installation.

While the design and internal tolerances of a type "N" fitting are such that incorrect installation is nearly impossible, there are dozens of ways one may install a "UHF" fitting. All are incorrect, but one. At HF (3–30 MHz), a poorly installed coaxial connector will work as well as a proper one, unless it falls off or shorts out entirely. At VHF/UHF this isn't the case. This connector installation procedure has been described numerous times in every radio-related publication, so I'll only add a few comments on the subject.

1. When using foamed polyethylene (soft, white, cellular material) dielectric coaxial cables, do **not** solder-tin the braid as part of the preparation for connector attachment. This type cable cannot withstand soldering heat for any length of time. Leave the bare copper braid exposed for rapid soldering through the holes in the "UHF" connector body.

2. When using foamed polyethylene dielectric cables, you'll find that you might need to reduce the diameter of the center conductor to fit the center pin of the "UHF" connector. With solid-conductor cables (Times FM-8, Belden 9913), use a small file and carefully trim the conductor, using caution to maintain its roundness. With stranded-conductor cables, snip off one or two strands at a time until the overall conductor diameter will fit the connector center pin. Don't remove more strands than necessary, and be careful to remove them completely, right down to the dielectric material.

3. Trim the cable end so that the outer braid completely covers the dielectric material, but be sure that not a single strand of braid is long enough to extend beyond the end of the dielectric. In other words, the braid should be cut off exactly "flush" with the end of the dielectric. There is a slight danger to this, in that a slight miscalculation can result in a short-circuit between the braid and center conductor. Be carcful.

4. Trim the cable's outer jacket material only as far as necessary to expose enough braid for soldering through the connector body holes. Do **not** remove more jacket material than is necessary to accomplish this task.

5. When affixing the connector body to the prepared cable end, "sight" down the center pin hole to assure that no center conductor strands are misaligned and could potentially short to the connector body or cable braid. Insert the cable into the connector slowly and carefully, with a gentle clockwise twisting motion. Do **not** twist the connector back and forth on the cable; instead, "screw on" the connector, as if threading a nut on a bolt.

6. If the cable end was prepared properly, the connector should "seat" when the dielectric presses against an internal ridge of the connector body. At this point, a bit of the cable's center conductor should extend from the end of the connector center pin, and the cable's outer conductor braid should be visible through all four solder holes in the connector body. Also, the cable's outer jacket should be fully inside the connector body (no braid should be exposed beyond the back end of the connector). If the outer jacket is not fully inside the connector body, the connector is not threaded onto the cable properly, and the installation will lack strength. Try again.

7. Solder the center conductor to its pin, using only as much heat as necessary for the solder to flow smoothly. Rather than apply a small soldering iron (25 watt) to the pin for a long time, it's far better to use a large iron (150 watt) for just a few seconds.

8. Now test the connector for shorts before soldering the braid. Clip your ohmmeter leads to the connector pin and body, and wiggle the cable back and forth a bit while observing the meter for evidence of intermittent short-circuits. If the meter flickers at all, unsolder the center conductor and start again.

9. If all is well, solder the braid through all four solder holes in the connector body. Again, it's better to use a large, powerful iron for a very short time than to use a smaller iron for a longer period. If you used a "UHF" connector with a silver-plated body (such as the Amphenol 83-822 discussed earlier), solder should flow very quickly between the connector and braid; a good, secure connection will result in just a couple of seconds.

10. Allow a few minutes for the connector and cable end to cool to room temperature before disturbing them. Have a beer. When the connector is cool enough to handle comfortably, recheck the installation for possible short circuits with an ohmmeter (as in step #8).

Oh, yes. It is important to slide the outer portion of the "UHF" connector over the cable **before** starting all this. Haven't we all been caught by Murphy on this one?

I find that following these simple steps results in a well-installed connector capable of excellent VHF performance about 99% of the time. After installing a few dozen connectors in one sitting, though, you can get pretty tipsy if you follow all of step #10 each time.

Next month we'll feature another interview, and have the results of my GaAsFET preamplifier evaluation suggested in the August column. September is a great month for tropo, and we had some amazing ducting here on the east coast at this time last year, so keep active!

73, Steve, WB2WIK

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WANTED: ARRL; Antenna Manuals Vol. 1 to 5, Hints & Kinks Vol. 1 to 6 & 8, Handbook 1945. State price. Hank Schultz, KA3GXP, 610 Young Road, Apt. 1, Erie, PA 16509-3151.

WANTED: Coaxial transfer type switches and relays w/'N' connectors, AN/URA-17A support brackets, and ICOM SP-2 speaker. C.T. Huth, 130 Hunter St., Tiffin, OH 44883.

WANTED: Sencore VA-48 TV analyzer, microwave oven leakage tester, 10J107 color TV test jig kit. Clarence Wilken, 40 N. Bailey, Freeport, IL 61032, (815-938-2221).

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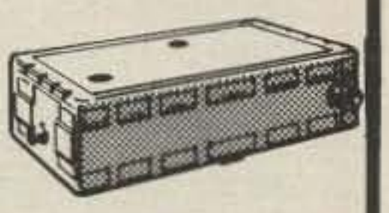

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SSB (PBT) XTAL	FL-30	9011.5	2.3
FM Filter	9M15A	9011.5	15 (-3dB)
SSB Narrow (Hygrade Crystal)	FL-44A	455	2.4
OPTIONAL FILTERS			
CW Narrow	FL-52A	455	0.500
CW Narrow	FL-53A	455	0.250
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